A-3. Accessories

Accessories for TE series

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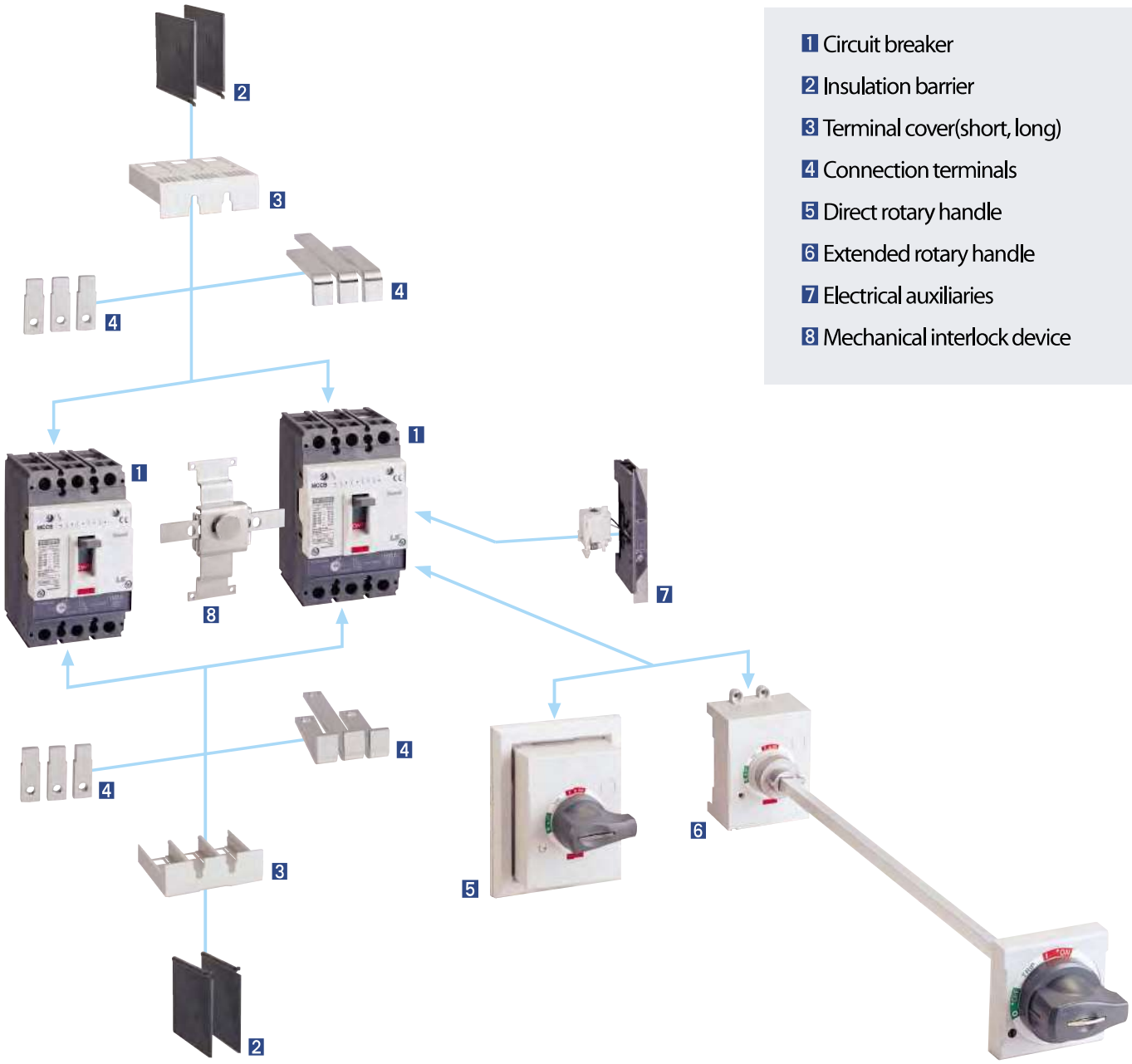
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Accessories for TE series

Susol

Overview



1 Circuit breaker
2 Insulation barrier
3 Terminal cover(short, long)
4 Connection terminals
5 Direct rotary handle
6 Extended rotary handle
7 Electrical auxiliaries
8 Mechanical interlock device

Auxiliary and Alarm switch



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 viceversa.



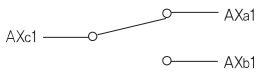
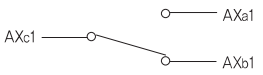
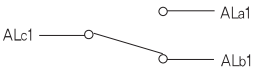
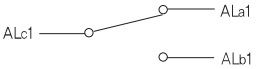
Alarm switch (AL)

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.

Combination switch (AX+AL)

It consists of one auxiliary switch (AX) and one alarm switch (AL) in a body to connect into the same position of the breaker.

Contact

MCCB	ON	OFF	TRIP
AX			
AL			

Rating

Conventional thermal current Ith	5A				
Rated operational current Ie with rated operational voltage Ue	Voltage	Current, Ie		Minimum load current	
		Resistance	Inductance		
- Altemating current 50/60Hz AC	125V	5	3		TE100 TE160
	250V	3	2		
	500V	-	-	5V DC 160mA	
- Direct current DC	30V	4	3	30V DC 30mA	
	125V	0.4	0.4		
	250V	0.2	0.2		

Shunt trip, SHT

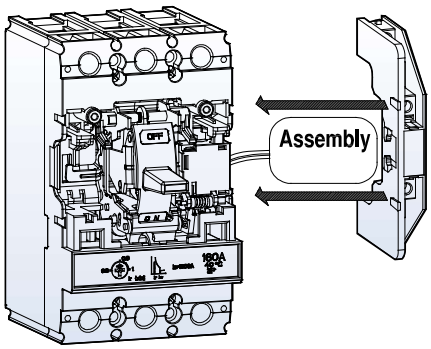


The shunt trip opens the mechanism in response to an externally applied voltage signal. The releases include coil clearing contacts that automatically clear the signal circuit when the mechanism has tripped.
The shunt release can be installed in the right accessory compartment of the MCCBs.

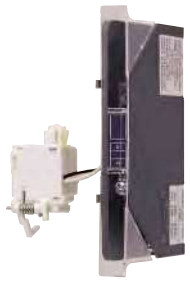
- Range of operational voltage
  AC: 0.7~1.1Vn, DC: 0.8~1.1Vn
- Frequency(Only AC): 45Hz ~ 65 Hz

Rating

Control voltage, Ue		Power consumption		
		AC (VA)	DC (W)	mA
Voltage	AC/DC 12V	0.35	0.36	30
	AC/DC 24V	0.64	0.65	27
	AC/DC 48V	1.09	1.1	23
	AC/DC 60V	1.2	1.22	20
	AC/DC 100~130V	0.73	0.75	5.8
	AC/DC 200~250V	1.21	1.35	5.4
	AC 380~450V	1.67	-	3.8
	AC 440~500V	1.68	-	3.5
Max.opening time		50ms (max.)		
Tightening torque of terminal screw		8.2 kgf · cm		



Undervoltage release, UVT



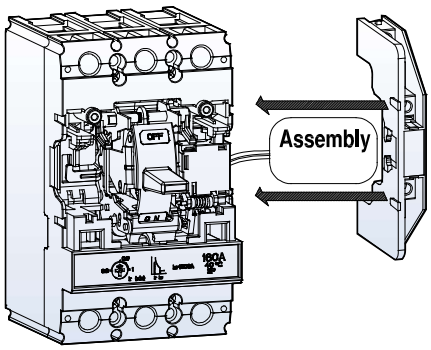
The undervoltage release automatically opens a circuit breaker when voltage drops to a value ranging between 20% to 70% of the line voltage. The operation is instantaneous, and after tripping, the circuit breaker cannot be re-closed again until the voltage returns to 85% of line voltage. Continuously energized, the undervoltage release must be operating before the circuit breaker can be closed. The undervoltage release can be easily installed in the right accessory compartment of the MCCBs.

- Range of tripping voltage: 0.2 ~ 0.7Vn
- MCCB making is possible voltage: 0.85Vn (Exceed)
- Frequency (Only AC): 45Hz ~ 65Hz



Rating

Control voltage, Ue		Power consumption		
		AC (VA)	DC (W)	mA
Voltage	AC/DC 24V	0.64	0.65	27
	AC/DC 48V	1.09	1.1	23
	AC/DC 100~110V	0.73	0.75	5.8
	AC/DC 200~220V	1.21	1.35	5.4
	AC 380~440V	1.67	-	3.8
	AC 440~480V	1.68	-	3.5
Max.opening time		50ms (max.)		
Tightening torque of terminal screw		8.2 kgf · cm		
Operating voltage range	Trip	20~70% Vn		
	Reset/Closing	≥ 0.85Vn		



Maximum possibilities

Position	Type	TE160
		3/4P
Left-hand seat	AX	1
	AL	1
Right-hand seat	AX	1
	AL	1
	SHT/UVT	1

Note) Right-hand seat can be installed only one Electrical Accessary

Rotary handles



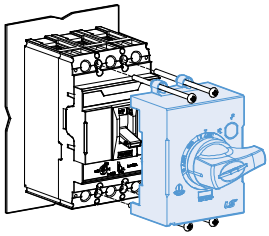
The rotary handle operating mechanism is available in either the direct version or in the extended version on the compartment door.
It is always fitted with a compartment door lock and on a request it can be supplied with a key lock in the open position.

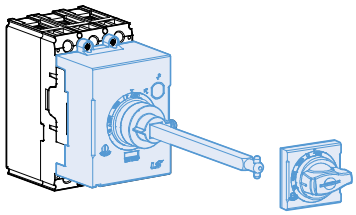
Direct rotary handles

MCCB	Rotary handle
TE100/160	DH1E

Extended rotary handles

MCCB	Rotary handle
TE100/160	EH1E





Degree of protections

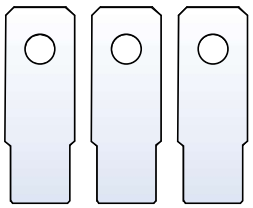
Type	Degree of protection
DH1E	The access probe of 1.0mm diameter shall not penetrate
EH1E	Totally protected against ingress of dust and water jets from any direction

Terminals

Front connection

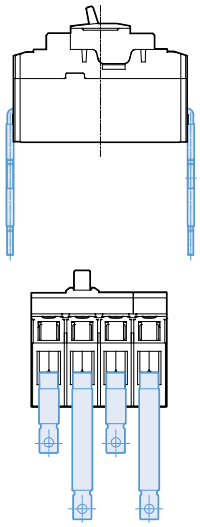
Extended terminal

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

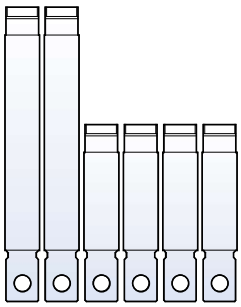
MCCB	Pole	Type	Feature
TE100/160	3P	ET13E	
	4P	ET14E	

Rear connection

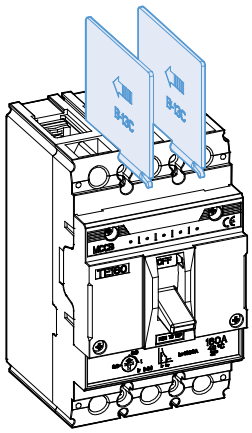
Rear connection terminals are used to adapt Susol TE circuit breakers to switchboards or other application that require rear connection.
These can be connected directly to circuit breakers without any modification.



Flat terminals

MCCB	Pole	Type	Feature
TE100/160	3P	RTF13	
	4P	RTF14	

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	
		3P	4P
B13C	TE100, TE160	4pcs	6pcs

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.



Short type covers

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

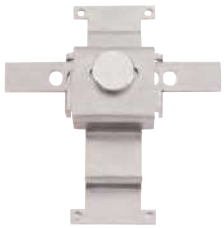


Long type covers

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

Type		Terminal cover	
Frame type	pole	Long type	Short type
TE100, TE160	3P	ITL13E	ITS13E
	4P	ITL14E	ITS14E

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.

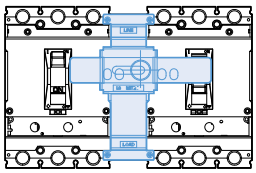
Fixing is carried out directly on the cover of the breakers.

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)

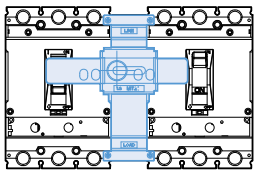
This mechanical interlocking device is very useful and simple for consisting of manual source-changeover system.

