Catalogue

2009

Susol

Super Solution

Low voltage circuit breakers

LS Industrial Systems

www.lsis.biz

The Challenges and Growth achieved by LG
will continue with New Will of LS Industrial Systems.

New Name for LG Industrial Systems,
New Take-off for LS Industrial Systems

LS Industrial Systems

To advance to the next level,
LG Industrial Systems is reborn as LS Industrial Systems.
LS Industrial Systems will continue to lead the future
of industrial electrics and automation by providing
Total Solution, a core essential
for competition in the 21st century industrial era.

A brief company chronology

2000'S

Mar. 2005 | Official Declaration of NEW Corporate Identification (LS)

Feb. 2004 | Signed investment agreement to build electricity/automation equipment factory in Usi City, Jangssu Province, China

Jan. 2004 | Opening U.A.E branch office

Dec. 2001 | Established trading company in Shanghai, China

Jun. 2001 | Unveiled a New Vision including Mid- and Long-Term Strategies

Sept. 2000 | Completion of Power Testing & Technology Institute

1990'S

Dec. 1999 | Transfer of building equipment business to LG-OTIS

Nov. 1999 | Completion of electricity power plant in Vietnam

Jun. 1997 | Established joint venture in Vietnam

Sept. 1995 | LG Industrial Systems Co., Ltd. Goldstar Instrument & Electric Co., Ltd. and Goldstar Electric Machinery Co., Ltd. merged into one company.

July. 1994 | Completion of Dae-Ryun factory in China

1980'S~ 1970'S

July. 1984 | LG Industrial Systems Co., Ltd. opened to public

July. 1974 | Established LG Industrial Systems Co., Ltd.

1960'S~ 1950'S

1958 ~1973 | **LGIS laid foundations for the Electric Power Industry**

After Goldstar Co. was established in 1958, we started to produce WHM (Watt Hour Meter) units for the first time in Korea in 1964. We then proceeded to lay the foundation for the electric power and electronics industries, which were very important bases for industrial development of Korea.

R&D chronology

Susol circuit breakers

META-MEC MCCB and ELCB
(1996~)

MCB, BK type (1989~)

HiMEC MCCB and ELCB
(1989~1998)

2006 | • Developed Susol series MCCB & Contactor, TOR

2002 | • Developed Meta-MEC 4 pole ELCB and Magnetic Contactor
• Developed UL MCCB up to 600A
• Developed the newest Power Equipment Diagnosis System

2001 | • Developed Meta-MEC series low AF MCCB and obtained KEMA certificate according to IEC60947 and marked CE
• Developed high voltage GIS 362kV, 63kA and 8000A

2000 | • Developed Pro-MEC VCB and obtained international quality standard certificates (IEC 60056 & CESI)

1999 | • Developed Meta-MEC series low AF Contactors & TOR and obtained KEMA certificate according to IEC60947 and marked CE
• Developed Korea's first DPR(Digital Protection Relay)
• Developed Meta-MEC series adjustable type MCCB and obtained CE certificate (IEC60947 & KEMA Mark)

1998 | • Developed Meta-MEC series high AF MCCB & MS and obtained KEMA certificate according to IEC60947 and marked CE
• Developed Digital EMPR and obtained EMPR CE certificate

1997 | • Obtained the CE certificate (IEC 60947, TUV certificate) on MCCB, MS

1996 | • LGIS Cheongju Plant obtained the ISO14001

1995 | • Developed Demand Controller
• Developed high-performance Hi-MEC series MCCB & ELCB

1993 | • Obtained ISO9001
• Obtained ISO9002 for low voltage equipment
• Developed EMPR (Electronic Motor Protection Relay)
• Developed Korea's first GIMAC (Digital Integrated Meter)

1992 | • Developed IMC (Intelligent Motor Controller)

1990 | • Obtained U.S. ANSI Standard for vacuum circuit breakers

1989 | • Developed Korea's first high-performance Hi-MEC series MCCB & ELCB

1986 | • Broke the 10million units barrier in electric equipment
• Commenced the SCADA System Project
• Developed 154kV high-voltage GCB (Gas Circuit Breaker)
• Initiated the high-voltage GIS (Gas Insulated Switchgear) project

1984 | • Obtained LR and KR certification for MCCB

1977 | • Developed Earth Leakage Circuit Breakers

1974 | • Developed Molded Case Circuit Breakers

Super Solution

GOOD DESIGN
산업자원부선정

product
design
award
2007

■ Design for technical strong point: The Susol Design

SuSol Series MCCB is available forworld best breaking capacity up to 150kA, and MS is seal structure for hidden electricity Arc.
SuSol product represents simultaneously simple and complicated design for using cut diamond motive to emphasis on the hardness of industrial product.
And we applied the identity of product image by designing same concept MCCB and MS which is installed to cubicle.

SuSol Series acquire the competitive power through getting the picking up GD product and wining IF Design Award.

For power distribution

- The highest breaking capacity
- Optimum coordination technique (Cascading & discrimination)
- Powerful engineering tools

For protection of motor & its control device

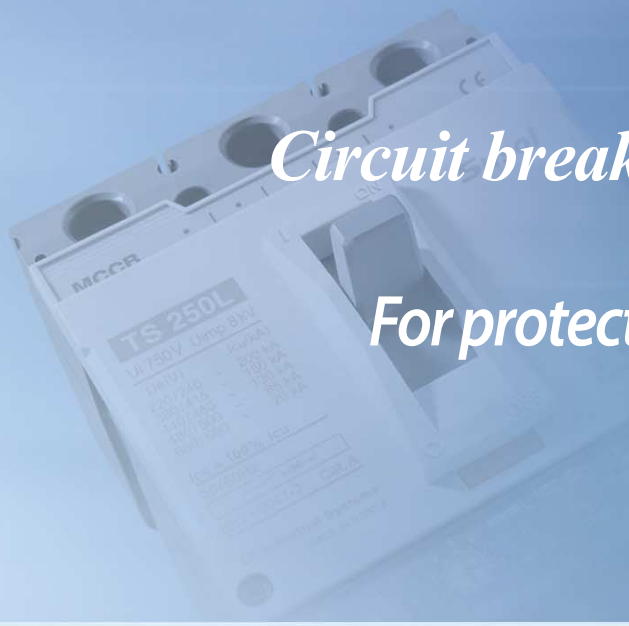
- Optimal overload protection
- Guaranteed type-2 coordination between circuit breaker and contactor, relay

For controlling and disconnecting circuits

For extensive applications

- Wide range of optimized auxiliaries and accessories

Global Leading Products



Circuit breakers

For protection of power distribution

Circuit breakers

For protection of motor &
its control device

Disconnecting switches

For controlling and
disconnecting circuits

Susol TD and TS series

Circuit breakers and Disconnecting switches

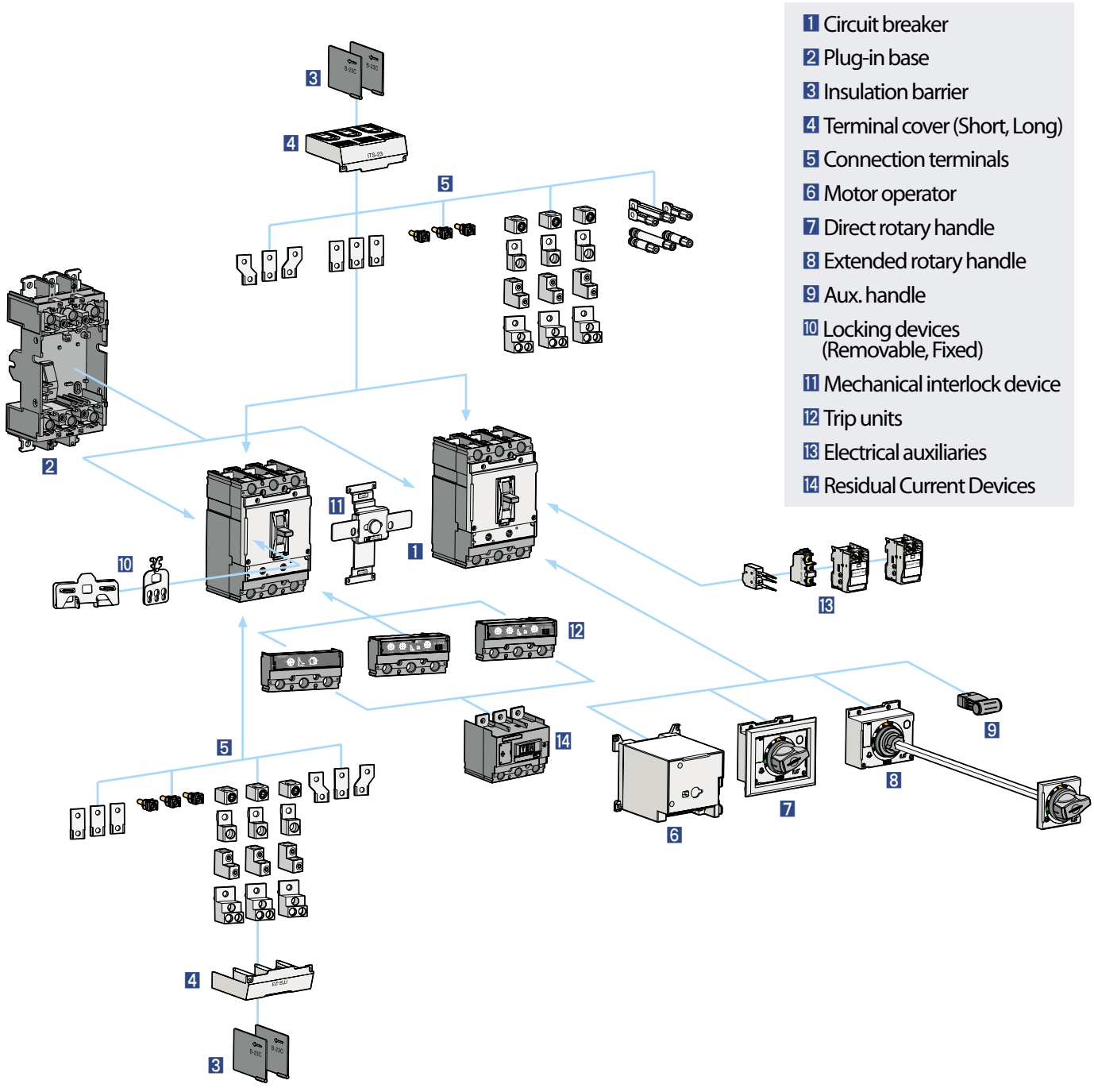
Susol TD and TS circuit breakers provide superior performance in a compact package. They are used in cascade rated systems, allowing the use of lower interruption circuit breakers downstream, which lead to lower system cost.

While meeting IEC60947-2 service and interrupting ratings, these breakers provide unmatched flexibility by employing a wide variety of trip units including fixed thermal & magnetic, adjustable thermal-fixed magnetic, adjustable thermal adjustable magnetic, and electronic options.

Susol TD circuit breaker is available in one frame size in ratings from 16 to 160 amperes and TS circuit breakers are available in three frame sizes in ratings from 40 to 800 amperes and in interrupting capacities up to 150 kA at 415V AC.

Standard calibration is at 40°C with optional 55°C factory calibration available for applications where higher ambient temperatures are encountered.

System overview



Marking and configuration

Susol

Rated frequency

Symbol indicating suitability for isolation as defined by IEC 947-2

Standard

Manufacturer

Utilization category

Marking and configuration

Susol

Model (Rating and breaking capacity)
- TS: Series
- 250: Max. Ampere rating
- N: Normal (Standard)
- H: High
- L: Current limiting

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

	160AF	250AF	630AF	800AF
N - -	TD100N TD160N -	TS100N TS160N TS250N	TS400N TS630N -	TS800N - -
H - -	TD100H TD160H -	TS100H TS160H TS250H	TS400H TS630H -	TS800H - -
L - -	TD100L TD160L -	TS100L TS160L TS250L	TS400L TS630L -	TS800L - -

N	30kA(1P) 50kA	50kA	65kA	65kA
H	50kA(1P) 85kA	85kA	85kA	100kA
L	150kA	150kA	150kA	150kA

Product: Molded Case Circuit Breaker

Upstream connections

Fixing hole

Certificate plate

Indication of closed (I/ON) position

Brand name

Operating handle

Indication of open (O/OFF) position

Company logo

"push to trip" button

Rating of trip unit

Trip unit

Fixing hole

Downstream connections

CB Test certificate by KEMA
- Ref. Certificate No.: NL-9937
- Standard No. IEC60947-2

IEC IECEE CB SCHEME

CB TEST CERTIFICATE

Ref. Certificate No. NL-9937

IEC SYSTEM FOR MUTUAL RECOGNITION OF TEST CERTIFICATES FOR ELECTRICAL EQUIPMENT (IECEE) CB SCHEME

Issued by:	KEMA Quality B.V.	
Registration date:	2005-12-06	
Product:	Moulded case circuit-breakers	
Applicant:	LS INDUSTRIAL SYSTEMS CO., LTD.	Yonse Jaedan Severance Building 84-11, 5ga, Namdaemun-ro Jung-gu Seoul 100-753 Korea, Republic Of
Manufacturer:	LS INDUSTRIAL SYSTEMS CO., LTD.	Yonse Jaedan Severance Building 84-11, 5ga, Namdaemun-ro Jung-gu Seoul 100-753 Korea, Republic Of
Factory:	LS INDUSTRIAL SYSTEMS CO., LTD.	Cheongju Plant #1, Songjung-dong Hungduk-gu Cheongju 361-720 Korea, Republic Of
Rating and principal characteristics:	See first pages of the Test Reports	
Trade mark (if any):	LS	
Model/Type reference:	TD100, TD160, TS100, TS160, TS250, TS400, TS630, TS800, TS100, TS160, TS250 ETS, TS400, TS630,TS800 ETS & ETM all circuit-breakers version E, N, S, H, P and L	
Additional information:		
Sample of product tested to be in conformity with IEC:	60947-2(ed.3)	
Test Report Ref. No:	2086029.50-56	

This CB Test Certificate is issued by the National Certification Body:

KEMA Quality B.V.
Utrechtseweg 310
P.O. Box 5185
6802 ED Arnhem
The Netherlands

KEMA

Signed by: H.L. Schendstok

Date of issue: 2005-12-06

1/1

Trip units

Susol

On TS100 to TS800 circuit breakers, the thermal-magnetic and electronic trip units are interchangeable and may be rapidly fitted to the circuit breakers.
It is therefore easy to change the protection of a given circuit following a modification in an installation. On TS400 and 630 circuit breakers, the electronic trip units are interchangeable plug-in modules. Trip unit ETM offers a large number of protection settings.

Each Trip devices has different types of protection depending on the associated trip unit:

- Standard protection
- Protection of networks supplied by line distribution
- Protection of long cables
- Protection of DC networks
- Protection of motor-starters
- Service connection circuit breaker (for special subscriber contracts)

Susol TD100, TD160 circuit breakers may be equipped with either FTU or FMU.
The trip units are not interchangeable types and can be supplied only after fixed with circuit breakers.

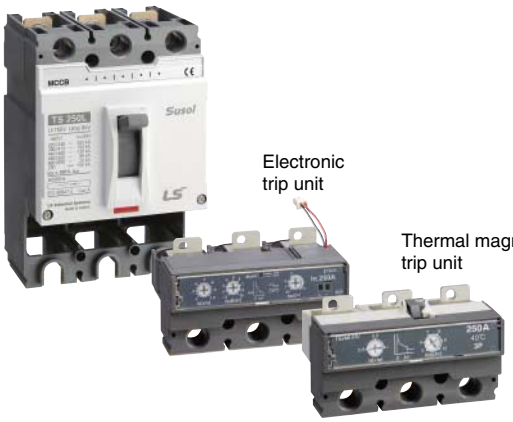
Ampere ratings

MCCB frame type	Type of trip unit	Rated current, In [A]						
		Thermal magnetic release				Electronic release		DSU
		FTU	FMU	ATU	MTU	ETS	ETM	
TD100	Built in unit	16, 20, 25, 32, 40, 50, 63, 80, 100	16, 20, 25, 32, 40, 50, 63, 80, 100	-	-	-	-	-
TD160		100, 125, 160	100, 125, 160	-	-	-	-	160
TS100	Inter changeable trip unit	40, 50, 63, 80, 100	40, 50, 63, 80, 100	-	1.6, 3.2, 6.3, 12, 20, 32, 50, 63, 100	40, 80	-	100
TS160		100, 125, 160	100, 125, 160	100, 125, 160	32, 50, 63, 100, 160	40, 80, 160	-	160
TS250		125, 160, 200, 250	125, 160, 200, 250	125, 160, 200, 250	100, 160, 220	40, 80, 160, 250	-	250
TS400		300, 400	300, 400	300, 400	320	160, 250, 400	160, 250, 400	400
TS630		500, 630	500, 630	500, 630	500	160, 250, 400, 630	160, 250, 400, 630	630
TS800		700, 800	800	800	630	630, 800	630, 800	800

Types of trip units

FTU	• Fixed thermal, Fixed magnetic
FMU	• Adjustable thermal, Fixed magnetic
ATU	• Adjustable thermal, Adjustable magnetic
MTU	• Magnetic only
ETS	• Electronic (LSI)
ETM	• Electronic (LSIG, Ammeter, Communication, Zone selective interlocking)
DSU	• Disconnecting switch

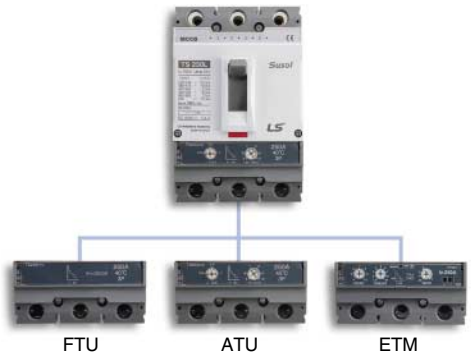
Trip units



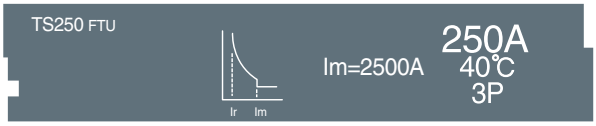
Trip unit identification

TS250 FMU

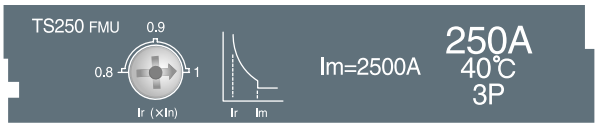
- TS250 — MCCB frame type
- FMU — Trip unit function



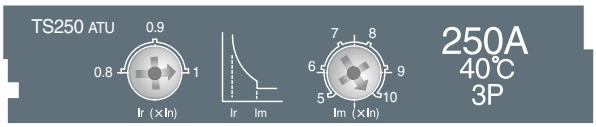
FTU **Fixed-thermal, fixed-magnetic**



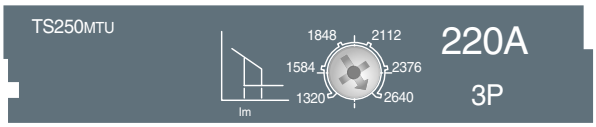
FMU **Adjustable-thermal, fixed-magnetic**



ATU **Adjustable-thermal, adjustable-magnetic**

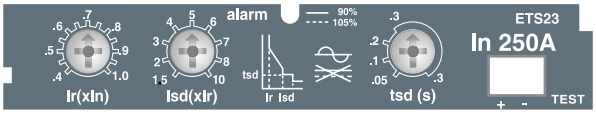


MTU **Magnetic only**

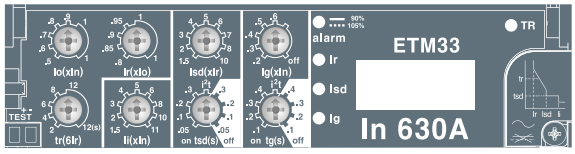


DSU **Disconnecting switch**

ETS **Electronic (LSI)**



ETM **Electronic (LSIG, multi-function unit)**



Electrical characteristics

				TD100			TD160			TS100		
Frame size			[AF]	100			160			100		
Rated current, In ♣			[A]	16, 20, 25, 32, 40, 50, 63, 80, 100			1P: 16, 20, 25, 32, 40, 50, 63, 80, 100, 125, 160 2, 3P: 100, 125, 160			40, 50, 63, 80, 100		
No. of poles				2*, 3, 4			1, 2*, 3, 4			2*, 3, 4		
Rated operational voltage, Ue	AC		[V]	690			240(1P), 690			690		
	DC		[V]	500			250(1P), 500			500		
Rated impulse withstand voltage, Uimp			[kV]	8			8			8		
Rated insulation voltage, Ui			[V]	750			750			750		
Rated ultimate short-circuit breaking capacity, Icu				N	H	L	N	H	L	N	H	L
	AC 50/60Hz	220/240V	[kA]	85	100	200	30(1P) 85	50(1P) 100	200	100	120	200
		380/415V	[kA]	50	85	150	50	85	150	50	85	150
		440/460V	[kA]	50	70	130	50	70	130	50	70	130
		480/500V	[kA]	30	50	65	30	50	65	42	65	85
		660/690V	[kA]	5	8	10	5	8	10	10	15	20
	DC	250V	[kA]	42	65	100	16(1P) 42	25(1P) 65	100	50	85	100
		500V(2poles in series)	[kA]	42	65	100	42	65	100	50	85	100
Rated service breaking capacity, Ics			[%Icu]	100%	100%	100%	100%	100%	100%	100%	100%	100%
Rated short-circuit making capacity Icm												
	AC 50/60Hz	220/240V	[kA]	187	220	440	105(1P) 187	105(1P) 220	440	220	264	440
		380/415V	[kA]	105	187	330	105	187	330	105	187	330
		440/460V	[kA]	105	154	286	105	154	286	105	154	286
		480/500V	[kA]	63	105	143	63	105	143	88	143	187
		660/690V	[kA]	8	14	17	8	14	17	17	30	40
Category of utilization				A			A			A		
Isolation behavior				●			●			●		
Trip unit (release)												
Thermal-Magnetic												
● fixed-thermal, fixed-magnetic			FTU	●			●			●		
● adjustable-thermal, fixed-magnetic			FMU	●			● *****			●		
● adjustable-thermal, adjustable-magnetic			ATU	-			-			-		
● magnetic only			MTU ***	-			-			●		
Electronic												
● LSI			ETS ***	-			-			●		
● LSI			ETM ***	-			-			-		
Option	Earth-fault protection, Ig			-			-			-		
	Zone selective interlocking, ZSI			-			-			-		
	Ammeter			-			-			-		
	Communication			-			-			-		
	Earth-leakage protection module ****			-			-			-		
Connection	fixed	front-connection		●			●			●		
		rear-connection		●			● *****			●		
	plug-in	front-connection		●			● *****			●		
		rear-connection		●			● *****			●		
Mechanical life		[operations]		25000			25000			25000		
Electrical life @ 415 V AC			[operations]	10000			10000			10000		
Basic dimensions, W×H×D (front connection)	1-pole		[mm]	-			35×140×86			-		
	3-pole		[mm]	90×140×86			90×140×86			105×160×86		
	4-pole		[mm]	120×140×86			120×140×86			140×160×86		
Weight (front connection)	1-pole		[kg]	-			0.57			-		
	3-pole		[kg]	1.5			1.5			2		
	4-pole		[kg]	1.8			1.8			2.6		
Reference standard				IEC60947-2			IEC60947-2			IEC60947-2		

♣ Applicable to MCCBs equipped with FTU, FMU, ATU
* 2 pole MCCB in 3pole frame size
** 700A only available for TS800FTU
*** Available for 3pole circuit breakers
**** Under development
***** Not applicable to 1pole

	TS160			TS250			TS400			TS630			TS800		
	160			250			400			630			800		
	(100)※, 125, 160			125, 160, 200, 250			300, 400			500, 630			700**, 800		
	2*, 3, 4			2*, 3, 4			2*, 3, 4			2*, 3, 4			2*, 3, 4		
	690			690			690			690			690		
	500			500			500			500			500		
	8			8			8			8			8		
	750			750			750			750			750		
	N	H	L	N	H	L	N	H	L	N	H	L	N	H	L
	100	120	200	100	120	200	100	120	200	100	120	200	100	120	200
	50	85	150	50	85	150	65	85	150	65	85	150	65	100	150
	50	70	130	50	70	130	65	85	130	65	85	130	65	100	130
	42	65	85	42	65	85	42	65	85	42	65	85	42	85	100
	10	15	20	10	15	20	10	20	35	10	20	35	10	20	35
	50	85	100	50	85	100	50	85	100	50	85	100	50	85	100
	50	85	100	50	85	100	50	85	100	50	85	100	50	85	100
	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	220	264	440	220	264	440	220	264	440	220	264	440	220	264	440
	105	187	330	105	187	330	143	187	330	143	187	330	143	220	330
	105	154	286	105	154	286	143	187	286	143	187	286	143	220	286
	88	143	187	88	143	187	88	143	187	88	143	187	88	187	220
	17	30	40	17	30	40	17	40	74	17	40	74	17	40	74
	A			A			A			A			A		
	●			●			●			●			●		
	●			●			●			●			●		
	●			●			●			●			●		
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	●			●			●			●			●		
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	●			●			●			●			●		
	●			●			●			●			●		
	●			●			●			●			●		
	25000			25000			20000			20000			10000		
	10000			10000			6000			6000			3000		
	-			-			-			-			-		
	105×160×86			105×160×86			140×260×110			140×260×110			210×320×135		
	140×160×86			140×160×86			186.5×260×110			186.5×260×110			280×320×135		
	-			-			-			-			-		
	2			2			5.4			5.4			15.1		
	2.6			2.6			7.2			7.2			19.6		
	IEC60947-2			IEC60947-2			IEC60947-2			IEC60947-2			IEC60947-2		

1. The breakers with electronic trip units are available only at 3-pole version. (Only for AC supply)
※ The trip unit ATU is available from 125A

Thermal magnetic trip units

The new series of Susol TD & TS series molded case circuit breakers can be fitted with thermal magnetic trip units and are used in protection of AC and DC networks with a range of use from 16A to 800A. There are two kinds of trip units according to way of installation as follows.

