TERASAKI
Innovators in Protection Technology

TemBreak2

- New compact breakers -

The Ultimate Safety Breaker

TERASAKI ELECTRIC CO., LTD.
www.terasaki.co.jp

Catalogue No.'14-I64E

TABLE OF CONTENTS

FEATURES

Saving space and saving money !

No.4

Operation in pollution degree 3 to IEC standard

No.1

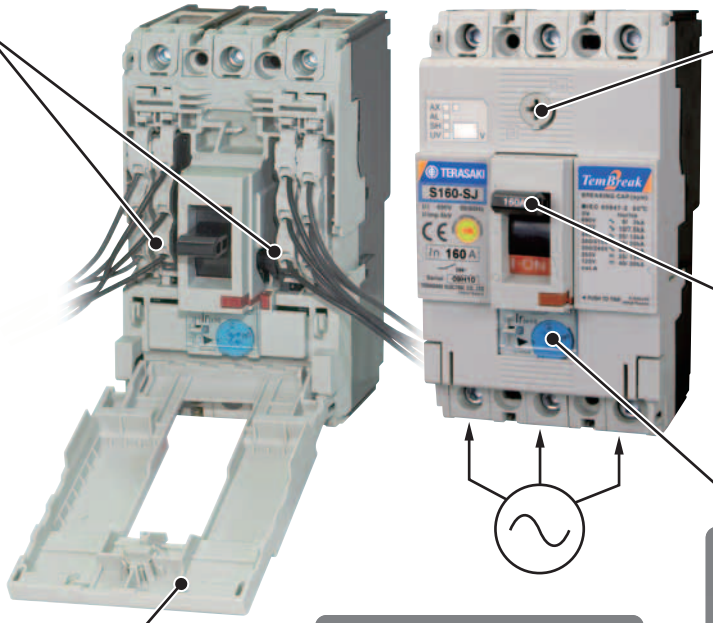
Compact size: W75 H130 D68; and high breaking capacity: 40kA 415V (S160-SF/SJ)

No.6

IP20 protection for the terminals and IP30 protection for the front cover with toggle (with terminal covers)

No.9

Two alarm switches can be easily installed



No.7

Unique accessory cover opens with only one screw

No.8

Practical internal accessories can be installed with one touch

- *ayxiliary switch*
- *alarm switch*
- *shunt trip*
- *undervoltage trip*

No.5

Suitable for isolation with positive contact indication

No.2

Huge adjustment range for overload protection: 63 to 100% Dial cover can be sealed. (Adjustable thermal MCCBs)

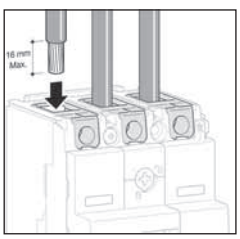
No.3

Unlimited performance when reverse-connected

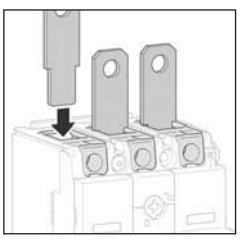
No.10

Secure accessory cover retains nameplate

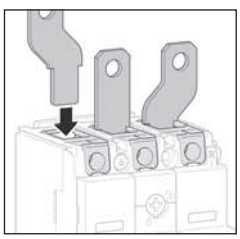
VARIED TERMINATIONS



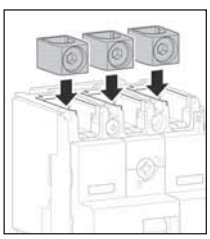
cable clamp



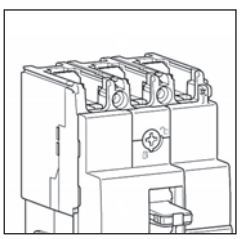
straight extension bar



spread extension bar



cable clamp for aluminum conductors



front connections

1 Ratings and Specifications

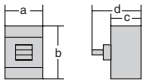
Molded Case Circuit Breakers

Molded Case Circuit Breakers

1 Fixed thermal and fixed magnetic MCCBs

Frame size (A)				100		160		160			160		250			250				
Type				**E100-SF**		**E160-SF**		**S160-SCF**			**S160-SF**		**E250-SF**			**S250-SF**				
Number of poles				2	3	1		2	3	4	3	4	2＊	3	4	2＊	3	4		
■Ratings																				
Rated current, A				10	50	16	63	15	75		15	75	125			125				
Calibrated at 40°C				15	60	20	80	20	100		20	100	150			150				
				20	75	25	100	30	125		30	125	175			175				
				30	100	32	125	40	160		40	160	200			200				
				40		40		50			50		225			225				
						50		60			60		250			250				
						(45°C only)														

＊center pole omitted

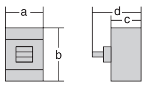
Rated insulation voltage〔U_i〕 V			AC	690		690		690			690		690			690				
Rated impulse withstand voltage〔U_{imp}〕 kV				6		8		8			8		8			8				
Utilization Category				A		A		A			A		A			A				
■Rated breaking capacity, kA																				
IEC60947-2		AC	690V	—		—		—			6/3		—			4/4				
I_{cu}/I_{cs}(sym)			500V	7.5/3.8		—		7.5/4			10/7.5		10/7.5			25/13				
			440V	10/5		—		15/7.5			25/13		15/12			30/15				
			415V	10/5		—		25/13			40/20		25/19			40/20				
			380V	16/8		—		25/13			40/20		25/19			40/20				
			240V	25/13		25/13		35/18			50/25		35/27			85/43				
		① DC	250V	7.5/3.8		—		20/10			25/13		15/12			25/13				
			125V	15/7.5		10/5		30/15			40/20		25/19			40/20				
■Rated short time withstand current, kA				—		—		—			—		—			—				
■External dimensions, mm																				
			a	50	75	25		50	75	100	75	100	105	105	140	105	105	140		
			b	130		130		130			130		165			165				
			c	68		68		68			68		68			68				
			d	87		95		95			95		95			95				
Weight (◉ marked standard type) kg				0.48	0.74	0.3		0.6	0.8	1.0	0.8	1.0	1.5	1.5	1.9	1.5	1.5	1.9		
■Connections and Mountings																				
Front-connected (FC)	Terminal screws			◉		◉		◉			◉		◉			◉				
	With straight extension bars			—		○		○			○		○			○				
	With spread extension bars			—		—		—	○		○		—	○		—	○			
	Cable clamps			○		○		—			—		○			○				
Rear-connected (RC)	Bolt studs			○		—		—			—		—			—				
	Flat bar studs			—		—		○			○		○			○				
Plug-in (PM)	For switchboards	Standard (PMC)		—		—		—			—		—			—				
		High-performance (PMB)		—		—		—			—		—			—				
	For distribution boards (PMC)			—		—		—			—		—			—				
Draw-out type (DR)				—		—		—			—		—			—				
TemPlug70 (PG)				—		—		—			—		—			—				
TemPlug45B (PG4)				—		—		—			—		—			—				
DIN rail mount				—		—		—	○ ⑪		○ ⑪		—			—				
Clip-in chassis mount				—		—		—			—		—			—				
■Accessories (optional)			**Symbol**																	
Internally mounted	Auxiliary switch		A X	●		—		●			●		●			●				
	Alarm switch		A L	●		—		●			●		●			●				
	Shunt trips		S H	●		—		●			●		●			●				
	Undervoltage trips		U V	●		—		●			●		●			●				
Externally mounted	Motor operator		M C	—	●	—		—			—		●			●				
	External operating handle	Breaker-mounted	H B	—	●	—		—	●		●		●			●				
		Door-mounted (variable depth)	H P	—	●	—		—	●		●		●			●				
	Toggle extension		H A	—		—		—			—		—			—				
	Mechanical interlock	Slide type	M S	—	●	—		—	●		●		●			●				
	Toggle holder		H H	●		●		●			●		●			●				
	Toggle lock		H L	●		●		●			●		●			●				
	Terminal cover	For front-connected	C F	●		●		●			●		●			●				
		For rear-connected and plug-in	C R	●		—		●			●		●			●				
		For cable clamps	C S	—		—		—			—		●			●				
	Interpole barrier		B A	●		—		● ③			● ③		● ③			● ③				
	Terminal block for lead		T F	●		—		●			●		●			●				
	Door flange		D F	●		●		●			●		●			●				
■Standard specifications																				
Overcurrent trip mechanism				Fixed thermal Fixed magnetic⑦		Fixed thermal Fixed magnetic		Fixed thermal Fixed magnetic			Fixed thermal Fixed magnetic		Fixed thermal Fixed magnetic			Fixed thermal Fixed magnetic				
Trip button (color)				Yes (Red)		Yes (Red)		Yes (Red)			Yes (Red)		Yes (Red)			Yes (Red)				
Handle position indication (ON: Red, OFF: Green)				Yes		Yes		Yes			Yes		Yes			Yes				
Suitability for isolation				Non		Yes		Yes			Yes		Yes			Yes				
CE marking				Non		Yes		Yes			Yes		Yes			Yes				

Notes:
◉ : Standard. This configuration used unless otherwise specified. ○ : Optional standard. Specify when ordering. ● : "yes" or "available". — : "no" or "not available".
① : DC rating available on request. ③ : Line side interpole barriers are supplied as standard. (Front connection only) ⑦ : Hydraulic-magnetic type for below 10A rating.
⑪ : Provided with DIN rail adaptor.

1 Ratings and Specifications

Molded Case Circuit Breakers

2 Adjustable thermal and fixed or adjustable magnetic MCCBs

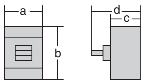
Frame size (A)		160	160	250	250
Type		**S160-SCJ**	**S160-SJ**	**E250-SJ**	**S250-SJ**
Number of poles		3 / 4	3 / 4	3 / 4	3 / 4
■Ratings					
Rated current, A Calibrated at 45°C		25 40 63 80 100 125 160	25 40 63 80 100 125 160	100 125 160 200 250	160 200 250
Rated insulation voltage 〔U_i〕 V	AC	690	690	800	800
Rated impulse withstand voltage 〔U_{imp}〕 kV		8	8	8	8
Utilization Category		A	A	A	A
■Rated breaking capacity, kA					
IEC60947-2 AC	690V	—	6/3	—	4/4
I_{cu}/I_{cs}(sym)	525V	7.5/4	10/7.5	7.5/6	10/7.5
	440V	15/7.5	25/13	15/12	30/15
	415V	25/13	40/20	25/19	40/20
	380V	25/13	40/20	25/19	40/20
	240V	35/18	50/25	35/27	85/43
① DC	250V	20/10	25/13	15/12	25/13
	125V	30/15	40/20	25/19	40/20
■Rated short time withstand current, kA		—	—	—	—
■External dimensions, mm					
	a	75 / 100	75 / 100	105 / 140	105 / 140
	b	130	130	165	165
	c	68	68	68	68
	d	95	95	95	95
Weight (◉ marked standard type) kg		0.8 / 1.0	0.8 / 1.0	1.5 / 1.9	1.5 / 1.9
■Connections and Mountings					
Front-connected (FC)	Terminal screws	◉	◉	◉	◉
	With straight extension bars	○	○	○	○
	With spread extension bars	○	○	○	○
	Cable clamps	○	○	○	○
Rear-connected (RC)	Bolt studs	—	—	—	—
	Flat bar studs	○	○	○	○
Plug-in (PM)	For switchboards Standard (PMC)	—	—	—	—
	High-performance (PMB)	—	—	—	—
	For distribution boards (PMC)	—	—	—	—
Draw-out type (DR)		—	—	—	—
TemPlug70 (PG)		—	—	—	—
TemPlug45B (PG4)		—	—	—	—
DIN rail mount		○ ⑪	○ ⑪	—	—
Clip-in chassis mount		—	—	—	—
■Accessories (optional)	**Symbol**				
Internally mounted: Auxiliary switch	A X	●	●	●	●
Internally mounted: Alarm switch	A L	●	●	●	●
Internally mounted: Shunt trips	S H	●	●	●	●
Internally mounted: Undervoltage trips	U V	●	●	●	●
Externally mounted: Motor operator	M C	—	—	●	●
External operating handle: Breaker-mounted	H B	●	●	●	●
External operating handle: Door-mounted (variable depth)	H P	●	●	●	●
Toggle extension	H A	—	—	—	—
Mechanical interlock Slide type	M S	●	●	●	●
Toggle holder	H H	●	●	●	●
Toggle lock	H L	●	●	●	●
Terminal cover: For front-connected	C F	●	●	●	●
Terminal cover: For rear-connected and plug-in	C R	●	●	●	●
Terminal cover: For cable clamps	C S	●	●	●	●
Interpole barrier	B A	● ③	● ③	● ③	● ③
Terminal block for lead	T F	●	●	●	●
Door flange	D F	●	●	●	●
■Standard specifications					
Overcurrent trip mechanism		Adjustable thermal Fixed magnetic	Adjustable thermal Fixed magnetic	Adjustable thermal Adjustable magnetic	Adjustable thermal Adjustable magnetic
Trip button (color)		Yes (Red)	Yes (Red)	Yes (Red)	Yes (Red)
Handle position indication (ON: Red, OFF: Green)		Yes	Yes	Yes	Yes
Suitability for isolation		Yes	Yes	Yes	Yes
CE marking		Yes	Yes	Yes	Yes

Notes:
◉ : Standard. This configuration used unless otherwise specified. ○ : Optional standard. Specify when ordering. ● : "yes" or "available". — : "no" or "not available".
① : DC rating available on request. ③ : Line side interpole barriers are supplied as standard. (Front connection only)
⑪ : Provided with DIN rail adaptor.

Ratings and Specifications

Molded Case Circuit Breakers

3 Switch-disconnectors

Frame size (A)		160		250	
Type		**S160-SN**		**S250-SN**	
Number of poles		3	4	3	4
■Ratings					
Rated current, A		160		250	
Rated insulation voltage 〔U_i〕 V	AC	690		800	
Rated operational voltage V	AC	690		690	
	DC	250		250	
Rated short circuit making capacity, kA peak		2.8		6	
Rated short time withstand current, kA		2 (0.3sec)		3 (0.3sec)	
Rated impulse withstand voltage 〔U_{imp}〕 kV		8		8	
■Performance					
Utilization category	AC 690V	AC-23A		AC-23A	
IEC 60947-3	DC 250V	DC-22A		DC-22A	
Upstream breaker (OCPD) ㉙		S160-SF		S250-SF	
■External dimensions, mm					
	a	75	100	105	140
	b	130		165	
	c	68		68	
	d	95		95	
Weight (◉ marked standard type) kg		0.7	0.9	1.5	1.9
■Connections and Mountings					
Front-connected (FC)	Terminal screws	◉		◉	
	With straight extension bars	○		○	
	With spread extension bars	○		○	
	Cable clamps	○		○	
Rear-connected (RC)	Bolt studs	—		—	
	Flat bar studs	○		○	
Plug-in (PM) For switchboards	Standard (PMC)	—		—	
	High-performance (PMB)	—		—	
Plug-in (PM) For distribution boards (PMC)		—		—	
Draw-out type (DR)		—		—	
TemPlug70 (PG)		—		—	
TemPlug45B (PG4)		—		—	
DIN rail mount		○ ⑪		—	
Clip-in chassis mount		—		—	
■Accessories (optional)	**Symbol**				
Internally mounted: Auxiliary switch	A X	●		●	
Internally mounted: Alarm switch	A L	●		●	
Internally mounted: Shunt trips	S H	●		●	
Internally mounted: Undervoltage trips	U V	●		●	
Externally mounted: Motor operator	M C	—		●	
Externally mounted: External operating handle, Breaker-mounted	H B	●		●	
Externally mounted: External operating handle, Door-mounted (variable depth)	H P	●		●	
Externally mounted: Toggle extension	H A	—		—	
Externally mounted: Mechanical interlock Slide type	M S	●		●	
Externally mounted: Toggle holder	H H	●		●	
Externally mounted: Toggle lock	H L	●		●	
Externally mounted: Terminal cover, For front-connected	C F	●		●	
Externally mounted: Terminal cover, For rear-connected and plug-in	C R	●		●	
Externally mounted: Terminal cover, For cable clamps	C S	●		●	
Externally mounted: Interpole barrier	B A	● ③		● ③	
Externally mounted: Terminal block for lead	T F	●		●	
Externally mounted: Door flange	D F	●		●	
■Standard specifications					
Trip button (color)		Yes (Red)		Yes (Red)	
Handle position indication (ON: Red, OFF: Green)		Yes		Yes	
Suitability for isolation		Yes		Yes	
CE marking		Yes		Yes	

Notes:

◉ : Standard. This configuration used unless otherwise specified. ○ : Optional standard. Specify when ordering. ● : "yes" or "available". — : "no" or "not available".

③ : Line side interpole barriers are supplied as standard. (Front connection only) ⑪ : Provided with DIN rail adaptor.

㉙ : Required for overcurrent protection. Rated conditional short-circuit current [I_{cc}] will be the same as Rated short-circuit breaking capacity of upstream breaker.

2 Mounting and Connection

List of connecting types

Connecting types (Abbreviation)	Front-connected (FC)			Rear-connected (RC)	
	For compression terminals / flat bars	With extension bars	With cable clamps	Flat bar studs Stud can be turned 45° or 90°	Bolt studs
Outer view / Breaker					
E100-SF	◉	—	○	—	○
E160-SF	◉	○	○	—	—
S160-SCF **S160-SF**	◉	○	—	○	—
S160-SCJ **S160-SJ** **S160-SN**	◉	○	○	○	—
E250-SF **S250-SF** **E250-SJ** **S250-SJ** **S250-SN**	◉	○	○	○	—
Remarks	• Connect compression terminals or flat bars directly to breaker terminals.	• Extension bars are attached to breaker terminals. Connect compression terminals or flat bars to the extension bars.	• Cable clamps are attached to breaker terminals. Connect wires directly to cable clamps.	• Flat bar studs will be factory installed in the horizontal position unless otherwise specified. • For E250, S250, the flat bar studs in the vertical position are available on request. Please select a position code from those shown in the table below: • For S160, the studs are horizontal direction only.	

Position code	Position of flat bar studs	
	Line side	Load side
RC-A	Vertical	Horizontal
RC-B	Horizontal	Vertical
RC-C	Vertical	Vertical
RC-D	Horizontal	Horizontal

See page 2-6 for dimensions and tightening torques of terminal screws.

Notes:

◉ : Standard. This configuration used unless otherwise specified.
○ : Optional standard. Specify when ordering.
▲ : Semi-standard.
△ : Custom-built. Contact us for details.
— : "no" or "not available".

①. See page 2-3 for details.

Connecting parts

There are the following connecting/mounting hardware available as options:

1. Extension bars for front conection

Type	Number of poles	Applicable breakers		Min order qty	Constituent parts			Remarks
					Extension bar	Screw B	Screw C	
T2FB12L2SH	2	**S160-SCF, S160-SF, S160-SCJ, S160-SJ, S160-SN**	Straight extension bars	1/2 ①	2	2	2	
T2FB12L3SH	3				3	3	3	
T2FB12L4SH	4				4	4	4	
T2FB12L2SB	2	**S160-SCF, S160-SF, S160-SCJ, S160-SJ, S160-SN**	Straight extension bars	1	4	4	4	
T2FB12L3SB	3				6	6	6	
T2FB12L4SB	4				8	8	8	
T2FB25L3WH	3	**E250-SF, S250-SF, E250-SJ, S250-SJ, S250-SN**	Spread extension bars	1/2 ①	3	3	3	
T2FB25L4WH	4				4	4	4	
T2FB25L3WB	3	**E250-SF, S250-SF, E250-SJ, S250-SJ, S250-SN**	Spread extension bars	1	6	6	6	
T2FB25L4WB	4				8	8	8	
T2FB25L2SH	2	**E250-SF, S250-SF, E250-SJ, S250-SJ, S250-SN**	Straight extension bars	1/2 ①	2	2	2	
T2FB25L3SH	3				3	3	3	
T2FB25L4SH	4				4	4	4	
T2FB25L2SB	2	**E250-SF, S250-SF, E250-SJ, S250-SJ, S250-SN**	Straight extension bars	1	4	4	4	
T2FB25L3SB	3				6	6	6	
T2FB25L4SB	4				8	8	8	

● See page 2-6 for screws B and C.

Note ①**:** Two sets, one for the line side and one for the load side, are required per breaker.

2. Frat bar stud for rear connection

Type	Number of poles	Applicable breakers	Min order qty	Constituent parts			Remarks
				Stud bar	Screw D	Screw E	
T2RP12L2S	2	**S160-SCF, S160-SF, S160-SCJ, S160-SJ, S160-SN**	1	4	4	4	
T2RP12L3S	3			6	6	6	
T2RP12L4S	4			8	8	8	
T2RP25L2S	2	**E250-SF, S250-SF, E250-SJ, S250-SJ, S250-SN**	1 ①	4	4	4	
T2RP25L3S	3			6	6	6	
T2RP25L4S	4			8	8	8	

● See page 2-6 for screws D and E.