MCCB		Interlock
Frame type	pole	
TE100, TE160	3P	MIT13E
	4P	MIT14E

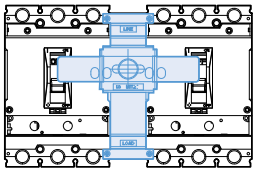
Operation



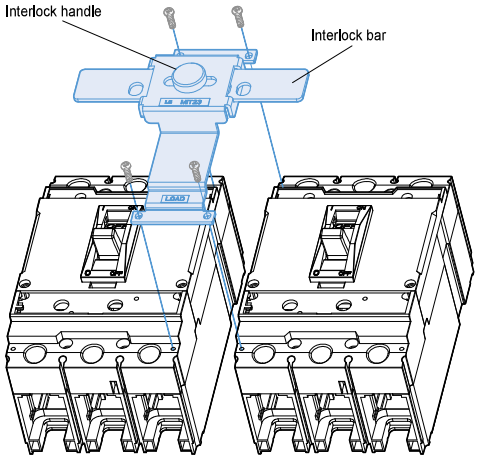
Left MCCB: ON/OFF is possible
Right MCCB: Off lock



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

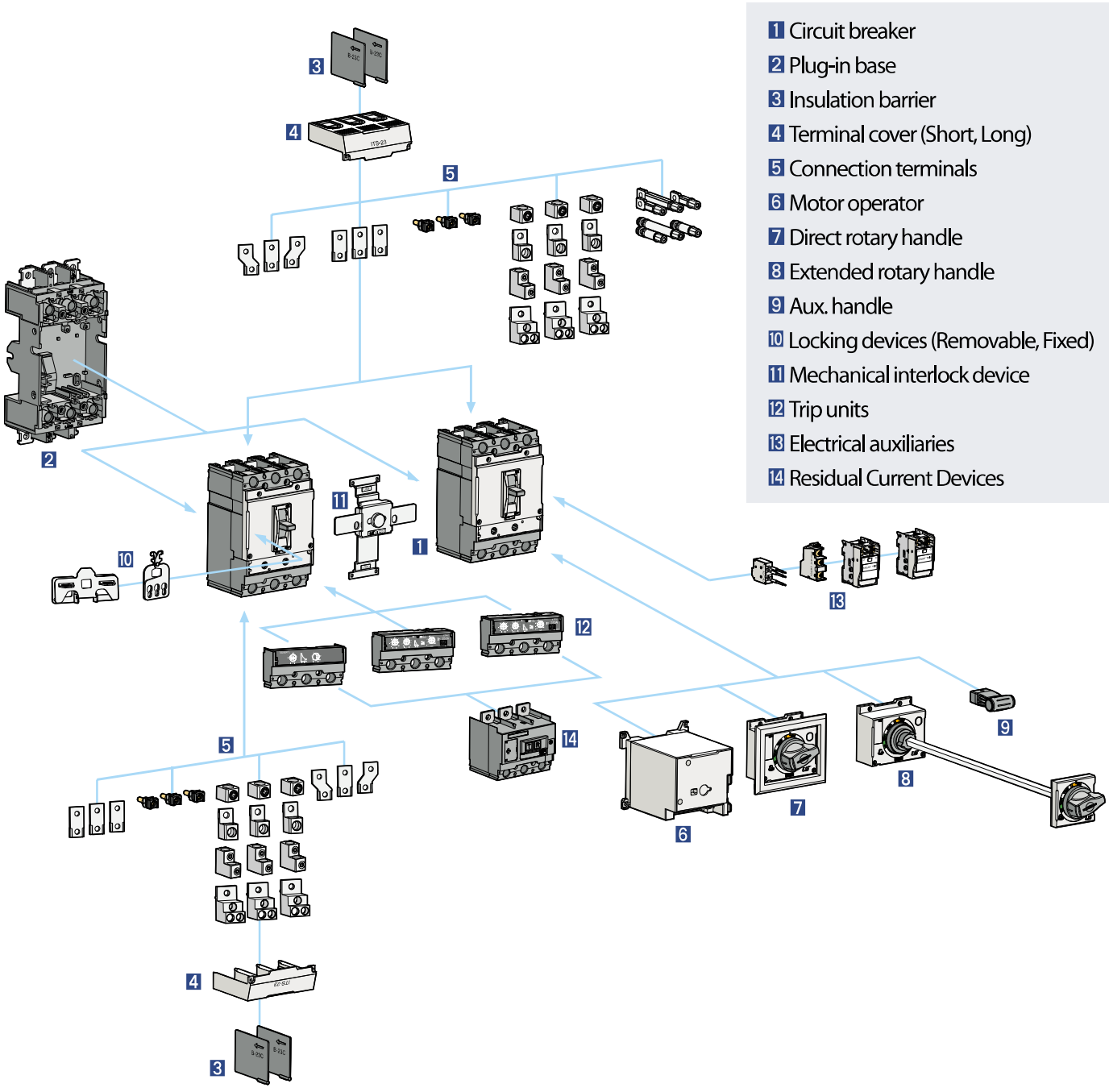


Both MCCBs are of locked



Note) Terminal covers do not use with the interlock.

Overview


1 Circuit breaker
2 Plug-in base
3 Insulation barrier
4 Terminal cover (Short, Long)
5 Connection terminals
6 Motor operator
7 Direct rotary handle
8 Extended rotary handle
9 Aux. handle
10 Locking devices (Removable, Fixed)
11 Mechanical interlock device
12 Trip units
13 Electrical auxiliaries
14 Residual Current Devices

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

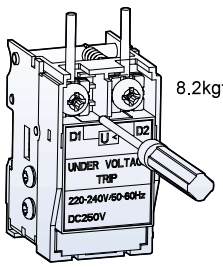
The undervoltage release automatically opens a circuit breaker when voltage drops to a value ranging between 35% to 70% of the line voltage. The operation is instantaneous, and after tripping, the circuit breaker cannot be re-closed again until the voltage returns to 85% of line voltage.

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 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

Technical data

	Control voltage (V)	Consumption			Applicable MCCBs
		AC (VA)	DC (W)	mA	
Power consumption	AC/DC 24V	0.64	0.65	27	TD100, TD160, TS100, TS160, TS250, TS400, TS630, TS800
	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) - Drop (Circuit breaker trips) - Rise (Circuit breaker can be switched on)		0.7~1.35Vn ~0.85Vn			



8.2kgf · cm

Electrical auxiliaries



SHT

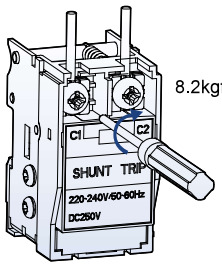
Shunt release, SHT

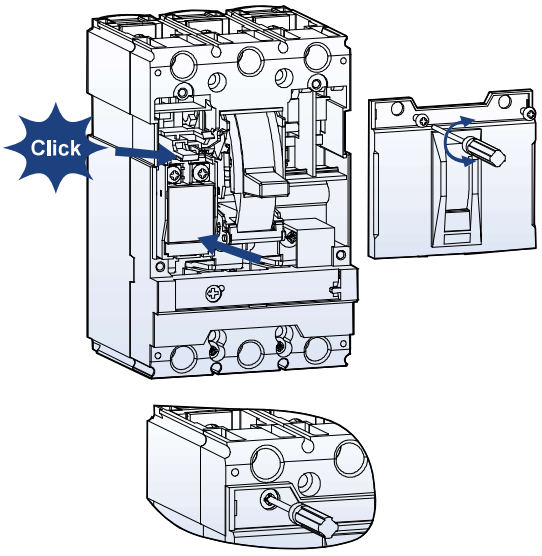
The shunt release opens the mechanism in response to an externally applied voltage signal. The releases include coil clearing contacts that automatically clear the signal circuit when the mechanism has tripped.
The shunt release can be installed in the left accessory compartment of the Susol TD & TS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

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

Technical data

	Control voltage (V)	Consumption			Applicable MCCBs
		AC (VA)	DC (W)	mA	
Power consumption	DC 12V	-	0.36	30	TD100, TD160, TS100, TS160, TS250, TS400, TS630, TS800
	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			

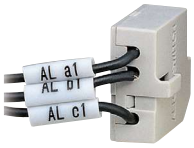




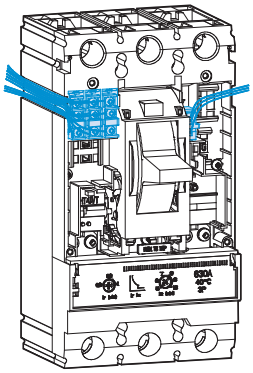
Electrical auxiliaries



AX



AL



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	AXc1 — AXa1 / AXb1	AXc1 — AXa1 / AXb1	
Position of AL, FAL	ALc1 — ALa1 / ALb1		ALc1 — ALa1 / ALb1

Technical data

Conventional thermal current Ith	5A				
Rated operational current Ie with rated operational voltage Ue	Voltage	Current, Ie		Minimum load current	
		Resistance	Inductance		
- Altemating current 50/60Hz AC	125V	5	3	5V DC 160mA	TD100 TD160 TS100 TS160 TS250 TS400 TS630 TS800
	250V	3	2		
	500V	-	-		
- Direct current DC	30V	4	3	30V DC 30mA	
	125V	0.4	0.4		
	250V	0.2	0.2		

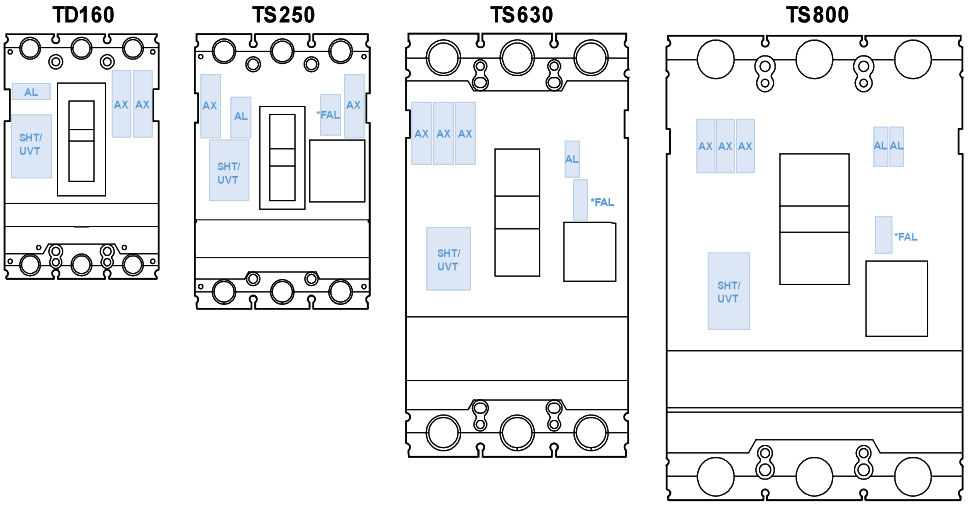
Electrical auxiliaries

Possible configuration of electrical auxiliaries

Maximum possibilities

Phase	Accessory	TD160	TS250	TS630	TS800
R (Left)	AX	-	1	3	3
	AL	1	1	-	-
	SHT or UVT	1	1	1	1
T (Right)	AX	2	1	-	-
	AL	-	-	1	2
	FAL	-	1	1	1

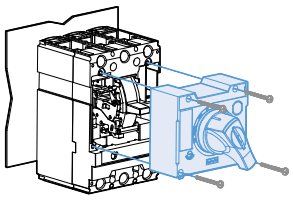
Note) FAL can be applied to only MCCB with electronic trip release.



Rotary handles

Rotary handles

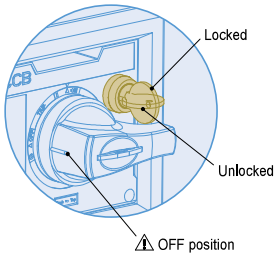
The rotary handle operating mechanism is available in either the direct version or in the extended version on the compartment door.
It is always fitted with a compartment door lock and on a request it can be supplied with a key lock in the open position.



Direct rotary handles

Direct rotary handles

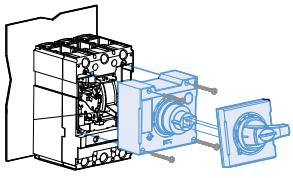
MCCB	Rotary handle
TD100,TD160	DH1
TS100,TS160,TS250	DH2
TS400,TS630	DH3
TS800	DH4



Direct rotary handle with a key lock

Direct rotary handles with a key lock

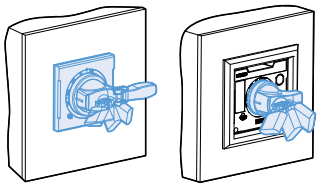
MCCB	Padlockable device	Lock function
TD100, TD160	DHK1	Lock in On or Off position
TS100, TS160, TS250	DHK2	
TS400, TS630	DHK3	
TS800	DHK4	



Extended rotary handles

Extended rotary handles

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

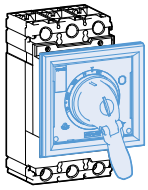


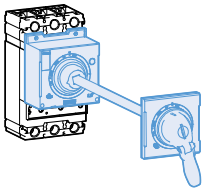
Padlocks for direct or extended handle

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

Rotary handles

Rotary handles

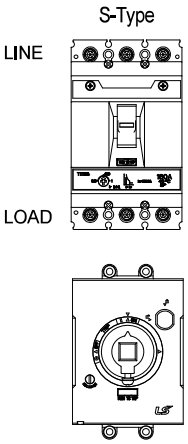


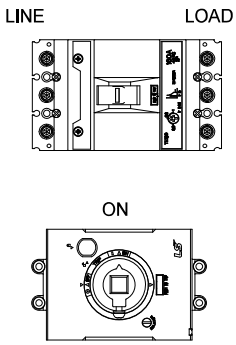


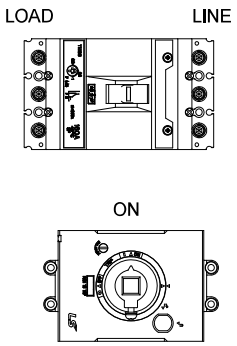
Degree of protections

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.

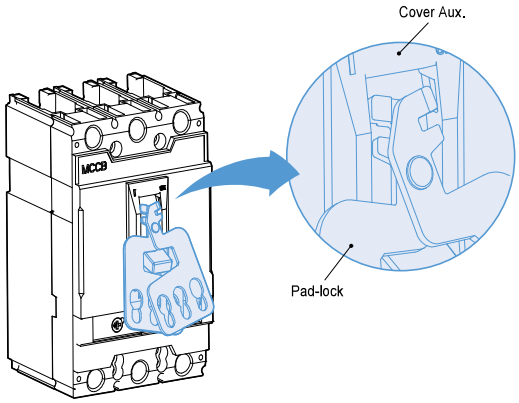
This device allows the handle to be locked in the “OFF” position.
Locking in the OFF position guarantee isolation according to IEC 60947-2.

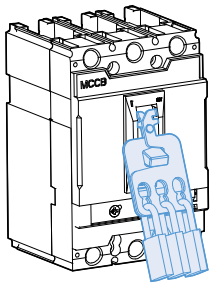
The locking device for the toggle handle can be installed in 3-pole and 4-pole circuit-breakers.
Maximum three (3) padlocks with shackle diameters ranging from 5 to 8mm may be used.
(Padlocks are not supplied)

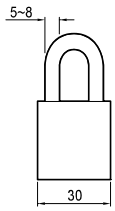


Removable locking device

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







Padlock dimensions

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)

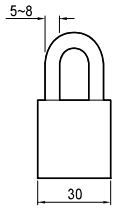


Fixed locking device

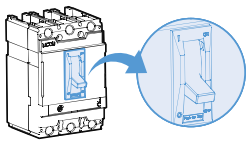
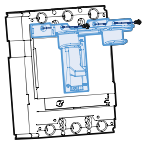
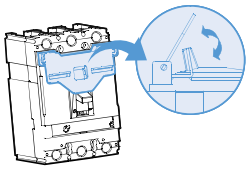
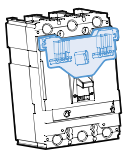
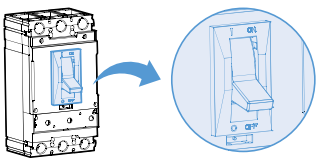
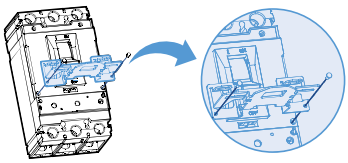
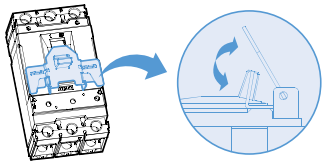
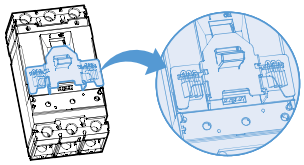
MCCB	Padlockable device	Function
TD100,TD160	PHL1	Lock in Off or On position
TS100,TS160,TS250	PHL2	
TS400,TS630	PHL3	
TS800	PHL4	

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

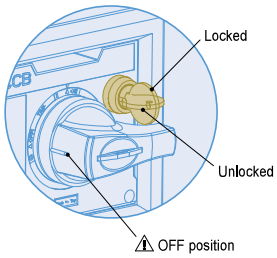
TD100, 160	① 	② 
	③ 	④ 
TS100 ~ TS800	① 	② 
	③ 	④ 

Locking devices



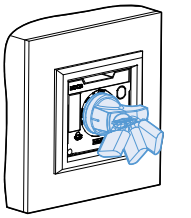
Locking by rotary handle with a key lock

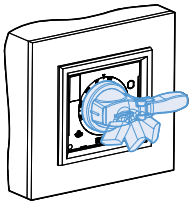
A locking can be done by using the rotary handle which has key lock device.
The lock is used to lock the circuit-breaker in the OFF position.



