

E series MCCBs

Low Voltage Circuit Breakers



LSELECTRIC

E series MCCBs

Low Voltage Circuit Breakers

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E Series circuit breakers are reliable and cost effective for industrial & Commercial buildings.



E series MCCBs

Reliable and economic solution for basic applications



TD100/160E

90(W) x 140(H) x 86mm(D)



TS100/160/250E

105(W) x 160(H) x 86mm(D)



TS400/630E

140(W) x 260(H) x 110mm(D)



Sharing all accessories with the other E series for the economic solution of the system:

- Short circuit current up to 440V 36kA
- Rated current up to 630A

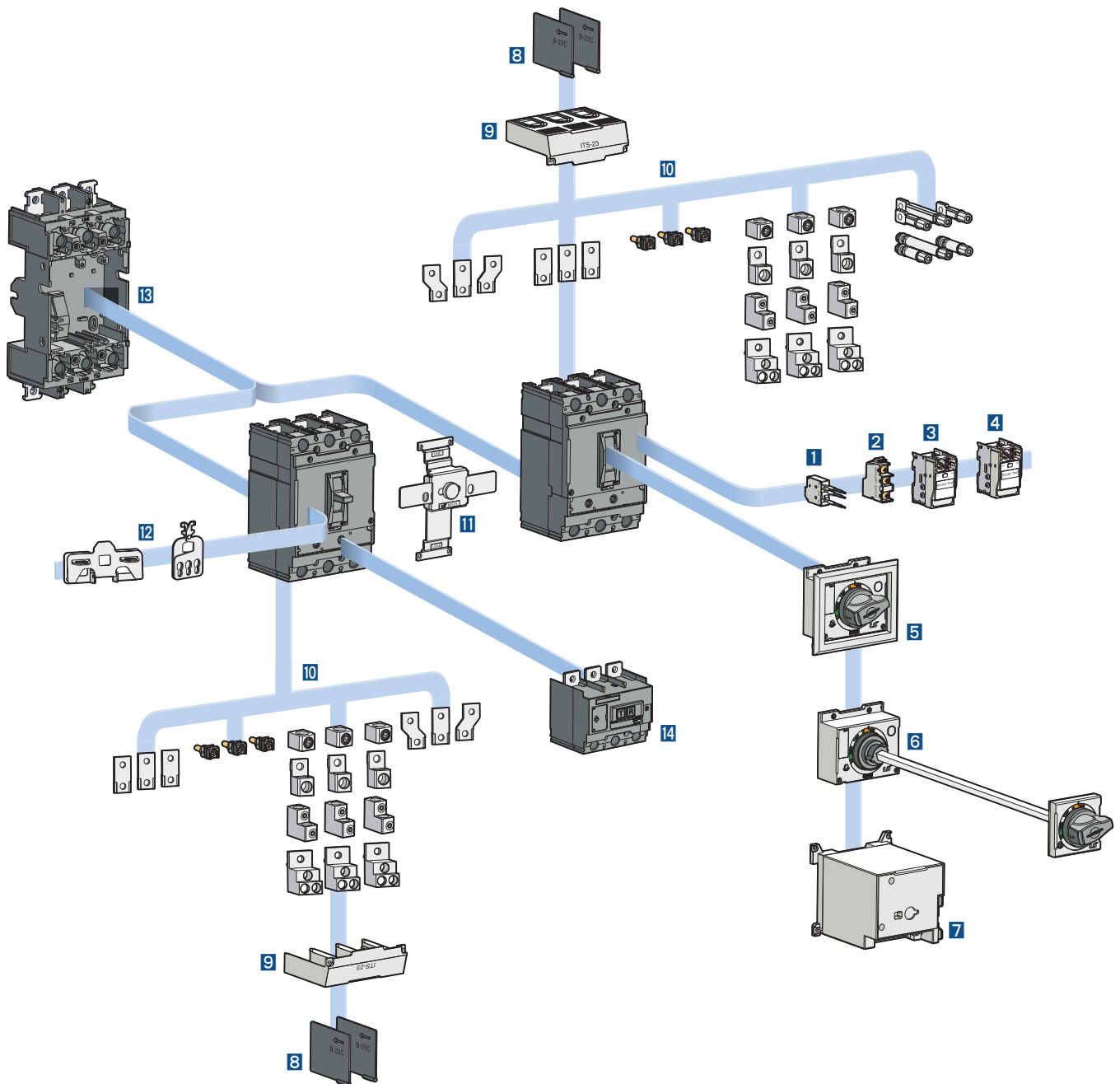
$$I_{cs} = 100\% \text{ of } I_{cu}$$

Type		TD100/160E	TS100/160/250E	TS400/630E
Poles		3, 4	3, 4	3, 4
Ue		AC 440V	AC 440V	AC 440V
Ui		800V	800V	800V
Uimp		8kV	8kV	8kV
Rated current		16~100A 100~160A	40~100A 100~160A 125~250A	300~400A 400~630A
Reference standard		IEC60947-2		
Icu	220/240Vac	70kA	70kA	70kA
	380/415Vac	36kA	36kA	36kA
	440Vac	36kA	36kA	36kA
Ics (% of Icu)	220/240Vac	100%	100%	100%
	380/415Vac	100%	100%	100%
	440Vac	100%	100%	100%
Category		A	A	A

E series MCCBs



E series MCCBs share all accessories of the other E series



- | | |
|---------------------------------|--|
| 1 Alarm switch | 8 Insulation barrier |
| 2 Auxiliary switch | 9 Terminal cover (Short, Long) |
| 3 Shunt release | 10 Connection terminals |
| 4 Under-voltage release | 11 Mechanical interlock device |
| 5 Direct rotary handle | 12 Locking devices (Removable, Fixed) |
| 6 Extended rotary handle | 13 Plug-in base |
| 7 Motor operator | 14 Residual Current Devices |

MCCB 100/160AF

TD100E TD160E



Ordering information



Type



Frame size

100	100AF
160	160AF



Economic series



Trip unit

Adjustable-thermal & Fixed-magnetic



Rated current

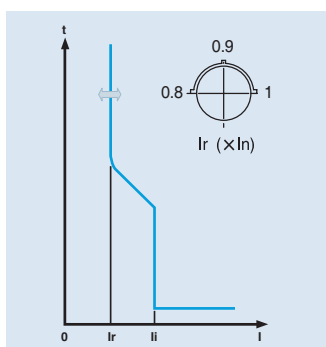
16	16A
20	20A
25	25A
32	32A
40	40A
50	50A
63	63A
80	80A
100	100A
125	125A
160	160A



Pole

3P
4P3D
4P4D

Type		TD100E	TD160E
Frame size		100AF	160AF
Poles		3P	3P
		4P3D (N-R-S-T, Neutral no protection)	4P3D (N-R-S-T, Neutral no protection)
		4P4D (N-R-S-T, Neutral protection, 100% Ir)	4P4D (N-R-S-T, Neutral protection, 100% Ir)
Ue		AC 440V	AC 440V
Ui		800V	800V
Uimp		8kV	8kV
Rated current		16, 20, 25, 32, 40 50, 63, 80, 100A	100, 125, 160A
Reference standard		IEC60947-2	
Icu	220/240Vac	70kA	70kA
	380/415Vac	36kA	36kA
	440Vac	36kA	36kA
Ics (% of Icu)	220/240Vac	100%	100%
	380/415Vac	100%	100%
	440Vac	100%	100%
Category		A	A
Reverse feed		Yes	Yes
Trip unit	FMU	Adjustable-thermal & Fixed-magnetic unit	Adjustable-thermal & Fixed-magnetic unit
Lifespan	Mechanical	25,000 operations	25,000 operations
	Electrical	10,000 operations @415Vac	10,000 operations @415Vac
Dimension	W	90(3P) / 120(4P)mm	90(3P) / 120(4P)mm
	H	140mm	140mm
	D	86mm	86mm
Weight	3P	1.5kg	1.5kg
	4P	1.8kg	1.8kg



FMU

- Adjustable thermal & fixed magnetic trip unit
- Adjustable: $0.8 \sim 1 \times I_n$



MCCB 100/160/250AF

TS100E
TS160E
TS250E



Ordering information



Type



Frame size

100	100AF
160	160AF
250	250AF



Economic series



Trip unit

Adjustable-thermal & Fixed-magnetic



Rated current

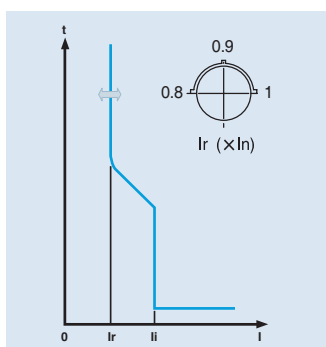
40	40A
50	50A
63	63A
80	80A
100	100A
125	125A
160	160A
200	200A
250	250A



Pole

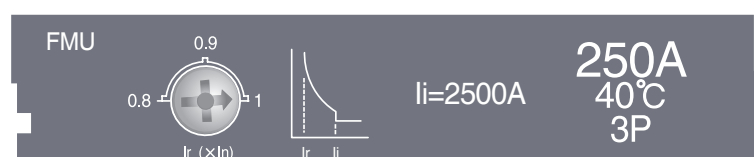
3P
4P3D
4P4D

Type		TS100E	TS160E	TS250E
Frame size		100AF	160AF	250AF
Poles		3P	3P	3P
		4P3D (N-R-S-T, Neutral no protection)	4P3D (N-R-S-T, Neutral no protection)	4P3D (N-R-S-T, Neutral no protection)
		4P4D (N-R-S-T, Neutral protection, 100% Ir)	4P4D (N-R-S-T, Neutral protection, 100% Ir)	4P4D (N-R-S-T, Neutral protection, 100% Ir)
Ue		AC 440V	AC 440V	AC 440V
Ui		800V	800V	800V
Uimp		8kV	8kV	8kV
Rated current		40, 50, 63, 80, 100A	100, 125, 160A	125, 160, 200, 250A
Reference standard		IEC60947-2		
Icu	220/240Vac	70kA	70kA	70kA
	380/415Vac	36kA	36kA	36kA
	440Vac	36kA	36kA	36kA
Ics (% of Icu)	220/240Vac	100%	100%	100%
	380/415Vac	100%	100%	100%
	440Vac	100%	100%	100%
Category		A	A	A
Reverse feed		Yes	Yes	Yes
Trip unit	FMU	Adjustable-thermal & Fixed-magnetic unit	Adjustable-thermal & Fixed-magnetic unit	Adjustable-thermal & Fixed-magnetic unit
Lifespan	Mechanical	25,000 operations	25,000 operations	25,000 operations
	Electrical	10,000 operations @415Vac	10,000 operations @415Vac	10,000 operations @415Vac
Dimension	W	105(3P) / 140(4P)mm	105(3P) / 140(4P)mm	105(3P) / 140(4P)mm
	H	160mm	160mm	160mm
	D	86mm	86mm	86mm
Weight	3P	2kg	2kg	2kg
	4P	2.6kg	2.6kg	2.6kg



FMU

- Adjustable thermal & fixed magnetic trip unit
- Adjustable: 0.8~1×In



MCCB 400/630AF

TS400E TS630E



Ordering information

TS

Type

630

Frame size

400	400AF
630	630AF

E

Economic series

FMU

Trip unit

Adjustable-thermal & Fixed-magnetic

500

Rated current

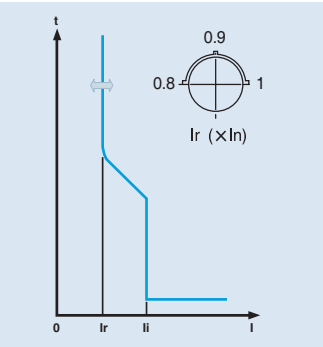
300	300A
400	400A
500	500A
630	630A

3P

Pole

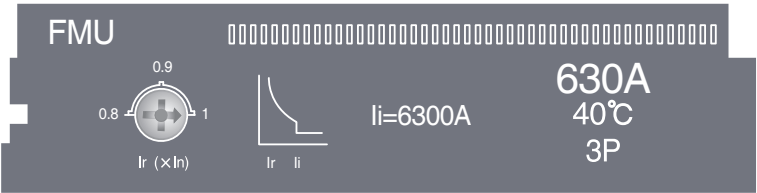
3P
4P3D
4P4D

Type		TS400E	TS630E
Frame size		400AF	630AF
Poles		3P	3P
		4P3D (N-R-S-T, Neutral no protection)	4P3D (N-R-S-T, Neutral no protection)
		4P4D (N-R-S-T, Neutral protection, 100% Ir)	4P4D (N-R-S-T, Neutral protection, 100% Ir)
Ue		AC 440V	AC 440V
Ui		800V	800V
Uimp		8kV	8kV
Rated current		300, 400A	500, 630A
Reference standard		IEC60947-2	
Icu	220/240Vac	70kA	70kA
	380/415Vac	36kA	36kA
	440Vac	36kA	36kA
Ics (% of Icu)	220/240Vac	100%	100%
	380/415Vac	100%	100%
	440Vac	100%	100%
Category		A	A
Reverse feed		Yes	Yes
Trip unit	FMU	Adjustable-thermal & Fixed-magnetic unit	Adjustable-thermal & Fixed-magnetic unit
Lifespan	Mechanical	20,000 operations	20,000 operations
	Electrical	6,000 operations @415Vac	6,000 operations @415Vac
Dimension	W	140(3P) / 186.5(4P)mm	140(3P) / 186.5(4P)mm
	H	260mm	260mm
	D	110mm	110mm
Weight	3P	5.4kg	5.4kg
	4P	7.2kg	7.2kg



FMU

- Adjustable thermal & fixed magnetic trip unit
- Adjustable: 0.8~1×In



Electrical auxiliaries

The following devices are installed into all TD & TS circuit breakers regardless of frame size. And, the electrical auxiliaries can be easily installed in the accessory compartment of the circuit breakers which is cassette type.



UVT

Undervoltage release, UVT

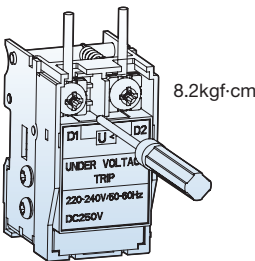
The undervoltage release automatically opens a circuit breaker when voltage drops to a value ranging between 35% to 70% of the line voltage. The operation is instantaneous, and after tripping, the circuit breaker cannot be re-closed again until the voltage returns to 85% of line voltage.

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 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

Technical data

Power consumption	Control voltage (V)	Consumption			Applicable MCCBs
		AC (VA)	DC (W)	mA	
	AC/DC 24V	0.64	0.65	27	TD100, TD160, TS100, TS160, TS250, TS400, TS630
	AC/DC 48V	1.09	1.10	23	
	AC/DC 110~130V	0.73	0.75	5.8	
	AC 200~240V/DC 250V	1.21	1.35	5.4	
	AC 380~440V	1.67	-	3.8	
AC 440~480V	1.68	-	3.5		
Max.opening time (ms)		50			
Tightening torque of terminal screw		8.2kgf·cm			
Transformer operating voltage (V)		0.7~1.35Vn			
- Drop (Circuit breaker trips)		~0.85Vn			
- Rise (Circuit breaker can be switched on)					



Electrical auxiliaries



SHT

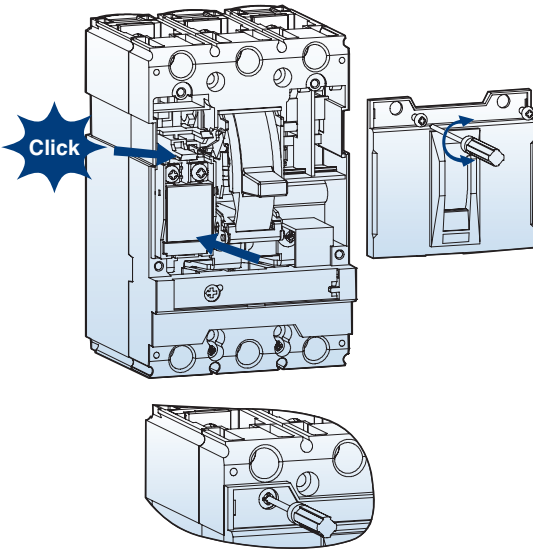
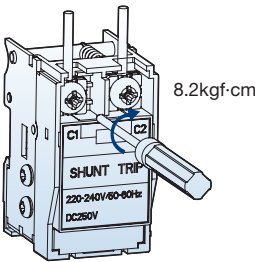
Shunt release, SHT

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 TD & TS circuit-breakers.

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

Technical data

Power consumption	Control voltage (V)	Consumption			Applicable MCCBs
		AC (VA)	DC (W)	mA	
	DC 12V	-	0.36	30	TD100, TD160, TS100, TS160, TS250, TS400, TS630
	AC/DC 24V	0.58	0.58	24	
	AC/DC 48V	1.22	1.23	25	
	AC/DC 110~130V	1.36	1.37	10.5	
	AC 220~240V/DC250V	1.80	1.88	7.5	
AC 380~500V	1.15	-	2.3		
Max.opening time (ms)		50			
Tightening torque of terminal screw		8.2kgf-cm			



Electrical auxiliaries

Auxiliary switch (AX), Alarm switch (AL) and Fault alarm switch (FAL)

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.

Contact operation

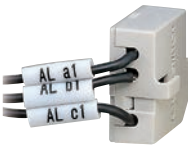
MCCB	ON	OFF	TRIP
Position of AX			
Position of AL, FAL			

Technical data

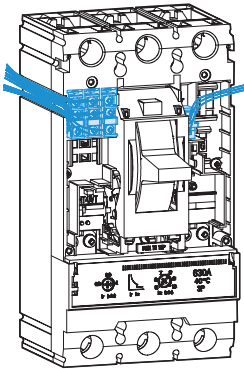
Conventional thermal current Ith	5A				TD100
Rated operational current Ie with rated operational voltage Ue	Voltage	Current, Ie		Minimum load current	
		Resistance	Inductance		
- Alternating current 50/60Hz AC	125V	5	3	5V DC 160mA	TS100
	250V	3	2		TS160
	500V	-	-		TS250
- Direct current DC	30V	4	3	30V DC 30mA	TS400
	125V	0.4	0.4		TS630
	250V	0.2	0.2		



AX



AL

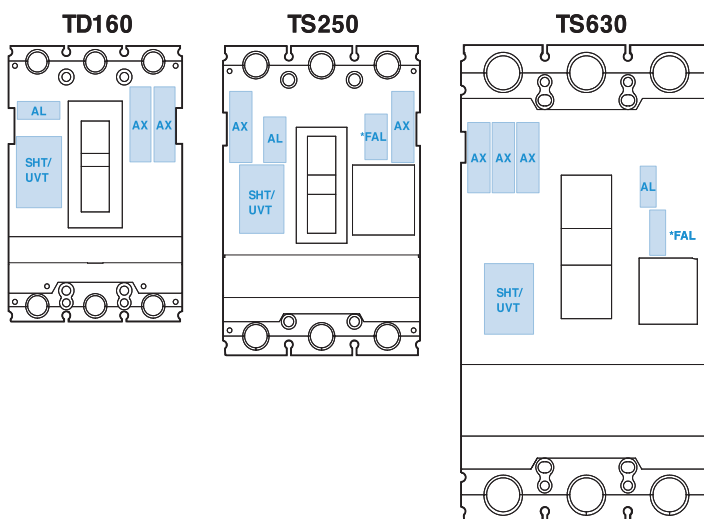


Electrical auxiliaries

Possible configuration of electrical auxiliaries

Maximum possibilities

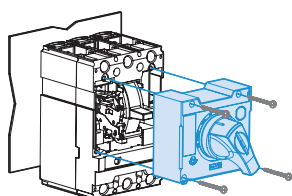
Phase	Accessory	TD160	TS250	TS630
R (Left)	AX	-	1	3
	AL	1	1	-
	SHT or UVT	1	1	1
T (Right)	AX	2	1	-
	AL	-	-	1



Rotary handles

Rotary handles

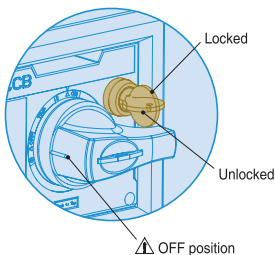
The rotary handle operating mechanism is available in either the direct version or in the extended version on the compartment door.
It is always fitted with a compartment door lock and on a request it can be supplied with a key lock in the open position.