Note ①**:** The studs can be rotated to four angular positions: 0 (horizontal), 45, 90 (vertical) and 135 degrees.

Front connected type (without extension bar)

Frame size (A)	Breaker		Nominal wire size (mm²)										
			2	5.5	8	14	22	38	60	70	80	100	150
100	**E100-SF**	(15-50A)	R2-5 (R2-6)	R5.5-5 (R5.5-6)	R8-5 (R8-6)	R14-5	NTMCB22-5S AMP33114						
		(60-160A)			R8-8	R14-8	R22-8	AMP322870 JST38-S8 NTM38-8S	60-2BA Note ②				
160	**S160-SCF, S160-SF, S160-SCJ S160-SJ, S160-SN**	(15-50A)	R2-5 (R2-6)	R5.5-5 (R5.5-6)	R8-5 (R8-6)	R14-5	NTMCB22-5S AMP33114						
		(60-160A)			R8-8	R14-8	R22-8	AMP322870 JST38-S8 NTM38-8S	60-2BA Note ②	MELEC TM70-8			
250	**E250-SF, S250-SF, E250-SJ S250-SJ, S250-SN**							R38-8	R60-8		80-3BA Note ②	100-3BA Note ②	CB150-8
											CB80-8	CB100-8	

Front connected type (with extension bar)

Frame size (A)	Breaker	Nominal wire size (mm²)						
		38	60	80	100	150	200	325
250	**E250-SF, S250-SF, E250-SJ, S250-SJ, S250-SN**	R38-10	R60-10	R80-10	R100-10	R150-10		
						CB150-10		

Notes:

①. Commercially made compression terminals can be used (refer to ▭ boxes)

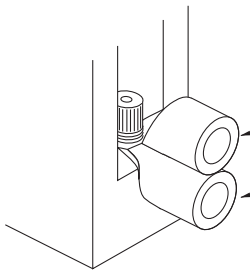
R/RD : JIS-compliant
CB : JEM 1399-compliant
AMP : Made by Nippon AMP Co., Ltd.
JST : Made by Japan Solderless Terminal Manufacturing Co., Ltd.
NTK : Made by Nippon Tanshi Co., Ltd.
NTM : Made by Nichifu Terminal Industries Co., Ltd.
MELEC : Made by Shanghai JiaMeng Electrical Equipment Co., Ltd.

②. Compression terminals in ▭ box cells are made by us at Terasaki. They are available from us or our authorized agents.

③. Compression terminals enclosed in parentheses are to be used as the lower terminal when two terminals are connected.

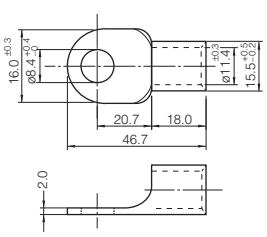
Connection (two terminals)

If a shortage of insulating occurs between the mounting plate and a terminal, use a recommended taping or insulator.

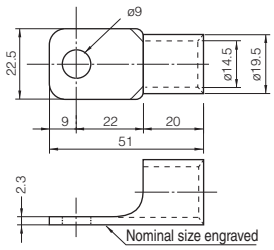


Terasaki made compression terminals are used (refer to ☐ box)

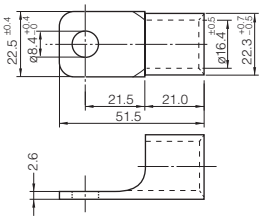
60-2BA



80-3BA

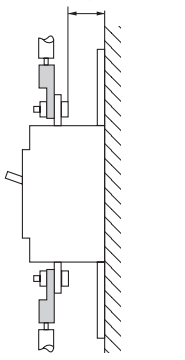


100-3BA



Connection (one electric cable)

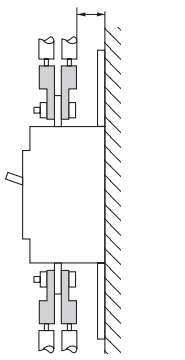
If a shortage of insulating occurs, use a recommended taping or insulator.



Make connection so that the screw heads face toward the mounting surface.

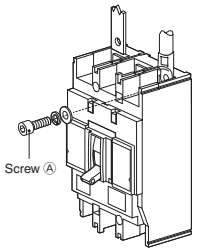
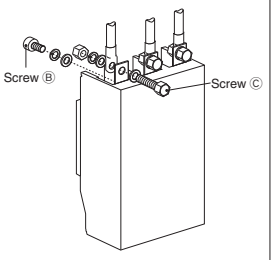
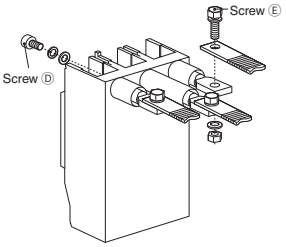
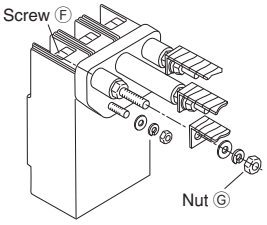
Connection (two electric cables)

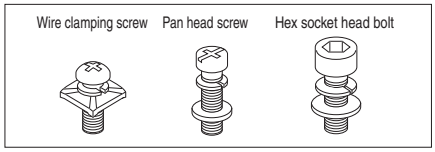
If a shortage of insulating occurs, use a recommended typing or insulator.



Make connection so that the screw heads face toward the mounting surface.

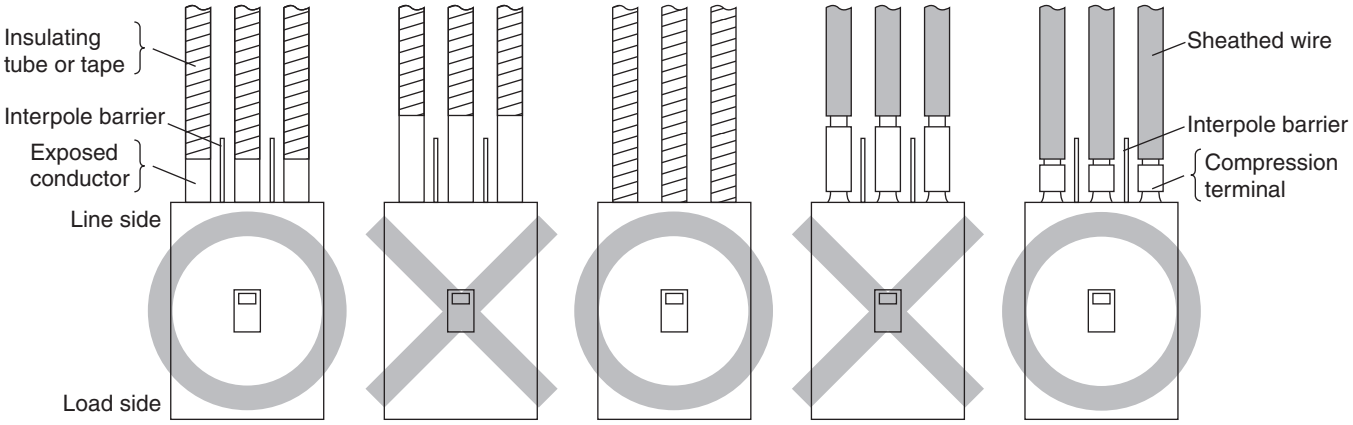
3 Terminal screw sizes and standard torques

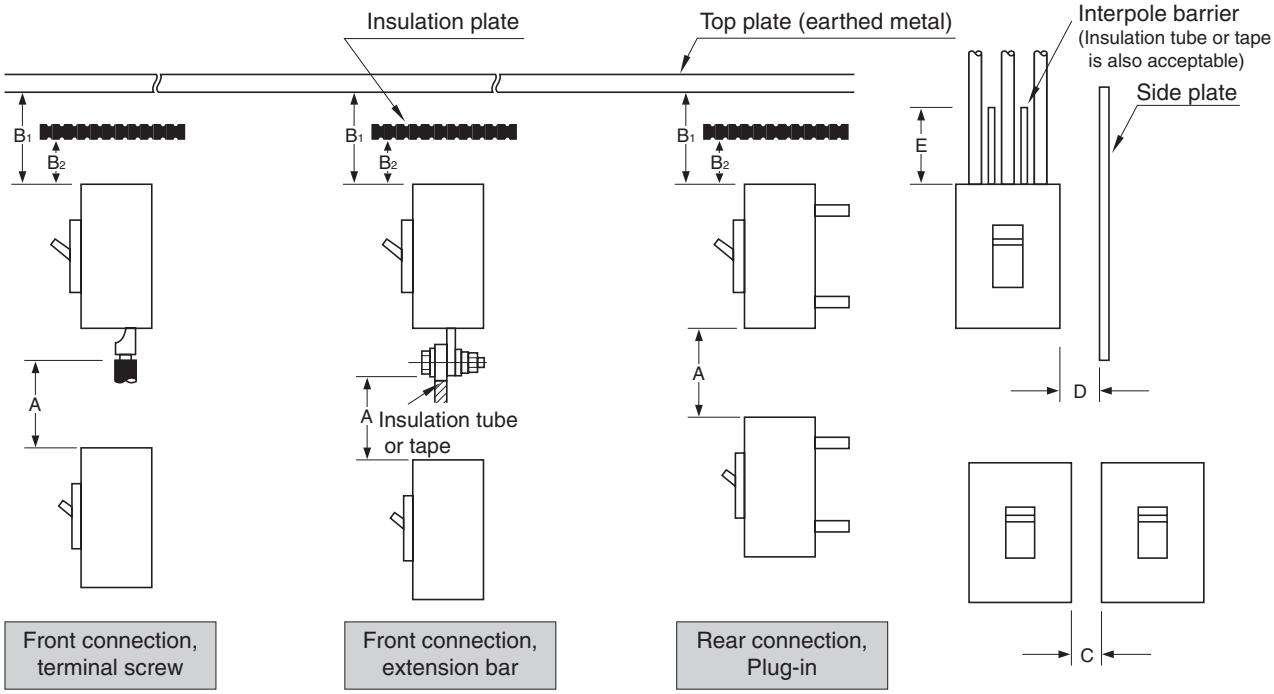
Connecting types / Type		Front connection (FC)			Rear connection (RC) (Flat bar stud)		Rear connection (RC) (Bolt stud)	
								
Frame size (A)	Breaker	Compression terminal Screw size (A) Torque (N·m)	Extension bar Screw size (B) Torque (N·m)	Extension bar Screw size (C) Torque (N·m)	Screw size (D) Torque (N·m)	Screw size (E) Torque (N·m)	Screw size (F) Torque (N . m)	Screw size (G) Torque (N . m)
100	**E100-SF (10～50A)**	Pan head M5×12 Wire clamping screw 2.3～3.4	—	—	—	—	Pan head M4×14 1.1～1.7	Hex. nut M6 2.7～4.5
	E100-SF (60～100A)	Pan head M8×14 4.9～6.9	—	—	—	—	Hex head M6 nut 2.7～4.5	Hex. nut M8 6.9～10.8
160	**S160-SCF S160-SF S160-SCJ S160-SJ (15～50A)**	Wire clamping M5×14 2.3～3.4	Wire clamping M5×14 2.3～3.4	Hex head M8×22 11.8～18.6	Pan head M5×14 2.3～2.8	Hex head M8×23 2.7～4.5	—	—
	S160-SCF S160-SF S160-SCJ S160-SJ (60～160A)	Pan head M8×14 4.9～6.9	Pan head M8×14 4.9～6.9	Hex head M8×22 11.8～18.6	Hex socket head M6×18 7.8～11.8	Hex head M8×23 11.8～18.6	—	—
	S160-SN	Pan head M8×14 4.9～6.9	Pan head M8×14 4.9～6.9	Hex head M8×22 11.8～18.6	Hex socket head M6×18 7.8～11.8	Hex head M8×23 11.8～18.6	—	—
250	**E250-SF S250-SF E250-SJ S250-SJ S250-SN**	Hex socket head M8×18 7.8～12.7	Hex socket head M8×18 7.8～12.7	Hex head M10×25 22.5～37.2	Hex socket head M6×18 7.8～11.8	Hex head M8×25 11.8～18.6	—	—



4 Insulation distance from the line side

The insulation distance between the breaker and earthed metal parts and insulators shown in the table on the next page must be maintained to prevent arcing faults occurring due to conductive ionised gas. In addition, completely cover exposed conductors, to their roots at the breaker or to below the height protected by interpole barriers, on the line side of the breaker using insulation tube or tape, in order to provide positive protection against short circuit or ground fault due to metal chipping, surge voltage, dust particles or salt. Be sure to install the interpole barriers supplied with the breaker.





A . Distance from lower breaker to exposed live part of upper breaker terminal (front connection) or distance from lower breaker to end face of upper breaker (rear connection).
B1 . Distance from end face of breaker to top plate.
B2 . Distance from end face of breaker to insulation plate.
C . Gap between breakers.
D . Distance from side of breaker to side plate (earthed metal).
E . Dimension of insulation over exposed conductors.

2 Mounting and Connection

Molded Case Circuit Breakers

4 Insulation distance from the line side

Insulation distance, mm (AC 460 V or less) Note ①

Molded Case Circuit Breakers

Breaker	A Note②	B1	B2		C	D	E
E100-SF	30	10	10	✻	Possible to set close	25	Not less than the length of the bare live part Note ③
E250-SF, E250-SJ	50	40	40	✻	Possible to set close	50	Not less than the length of the bare live part Note ③
S160-SCF, S160-SF, S160-SCJ, S160-SJ	50	50	10	✻	Possible to set close	25	Not less than the length of the bare live part Note ③
S250-SF, S250-SJ	50	50	40	✻	Possible to set close	50	Not less than the length of the bare live part Note ③

Notes:

①. Required to allow free and uninterrupted flow of arc gases. Ensure additional clearance or insulation distance if required to perform wiring, barrier installation or electrical work or to meet the need for more insulation distance between bare live parts and grounded metal members in a switchboard or the like.

②. The figures are for lower breakers.

③. For front connection breakers, insulate all exposed conductors of the line side until the breaker end. If interpole barriers are packed, be sure to use the barriers; more over, insulate all exposed conductors by insulating tape or the like so that the tape overlaps with the barriers.

✻. If using extension bars (optional), ensure the insulation distance specified for the application.

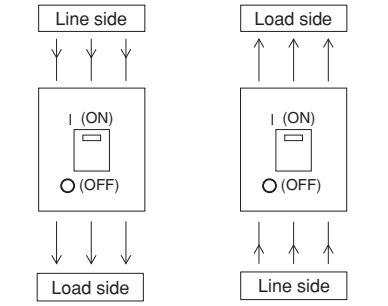
2 Mounting and Connection

Molded Case Circuit Breakers

5 Reverse connection

The breakers are available for normal connection by default. Reverse connection is optionally allowed. See the tables below.

Breaker	AC240V	AC415V	AC450V
E100-SF **S160-SCF, S160-SF, S160-SCJ, S160-SJ, 160-SN** **E250-SF, S250-SF, E250-SJ, S250-SJ, S250-SN**	◎	◎	◎



Normal connection Reverse connection

2 Mounting and Connection

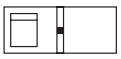
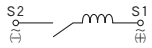
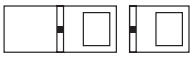
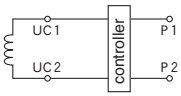
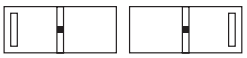
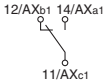
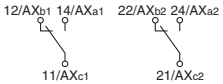
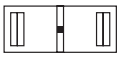
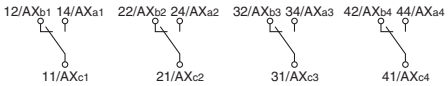
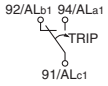
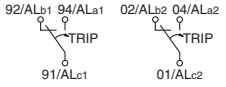
Molded Case Circuit Breakers

6 Lists of breaker mounting screws

Breaker	Number of poles	Front-connected (FC)		Rear-connected (RC)	
		Screw size	Qty	Screw size	Qty
E100-SF	2,3	Pan head M4×65	2	Pan head M4×65	2
S160-SCF ,S160-SF ,S160-SCJ ,S160-SJ ,S160-SN	2,3	Pan head M4×61	2	Pan head M4×61	2
	4				
E250-SF ,S250-SF ,E250-SJ ,S250-SJ ,S250-SN	2,3	Pan head M4×55	2	Pan head M4×55	2
	4	Pan head M4×55	4	Pan head M4×55	4

3 Accessories

1. Connection diagrams and terminal numbers

Accessory	Combination symbol	Connection diagram and terminal No.	Remarks
Shunt trip device (SH)		• With anti-burn switch 	Applicable to E100-SF. . Shunt trips are fitted with anti-burn switches.
		• Without anti-burn switch 	Applicable to other breakres except E100-SF. Shunt trips are continuous rating without anti-burn switches.
Undervoltage trip device (UV)		For AC  For DC 	Applicable to E100-SF. UVT controller is required for AC UVT. See page 3-5 for the details.
			
Auxiliary switch (AX)			1pc Aux. SW installed.
			2pcs Aux. SW installed.
			4pcs Aux. SW installed.
Alarm switch (AL)			1pc Alarm. SW installed.
			2pcs Alarm. SW installed.

2. Possible combinations

Molded Case Circuit Breakers

Type	Number of poles ①	AX Auxiliary switch	AL Alarm switch	SH Shunt trip	UV Under voltage trip	AX AL	AX SH	AX UV	AL SH	AL UV	AX AL SH	AX AL UV
E100-SF	2											
E100-SF	3											
S160-SCF	2											
S160-SCF **S160-SF** **S160-SCJ** **S160-SJ** **S160-SN**	3・4											
E250-SF **S250-SF** **E250-SJ** **S250-SJ** **S250-SN**	3・4											

Notes:
①: The two-pole type breaker obtained by modifying a three-pole breaker by removing the conductive part of its central pole is regarded as the same as the three-pole type.

3. Ratings and operation data of auxiliary and alarm switches

(1) Ratings of AX and AL

• The applicable load of the switch shall be no larger than the rating and no smaller than the minimum load.

Type of breaker	Standard							For microload ①		
	AC (V)			DC (V)			Minimum load	DC (V)		Minimum load
	Voltage (V)	Current (A)		Voltage (V)	Current (A)			Voltage (V)	Current (A)	
		Resistive load	Inductive load ②		Resistive load	Inductive load ②			Resistive load	
E100-SF	480	—	—	250	0.2	0.03	DC6V 100mA DC24V 25mA	125	0.1	DC6V 5mA DC24V 1.25mA
	250	3	2	125	0.4	0.05		30	0.1	
	125	3	2	30	3	2				
S160-SCF, S160-SF, S160-SCJ, S160-SJ, S160-SN E250-SF, S250-SF, E250-SJ, S250-SJ, S250-SN	480	—	—	250	—	—	DC15V 100mA	30	0.1	DC5V 1mA
	250	3	2	125	0.4	0.05				
	125	3	2	30	3	2				

Note: ① This is a custom-made product. When ordering for this product, specify that it is intended for minute load use.
Note: ② The inductive load means power factor of no smaller than 0.4 and time constant of no larger than 7 ms.

(2) Operation of AX and AL

Switch	Breaker status	[ON]	[OFF]	[TRIP]
Auxiliary switch (AX) status		11/AXc-14/AXa "Closed" 11/AXc-12/AXb "Open"	11/AXc-14/AXa "Open" 11/AXc-12/AXb "Closed"	11/AXc-14/AXa "Open" 11/AXc-12/AXb "Closed"
Alarm switch (AL) status		91/ALc-94/ALa "Open" 91/ALc-92/ALb "Closed"	91/ALc-94/ALa "Open" 91/ALc-92/ALb "Closed"	91/ALc-94/ALa "Closed" 91/ALc-92/ALb "Open"

4. Shunt trip device (SH)

Ratings of SHT

Type of breaker	Peak exciting current, A					
	Rated voltage	AC (V)		DC (V)		
		100-115	200-480	24	48	100-115	200-230
E100-SF		3.4	0.83	1.6	0.71	0.4	0.16

Type of breaker	Peak exciting current, A						
	Rated voltage	AC (V)			DC (V)			
		100-120	200-240	380-450	24	48	100-120	200-240
S160-SCF, S160-SF, S160-SCJ, S160-SJ, S160-SN E250-SF, S250-SF, E250-SJ, S250-SJ, S250-SN		0.014	0.014	0.0065	0.03	0.03	0.011	0.011

Notes:
(1) The permissible voltage range is from 85% to 110% of the rated voltage for AC or 75% to 125% thereof for DC.
Ensure that the voltage does not drop exceeding the permissible voltage range when SHT is actuated.
(2) Breaker contacts usually start opening within 30 ms after the rated voltage is applied to the breaker.