Locking by rotary handle with a key lock

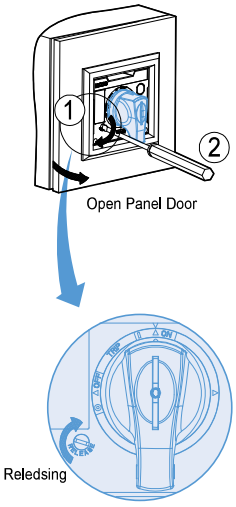
MCCB	Padlockable device	Function
TD100,TD160	DHK1	Lock in Off position
TS100,TS160,TS250	DHK2	
TS400,TS630	DHK3	
TS800	DHK4	





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

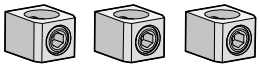
Front connection



Terminal mounter

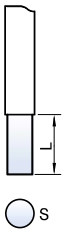
- It is supplied with Susol MCCBs as an standard part of circuit breaker.
- Connecting part with terminal for bus bar, cable with lug

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



Inner box terminal

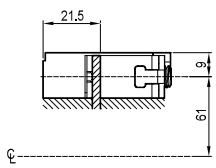
- Bare cable connectors for Susol TD and TS series circuit breakers
- Can be used for both aluminum and copper cables



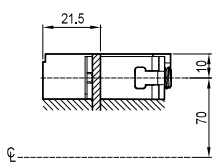
Applicable to	Type	Pole	Set quantity	Cable connection possibilities	Conductor size	
TD100, 160	SBT13 SBT14	3 4	1 Set (3EA) 1 Set (4EA)	1	L(mm) S(mm²)Cu/Al Tightening torque (kgf · cm)	21 2.5~95 120~147
TS100, 160, 250	SBT23 SBT24	3 4	1 Set (3EA) 1 Set (4EA)	1	L(mm) S(mm²)Cu/Al Tightening torque (kgf · 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	3	1 Set (3EA)	1	L(mm) S(mm²)Cu/Al Tightening torque (kgf · cm)	18 2.5~95 306
PB22, 23	Note2) IBT23	3	1 Set (3EA)	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, 23 are for Plug-in base.

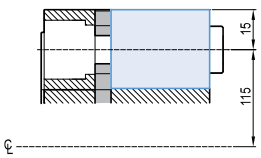
SBT13, 14



SBT23, 24



IBT33, 34(TS400)

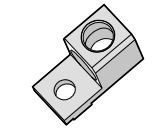


Terminals

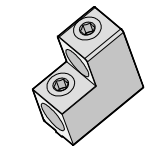
Front connection

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

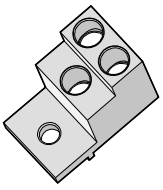
- The extended box terminals for TD and TS circuit breakers can be used for cooper cables/bars and aluminum cables. There are four (4) kinds of terminals.
- For TD100, TD160: 1-cable connector (EBT13, EBT14)
- For TS100, TS160, TS250: 1-cable connector (EBT23, EBT24)
- For TS400, TS630: 2-cable connector (EBT33, EBT34)
- For TS800: 3-cable connector (EBT43, EBT44)



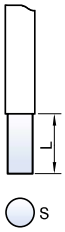
1-cable connector



2-cable connector

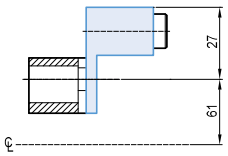


3-cable connector

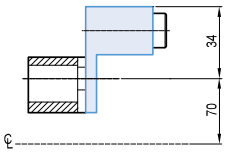


Applicable to	Type	Pole	Set quantity	Cable connection possibilities	Conductor size	
TD100, 160	EBT13 EBT14	3 4	1 Set (3EA) 1 Set (4EA)	1	L(mm)	20
					S(mm²)Cu/Al	2.5~95
					Tightening torque (kgf · cm)	306
TS100, 160, 250	EBT23 EBT24	3 4	1 Set (3EA) 1 Set (4EA)	1	L(mm)	24
					S(mm²)Cu/Al	10~150
	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

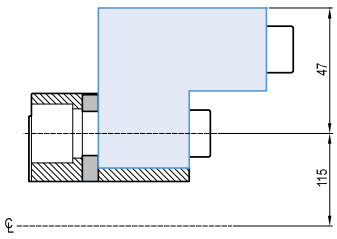
EBT13, 14



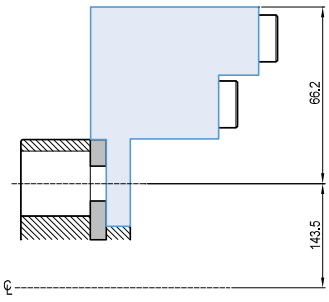
EBT23, 24



EBT33, 34



EBT43, 44

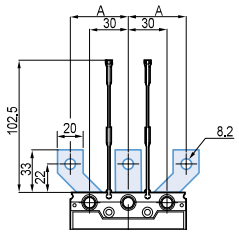


Terminals

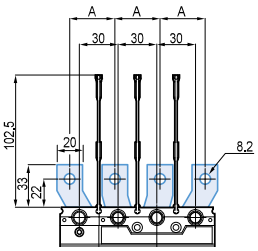
Front connection

Spreaders

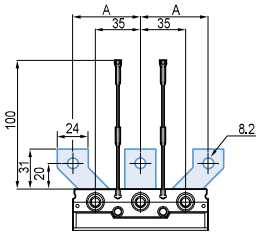
- As an optional part of circuit breaker
- Can increase the pitch of the terminals



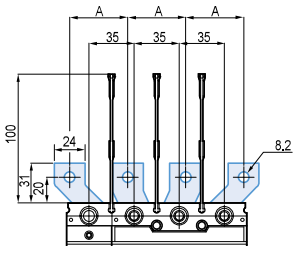
TD100, 160 3P



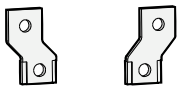
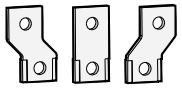
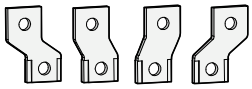
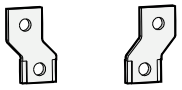
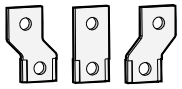
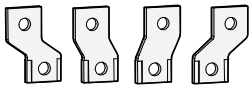
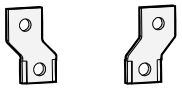
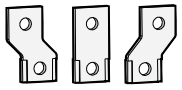
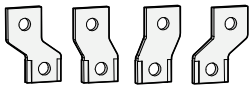
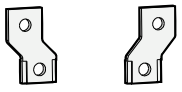
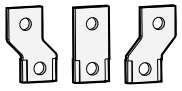
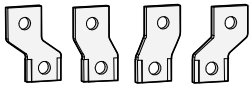
TD100, 160 4P



TS100, 160, 250 3P



TS100, 160, 250 4P

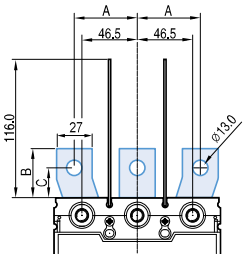
MCCB	Pole	Type	Size A (mm)	Feature
TD100, TD160	2P	SP12a	35	
	3P	SP13a		
	4P	SP14a		
	2P	SP12b	45	
	3P	SP13b		
	4P	SP14b		
TS100, TS160, TS250	2P	SP22a	45	
	3P	SP23a		
	4P	SP24a		
	2P	SP22b	52.5	
	3P	SP23b		
	4P	SP24b		

Terminals

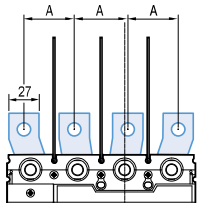
Front connection

Spreaders

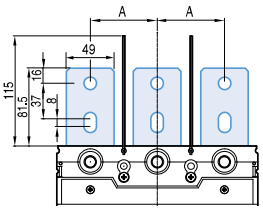
- As an optional part of circuit breaker
- Can increase the pitch of the terminals



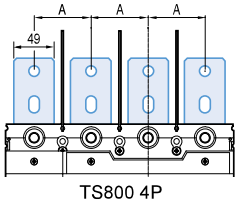
TS400, 630 3P



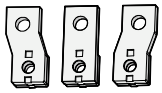
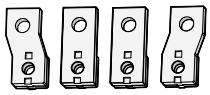
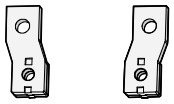
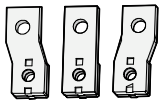
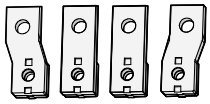
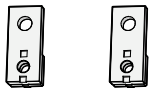
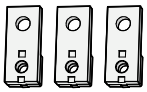
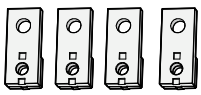
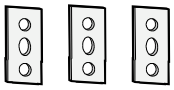
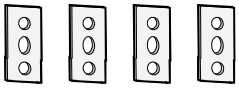
TS400, 630 4P



TS800 3P



TS800 4P

MCCB	Pole	Type	Size(mm)			Feature
			A	B	C	
TS400, TS630	2P	SP32a	52.5	41	25	
	3P	SP33a				
	4P	SP34a				
	2P	SP32b	70	54	38	
	3P	SP33b				
	4P	SP34b				
	2P	SPS32	46.5	41	25	
	3P	SPS33				
	4P	SPS34				
TS800	2P	SPS42	70	81.5		
	3P	SPS43				
	4P	SPS44				

Terminals

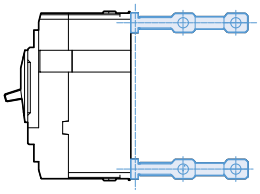
Rear connection

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

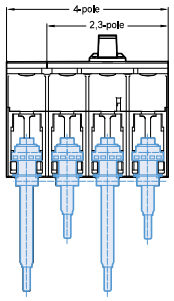
There are two kinds of rear connection terminals.
- Flat type
- Round type

Flat type

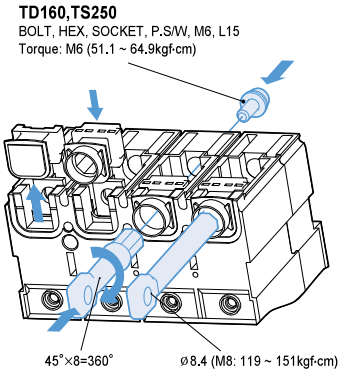
Flat vertical terminals

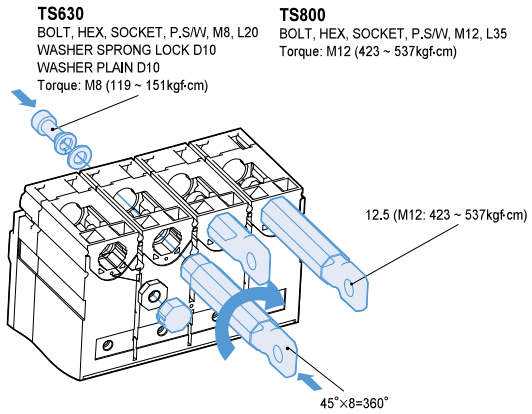


MCCB	2-pole	3-pole	4-pole
TD100,TD160	RTB12	RTB13	RTB14
TS100,TS160,TS250	RTB22	RTB23	RTB24
TS400,TS630	RTB32	RTB33	RTB34
TS800	RTB42	RTB43	RTB44



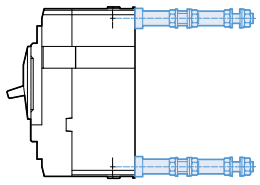
Flat type



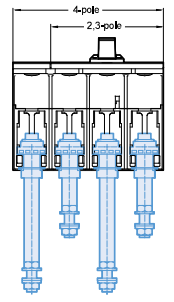


Round type

Round threaded terminals



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



Round type

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.

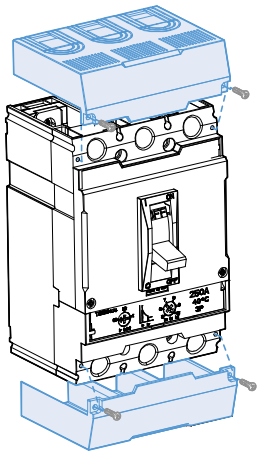
Two types by length are available:

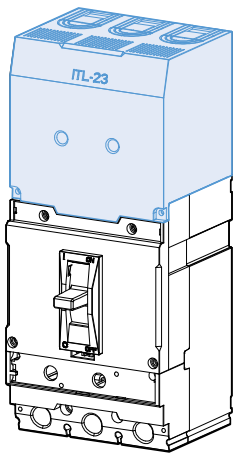
Short type covers, ITS
- IP40 degree of protection
- For fixed circuit-breakers with rear terminals and for moving parts of plug-in

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
TS800	2P (1), 3-pole	ITL43	ITS43
	4-pole	ITL44	ITS44

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





Insulation

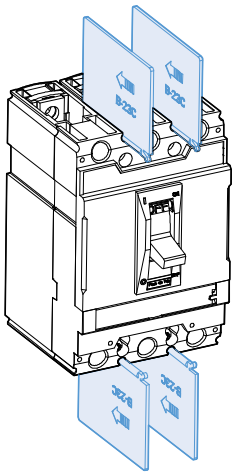
Insulation by barrier

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.