Direct rotary handles

Direct rotary handles

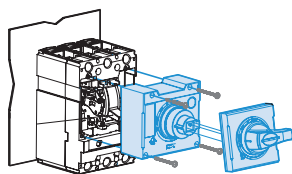
MCCB	Rotary handle
TD100, TD160	DH1
TS100, TS160, TS250	DH2
TS400, TS630	DH3



Direct rotary handle with a key lock

Direct rotary handles with a key lock

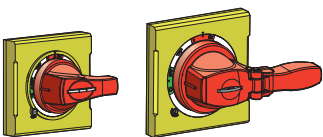
MCCB	Padlockable device	Lock function
TD100, TD160	DHK1	Lock in Off position
TS100, TS160, TS250	DHK2	
TS400, TS630	DHK3	



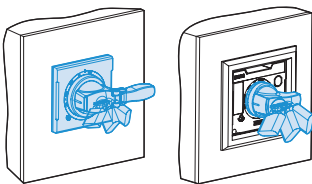
Extended rotary handles

Extended rotary handles

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



Red/Yellow color handle available



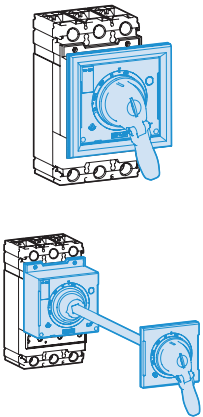
Padlocks for direct or extended handle

Padlocks can be used to lock the breaker in the ON or OFF position.

Rotary handles

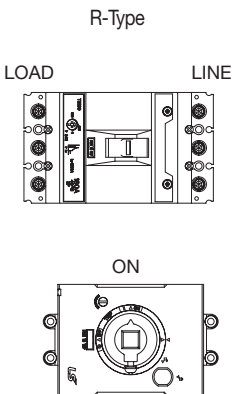
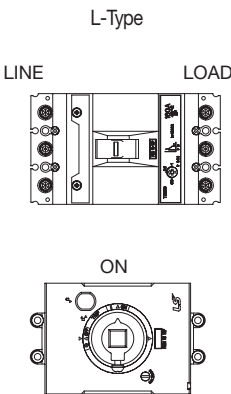
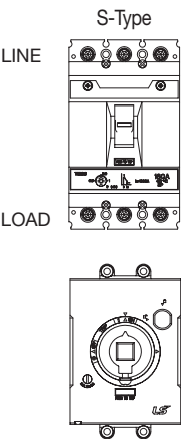
Rotary handles

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

Type suffix according to the mounting position



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.

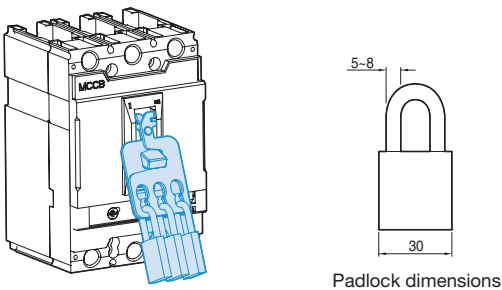
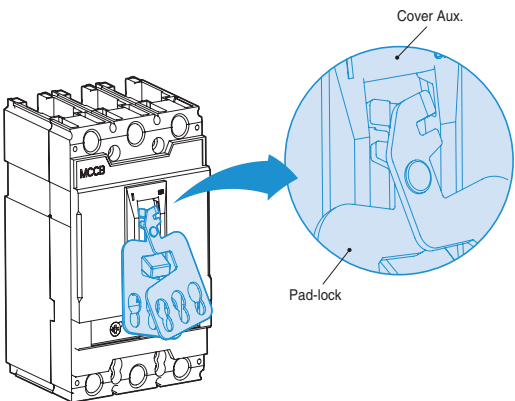
This device allows the handle to be locked in the “OFF” position.
Locking in the OFF position guarantee isolation according to IEC 60947-2.

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)



Removable locking device

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

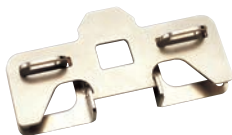


Locking devices

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)



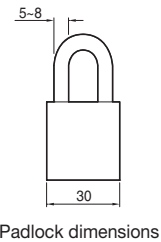
Fixed locking device

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

How to use

The locking device for the toggle handle is designed to be easily attached to the front of circuit-breaker.

- ① Please set the toggle handle in the position of "On" or "Off".
- ② Install the lock device onto the front of auxiliary cover of circuit breaker.
- ③ Folding the wings of lock device as shown in picture 3.
- ④ The padlock to be used shall be that which is commercially available with the nominal dimension. (30mm nominal dimension, 5~8mm diameter)



Padlock dimensions

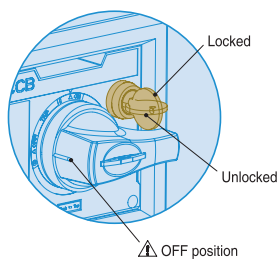
TD100, 160	①		②	
	③		④	
TS100 ~ TS630	①		②	
	③		④	

Locking devices



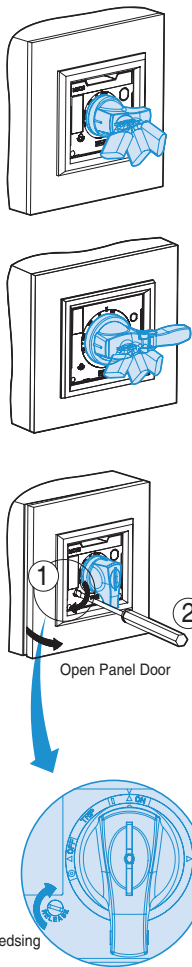
Locking by rotary handle with a key lock

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.



Locking by rotary handle with a key lock

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



Padlocking by rotary handle

A padlocking can be also done by using the rotary handle. The lock is used to lock the circuit-breaker in the ON and OFF position. Maximum three (3) padlocks with shackle diameters ranging from 5 to 8mm may be used. (Padlocks are not supplied)

Releasing panel door lock at ON position

The panel door can be locked at ON and TRIP position of rotary handle. To open the panel door at ON position, just rotate release screw clockwise.

Terminals

Front connection

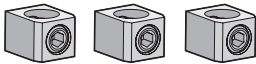
Terminal mounter



- It is supplied with E series MCCBs as a 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	-

Inner box terminal



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

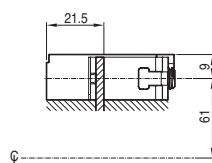


Applicable to	Type	Pole	Set quantity	Cable connection possibilities	Conductor size
TD100, 160	SBT13	3	1 Set (3EA)	1	L(mm) 21
	SBT14	4	1 Set (4EA)		S(mm ²)Cu/Al 2.5~95
					Tightening torque (kgf-cm) 120~147
TS100, 160, 250	SBT23	3	1 Set (3EA)	1	L(mm) 21
	SBT24	4	1 Set (4EA)		S(mm ²)Cu/Al 10~150
					Tightening torque (kgf-cm) 120~147
TS400, 630	IBT33 ^{Note1)}	3	1 Set (3EA)	1	L(mm) 30
	IBT34	4	1 Set (4EA)		S(mm ²)Cu/Al 70~300
					Tightening torque (kgf-cm) 367~428
PB12, 13	IBT13 ^{Note2)}	3	1 Set (3EA)	1	L(mm) 18
					S(mm ²)Cu/Al 2.5~95
					Tightening torque (kgf-cm) 306
PB22, 23	IBT23 ^{Note2)}	3	1 Set (3EA)	1	L(mm) 21
					S(mm ²)Cu/Al 10~150
					Tightening torque (kgf-cm) 306

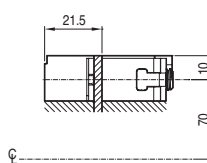
Note) 1. IBT3 for TS630 can be applied in case that rate current is upto 400A.

2. IBT13, 23 are for Plug-in base.

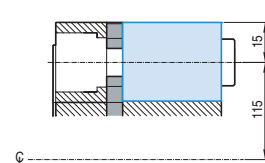
SBT13, 14



SBT23, 24



IBT33, 34(TS400)

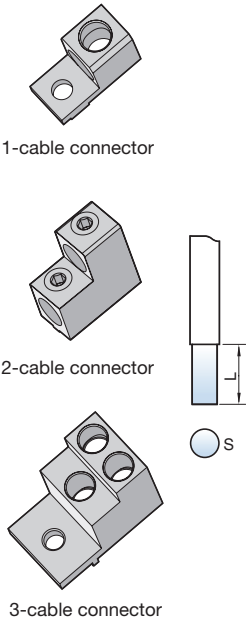


Terminals

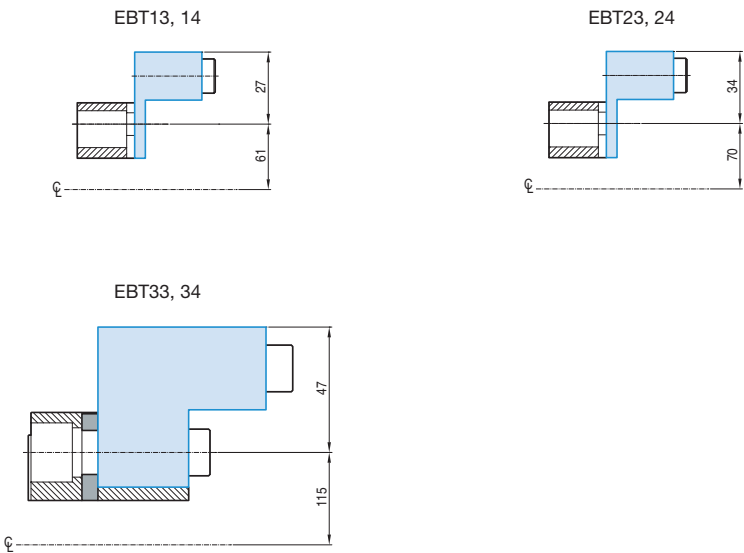
Front connection

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 (3) kinds of terminals.
- For TD100, TD160: 1-cable connector (EBT13, EBT14)
- For TS100, TS160, TS250: 1-cable connector (EBT23, EBT24)
- For TS400, TS630: 2-cable connector (EBT33, EBT34)



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

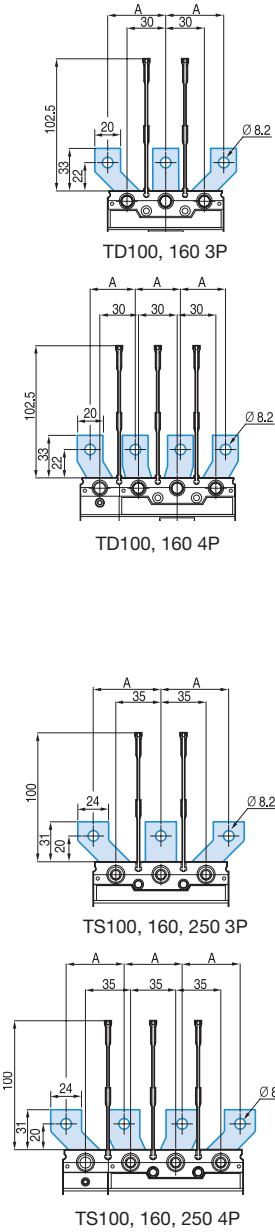


Terminals

Front connection

Spreaders

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



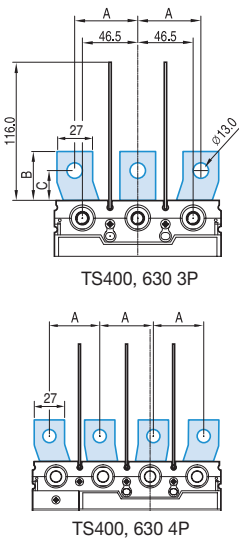
MCCB	Pole	Type	Size A (mm)	Feature
TD100, TD160	2P	SP12a	35	
	3P	SP13a		
	4P	SP14a		
	2P	SP12b	45	
	3P	SP13b		
	4P	SP14b		
TS100, TS160, TS250	2P	SP22a	45	
	3P	SP23a		
	4P	SP24a		
	2P	SP22b	52.5	
	3P	SP23b		
	4P	SP24b		

Terminals

Front connection

Spreaders

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



MCCB	Pole	Type	Size(mm)			Feature
			A	B	C	
TS400, TS630	2P	SP12a	52.5	41	25	
	3P	SP13a				
	4P	SP14a				
	2P	SP12b	70	54	38	
	3P	SP13b				
	4P	SP14b				
	2P	SP22a	46.5	41	25	
	3P	SP23a				
	4P	SP24a				

Terminals

Rear connection

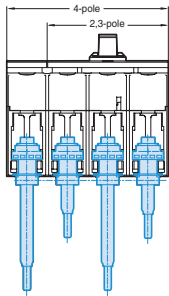
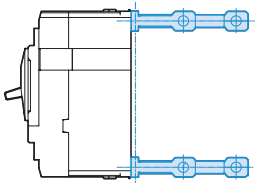
Rear connection terminals are used to adapt TD and TS circuit breakers to switchboards or other applications that require rear connection. These can be connected directly to circuit breakers without any modification

There are two kinds of rear connection terminals.

- Flat type
- Round type

Flat type

Flat vertical terminals

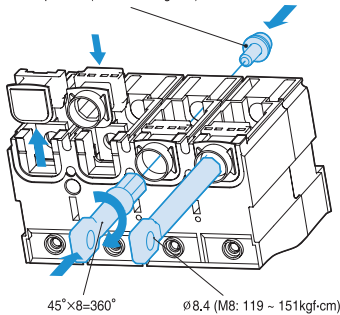


Flat type

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

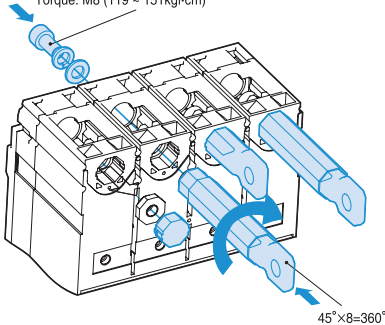
TD160, TS250

BOLT, HEX, SOCKET, P.S/W, M6, L15
Torque: M6 (51.1 ~ 64.9kgf-cm)



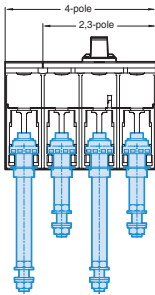
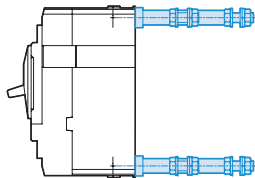
TS630

BOLT, HEX, SOCKET, P.S/W, M8, L20
WASHER SPRONG LOCK D10
WASHER PLAIN D10
Torque: M8 (119 ~ 151kgf-cm)



Round type

Round threaded terminals



Round type

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

Insulation



Short type covers



Long 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:

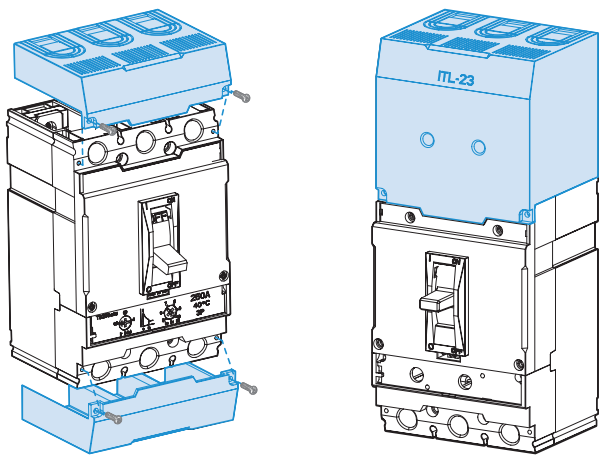
- Short type covers, ITS
- IP40 degree of protection
 - For fixed circuit-breakers with rear terminals and for moving parts of plug-in

Long type covers, ITL

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

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

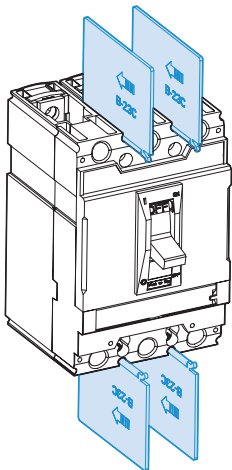
Note) (1) 2P in 3pole mold case



Insulation



Insulation barriers



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

Interlock



Mechanical Interlock
(Padlocks are not supplied)

Mechanical interlocking device

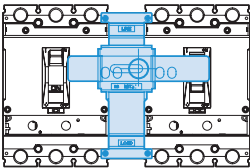
The mechanical interlock (MIT) can be applied on the front of two breakers mounted side by side, in either the 3-pole or 4-pole version and prevents simultaneous closing of the two breakers.

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

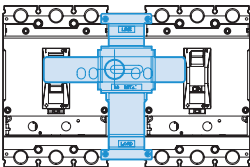
The front interlocking plate allows installation of a padlock in order to fix the position. (possibility of locking in the O-O position as well)

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

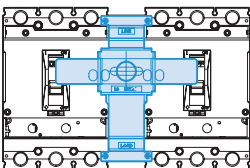
Operation



Left MCCB: ON/OFF is possible
Right MCCB: Off lock

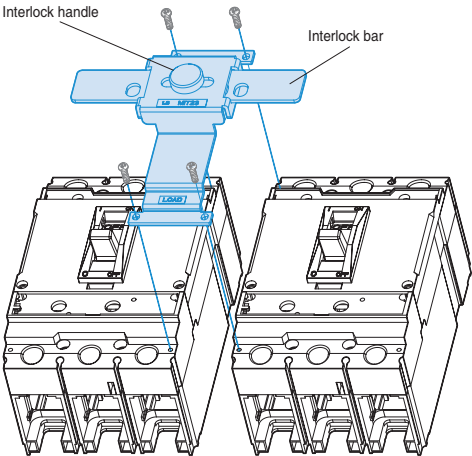


Left MCCB: Off lock
Right MCCB: ON/OFF is possible



Both MCCBs are of locked

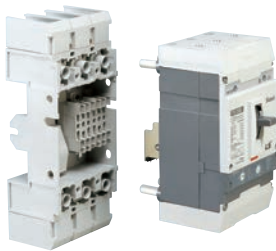
MCCB		Interlock
Frame type	Pole	
TD100, TD160	3-pole	MIT13
	4-pole	MIT14
TS100, TS160, TS250	3-pole	MIT23
	4-pole	MIT24
TS400, TS630	3-pole	MIT33
	4-pole	MIT34



Plug-in device

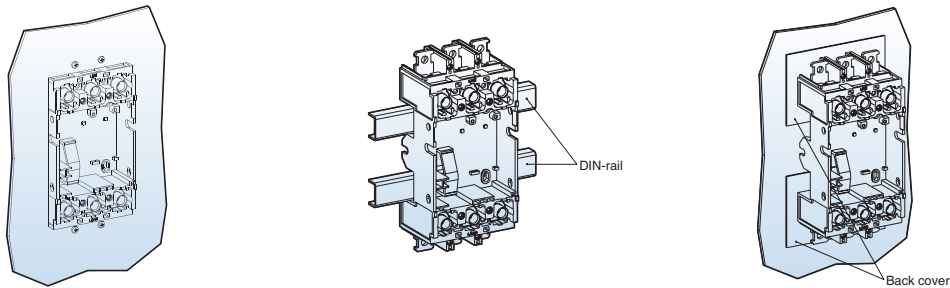
Plug-in device

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.