5. Undervoltage trip device (UV)

Ratings of UVT with Inst

Type of breaker	Power supply capacity, VA			Exciting current, mA		
	Rated voltage	AC (V)			DC (V)	
	100-120	200-240	380-450	24	100-120	200-240
E100-SF	5 min ②	5 min ②	5 min ②	18.2 ①	4.8 ①	—
S160-SCF, S160-SF, S160-SCJ, S160-SJ, S160-SN E250-SF, S250-SF, E250-SJ, S250-SJ, S250-SN	1.4 ①	1.5 ①	2.3 ①	23 ①	10 ①	3.5 ①

Note: ①: No UVT controller is required.
②: Equipped with the UVT controller. See page 3-5 for specifications of the UVT controller.

TemBreak2 UVT are available with 500±300 msec time delays.
UVT controller is installed on the breaker.

Rating of UVT with time delay

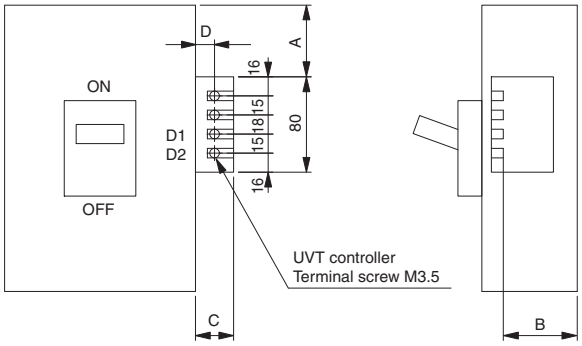
Time delays: 500±300 msec.

Applicable breakers	Power supply capacity, VA						Exciting current, mA				
	Rated voltage	AC (V)						DC (V)			
	100-110	115-120	200-220	230-240	380-415	440-450	24	100-110	115-120	200-220	230-240
S160-SCF, S160-SF, S160-SCJ, S160-SJ, S160-SN E250-SF, S250-SF, E250-SJ, S250-SJ, S250-SN	1.1	1.3	2.1	2.5	1.5	1.7	22	7.6	8.3	8.6	9.3

- Mounting dimensios and terminal arrangement of the UVT controller installed on the breaker

Applicable breakers		A (mm)	B (mm)	C (mm)	D (mm)
160-SCF, S160-SF, S160-SCJ S160-SJ, S160-SN	2P, 3P, 4P	34	55	24	15
E250-SF, S250-SF, E250-SJ S250-SJ, S250-SN	3P, 4P	49.5	55	24	15

• The UVT controller is installed in the right hand side of the breaker



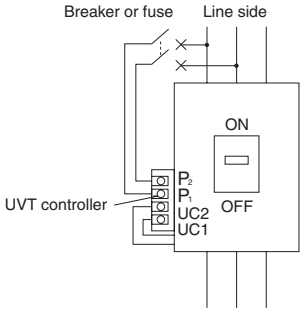
Notes: 1. Tightening torque of terminal screws: 0.9 – 1.2 N·m
2. Applicable lead wire size: 2.0 mm² max

UVT controller for Type E100-SF

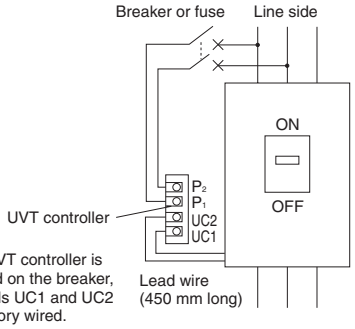
E100-SF equipped with the AC UVT need a UVT controller. The UVT controller is installed on the breaker by default. Separate installation of the controller is also available on request. Also a UVT controller (type XCU1D) with a time delay of less than 500 ms is available on request.

● **UVT controller connection diagram**

UVT controller installed on the breaker

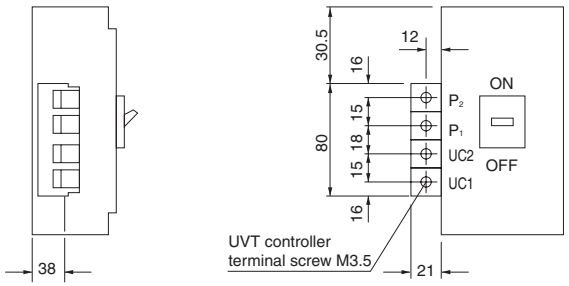


UVT controller installed external to the breaker



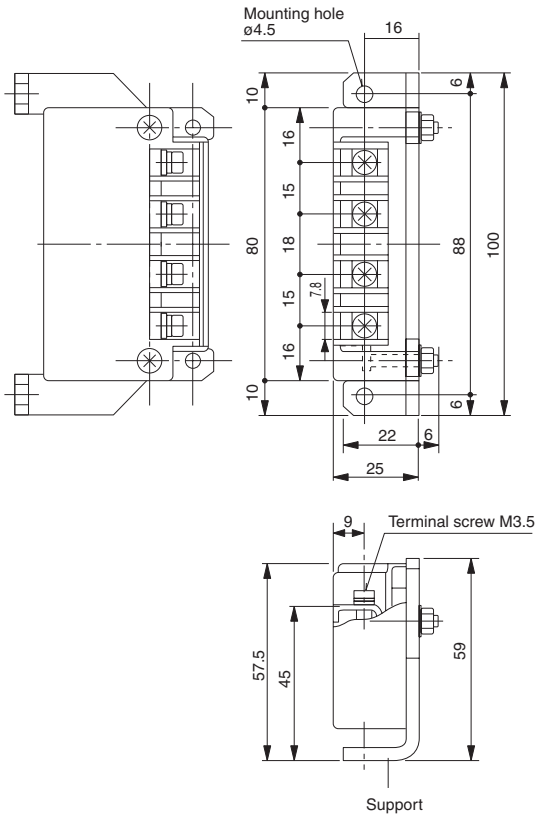
Note: If the UVT controller is installed on the breaker, terminals UC1 and UC2 are factory wired.

● Mounting dimensios and terminal arrangement of the UVT controller installed on the breaker



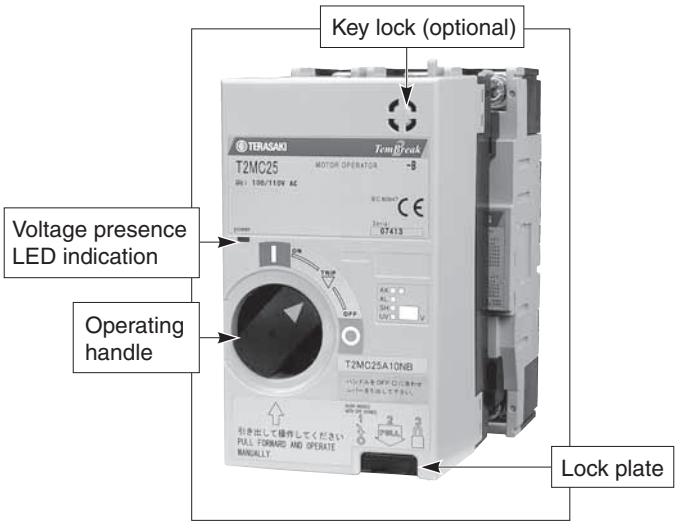
Notes:
1. Tightening torque of terminal screws: 0.88 – 1.18 N·m
2. Applicable wire size: 2.0 mm² max

● Outline of the UVT controller installed external to the breaker



1. Motor operators (MC)

Motor driven type



Ratings and Specifications

		T2MC25L
Type of breaker		E250-SF, S250-SF, E250-SJ, S250-SJ, S250-SN
Rated operational voltage ①		●AC100-110V ●AC200-220V ●AC230-240V ●DC24V ●DC48V ●DC100-110V ●DC200-220V
Peak steady-state/ starting current, A ②	AC100-110V	4.5/8
	AC200-220V	4/8
	AC230-240V	3.5/7
	DC24V	18/26
	DC48V	12/18
	DC100-110V	2.2/6
	DC200-220V	2.2/5.5
Operation method		Motor driven (direct drive system)
Operating time, s at rated voltage	ON	0.1
	OFF/RESET	0.1③④
Operating switch ratings		100V 0.1A (Open voltage/current: 44 V/4 mA)⑤
Power supply required		300VA or higher
Dielectric withstand voltage (for one minute)		AC1500V (AC 1000 V for DC 24/48 V)
Weight		1.4kg

Notes:
① : Permissible operating range is 85 to 110%. A power transformer is available as option for AC380V or AC400-460V.
② : The currents shown are the maximum values at the maximum rated operational voltage.
③ : The operating time is the value when the rated operational voltage is supplied.
Allow a longer time for the motor operator to complete the operation.
④ : The motor operator is of a short time duty. Do not subject it to more than 10 continuous ON-OFF operations. If this occurs, allow the motor operator to cool for at least 15 minutes.
⑤ : When the rated operational voltage is DC24V the open voltage will be DC22V.

Features

★Installation and removal ease

Simply rotate two knobs allows the motor operator to be installed on or removed from the breaker.

★High-speed, stable actuation

The operating time as short as up to 0.1 second makes it possible to use the motor operators for synchronized closing of breakers.

★Silent operation

T2MC25L use a direct drive system, providing operational silence.

★"Lock-in off" capability

This capability allows the breaker to be padlocked in the OFF state.
Up to thee padlocks with a 5 to 8 mm hasp diameter can be used.
Padlocks are not supplied.

Motorized operation

The motor operator has an input-signal self-hold circuit; closing the ON or OFF switch (see circuit diagrams shown bellow) momentarily allows activating the motor operator. To reset the tripped breaker to the OFF position, close the OFF (RESET) switch.
The voltage presence LED indication is on when the power is supplied to the motor operator.

■ Auto reset feature (optional)

The auto reset feature allows the breaker to be automatically reset approx. 1.5 seconds after the breaker trips open. This option contains auto-reset switches and does not require to use auxiliary or alarm switches installed in the breaker.

Note : that after the thermal OCR trips a thermal-magnetic breaker, the breaker cannot be immediately closed though it can be auto-reset. Wait for a few minutes after the tripping and provide a close signal to the breaker.

This option resets the tripped breaker automatically, regardless of the cause of the tripping.

Manual operation

Pull the operating handle out. Rotating the handle counterclockwise turns ON the breaker and clockwise turns OFF or resets the breaker.

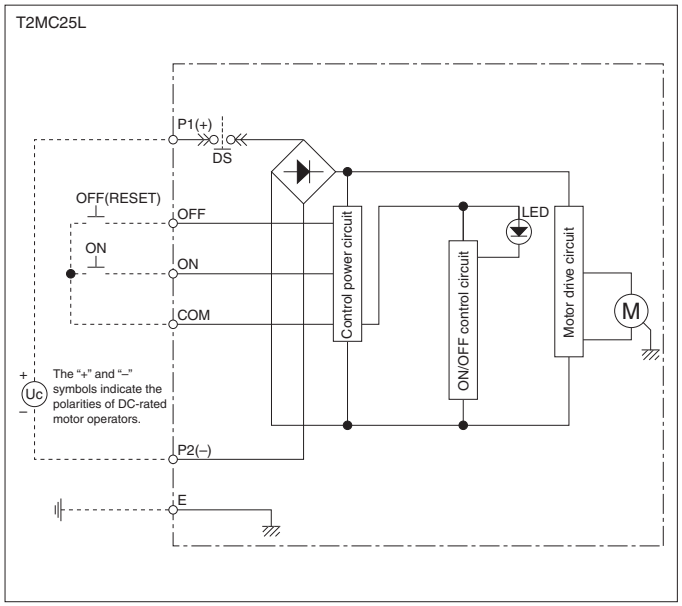
Operation precautions

1. Ensure that the actual operation voltage ranges from 85% to 110% of the rated one.
2. Use operation switches whose ratings and power capacity is as specified in the “Ratings and Specifications” table on the previous page.
3. Use noise filters if the control power supply of the motor operator is shared by peripheral devices. Otherwise, power supply noise may cause malfunction of the peripheral devices.
4. When the motors are used in conjunction with the mechanical interlock the electrical interlock should be provided between the motors in order to avoid the simultaneous closing. The followings are the available electrical interlock cables.

Interlock cables Order codes	Length	Remarks
T2MM25L05	500mm	for the electrical interlock between T2MC12 and T2MC25/25L.
T2MM25L15	1500mm	
T2MM40L06	600mm	for the electrical interlock between T2MC40 and T2MC80.
T2MM40L21	2100mm	
T2MM40S06	600mm	for the electrical interlock between T2MC40 and T2MC12/25/25L.
T2MM40S21	2100mm	

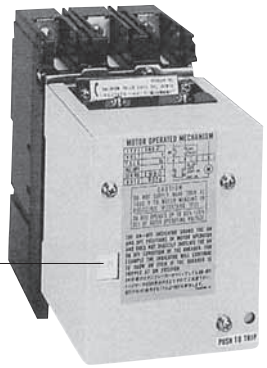
Control circuit diagrams of motor operators

T2MC25L



1. Motor operators (MC)

Motor driven type



(XMB1)

Ratings and Specifications

		XMB1
Series/type of breaker		E100-SF
Rated operational voltage ①		●AC100-110V ●AC200-220V ●DC100V ●DC110V
Auto reset		Optional ②
		Non
Peak steady-state/ starting current, A ③	AC100-110V	2.0/4.5
	AC200-220V	1.0/2.0
	DC100V	—⑥
	DC110V	—⑥
Operation method		Motor driven
Operating time, s at rated voltage	ON	1.2
	OFF/RESET	0.85 ④⑤
Operating switch ratings		250V, 5A
Power supply required		100 VA or higher
Dielectric withstand voltage (for one minute)		AC1000V
Weight		1.8

Notes:

① Ensure that the actual operation voltage is within the following range:85% to 110% of the AC rated voltage, or 75% to 110% of the DC rated voltage In case the rated operation voltage is AC 380 V or AC 400 to 460 V, optional power supply transformers are available on request.

② Auto reset require to use auxiliary switch (1b) installed in the breaker. If the number of auxiliary switches is insufficient, actuate an external relay via an auxiliary switch (1a) and use the relay contact (1b) for auto reset.

③ The currents shown are the maximum values at the maximum rated operational voltage.

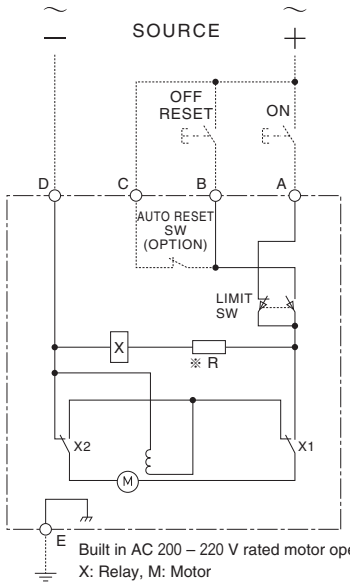
④ The operating time assume the motor operator is supplied with the rated operation voltage. Longer operating time will be required under actual operating conditions.

⑤ The motor operator is short-time rated. The number of continuous switching (ON-OFF) cycles must not exceed 10. After any 10 continuous switching cycles, provide a pause of at least 15 minutes to the motor operator for cooling.

⑥ Can be custom-made on request. The outline dimensions of the motor operator will be larger. An auto-reset switch cannot be used. Contact us for details.

Control circuit diagrams of motor operators

XMB1
• For AC and DC



Built in AC 200 – 220 V rated motor operators.
X: Relay, M: Motor

Motorized Operation

■ Breaker ON

Operating the ON switch energises the motor which turns ON the breaker. When the breaker is energised the limit switch operates to de-energise the motor.
Note: This is not a self-holding type. Gives a signal exceeding the operating time.

■ Breaker OFF

Operating the OFF/RESET s witch energises the motor which turns OFF the breaker. When the breaker is energised the limit switch operates to de-energise the motor.
Note: This is not a self holding type. Gives a signal exceeding the operating time.

■ Breaker RESET

Operate the OFF/RESET switch to reset the tripped breaker. When the breaker is reset (OFF) the limit switch operates to de-energise the motor.
Note: This is not a self holding type. Gives a signal exceeding the operating time.

Automatic Reset (Optional)

The automatic reset feature
can be incorporated by adding the breake's auxiliary switch contact (b-contact) in parallel with the OFF/RESET control switch.
Note: When the cause of the trip has not been removed the ON-TRIP-RESET-ON operation is repeated. Therefore, do not use the ON operation switch which is normally closed.

Manual Operation

To operate the mechanical test fa cility of the motor operator pump the manual lever left and right approximately 20 times.
Note: This facility must not be used for ON load operations.

Lock in OFF position

The breaker can be padloked in the OFF position. (padlock not supplied).

CAUTIONARY NOTES

If the motor operator is turned ON with the breaker OFF and the UVT de-energised, apply the power and complete one ON-OFF operation. (The breaker cannot be turned ON). Then complete one ON operation again (The breaker can be turned ON)

When the breaker is ON and is then tripped, the ON/OFF indicator on the motor operator will be indicating ON until the breaker is reset.
Note: The breaker's condition may differ.
Note: Allow several minutes to cool when a thermal-magnetic breaker is tripped by a thermal overload trip, then reset the breaker.

2. Toggle holder (HH) and toggle lock (HL)

Toggle holder (HH)

Simply fitting the toggle holder onto the breaker toggle disables breaker operation without using padlocks.

Toggle lock (HL)

The toggle lock is a tool that locks the breaker on or off. When an overcurrent occurs, the breaker will trip even if the breaker toggle is locked in the ON position.
(Use commercially available padlocks).

Toggle holders/toggle locks

Type of breaker	Toggle holder		Figure	Toggle lock		Figure
	Order codes	Marking codes		Order codes	Marking codes	
E100-SF	TKB-1DH	—	1	①	—	1
E160-SF, S160-SCF, S160-SF, S160-SCJ, S160-SJ, S160-SN **E250-SF, S250-SF, E250-SJ, S250-SJ, S250-SN**	T2HH25L	T2HH25L	2	T2HL25L	T2HL25L	3

Notes: ①. A hole must be drilled in the breaker toggle. Please state “with toggle lock (HL)” when ordering.

Fig. 1

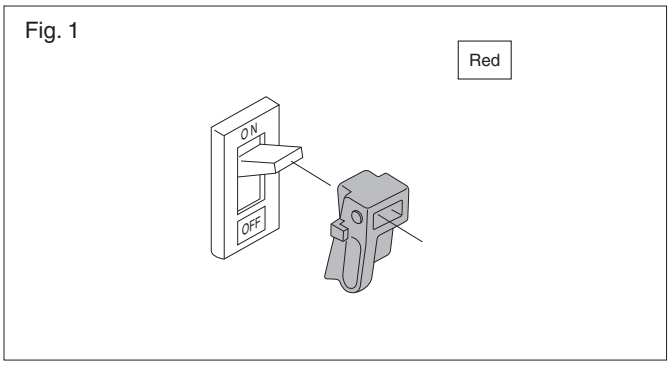


Fig. 2

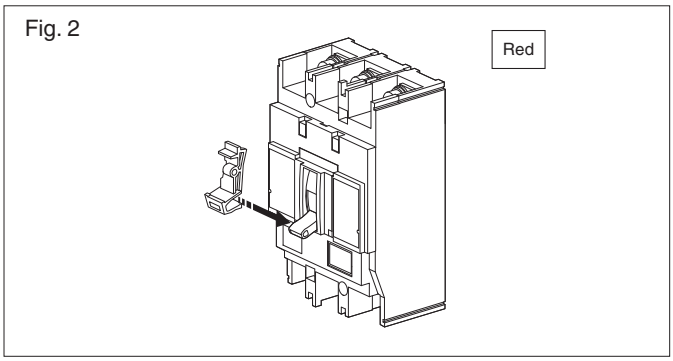
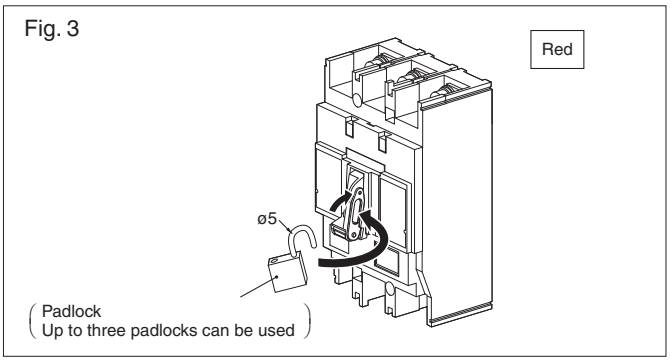


Fig. 3

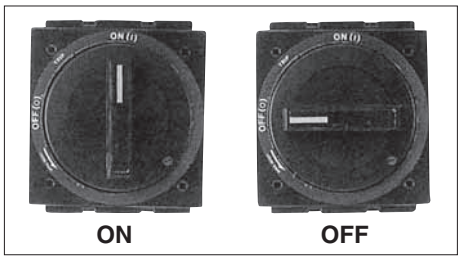


3. External operating handles

3-1. Breaker-mounted (HB) for E100

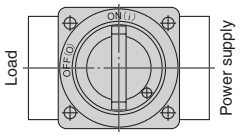
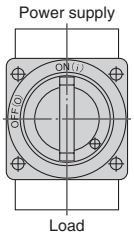
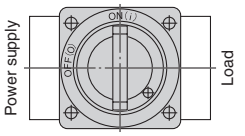
The external operating handle is a tool that allows the breaker installed in a switchboard to be operated from outside.
The breaker-mounted type external operating handle is designed to be mounted directly to the breaker body.