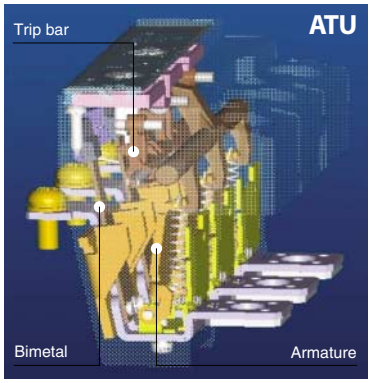
- Built-in trip units for TD series upto 160A
- Interchangeable trip units for TS series upto 800A

Function

Protection of power distribution

- Overload protection: Thermal protection with a fixed or adjustable threshold
- Short-circuit protection: Magnetic protection with a fixed or adjustable pick-up
- Protection of the fourth pole
  4P3T type (neutral unprotected)
  4P4T type 50% (neutral protection at 0.5 × In)
  4P4T type 100% (neutral protection at 1 × In)

Operation



Thermal magnetic types

- Time-Delay operation
  An overcurrent heats and warps the bimetal to actuate the trip bar by the bimetal characteristic.
- Instantaneous operation
  If the overcurrent is excessive, the armature is attracted and the trip bar actuated by electromagnetic force.

Ratings

Ratings(A)		Thermal magnetic trip units(FTU/FMU/ATU) TD100 to TS800																	
at 40℃	In	16	20	25	32	40	50	63	80	100	125	160	200	250	300	400	500	630	800
TD100		●	●	●	●	●	●	●	●	●	-	-	-	-	-	-	-	-	-
TD160		-	-	-	-	-	-	-	-	●	●	●	-	-	-	-	-	-	-
TS100		-	-	-	-	●	●	●	●	●	-	-	-	-	-	-	-	-	-
TS160		-	-	-	-	-	-	-	-	●	●	●	-	-	-	-	-	-	-
TS250		-	-	-	-	-	-	-	-	-	●	●	●	●	-	-	-	-	-
TS400		-	-	-	-	-	-	-	-	-	-	-	-	-	●	●	-	-	-
TS630		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	●	●	-
TS800		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	●

Note) Rated current 700A is available for TS800FTU.

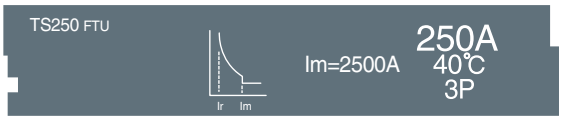
Thermal magnetic trip units
Overview

Characteristics

Fixed thermal, fixed magnetic trip units

FTU

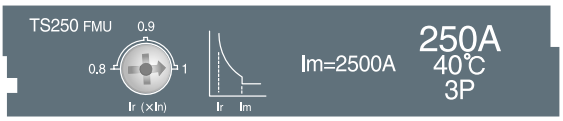
- Fixed thermal
  16A ... 800A rated currents
- Fixed magnetic
  400A ... 8000A tripping currents
- Applicable to TD100 ... TS800 frames



Adjustable thermal, fixed magnetic trip units

FMU

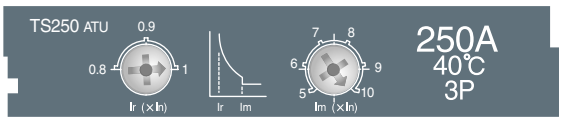
- Adjustable thermal
  16A ... 800A rated currents
  Adjustable : 0.8~1 × In
- Fixed magnetic
  400A ... 8000A tripping currents
- Applicable to TD100 ... TS800 frames



Adjustable thermal, adjustable magnetic trip units

ATU

- Adjustable thermal
  100A ... 800A rated currents
  Adjustable : 0.8~1 × In
- Adjustable magnetic
  500A ... 8000A tripping currents
  Adjustable : 5~10 × In
- Applicable to TS160 ... TS800 frames



Electronic trip units (Standard type)

The new series of Susol TS series molded case circuit breakers for AC networks can be equipped with ETS23, ETS33 and ETS43. The trip units can be fitted with three (3) pole TS100 to TS800.
The wide range of adjustments makes the trip units particularly suitable in all distribution applications where reliability and trip precision are required.

Function

Protection of power distribution
- Overload protection
- Short-circuit protection

Ratings

		Trip units					
		ETS23			ETS33		ETS43
Rated current, In (A)	40	●	●	●	-	-	-
	80	●	●	●	-	-	-
	160	-	●	●	●	●	-
	250	-	-	●	●	●	-
	400	-	-	-	●	●	-
	630	-	-	-	-	●	●
	800	-	-	-	-	-	●
Applicable to		TS100 N/H/L	TS160 N/H/L	TS250 N/H/L	TS400 N/H/L	TS630 N/H/L	TS800 N/H/L

Current setting, Ir(A)

ETS	16	32	40	64	80	100	160	250	320	400	630	800
ETS23 for TS100N/H/L												
ETS23 for TS160N/H/L												
ETS23 for TS250N/H/L												
ETS33 for TS400N/H/L												
ETS33 for TS630N/H/L												
ETS43 for TS800N/H/L												

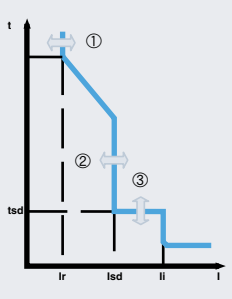
Setting values

Overload protection (long time)	
Setting current (A), Ir	0.4, 0.45, 0.5, 0.55, 0.6, 0.65, 0.7, 0.75, 0.8, 0.85, 0.9, 0.95, 1.0 × In, 13 setting
Tripping time (s)	Fixed at 6 × Ir , tolerance ±20%

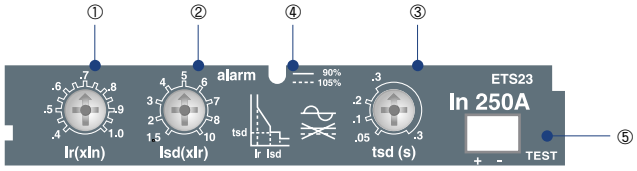
Short-circuit protection (short time)						
Tripping threshold (A), (Isd)	1.5, 2, 3, 4, 5, 6, 7, 8, 10 × Ir 9 settings, tolerance ±15%					
Time delay (tsd)	setting time (ms)	50	100	200	300	4 settings
	operation time (ms)	30 < t ≤ 70	70 < t ≤ 140	140 < t ≤ 240	240 < t ≤ 350	

Short circuit protection (Instantaneous)	
Tripping threshold (A), Ii	Fixed at 11 × In

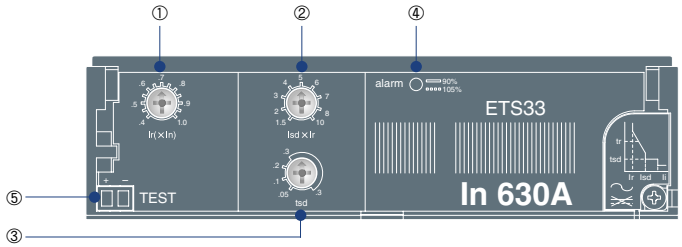
① Adjustable rated current setting (Ir)
② Adjustable short time delay current setting (Isd)
③ Adjustable time delay setting (tsd)
④ Alarm LED
90% Ir: ON,
105% Ir or more: ON-OFF
⑤ Test connector



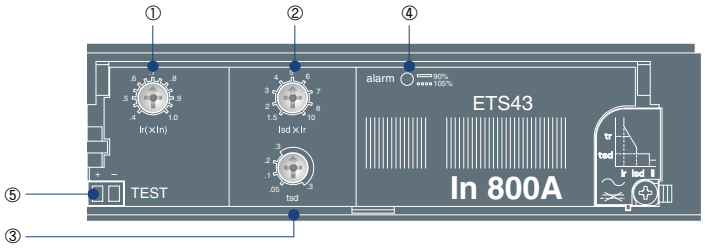
ETS23 for TS100/TS160/TS250



ETS33 for TS400/TS630



ETS43 for TS800



Electronic trip units (Multi-functional type)

The new series of Susol TS series molded case circuit breakers for AC networks can be equipped with ETM33 and ETM43. The trip units can be fitted with three (3) pole TS400, TS630 and TS800.
The more wide range of adjustments makes the trip units particularly suitable in all distribution applications where reliability and trip precision are required.

Function

- Protection of power distribution
- Overload, Short-circuit protection, Instantaneous protection, Earth fault protection
- Ammeter
- Zone selective interlocking (ZSI)
- Communication (RS485-Modbus/RTU)

Ratings

Rated current, In(A)

Rated current In (A)	Trip unit		
	ETM33		ETM43
160	●	●	-
250	●	●	●
400	●	●	●
630	-	●	●
800	-	-	●
Circuit breakers	TS400 N/H/L	TS630 N/H/L	TS800 N/H/L

Setting values

Overload protection (long time)						
Setting current (A), Ir	Adjustable 0.4 ~ 1.0 × In, 30 settings					
Tripping time (s) at 6× Ir	Adjustable 2, 4, 6, 8,12 5 settings, tolerance ±20%					

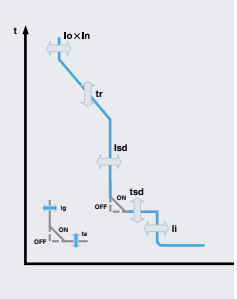
Short-circuit protection (short time)						
Tripping threshold (A), Isd	Adjustable 1.5, 2, 3, 4, 5, 6, 7, 8, 10 × Ir, 9 settings, tolerance ±15%					
Time delay (tsd)	setting time (ms)	50	100	200	300	4 settings
	operation time (ms)	30<t≤70	70<t≤140	140<t≤240	240<t≤350	I^2t is off

Short-circuit protection (instantaneous)	
Tripping threshold (A), Ii	Adjustable 1.5, 2, 4, 5, 6, 8, 10, 11 × In, 9 settings

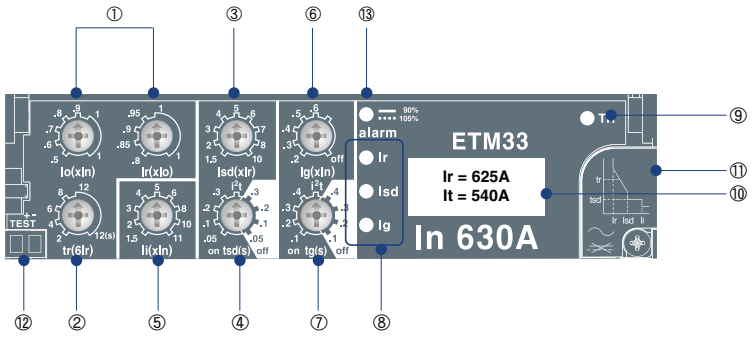
Indication of tripping reason	
LED indication	Ir, Isd, Ii, (Ig)

Option for TS400ETM to TS800ETM						
Ammeter (A)	Maximum load phase current and R,S,T,N phase current					
Earth fault protection (E)	Adjustable tripping threshold (A), 0.2~1 × In, 9 setting					
	setting time (ms)	100	200	300	400	4 settings
	operation time (ms)	60<t≤140	140<t≤230	230<t≤350	350<t≤500	I^2t is off
Communication (C)	Setting, R, S, T, N phase current, tripping reason					
ZSI (Z)	ZSI input and output signal					

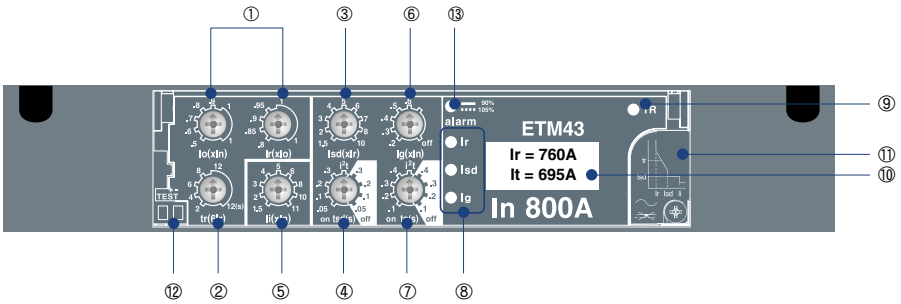
① Adjustable rated current setting (Ir)
② Adjustable long time setting (tr)
③ Adjustable short time current setting (Isd)
④ Adjustable time delay setting (tsd)
⑤ Adjustable instantaneous current setting (Ii)
⑥ Adjustable earth fault current setting (Ig)
⑦ Adjustable earth fault delay setting (tg)
⑧ Indication LED
⑨ TR (trip reason) button
⑩ Display LCD (Ammeter)
⑪ Battery
⑫ Test connector
⑬ Alarm LED



ETM33 for TS400/TS630



ETM43 for TS800



Electrical characteristics



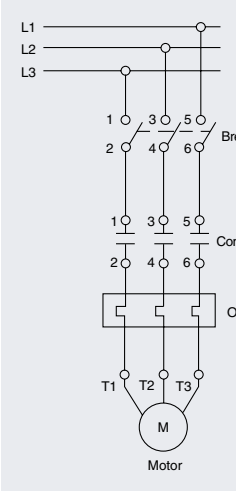
				TS100			TS160			TS250		
Frame size			[AF]	100			160			250		
Rated current, In			[A]	1.6, 3.2, 6.3, 12, 20, 32, 50, 63, 100			32, 50, 63, 100, 160			100, 160, 220		
No. of poles				3			3			3		
Rated operational voltage, Ue		AC	[V]	690			690			690		
		DC	[V]	500			500			500		
Rated impulse withstand voltage, Uimp			[kV]	8			8			8		
Rated insulation voltage, Ui			[V]	750			750			750		
Rated ultimate short-circuit breaking capacity, Icu				N	H	L	N	H	L	N	H	L
	AC 50/60Hz	220/240V	[kA]	100	120	200	100	120	200	100	120	200
		380/415V	[kA]	50	85	150	50	85	150	50	85	150
		440/460V	[kA]	50	70	130	50	70	130	50	70	130
		480/500V	[kA]	42	65	85	42	65	85	42	65	85
		660/690V	[kA]	10	15	20	10	15	20	10	15	20
Rated service breaking capacity, Ics [%Icu]				100%	100%	100%	100%	100%	100%	100%	100%	100%
Rated short-circuit making capacity, Icm												
	AC 50/60Hz	220/240V	[kA]	220	264	440	220	264	440	220	264	440
		380/415V	[kA]	105	187	330	105	187	330	105	187	330
		440/460V	[kA]	105	154	286	105	154	286	105	154	286
		480/500V	[kA]	88	143	187	88	143	187	88	143	187
		660/690V	[kA]	17	30	40	17	30	40	17	30	40
Category of utilization				A			A			A		
Isolation behavior				●			●			●		
Trip unit (release)												
	● magnetic only		MTU	●			●			●		
Connection	fixed	front-connection		●			●			●		
		rear-connection		●			●			●		
	plug-in	front-connection		●			●			●		
		rear-connection		●			●			●		
Mechanical life			[operations]	25000			25000			25000		
Electrical life @415 V AC			[operations]	10000			10000			10000		
Basic dimensions, W × H × D (front connection)		3-pole	[mm]	105 × 160 × 86			105 × 160 × 86			105 × 160 × 86		
Weight (front connection)		3-pole	[kg]	2			2			2		
Reference standard				IEC60947-2			IEC60947-2			IEC60947-2		

MCCBs for motor protection

Susol

	TS400			TS630			TS800	
	400			630			800	
	320			500			630	
	3			3			3	
	690			690			690	
	500			500			500	
	8			8			8	
	750			750			750	
N	H	L	N	H	L	N	H	L
100	120	200	100	120	200	100	120	200
65	85	150	65	85	150	65	100	150
65	85	130	65	85	130	65	100	130
42	65	85	42	65	85	42	85	100
10	20	35	10	20	35	10	20	35
100%	100%	100%	100%	100%	100%	100%	100%	100%
220	264	440	220	264	440	220	264	440
143	187	330	143	187	330	143	220	330
143	187	286	143	187	286	143	220	286
88	143	187	88	143	187	88	187	220
17	40	74	17	40	74	17	40	74
	A			A			A	
	●			●			●	
	●			●			●	
	●			●			●	
	●			●			●	
	●			●			●	
	●			●			●	
	20000			20000			10000	
	6000			6000			3000	
	140×260×110			140×260×110			210×320×135	
	5.4			5.4			15.1	
	IEC60947-2			IEC60947-2			IEC60947-2	

Magnetic only trip unit
MTU for TS100, TS160, TS250, TS400, TS630, TS800



Magnetic only release

For the protection of motors from 1.6 to 250kW(400V), TS100 to TS800 circuit Breakers must be equipped with a special trip unit MTU adjustable thresholds.

This assembly ensures: Short-circuit protection (magnetic trip unit with adjustable thresholds); Suitability for isolation. For the TS100 to TS800 circuit breakers, trip unit MTU is interchangeable.

The circuit breakers presented here: Provide protection against short-circuits; Are suitable for isolation as defined by IEC60947-2 standard.

Configuration

Trip unit identification

Trip unit rating, In
and reference temperature

Magnetic setting for short-circuit protection

Catalogue numbering system

TS250 **MTU**

Magnetic only release

MCCB frame type
- TS100: TS100N, TS100H, TS100L
- TS160: TS160N, TS160H, TS160L
- TS250: TS250N, TS250H, TS250L
- TS400: TS400N, TS400H, TS400L
- TS630: TS630N, TS630H, TS630L
- TS800: TS800N, TS800H, TS800L

Characteristics

Magnetic trip units(MTU)

Rating(A)		In	TS100 to TS800													
			1.6	3.2	6.3	12	20	32	50	63	100	160	220	320	500	630
	N / H / L	TS100	●	●	●	●	●	●	●	●	●	-	-	-	-	-
		TS160	-	-	-	-	-	●	●	●	●	●	-	-	-	-
		TS250	-	-	-	-	-	-	-	-	●	●	●	-	-	-
		TS400	-	-	-	-	-	-	-	-	-	-	-	●	-	-
		TS630	-	-	-	-	-	-	-	-	-	-	-	-	●	-
		TS800	-	-	-	-	-	-	-	-	-	-	-	-	-	●

Short - circuit protection(magnetic)

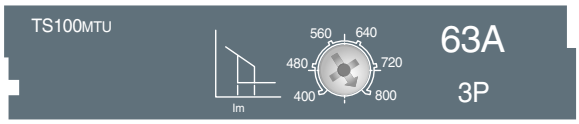
Pick - up	Im	setting
		6..12 × In (6 Point)

Setting details

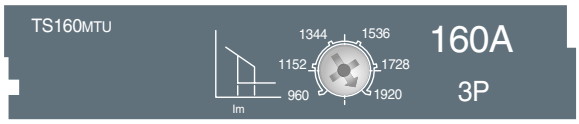
MTU In	6 × In	..	..	..	..	12 × In
1.6	10	12	14	16	18	20
3.2	20	24	28	32	36	40
6.3	40	48	56	64	72	80
12	70	84	98	112	126	140
20	120	144	168	192	216	240
32	190	228	266	304	342	380
50	300	360	420	480	540	600
63	400	480	560	640	720	800

MTU In	6 × In	..	..	..	..	12 × In
100	600	720	840	960	1080	1200
160	960	1152	1344	1536	1728	1920
220	1320	1584	1848	2112	2376	2640
320	1920	2304	2688	3072	3456	3840
500	3000	3600	4200	4800	5400	6000
630	3780	4536	5292	6048	6804	7560

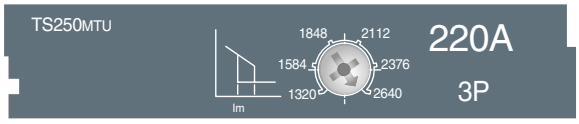
TS100MTU
- Adjustable magnetic only unit



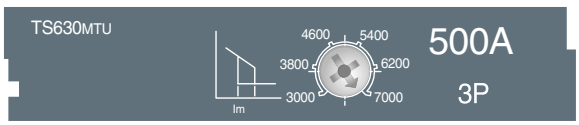
TS160MTU
- Adjustable magnetic only unit

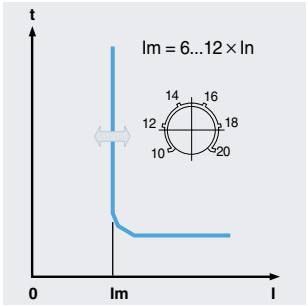


TS250MTU
- Adjustable magnetic only unit



TS400 MTU, TS630MTU, TS800MTU
- Adjustable magnetic only unit





Electrical characteristics

			TD series		
					
			TD160NA	TS100NA	TS160NA
Frame size		[AF]	160	100	160
Conventional thermal current, Ith		[A]	160	100	160
No. of poles			2, 3, 4	2, 3, 4	2, 3, 4
Rated operational voltage,	AC	[V]	690	690	690
Ue	DC	[V]	500	500	500
Rated operational current, Ie			160	100	160
Rated impulse withstand voltage,Uimp		[kV]	8	8	8
Rated insulation voltage, Ui		[V]	750	750	750
Rated short-circuit making capacity, Icm		[kA peak]	3.1	2.8	3.6
Rated short-time	1s	[A rms]	2200	2000	2500
withstand current, Icw	3s	[A rms]	2200	2000	2500
	20s	[A rms]	960	690	960
Isolation behavior			●	●	●
Trip unit (release)					
● disconnector unit		DSU	●	●	●
Connection fixed	front-connection		●	●	●
	rear-connection		●	●	●
plug-in	front-connection		●	●	●
	rear-connection		●	●	●
Mechanical life		[operations]	25000	25000	25000
Electrical life @415 V AC		[operations]	10000	10000	10000
Basic dimensions, W×H×D	3-pole	[mm]	90×140×86	105×160×86	105×160×86
(front connection)	4-pole	[mm]	120×140×86	140×160×86	140×160×86
Weight	3-pole	[kg]	1.5	2	2
(front connection)	4-pole	[kg]	1.8	2.6	2.6
Reference standard			IEC60947-3	IEC60947-3	IEC60947-3

The switch-disconnectors are different from the circuit-breakers in the absence of the conventional protection unit. They keep the overall dimensions, connection systems and accessories unchanged from the corresponding circuit-breakers. Installation standards require upstream protection. However, thanks to their high-set magnetic release, TD160 ... TS800 DSU are self protected.