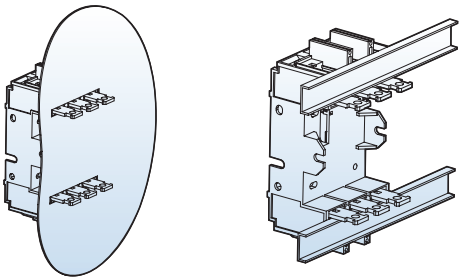


MCCB	Pole	Arrangement	Type	Means
TD100, TD160	2	Single line	PB12	
	3	Single line	PB13	
	4	Single line	PB14	
	2	Double line	PB12D2	For distribution board
	3	Double line	PB13D2	For distribution board
TS100, TS160, TS250	2	Single line	PB22	
	3	Single line	PB23	
TS400, TS630	2	Single line	PB32	
	3	Single line	PB33	

Front connection



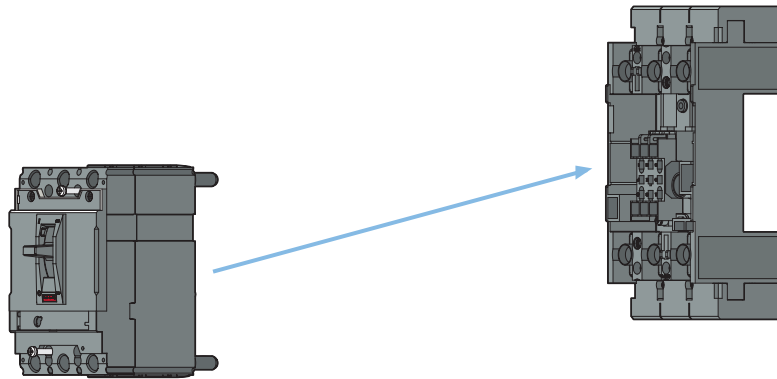
Rear connection



Plug-in system

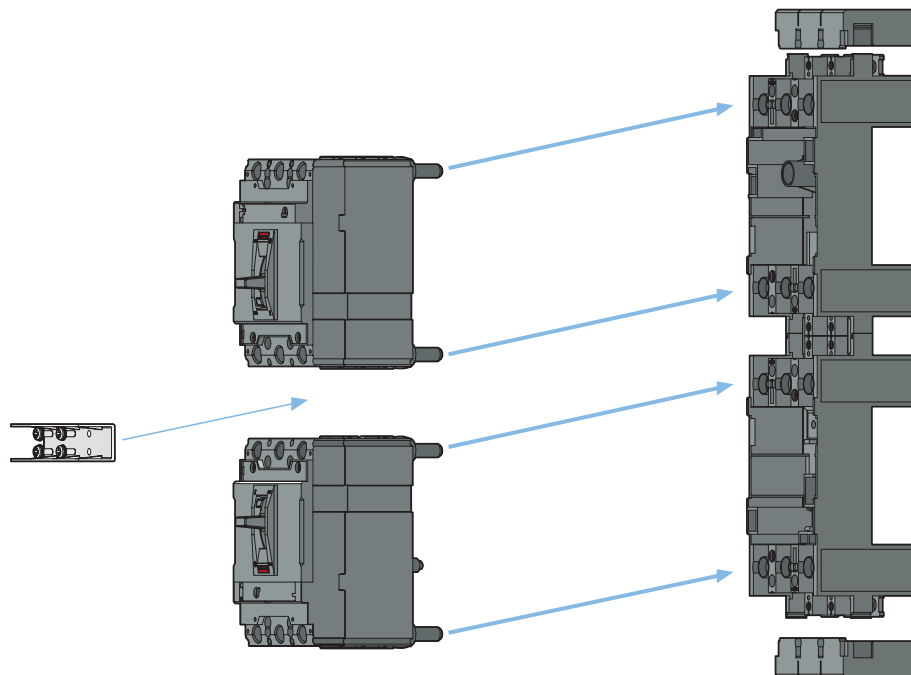
Normal type Plug-in MCCB: PB□ type

- MCCB rating: TD100~TS630
- generally used in switchgears



Double-row type Plug-in MCCB: PB□D2 type

- MCCB rating: TD100, 160
- generally used in branch circuits

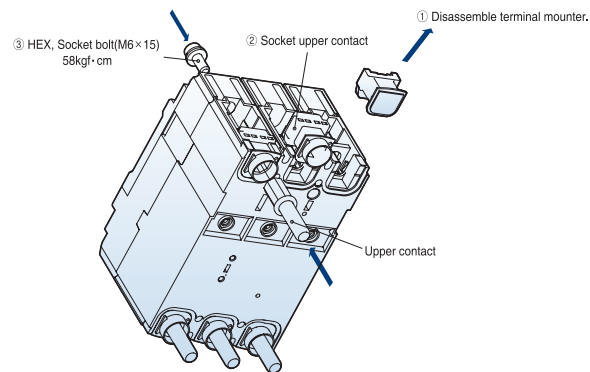


Plug-in device

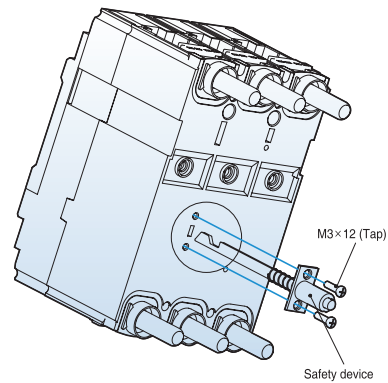
Assembling procedure

TD100, TD160

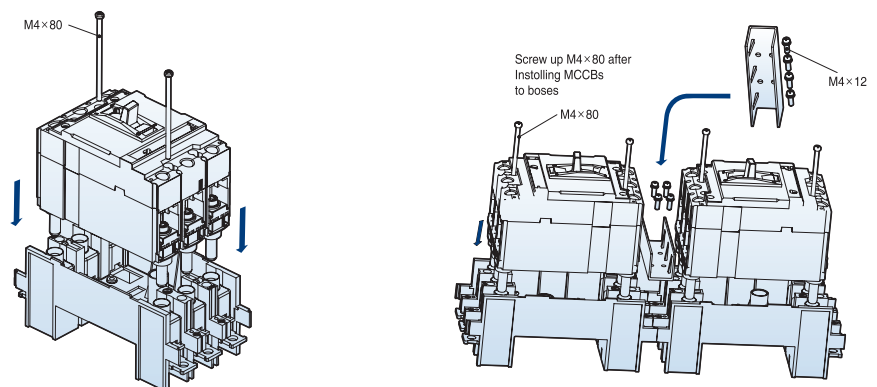
1. Conversion to Plug-in MCCB



2. Assembling safety device



3. Assembling MCCB and plug-in device



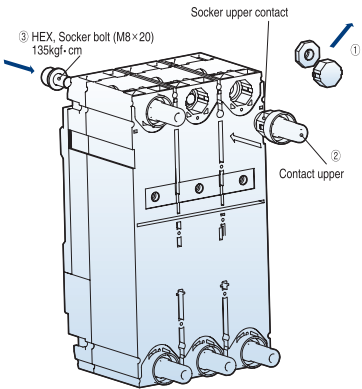
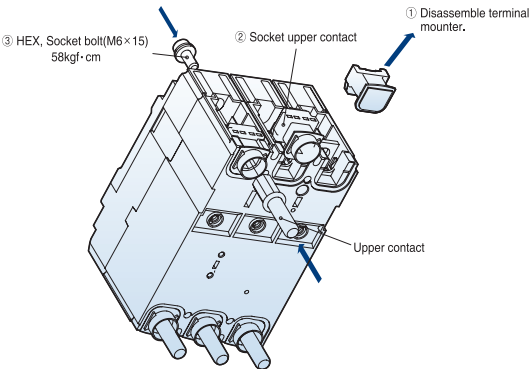
Plug-in device

Assembling procedure

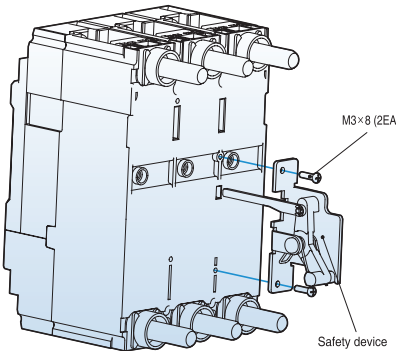
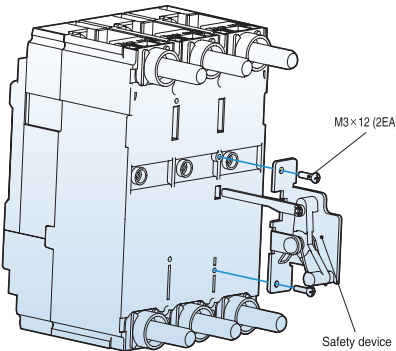
TS100, TS160, TS250

TS400, TS630

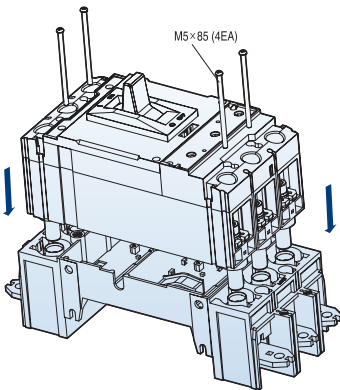
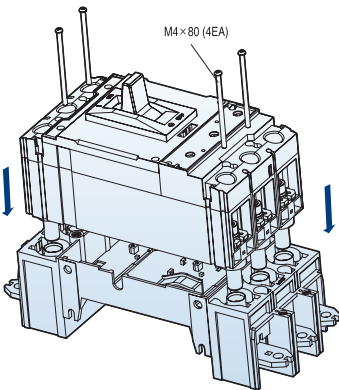
1. Conversion to Plug-in MCCB



2. Assembling safety device



3. Assembling MCCB and plug-in device



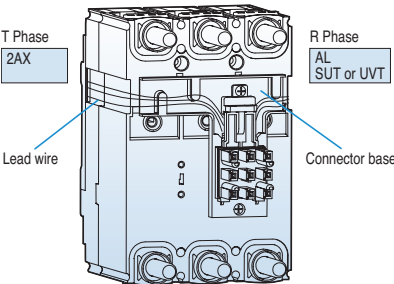
Connector KIT

Electric auxilaly circuit(AX, AL, SHT, UVT) from Breaker via one to three connector KIT(nine wires each). These are made of moving part on Breaker and fixed part on plug-in base up to 630AF.

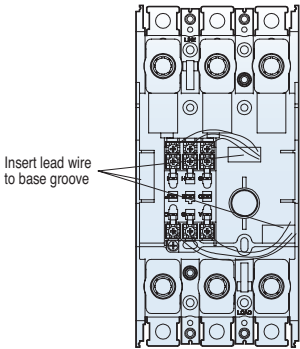
Breaker Max.	Fixed part		Moving part	
	Max. Installed Q'TY	Description	Q'TY	Description
TD160	1	SPARE PART ASS'Y, CONNECOR KIT,TD160	1	SPARE PART ASS'Y, BASE CONNECTOR,TD160
TS250	2		1	SPARE PART ASS'Y, BASE CONNECTOR,TS250
TS400/630	3		1	SPARE PART ASS'Y, BASE CONNECTOR,TS630

TD160

Moving part

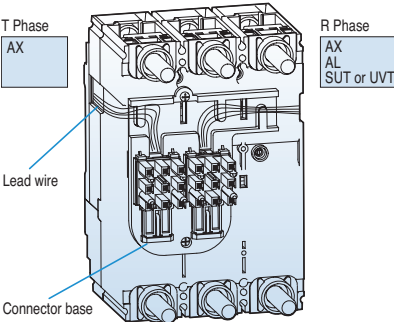


Fixed part

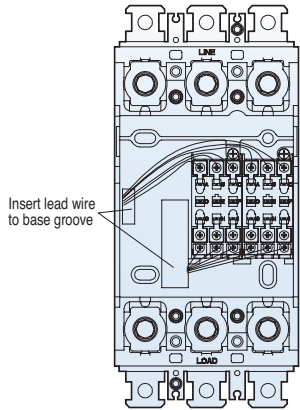


TS250

Moving part



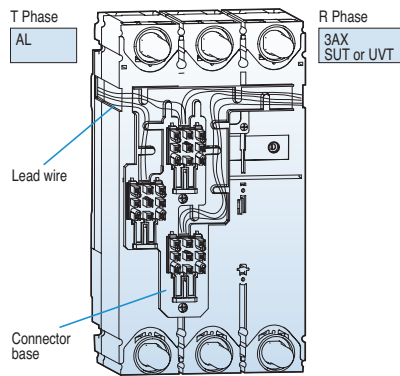
Fixed part



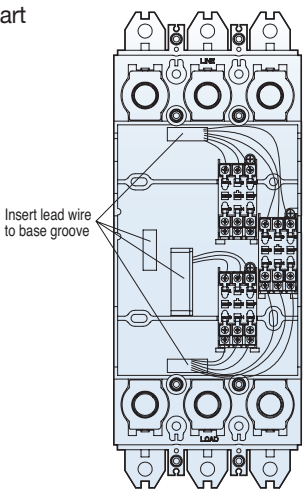
Connector KIT

TS400/630

Moving part

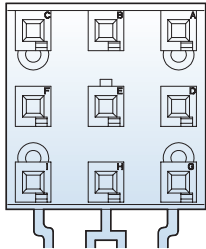


Fixed part

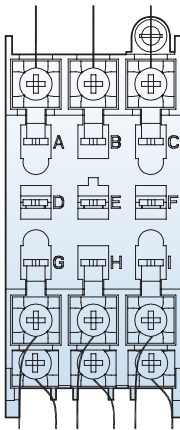


Read wire color

Moving part



Fixed part



Lead wire color

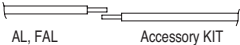
A: Red	B: White	C: Black
D: Blue	E: Yellow	F: Green
G: Gray	H: Orange	I: Brown

Note) Useless lead wires should be ended for Preventing an electric accident.

Lead wire color

A: Red	B: White	C: Black
D: Blue	E: Yellow	F: Green
G: Gray	H: Orange	I: Brown

Note) Useless lead wires should be ended for Preventing an electric accident.
- To connent AL and FAL solder the wire and insulates the wire



Remote operation

Motor operator



TS250 + MOP2

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.
- Applicable to 2, 3 and 4-pole breakers.

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:

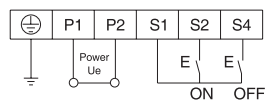
- Commercial sector: Hospital, Tall building, Bank, Insurance companies, Shopping centers
- Industry: Ships, Assembly lines at plant, Military sites, Port and Railway installation

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, TS160, TS250	MOP2	① DC 24V ② AC 100~110V/ DC 110V	≤5A (DC 24V) ≤2A (AC)	350	230	14	25,000	120
TS400, TS630	MOP3	③ AC 230/ DC 220V		500	350	35	20,000	60

Wiring connection

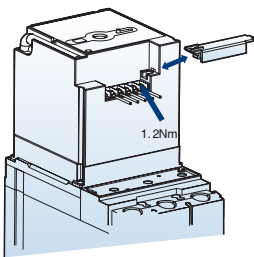
Standard connection

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



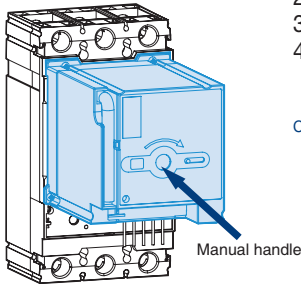
Connection with alarm switch (AL)

- 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.



Remote operation

Manual operation

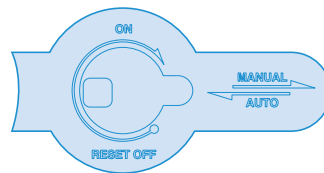


- 1) Insert the manual handle into the slot of Motor Operator surface and rotate it clockwise.
- 2) It must be rotated just 180° clockwise for safe operation of micro switch in the motor operator.
- 3) Return the manual handle after the manual operation
- 4) Turn the slide switch back to the position of AUTO.

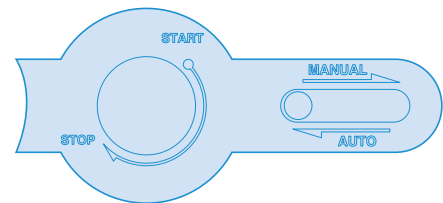
CAUTION: When the circuit breaker is tripped by trip button in the OFF status, it is impossible to operate motor operator automatically. It must be reset by manual operation.

Automatic operation

- 1) Set the slide switch to AUTO, then internal power is closed automatically.
- 2) Operating frequency should be less than these below regulated values.
TD160N/H/L, TS250N/H/L: 180 operations per hour
- 3) Use the ON/OFF switch in the range of regulated values.
- 4) It may interfere near communication equipments because of internal switching power supply.
It's recommended that a noise filter be installed to power supply.
- 5) Please do not input ON/OFF signals at the same time during the automatic operation.
- 6) If the circuit breaker has a UVT attached inside, charge a UVT on the rated voltage before performing MOTOR OPERATOR.