■ Outer view



■ Breaker mounting direction

The ON and OFF positions of the handle and the positions of drilled holes in the panel do not need to be changed depending on the breaker mounting direction. The upper power supply type is standard. If a non-standard type is required, state the type when ordering.

R : Right power supply type	U: Upper power supply type (standard)	L: Left power supply type
		

- For a change in mounting direction, see the Operating Instructions packaged with the product.

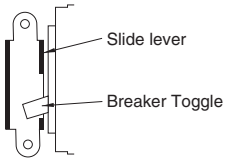
■ Mounting instructions

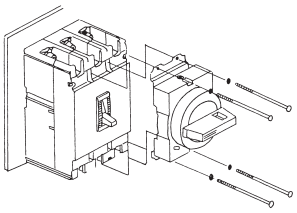
The external operating handle has not been mounted on the breakers.
For details on how to mount the handle, see the Operating Instructions packaged with the product.

[1] Mounting of external operating handle assembly

Secured to backing plate (TFJ21XH)

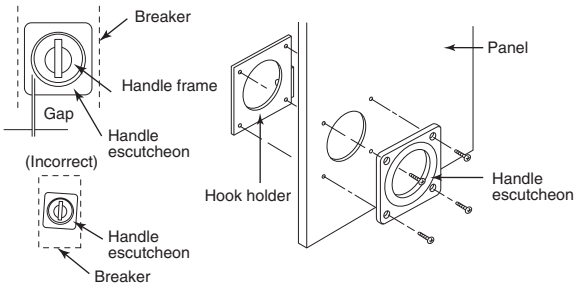
- Make sure that the breaker is in the OFF position.
- Put the external operating handle assembly onto the breaker in place so that the breaker toggle is engaged with the slide lever of the assembly. Secure the assembly together with the breaker to the backing plate.





[2] Installation of handle escutcheon and latch plate

- Drill holes in the panel according to the panel cutout dimensions. Sandwich the panel between the handle escutcheon and latch plate and temporarily tighten using the supplied screws.
- Close the panel.
  Make adjustment so that the gap between the handle assembly and handle escutcheon is even and the assembly is not inclined against the breaker.



■ Panel lock mechanism

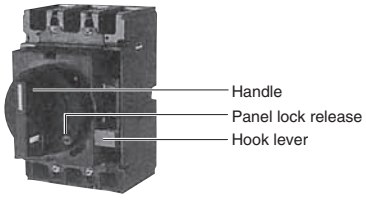
The external operating handle keeps the panel door locked when in the 'ON' position. There are two types, RESET, Open and OFF, Open.

(1) Reset, Open (Standard type)
The handle is turned to the 'RESET/OPEN COVER' position to open the panel door.

(2) OFF, Open
The handle is turned to the OFF position to open the panel door.

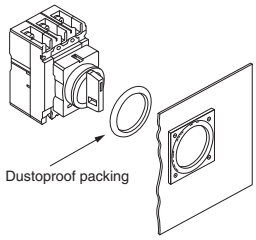
- Panel lock release knob
  The release knob enables the panel door to be opened with the handle in the 'ON' position. To release: turn the release knob in the direction of anti-clockwise with a flat-bladed screwdriver.

- Safety interlock (Standard)
  The safety interlock prevents the breaker from turning ON as long as the panel is open. This interlock can be released using the hook lever.



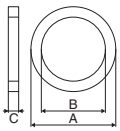
■ Protection degree (IEC 60529)

IP30	standard specification
IP50	optional, with a dust proof packing
IP55	special specification



Dustproof packing for IP50 (optional) mm

Type of handle	Type of dustproof packing	A	B	C
TFJ21XH	Dustproof packing /2	93	73	7



Possible combinations of breaker and external operating handle

Type of external operating handle	Type of breaker
TFJ21XH	**E100-SF**

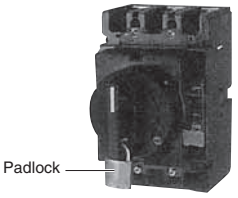
■ Toggle lock mechanism

● Padlock (Standard)

This mechanism allows the breaker to be padlocked in the ON or OFF position.
Padlocks are not supplied.
Up to three padlocks can be installed.

Padlock dimensions (mm)

Type of handle	A	Dia.
TFJ21XH	13 min	ø3.5-6



■ To be stated when ordering

Order code TFJ21XH U R 3 B

Type of external operating handle	Breaker mounting direction	Panel lock	Protection degree	Colour
TFJ21XH	U: Upper power supply type ✻ R: Right power supply type L: Left power supply type	R : RESET open ✻ F : OFF open	3 : IP30 ✻ 5 : IP50 55 : IP55 (special spec.)	B : Black handle (Black base) ✻ R : Red handle (Yellow base)

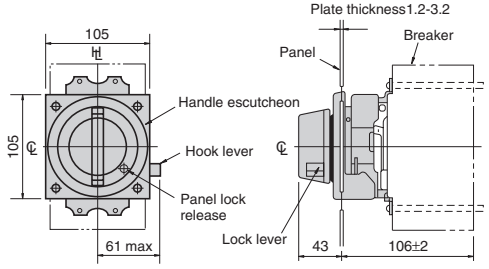
✻: standard specification

ASL: Arrangement Standard Line
H: Handle Frame Centre Line
℄: Handle Centre Line

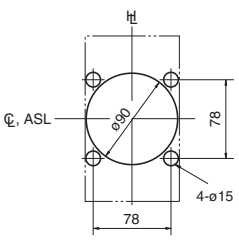
TFJ21XH

Applicable breaker types	Mounting screw
E100-SF	**M4×75, 2 pcs**

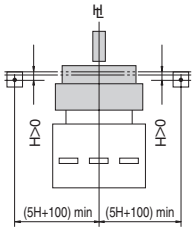
● Outline dimensions



● Panel cutout dimensions



● Relative positions of the hinge and handle as seen from the load side of the breaker

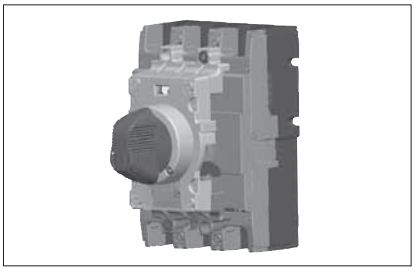


3. External operating handles

3-2. Breaker-mounted (field installable) (HB) for S160, E250, S250

The external operating handle is a tool that allows the breaker installed in a switchboard to be operated from outside and complies with IEC 60204-1.
The breaker-mounted type external operating handle is designed to be mounted directly to the breaker body.

■ Outer view

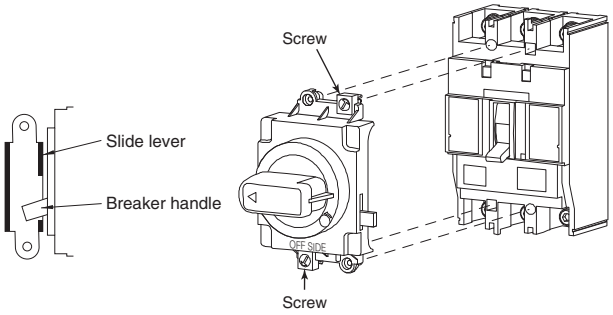


■ Mounting instructions

The external operating handle has not been mounted on the breakers.
For details on how to mount the handle, see the Operating Instructions packaged with the product.

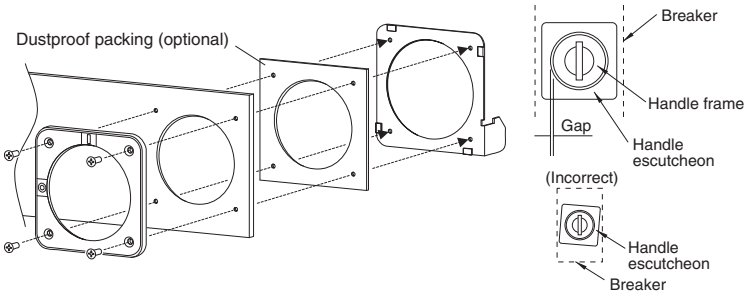
[1] Mounting of external operating handle assembly

- Make sure that the breaker is in the OFF position.
- Put the external operating handle assembly onto the breaker in place so that the breaker handle is engaged with the handle catch of the assembly.
  Tighten the screw to secure the handle assembly.



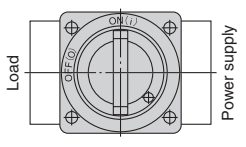
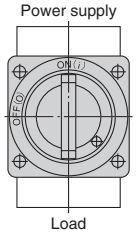
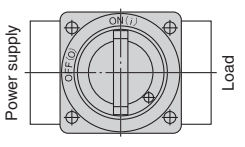
[2] Installation of handle escutcheon and latch plate

- Drill holes in the panel according to the panel cutout dimensions.
  Sandwich the panel between the handle escutcheon and latch plate and temporarily tighten using the supplied screws.
- Close the panel.
  Make adjustment so that the gap between the handle assembly and handle escutcheon is even and the assembly is not inclined against the breaker.



■ Breaker mounting direction

The ON and OFF positions of the handle and the positions of drilled holes in the panel do not need to be changed depending on the breaker mounting direction. The upper power supply type is standard. If a non-standard type is required, state the type when ordering.

R : Right power supply type	U: Upper power supply type (standard)	L: Left power supply type
		

- For a change in mounting direction, see the Operating Instructions packaged with the product.

■ Panel lock mechanism

The external operating handle keeps the panel door locked when in the 'ON' position. There are two types, RESET, Open and OFF, Open.

(1) Reset, Open (Standard type)
The handle is turned to the 'RESET/OPEN COVER' position to open the panel door.

(2) OFF, Open
The handle is turned to the OFF position to open the panel door.

- Panel lock release knob
  The release knob enables the panel door to be opened with the handle in the 'ON' position. To release: turn the release knob in the direction of anti-clockwise with a flat-bladed screwdriver.

- Safety interlock (Standard)
  The safety interlock prevents the breaker from turning ON as long as the panel is open. This interlock can be released using the hook lever.

■ Toggle lock mechanism

- Padlock (Standard)
  This mechanism allows the breaker to be padlocked in the OFF position.
  Padlocks are not supplied.
  Up to three padlocks can be installed.

Padlock dimensions (mm)

Type of handle	A	Dia.
T2HB	13 min	ø5.5-8

■ Protection degree (IEC 60529)

IP30	standard specification
IP50	optional, with a dust proof packing
IP55	special specification

Possible combinations of breaker and external operating handle

TemBreak2

Type of breaker	Type of external operating handle
S160-SCF, S160-SF, S160-SCJ, S160-SJ, S160-SN	T2HB16L ①
E250-SF, S250-SF, E250-SJ, S250-SJ, S250-SN	T2HB25L ①

Note ① : Key lock is not available.

■ To be stated when ordering

Order code T2HB16L U R 3 B N

Type of external operating handle	Breaker mounting direction	Panel lock	Protection degree	Colour	Key lock
T2HB16L T2HB25L	U: Upper power supply type ✻ R: Right power supply type L: Left power supply type	R : RESET open ✻ F : OFF open	3 : IP30 ✻ 5 : IP50 S : IP55 (special spec.)	B : Black handle (Black base) ✻ R : Red handle (Yellow base)	N : without key lock ✻

✻: standard specification

3. External operating handles

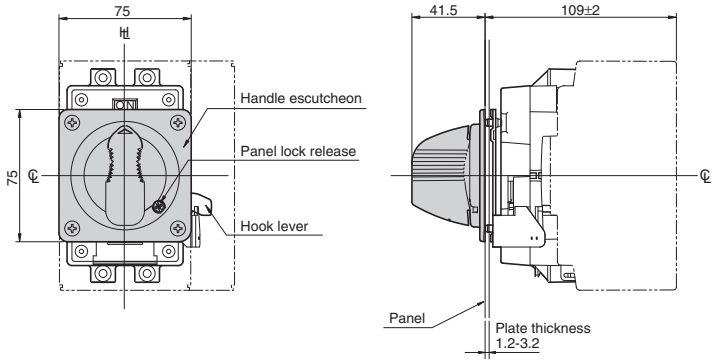
ASL: Arrangement Standard Line
H: Handle Frame Centre Line
℄: Handle Centre Line

■ Outline dimensions

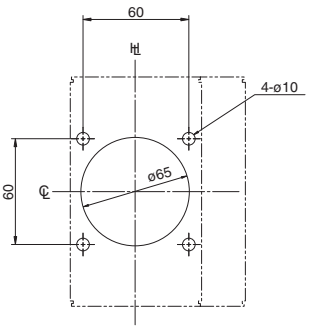
T2HB16L

Applicable breaker types		
S160-SCF	S160-SF	S160-SCJ
S160-SJ	S160-SN	

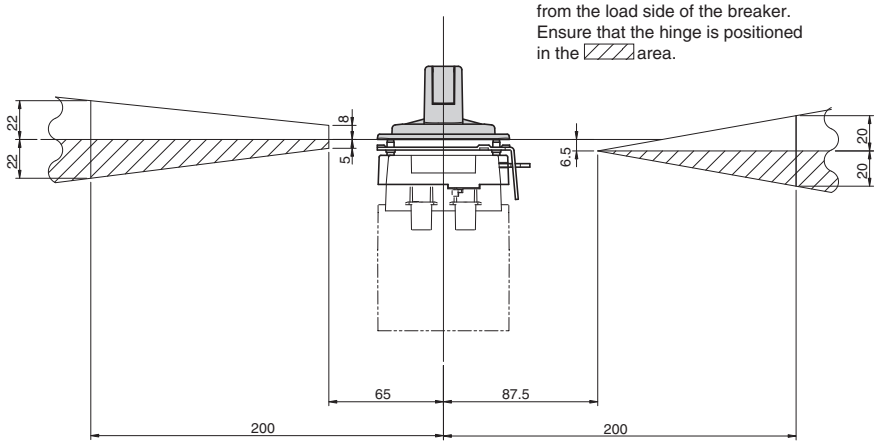
● Outline dimensions



● Panel cutout dimensions



• Positions of the hinge and handle as seen from the load side of the breaker. Ensure that the hinge is positioned in the ▨ area.

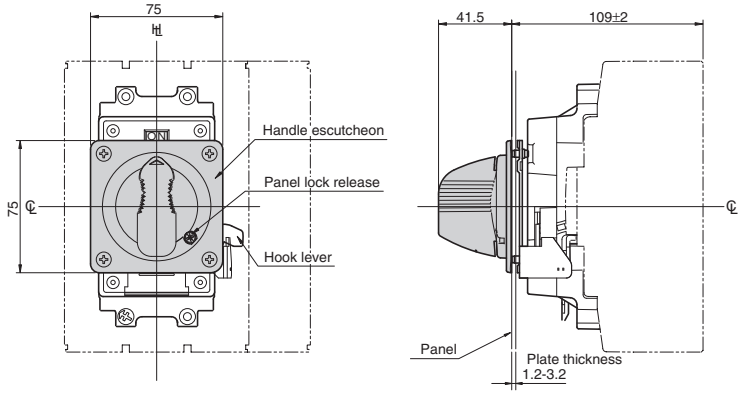


ASL: Arrangement Standard Line
HL: Handle Frame Centre Line
℄: Handle Centre Line

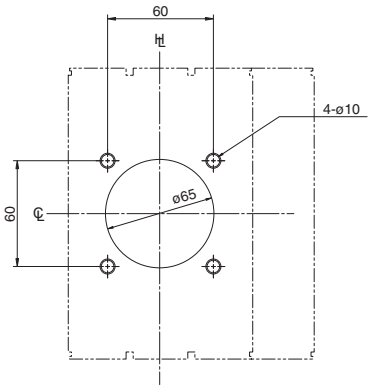
T2HB25L

Applicable breaker types		
E250-SF	S250-SF	E250-SJ
S250-SJ	S250-SN	

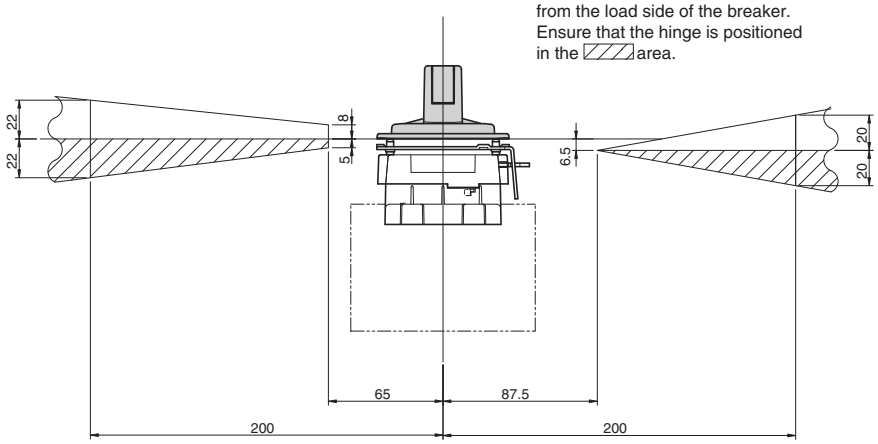
● Outline dimensions



● Panel cutout dimensions



• Positions of the hinge and handle as seen from the load side of the breaker. Ensure that the hinge is positioned in the ▨ area.

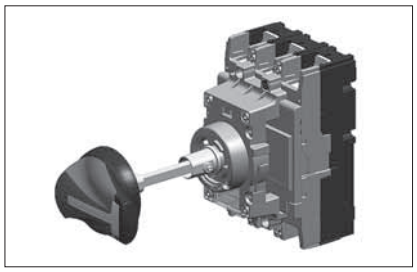


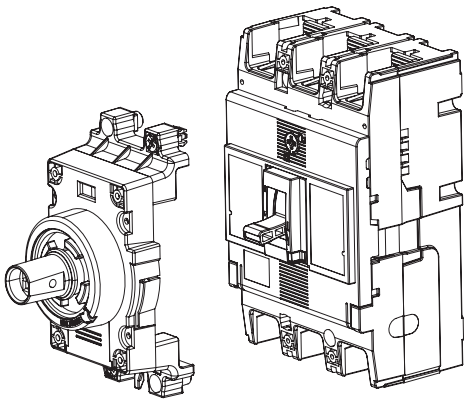
3. External operating handles

3-3. Door-mounted (depth adjustable) (HS) standard type

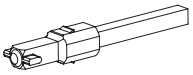
Door-mounted type external operating handles allow breakers installed in control centers or switchboards to be manually operated from outside and complies with IEC 60204-1.
This handle assembly consists of an operation mechanism section which is to be installed in the breaker body, a handle section which is to be installed in a panel and a square shaft which couples both the sections.

■ Outer view

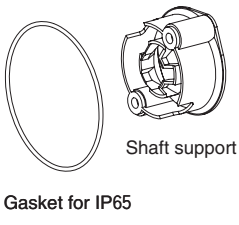




Operating unit



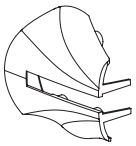
Square shaft



Shaft support

Gasket for IP65

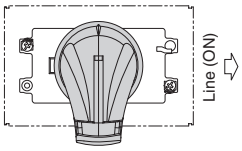
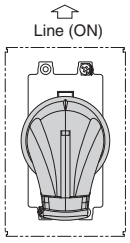
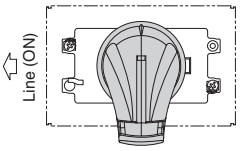
Operating handle



Handle cover

■ Breaker mounting direction

The ON and OFF positions of the handle and the positions of drilled holes in the panel do not need to be changed depending on the breaker mounting direction.

Horizontal mounting / ON to move the breaker handle right	Vertical mounting / ON to move the breaker handle up	Horizontal mounting / ON to move the breaker handle left
		

■ Operation direction of handles

Rotate the operating handle clockwise to turn the breaker on.

Type T1HS10X, T2HS25L

Type T2HS16LS00

Rotate clockwise to turn the breaker ON

■ Panel lock mechanism

The external operating handle keeps the panel door locked when in the 'ON' position. There is OFF open type only.

OFF open type

The handle is turned to the OFF position to open the panel door.

- Panel lock release button

  The release button enables the panel door to be opened with the handle in the 'ON' position. To release: push the release button on the side of the operating handle with a flat-bladed screwdriver.

Type T1HS10X, T2HS25L

Type T2HS16LS00

■ Protection degree (IEC 60529)

IP55	standard specification
IP65	special specification ✻

✻: Special handle unit and gasket are used for IP65.