TS series

	TS250NA	TS400NA	TS630NA	TS800NA
	250	400	630	800
	250	400	630	800
	2, 3, 4	2, 3, 4	2, 3, 4	2, 3, 4
	690	690	690	690
	500	500	500	500
	250	400	630	800
	8	8	8	8
	750	750	750	750
	4.9	7.1	8.5	12
	3500	5000	6300	8000
	3500	5000	6300	8000
	1350	1930	2320	2560
	●	●	●	●
	●	●	●	●
	●	●	●	●
	●	●	●	●
	●	●	●	●
	●	●	●	●
	25000	20000	20000	10000
	10000	6000	6000	3000
	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
	2	5.4	5.4	15.1
	2.6	7.2	7.2	19.6
	IEC60947-3	IEC60947-3	IEC60947-3	IEC60947-3

Trip unit identification

Electrical auxiliaries

AX

AL

Auxiliary switch (AX)

Auxiliary switch is for applications requiring remote “ON” and “OFF” indication.
Each switch contains two contacts having a common connection.
One is open and the other closed when the circuit breaker is open, and vice-versa.

Alarm switch (AL)

Alarm switches offer provisions for immediate audio or visual indication of a tripped breaker due to overload, short circuit, shunt trip, or undervoltage release conditions.
They are particularly useful in automated plants where operators must be signaled about changes in the electrical distribution system. This switch features a closed contact when the circuit breaker is tripped automatically. In other words, this switch does not function when the breaker is operated manually. Its contact is open when the circuit breaker is reset.

Fault alarm switch (FAL)

FAL Indicates that the breaker has tripped due to overload or short circuit.
And, it can be applied to only circuit breakers with electronic trip units.

UVT

Undervoltage release, UVT

The undervoltage release automatically opens a circuit breaker when voltage drops to a value ranging between 35% to 70% of the line voltage. The operation is instantaneous, and after tripping, the circuit breaker cannot be re-closed again until the voltage returns to 85% of line voltage.

Continuously energized, the undervoltage release must be operating before the circuit breaker can be closed. The undervoltage release can be easily installed in the left accessory compartment of the Susol TD and TS circuit-breakers.

- Range of tripping voltage: 0.35 ~ 0.7Vn
- MCCB making is possible voltage: 0.85Vn (exceed)
- Frequency (only AC): 45Hz ~ 65Hz

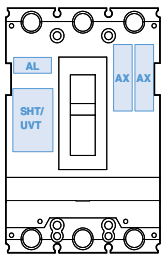
SHT

Shunt release, SHT

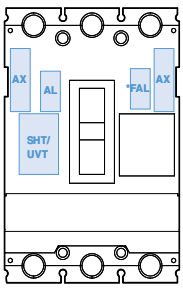
The shunt release opens the mechanism in response to an externally applied voltage signal. The releases include coil clearing contacts that automatically clear the signal circuit when the mechanism has tripped. The shunt release can be installed in the left accessory compartment of the Susol TD & TS circuit-breakers.

- Range of operational voltage: 0.7 ~ 1.1Vn
- Frequency (only AC): 45Hz ~ 65Hz

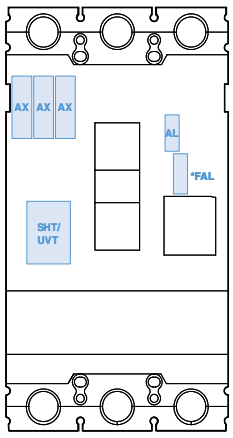
TD160



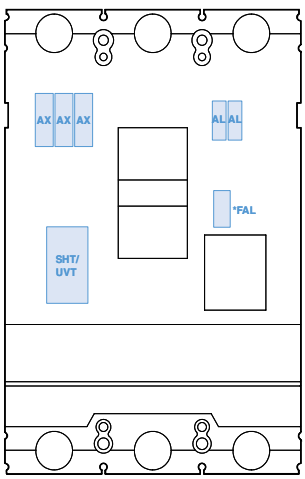
TS250



TS630

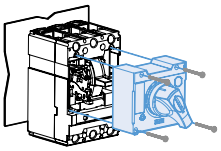


TS800



Rotary handles

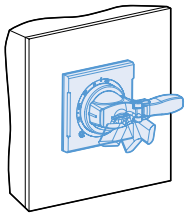
The rotary handle operating mechanism is available in either the direct version or in the extended version on the compartment door.
It is always fitted with a compartment door lock and on a request it can be supplied with a key lock in the open position.



Direct rotary handles

Direct rotary handles

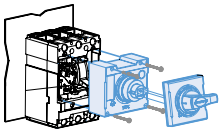
MCCB	Rotary handle
TD100,TD160	DH1
TS100,TS160,TS250	DH2
TS400,TS630	DH3
TS800	DH4



Direct rotary handles with a key lock

Direct rotary handles with a key lock

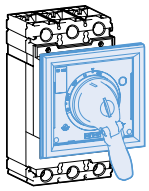
MCCB	Padlockable device	Lock function
TD100, TD160	DHK1	Lock in On or Off position
TS100, TS160, TS250	DHK2	
TS400, TS630	DHK3	
TS800	DHK4	



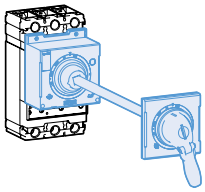
Extended rotary handles

Extended rotary handles

MCCB	Padlockable device
TD100,TD160	EH1
TS100,TS160,TS250	EH2
TS400,TS630	EH3
TS800	EH4



Circuit breaker with cover frame and rotary direct handle



Circuit breaker with cover frame and rotary extended handle

Degree of protections

Type	Degree of protection	IP
Circuit breaker with cover frame and rotary direct handle	The access probe of 1.0mm diameter shall not penetrate.	IP40
Circuit breaker with cover frame and rotary extended handle	Totally protected against ingress of dust and water jets from any direction	IP65

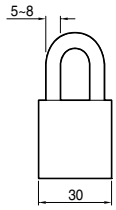
Locking devices

Removable locking device

Removable locking device is available for all TD & TS circuit breakers.
The locking device is designed to be easily attached to the circuit-breaker.

This device allows the handle to be locked in the “OFF” position.
Locking in the OFF position guarantee isolation according to IEC 60947-2.

The locking device for the toggle handle can be installed in 3-pole and 4-pole circuit-breakers.
Maximum three (3) padlocks with shackle diameters ranging from 5 to 8mm may be used.
(Padlocks are not supplied)



Padlock dimensions

MCCB	Padlockable device	Function
TD100,TD160	PL1	“OFF” position
TS100,TS160,TS250	PL2	
TS400,TS630	PL3	
TS800	PL4	

Fixed locking device

Fixed locking device is available for all TD & TS circuit breakers.
This device allows the handle to be locked in the “ON” and “OFF” position.
Locking in the OFF position guarantee isolation according to IEC 60947-2.

The locking device for the toggle handle can be installed in 3-pole and 4-pole circuit-breakers.
Maximum three (3) padlocks with shackle diameters ranging from 5 to 8mm may be used.
(Padlocks are not supplied)

MCCB	Padlockable device	Function
TD100,TD160	PHL1	Lock in Off or On position
TS100,TS160,TS250	PHL2	
TS400,TS630	PHL3	
TS800	PHL4	

Locking by rotary handle with a key lock

A locking can be done by using the rotary handle which has key lock device.
The lock is used to lock the circuit-breaker in the OFF position.
The key can only be removed when the circuit-breaker is in the OFF position.
The key cannot be removed when the rotary handle is in the ON position.

MCCB	Padlockable device	Function
TD100,TD160	DHK1	Lock in Off position
TS100,TS160,TS250	DHK2	
TS400,TS630	DHK3	
TS800	DHK4	

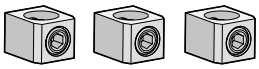
Terminals

Front connection

Terminal mounter

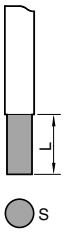
- It is supplied with Susol MCCBs as an standard part of circuit breaker.
- Connecting part with terminal for bus bar, cable with lug

MCCB	Type
TD100,TD160	TM1
TS100,TS160,TS250	TM2
TS400,TS630	-
TS800	-



Inner box terminal

- Bare cable connectors for Susol TD and TS series circuit breakers
- Can be used for both aluminum and copper cables

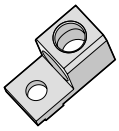


Applicable to	Type	Pole	Set quantity	Cable connection possibilities	Conductor size	
TD100, 160	SBT13 SBT14	3 4	1 Set (3EA) 1 Set (4EA)	1	L(mm) S(mm²)Cu/Al Tightening torque (kgf · cm)	21 2.5~95 120~147
TS100, 160, 250	SBT23 SBT24	3 4	1 Set (3EA) 1 Set (4EA)	1	L(mm) S(mm²)Cu/Al Tightening torque (kgf · cm)	21 10~150 120~147
TS400, 630	Note1) IBT33 IBT34	3 4	1 Set (3EA) 1 Set (4EA)	1	L(mm) S(mm²)Cu/Al Tightening torque (kgf · cm)	30 70~300 367~428
PB12, 13	Note2) IBT13 IBT14	3 4	1 Set (3EA) 1 Set (4EA)	1	L(mm) S(mm²)Cu/Al Tightening torque (kgf · cm)	18 2.5~95 306
PB22, 23	Note2) IBT23 IBT24	3 4	1 Set (3EA) 1 Set (4EA)	1	L(mm) S(mm²)Cu/Al Tightening torque (kgf · cm)	21 10~150 306

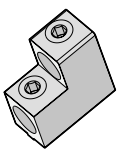
Note) 1. IBT3 for TS630 can be applied in case that rate current is upto 400A. 2. IBT13, 14 and IBT23, 24 are for Plug-in base.

Extended box terminals (Copper cables/bars and aluminum cables)

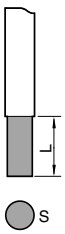
- The extended box terminals for TD and TS circuit breakers can be used for cooper cables/bars and aluminum cables. There are four (4) kinds of terminals.

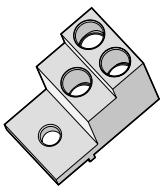


1-cable connector



2-cable connector

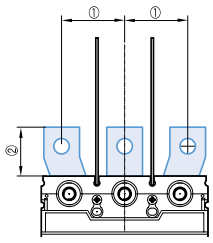




3-cable connector

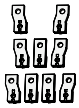
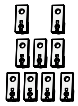
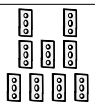
Applicable to	Type	Pole	Set quantity	Cable connection possibilities	Conductor size	
TD100, 160	EBT13 EBT14	3 4	1 Set (3EA) 1 Set (4EA)	1	L(mm) S(mm²)Cu/Al Tightening torque (kgf · cm)	20 2.5~95 306
TS100, 160, 250	EBT23 EBT24	3 4	1 Set (3EA) 1 Set (4EA)	1	L(mm) S(mm²)Cu/Al Tightening torque (kgf · cm)	24 10~150 306
TS400, 630	EBT33 EBT34	3 4	1 Set (3EA) 1 Set (4EA)	2	L(mm) S(mm²)Cu/Al Tightening torque (kgf · cm)	33 or 62 2×85 to 2×240 367~428
TS800	EBT43 EBT44	3 4	1 Set (3EA) 1 Set (4EA)	3	L(mm) S(mm²)Cu/Al Tightening torque (kgf · cm)	25~48 3×85 to 3×240 367~428

Terminals



Front connection

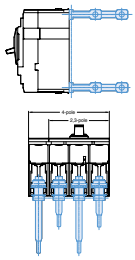
Spreaders
- As an optional part of circuit breaker
- Can increase the pitch of the terminals

MCCB	Pole	Type		Size(mm) ① a type		Size(mm) ② b type		Feature
TD100 TD160	2P	SP12a	SP12b	35.0	45.0	33.0		
	3P	SP13a	SP13b					
	4P	SP14a	SP14b					
TS100 TS160 TS250	2P	SP22a	SP22b	45.0	52.5	31.0		
	3P	SP23a	SP23b					
	4P	SP24a	SP24b					
TS400 TS630	2P	SP32a	SP32b	52.5	70.0	41.0	54.0	
	3P	SP33a	SP33b					
	4P	SP34a	SP34b					
	2P	SPS32a		46.5		41.0		
	3P	SPS33a						
	4P	SPS34a						
TS800	2P	SPS42a		70.0		81.5		
	3P	SPS43a						
	4P	SPS44a						

Rear connection

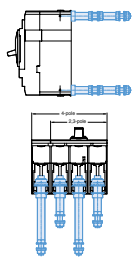
Rear connection terminals are used to adapt Susol TD and TS circuit breakers to switchboards or other applications that require rear connection.
These can be connected directly to circuit breakers without any modification

There are two kinds of rear connection terminals.
- Flat type
- Round type


Flat type

Flat vertical terminals

MCCB	2-pole	3-pole	4-pole
TD100,TD160	RTB12	RTB13	RTB14
TS100,TS160,TS250	RTB22	RTB23	RTB24
TS400,TS630	RTB32	RTB33	RTB34
TS800	RTB42	RTB43	RTB44


Round type

Round threaded terminals

MCCB	2-pole	3-pole	4-pole
TD100,TD160	RTR12	RTR13	RTR14
TS100,TS160,TS250	RTR22	RTR23	RTR24
TS400,TS630	-	-	-
TS800	-	-	-

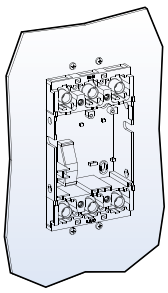
Plug-in device

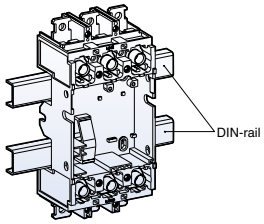
Plug-in device

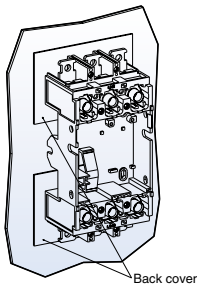
The plug-in base is the fixed part of the plug-in version of the circuit-breaker.
It will be installed directly on the back plate of panel.
The circuit-breaker is racked out by unscrewing the top and bottom fixing screws.
Plug-in base makes it possible to extract and/or rapidly replace the circuit breaker without having to touch connections for ship and important installations.

MCCB	Pole	Arrangement	Type	Means
TD100, TD160	2	Single line	PB12	
	3	Single line	PB13	
	2	Double line	PB12D2	For distribution board
	3	Double line	PB13D2	For distribution board
TS100, TS160, TS250	2	Single line	PB22	
	3	Single line	PB23	
TS400, TS600	2	Single line	PB32	
	3	Single line	PB33	
TS800	2	Single line	PB42	
	3	Single line	PB43	

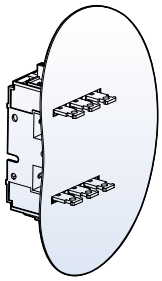
Front connection

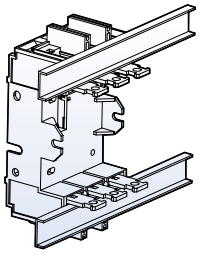




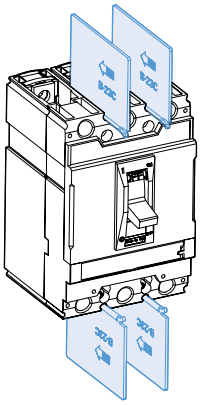


Rear connection





Insulation



Insulation by barrier

These allow the insulation characteristics between the phases at the connections to be increased.
They are mounted from the front, even with the circuit-breaker already installed, inserting them into the corresponding slots.
They are incompatible with both the insulating terminal covers.
It is possible to mount the phase separating partitions between two circuit-breakers side by side.

Type	Applied MCCB	Set quantity
B-23C	TD100, TD160	4pcs
	TS100, TS160, TS250	4pcs
B-33C	TS400, TS630	4pcs
B-43C	TS800	4pcs

Short type covers

Insulation by terminal cover

Insulation terminal cover

The terminal covers are applied to the circuit-breaker to prevent accidental contact with live parts and thereby guarantee protection against direct contacts.

Two types by length are available:

Short type covers, ITS
- IP40 degree of protection
- For fixed circuit-breakers with rear terminals and for moving parts of plug-in

Long type covers, ITL
- IP40 degree of protection
- For fixed circuit-breakers with front, front extended, front for cables terminals.

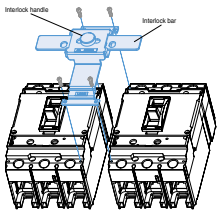
Long type covers

MCCB		Terminal cover	
Frame type	Pole	Long type	Short type
TD100,TD160	2P (1) , 3-pole	ITL13	ITS13
	4-pole	ITL14	ITS14
TS100,TS160,TS250	2P (1), 3-pole	ITL23	ITS23
	4-pole	ITL24	ITS24
TS400,TS630	2P (1), 3-pole	ITL33	ITS33
	4-pole	ITL34	ITS34
TS800	2P (1), 3-pole	ITL43	ITS43
	4-pole	ITL44	ITS44

Note) (1) 2P in 3pole mold case

Interlock

Mechanical Interlock
(Padlocks are not supplied)



Mechanical interlocking device

The mechanical interlock (MIT) can be applied on the front of two breakers mounted side by side, in either the 3-pole or 4-pole version and prevents simultaneous closing of the two breakers.

Fixing is carried out directly on the cover of the breakers.

The front interlocking plate allows installation of a padlock in order to fix the position. (possibility of locking in the O-O position as well)

This mechanical interlocking device is very useful and simple for consisting of manual source-changeover system.

MCCB		Interlock
Frame type	Pole	
TD100,TD160	3-pole	MIT13
	4-pole	MIT14
TS100,TS160,TS250	3-pole	MIT23
	4-pole	MIT24
TS400,TS630	3-pole	MIT33
	4-pole	MIT34
TS800	3-pole	MIT43
	4-pole	MIT44

Remote operation

Susol TS250N with motor operator

Motor operator

Motor operators can also be operated by manual.The motor drives a mechanism which switches TD & TS toggle handle to the “ON” and “OFF/RESET” positions.

- The manual actuator handle is located on the front of the cover.
- Manual or Automatic operation can be selected.

The motor operator is an essential device for constructing a remote operated automatic source-changeover system to ensure a continuous supply of electrical power at following certain installations:

- Commercial sector: Hospital, Tall building, Bank, Insurance companies, Shopping centers
- Industry: Ships, Assembly lines at plant, Military sites, Port and Railway installation

MCCB	Type	Control voltage	Actuation current (A)	Response time (ms)		Consumption (W)	Mechanical service life (operations)	No. of operations per hour
				Closing	Opening			
TD100, TD160	MOP1	① DC 24V ② AC 100~240V/ DC 100~220V	≤2.5A (DC 24V) ≤0.5A (AC)	310	200	14	25,000	120
TS100, 160, 250	MOP2	① DC 24V ② AC 100~110V/ DC 110V ③ AC 230/ DC 220V	≤5A (DC 24V) ≤2A (AC)	350	230	14	25,000	120
TS400, 630	MOP3			500	350	35	20,000	60
TS800	MOP4			700	420	35	10,000	20

Residual Current Devices (RCD)

Apart from the protection against overloads typical of automatic circuit breakers, the residual current circuit breaker derived from them also guarantee protection of people against earth leakage currents, thereby ensuring protection against direct contacts, indirect contacts and fire hazards.-(ELCB)
The RCD unit has numerous current and time settings and an override blocking the time settings when set to 30mA. The earth leakage test button tests the electrical and mechanical operation of the device. In order to allow for a dielectric test of the breaker and RCD combination without damaging the electronics, the dielectric plug is placed within the setting area.
The RCD unit may be equipped with an alarm switch (FAL) to remotely indicate tripping due to an earth leakage current.

Ratings and Selection

RCD type		RTU23	RTU33	RTU43
Number of poles		3*	3*	3*
Applicable circuit breaker	TS100	■		
	TS160	■		
	TS250	■		
	TS400		■	
	TS630		■	
	TS800			■
Protection charicteristics				
Sensitivity	I△n(A)	(adjustable) 0.03-0.3-1-3-10	(adjustable) 0.03-0.3-1-3-10	(adjustable) 0.03-0.3-1-3-10
Time delay **	Intentional time delay(ms)	(adjustable) 0-60-150-300-600	(adjustable) 0-60-150-300-600	(adjustable) 0-60-150-300-600
	Max. breaking time(ms)	(adjustable) 40-140-240-450-880	(adjustable) 40-140-240-450-880	(adjustable) 40-140-240-450-880
Rated voltage	AC 50/60 Hz	220~460V / 460~690V	220~460V / 460~690V	220~460V / 460~690V

* 3P modules may also be used on 2P circuit breakers.
** If the sensitivity is set to 30mA, the time delay setting is reduced to zero.

Combination

The addition of the RCD unit does not affect circuit breaker characteristics.