[TD100, 160, TS100, 160, 250]



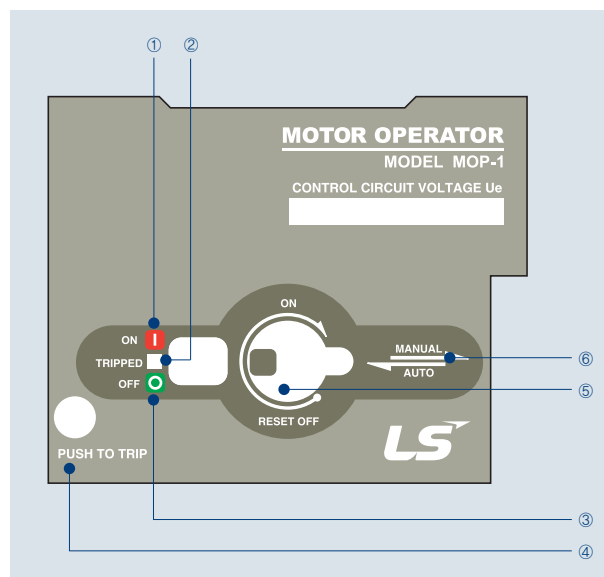
[TS400, 630]

Remote operation

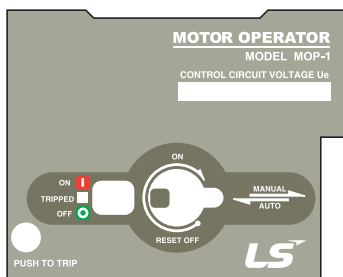
Motor operator

Feature

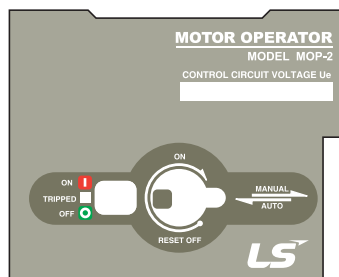
- ① On position indication (Red color)
 - ② Trip position indication (White color)
 - ③ Off position indication (Green color)
 - ④ Button for push to trip
 - ⑤ On/Off/Reset selection lever
 - ⑥ Manual/Auto selection lever
- (available for only for TD160AF and TS630AF)



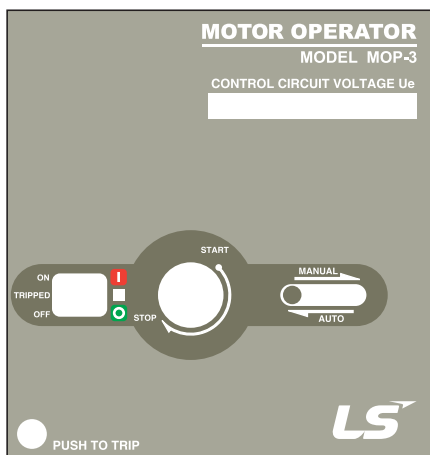
TD160 MOP-1



TS250 MOP-2



TS630.... MOP-3



Residual Current Devices (RCD)



3P



4P



The Susol circuit breaker can offer protection against earth leakage currents by using an add-on residual current device (RCD). In particular, the TS100, TS160 and TS250 circuit breakers can be combined with the RTU23/24 of residual current device, the TS400 and TS630 circuit breakers can be combined with the RTU33/34 of residual current device. In all cases the RCD unit interfaces directly below the circuit breaker trip unit area without the use of any secondary wiring or connections.

The Susol circuit breaker and an RCD unit combination can be connected like any stand-alone breaker and are available as fixed or plug-in devices. The main connection interface of the RCD is an exact replacement of the breaker connection area, thus allowing the use of all standard breaker terminals.

Overview

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.

Compliance with standards :

- IEC 60947-2 (industrial), Appendix B
- IEC 61009 (residential)
- IEC 60755, class A, immunity to DC components up to 6mA
- VDE664, operation down to -25°C

Remote indications :

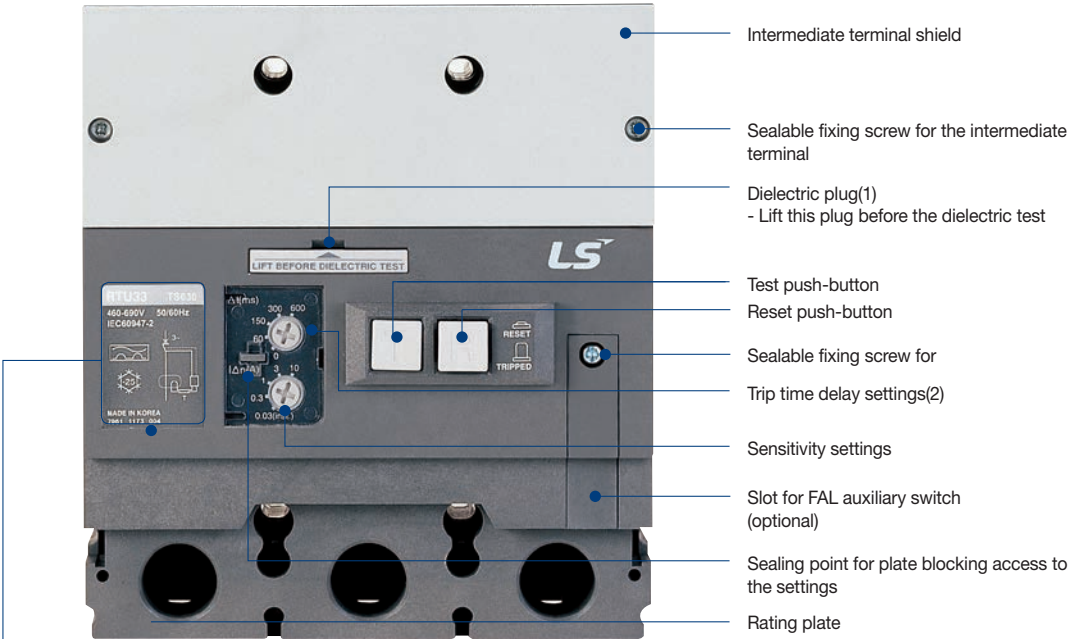
RCD unit may be equipped with an alarm contact (FAL-fault alarm switch) to remotely indicate tripping due to an earth leakage current.

Power supply :

RCD unit are self-supplied internally by the distribution-system voltage and therefore do not require any external source. They continue to function even when supplied by only two phases.

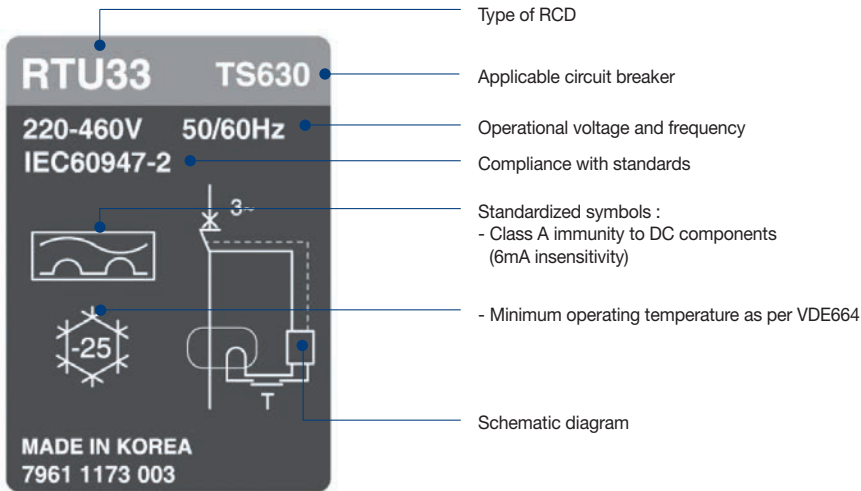
Residual Current Devices (RCD)

Configuration



- If the sensitivity is set to 30 mA, there is no time delay.
Whatever the time-delay setting.

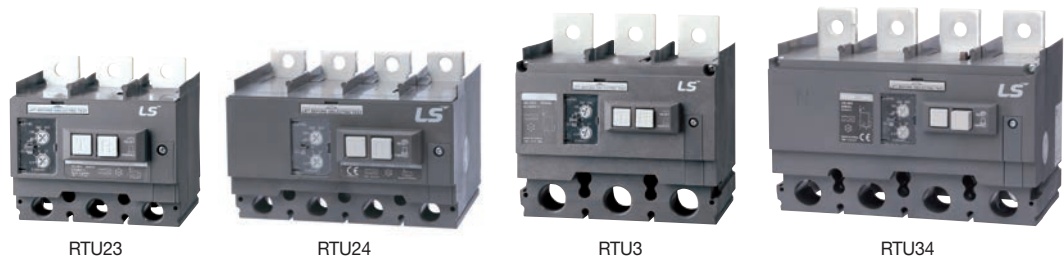
Detail of Rating plate



Accessories

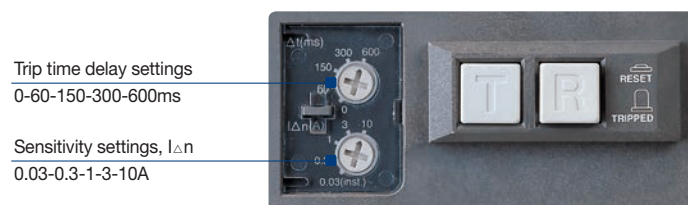
Residual Current Devices (RCD)

Ratings and Selection



		RTU23	RTU24	RTU33	RTU34
Number of poles		3*	4	3*	4
Applicable circuit breaker	TS100	■	■		
	TS160	■	■		
	TS250	■	■		
	TS400			■	■
	TS630			■	■
Protection characteristics					
Sensitivity	$I_{\Delta n}$ (A)	(adjustable) 0.03-0.3-1-3-10			
Time delay **	Intentional time delay (ms)	(adjustable) 0-60-150-300-600			
	Max. breaking time (ms)	(adjustable) 40-150-300-600-990			
Rated voltage	AC 50/60 Hz	220-460V / 460-690V			

Note 1) RTU can not be applied to 63A or less MTU type MCCB.
2) RTU can not be applied to MCCB (Electronic trip unit) + D/E-Handle
3) RTU24, RTU34: Only combination of N-R-S-T type MCCB is possible
4) RTU24 can be only combined with thermal-magnetic unit, which is produced after July.18, and electronic unit, which is produced after March. 2019.
5) RTU34 can be only combined with thermal-magnetic unit and electronic unit, which are produced after September. 2019.
* 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.



Residual Current Devices (RCD)

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

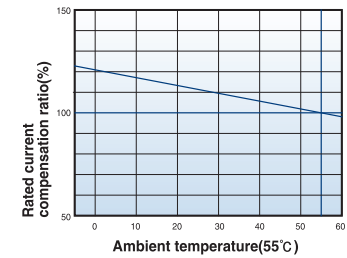
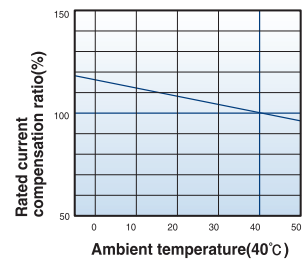
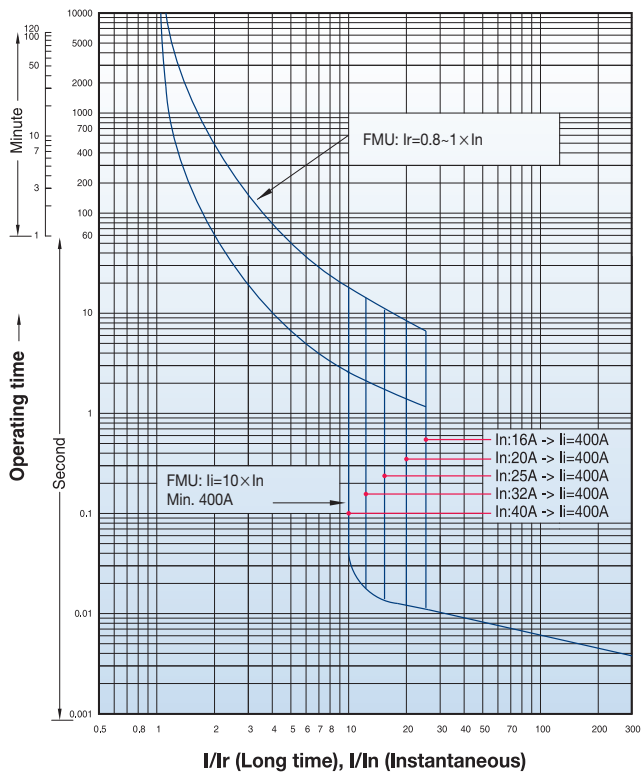
		RTU23	RTU24	RTU33	RTU34
MCCB	L×H×D (mm)	105×160×86	140×160×86	140×260×110	186.5×260×110
MCCB+RCD		105×240×86	140×240×86	140×370×110	186.5×370×110
RCD		105×80×86	140×80×86	140×110×110	186.5×110×110
MCCB+RCD	Weight (kg)	2.7	1.1	8.1	3.9
RCD		1.0	3.7	2.6	11.1
Type		Bottom			
Accessory		FAL (fault alarm switch)			



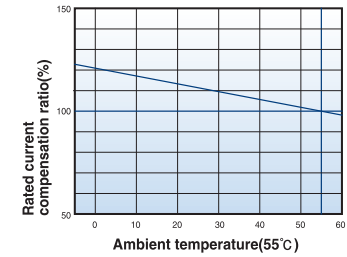
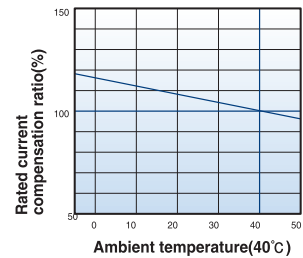
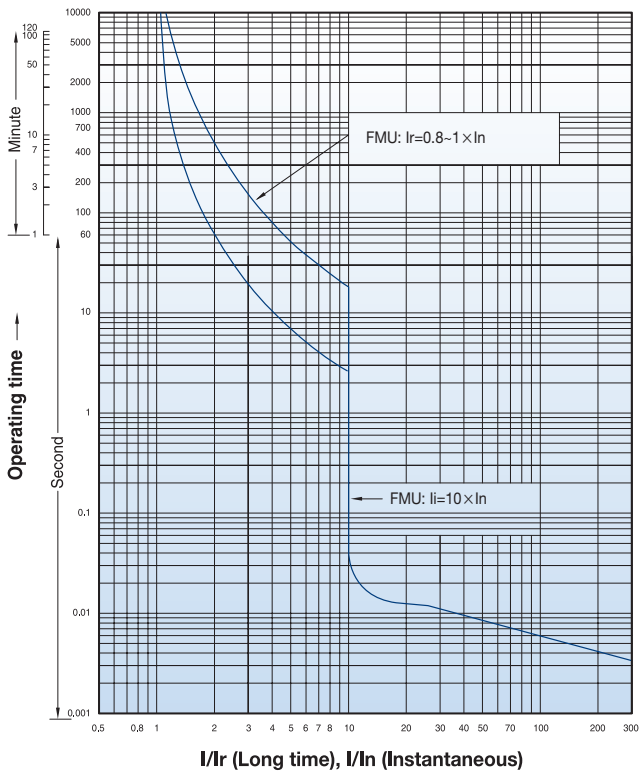
Characteristics curves

Circuit breakers with thermal-magnetic trip units

TD100
FMU
16~100A

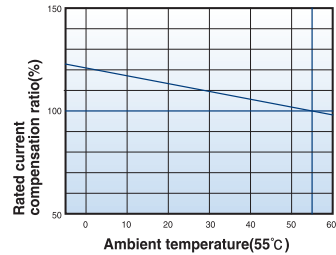
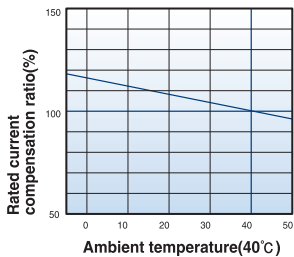
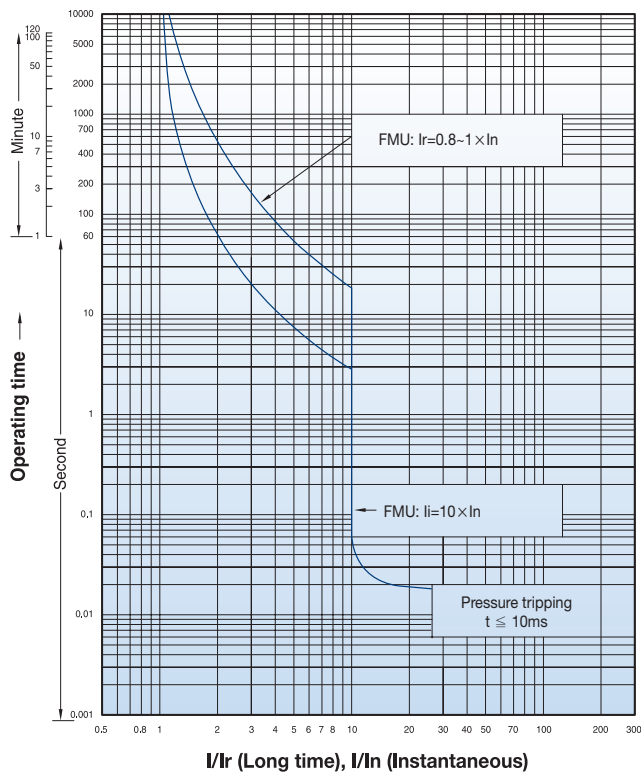


TD160
FMU
100~160A

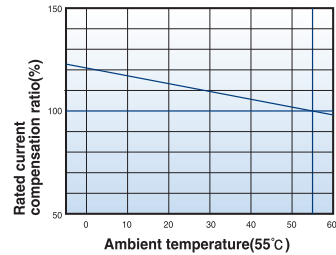
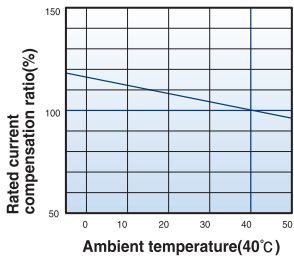
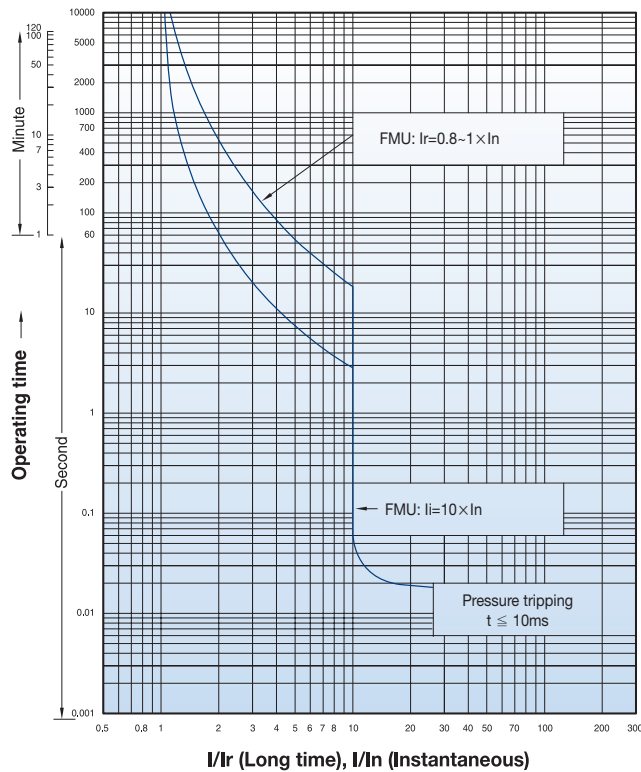