Possible combinations of breaker and external operating handle

Type of breaker	Type of external operating handle	Shafts order codes
E100-SF	T1HS10X	T2PS083
S160-SCF, S160-SF, S160-SCJ, S160-SJ, S160-SN	T2HS16LS00	T2PS053
E250-SF, S250-SF, E250-SJ, S250-SJ, S250-SN	T2HS25L	T2PS083

■ Toggle lock mechanism

- Padlock (Standard)

  This mechanism allows the breaker to be padlocked in the OFF position.
  Padlocks are not supplied.
  Up to three padlocks can be installed.

Padlock dimensions (mm)

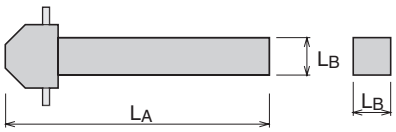
Type of handle	A	Dia.
T2HS16L/25L	13 min	ø5-8

Type T1HS10X, T2HS25L

Type T2HS16LS00

■ Dimensions of square shafts available

There are the following shaft dimensions available. Select an appropriate shaft depending on the mounting position of the breaker. Cut the shaft to an appropriate length if required. Coat the cut end faces of the shaft with an anti-corrosion paint.



Shafts order codes	LA (mm)	LB (mm)
T2PS083	358	8
T2PS053	352.5	5

■ Shaft support (optional)

The shaft support makes easy to insert to the operating handle when the panel door is being closed.

■ Key fitting facility (optional)

Key fitting facility is available for Castell FS1. Contact us for the details of mounting dimension.

■ To be stated when ordering

Order code T2HS25L F 5 B P N

Type of external operating handle	Panel lock	Protection degree	Colour	Pad locking lever	Optional
T1HS10X T2HS16LS00 T2HS25L	F : OFF open	5 : IP55 ✻ 6 : IP65 ①	B : Gray handle (Black base) ✻ R : Red handle (Yellow base)	P : Plastic M : Metal ②	N : No option S : With shaft support

✻: standard specification
Note ①: T1HS10X is not available for IP65.
Note ②: Metal is not available for T2HS16S00.

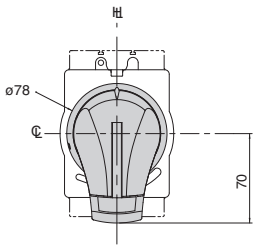
3. External operating handles

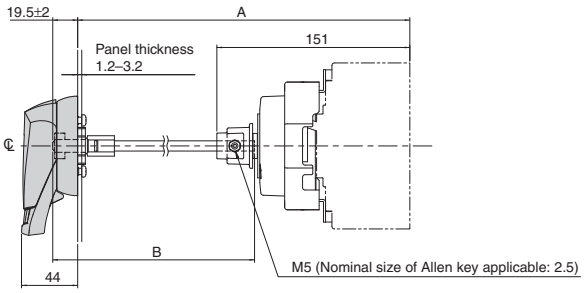
℄: Handle Frame Centre Line
℄: Handle Centre Line

■ Outline dimensions

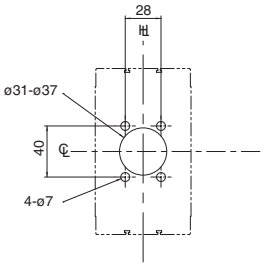
T1HS10X

● Outline dimensions

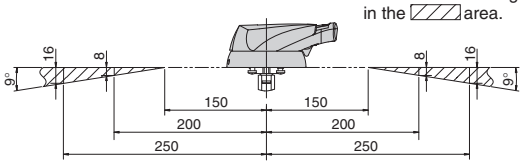




● Panel cutout dimensions



• Positions of the hinge and handle as seen from the load side of the breaker. Ensure that the hinge is positioned in the ▨ area.



Applicable breaker types	A±2 ①	B±0.5
E100-SF	182 min.	80
	460 max.	358

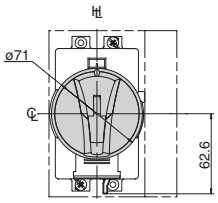
Note ①:
"Min (minimum)" means the minimum possible distance from the panel surface to the breaker mounting surface, which can be formed by cutting the square shaft.
"Max (maximum)" means the maximum distance of the same section, which is formed with no cutting of the square shaft.
A: Distance from the panel surface to the breaker mounting surface
B: Length of the square shaft used

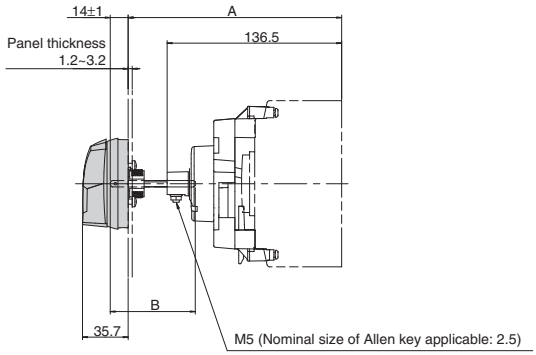
■ Outline dimensions

H: Handle Frame Centre Line
℄: Handle Centre Line

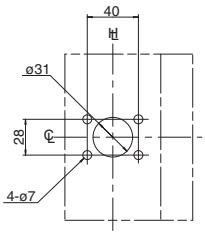
T2HS16LS00

● Outline dimensions

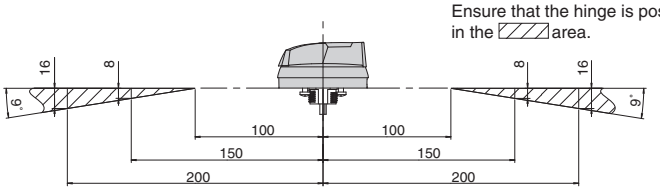




● Panel cutout dimensions



• Positions of the hinge and handle as seen from the load side of the breaker. Ensure that the hinge is positioned in the ▨ area.



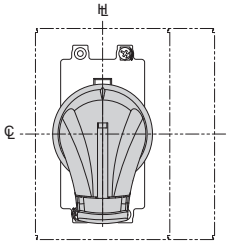
Applicable breaker types			A±1 ①	B±0.5
S160-SCF	S160-SF	S160-SCJ	175 min.	74.5
S160-SJ	S160-SN		453 max.	352.5

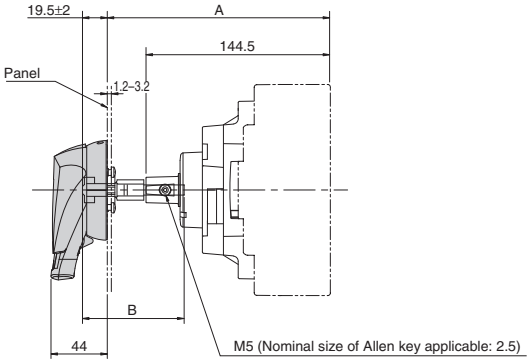
Note ①:
"Min (minimum)" means the minimum possible distance from the panel surface to the breaker mounting surface, which can be formed by cutting the square shaft.
"Max (maximum)" means the maximum distance of the same section, which is formed with no cutting of the square shaft.
A: Distance from the panel surface to the breaker mounting surface
B: Length of the square shaft used

■ Outline dimensions

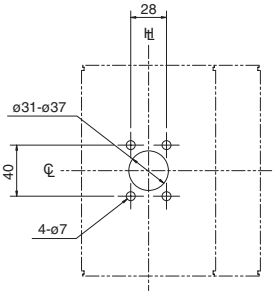
T2HS25L

● Outline dimensions

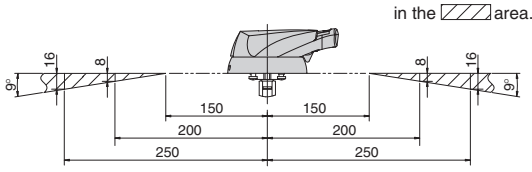




● Panel cutout dimensions



• Positions of the hinge and handle as seen from the load side of the breaker. Ensure that the hinge is positioned in the ▨ area.



Applicable breaker types			A±2 ①	B±0.5
E250-SF	S250-SF	E250-SJ	175 min.	80
S250-SJ	S250-SN		453 max.	358

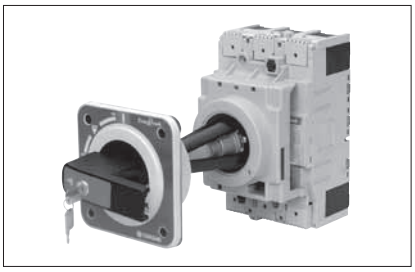
Note ①:
"Min (minimum)" means the minimum possible distance from the panel surface to the breaker mounting surface, which can be formed by cutting the square shaft.
"Max (maximum)" means the maximum distance of the same section, which is formed with no cutting of the square shaft.
A: Distance from the panel surface to the breaker mounting surface
B: Length of the square shaft used

3. External operating handles

3-4. Door-mounted (depth adjustable) (HP) ordinal type

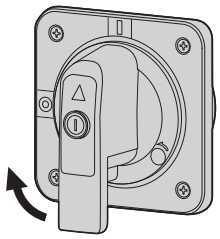
Door-mounted type external operating handles allow breakers installed in control centers or switchboards to be manually operated from outside and complies with IEC 60204-1.
This handle assembly consists of an operation mechanism section which is to be installed in the breaker body, a handle section which is to be installed in a panel and a square shaft which couples both the sections.

■ Outer view



■ Operation direction of handles

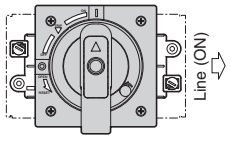
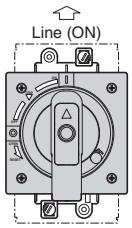
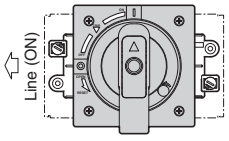
Rotate the operating handle clockwise to turn the breaker on.



Rotate clockwise
to turn the breaker ON

■ Breaker mounting direction

The ON and OFF positions of the handle and the positions of drilled holes in the panel do not need to be changed depending on the breaker mounting direction.

Horizontal mounting / ON to move the breaker handle right	Vertical mounting / ON to move the breaker handle up	Horizontal mounting / ON to move the breaker handle left
		

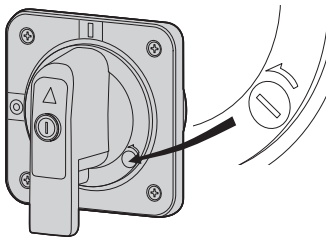
■ Panel lock mechanism

The external operating handle keeps the panel door locked when in the 'ON' position. There are two types, RESET, Open and OFF, Open.

(1) Reset, Open (Standard type)
The handle is turned to the 'RESET/OPEN COVER' position to open the panel door.

(2) OFF, Open
The handle is turned to the OFF position to open the panel door.

- Panel lock release knob
  The release knob enables the panel door to be opened with the handle in the 'ON' position. To release: turn the release knob in the direction of anti-clockwise with a flat-bladed screwdriver.



■ Protection degree (IEC 60529)

IP54	standard specification
IP65	special specification

■ Toggle lock mechanism

- Padlock (Standard)
  This mechanism allows the breaker to be padlocked in the OFF position.
  Padlocks are not supplied.
  Up to three padlocks can be installed.

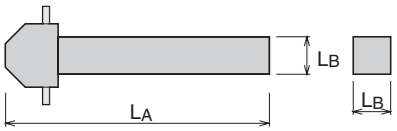
Padlock dimensions (mm)

Type of handle	A	Dia.
T2HP	13 min	ø5.5-8

- Key lock (Optional)
  Key locking is possible in the OFF position.

■ Dimensions of square shafts available

There are the following shaft dimensions available. Select an appropriate shaft depending on the mounting position of the breaker. Cut the shaft to an appropriate length if required. Coat the cut end faces of the shaft with an anti-corrosion paint.



Shafts order codes	LA (mm)	LB (mm)
T2PS251	121	8
T2PS252	221	
T2PS253	321	
T2PS254	421	

■ To be stated when ordering

Order code T2HP16L R 5 B N

Type of external operating handle	Panel lock	Protection degree	Colour	Key lock
T1HP10X T2HP16L T2HP25L	R : RESET open ✻ F : OFF open	5 : IP54 ✻ 6 : IP65	B : Black handle (Black base) ✻ R : Red handle (Yellow base)	K : with key lock N : without key lock ✻

✻: standard specification

Possible combinations of breaker and external operating handle

Type of breaker	Type of external operating handle
E100-SF	T1HP10X
S160-SCF, S160-SF, S160-SCJ, S160-SJ, S160-SN	T2HP16L
E250-SF, S250-SF, E250-SJ, S250-SJ, S250-SN	T2HP25L

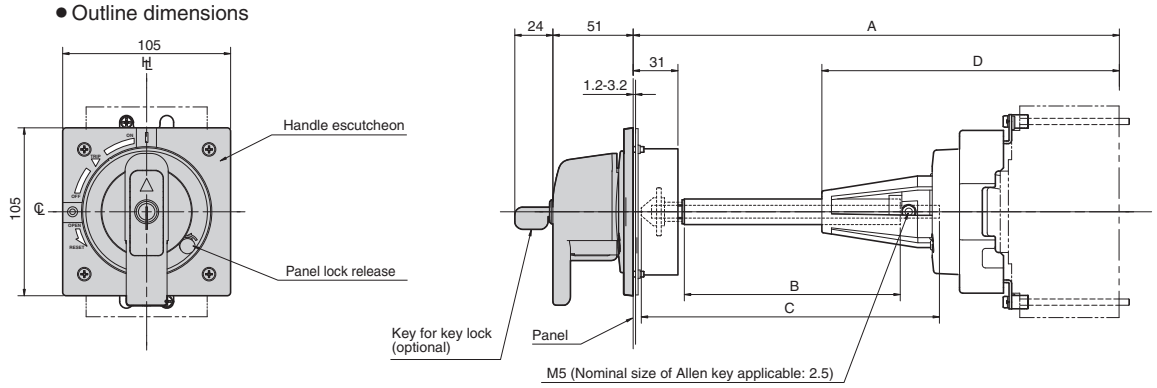
3. External operating handles

ASL: Arrangement Standard Line
HL: Handle Frame Centre Line
CL: Handle Centre Line

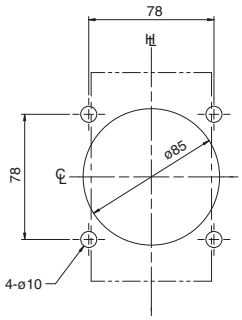
■ Outline dimensions

T1HP10X

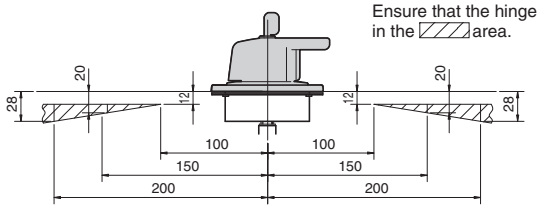
● Outline dimensions



● Panel cutout dimensions



• Positions of the hinge and handle as seen from the load side of the breaker. Ensure that the hinge is positioned in the ▨ area.



Applicable breaker types	A ①	B	C	D	Square shaft applicable	Shaft support
E100-SF	236min.	56	107	194	T2PS251	Yes
	250max.	70	121	194		Yes
	350max.	170	221	194	T2PS252	Yes
	450max.	270	321	194	T2PS253	Yes
	550max.	370	421	194	T2PS254	Yes

Note ①:
"Min (minimum)" means the minimum possible distance from the panel surface to the breaker mounting surface, which can be formed by cutting the square shaft.
"Max (maximum)" means the maximum distance of the same section, which is formed with no cutting of the square shaft.

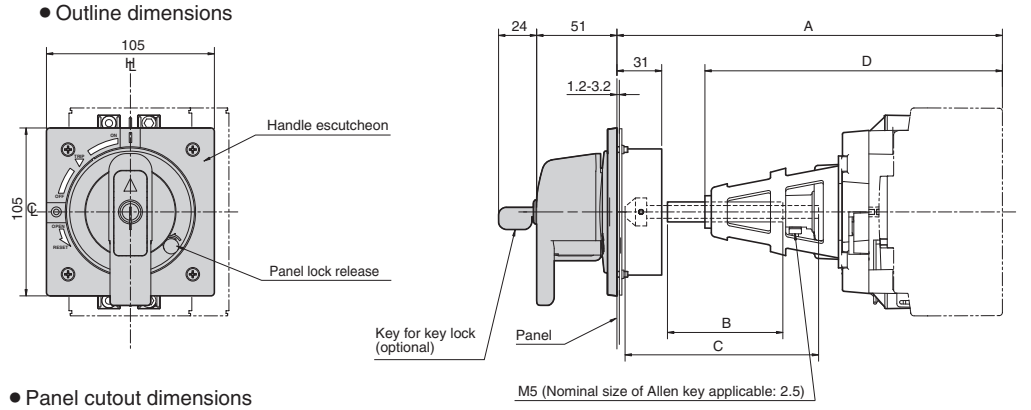
A: Distance from the panel surface to the breaker mounting surface
B: Length of the tube used to cover the square shaft
C: Length of the square shaft used
D: Distance from the tip of the shaft support to the breaker mounting surface

ASL: Arrangement Standard Line
⊢: Handle Frame Centre Line
℄: Handle Centre Line

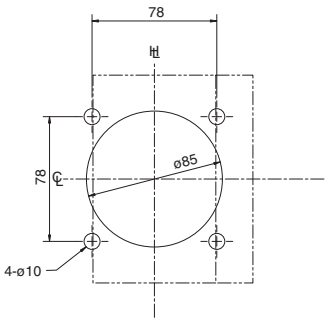
■ Outline dimensions

T2HP16L

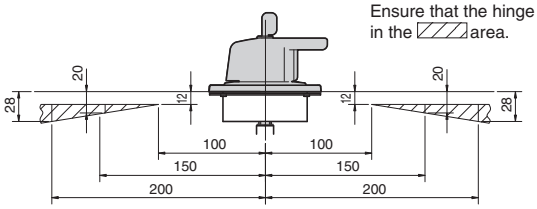
● Outline dimensions



● Panel cutout dimensions



• Positions of the hinge and handle as seen from the load side of the breaker. Ensure that the hinge is positioned in the ▨ area.



Applicable breaker types			A ①	B	C	D	Square shaft applicable	Shaft support
S160-SCF	**S160-SF**	**S160-SCJ**	229 min.	56	107	186	T2PS251	Yes
S160-SJ	**S160-SN**		243 max.	70	121	186		Yes
			343 max.	170	221	186	T2PS252	Yes
			443 max.	270	321	186	T2PS253	Yes
			543 max.	370	421	186	T2PS254	

Note ①:
"Min (minimum)" means the minimum possible distance from the panel surface to the breaker mounting surface, which can be formed by cutting the square shaft.
"Max (maximum)" means the maximum distance of the same section, which is formed with no cutting of the square shaft.

A: Distance from the panel surface to the breaker mounting surface
B: Length of the tube used to cover the square shaft
C: Length of the square shaft used
D: Distance from the tip of the shaft support to the breaker mounting surface

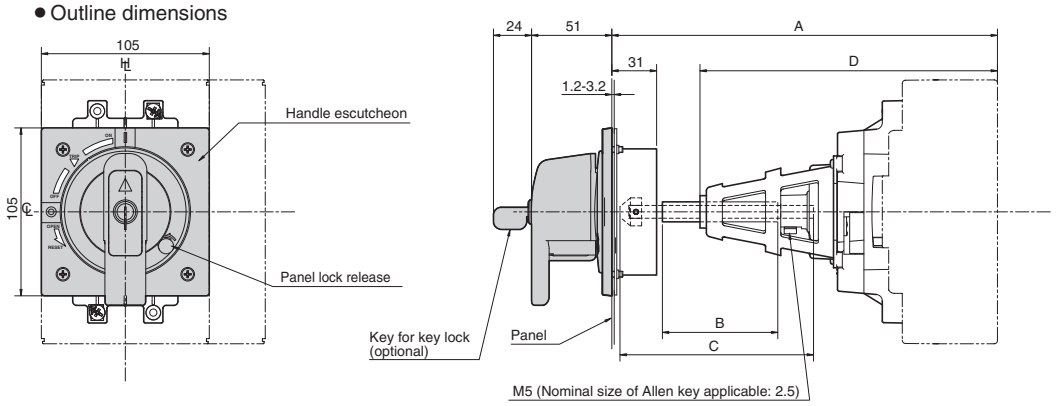
3. External operating handles

ASL: Arrangement Standard Line
⊩: Handle Frame Centre Line
℄: Handle Centre Line

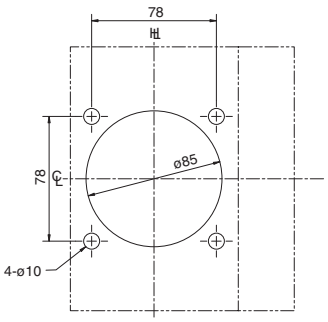
■ Outline dimensions

T2HP25L

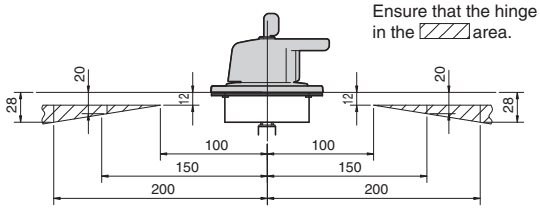
● Outline dimensions



● Panel cutout dimensions



• Positions of the hinge and handle as seen from the load side of the breaker. Ensure that the hinge is positioned in the ▨ area.