Insulation barriers

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



Interlock



Mechanical Interlock
(Padlocks are not supplied)

Mechanical interlocking device

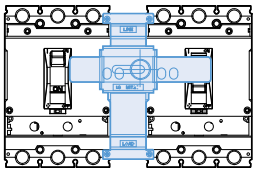
The mechanical interlock (MIT) can be applied on the front of two breakers mounted side by side, in either the 3-pole or 4-pole version and prevents simultaneous closing of the two breakers.

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

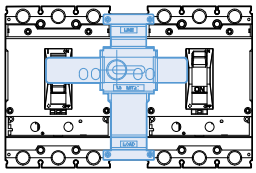
The front interlocking plate allows installation of a padlock in order to fix the position. (possibility of locking in the O-O position as well)

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

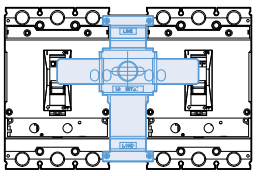
Operation



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

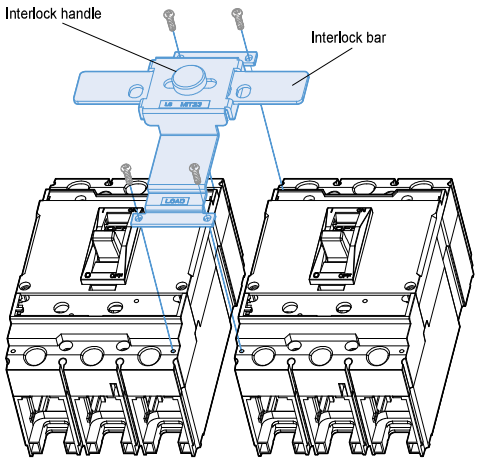


Left MCCB: Off lock
Right MCCB: ON/OFF is possible



Both MCCBs are of locked

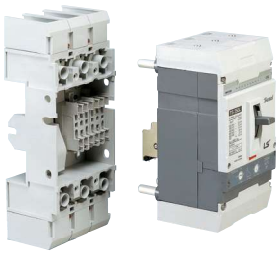
MCCB		Interlock
Frame type	Pole	
TD100,TD160	3-pole	MIT13
	4-pole	MIT14
TS100,TS160,TS250	3-pole	MIT23
	4-pole	MIT24
TS400,TS630	3-pole	MIT33
	4-pole	MIT34
TS800	3-pole	MIT43
	4-pole	MIT44



Plug-in device

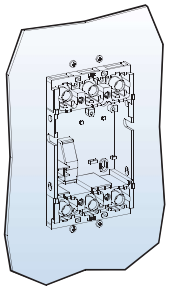
Plug-in device

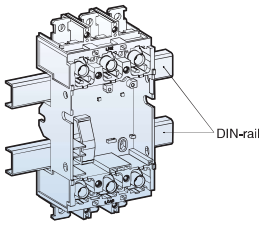
The plug-in base is the fixed part of the plug-in version of the circuit-breaker.
It will be installed directly on the back plate of panel.
The circuit-breaker is racked out by unscrewing the top and bottom fixing screws.
Plug-in base makes it possible to extract and/or rapidly replace the circuit breaker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

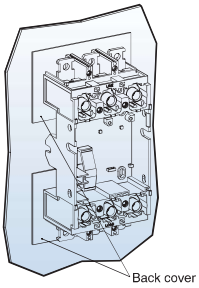


MCCB	Pole	Arrangement	Type	Means
TD100, TD160	2	Single line	PB12	
	3	Single line	PB13	
	4	Single line	PB14	
	2	Double line	PB12D2	For distribution board
	3	Double line	PB13D2	For distribution board
TS100, TS160, TS250	2	Single line	PB22	
	3	Single line	PB23	
TS400, TS600	2	Single line	PB32	
	3	Single line	PB33	
TS800	2	Single line	PB42	
	3	Single line	PB43	

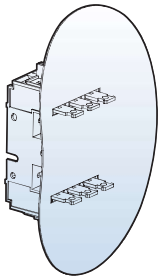
Front connection

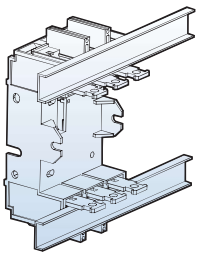






Rear connection

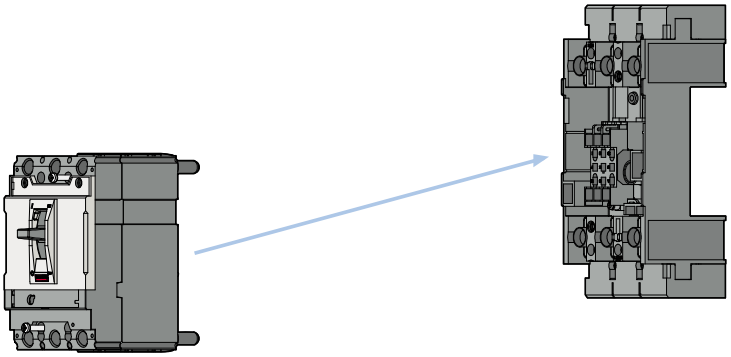




Plug-in system

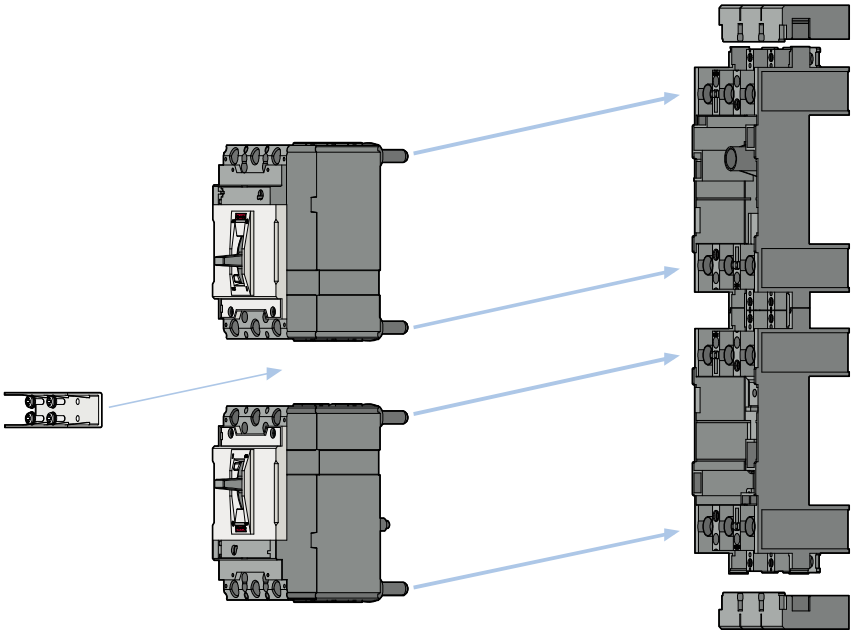
Normal type Plug-in MCCB: PB□ type

- MCCB rating: TD100~TS800
- generally used in switchgears



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

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

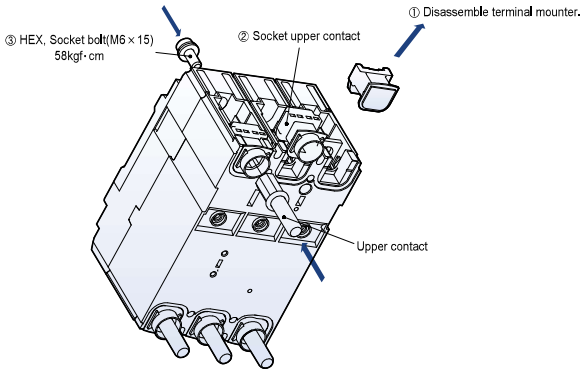


Plug-in device

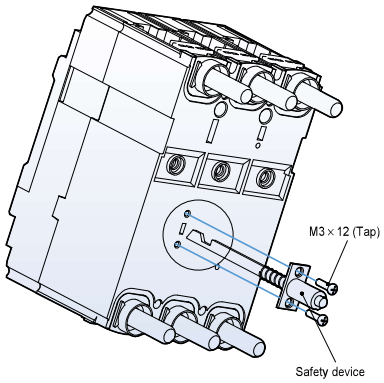
Assembling procedure

TD100, TD160

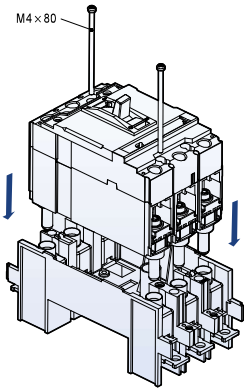
1. Conversion to Plug-in MCCB

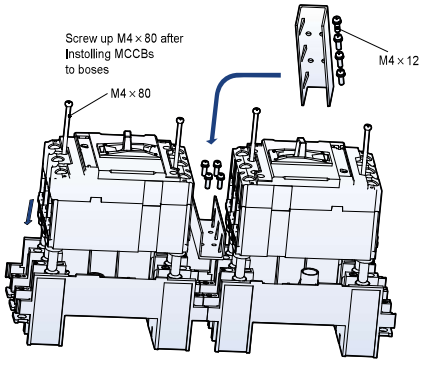


2. Assembling safety device



3. Assembling MCCB and plug-in device



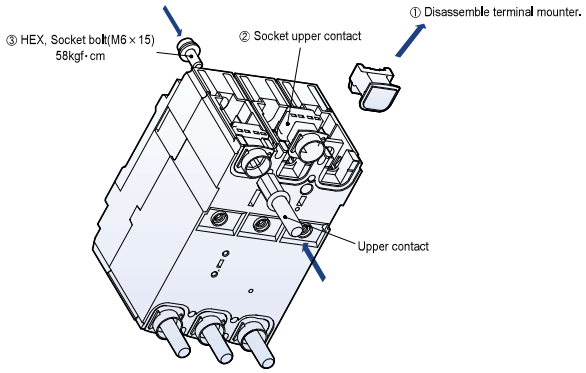


Plug-in device

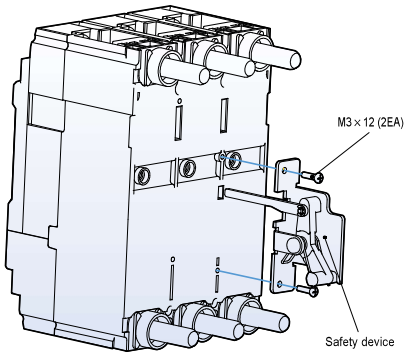
Assembling procedure

TS100, TS160, TS250

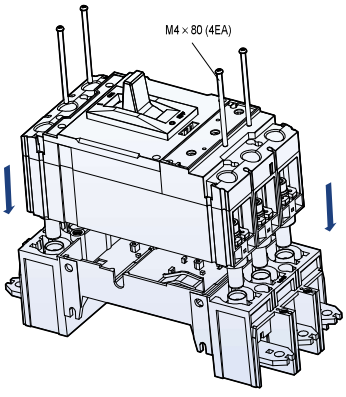
1. Conversion to Plug-in MCCB



2. Assembling safety device



3. Assembling MCCB and plug-in device

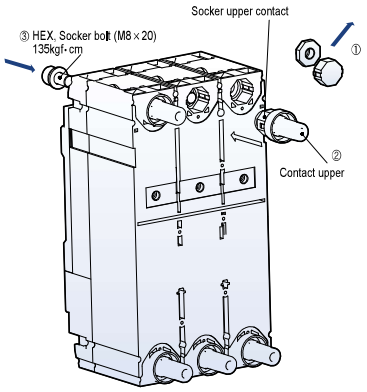


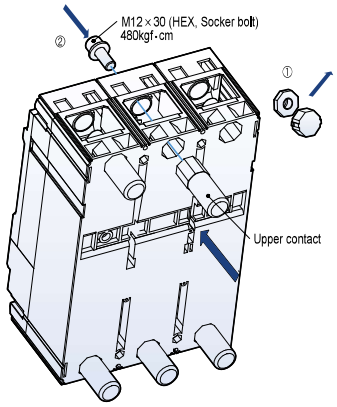
Plug-in device

Assembling procedure

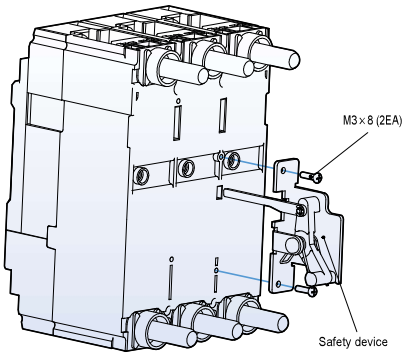
TS400, TS630	TS800

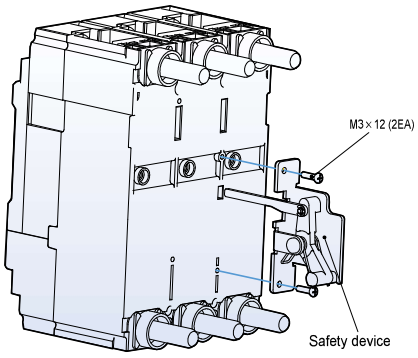
1. Conversion to Plug-in MCCB



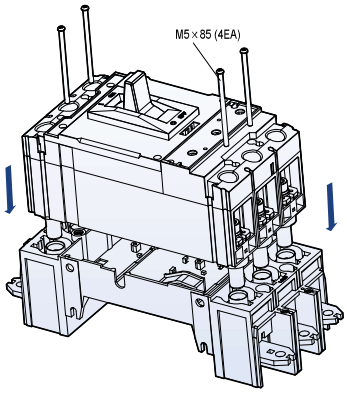


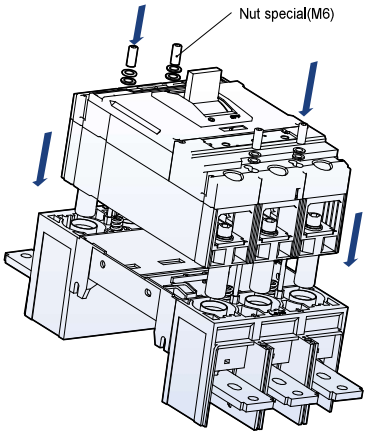
2. Assembling safety device





3. Assembling MCCB and plug-in device





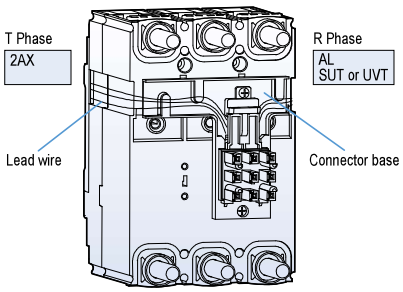
Connector KIT

Electric auxilialy 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 800AF.