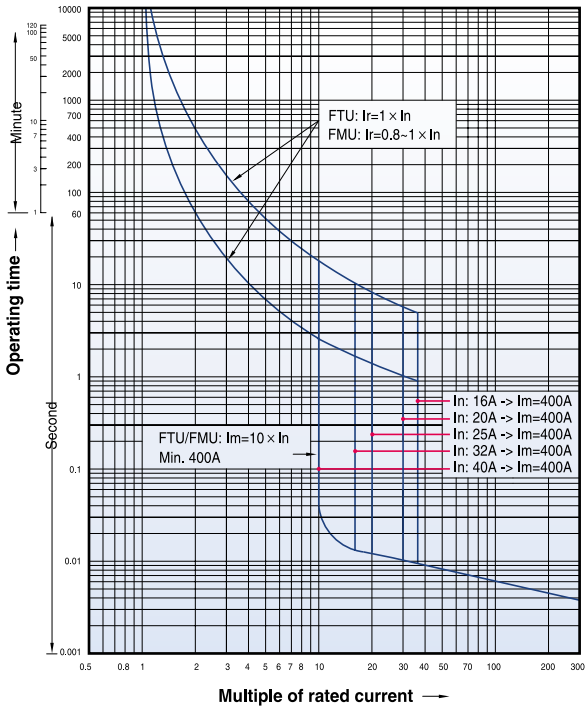
- Conformity with standards
- Protection degrees, class II insulation front face
- Suitability for isolation as defined by IEC 60947-2
- Electrical characteristics
- Trip unit characteristics
- Installation and connection methods
- Indication, measurement and control accessories
- Installation and connection accessories

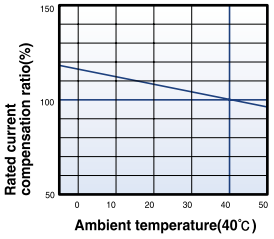
		RTU23	RTU33	RTU43
MCCB	L×H×D(mm)	105×160×86	140×260×110	210×320×135
MCCB+RCD		105×240×86	140×370×110	210×450×135
RCD		105×80×86	140×110×110	210×130×135
MCCB+RCD	Weight(kg)	2.7	8.08	16.28
RCD		0.96	2.52	4.6
Type		Bottom		
Accessory		FAL(fault alram switch)		

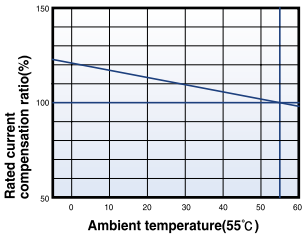
Circuit breakers with thermal-magnetic trip units

TD100

FTU
FMU
16~100A

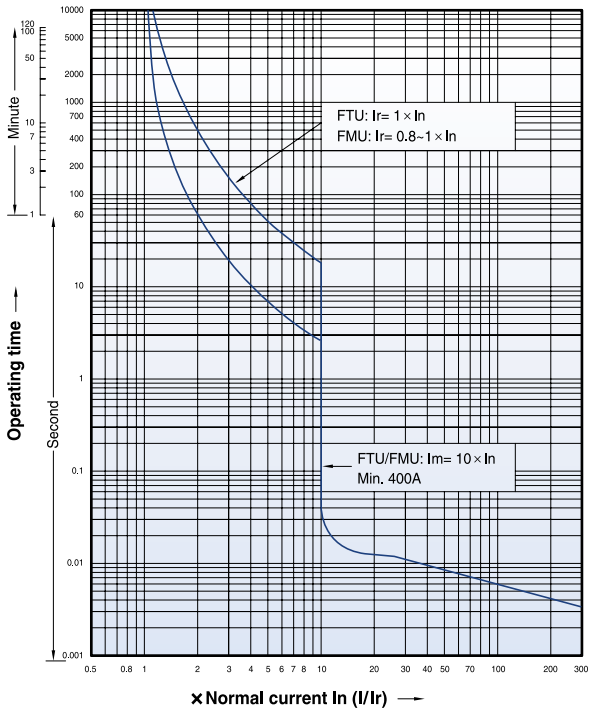


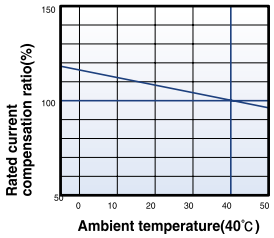


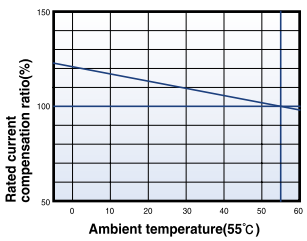


TD160

FTU
FMU
100~160A







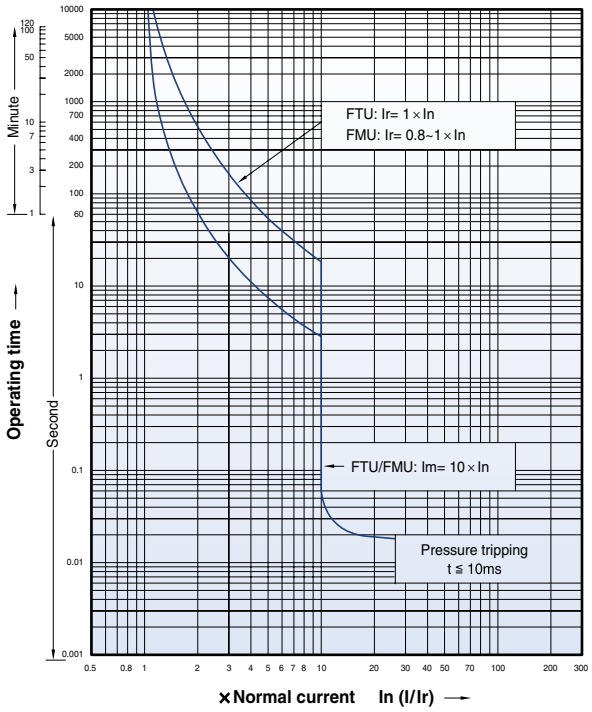
Characteristics curves

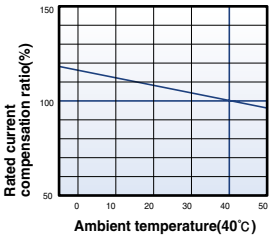
Susol

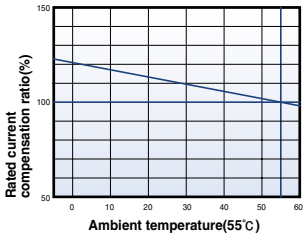
Circuit breakers with thermal-magnetic trip units

TS100

FTU
FMU
40~100A







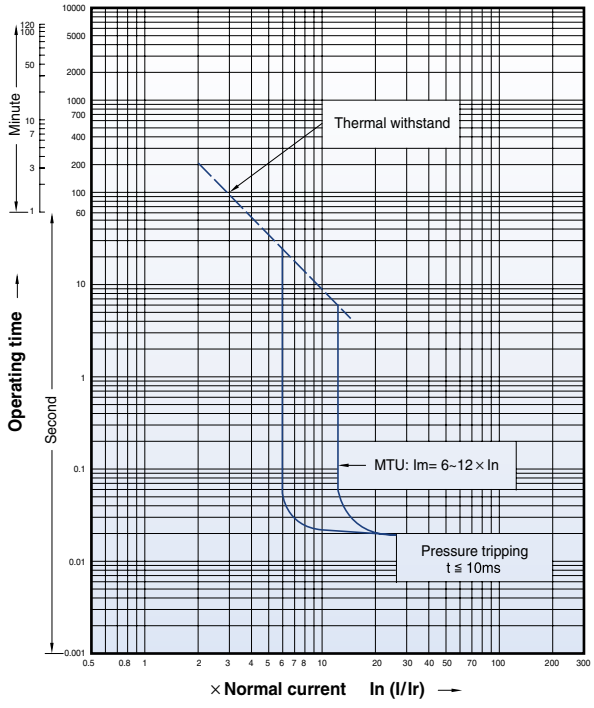
Circuit breakers with magnetic only trip units

TS100

Magnetic only
MTU
1.6~100A

TS160

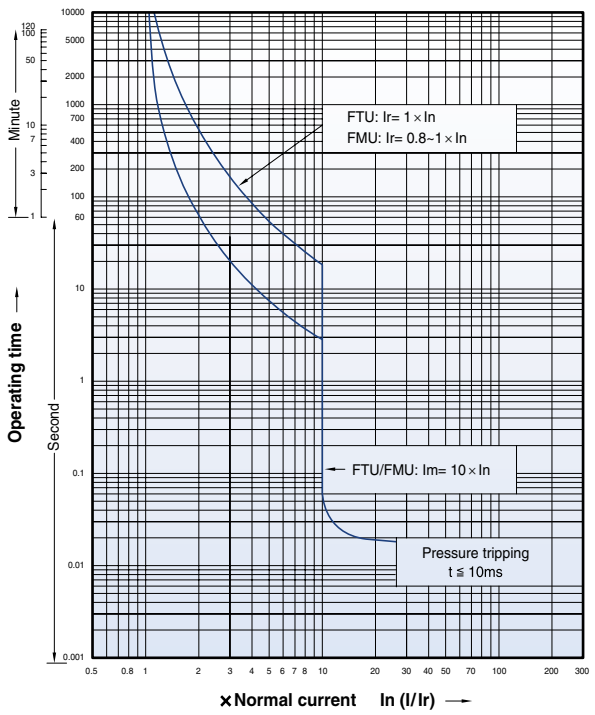
Magnetic only
MTU
32~160A

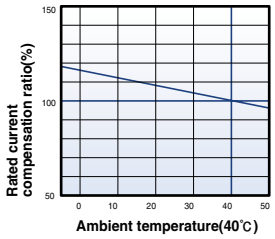


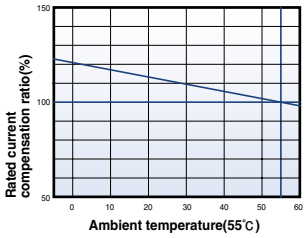
Circuit breakers with thermal-magnetic trip units

TS160

FTU
FMU
100, 125, 160A

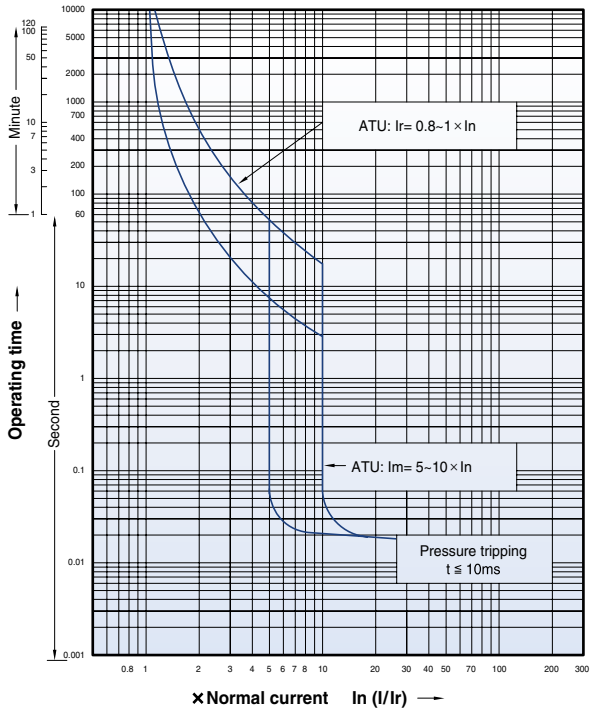


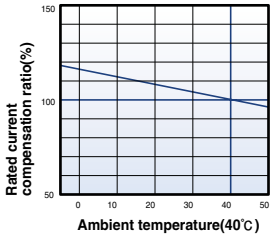


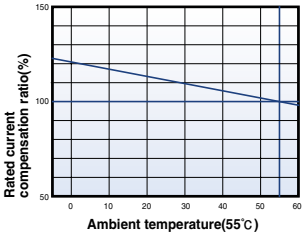


TS160

ATU
100, 125, 160A



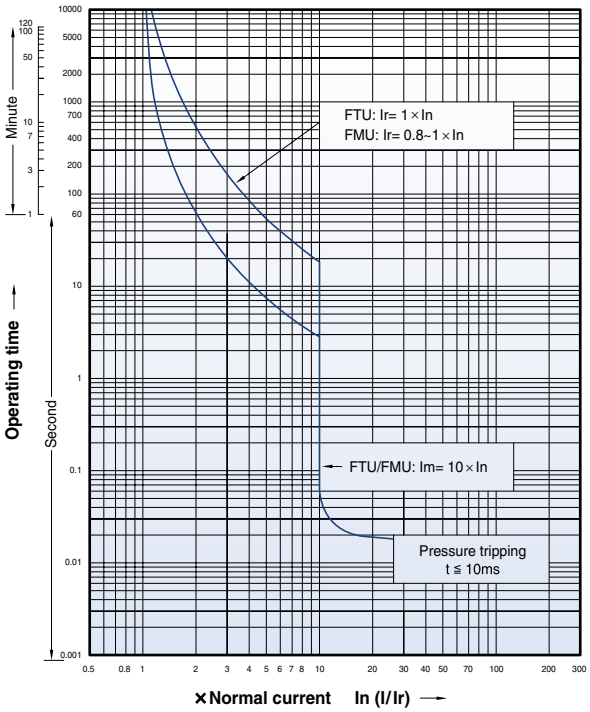


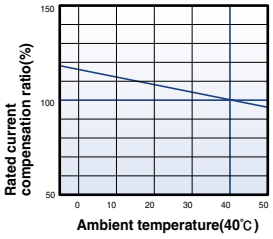


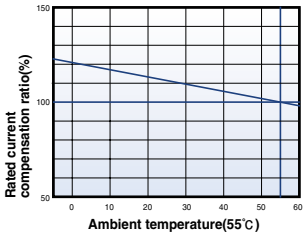
Circuit breakers with thermal-magnetic trip units

TS250

FTU
FMU
125~250A

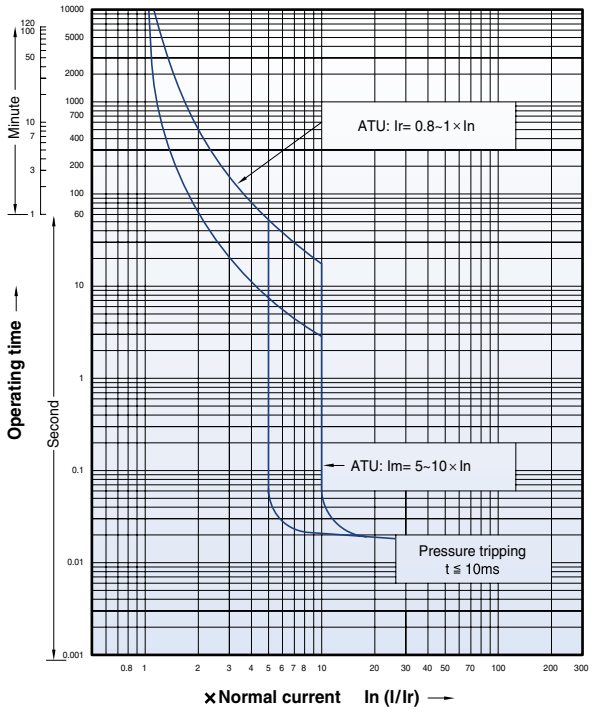


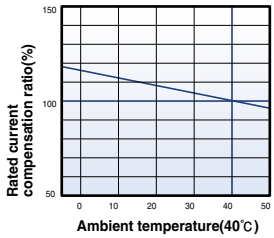


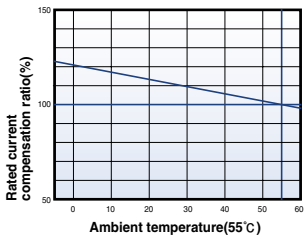


TS250

ATU
125~250A



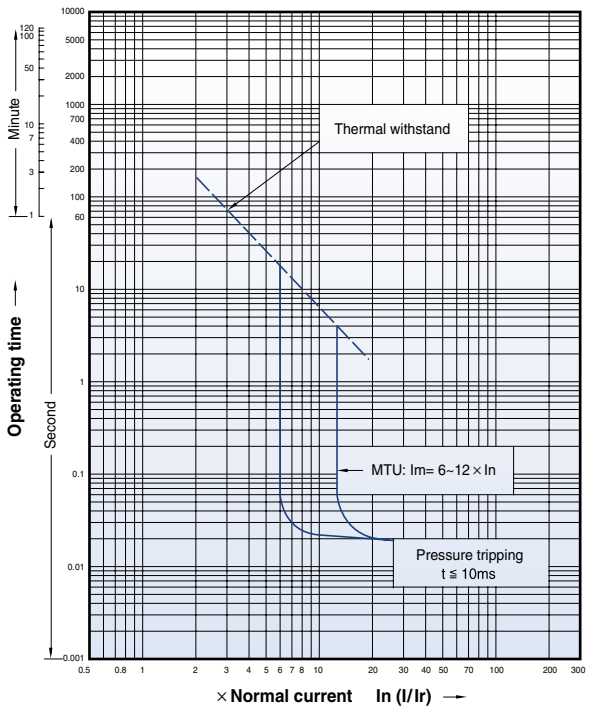




Circuit breakers with magnetic only trip units

TS250

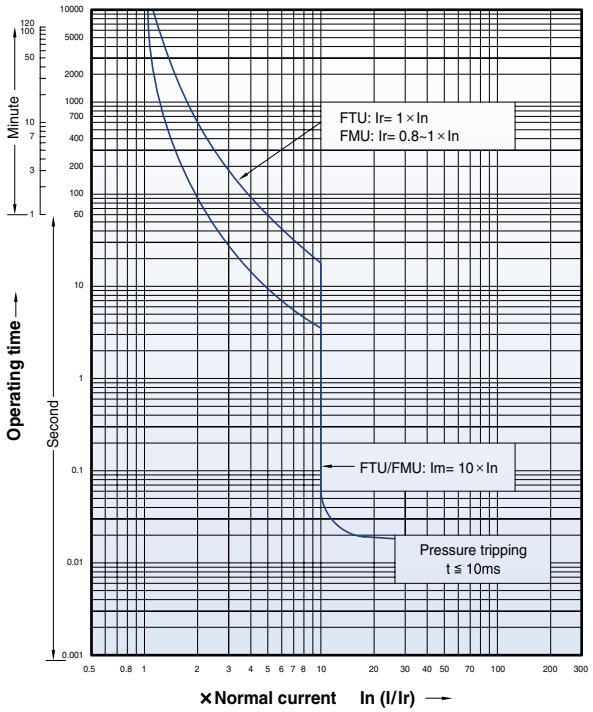
Magnetic only
MTU
100, 160, 220A

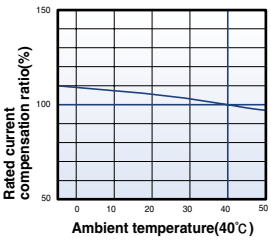


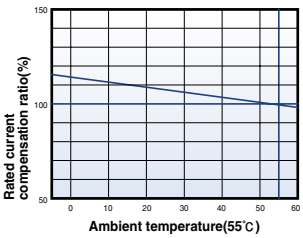
Circuit breakers with thermal-magnetic trip units

TS400

FTU
FMU
300, 400A





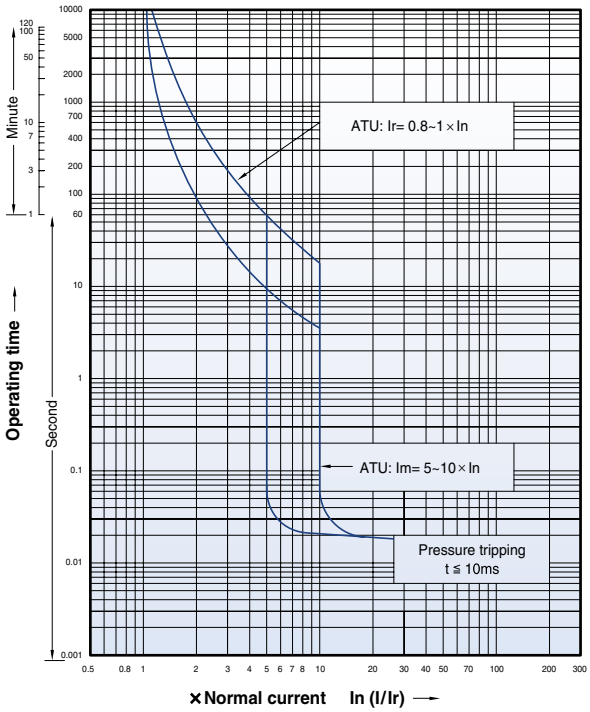


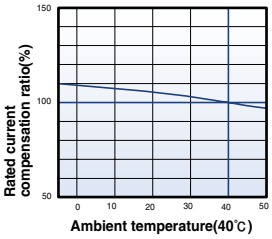
Circuit breakers with thermal-magnetic trip units

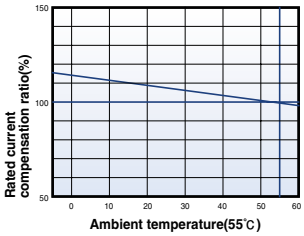
TS400

ATU

300, 400A





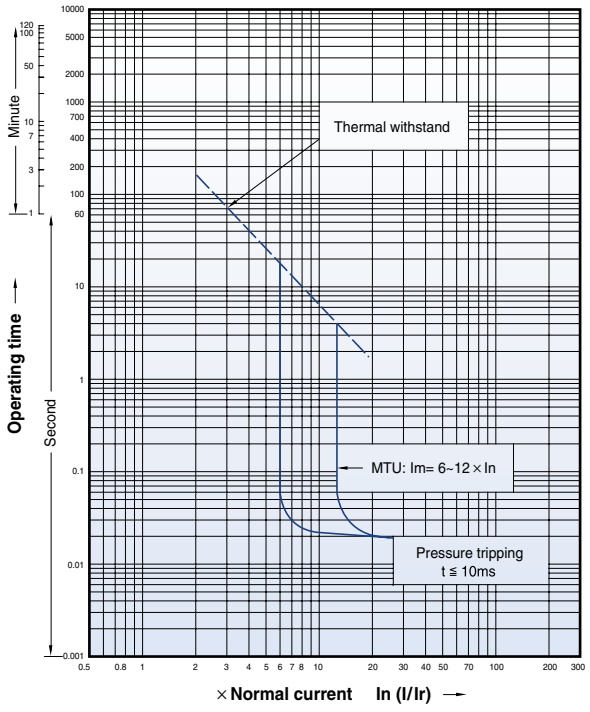


Circuit breakers with magnetic only trip units

TS400

MTU

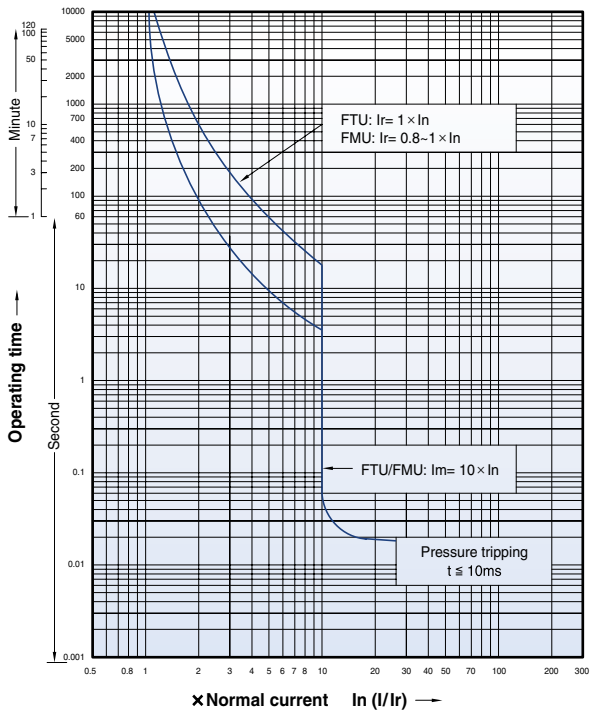
320A

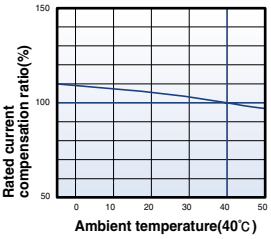


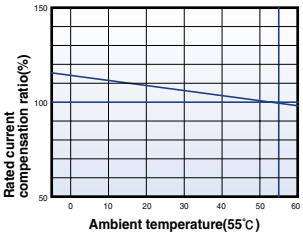
Circuit breakers with thermal-magnetic trip units

TS630

FTU
FMU
500, 630A

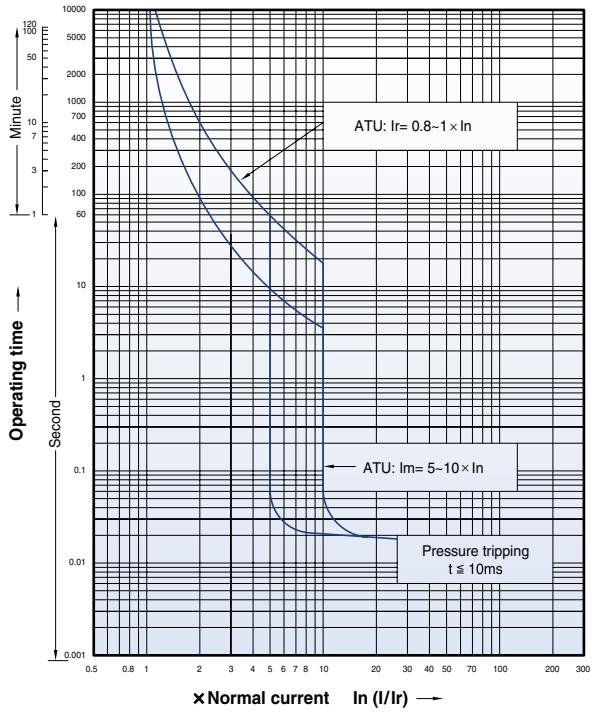


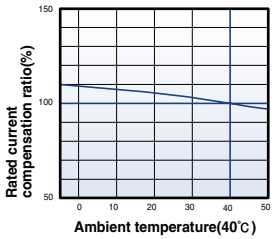


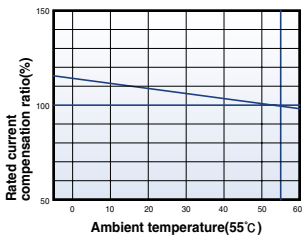


TS630

ATU
500, 630A





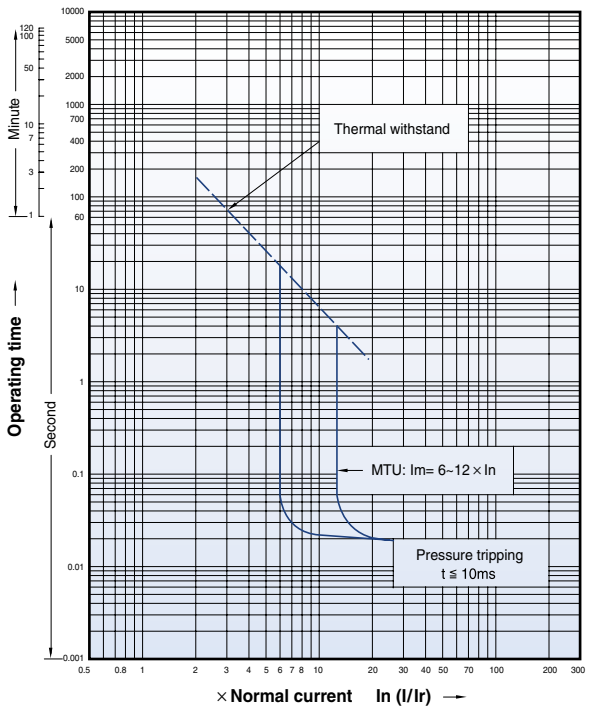


Characteristics curves

Circuit breakers with magnetic only trip units

TS630

MTU
500A

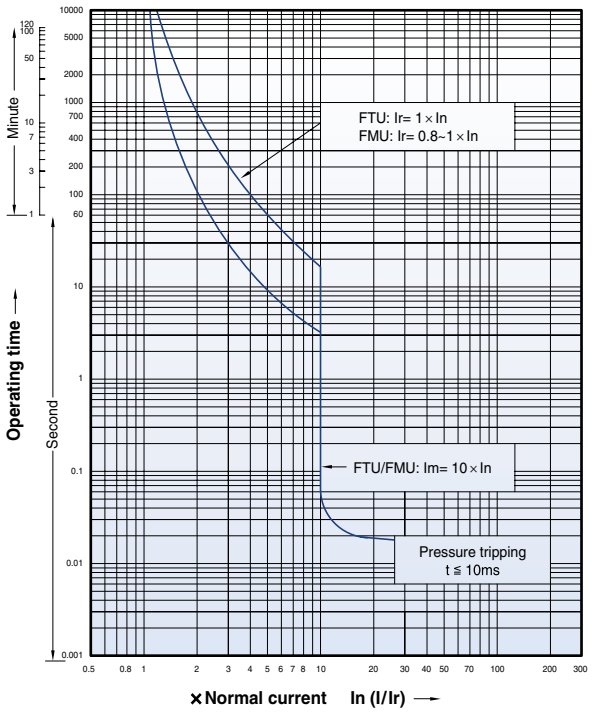


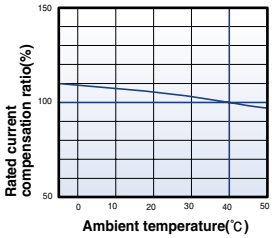
Circuit breakers with thermal-magnetic trip units