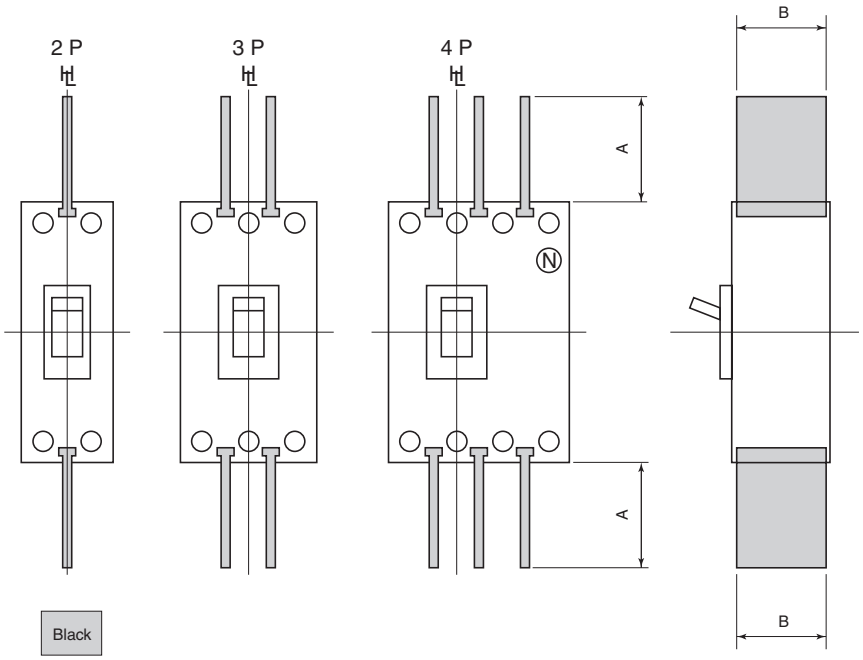
Applicable breaker types			A ①	B	C	D	Square shaft applicable	Shaft support
E250-SF	**S250-SF**	**E250-SJ**	229 min.	56	107	186	T2PS251	Yes
S250-SJ	**S250-SN**		243 max.	70	121	186		Yes
			343 max.	170	221	186	T2PS252	Yes
			443 max.	270	321	186	T2PS253	Yes
			543 max.	370	421	186	T2PS254	

Note ①:
"Min (minimum)" means the minimum possible distance from the panel surface to the breaker mounting surface, which can be formed by cutting the square shaft.
"Max (maximum)" means the maximum distance of the same section, which is formed with no cutting of the square shaft.

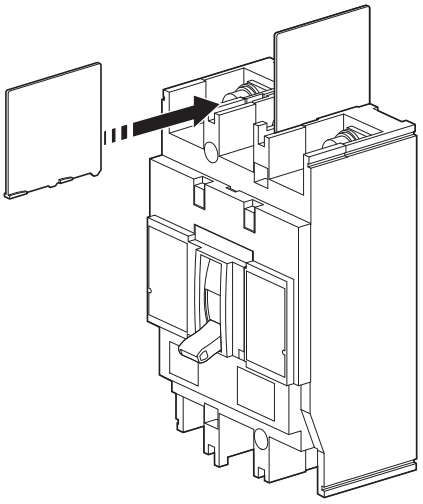
A: Distance from the panel surface to the breaker mounting surface
B: Length of the tube used to cover the square shaft
C: Length of the square shaft used
D: Distance from the tip of the shaft support to the breaker mounting surface

4. Interpole barriers (BA)

Interpole barriers serve to enhance electrical insulation between poles and prevent short-circuit due to electrically conductive foreign matter. Combined use of interpole barriers and terminal covers (standard type) is not possible.



• Slide interpole barriers into the grooves located on the breaker.



■ To be stated when ordering
Please state the type when ordering. One set contains two barriers.
Caution: Be sure to use the interpole barriers supplied with the breaker in order to prevent accidents.

Types and dimensions of interpole barriers, units in mm

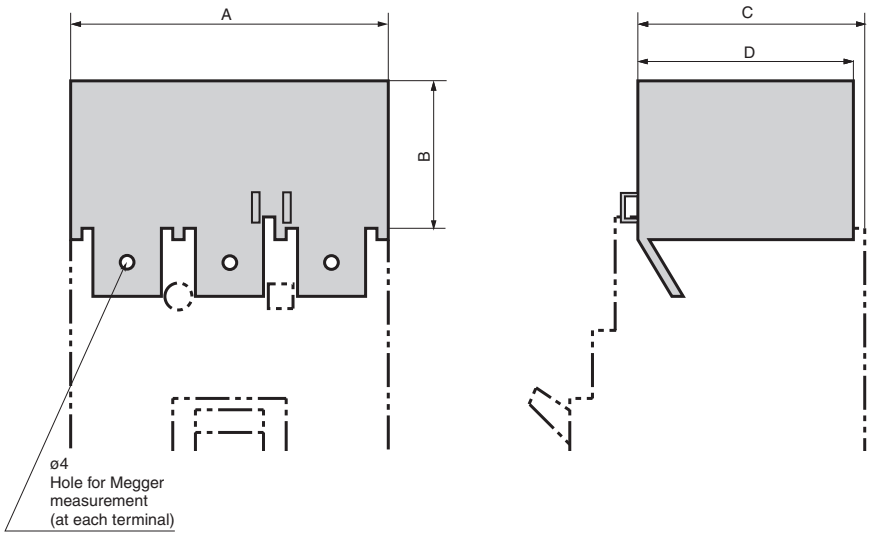
Types of breakers	Interpole barrier		A	B
	Type	Code		
E100-SF	TQQ-2CC	—	36	50
S160-SCF, S160-SF, S160-SCJ S160-SJ, S160-SN ①	T2BA16L3SH	—	50	55
E250-SF, S250-SF, E250-SJ S250-SJ, S250-SN ①	T2BA25L3SH	T2BA25LS	101	53

Note ①**:** Line side interpole barriers are supplied as standard for front connected breakers.

5. Terminal covers CF/CR/CS

Terminal covers prevent live parts of the breaker from being exposed to the external environment. There are three types of terminal covers available: CF for front-connected breakers, CR for rear-connected and plug-in breakers, and CS for front-connected breakers with cable clamps. Select appropriate terminal covers depending on the type and application of the breaker.

(1) CF for front-connected breakers



Plug-in mounted version

This version can be mounted simply by being plugged in the breaker body.

■ To be stated when ordering
• Please state the order codes in the table below. One set includes one terminal cover for the ON side and one for the OFF side.

Types and dimensions of terminal covers, units in mm

CF for front-connected breakers

Types of breakers	Terminal cover				A			B		C		D		Colour of cover G:Gray C':Clear	Mounting version	
	Size	Note:	Order codes ①	Marking codes	2 poles	3 poles	4 poles	2/3 poles	4 poles	2/3 poles	4 poles	2/3 poles	4 poles		Plug-in mounted	Screw-mounted
E100-SF	Large		XPR1 ∗ G	—	49	74	—	30	—	63	—	54	—	G	○	—
			XPR1 ∗ C											C'		
	Small		TPT1 ∗ G	—	49	74	—	2	—	63	—	54	—	G		
			TPT1 ∗ C											C'		
S160-SF, S160-SCJ S160-SJ, S160-SN	Large		T2CF16L ∗ SLNG	—	—	75	100	50	50	61	61	60.3	60.3	G	○	—
			T2CF16L ∗ SLNC											C'		
	Small		T2CF16L ∗ SSNG	—	—	75	100	25	25	61	61	60.3	60.3	G		
			T2CF16L ∗ SSNC											C'		
S160-SCF	Large		T2CF16L ∗ SLNG	—	50	75	100	50	50	61	61	60.3	60.3	G	○	—
			T2CF16L ∗ SLNC											C'		
	Small		T2CF16L ∗ SSNG	—	50	75	100	25	25	61	61	60.3	60.3	G		
			T2CF16L ∗ SSNC											C'		
E250-SF, S250-SF E250-SJ, S250-SJ, S250-SN	Small		T2CF25L ∗ SSNG	T2CF25L ∗ SS	105	105	140	29	29	59	59	57.5	57.5	G	○	—
			T2CF25L ∗ SSNC											C'		
	Large	②	T2CF25L ∗ SWNG	T2CF25L ∗ SW	147.5	147.5	196	55	55	59	59	57.5	57.5	G		
			T2CF25L ∗ SWNC											C'		
	Large		T2CF25L ∗ SLNG	T2CF25L ∗ SL	105	105	140	55	55	59	59	57.5	57.5	G		
			T2CF25L ∗ SLNC											C'		

Notes:
①. The asterisk indicates the number of poles. Please state the number of poles at the asterisk position when ordering.
②. Applicable to 3-pole breakers with spread extension bars.

(2) CR for rear-connected
CS for front-connected breakers with cable clamps

Fig.1

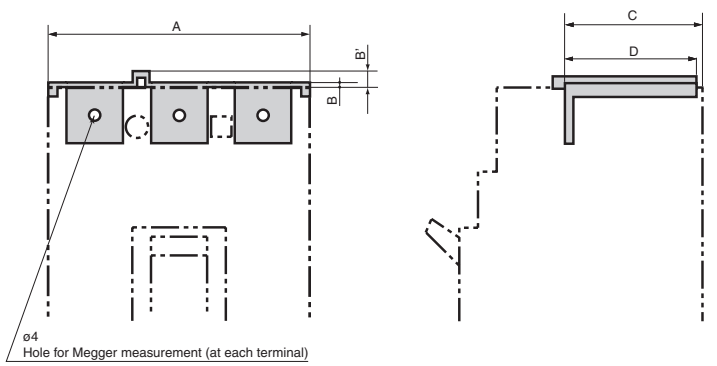
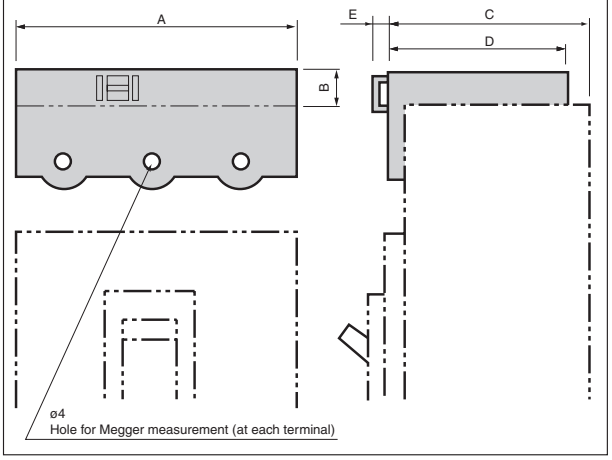


Fig.2



■ To be stated when ordering
- Please state "with CR" if ordering along with the breaker.
- Please state the order codes in the table below if ordering separately from the breaker. One set includes one terminal cover for the ON side and one for the OFF side.

Plug-in mounted version

This version can be mounted simply by being plugged in the breaker body.

Types and dimensions of terminal covers, units in mm

CR for rear-connected

Types of breakers	Terminal cover		A			B		B'	C		D		Colour of cover G: Gray	Figure
	Order codes ①	Marking codes	2 poles	3 poles	4 poles	2/3 poles	4 poles		2/3 poles	4 poles	2/3 poles	4 poles		
S160-SF, S160-SCJ, S160-SJ S160-SN	T2CR12L＊SG	—	—	75	100	5.5	5	—	61	61	60.3	60.3	G	1
S160-SCF	T2CR12L＊SG	—	50	75	100	5.5	5	—	61	61	60.3	60.3	G	1
E250-SF, S250-SF, E250-SJ S250-SJ, S250-SN	T2CR25L＊SG	T2CR25L	105	105	140	2.3	2.3	5.3	58.6	58.6	57.1	57.1	G	1

Types of breakers	Terminal cover		A			B		E (To screw head)	C		D		Colour of cover G: Gray	Figure
	Order codes ①	Marking codes	2 poles	3 poles	4 poles	2/3 poles	4 poles		2/3 poles	4 poles	2/3 poles	4 poles		
E100-SF	XPS1＊G	—	49	74	—	10	—	2.5	63	—	54	—	G	2

Notes:
①. The asterisk indicates the number of poles. Please state the number of poles at the asterisk position when ordering. One set includes one terminal cover fot the ON side and one for the OFF side.

CS for front-connected breakers with cable clamps

Types of breakers	Terminal cover		A		B	B'	C	D	Colour of cover G: Gray	Figure
	Order codes ①	Marking codes	3 poles	4 poles						
S160-SCJ, S160-SJ, S160-SN	T2CS12L＊SG	T2CS12L＊S	75	100	5.5	—	61	60.3	G	1
E250-SF, S250-SF, E250-SJ S250-SJ, S250-SN	T2CS25L＊SG	T2CS25L＊S	105	140	2.3	5.3	58.6	57.1	G	1

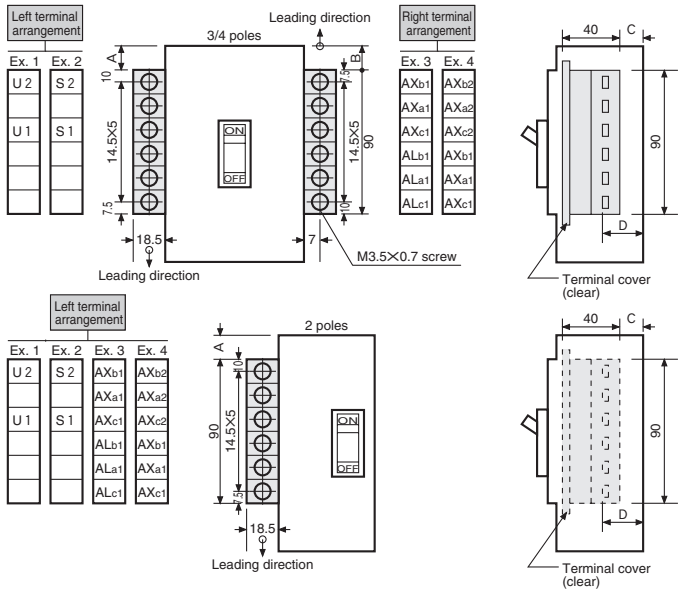
Notes:
①. The asterisk indicates the number of poles. Please state the number of poles at the asterisk position when ordering. One set includes one terminal cover fot the ON side and one for the OFF side.

6. Terminal blocks (TF)

6 terminals

Vertical leading type with 100A frame

Mounting position/typical terminal arrangement



Dimensions, mm

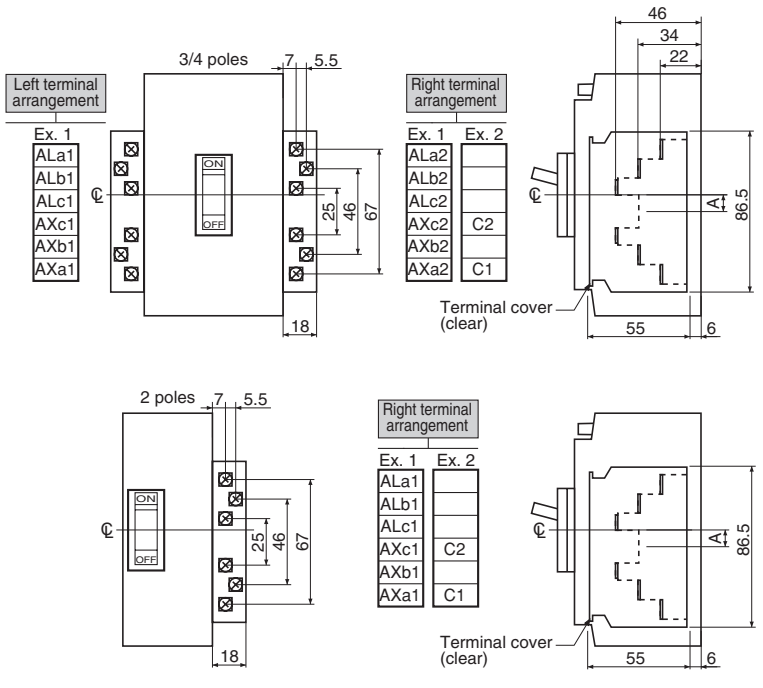
Frame size (A)	Types of breakers	A	B	C	D
100	**E100-SF** ①	16.5	16.5	21	36

Notes:
①: Terminal block cannot be mounted on the breaker which is equipped with the motor operator.
1) Tightening torque of M3.5 terminal screws: 0.9 – 1.2 N·m
2) Applicable wire size: 1.25mm² max (Vinyl-coated wire)

6 terminals

Vertical leading type with 160A frame

Mounting position/typical terminal arrangement



Dimensions, mm

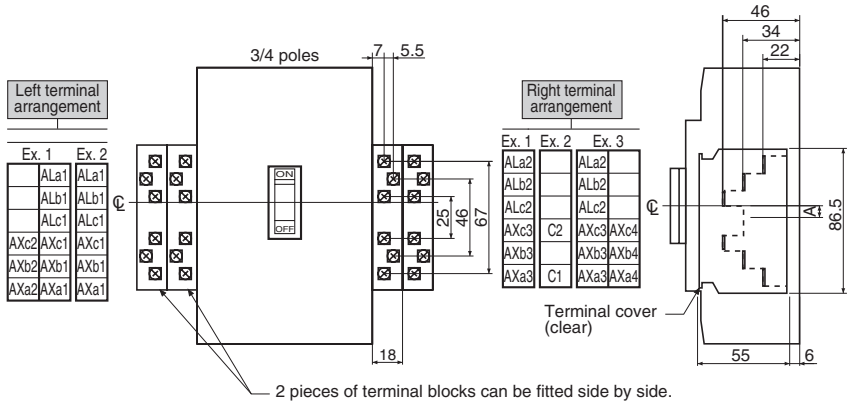
Types of breakers	A
S160-SCF (2/3/4 poles)	9
S160-SF, S160-SCJ, S160-SJ, S160-SN (3/4 poles)	9

Notes:
1) Tightening torque of M3.5 terminal screws: 0.9 – 1.2 N·m
2) Applicable wire size: 2.0mm² max

6 terminals

Vertical leading type with 250A frame

Mounting position/typical terminal arrangement



Dimensions, mm

Types of breakers	A
E250-SF, S250-SF, E250-SJ, S250-SJ, S250-SN	7

Notes:
1) Tightening torque of M3.5 terminal screws: 0.9 – 1.2 N·m
2) Applicable wire size: 2.0mm^2 max

7. Mechanical interlock

Slide interlock (MS)

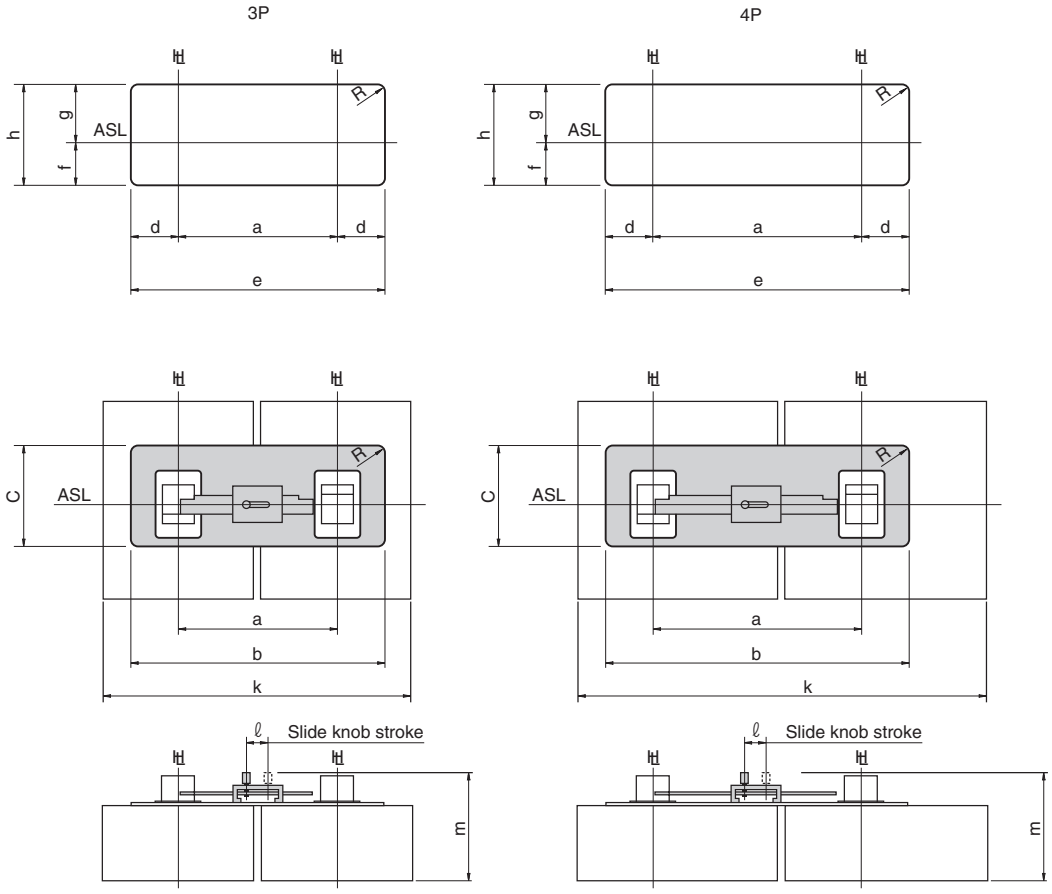
The slide interlock provides a mechanical interlock between two breakers so that only one of the two can be closed. Moving the slide on the front of the breaker left and right allows activation or deactivation of the interlock.