Circuit breakers with thermal-magnetic trip units

TS100
FMU
40~100A



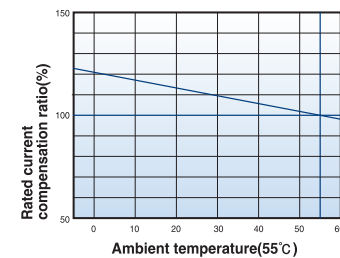
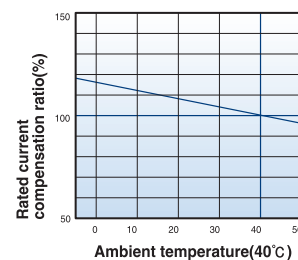
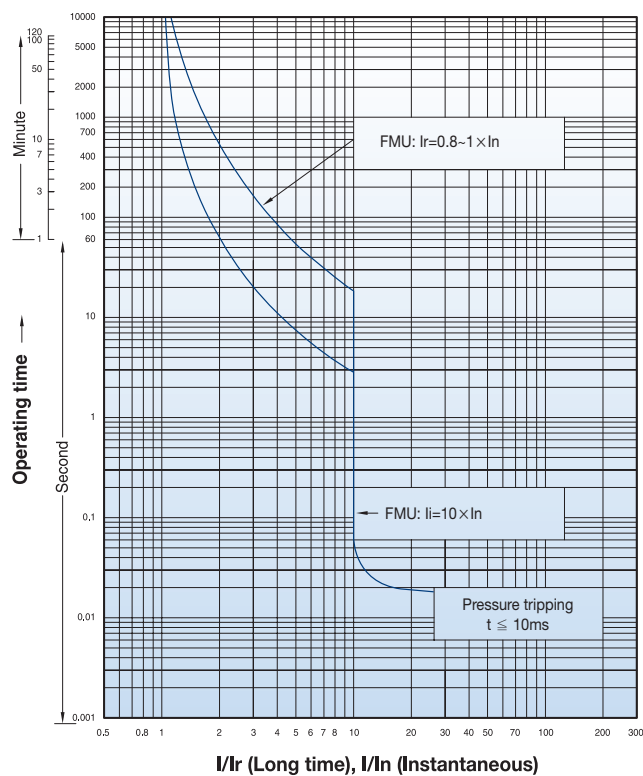
TS160
FMU
100, 125, 160A



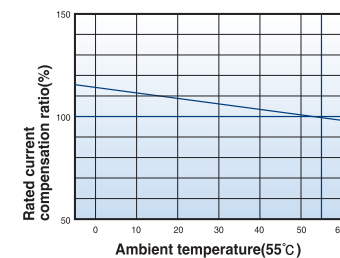
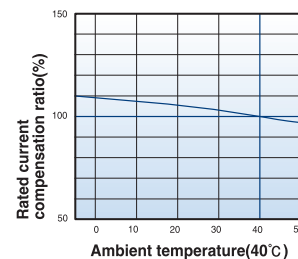
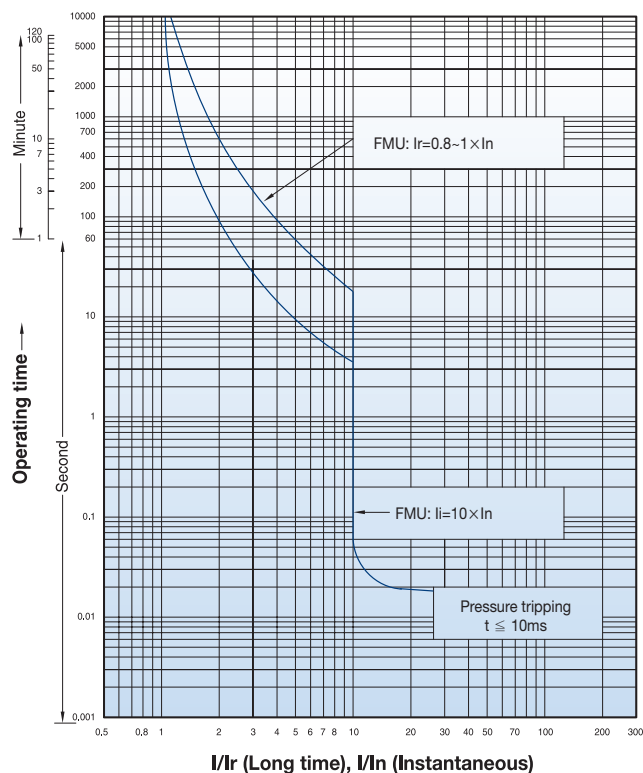
Characteristics curves

Circuit breakers with thermal-magnetic trip units

TS250
FMU
125~250A

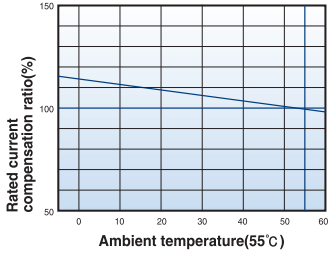
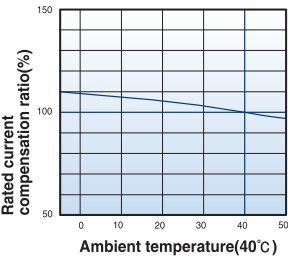
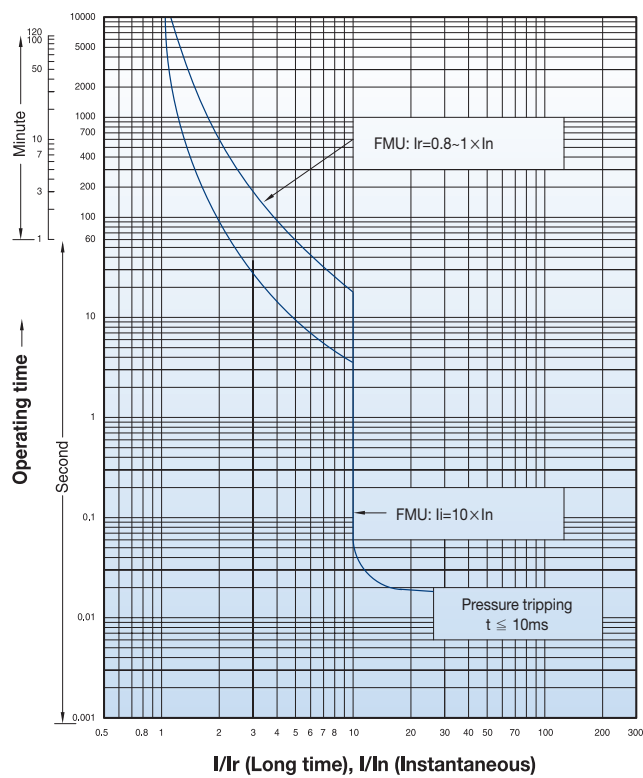


TS400
FMU
300, 400A



Circuit breakers with thermal-magnetic trip units

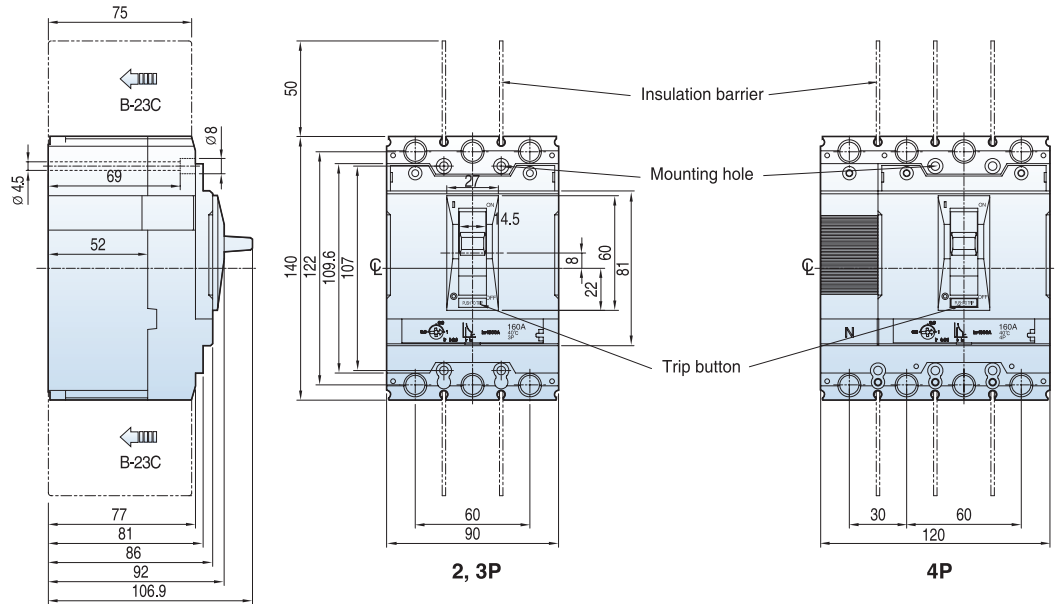
TS630
FMU
500, 630A



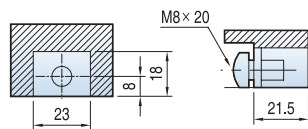
Overall dimensions

TD100/160

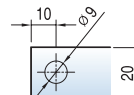
[mm]



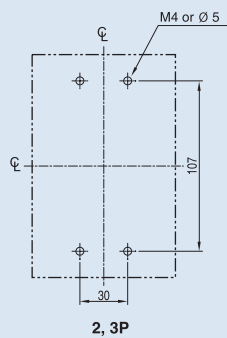
Terminal section



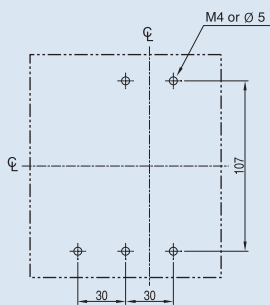
Conductor



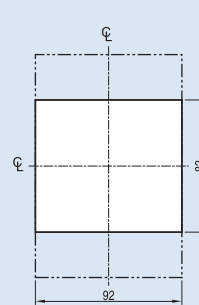
Panel drilling



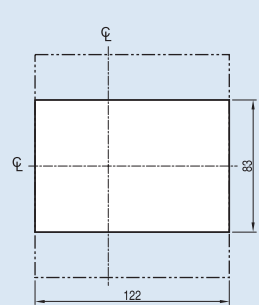
4P



Front panel cutting



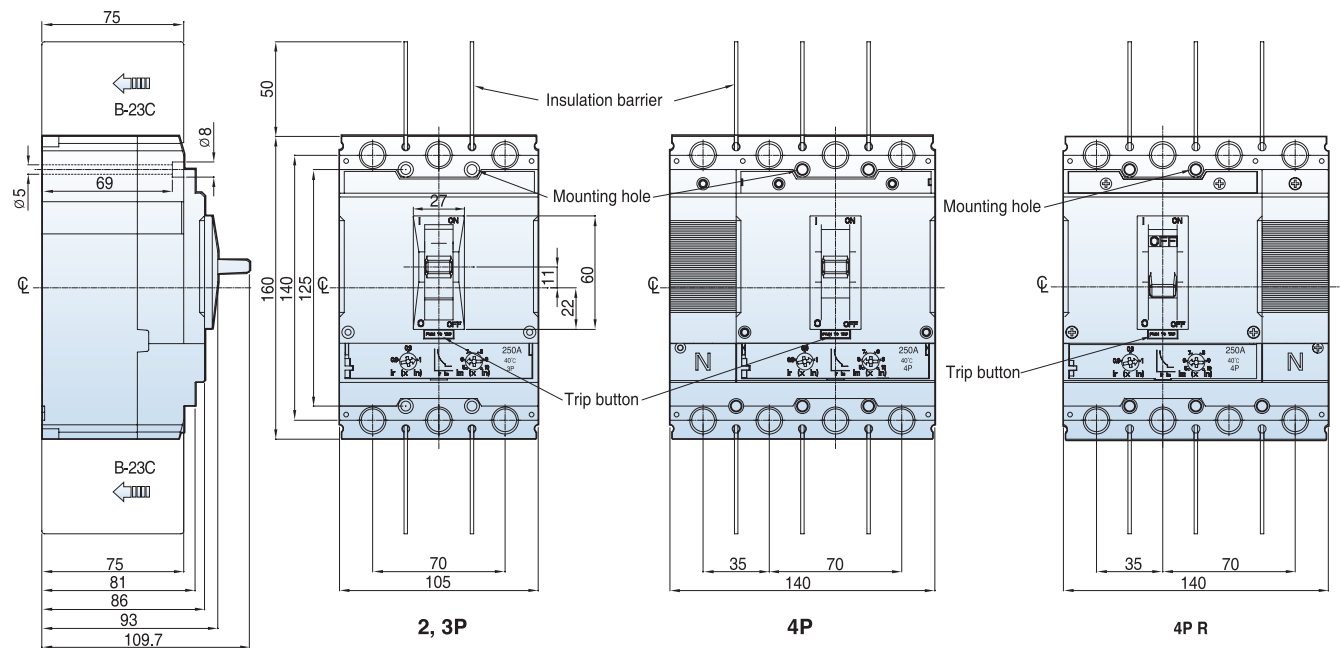
2, 3P



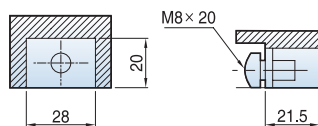
4P

TS100/160/250

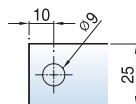
[mm]



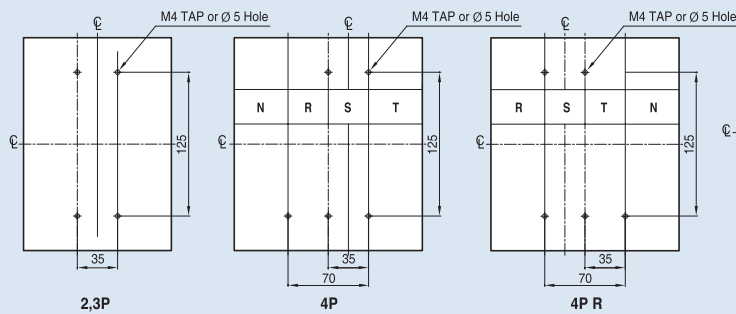
Terminal section



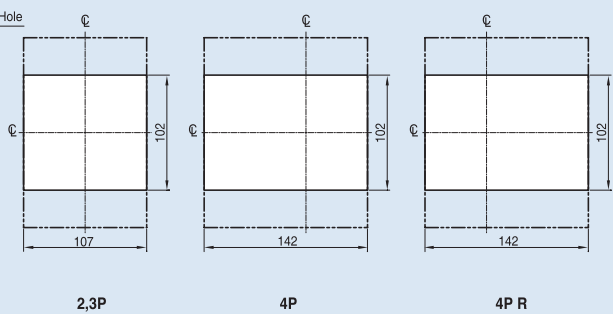
Conductor



Panel drilling

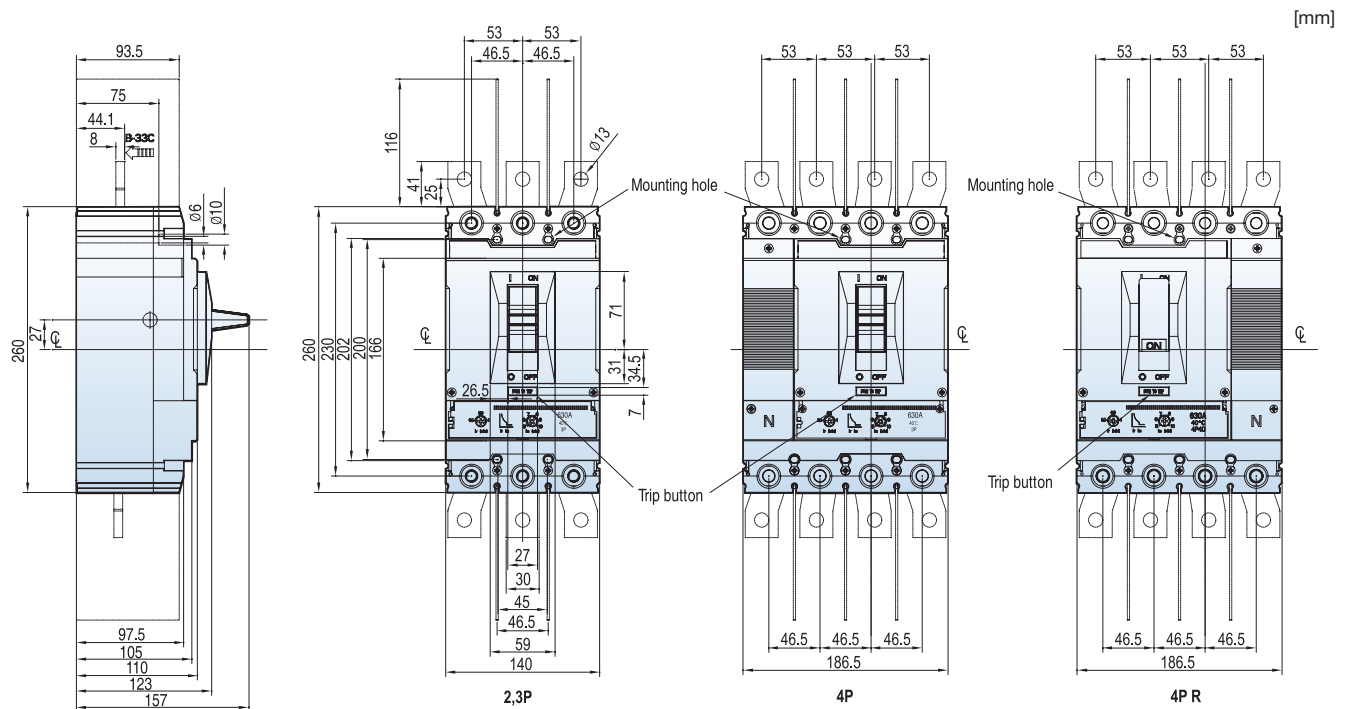


Front panel cutting

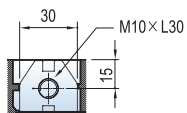


Overall dimensions

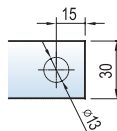
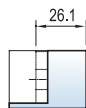
TS400/630