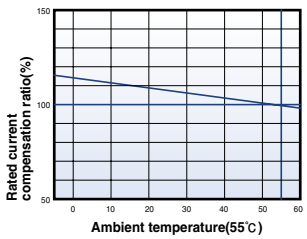
TS800

FTU
700, 800A

FMU
800A



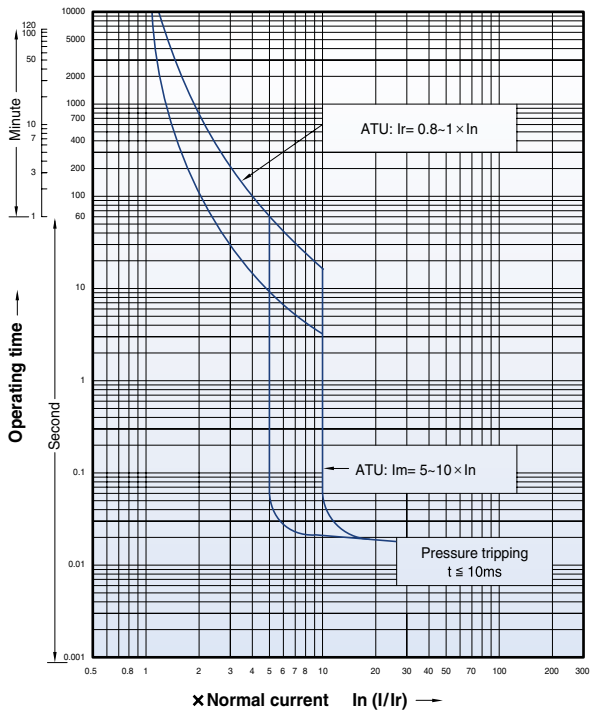


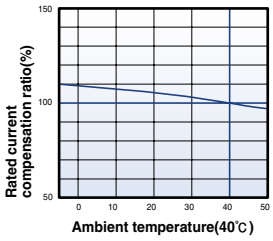


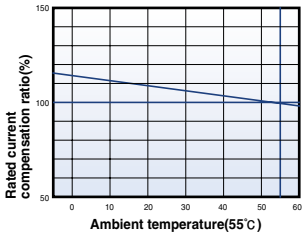
Circuit breakers with thermal-magnetic trip units

TS800

ATU
800A



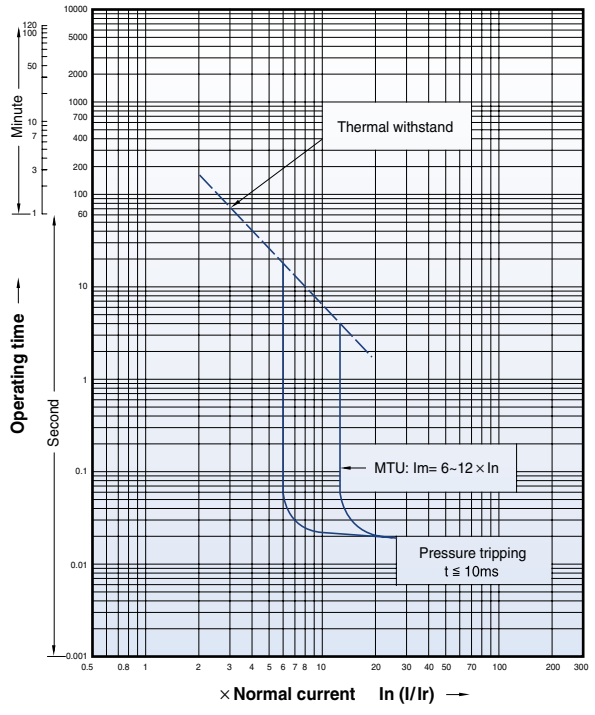




Circuit breakers with magnetic only trip units

TS800

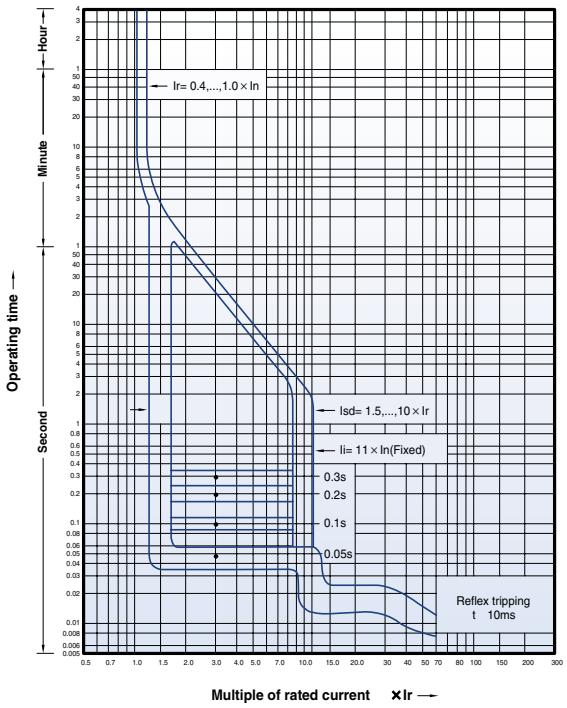
MTU
630A



Circuit breakers with electronic trip unit (ETS)

TS100 to TS800

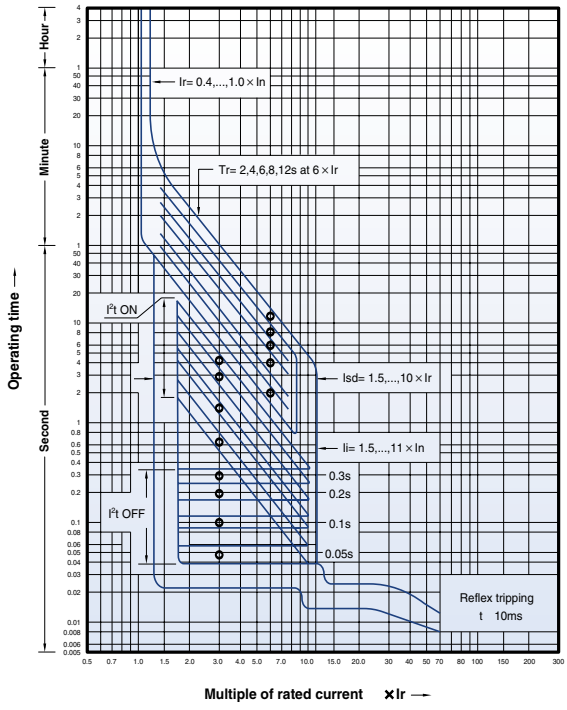
ETS23
ETS33
ETS43



Circuit breakers with electronic trip unit (ETM)

TS400
TS630
TS800

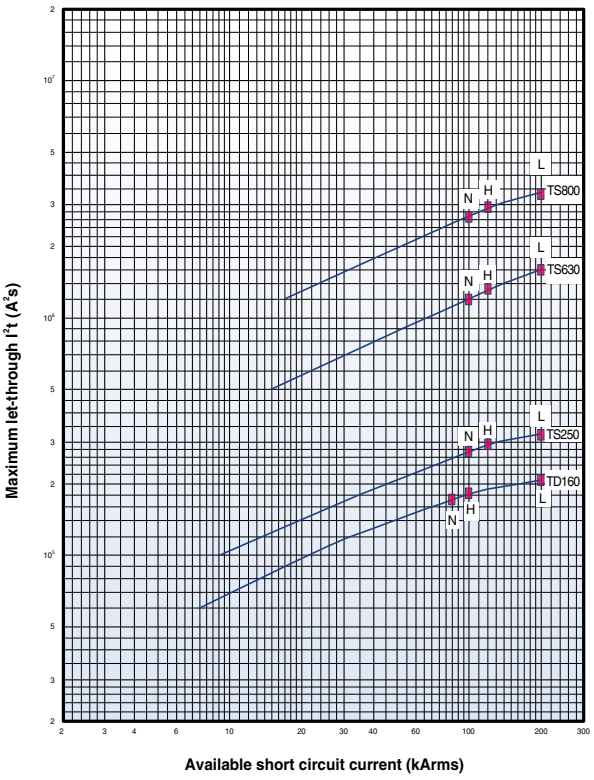
ETM33
ETM43



Specific let-through energy curves

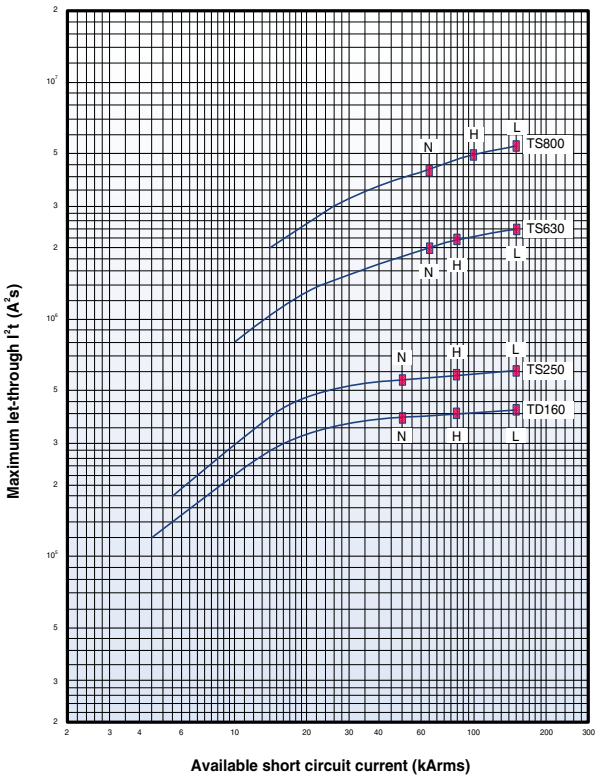
220/240V

Thermal stress



380/415V

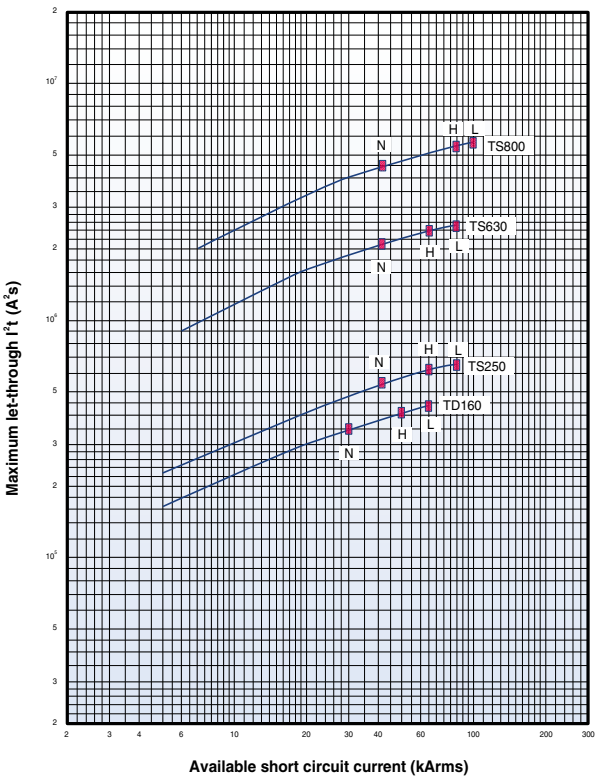
Thermal stress



Specific let-through energy curves

480/500V

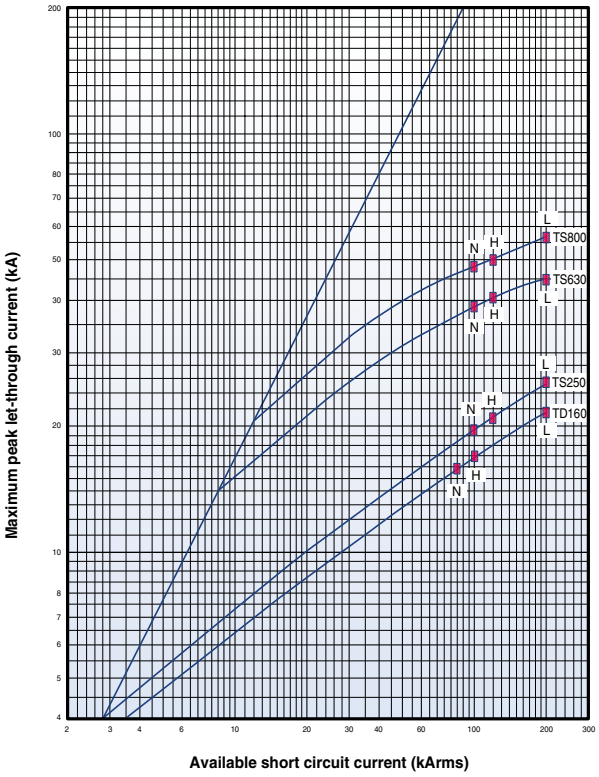
Thermal stress



Current-limiting curves

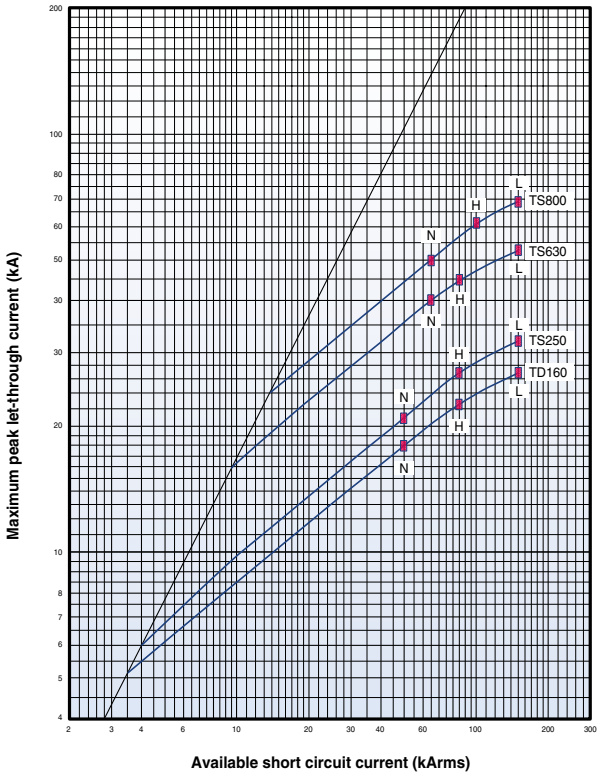
220/240V

Peak current



380/415V

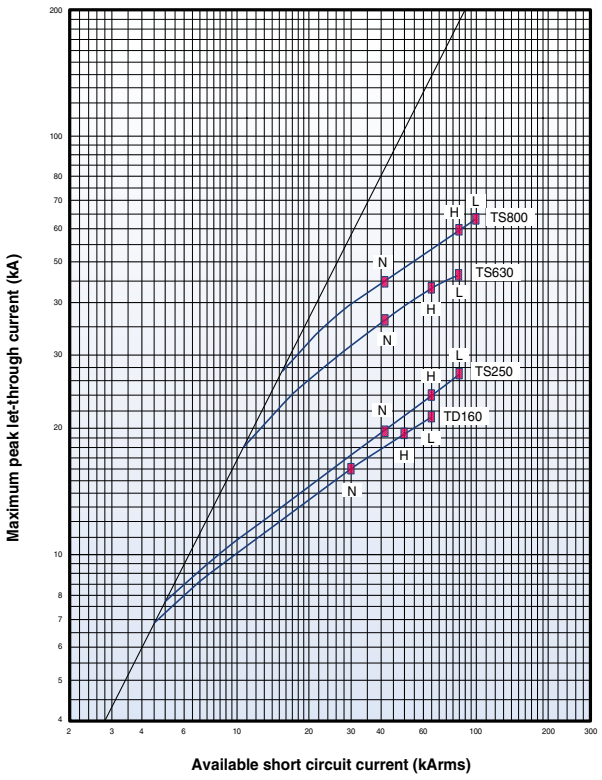
Peak current



Current-limiting curves

480/500V

Peak current

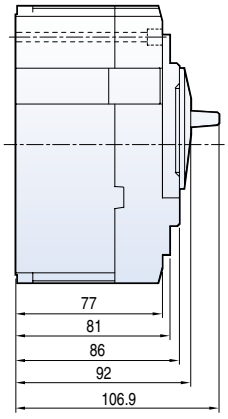


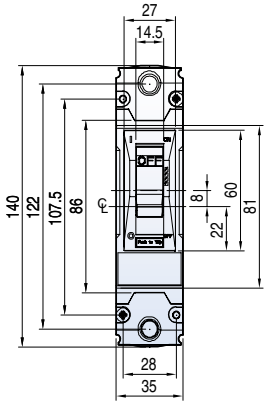
Overall dimensions

Susol

TD160

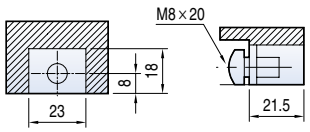
[mm]



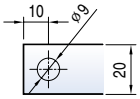


1P

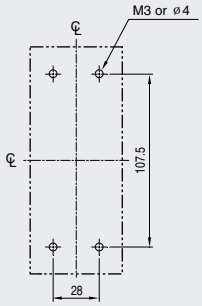
Terminal section



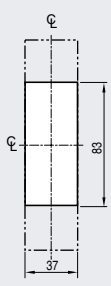
Conductor



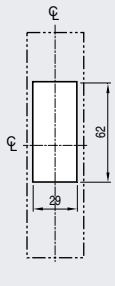
Panel drilling



Front panel cutting



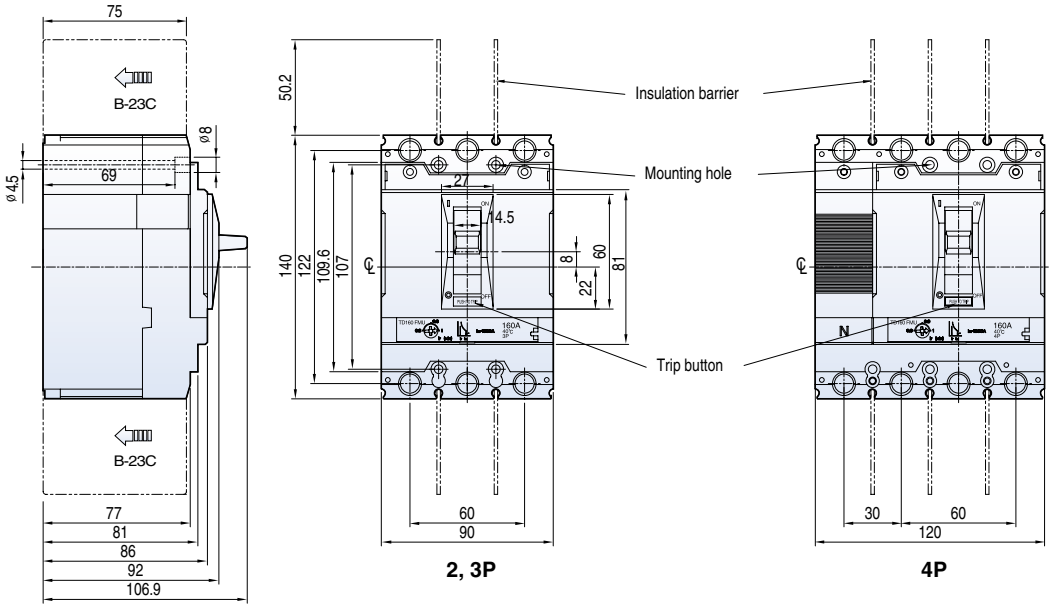
1P



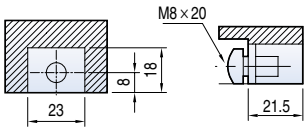
1P

TD100/160

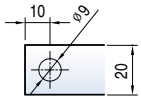
[mm]



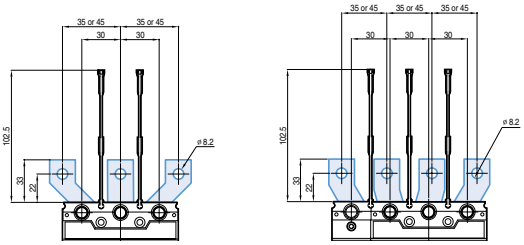
Terminal section



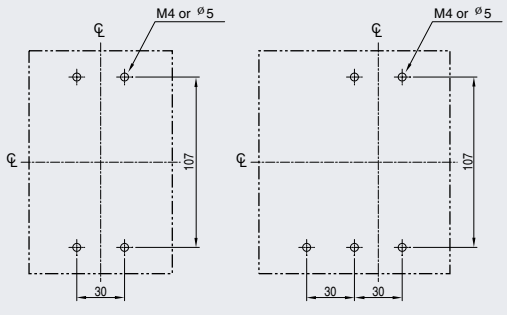
Conductor



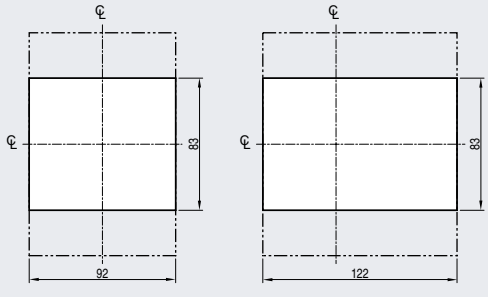
Spreader



Panel drilling



Front panel cutting

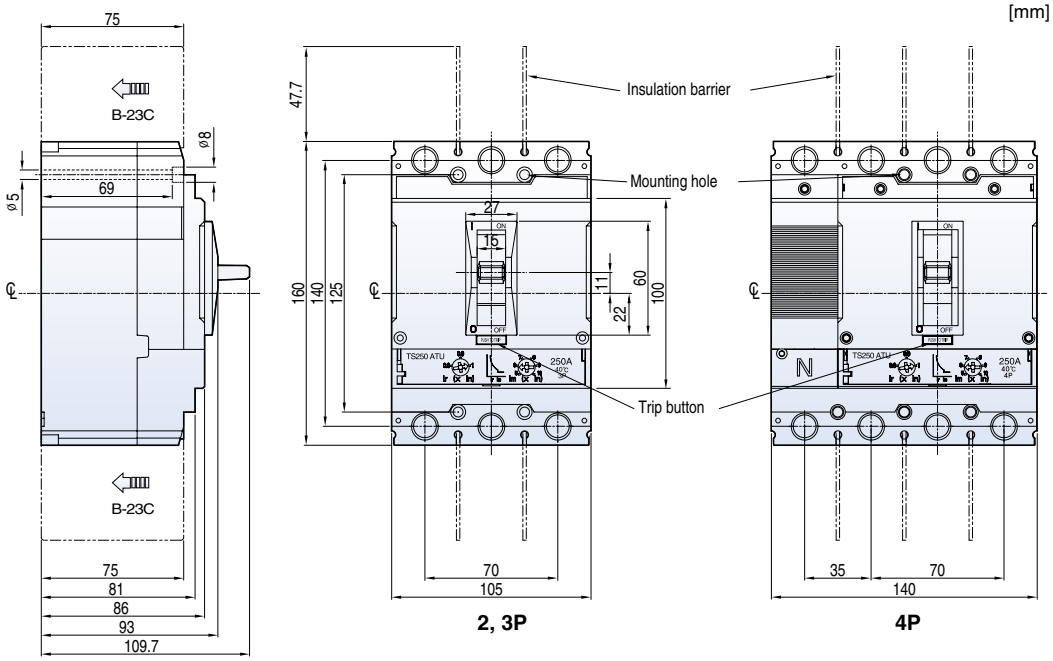


Overall dimensions

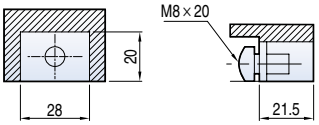
Susol

TS100/160/250

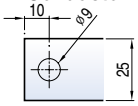
[mm]