ASL : Arrangement Standard Line
⊞ : Handle Frame Centre Line
℄ : Handle Centre Line

Dimensions mm

Types of breakers	Interlock Order codes	Number of poles	a	b	c	d	e	f	g	h	k	m	ℓ	R
E100-SF	XLF1 ①	3	100	150	102	26.5	153	52.5	52.5	105	175	99.6	15	8.5

Notes:
① : Please order with the breakers.
(1) The interlock cannot be applied to breakers equipped with a terminal block, UVT controller or OCR controller.
(2) See the outline dimensions of the breaker for the drilling plan.

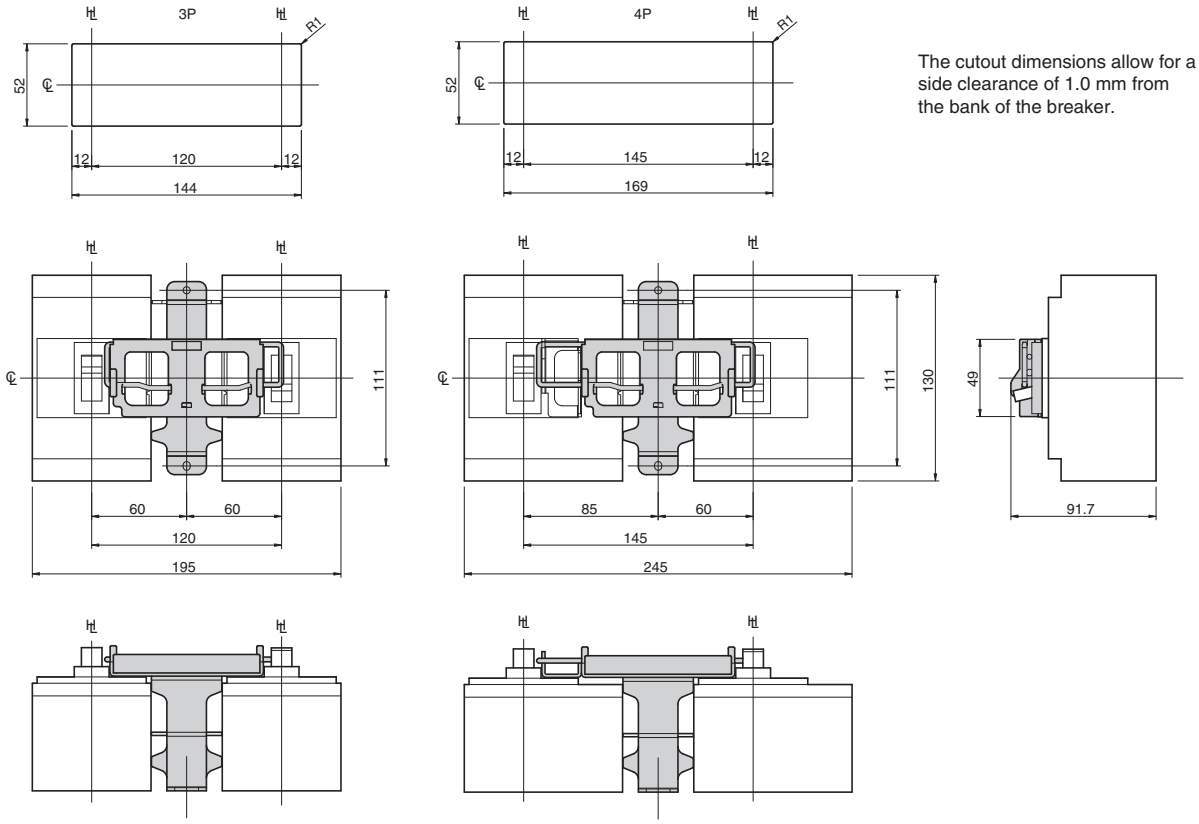


ASL: Arrangement Standard Line
⊩: Handle Frame Centre Line
℄: Handle Centre Line

Dimensions mm

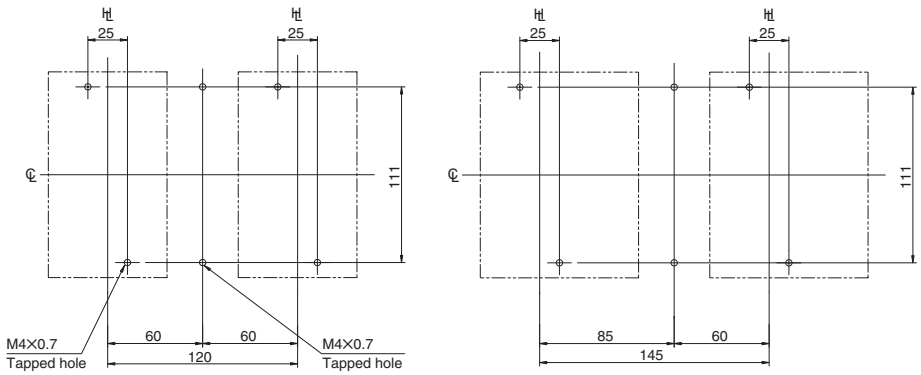
Types of breakers	Number of poles	Breaker connection method	Interlock Order codes
S160-SCF, S160-SF, S160-SCJ S160-SJ, S160-SN	3	FC,RC	T2MS16L3SF
	4	FC,RC	T2MS16L4SF

Panel cutout (front view)



The cutout dimensions allow for a side clearance of 1.0 mm from the bank of the breaker.

Drilling plan (front view)



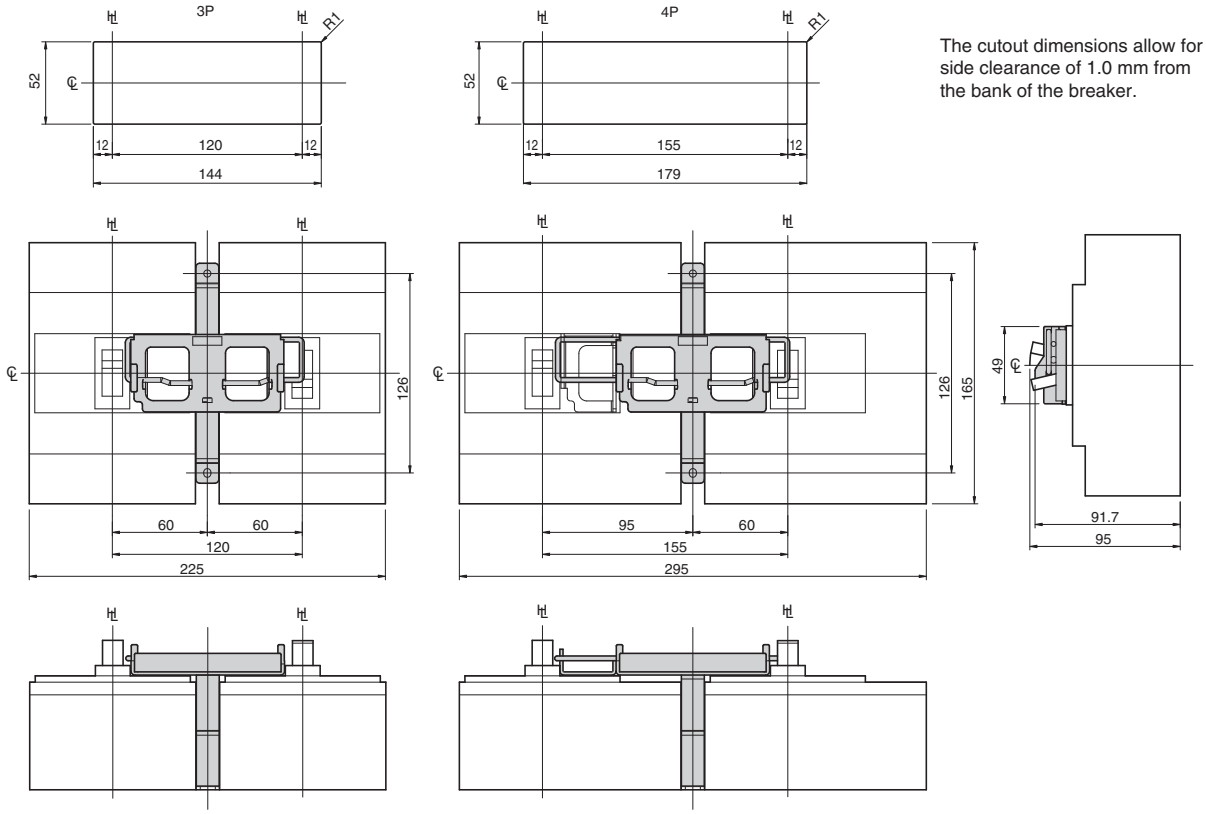
7. Mechanical interlock

ASL : Arrangement Standard Line
HL : Handle Frame Centre Line
℄ : Handle Centre Line

Dimensions mm

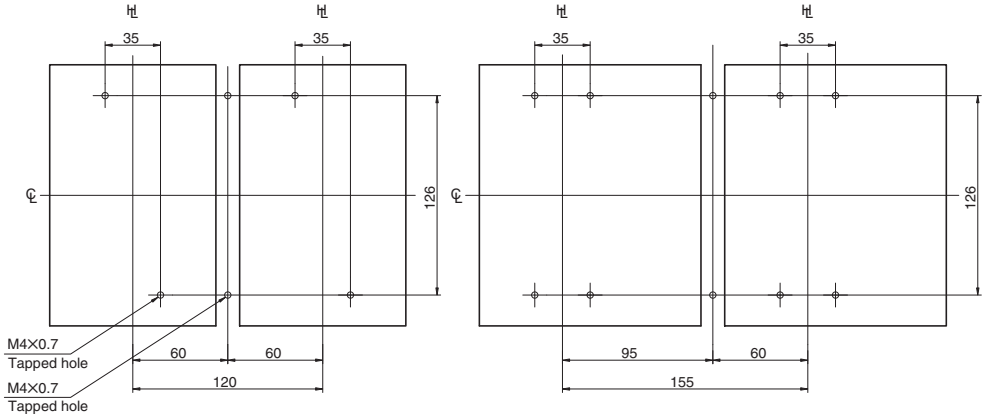
Types of breakers	Number of poles	Breaker connection method	Interlock Order codes
E250-SF, S250-SF, E250-SJ S250-SJ, S250-SN	3	FC,RC	T2MS25L3SF
	4	FC,RC	T2MS25L4SF

Panel cutout (front view)



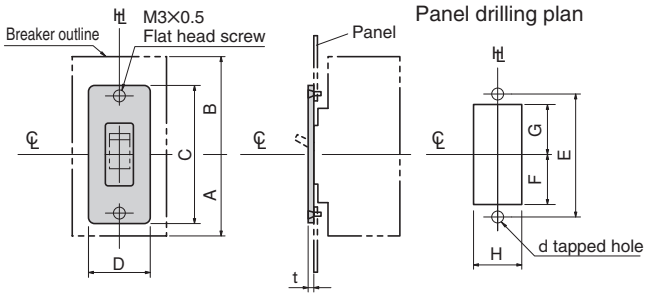
The cutout dimensions allow for a side clearance of 1.0 mm from the bank of the breaker.

Drilling plan (front view)



8. Door Flange (D.F)

Door flanges are recommended to be used to cover the cutout of a switchboard panel.



Dimensions mm

Types of breakers	Order codes	A	B	C	D	E	F		G		H		d	t
							Min	Max	Min	Max	Min	Max		
E100-SF	XAA1	65	65	105	50	92	37	42	37	42	32	45	M3×0.5	3
S160-SCF, S160-SF, S160-SCJ S160-SJ, S160-SN	T2DF25	65	65	105	50	92	37	42	37	42	32	45	M3×0.5	2
E250-SF, S250-SF, E250-SJ, S250-SJ, S250-SN	T2DF25	82.5	82.5	105	50	92	37	42	37	42	32	45	M3×0.5	2

4 Characteristics and Outline Dimensions

Molded Case Circuit Breakers

4 Characteristics and Outline Dimensions *TemBreak2*

Molded Case Circuit Breakers （100A Frame）

E100-SF

Ratings and Specifications

Type			E100-SF				
Number of poles			2	3			
■Ratings							
Rated current, A			10	50			
Calibrated at 40°C			15	60			
			20	75			
			30	100			
			40				
Rated insulation voltage 〔U_i〕 V		AC	690				
Rated impulse withstand voltage 〔U_{imp}〕 kV			6				
Utilization Category			A				
■Rated breaking capacity, kA							
IEC60947-2	AC	690V	—				
I_{cu}/I_{cs}(sym)		500V	7.5/3.8				
		440V	10/5				
		415V	10/5				
		380V	16/8				
		240V	25/13				
	① DC	250V	7.5/3.8				
		125V	15/7.5				
■Rated short time withstand current, kA			—				
Weight (◉ marked standard type) kg			0.48	0.74			
■Connections and Mountings							
Front-connected (FC)	Terminal screws		◉				
	With straight extension bars		—				
	With spread extension bars		—				
	Cable clamps		○				
Rear-connected (RC)	Bolt studs		○				
	Flat bar studs		—				
Plug-in (PM)	For switchboards Standard (PMC)		—				
	High-performance (PMB)		—				
	For distribution boards (PMC)		—				
Draw-out type (DR)			—				
TemPlug70 (PG)			—				
TemPlug45B (PG4)			—				
DIN rail mount			—				
Clip-in chassis mount			—				
■Accessories (optional)		Symbol					
Externally mounted: Motor operator		M C	—	●			
External operating handle: Breaker-mounted		H B	—	●			
External operating handle: Door-mounted (variable depth)		H P	—	●			
Externally mounted: Toggle extension		H A	—				
Externally mounted: Mechanical interlock Slide type		M S	—	●			
Externally mounted: Toggle holder		H H	●				
Externally mounted: Toggle lock		H L	●				
Externally mounted: Terminal cover	For front-connected	C F	●				
	For rear-connected and plug-in	C R	●				
	For cable clamps	C S	—				
Externally mounted: Interpole barrier		B A	●				
Terminal block for lead		T F	●				
Door flange		D F	●				
■Standard specifications							
Overcurrent trip mechanism			Thermal-magnetic⑦				
Trip button (color)			Yes (Red)				
Handle position indication (ON: Red, OFF: Green)			Yes				
Suitability for isolation			Non				
CE marking			Non				

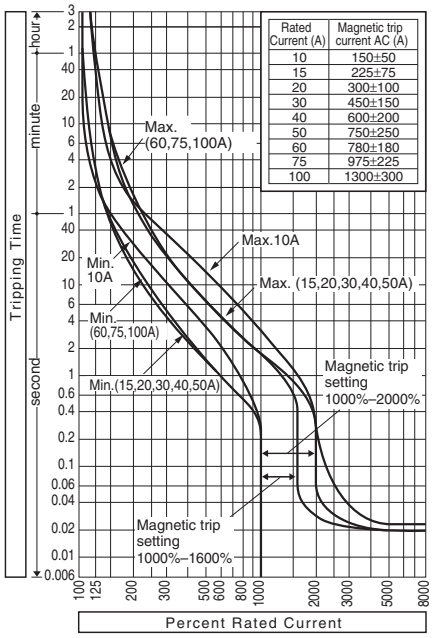
Notes:

◉ : Standard. This configuration used unless otherwise specified. ○ : Optional standard. Specify when ordering.

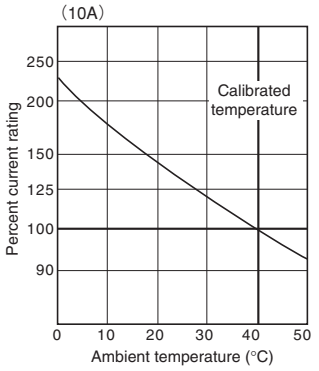
● : "yes" or "available". — : "no" or "not available". ① : DC rating available on request.

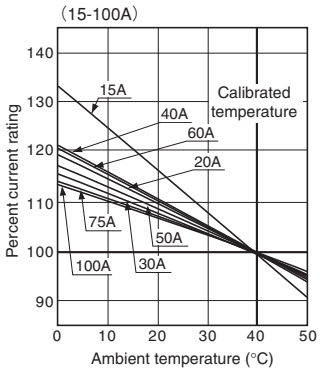
⑦ : Hydraulic-magnetic type for below 10A rating.

Time/Current characteristic curves



Ambient Compensating Curves





Combinations of Internally Mounted Accessories（Optional）

Poles	AX Auxiliary switch	AL Alarm switch	SH Shunt trip ✻1	UV Under voltage trip ✻2	AX AL	AX SH	AX UV	AL SH	AL UV	AX AL SH	AX AL UV
3											—

Toggle — Left pole / Right pole

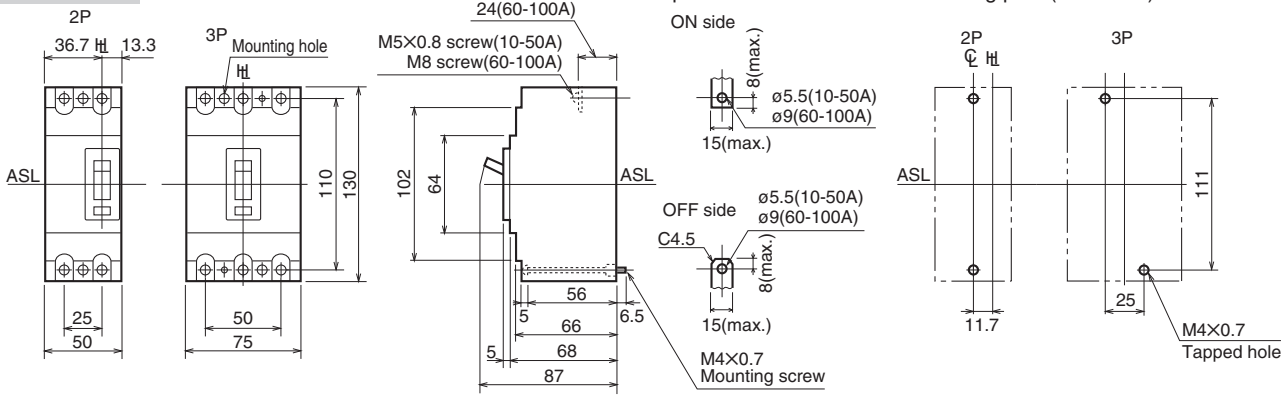
NOTE: 2-pole type breaker may incorporate only one combination of AX (max.2C), AL, SH, UV, AX–AL into the left pole.

NOTE: ✻1 Shunt trip is provided with anti-burnout switch.

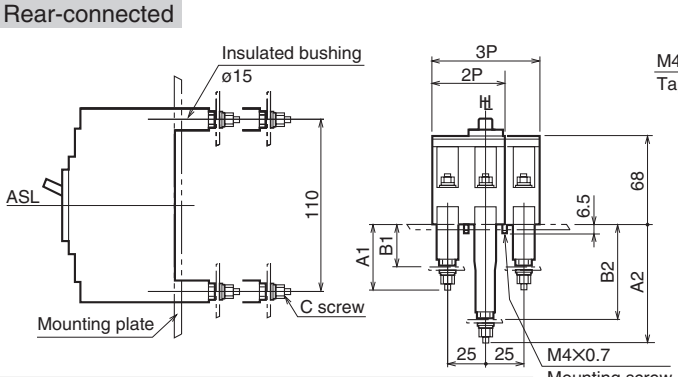
NOTE: ✻2 The UV Controller is installed externally when provided with AC UV.