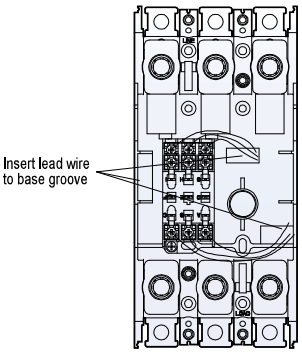
Breaker Max.	Q'ty	Fixed part	Moving part
TD160	1	SPARE PART ASS'Y, CONNECTOR KIT,TD160	SPARE PART ASS'Y, BASE CONNECTOR,TD160
TS250	2	SPARE PART ASS'Y, CONNECTOR KIT,TS250	SPARE PART ASS'Y, BASE CONNECTOR,TS250
TS400/630	3	SPARE PART ASS'Y, CONNECTOR KIT,TS400/630	SPARE PART ASS'Y, BASE CONNECTOR,TS630
TS800	3	SPARE PART ASS'Y, CONNECTOR KIT,TS800	SPARE PART ASS'Y, BASE CONNECTOR,TS800

TD160

Moving part

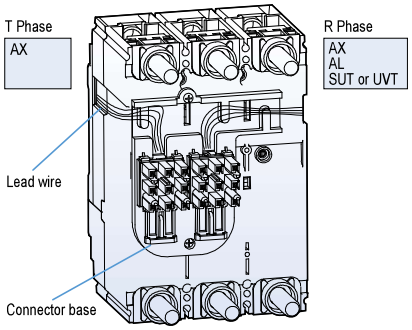


Fixed part

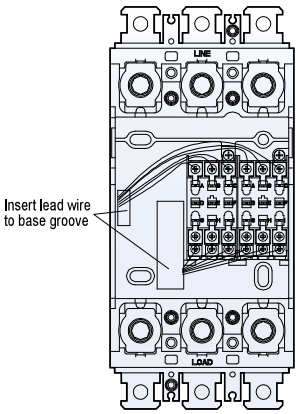


TS250

Moving part



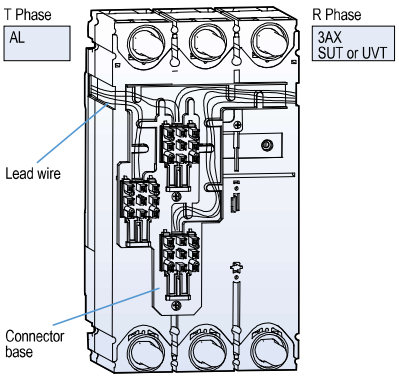
Fixed part



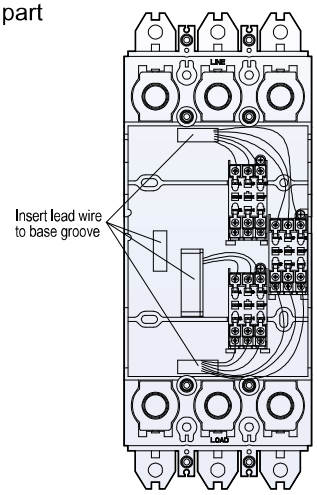
Connector KIT

TS400/630

Moving part

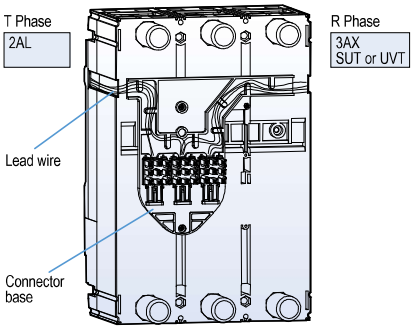


Fixed part

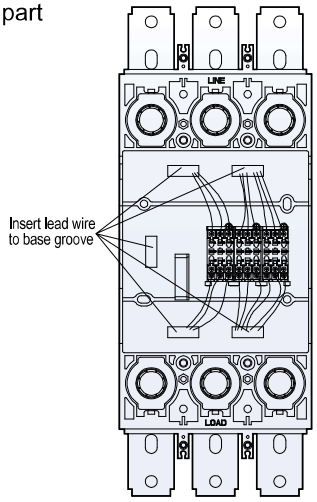


TS800

Moving part

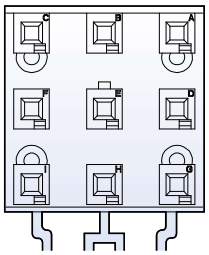


Fixed part



Read wire color

Moving part

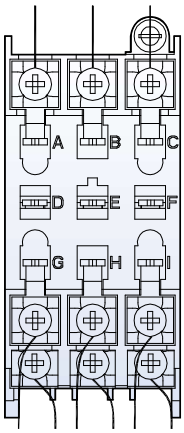


Lead wire color

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.

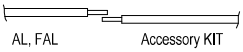
Fixed part



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.
- To connent AL and FAL solder the wire and insulates the wire



Remote operation

Motor operator



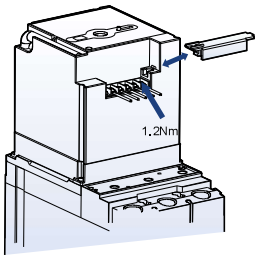
TS250 + MOP2

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

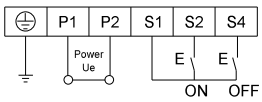
MCCB	Type	Control voltage	Actuation current (A)	Response time (ms)		Consumption (W)	Mechanical service life (operations)	No. of operations per hour
				Closing	Opening			
TD100, TD160	MOP1	① DC 24V ② AC 100~240V/ DC 100~220V	≤2.5A (DC 24V) ≤0.5A (AC)	310	200	14	25,000	120
TS100, TS160, TS250	MOP2	① DC 24V ② AC 100~110V/ DC 110V ③ AC 230/ DC 220V	≤5A (DC 24V) ≤2A (AC)	350	230	14	25,000	120
TS400,TS 630	MOP3			500	350	35	20,000	60
TS800	MOP4			700	420	35	10,000	20

Wiring connection



Standard connection

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

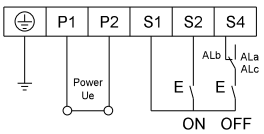


Connection with alarm switch (AL)

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.

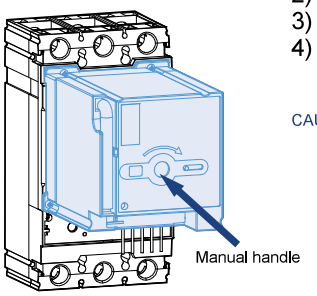
Connection with FAL (only for the breakers with electronic trip unit ETS or ETM)

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.



Remote operation

Manual operation

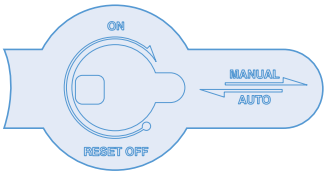


1) Insert the manual handle into the slot of Motor Operator surface and rotate it clockwise.
2) It must be rotated just 180° clockwise for safe operation of micro switch in the motor operator.
3) Return the manual handle after the manual operation
4) Turn the slide switch back to the position of AUTO.

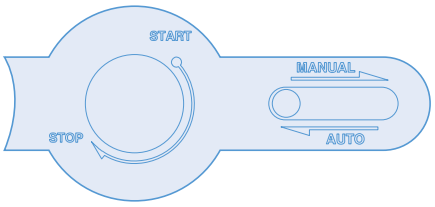
CAUTION: When the circuit breaker is tripped by trip button in the OFF status,
it is impossible to operate motor operator automatically It must be reset by manual operation.

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.
   TD 160N/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]



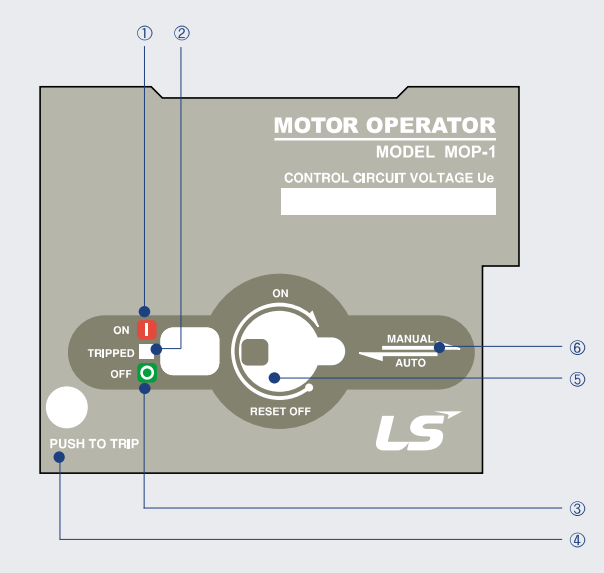
[TS400, 630, 800]

Remote operation

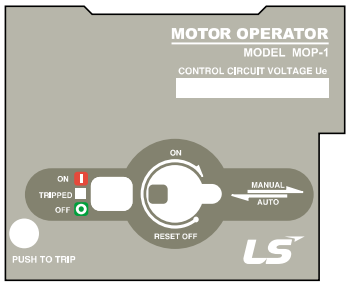
Motor operator

Feature

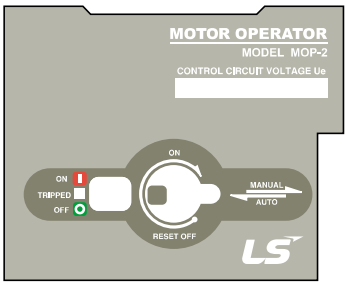
① On position indication (Red color)
② Trip position indication (White color)
③ Off position indication (Green color)
④ Button for push to trip
(available for only for TD160AF and TS630AF)
⑤ On/Off/Reset selection lever
⑥ Manual/Auto selection lever



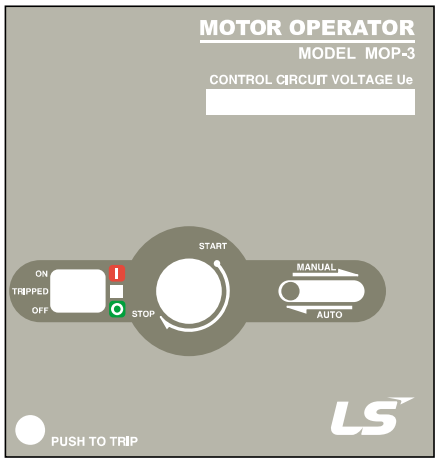
TD160 .... MOP-1



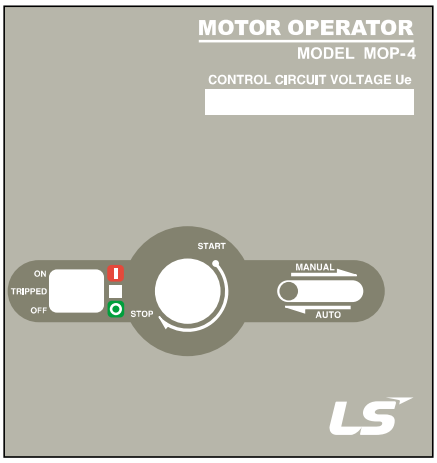
TS250 .... MOP-2



TS630.... MOP-3



TS800 .... MOP-4



Residual Current Devices (RCD)



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 of residual current device, the TS400 and TS600 circuit breakers can be combined with the RTU33 of residual current device and the TS800 circuit breaker can be combined with the RTU43 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)

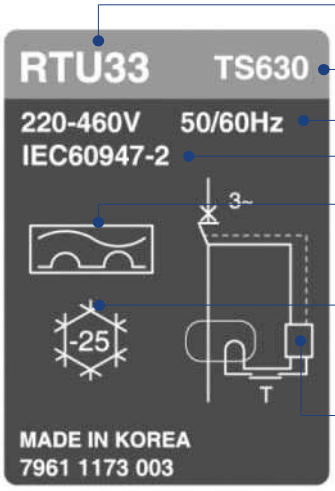
Configuration



- Intermediate terminal shield
- Sealable fixing screw for the intermediate terminal
- Dielectric plug(1)
  - Lift this plug before the dielectric test
- Test push-button
- Reset push-button
- Sealable fixing screw for
- Trip time delay settings(2)
- Sensitivity settings
- Slot for FAL auxiliary switch (optional)
- Sealing point for plate blocking access to the settings
- Rating plate

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

Detail of Rating plate



- Type of RCD
- Applicable circuit breaker
- Operational voltage and frequency
- Compliance with standards
- Standardized symbols :
  - Class A immunity to DC components (6mA insensitivity)
- Minimum operating temperature as per VDE664
- Schematic diagram

Residual Current Devices (RCD)

Ratings and Selection



RCD type		RTU23	RTU33	RTU43
Number of poles		3*	3*	3*
Applicable circuit breaker	TS100	■		
	TS160	■		
	TS250	■		
	TS400		■	
	TS630		■	
	TS800			■
Protection characteristics				
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

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
* 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.