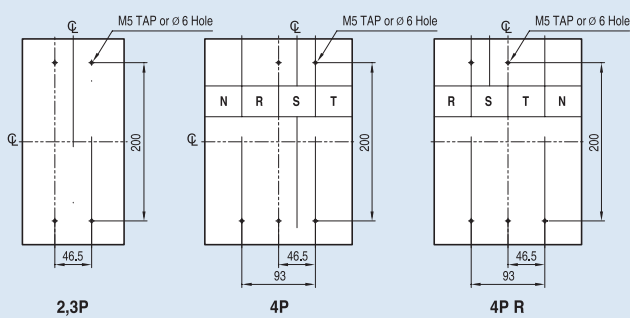
Terminal section



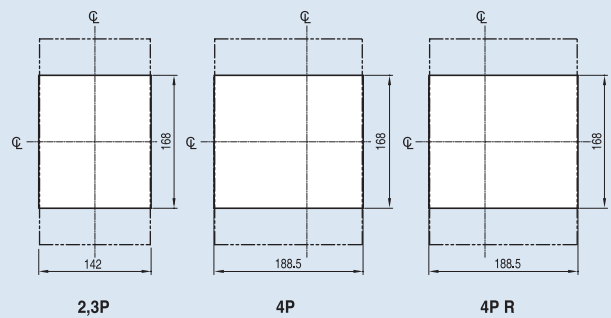
Conductor



Panel drilling



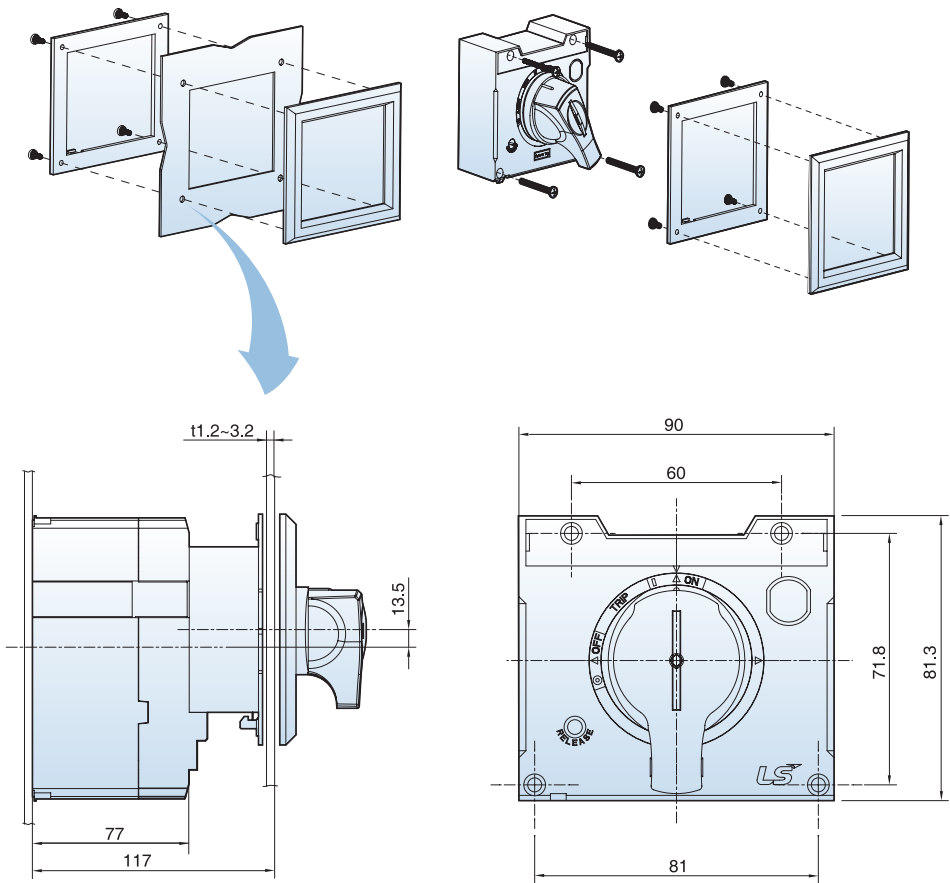
Front panel cutting



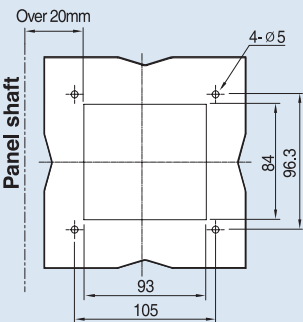
Direct rotary handles

DH1 & DHK1 for TD100/160

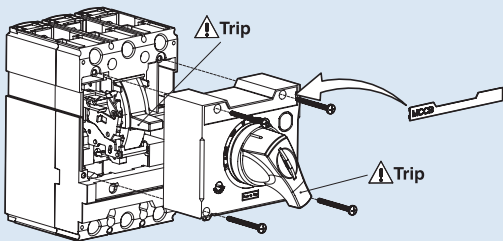
[mm]



Panel drilling



Way of installation

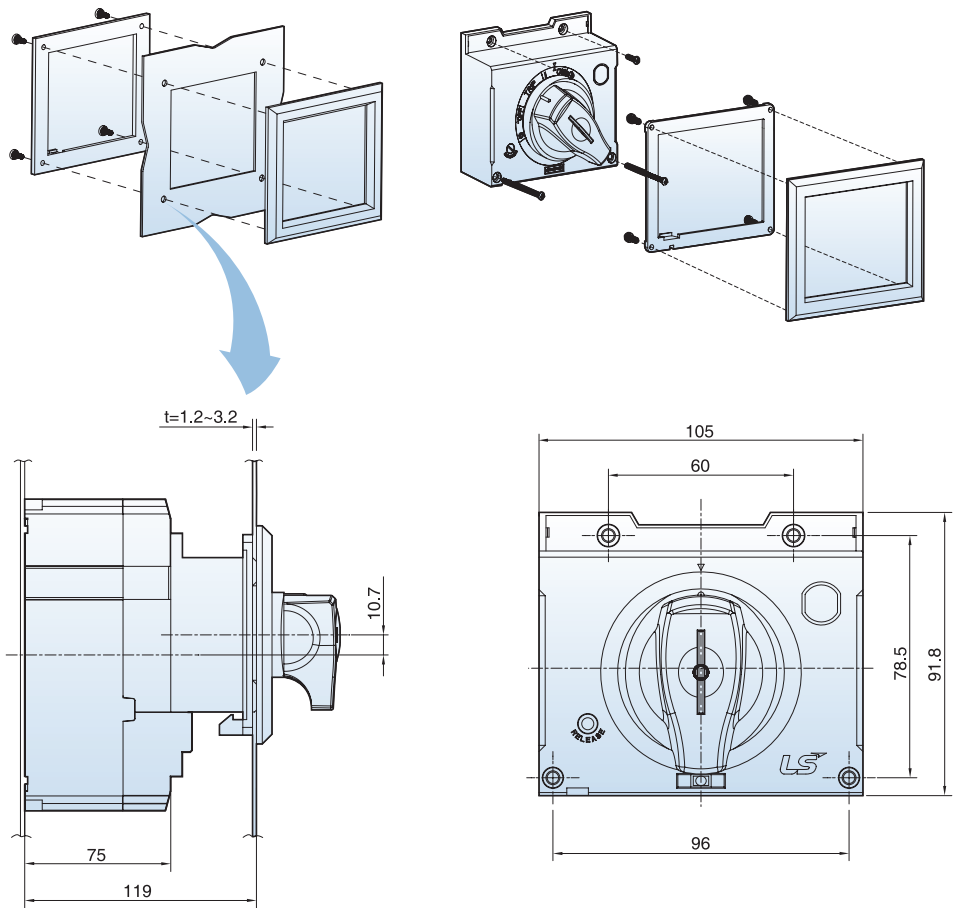


Overall dimensions

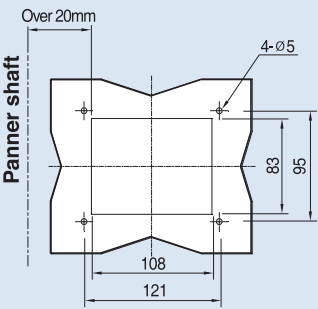
Direct rotary handles

DH2 & DHK2 for TS100/160/250

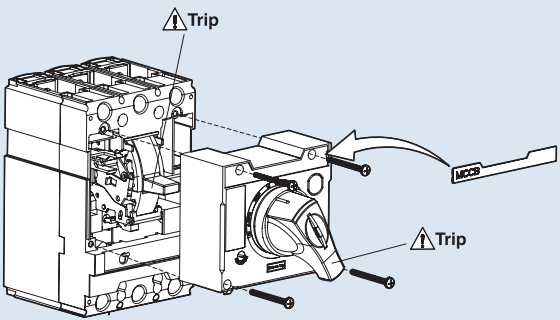
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Panel drilling



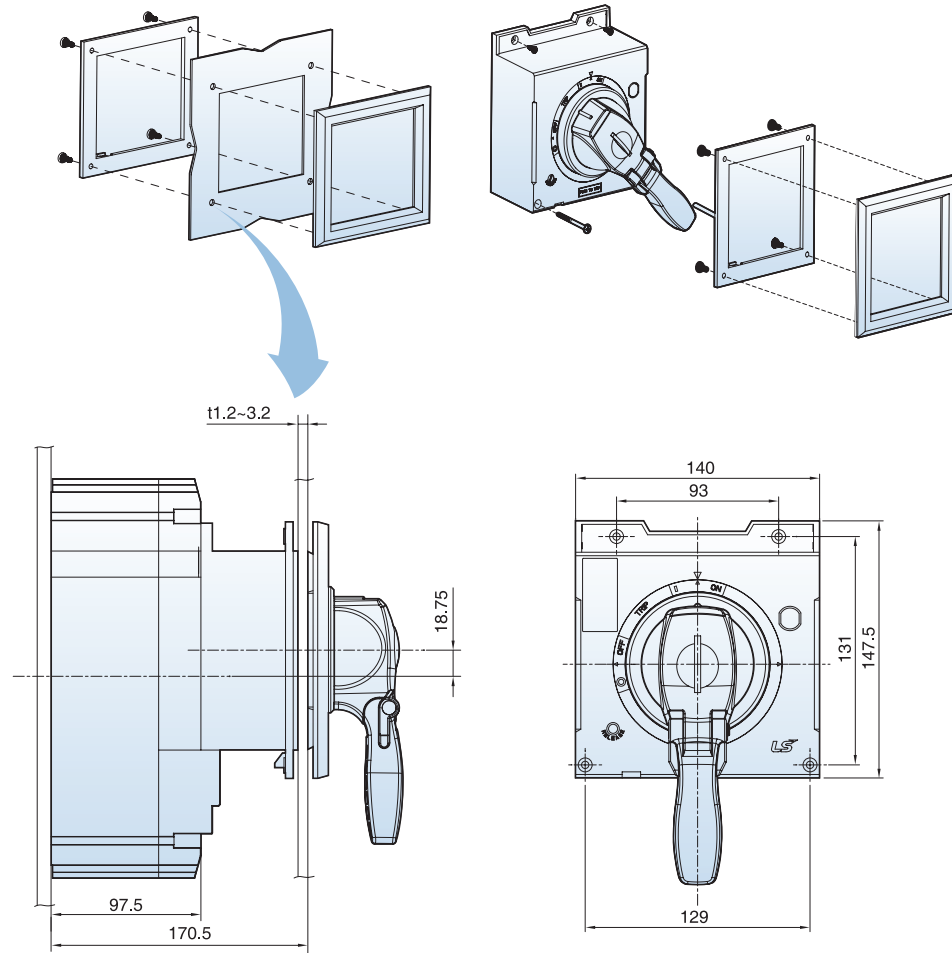
Way of installation



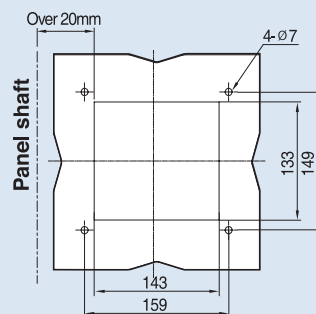
Direct rotary handles

DH3 & DHK3 for TS400/630

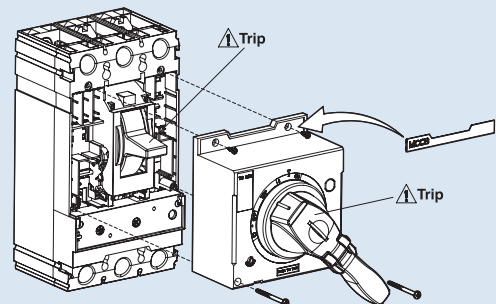
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Panel drilling



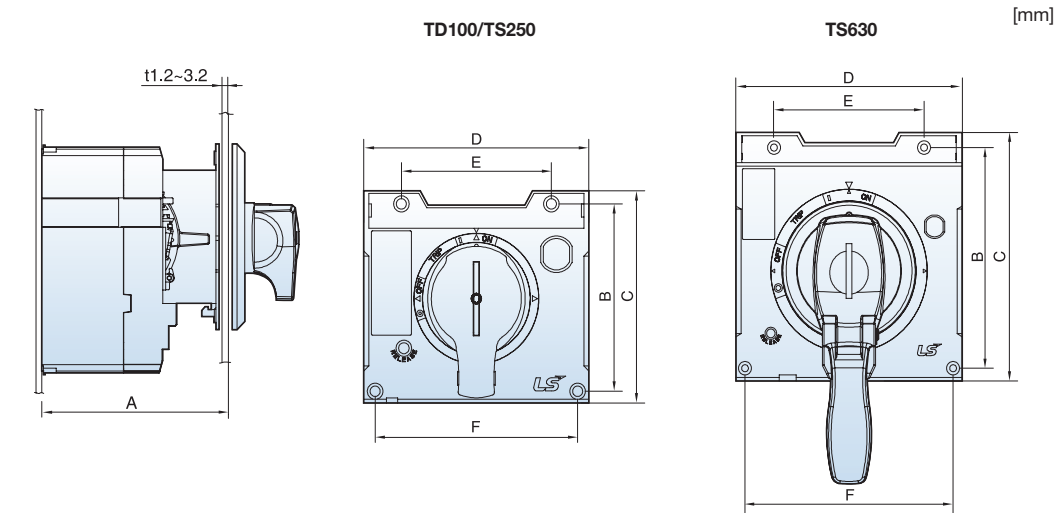
Way of installation



Overall dimensions

Direct rotary handles

Dimension table for D-handles

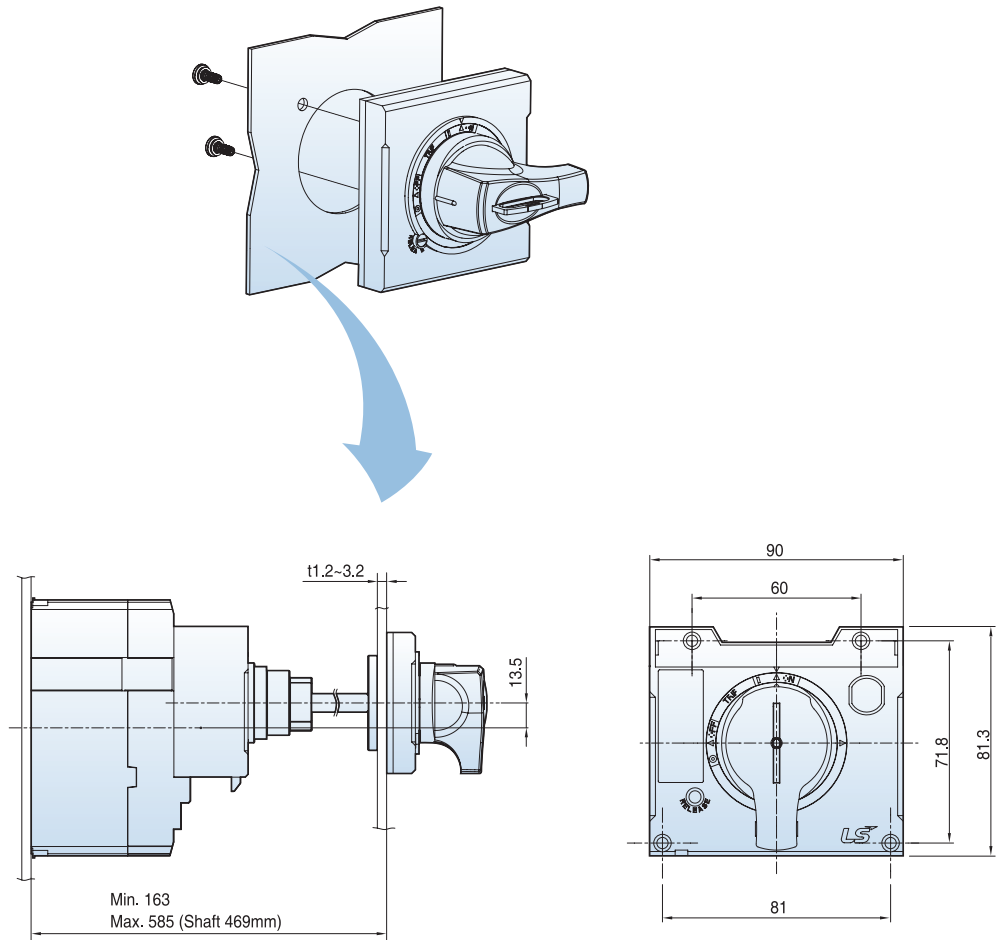


Applicable to	TD160	TS250	TS630
A (mm)	117	119	170.5
B (mm)	71.8	78.5	131
C (mm)	81.3	91.8	147.5
D (mm)	90	105	140
E (mm)	60	60	93
F (mm)	81	96	129

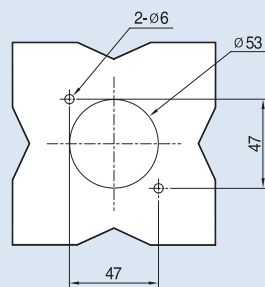
Direct rotary handles

EH1 for TD100/160

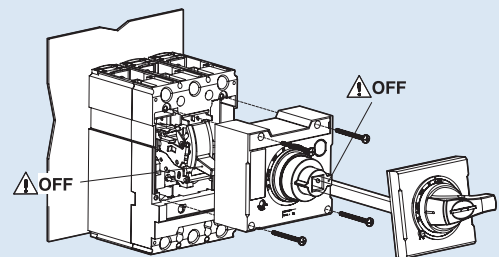
[mm]



Panel drilling



Way of installation

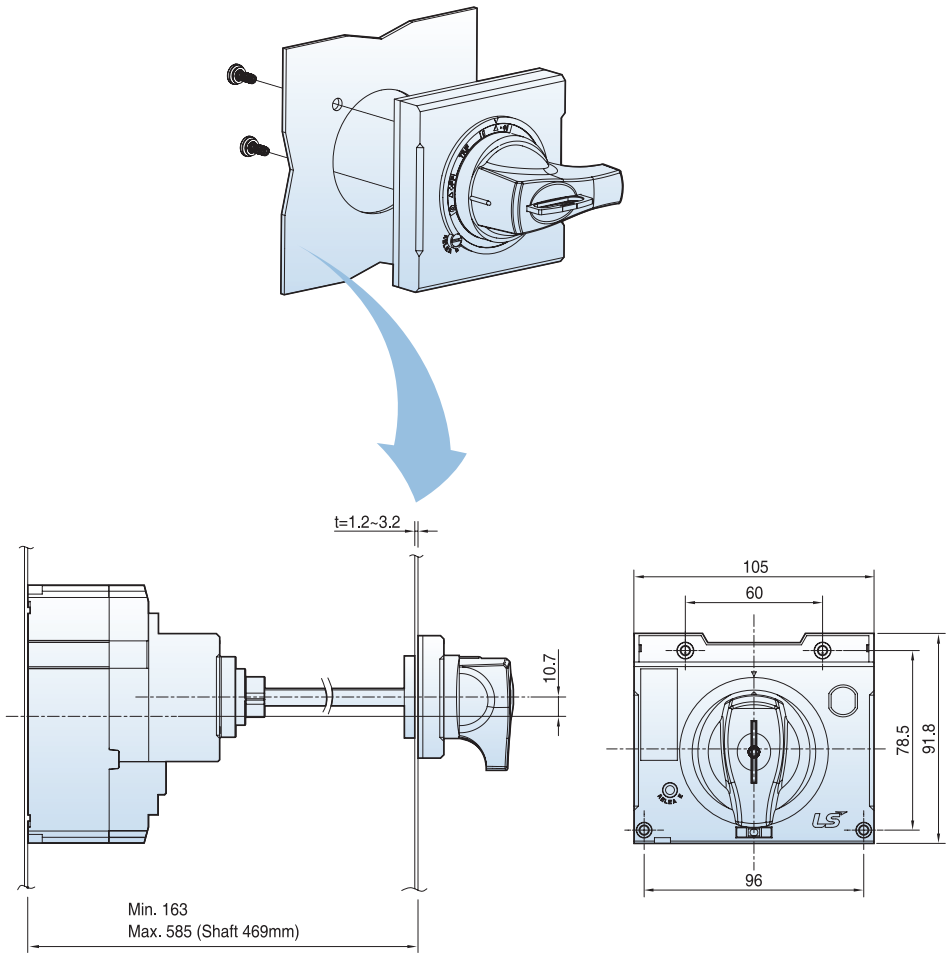


Overall dimensions

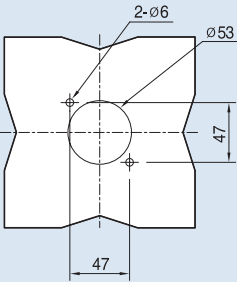
Direct rotary handles

EH2 for TS100/160/250

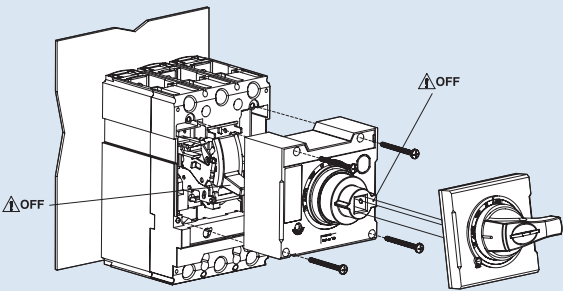
[mm]