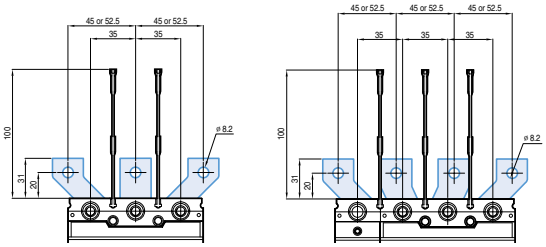
Terminal section



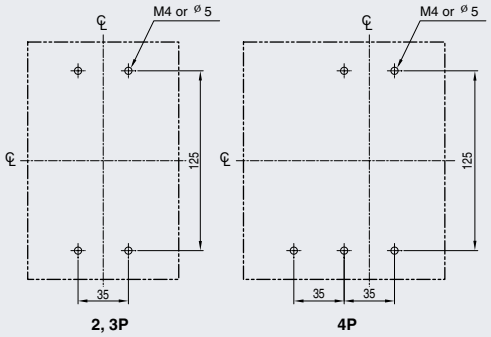
Conductor



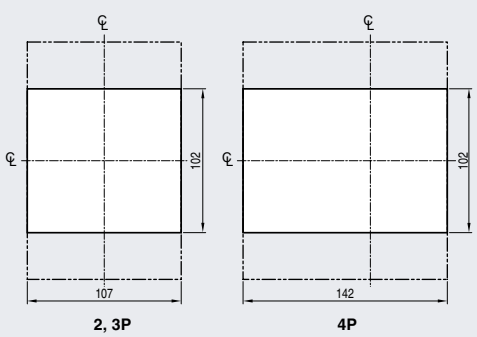
Spreader



Panel drilling

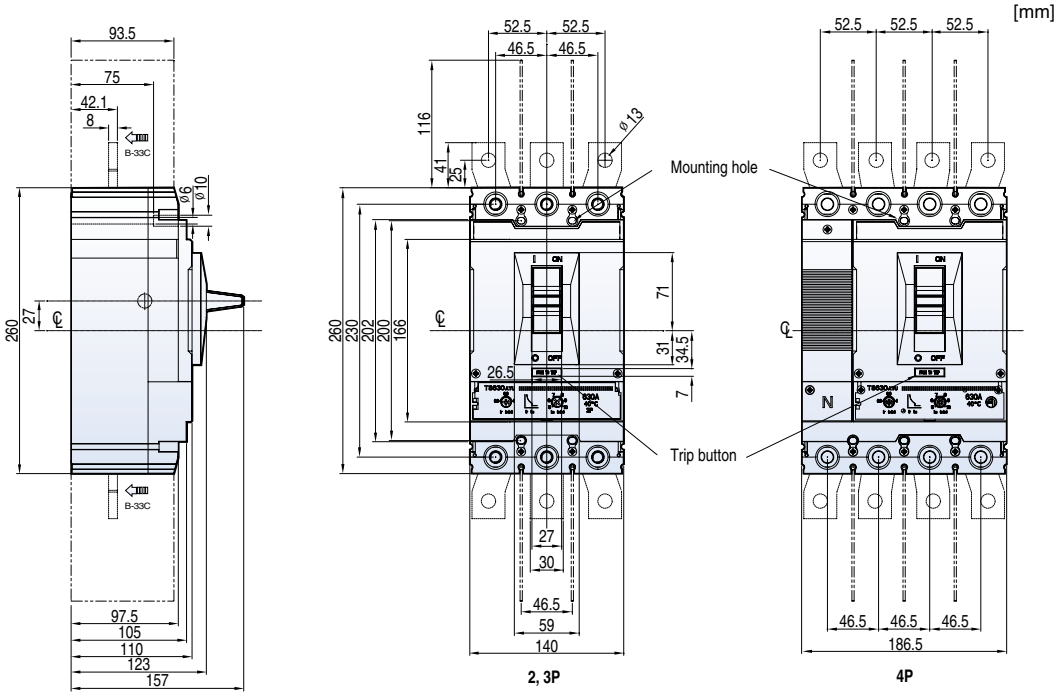


Front panel cutting

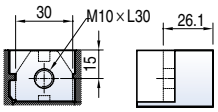


TS400/630

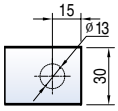
[mm]



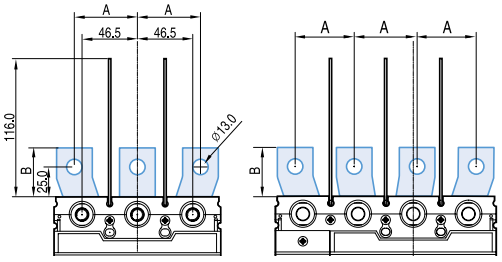
Terminal section



Conductor

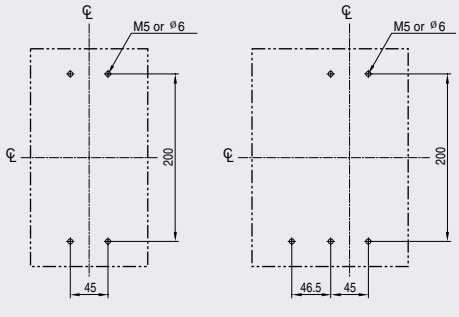


Spreader

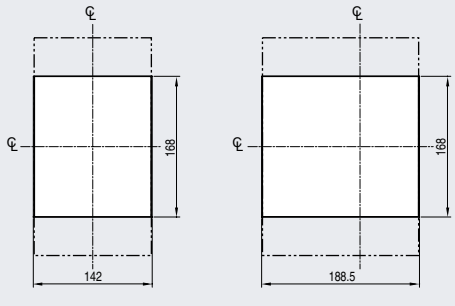


Type	A	B
SP32a, 33a, 34a	52.5	41.0
SP32b, 33b, 34b	70.0	54.0
SPS32, 33, 34	46.5	41.0

Panel drilling



Front panel cutting

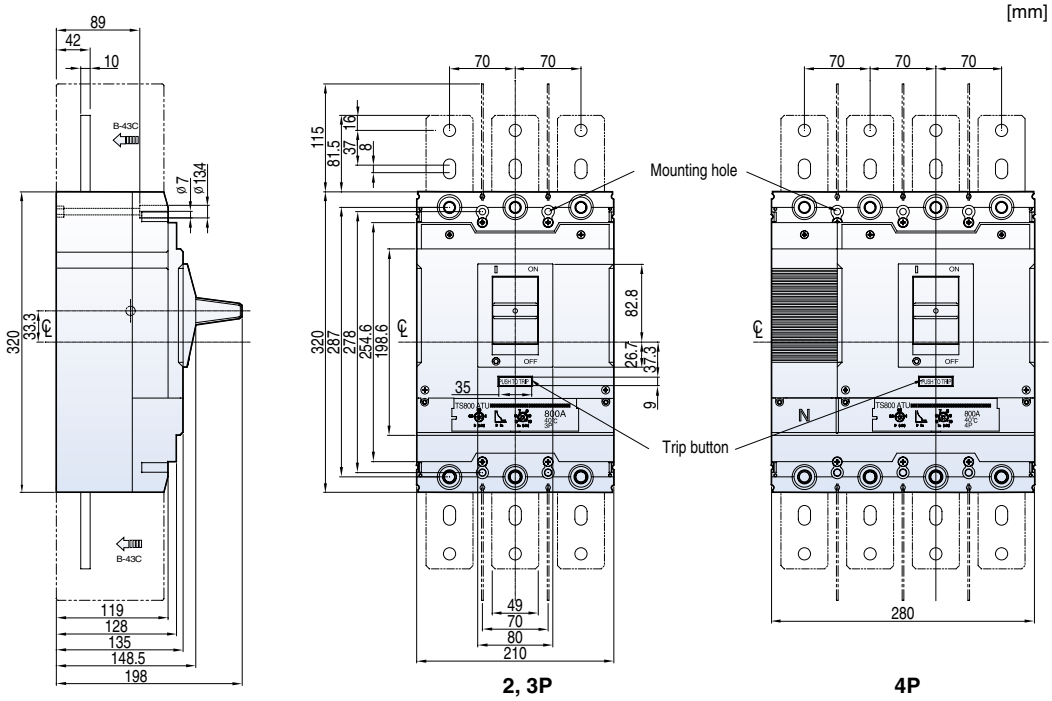


Overall dimensions

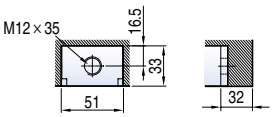
Susol

TS800

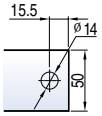
[mm]



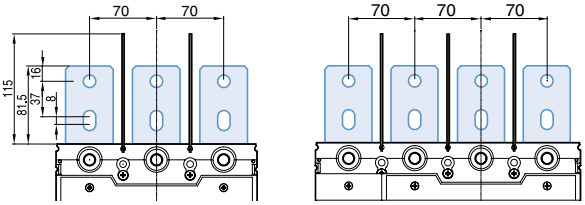
Terminal section



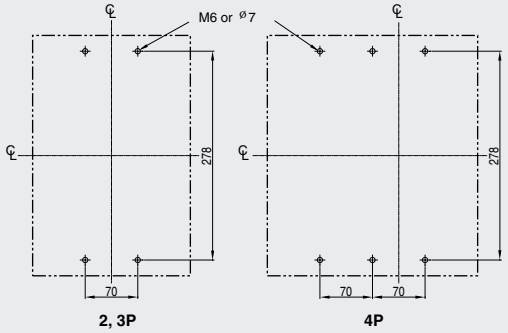
Conductor



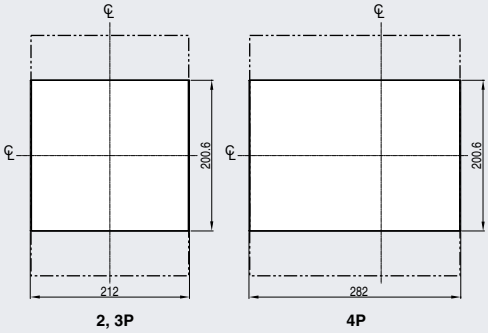
Spreader



Panel drilling



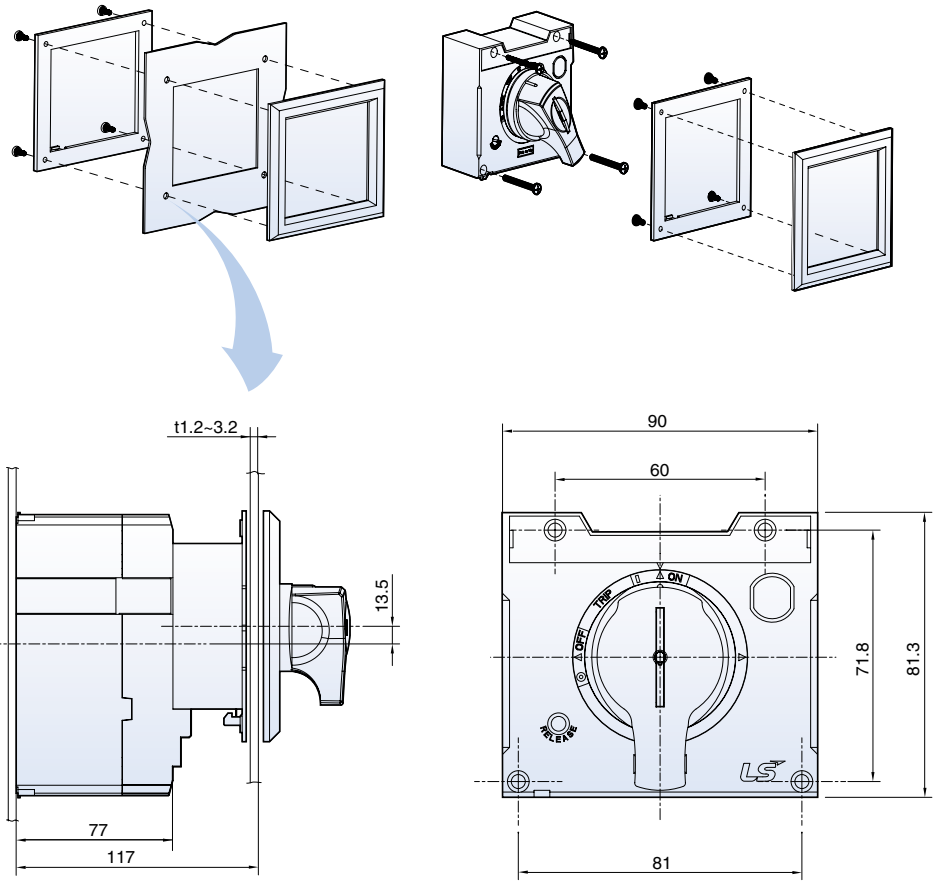
Front panel cutting



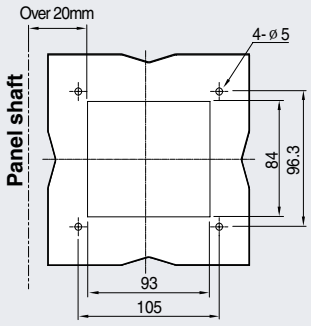
Direct rotary handles

DH1 & DHK1 for TD100/160

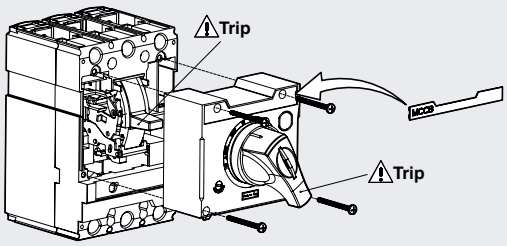
[mm]



Panel drilling



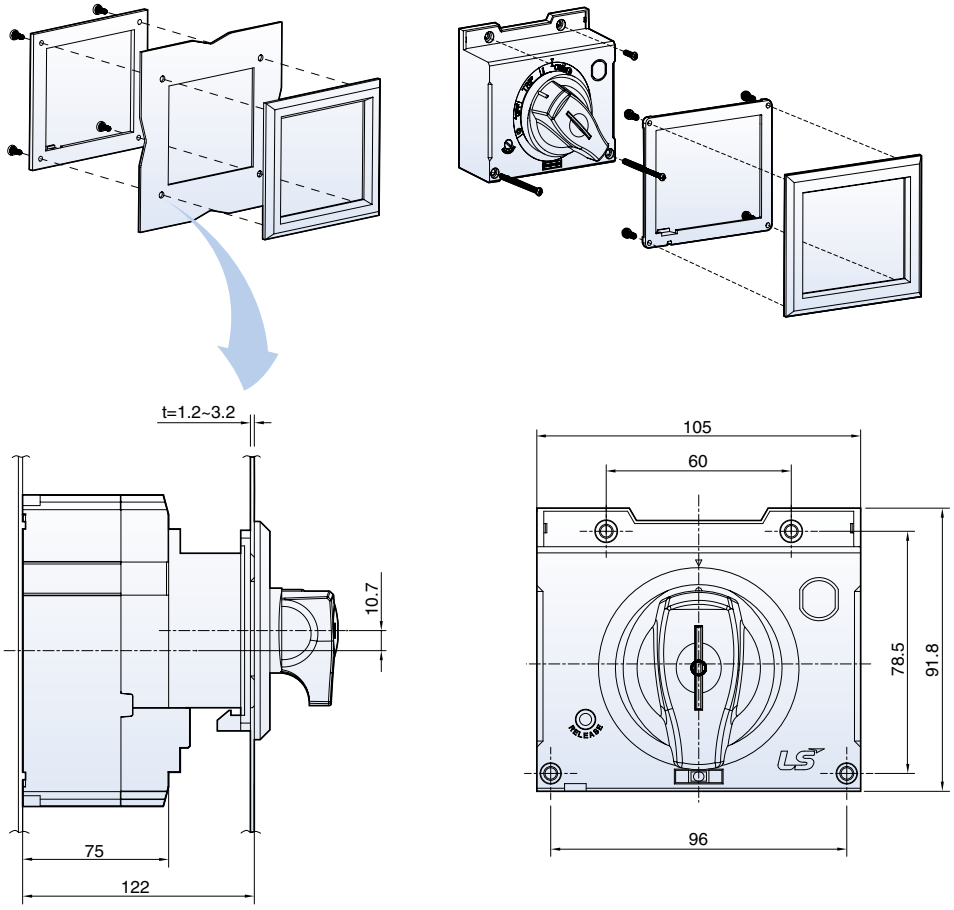
Way of installation



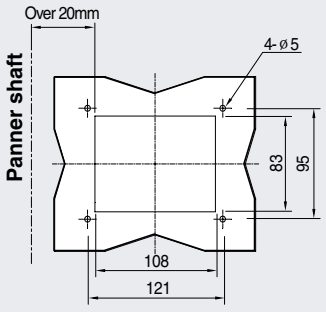
Direct rotary handles

DH2 & DHK2 for TS100/160/250

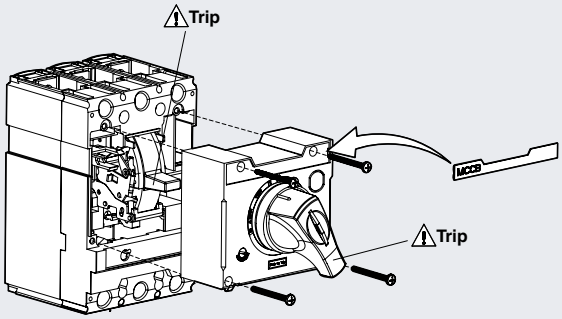
[mm]



Panel drilling



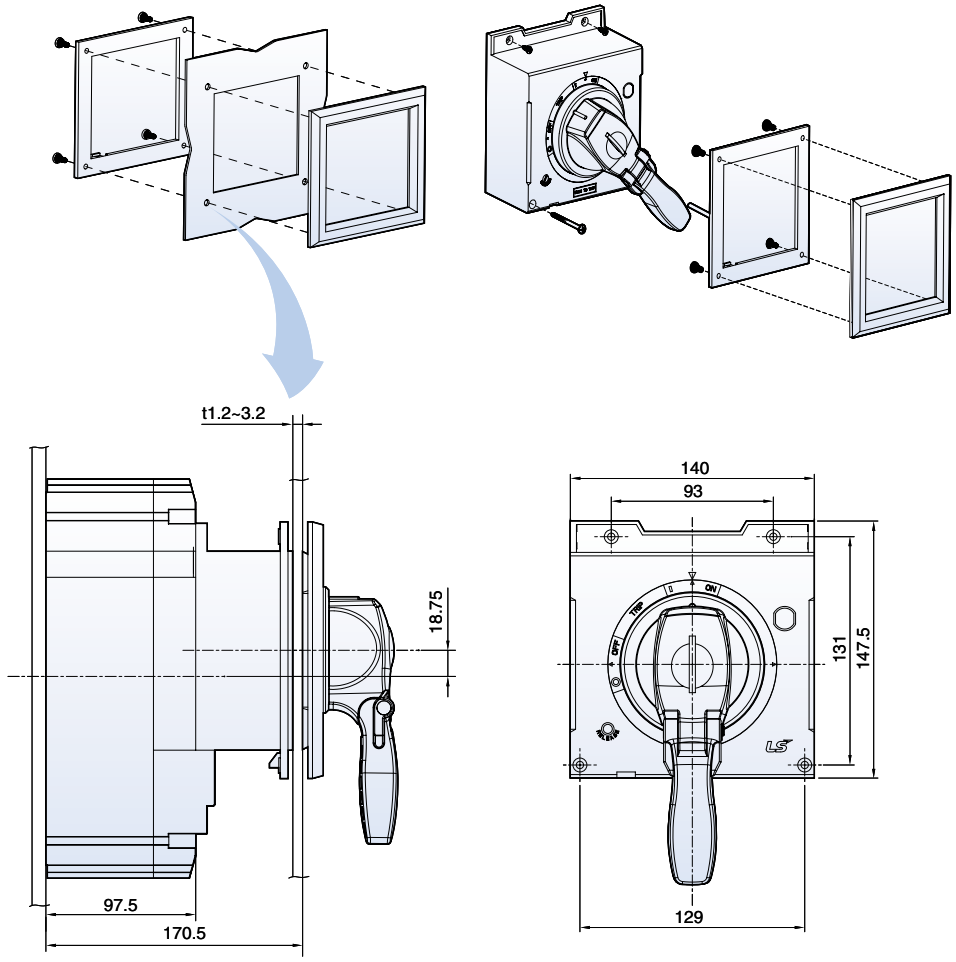
Way of installation



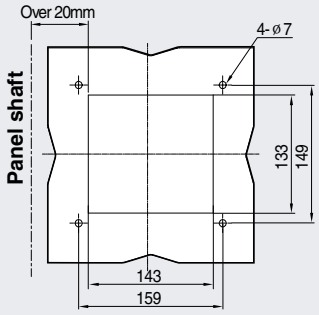
Direct rotary handles

DH3 & DHK3 for TS400/630

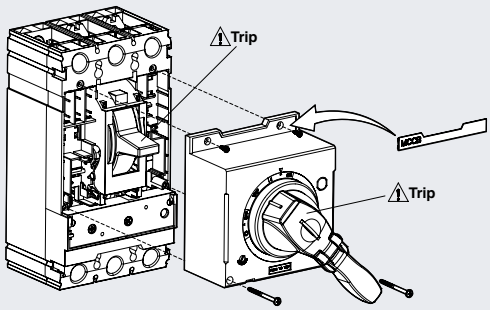
[mm]