Trip time delay settings
0-60-150-300-600ms

Sensitivity settings, I△n
0.03-0.3-1-3-10A



Residual Current Devices (RCD)

Combination

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

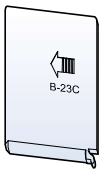
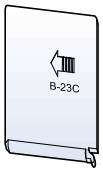
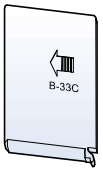
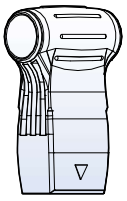
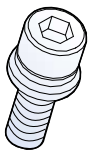
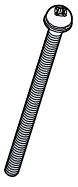
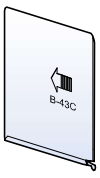
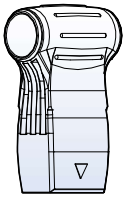
- Conformity with standards
- Protection degrees, class II insulation front face
- Suitability for isolation as defined by IEC 60947-2
- Electrical characteristics
- Trip unit characteristics
- Installation and connection methods
- Indication, measurement and control accessories
- Installation and connection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

		RTU23	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 alarm switch)		



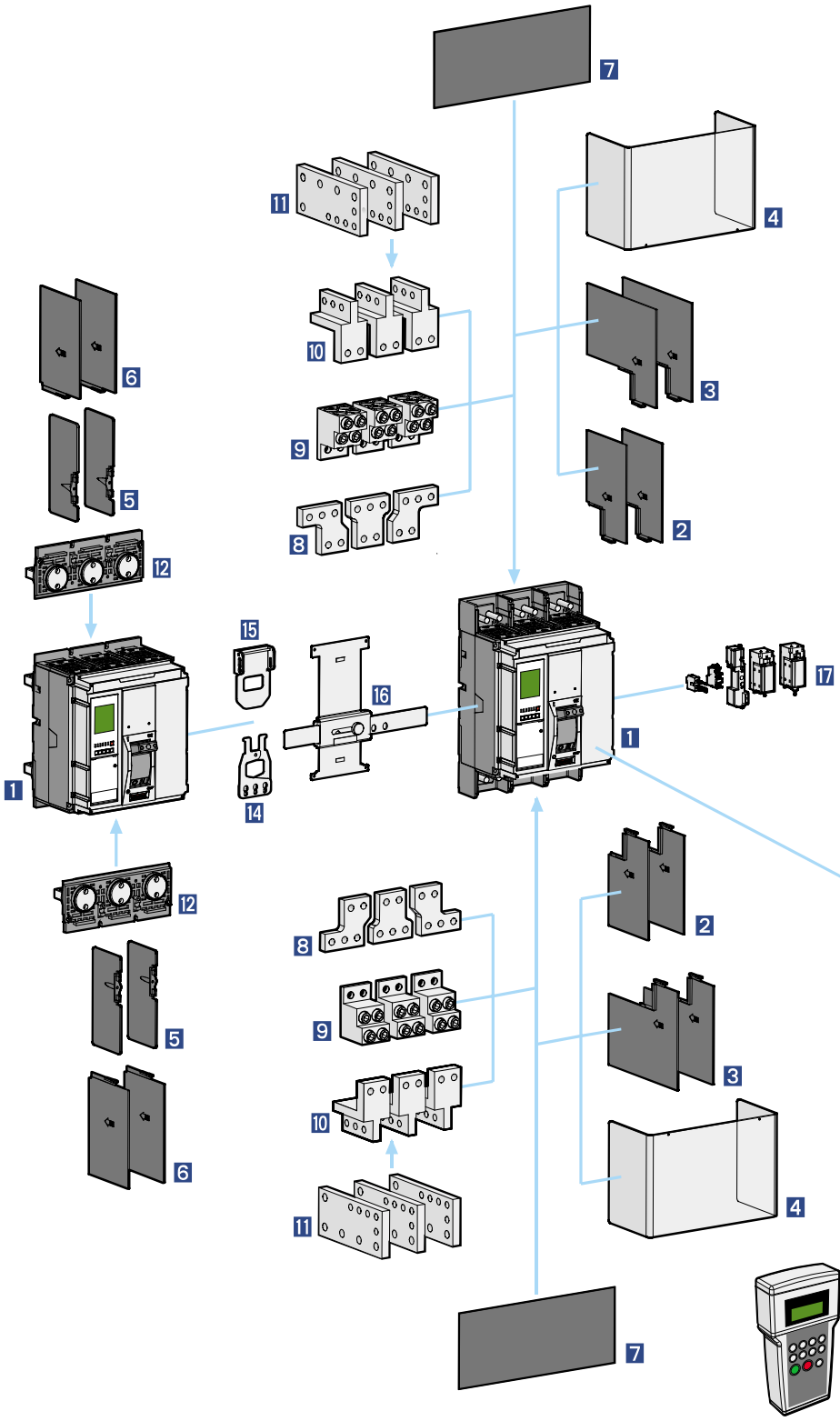
Standard accessories

The following accessories for mounting, connection, insulation, handle operation are standard items and are packed with Susol TD & TS series circuit breakers.

TD100N/H/L TD160N/H/L					
	M8×20	M3×75(1P) M4×75			
	1P: 2pcs 3P: 6pcs 4P: 8pcs	1P: 2pcs 3P: 2pcs 4P: 4pcs		3P: 4pcs 4P: 6pcs	
TS100N/H/L TS160N/H/L TS250N/H/L					
	M8×20	M4×75			
	3P: 6pcs 4P: 8pcs	3P: 2pcs 4P: 4pcs		3P: 4pcs 4P: 6pcs	
TS400N/H/L TS630N/H/L					
	M10×30	M5×85	M5		
	3P: 6pcs 4P: 8pcs	3P: 4pcs 4P: 4pcs	3P: 4pcs 4P: 4pcs	3P: 4pcs 4P: 6pcs	"1pc*"
TS800N/H/L					
	M12×35	M6×100	M6		
	3P: 6pcs 4P: 8pcs	3P: 4pcs 4P: 4pcs	3P: 4pcs 4P: 4pcs	3P: 4pcs 4P: 6pcs	"1pc*"

* Auxiliary operating handel : TS400, TS630, TS800N/H/L Only

TS 1000 to 1600AF Electrical and mechanical accessories

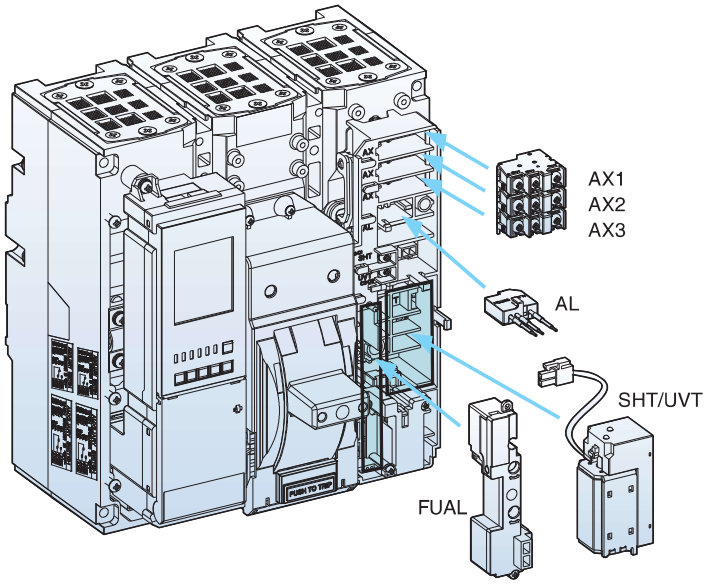


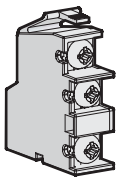
1 MCCB
2 Barrier for front connection
3 Barrier for extension terminal
4 Terminal cover
5 Barrier for rear connection
6 Barrier aux for rear connection
7 Plate protection
8 Busbar
9 Lug terminal
10 Vertical busbar
11 Extension busbar
12 Rear connection Note)
13 Auxiliary handle
14 Removable padlock (PL)
15 Fixed padlock (PHL)
16 Mechanical interlock (MIT)
17 Electrical auxiliary
18 Direct rotary handle
19 Extended rotary handle
20 Test kit
21 Voltage module
22 UVT time delay controller (UDC)

Note) Orderable with a breaker

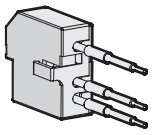
Electrical auxiliaries

The following devices are installed into TS1000 to 1600AF 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.





AX



AL

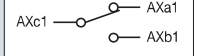
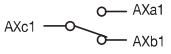
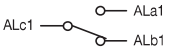
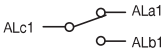
Auxiliary switch (AX)

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.

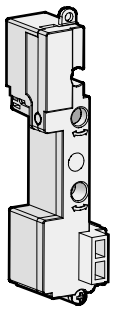
Alarm switch (AL)

Alarm switches indicate that the circuit breaker has tripped 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.

Contact operation

MCCB	ON	OFF	TRIP
Position of AX			
Position of AL			

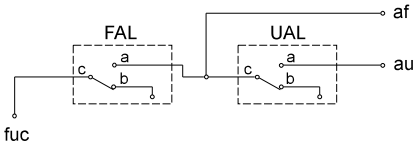
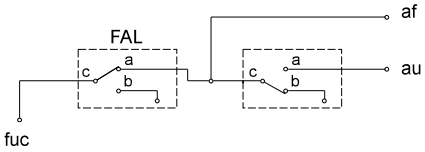
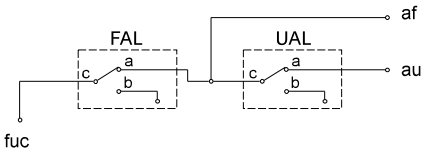
Electrical auxiliaries



FUAL

Indication switch FUAL

FUAL Indicates that the breaker has tripped due to FAL(overload, short circuit) and UAL(UVT, SHT) separately

Normal position CB no trip	 FAL Normal Open / UAL Normal Open
FAL operation CB trip due to OCR	 FAL Normal Close / UAL Normal Open
UAL operation CB trip due to UVT or SHT	 FAL Normal Close / UAL Normal Close

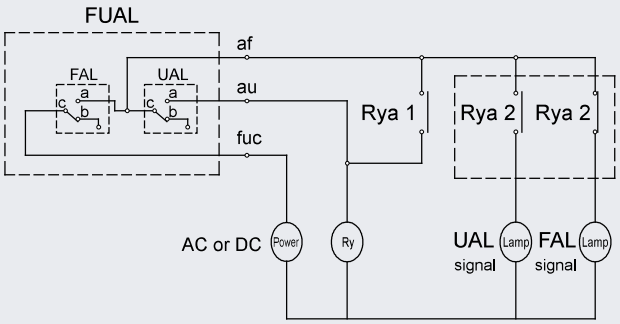


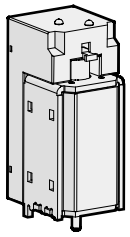
Figure. Example of Lock up Circuit for FUAL

⚠ **Caution**: Please use "Lock up Circuit" following under figure "Example of lock up circuit for FUAL"

⚠ **Caution**: When MCCB is tripped by SHT or UVT, the FAL signal appears for 20ms that is time of being transferred from "b"contact to "a" contact of control relay

⚠ **Caution**: When MCCB is tripped by SHT or UVT, the transfer time of Relay signal(Ryb2 off → Rya2 on) is 20ms. if FAL signal is connected with other sequence circuit such as Latch circuit or other look up circuit it may cause to be miss operation. So, please do not use latch circuit or look up circuit with FAL signal.

Electrical auxiliaries



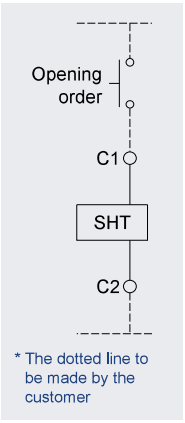
SHT Shunt trip device

SHT is a control device which trips a circuit breaker from remote place, when applying voltage continuously or instantaneously over 200ms to coil terminals(C1, C2).
When UVT coil is installed, its location is changed.

1. Rated voltage and characteristics of Trip coil

Rated voltage [Vn]		Operating voltage range [V]	Power consumption (VA or W)		Trip time [ms]
DC [V]	AC [V]		Inrush	Steady-state	
24~30	-	0.6~1.1 Vn	200	5	Less than 40ms
48~60	48	0.6~1.1 Vn			
100~130	100~130	0.56~1.1 Vn			
200~250	200~250	0.56~1.1 Vn			
-	380~480	0.56~1.1 Vn			

Note) Operating voltage range is the min. rated voltage standard for each rated voltage(Vn).



Wiring Diagram

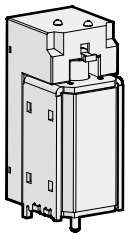
2. Specification of the wire

- Refer to the below table regarding the length and specification of wire when using trip coil with DC 24~30[V] or DC/AC 48~60[V] of rated voltage.

The maximum wire length

		Rated voltage [Vn]			
		DC 24~30 [V]		DC/AC 48 [V]	
Wire type		#14 AWG (2.08mm²)	#16 AWG (1.31mm²)	#14 AWG (2.08mm²)	#16 AWG (1.31mm²)
Operating voltage	100%	95.7m	61m	457.8m	287.7m
	85%	62.5m	38.4m	291.7m	183.2m

Electrical auxiliaries



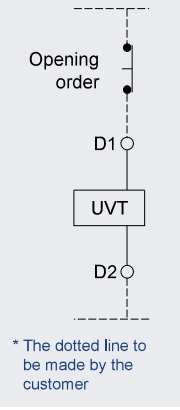
UVT Under Voltage Trip device

- If the voltage of the main or the control power is under voltage, UVT which is installed inside of the breaker breaks the circuit automatically. Please connect with UVT time-delay device in order to present the time delay function because UVT is technically instantaneous type.
- The closing of a circuit breaker is impossible mechanically or electrically if control power not supplied to UVT. To close the circuit breaker, 65~85% ofrated voltage should be applied to both terminals of UVT coil (D1, D2).
- When using UVT coil, the double trip coil can not be used, and the location of trip coil is changed.

1. Rated voltage and characteristics of UVT coil

Rated voltage [Vn]		Operating voltage range [V]		Power consumption (VA or W)		Trip time [ms]
DC [V]	AC [V]	Pick up	Drop out	Inrush	Steady-state	
24~30	-	0.65~0.85 Vn	0.44~0.6 Vn	200	5	Less than 50ms
48~60	48					
100~130	100~130					
200~250	200~250					
-	380~480					

Note) Operating voltage range is the min. rated standard for each rated voltage (Vh).



Wiring Diagram

2. Specification of the wire

- Refer to the below table regarding the length and specification of wire when using trip coil with DC 24~30[V] or DC/AC 48~60[V] of rated voltage.

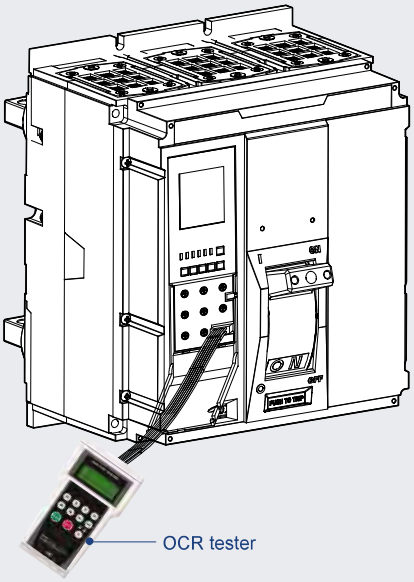
The maximum wire length

		Rated voltage [Vn]			
		DC 24~30 [V]		DC/AC 48 [V]	
Wire type		#14 AWG ($2.08mm^2$)	#16 AWG ($1.31mm^2$)	#14 AWG ($2.08mm^2$)	#16 AWG ($1.31mm^2$)
Operating voltage	100%	48.5m	30.5m	233.2m	143.9m
	85%	13.4m	8.8m	62.5m	39.3m

Note) In case of using UVT coil, the location of TC coil is changed.

OCR Tester [OT]





- It is a device which can test for the operation of Trip Relay under no power condition.

1. Maximum 17 times rated current can be inputted.
2. It is possible to enter the current value and phase on each of R/S/T/N
3. Frequency is adjustable.
4. It is available to test for long time delay/short time delay/instantaneous /ground fault.