Panel drilling



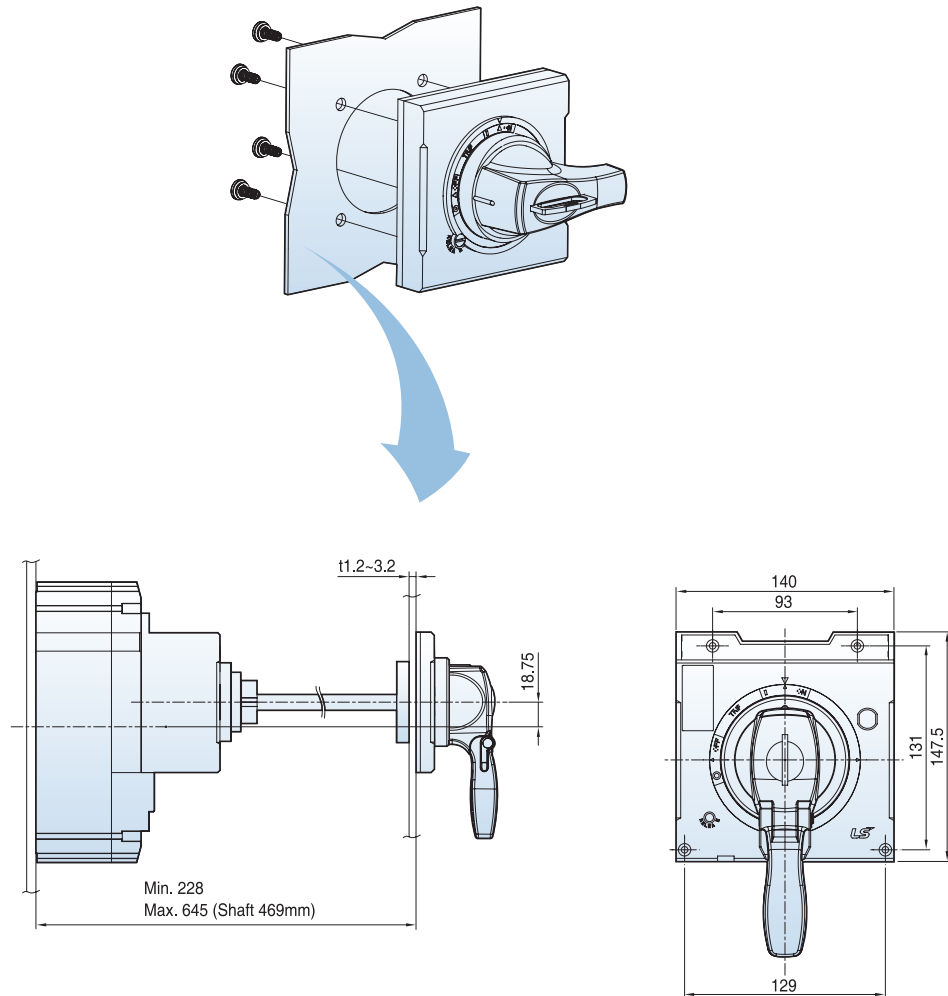
Way of installation



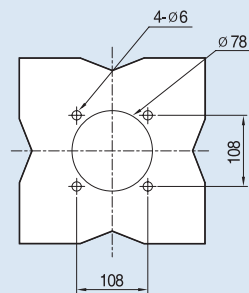
Direct rotary handles

EH3 for TS400/630

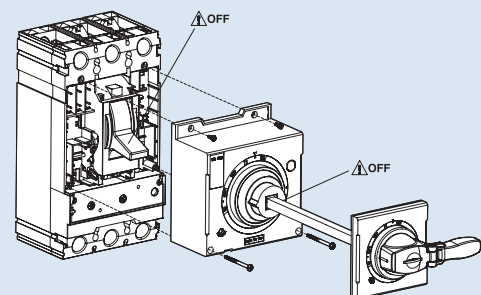
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Panel drilling



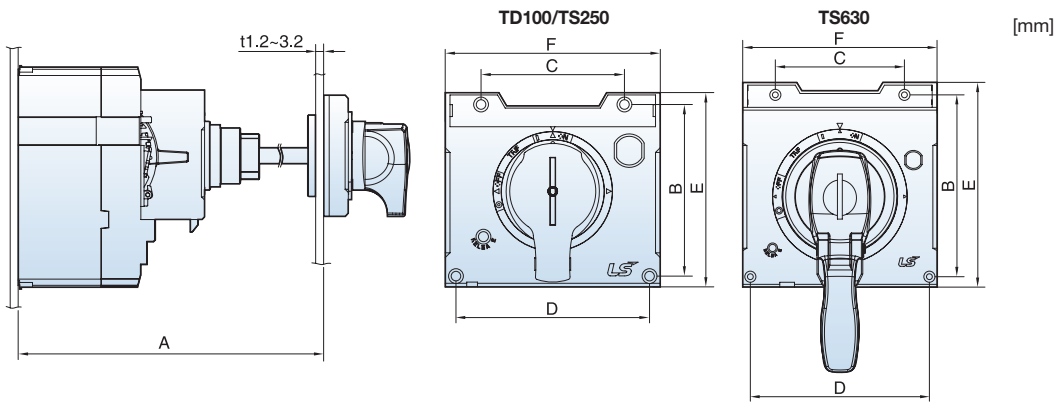
Way of installation



Overall dimensions

Extended rotary handles

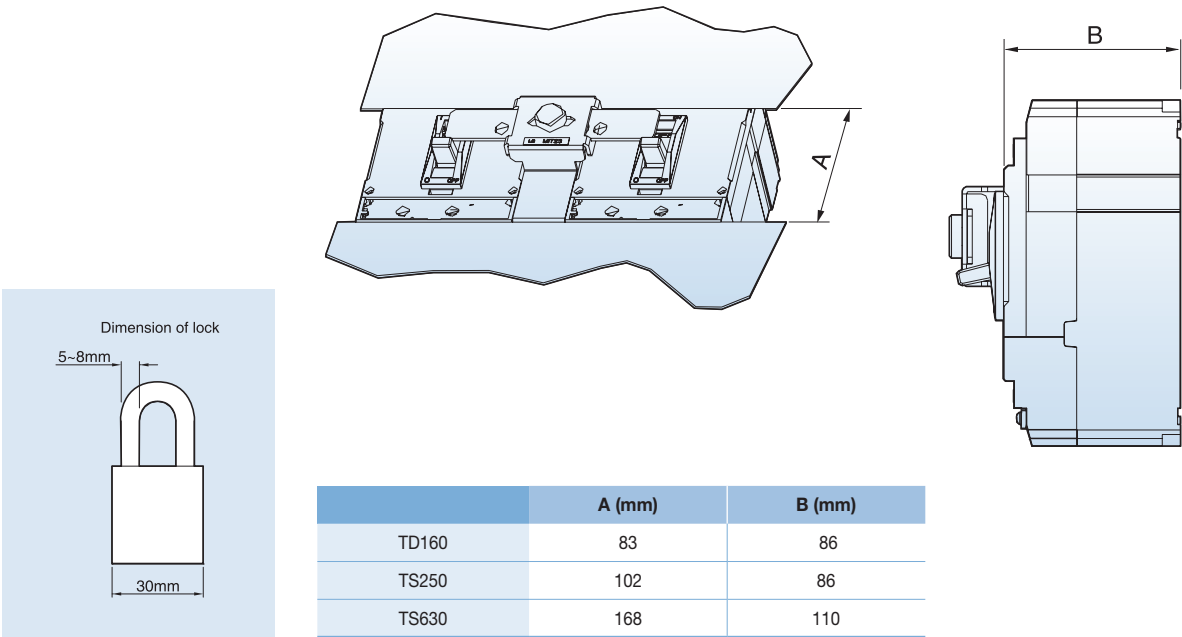
Dimension table for E-handles



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

Mechanical interlocking device

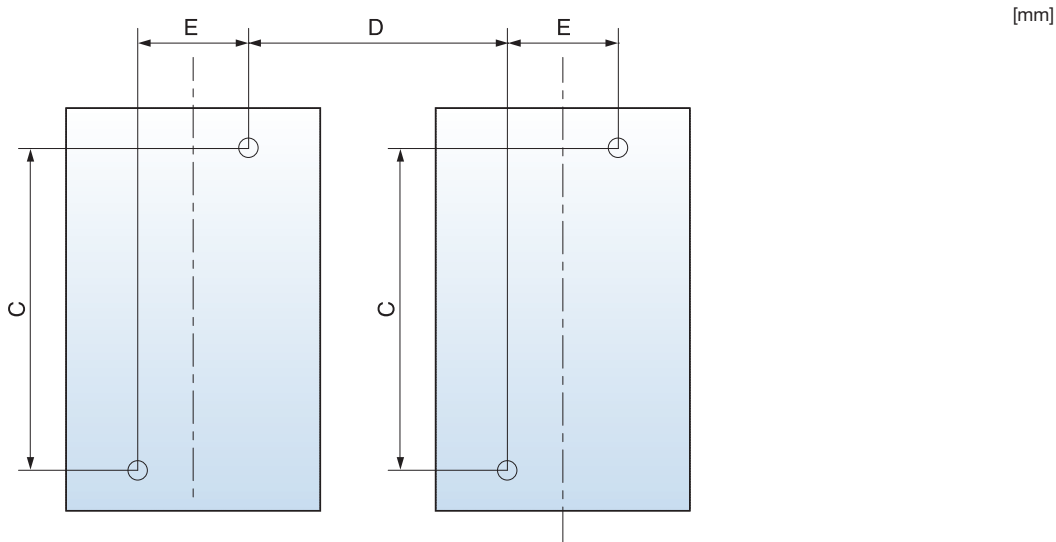
MIT13, MIT23, MIT33



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

Mechanical interlocking device

Mounting dimension for MIT



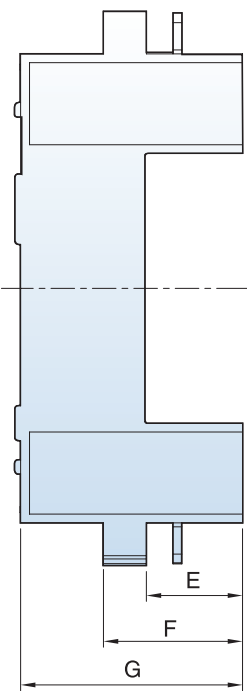
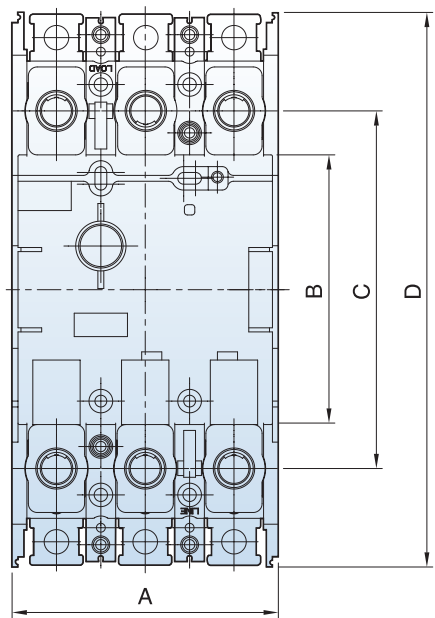
2, 3Pole MCCBs	C (mm)	D (mm)	E (mm)
TD100/160	107	90	30
TS100/160/250	125	105	35
TS400/630	200	139.5	46.5

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

Overall dimensions

Plug-in device

Plug-in devices for TD100/160



[mm]

TD100/160

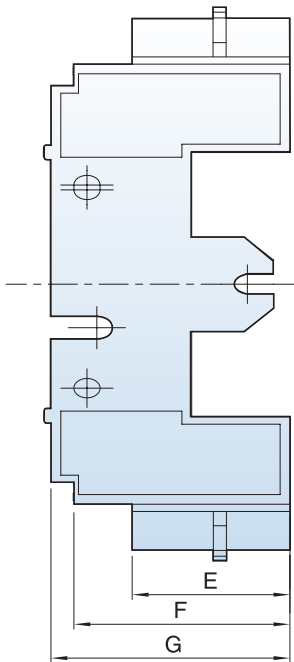
	TD100/160
A (mm)	90 (120*)
B (mm)	92
C (mm)	122
D (mm)	189.2 (185.6*)
E (mm)	32.5
F (mm)	47
G (mm)	75

* 4P Plug-in (TD100/160 only)

Plug-in device

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

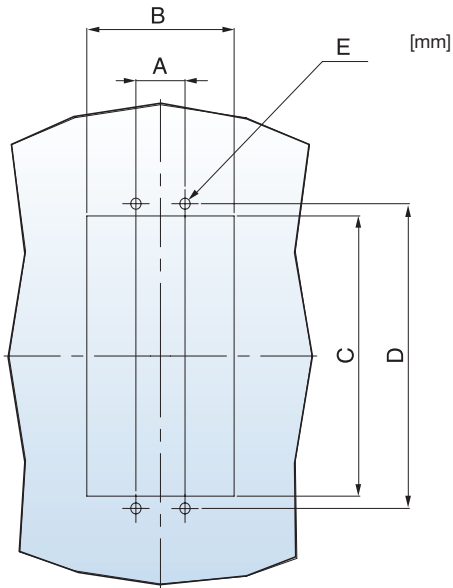
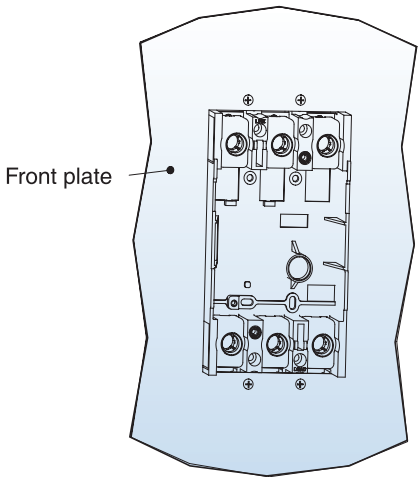
[mm]



TS100/160/250/400/630

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

Mounting to front plate



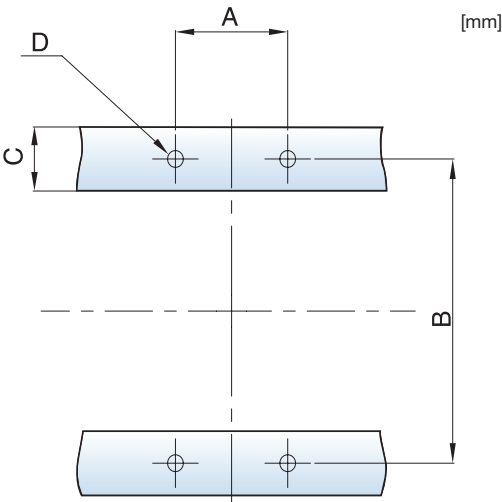
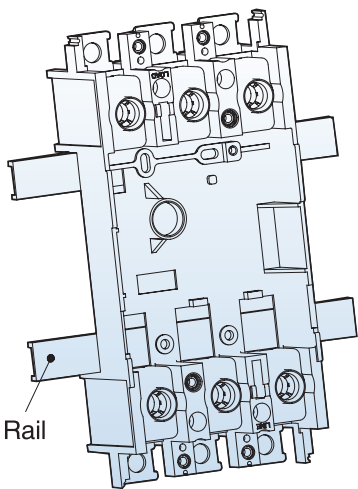
Applicable to	TD100/160	TS100/160/250	TS400/630
A (mm)	30 (60*)	35	46.5
B (mm)	90 (120*)	105	140
C (mm)	160	182	290
D (mm)	174	202	314
E (mm)	M4 or ø5	M4 or ø5	M5 or ø6

* 4P Plug-in (TD100/160 only)

Overall dimensions

Plug-in device

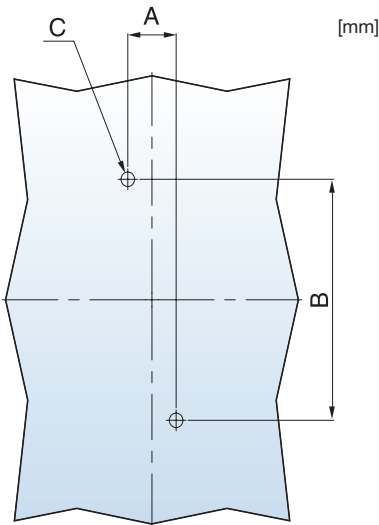
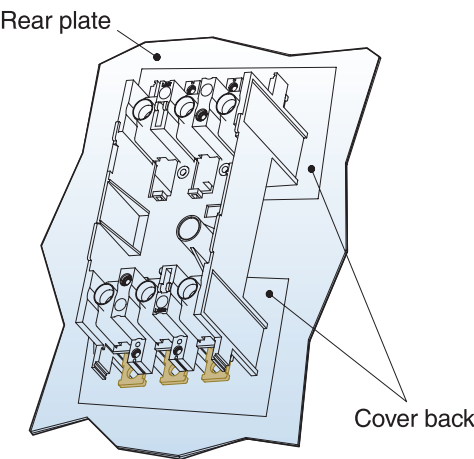
Rail mounting



Applicable to	TD100/160	TS100/160/250	TS400/630
A (mm)	30 (60°)	70	100
B (mm)	76	77.8	101.6
C (mm)	14	28	32
D (mm)	M4 or ø5	M6 or ø7	M6 or ø7

* 4P Plug-in (TD100/160 only)