Panel drilling



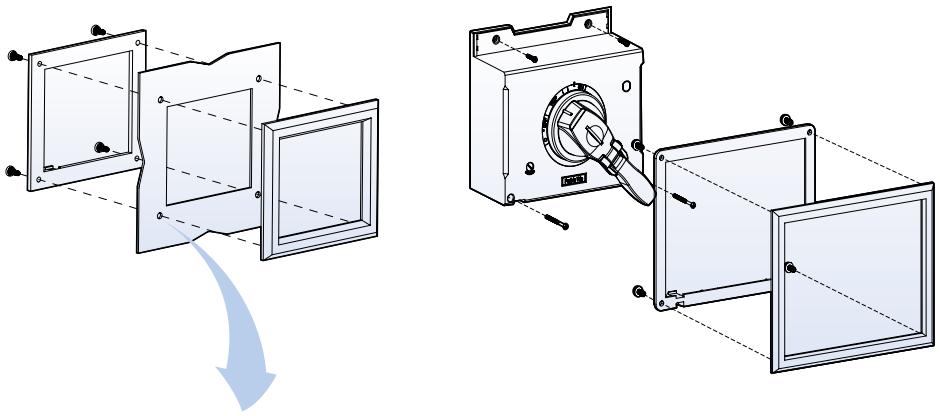
Way of installation

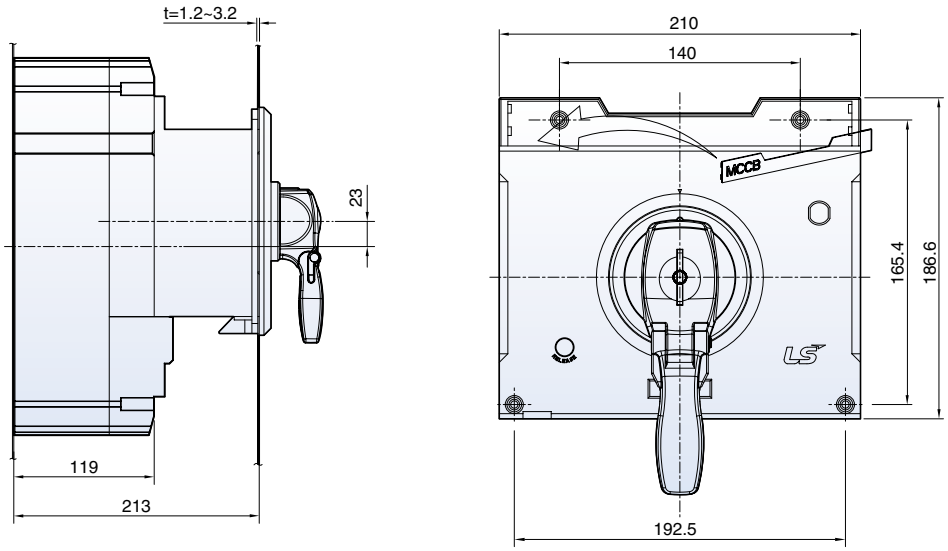


Direct rotary handles

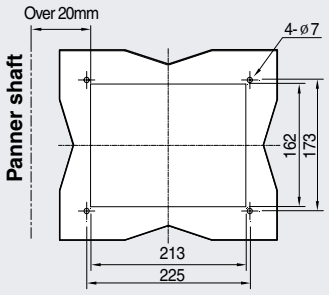
DH4 & DHK4 for TS800

[mm]

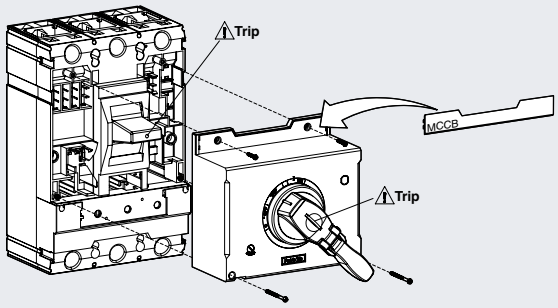




Panel drilling



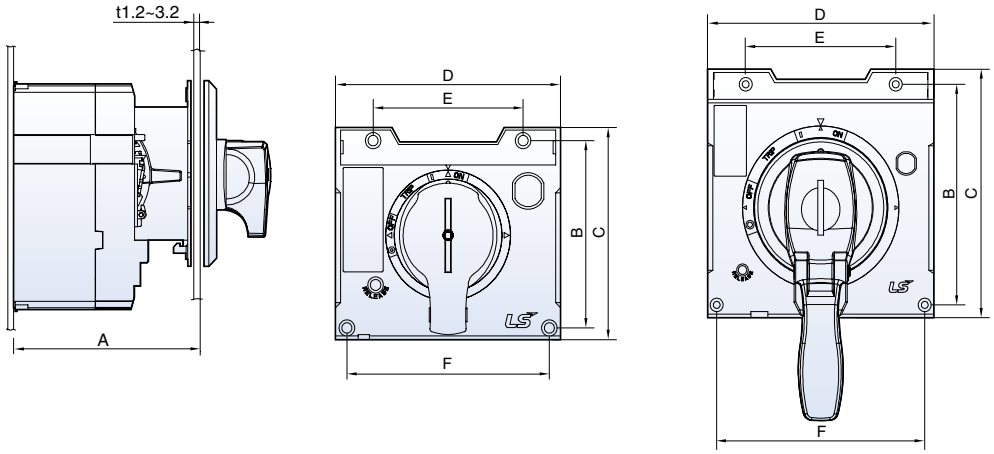
Way of installation



Direct rotary handles

Dimension table for D-handles

[mm]

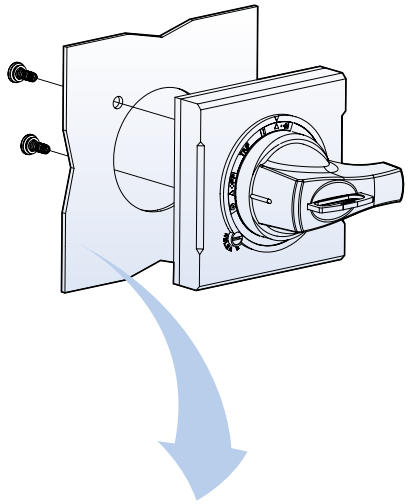


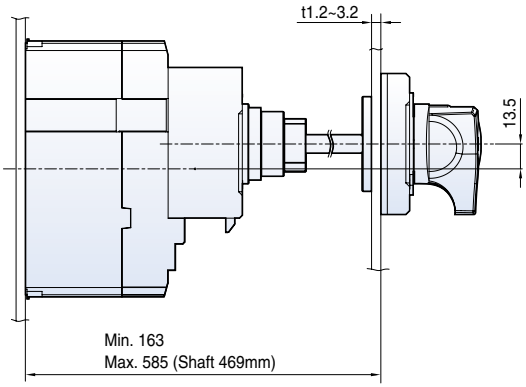
Applicable to	TD160	TS250	TS630	TS800
A (mm)	117	119	170.5	210
B (mm)	71.8	78.5	131	165.4
C (mm)	81.3	91.8	147.5	186.6
D (mm)	90	105	140	210
E (mm)	60	60	93	140
F (mm)	81	96	129	192.5

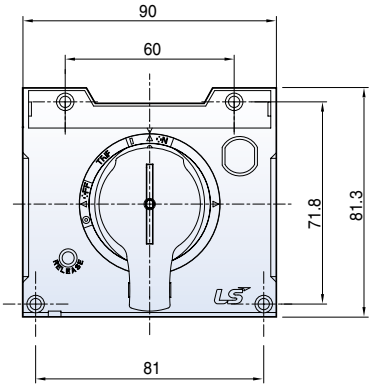
Extended rotary handles

EH1 for TD100/160

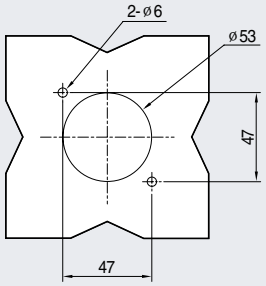
[mm]



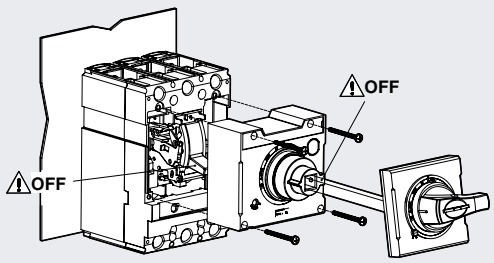




Panel drilling



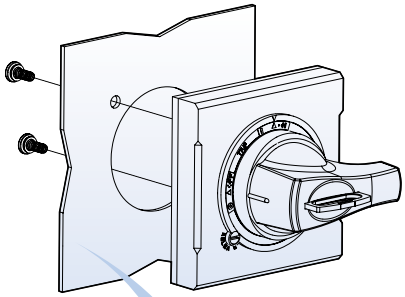
Way of installation

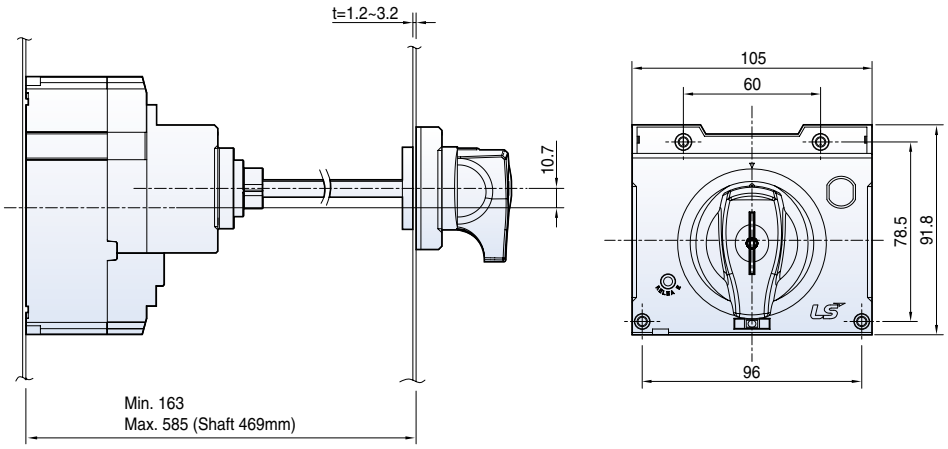


Extended rotary handles

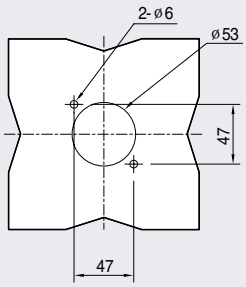
EH2 for TS100/160/250

[mm]

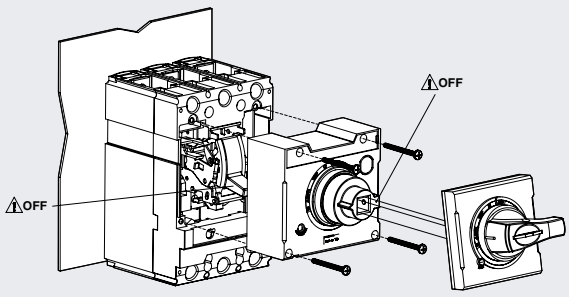




Panel drilling



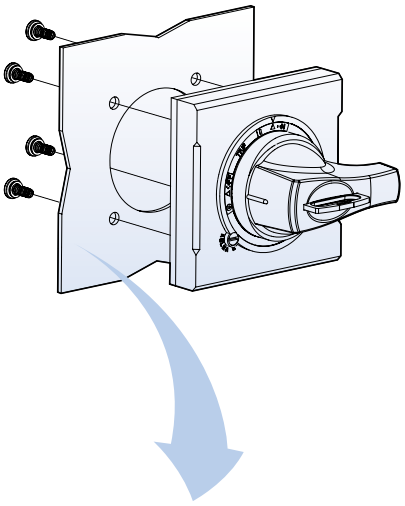
Way of installation

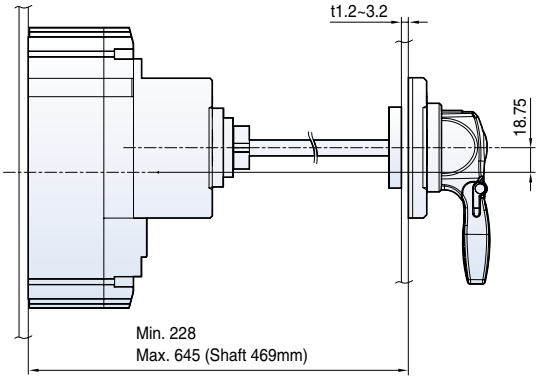


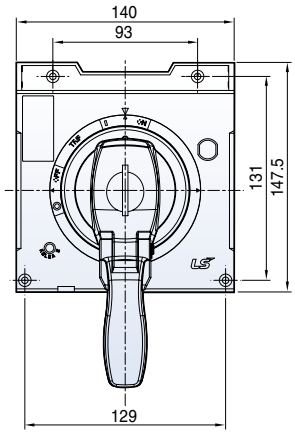
Extended rotary handles

EH3 for TS400/630

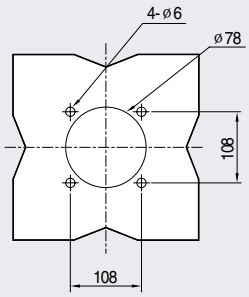
[mm]



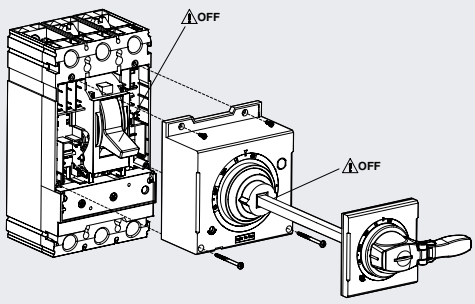




Panel drilling



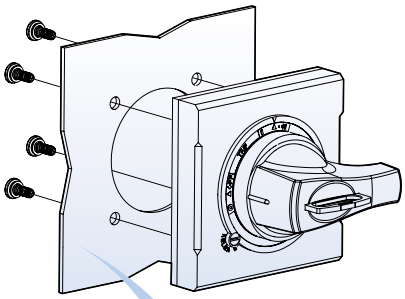
Way of installation

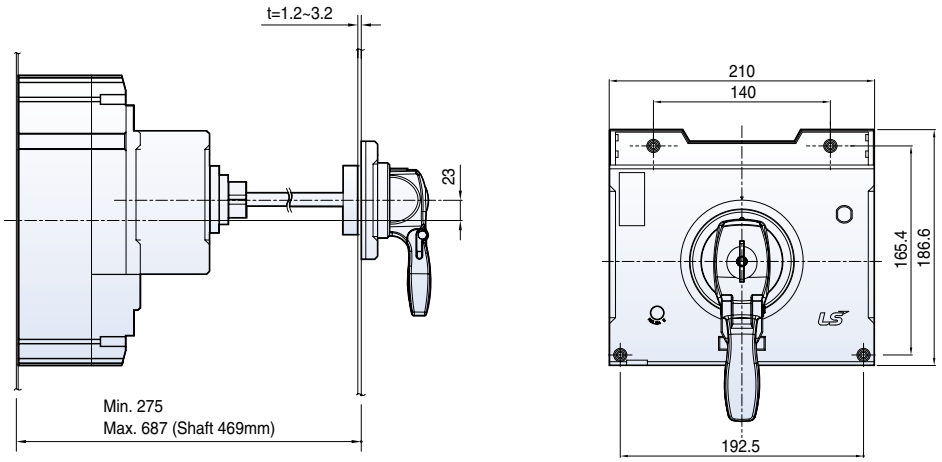


Extended rotary handles

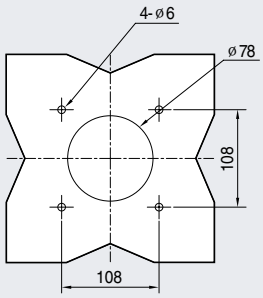
EH4 for TS800

[mm]

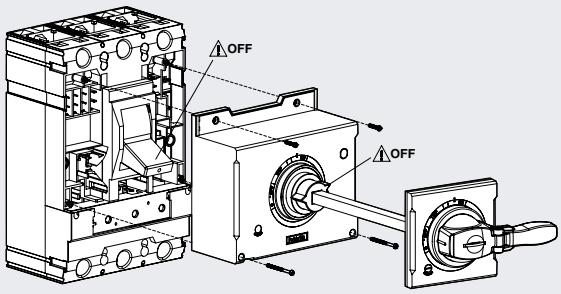




Panel drilling



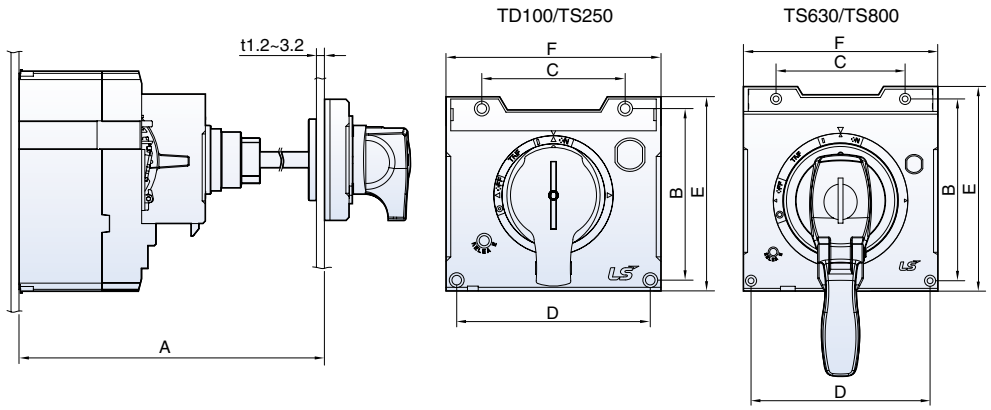
Way of installation



Extended rotary handles

Dimension table for E-handles

[mm]

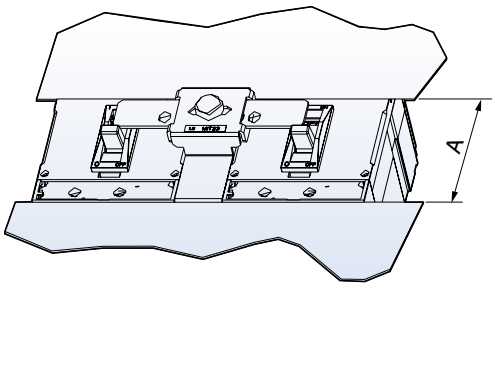


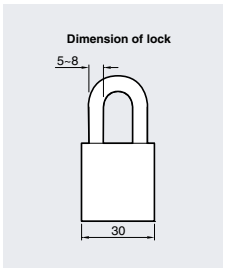
Model	EH1	EH2	EH3	EH4
Applicable to	TD160	TS250	TS630	TS800
A (mm)	Min. 163	Min. 163	Min. 228	Min. 275
	Max. 585	Max. 585	Max. 645	Max. 687
B (mm)	71.8	78.5	131	165.4
C (mm)	60	60	93	140
D (mm)	81	96	129	192.5
E (mm)	81.3	91.8	147.5	186.6
F (mm)	90	105	140	210
Shaft (mm)	469	469	469	469

Mechanical interlocking device

MIT13, MIT23, MIT33, MIT43

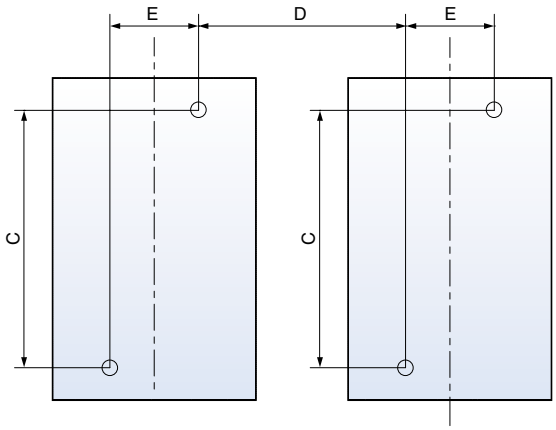
[mm]





	A (mm)	B (mm)
TD160	83	86
TS250	102	86
TS630	168	110
TS800	201	135

Mounting dimension for MIT



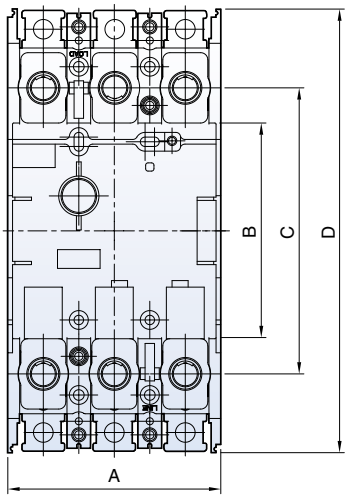
2, 3Pole MCCBs	C(mm)	D(mm)	E(mm)
TD100/160	107	90	30
TS100/160/250	125	105	35
TS400/630	200	139.5	46.5
TS800	278	210	70

4Pole MCCBs	C(mm)	D(mm)	E(mm)
TD100/160	107	90	60
TS100/160/250	125	105	70
TS400/630	200	139.5	93
TS800	278	210	140

Plug-in device

Plug-in device for TD100/160

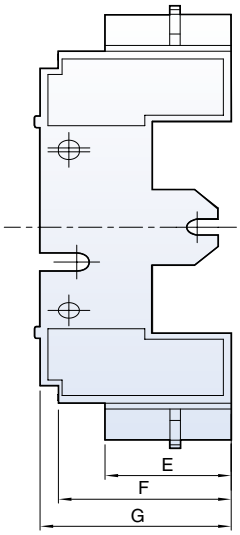
[mm]



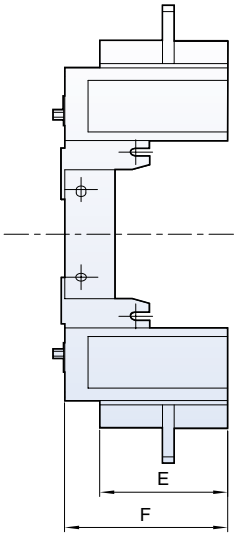
TD100/160

	TD100/160
A(mm)	90
B(mm)	92
C(mm)	122
D(mm)	189.2
E(mm)	32.5
F(mm)	47
G(mm)	75

Plug-in devices for TS100/160/250/400/630/800



TS100/160/250/400/630



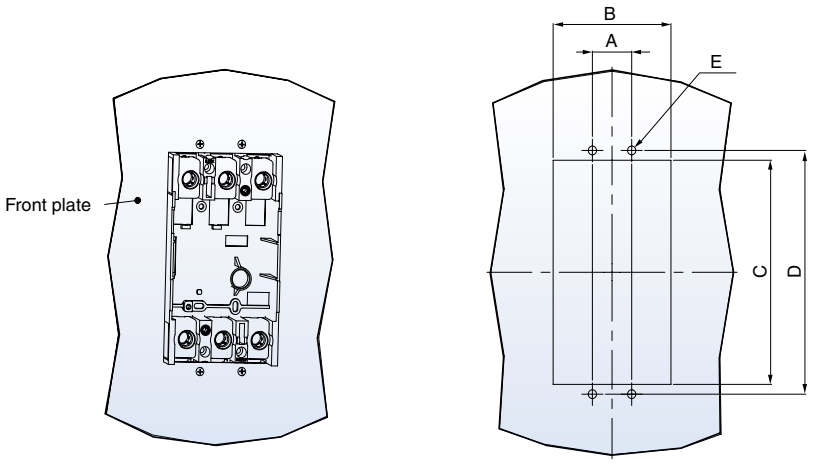
TS800

	TS100/160/250	TS400/630	TS800
A(mm)	105	140	210
B(mm)	103.5	186.4	220
C(mm)	140	230	287
D(mm)	220	335.2	451
E(mm)	48.2	73	110
F(mm)	66	94.2	140
G(mm)	73	102	-

Plug-in device

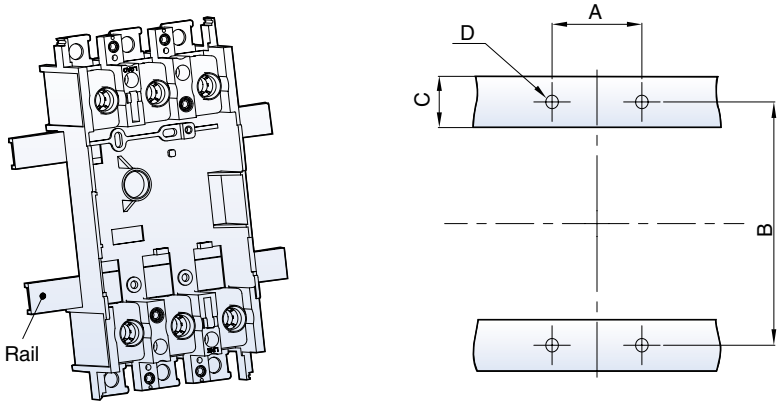
Mounting to front plate

[mm]