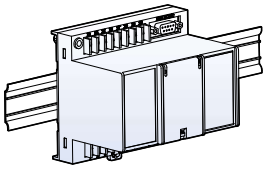
Configuration



R S T N	R, S, T, N phase signal input
▲ ▼	Increase/Decrease signal input
ENT. ESC	Signal setting/Delete
START STOP	Waveform generation/Stop
50Hz 60Hz Hz	Select frequency

UVT Time Delay Controller [UDC]





- UVT is a device which makes ACB tripped automatically to prevent the accident on load side due to under voltage or power breakdown.
  There are two types, Instantaneous type and time delay type.

- It can be installed on the rail or to the cradle.

- Instantaneous type: only available with UVT coil.

- Time delay type: available by connecting UVT coil and UVT time delay controller.

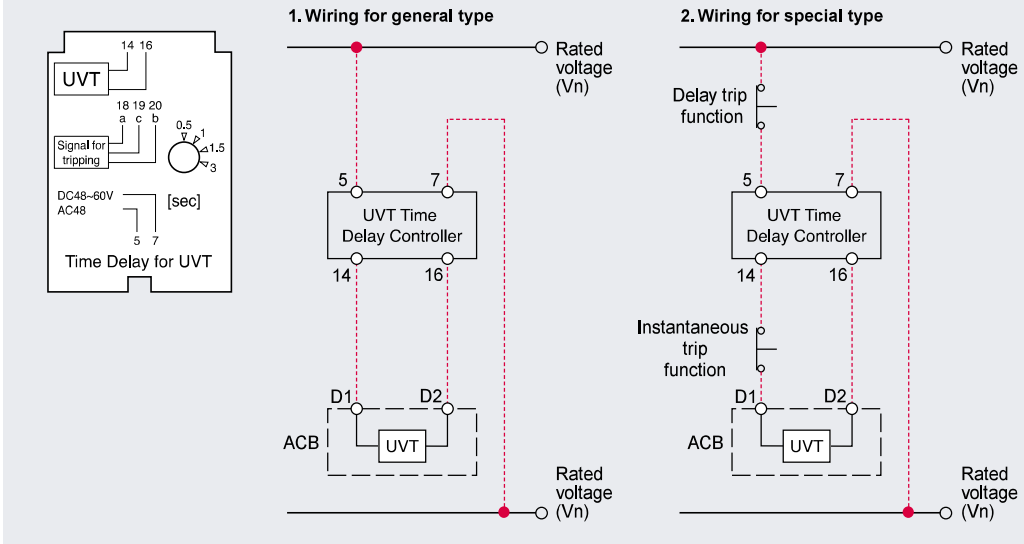
- Common use for the all types.

1. The rated voltage and characteristic of UVT time delay controller

Rated voltage [Vn]		Operating voltage range [V]		Power consumption (VA or W)		Trip time[s]
DC [V]	AC [V]	Pick up	Drop out	Inrush	Steady-state	
48~60	48	0.65~0.85 Vn	0.44~0.65Vn	200	5	0.5, 1, 1.5, 3
100~130	100~130					
200~250	200~250					
-	380~480					

Note) Operating voltage range is the min. rated standard for each rated voltage (Vh).

2. Wiring



* The wiring presented with red color should be set by users.

Rotary handle

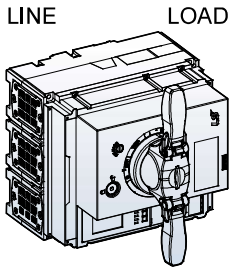
The rotary handle operating mechanism is available in either the direct version or in the extended version on the compartment door.
It is always fitted with a compartment door lock and on a request it can be supplied with a key lock in the open position. There are direct rotary handletwo and extended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

Direct rotary handle

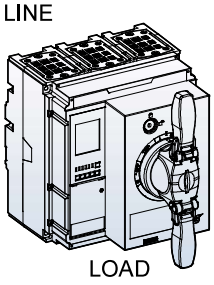
Degree of protection IP40

There are three types of direct rotary handle according to line load direction.
Indication of the three positions O(OFF), I(ON) and tripped. Circuit breaker locking capability in the OFF position by one to three padlocks, shackle diameter 5 to 6 mm (not supplied).

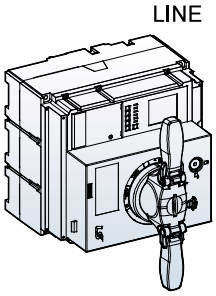
L Type



S Type

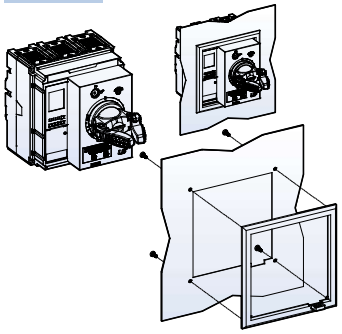


R Type

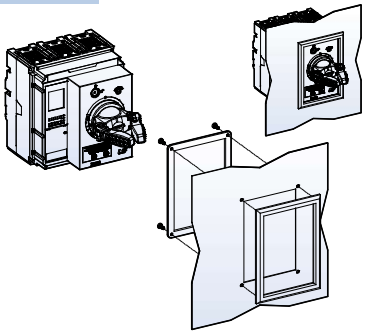


Door cut type for Direct rotary handle

A Type

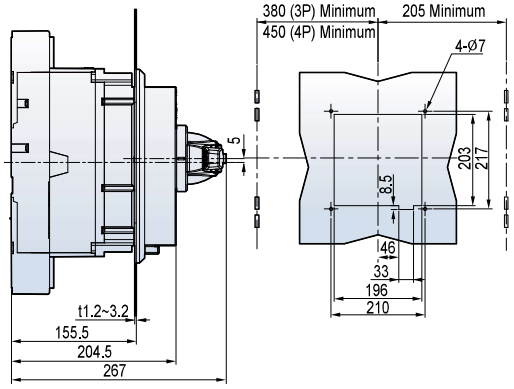


B Type

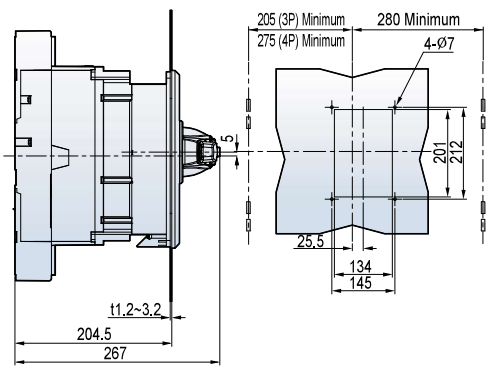


Dimension of door cut

A Type



B Type

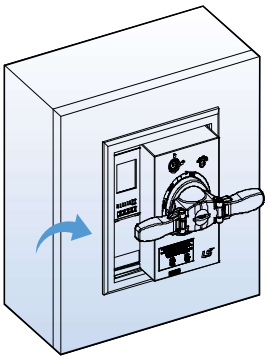


Note) 1. In case of disassembling and assembling the main cover, screw should be tightened in specific torque of1.5N.m (15.3kgf.cm)
2. In case of disassembling and assembling the main cover by over tightening torque, the parts of MCCB can be damaged.

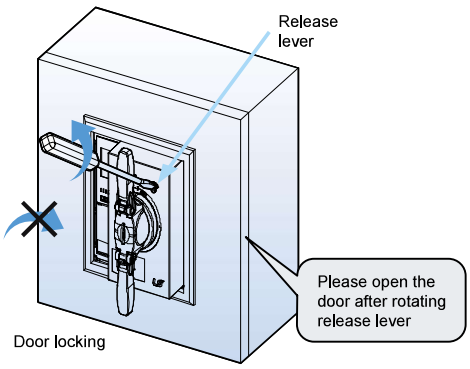
Rotary handle

Locking system(Door lock)

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 counterclockwise.
When MCCB is on position, panel door is can't be open.



OFF State



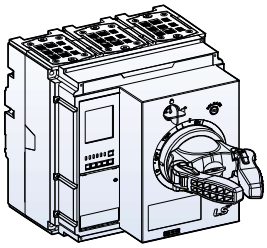
ON State

⚠ **Caution**

- If the door is opened with much pressure when the position of handle is ON or TRIP, the handle lock lever will be damaged

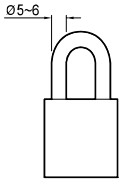
Key lock

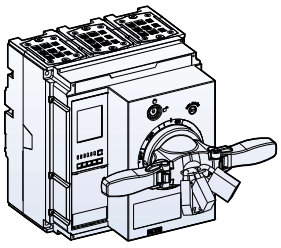
After locking handle, be sure that the key removed.



Key lock: locking OFF position

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 at ON or OFF position

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 6mm may be used. (Padlocks are not supplied)

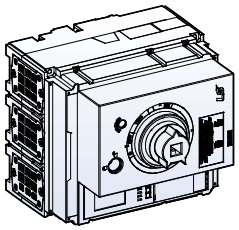
Rotary handle

Extended rotary handle

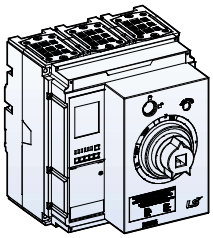
Degree of protections IP55

There are three types of extended rotary handle according to line & load direction
With Extended rotary handles, can be operate MCCB at the back of switchboards, from the switchboard front.
Indication of the three positions O(OFF), I(ON) and tripped circuit breaker locking capability in the OFF position by one to three padlocks, shackle diameter 5 to 6mm (not supplied).
When MCCB is on position, panel door is can't be open.

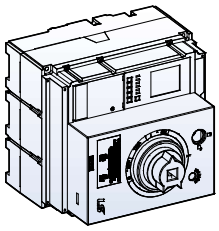
L Type



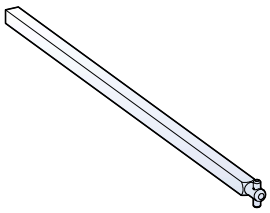
S Type



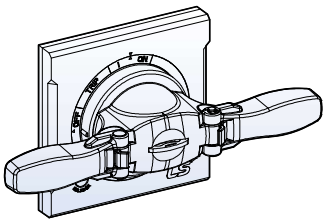
R Type



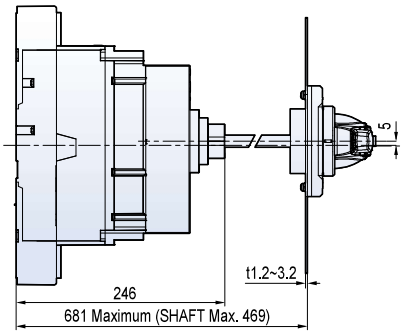
Shaft

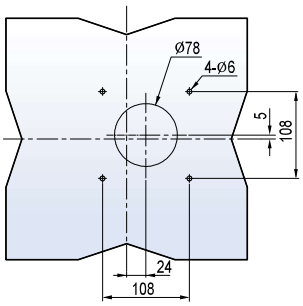


Handle



Dimension of door cut

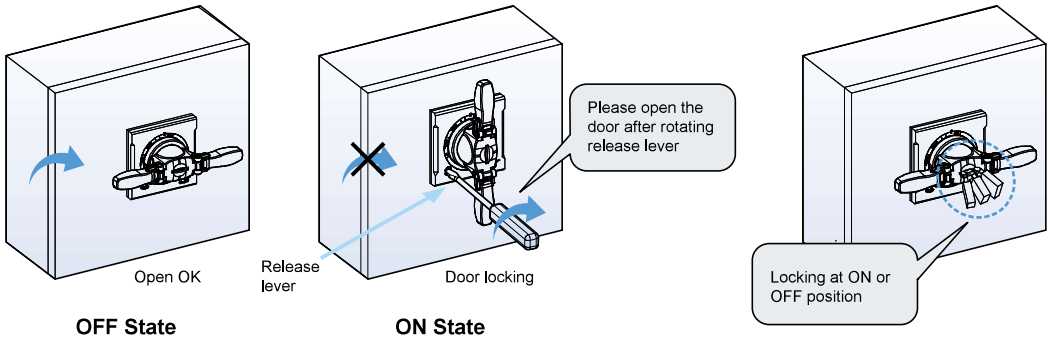




Rotary handle

Locking system(Door lock)

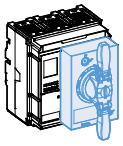
The panel door can be locked at ON and TRIP position of rotary handle.
To open the panel door at ON position, just rotate release screw clockwise.
When MCCB is on position, panel door is can't be open

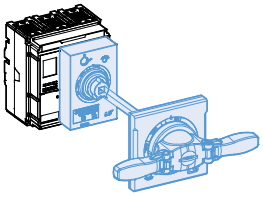


⚠ **Caution**

- If the door is opened with much pressure when the position of handle is ON or TRIP, the handle lock lever will be damaged

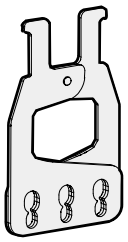
Degree of protections





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

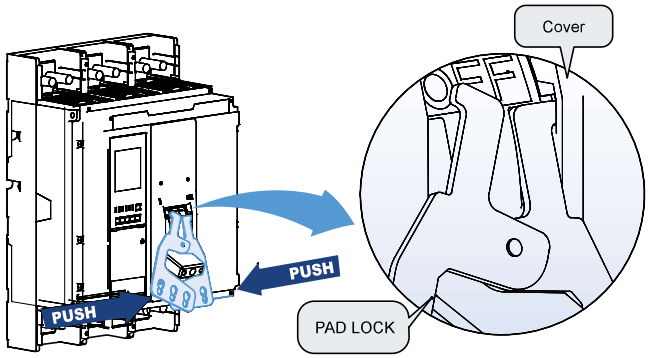
Locking devices

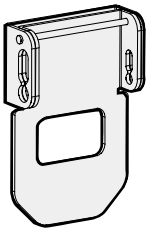


Removable padlock(PL)

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)

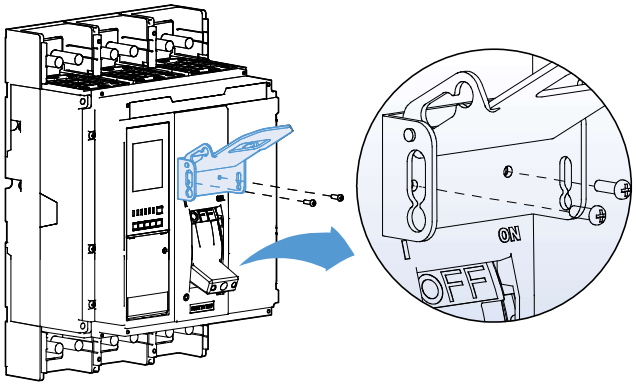




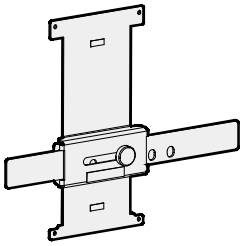
Fixed padlock (PHL)

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 circuitbreakers. Maximum three (3) padlocks with shackle diameters ranging from 5 to 8mm may be used. (Padlocks are not supplied)



Locking devices

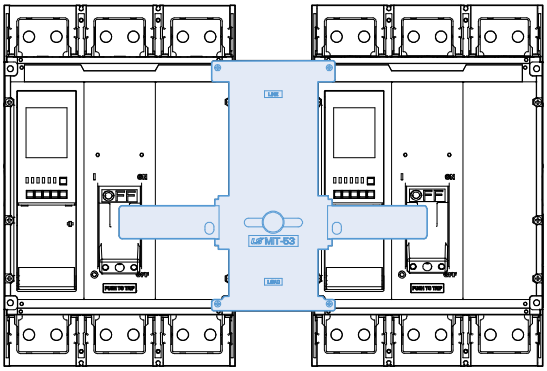


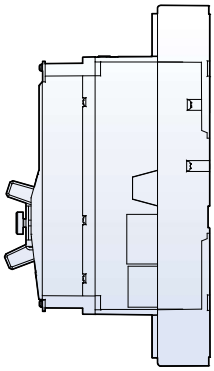
Mechanical interlock (MIT)

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.