Mounting to rear plate with cover back

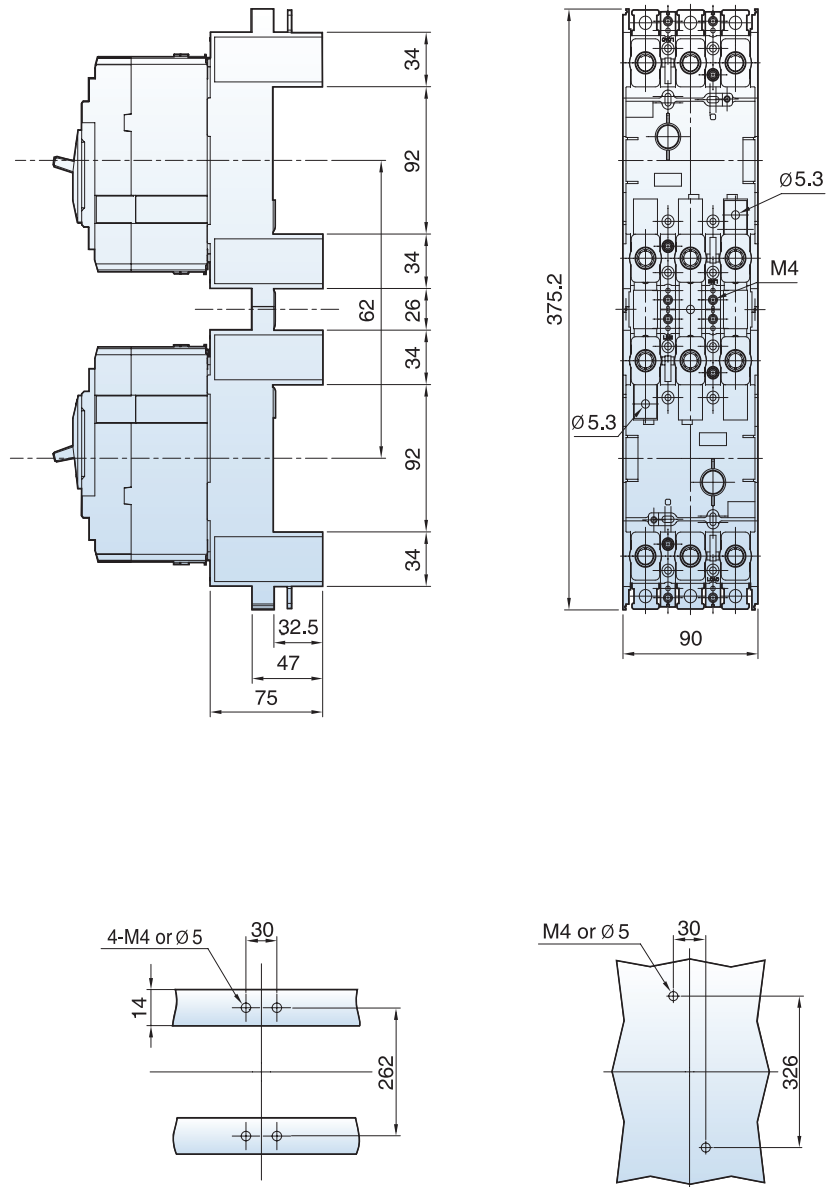


Applicable to	TD100/160	TS100/160/250	TS400/630
A (mm)	30 (60°)	35	46.5
B (mm)	140	154	262
C (mm)	M4 or ø5	M4 or ø5	M5 or ø6

* 4P Plug-in (TD100/160 only)

Mounting for TD100/160

[mm]

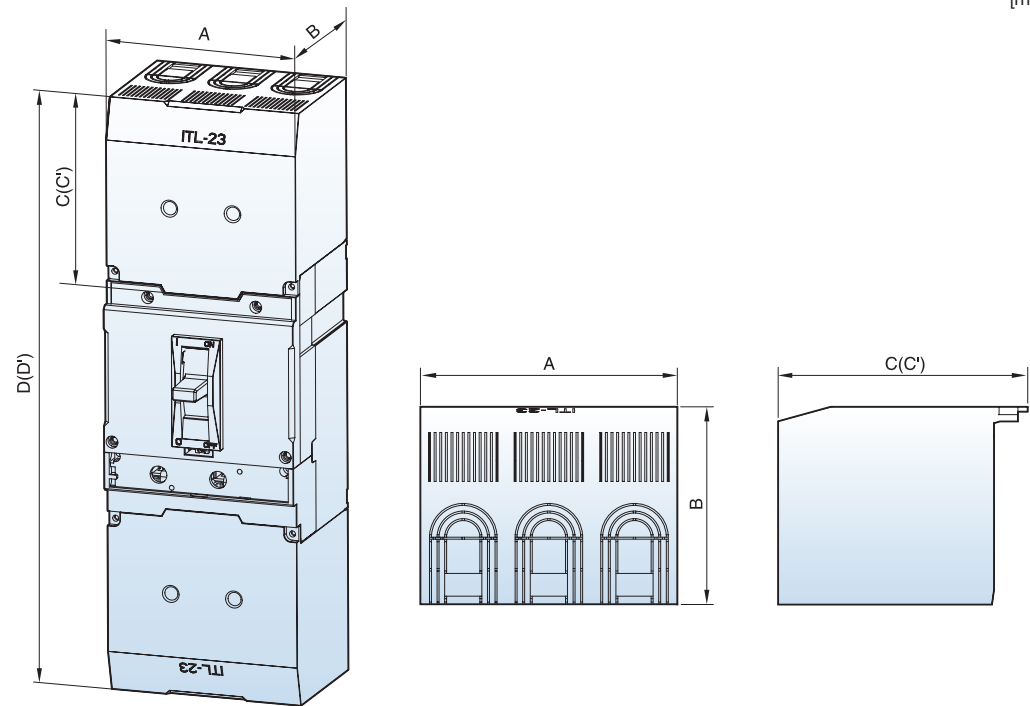


Overall dimensions

Terminal cover

ITS and ITL for TD100/160, TS100/160/250/400/630

[mm]

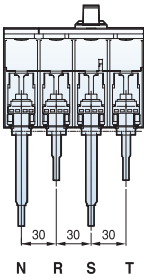
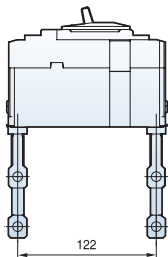


Applicable to	Type			Dimension(mm)					
Frame type	Pole	Long type	Short type	A	B	C (Long type)	C' (Short type)	D (Long type)	D' (Short type)
TD100, TD160	2P, 3P	ITL13	ITS13	90	80.8	48.5	30.5	196	160
	4P	ITL14	ITS14	120	80.8	32	25		
TS100, TS160, TS250	2P, 3P	ITL23	ITS23	105	80.8	102	36.3	321.4	190
	4P	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		

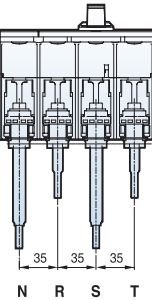
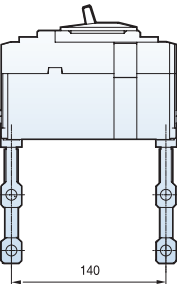
Rear terminals

[mm]

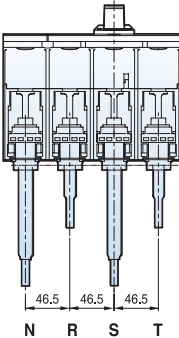
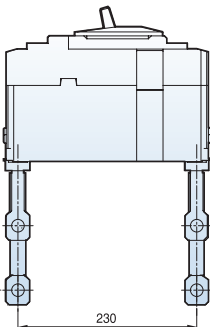
TD100
TD160



TS100
TS160
TS250



TS400
TS630



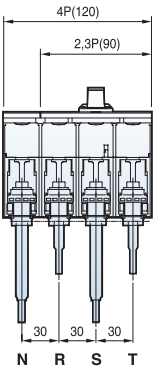
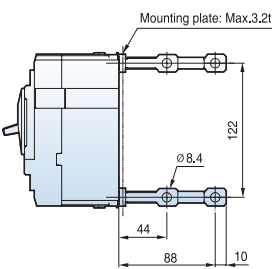
Overall dimensions

Rear terminals

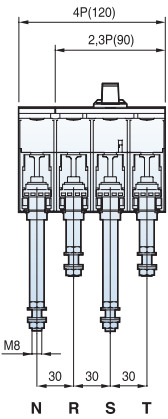
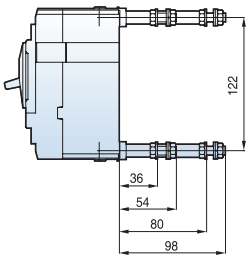
TD100 / TD160

[mm]

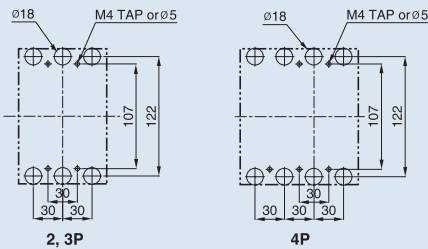
Bar type



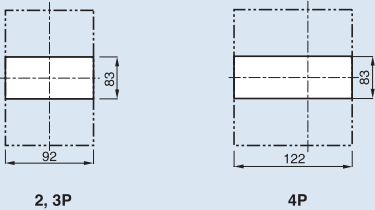
Round type



Panel drilling



Front panel cutting

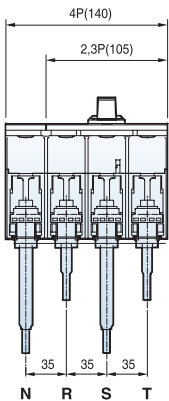
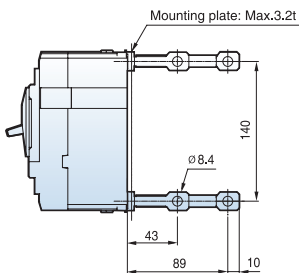


Rear terminals

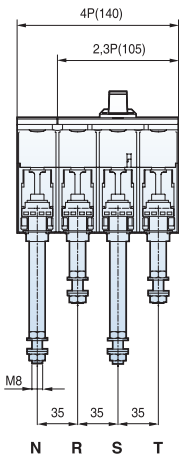
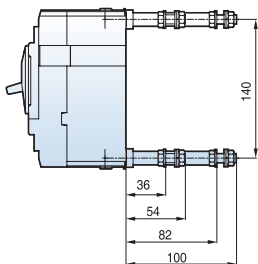
TS100 / TS160 / TS250

[mm]

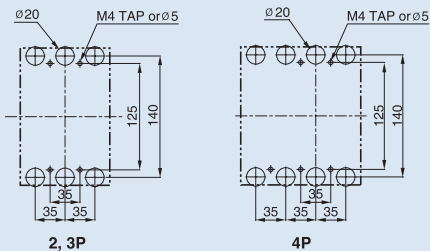
Bar type



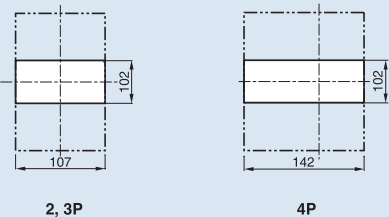
Round type



Panel drilling



Front panel cutting



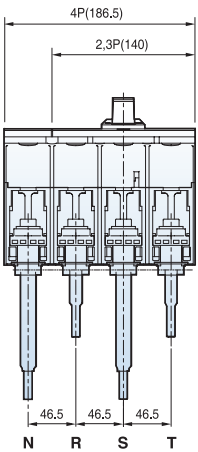
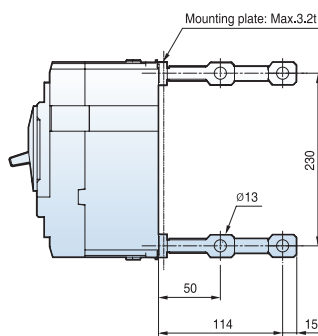
Overall dimensions

Rear terminals

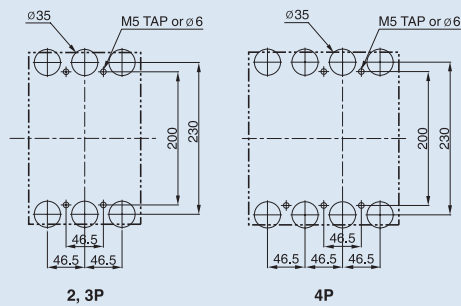
TS400 / TS630

[mm]

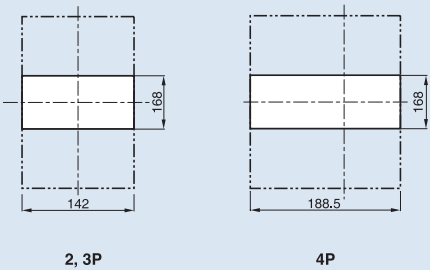
Bar type



Panel drilling



Front panel cutting



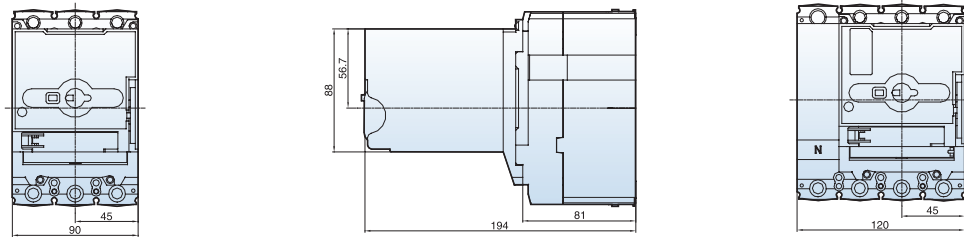
Circuit breaker with motor operator

MOP1, MOP2, MOP3, MOP4

[mm]

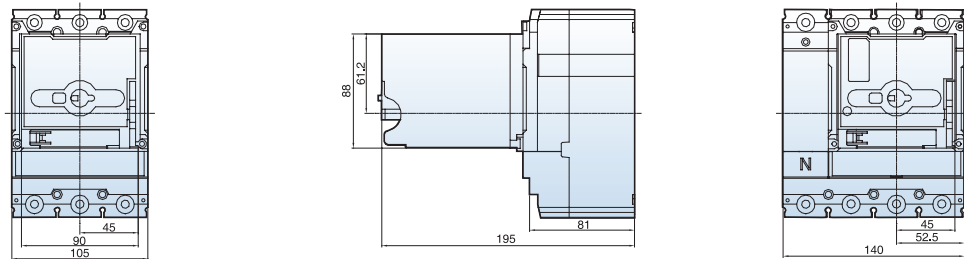
TD100
TD160

Circuit breaker with MOP1



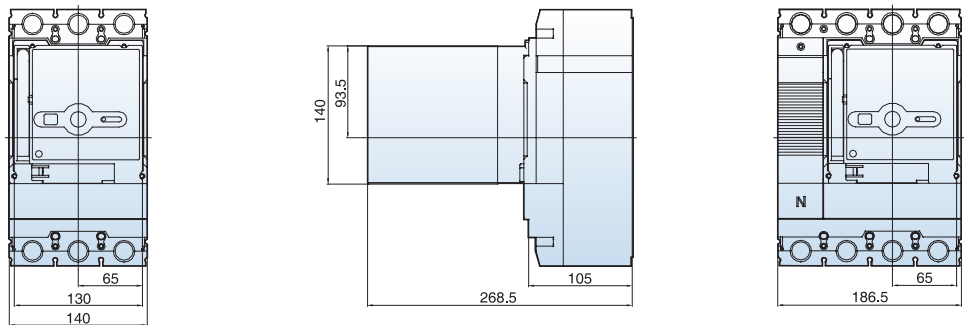
TS100
TS160
TS250

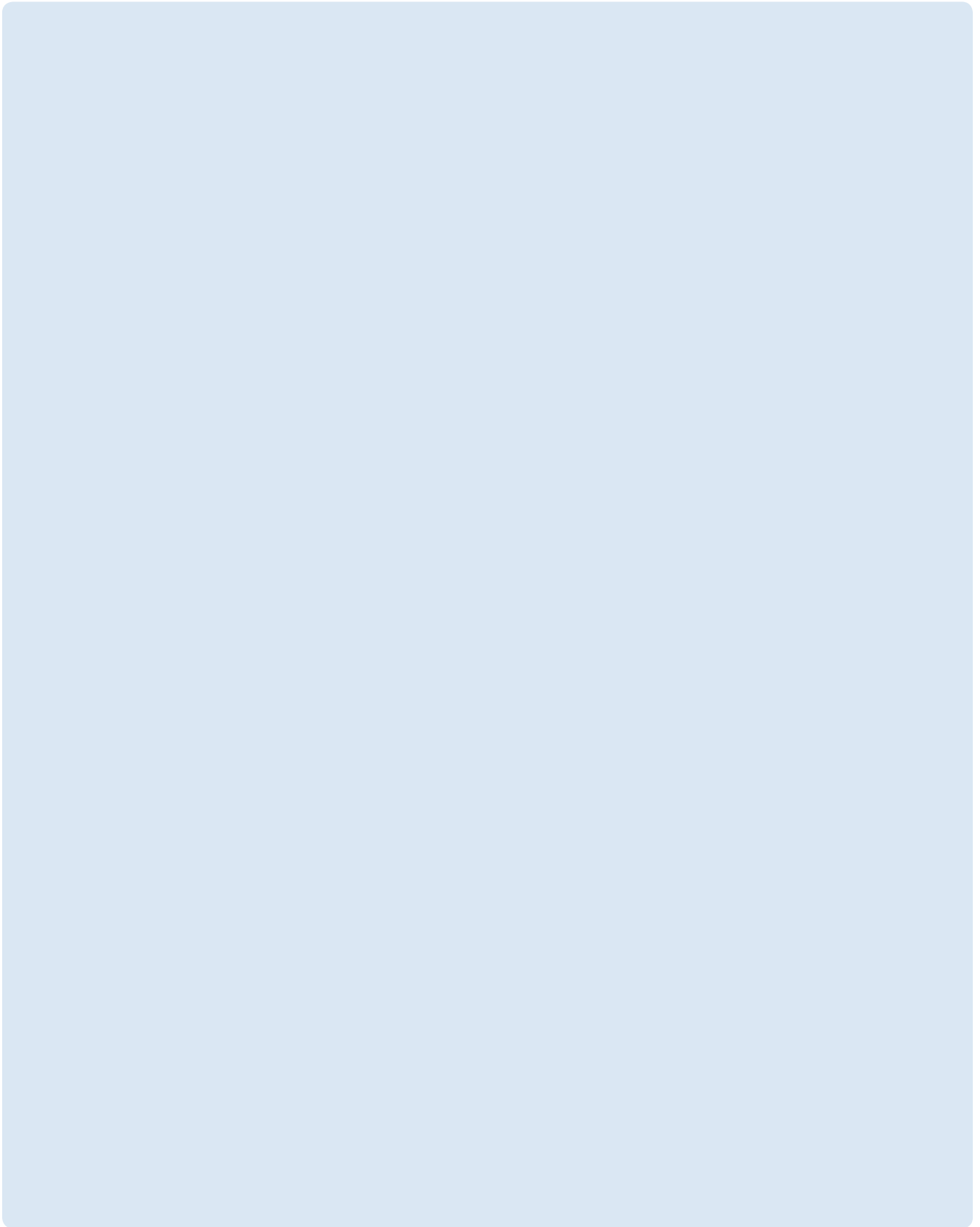
Circuit breaker with MOP2



TS400
TS630

Circuit breaker with MOP3







Safety Instructions

- For your safety, please read user's manual thoroughly before operating.
- Contact the nearest authorized service facility for examination, repair, or adjustment.
- Please contact qualified service technician when you need maintenance.
Do not disassemble or repair by yourself!
- Any maintenance and inspection shall be performed by the personnel having expertise concerned.



- According to The WEEE Directive, please do not discard the device with your household waste.

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