Applicable to	TD100/160	TS100/160/250	TS400/630	TS800
A (mm)	30	35	46.5	70
B (mm)	90	105	140	210
C (mm)	160	182	290	387
D (mm)	174	202	314	422
E (mm)	M4 or ø 5	M4 or ø 5	M5 or ø 6	M6 or ø 7

Rail mounting

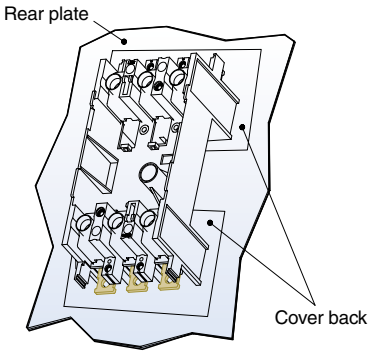


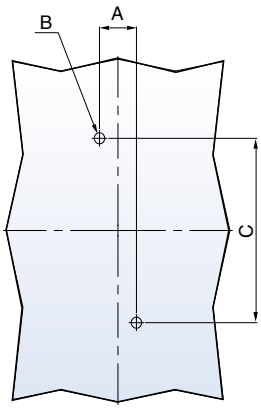
Applicable to	TD100/160	TS100/160/250	TS400/630	TS800
A (mm)	30	70	100	156
B (mm)	76	77.8	101.6	104.2
C (mm)	14	28	32	43
D (mm)	M4 or ø 5	M6 or ø 7	M6 or ø 7	M8 or ø 9

Plug-in device

Mounting to rear plate with cover back

[mm]

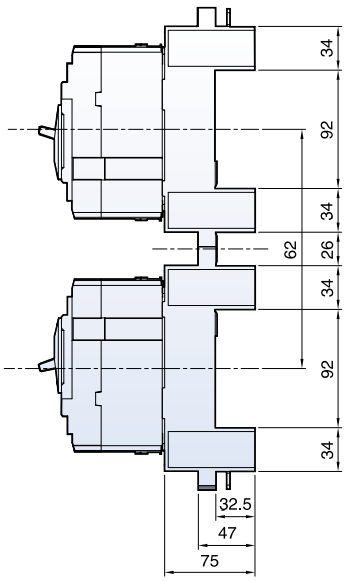


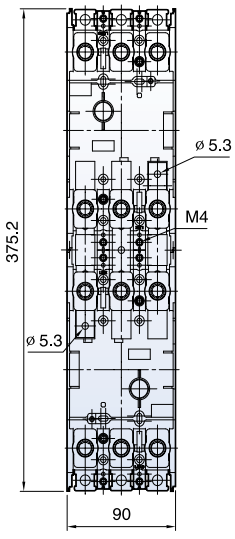


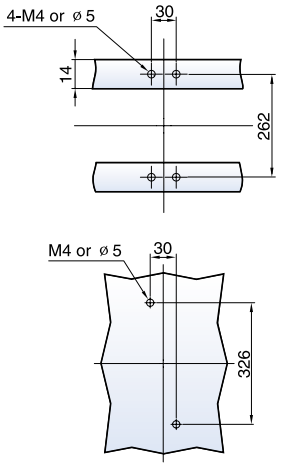
Applicable to	TD100/160	TS100/160/250	TS400/630	TS800
A (mm)	30	35	46.5	70
B (mm)	140	154	216	343
C (mm)	M4 or ø 5	M4 or ø 5	M5 or ø 6	M6 or ø 7

Mounting

[mm]



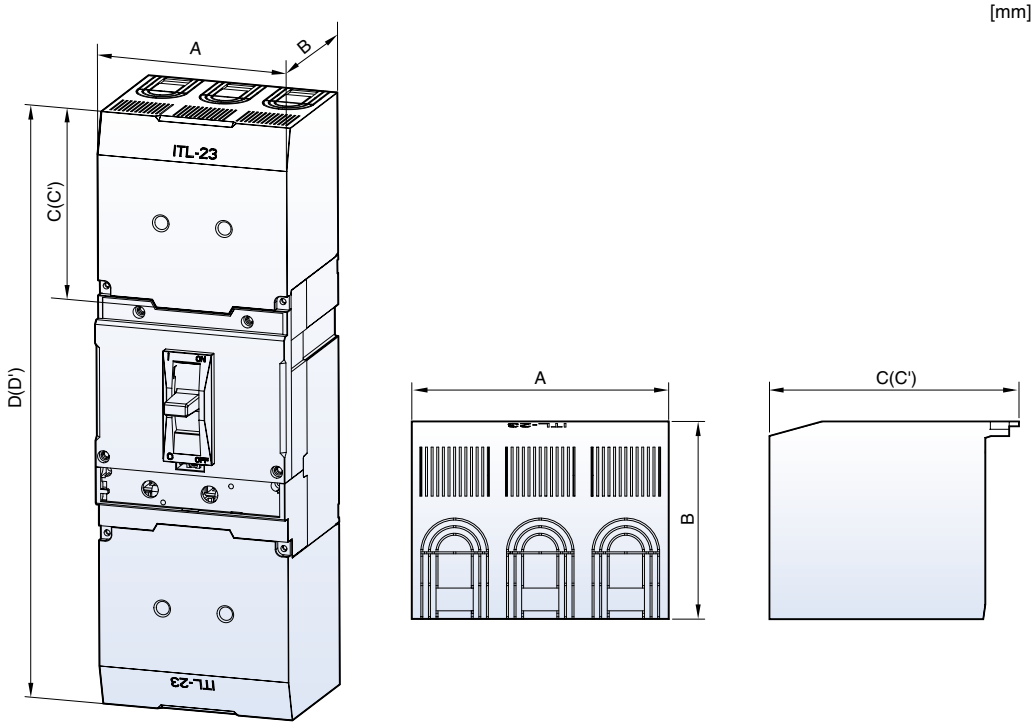




Terminal cover

ITS and ITL

[mm]



Applicable to	Type			Dimension(mm)					
Frame type	Pole	Long type	Short type	A	B	C (Long type)	C′ (Short type)	C (Long type)	D′ (Short type)
TD100, TD160	2P, 3P	ITL13	ITS13	90	80.8	48.5	30.5	196	160
	4P	ITL14	ITS14	120	80.8	32	25		
TS100, TS160, TS250	2P, 3P	ITL23	ITS23	105	80.8	102	36.3	321.4	190
	4P	ITL24	ITS24	140	80.8	98	32.3		
TS400, TS630	2P, 3P	ITL33	ITS33	140	105	144.5	54.8	479.4	300
	4P	ITL34	ITS34	186	105	138.5	48.8		
TS800	2P, 3P	ITL43	ITS43	210	127.8	181.5	61.5	600	360
	4P	ITL44	ITS44	280	127.8	172.5	52.5		

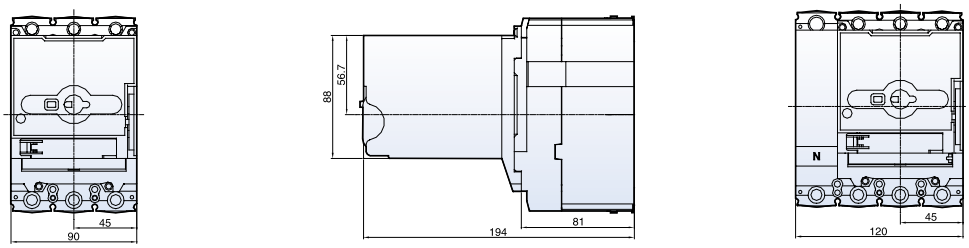
Circuit breaker with motor operator

MOP1, MOP2, MOP3, MOP4

[mm]

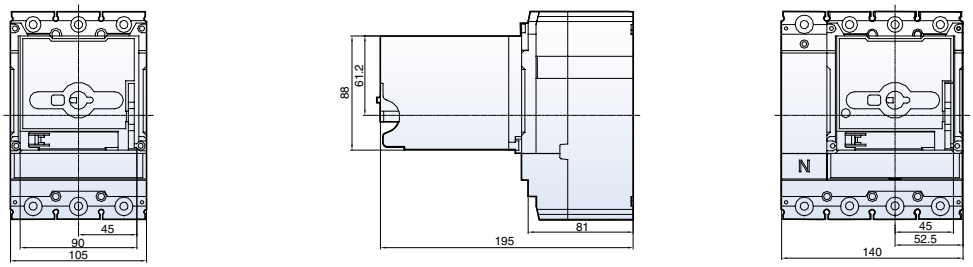
TD100N/H/L
TD160N/H/L

Circuit breaker with MOP1



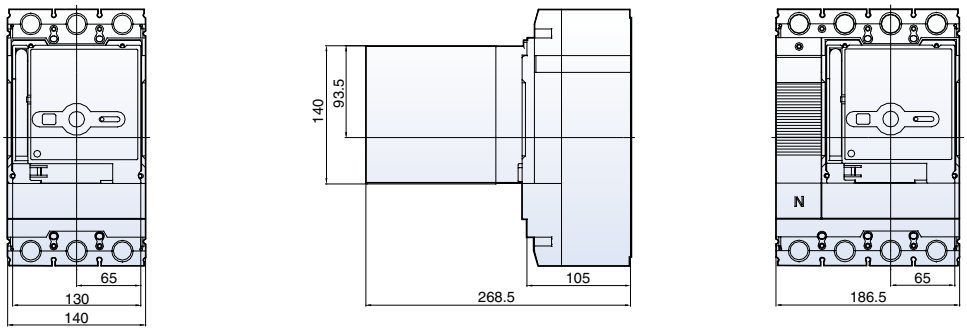
TS100N/H/L
TS160N/H/L
TS250N/H/L

Circuit breaker with MOP2



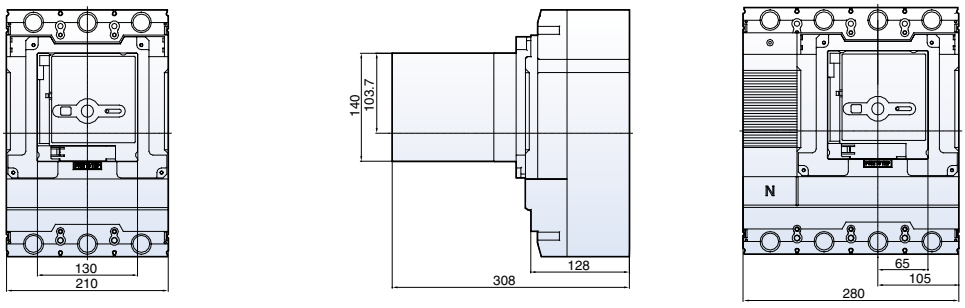
TS400N/H/L
TS630N/H/L

Circuit breaker with MOP3

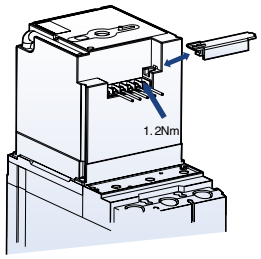


TS800N/H/L

Circuit breaker with MOP4

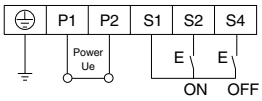


Motor operator



Standard connection

Circuit breaker On and Off controlled by remote operation and manual operation

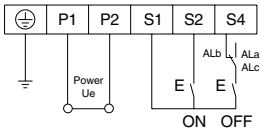


Connection with alarm switch (AL)

1) The below connection diagram is the method of using a alarm switch (AL) without shunt or undervoltage trip.
2) After clearing the fault surely, manual reset is mandatory in case of tripping due to an electrical fault.

Connection with FAL (only for the breakers with electronic trip unit ETS or ETM)

1) The below connection diagram is the method of using a FAL for circuit breakers with electronic trip unit.
2) After clearing the fault surely, manual reset is mandatory in case of tripping due to an electrical fault.



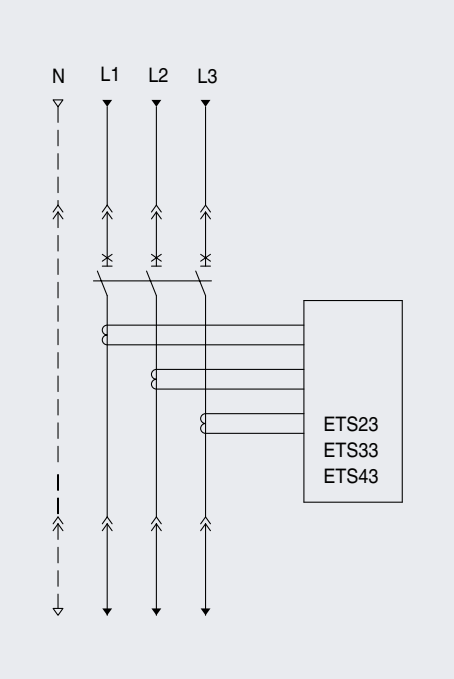
Wiring diagram

Susol

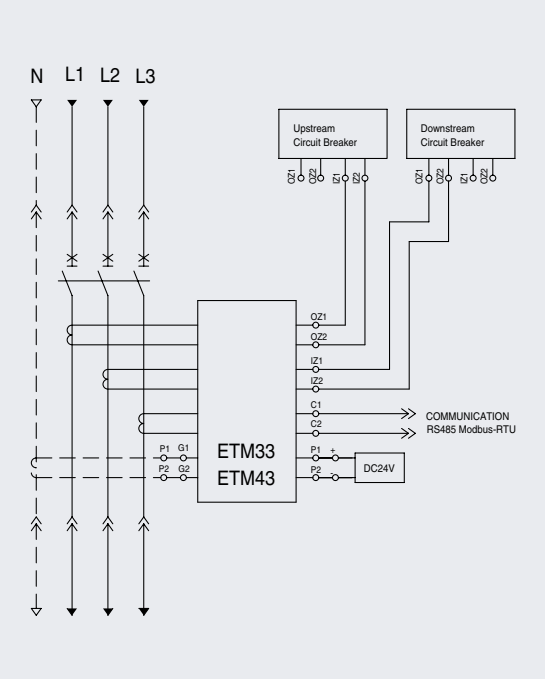
ETS23/ETS33/ETS43

The diagram is shown in the following conditions:

- Fixed version circuit-breaker (depending on type of circuit-breaker)
- Circuit breakers open.
- Releases not tripped



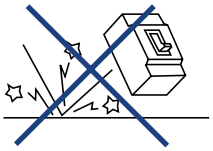
Three-pole circuit-breaker with
ETS23/ETS33/ETS43 electronic release



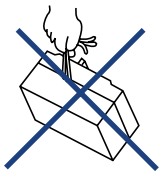
Three-pole circuit-breaker with
ETM33/ETM43 electronic release
(External natural current transformer)

Conditions for transport and storage

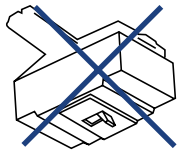
Transport



Do not drop the packing.

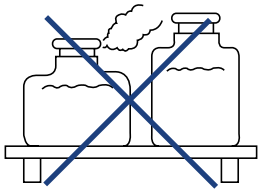


Don't bring the MCCB up with holding the wires for carrying.

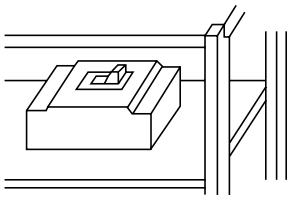


Don't bring the MCCB in a reverse state for carrying after installing on din rail.

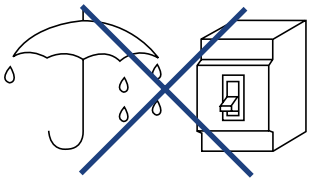
Storage



Avoid corrosive gas.

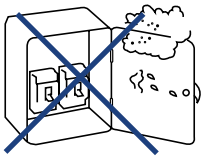


Keep the MCCB in state of Off or Trip position for storage.

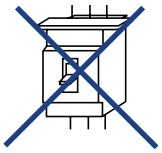


Avoid humid air.
Relative humidity: Max.85%

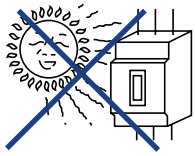
Installation



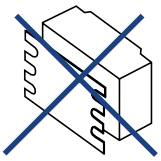
Avoid direct exposure to rain,oil, dust and powder etc.



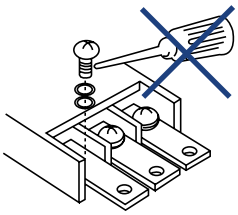
Don't block up the exhaust port.



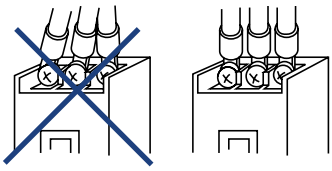
Avoid direct sunlight.



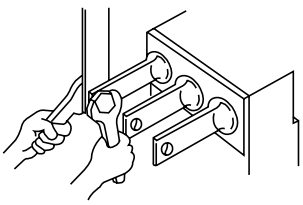
Do not remove the insulation plate at the back of MCCB.



Remove lubricating oil.



Hold the conductors firmly keeping the poles parallel with each other.



Don't deform the studs.
Fasten the conductors of rear connection type without deforming the stud.

Installation recommendations

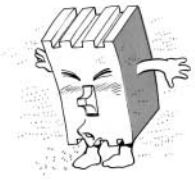
Susol TD and TS circuit breakers equipped with thermal magnetic trip units may be used between -25°C and +70°C. For temperature higher than 40°C, the circuit breakers should be derated. And, altitude does not significantly affect circuit breaker characteristics up to 2000m.

Please do not install the circuit breakers in place of environment with shock, high temperature, humidity, dust, corrosive gases, excessive vibration, etc. to prevent fire accidents and malfunction of the device.
1) Operating Ambient Temperature: -5 to 40°C
2) Permissible storage-temperature: - 40°C to 85°C
3) Relative Humidity: 45~85%
4) Altitude: less than 2,000m

Circuit breakers equipped with thermal magnetic trip units
For temperature higher than 40°C, the circuit breakers should be derated. But, on a request, we can supply Susol TD and TS circuit breakers which are particularly designed to hold 100% rated current (In) at 55°C without tripping in normal condition.

Circuit breakers equipped with electronic trip units
Susol TS circuit breakers equipped with electronic trip units may be used between -20°C and +70°C. For temperature higher than 40°C, the circuit breakers should be derated.

Susol TD and TS circuit breakers equipped with thermal magnetic trip units are designed to enable power supply, switching and short circuit breaking by -25°C. And, the permissible storage temperature range in the original packing is -40°C to + 85°C.



For the use of where dust or vapour is much contained, it is strongly recommended to put it into enclosure of dustproof or waterproof. Excessive vibration may cause tripping, breaks in connections or damage to mechanical parts.

In the environment containing corrosive gas, it is recommended to use MCCB of added corrosion resistive enclosure or in any enclosure of protective structure.

MCCB c/w trip unit

Series	AF	Rated ultimate short-circuit breaking capacity at 415VAC		Type of trip unit	Rated current	No of pole		Ambient temperature
TD	160	N		FMU	160A	3P		
TD	100	N	50kA	FTU	16, 20, 25, 32, 40, 50, 63, 80, 100A			
		H	85kA	FMU	16, 20, 25, 32, 40, 50, 63, 80, 100A	2P	3P2T	
		L	150kA			3P	3P3T	40°C
TD	160	N	50kA	FTU	100, 125, 160A	4P	4P3T	55°C
		H	85kA	FMU	100, 125, 160A		4P4T	
		L	150kA	DSU	160A		4P3T+N/2	
		NA	- (only for DSU)					
TS	250	N		ATU	250A	3P		
TS	100			FTU	40, 50, 63, 80, 100A			
		N	50kA	FMU	40, 50, 63, 80, 100A			
		H	85kA	MTU	1.6, 3.2, 6.3, 12, 20, 32, 50, 63, 100A			
		L	150kA	ETS23	40, 80A			
		NA	- (only for DSU)	DSU	100A			
TS	160			FTU	100, 125, 160A			
		N	50kA	FMU	100, 125, 160A			
		H	85kA	ATU	125, 160A			
		L	150kA	MTU	32, 50, 63, 100, 160A			
		NA	- (only for DSU)	ETS23	40, 80, 160A			
				DSU	160A			
TS	250			FTU	125, 160, 200, 250A			
		N	50kA	FMU	125, 160, 200, 250A			
		H	85kA	ATU	125, 160, 200, 250A			
		L	150kA	MTU	100, 160, 220A			
		NA	- (only for DSU)	ETS23	40, 80, 160, 250A			
				DSU	250A			
TS	400			FTU	300, 400A	2P	3P2T	40°C
		N	65kA	FMU	300, 400A	3P	3P3T	55°C
		H	85kA	ATU	300, 400A	4P	4P3T	
		L	150kA	MTU	320A		4P4T	
		NA	- (only for DSU)	ETS33	160, 250, 400A		4P3T+N/2	
				ETM33	160, 250, 400A			
				DSU	400A			
TS	630			FTU	500, 630A			
		N	65kA	FMU	500, 630A			
		H	85kA	ATU	500, 630A			
		L	150kA	MTU	500A			
		NA	- (only for DSU)	ETS33	160, 250, 400, 630A			
				ETM33	160, 250, 400, 630A			
				DSU	630A			
TS	800			FTU	700, 800A			
		N	65kA	FMU	800A			
		H	100kA	ATU	800A			
		L	150kA	MTU	630A			
		NA	- (only for DSU)	ETS43	630, 800A			
				ETM43	630, 800A			
				DSU	800A			

Example) 1. TD100N FTU100A 3P2T
2. TS160N FMU160A 3P3T
3. TS250N ATU250A 4P3T
4. TS800L ETS43 800A 3P3T

Note) 1. Type of trip units
(1) FTU Fixed thermal, fixed magnetic
(2) FMU Adjustable thermal, fixed magnetic
(3) ATU Adjustable thermal, adjustable magnetic
(4) MTU Magnetic only Trip Unit
(5) ETS Electronic Trip Unit, Standard
(6) ETM Electronic Trip Unit, Multifunction (11 options)
(7) DSU Disconnecting Switch Unit

2. Electronic type and MTU type MCCBs are only available in 3 pole.
3. Option for ETM33 (Please refer to page number 20 ~ 21 for more details.)
(1) ETM33 A (4) ETM33 AC (7) ETM33 ZA (10) ETM33 ZAC
(2) ETM33 E (5) ETM33 AEC (8) ETM33 ZE (11) ETM33 ZAEC
(3) ETM33 AE (6) ETM33 Z (9) ETM33 ZAE
4. Option for ETM43 (Please refer to page number 20 ~ 21 for more details.)
(1) ETM43 A (4) ETM43 AC (7) ETM43 ZA (10) ETM43 ZAC
(2) ETM43 E (5) ETM43 AEC (8) ETM43 ZE (11) ETM43 ZAEC
(3) ETM43 AE (6) ETM43 Z (9) ETM43 ZAE

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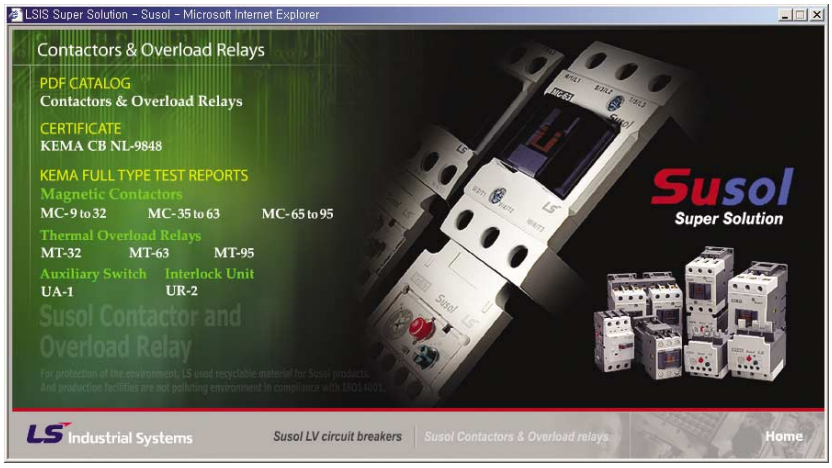

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