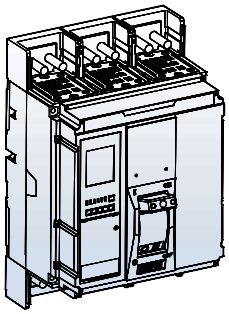
Fixing is carried out directly on the cover of the breakers.

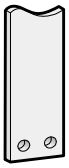
The front interlocking plate allows installation of a padlock in order to fix the position. (possibility of locking in the O-O position as well)
This mechanical interlocking device is very useful and simple for consisting of manual source changeover system





Terminal

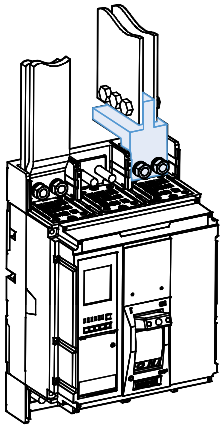


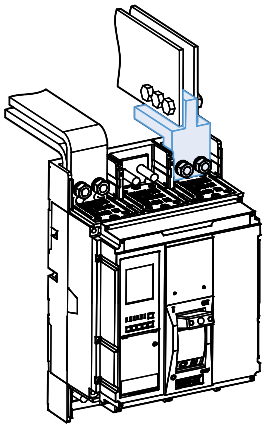


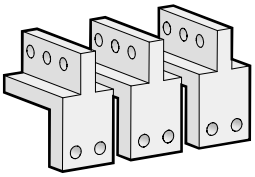
Front connection of Fixed devices

Bars

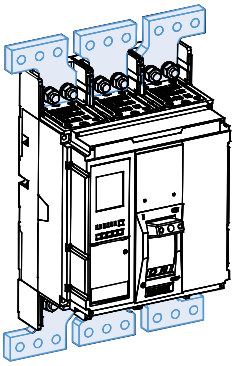
Fixed, front-connection Susol TS1600AF devices are equipped with terminals comprising captive screws for direct connection of bars.
Other connection possibilities for bars include vertical-connection adapters for edgewise bars and spreaders to increase the pole pitch to 95 mm.

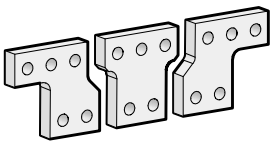






Vertical busbar

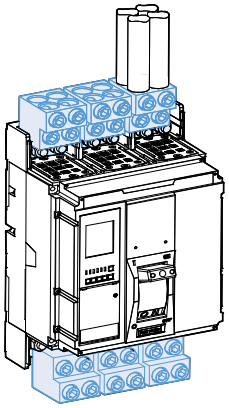


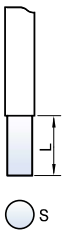


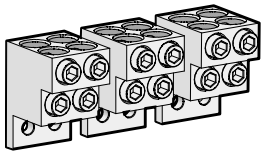
Busbars

Bare cables

Lug terminals may be used to connect four 85 up to 240㎟ copper or aluminum cables for each phases. Bare cable connection is possible for rating up to and including 1250A



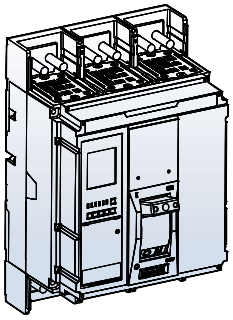




Lug terminal

L(mm)	25~55
S(㎟) Cu/Al	4×85 to 4×240
Torque(kgf · cm)	564

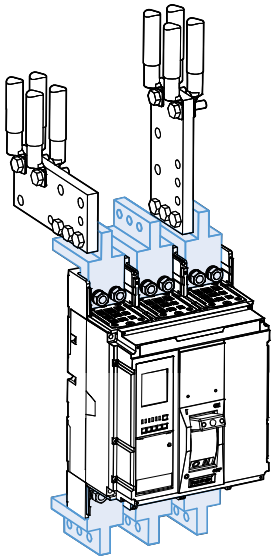
Terminal

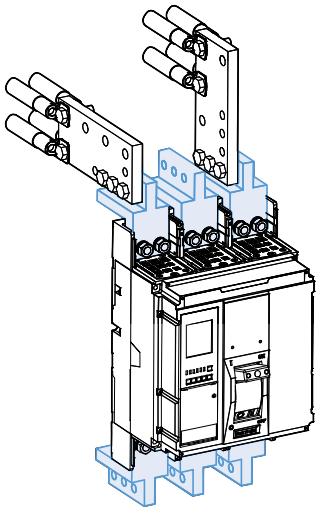


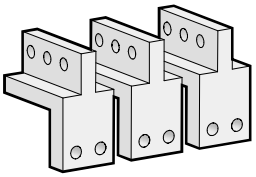
Crimped Terminals

Crimped terminals are combined with the vertical and extension busbars.
One to four cables with crimped terminals(±300 ㎟) may be connected.

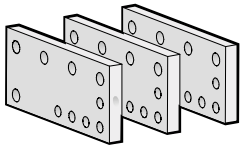
To ensure stability, connectors must be fixed and insulated between the terminal extensions.





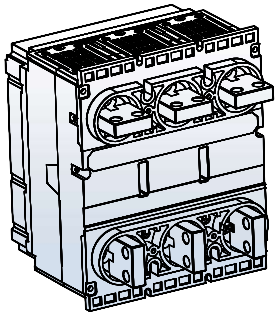


Vertical busbar



Extension busbars

Terminal



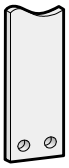
Rear connection of Fixed devices

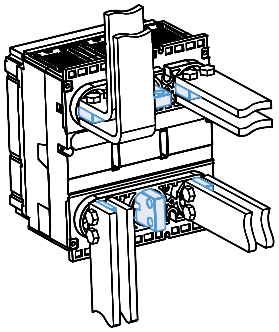
(Orderable with a breaker)

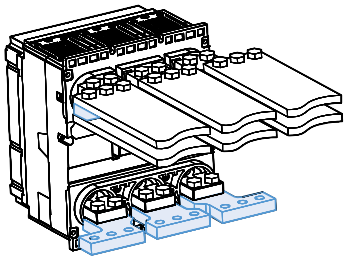
Bars

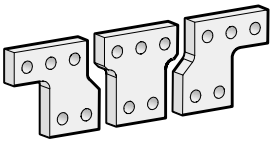
Rear connection devices equipped with horizontal or vertical connectors may be directly connected to flat or edgewise busbars, depending on the position of the connectors.
Busbars are available to increase the pole pitch to 95mm

The standard type of rear connection type is horizontal type.
If customer want to conect busbars with vertical or comvination(horizontal and vertical) please order separately.

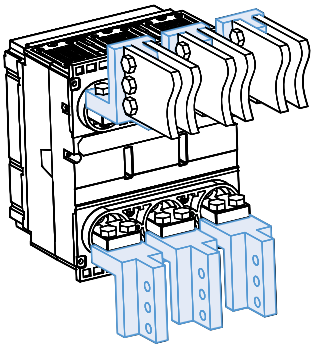


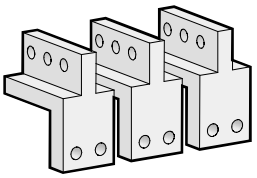






Busbars

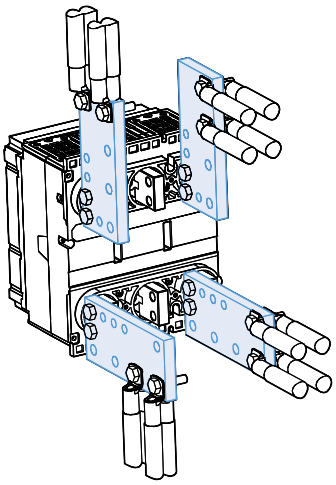


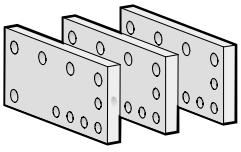


Vertical busbar

Crimped Terminals

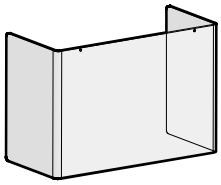
Crimped terminals enable connection of one to four cables with crimped terminals(±300 ㎟)
To ensure stability, connectors must be fixed and insulated between the terminal extensions





Extension busbars

Insulation

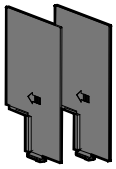


Terminal cover

Mounted on fixed, front-connection devices,
it insulates power-connection points.

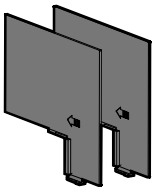
Barrier

These barriers are insulated between the phases for increase insulation level.
It also can be easily mounted, even the circuit-breaker already installed, inserting them in 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



Barrier for front connection

paking unit: 2ea/3Pole, 3EA/4Pole



Barrier for extension terminal

paking unit: 2ea/3Pole, 3EA/4Pole

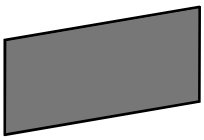
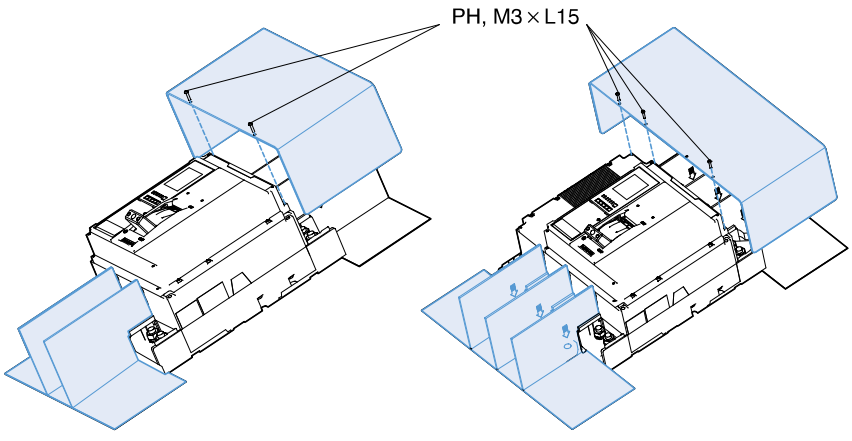


Plate protection

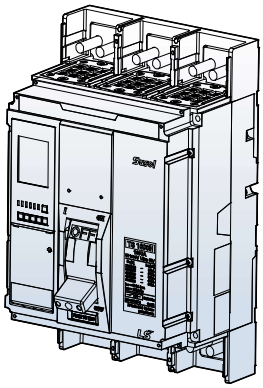
paking unit: 1ea/3Pole, 1ea/4Pole



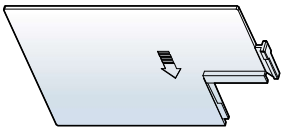
3Pole 4Pole

Standard accessories

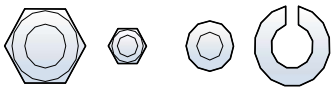
The following accessories for mounting, connection, insulation, handle operation are standard items and are packed with Susol TD & TS series circuit breakers.



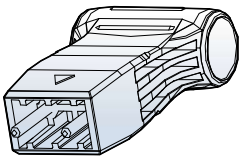
Circuit breaker: 1ea



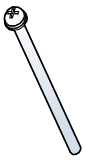
Barrier Interphase
3P: 2ea, 4P: 3ea



Nut(M5): 4ea
Nut(M10), S/W, P/W
3P: 12, 4P: 16



Handle Aux: 1ea

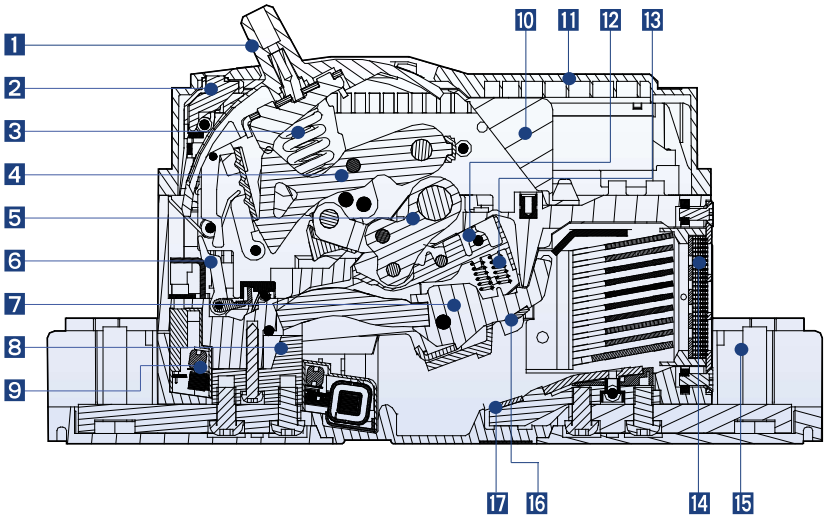


Screw (M5×110): 4ea



Plate protection: 1ea

Components



1 Handle
2 Test Button
3 Main Spring
4 Link Ass'y
5 Main Shaft Ass'y
6 Hard Trip Device
7 Moving Contactor
8 Load Terminal
9 Power CT
10 Handle Cover
11 Main Cover
12 Wall Holder Contactor
13 Contact Spring
14 Arc Chute
15 Terminal Bolt
16 Moving Tip
17 Fixed Tip