Outline dimensions (mm)

Front-connected

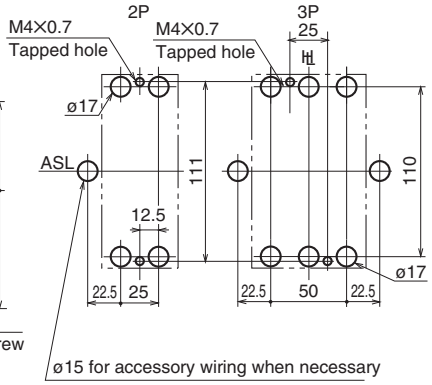


Rear-connected

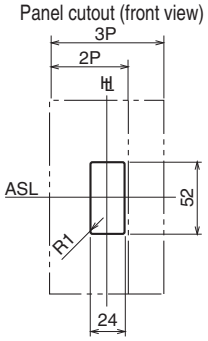


Rated Current (A)	A1	A2	B1	B2	C
10-50	45	80	30	65	M6
60-100	52.1	87.1	32.1	67.1	M8

Drilling plan (front view)



Panel cutout (front view)



Panel cutout dimensions shown give an allowance of 1.0mm around the handle escutcheon.

4 Characteristics and Outline Dimensions *TemBreak2*

Molded Case Circuit Breakers (160A Frame)

E160-SF

Ratings and Specifications

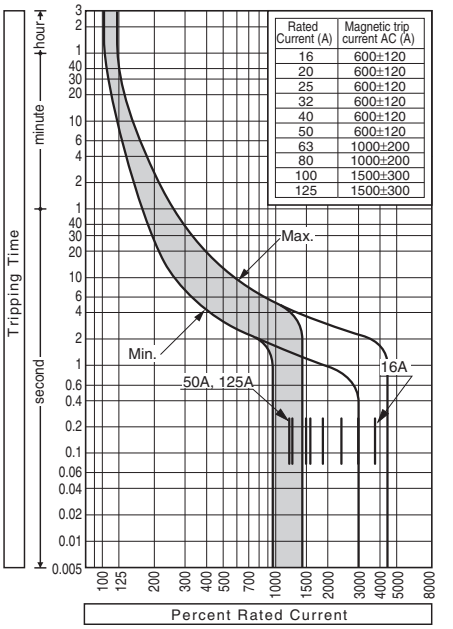
Type				E160-SF				
Number of poles				1				
■Ratings								
Rated current, A				16	63			
Calibrated at 45°C				20	80			
				25	100			
				32	125			
				40				
				50				
Rated insulation voltage 〔U_i〕 V			AC	690				
Rated impulse withstand voltage 〔U_{imp}〕 kV				8				
Utilization Category				A				
■Rated breaking capacity, kA								
IEC60947-2		AC	690V	—				
I_{cu}/I_{cs}(sym)			500V	—				
			440V	—				
			415V	—				
			380V	—				
			240V	25/13				
		① DC	250V	—				
			125V	10/5				
■Rated short time withstand current, kA				—				
Weight (◉ marked standard type) kg				0.3				
■Connections and Mountings								
Front-connected (FC)	Terminal screws			◉				
	With straight extension bars			○				
	With spread extension bars			—				
	Cable clamps			○				
Rear-connected (RC)	Bolt studs			—				
	Flat bar studs			—				
Plug-in (PM)	For switchboards	Standard (PMC)		—				
		High-performance (PMB)		—				
	For distribution boards (PMC)			—				
Draw-out type (DR)				—				
TemPlug70 (PG)				—				
TemPlug45B (PG4)				—				
DIN rail mount				—				
Clip-in chassis mount				—				
■Accessories (optional)			**Symbol**					
Externally mounted	Motor operator		M C	—				
	External operating handle	Breaker-mounted	H B	—				
		Door-mounted (variable depth)	H P	—				
	Toggle extension		H A	—				
	Mechanical interlock	Slide type	M S	—				
	Toggle holder		H H	●				
	Toggle lock		H L	●				
	Terminal cover	For front-connected	C F	●				
		For rear-connected and plug-in	C R	—				
		For cable clamps	C S	—				
	Interpole barrier		B A	—				
	Terminal block for lead		T F	—				
	Door flange		D F	●				
■Standard specifications								
Overcurrent trip mechanism				Thermal-magnetic				
Trip button (color)				Yes (Red)				
Handle position indication (ON: Red, OFF: Green)				Yes				
Suitability for isolation				Yes				
CE marking				Yes				

Notes:

◉ : Standard. This configuration used unless otherwise specified. ○ : Optional standard. Specify when ordering.

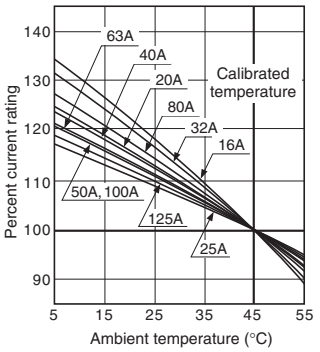
● : "yes" or "available". — : "no" or "not available". ① : DC rating available on request.

Time/Current characteristic curves



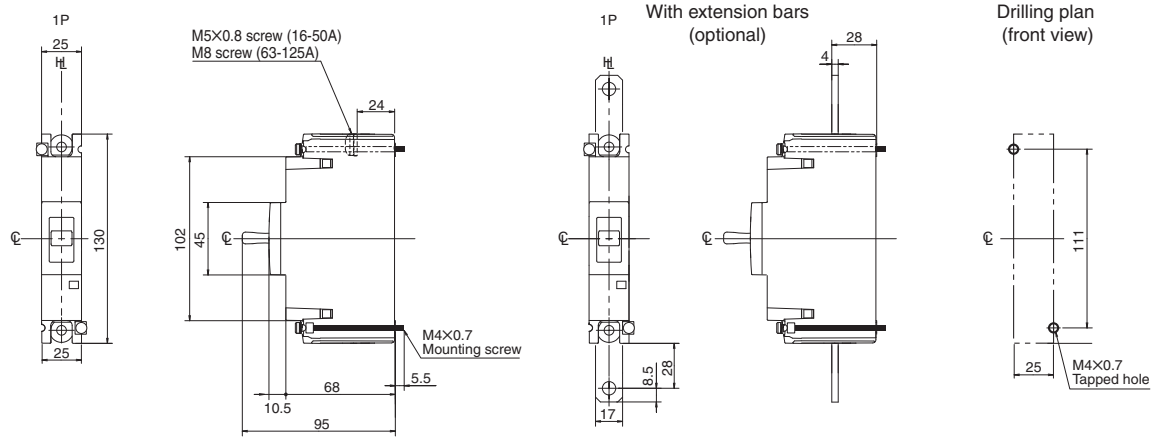
Rated Current (A)	Magnetic trip current AC (A)
16	600±120
20	600±120
25	600±120
32	600±120
40	600±120
50	600±120
63	1000±200
80	1000±200
100	1500±300
125	1500±300

Ambient Compensating Curves



Outline dimensions (mm) E160-SF

Front-connected



4 Characteristics and Outline Dimensions *TemBreak2*

Molded Case Circuit Breakers （160A Frame）

S160-SCF, S160-SF

Ratings and Specifications

Type			S160-SCF			S160-SF	
Number of poles			2	3	4	3	4
■Ratings							
Rated current, A			15	75		15	75
Calibrated at 40°C			20	100		20	100
			30	125		30	125
			40	160		40	160
			50			50	
			60			60	
Rated insulation voltage〔U_i〕 V		AC	690			690	
Rated impulse withstand voltage〔U_{imp}〕 kV			8			8	
Utilization Category			A			A	
■Rated breaking capacity, kA							
IEC60947-2	AC	690V	—			6/3	
I_{cu}/I_{cs}(sym)		500V	7.5/4			10/7.5	
		440V	15/7.5			25/13	
		415V	25/13			40/20	
		380V	25/13			40/20	
		240V	35/18			50/25	
	① DC	250V	20/10			25/13	
		125V	30/15			40/20	
■Rated short time withstand current, kA			—			—	
Weight (◉ marked standard type) kg			0.6	0.8	1.0	0.8	1.0
■Connections and Mountings							
Front-connected (FC)	Terminal screws		◉			◉	
	With straight extension bars		○			○	
	With spread extension bars		—	○		○	
	Cable clamps		—			—	
Rear-connected (RC)	Bolt studs		—			—	
	Flat bar studs		○			○	
Plug-in (PM) For switchboards	Standard (PMC)		—			—	
	High-performance (PMB)		—			—	
For distribution boards (PMC)			—			—	
Draw-out type (DR)			—			—	
TemPlug70 (PG)			—			—	
TemPlug45B (PG4)			—			—	
DIN rail mount			—	○ ⑪		○ ⑪	
Clip-in chassis mount			—			—	
■Accessories (optional)		**Symbol**					
Externally mounted: Motor operator		M C	—			—	
External operating handle: Breaker-mounted		H B	—	●		●	
External operating handle: Door-mounted (variable depth)		H P	—	●		●	
Toggle extension		H A	—			—	
Mechanical interlock Slide type		M S	—	●		●	
Toggle holder		H H	●			●	
Toggle lock		H L	●			●	
Terminal cover	For front-connected	C F	●			●	
	For rear-connected and plug-in	C R	●			●	
	For cable clamps	C S	—			—	
Interpole barrier		B A	● ③			● ③	
Terminal block for lead		T F	●			●	
Door flange		D F	●			●	
■Standard specifications							
Overcurrent trip mechanism			Thermal-magnetic			Thermal-magnetic	
Trip button (color)			Yes (Red)			Yes (Red)	
Handle position indication (ON: Red, OFF: Green)			Yes			Yes	
Suitability for isolation			Yes			Yes	
CE marking			Yes			Yes	

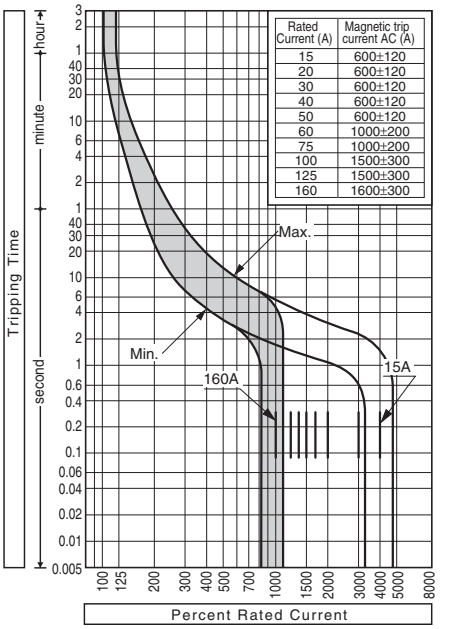
Notes:

◉ : Standard. This configuration used unless otherwise specified. ○ : Optional standard. Specify when ordering.

● : "yes" or "available". — : "no" or "not available". ① : DC rating available on request.

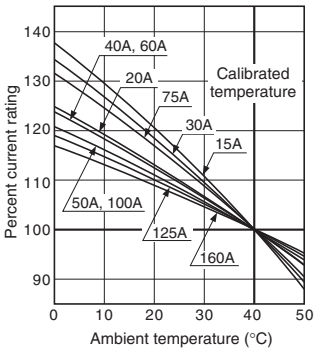
③ : Line side interpole barriers are supplied as standard. (Front connection only) ⑪ : Provided with DIN rail adaptor.

Time/Current characteristic curves

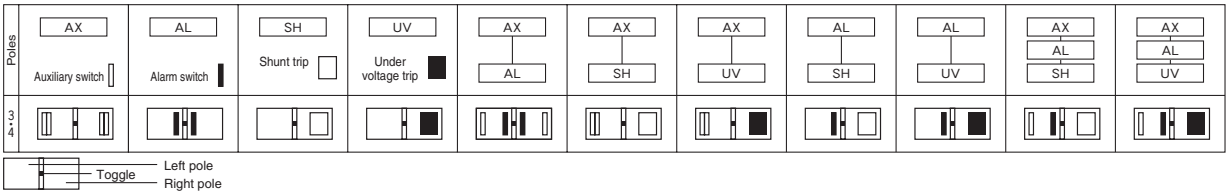


Rated Current (A)	Magnetic trip current AC (A)
15	600±120
20	600±120
30	600±120
40	600±120
50	600±120
60	1000±200
75	1000±200
100	1500±300
125	1500±300
160	1600±300

Ambient Compensating Curves

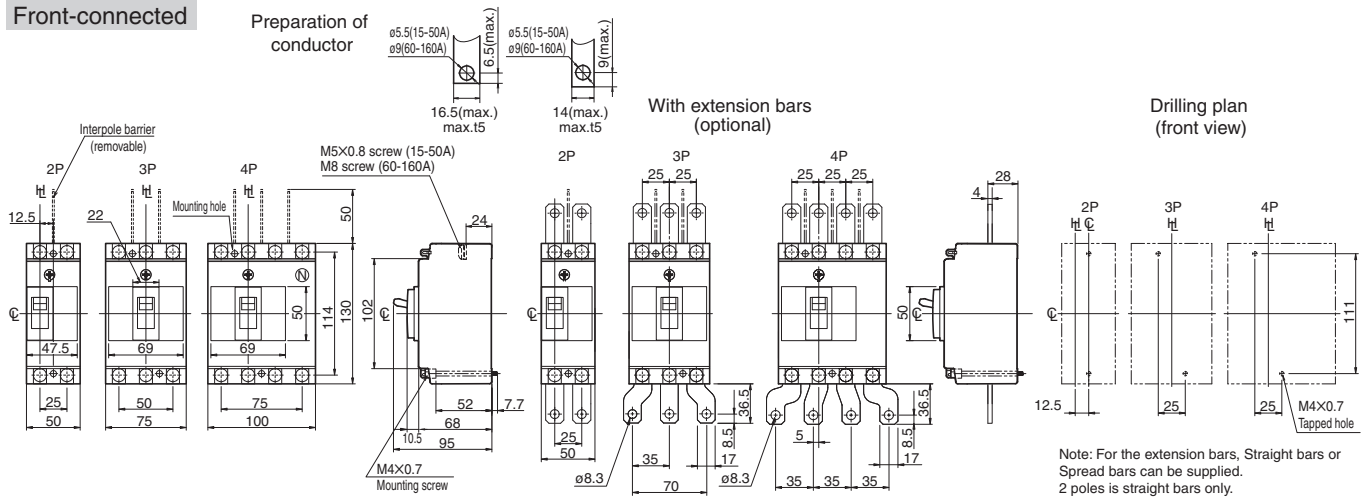


Combinations of Internally Mounted Accessories（Optional）

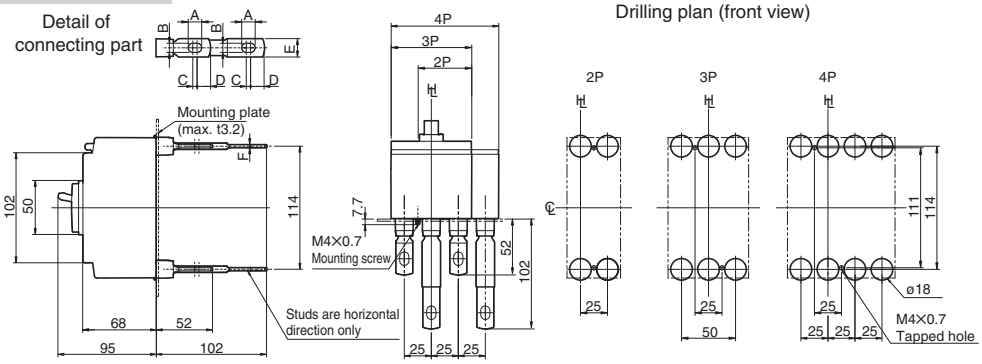


Outline dimensions (mm) S160-SCF, S160-SF

Front-connected

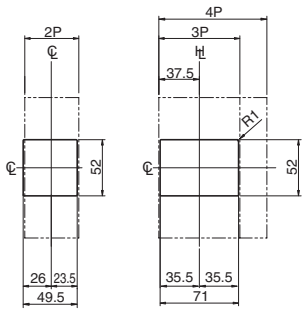


Rear-connected



Rated current (A)	A	B	C	D	E	F
15-50	10.5	6.5	4	13	16	4
60-160	12.5	8.5	4	13	16	5

Panel cutout (front view)



Panel cutout dimensions shown give an allowance of 1.0mm around the handle escutcheon.

4 Characteristics and Outline Dimensions *TemBreak2*

Molded Case Circuit Breakers (250A Frame)

E250-SF, S250-SF

Ratings and Specifications

Type				E250-SF			S250-SF				
Number of poles				2＊	3	4	2＊	3	4		
■Ratings											
Rated current, A				125			125				
Calibrated at 40°C				150			150				
				175			175				
				200			200				
				225			225				
				250			250				
＊center pole omitted											
Rated insulation voltage 〔U_i〕 V			AC	690			690				
Rated impulse withstand voltage 〔U_{imp}〕 kV				8			8				
Utilization Category				A			A				
■Rated breaking capacity, kA											
IEC60947-2		AC	690V	—			4/4				
I_{cu}/I_{cs}(sym)			500V	10/7.5			25/13				
			440V	15/12			30/15				
			415V	25/19			40/20				
			380V	25/19			40/20				
			240V	35/27			85/43				
		① DC	250V	15/12			25/13				
			125V	25/19			40/20				
■Rated short time withstand current, kA				—			—				
Weight (◉ marked standard type) kg				1.5	1.5	1.9	1.5	1.5	1.9		
■Connections and Mountings											
Front-connected (FC)	Terminal screws			◉			◉				
	With straight extension bars			○			○				
	With spread extension bars			—	○		—	○			
	Cable clamps			○			○				
Rear-connected (RC)	Bolt studs			—			—				
	Flat bar studs			○			○				
Plug-in (PM)	For switchboards	Standard (PMC)		—			—				
		High-performance (PMB)		—			—				
	For distribution boards (PMC)			—			—				
Draw-out type (DR)				—			—				
TemPlug70 (PG)				—			—				
TemPlug45B (PG4)				—			—				
DIN rail mount				—			—				
Clip-in chassis mount				—			—				
■Accessories (optional)						**Symbol**					
Externally mounted	Motor operator			●		M C	●				
	External operating handle	Breaker-mounted		●		H B	●				
		Door-mounted (variable depth)		●		H P	●				
	Toggle extension			—		H A	—				
	Mechanical interlock	Slide type		●		M S	●				
	Toggle holder			●		H H	●				
	Toggle lock			●		H L	●				
	Terminal cover	For front-connected		●		C F	●				
		For rear-connected and plug-in		●		C R	●				
		For cable clamps		●		C S	●				
	Interpole barrier			● ③		B A	● ③				
	Terminal block for lead			●		T F	●				
	Door flange			●		D F	●				
■Standard specifications											
Overcurrent trip mechanism				Thermal-magnetic			Thermal-magnetic				
Trip button (color)				Yes (Red)			Yes (Red)				
Handle position indication (ON: Red, OFF: Green)				Yes			Yes				
Suitability for isolation				Yes			Yes				
CE marking				Yes			Yes				

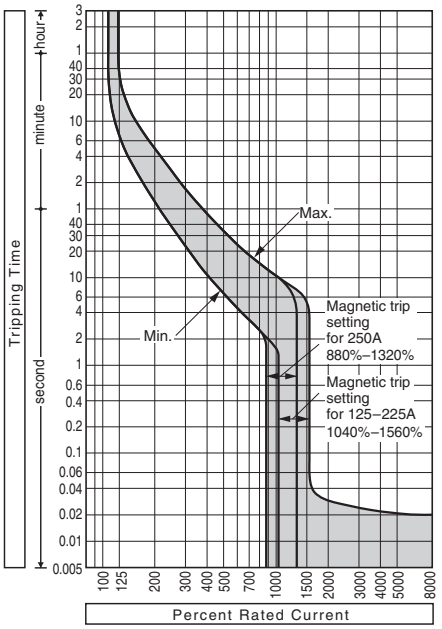
Notes:

◉ : Standard. This configuration used unless otherwise specified. ○ : Optional standard. Specify when ordering.

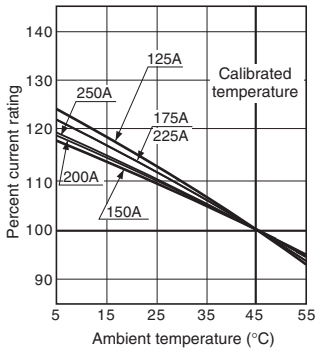
● : "yes" or "available". — : "no" or "not available". ① : DC rating available on request.

③ : Line side interpole barriers are supplied as standard. (Front connection only)

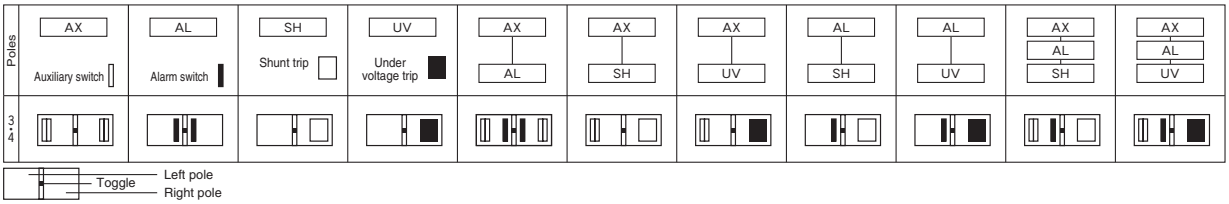
Time/Current characteristic curves



Ambient Compensating Curves

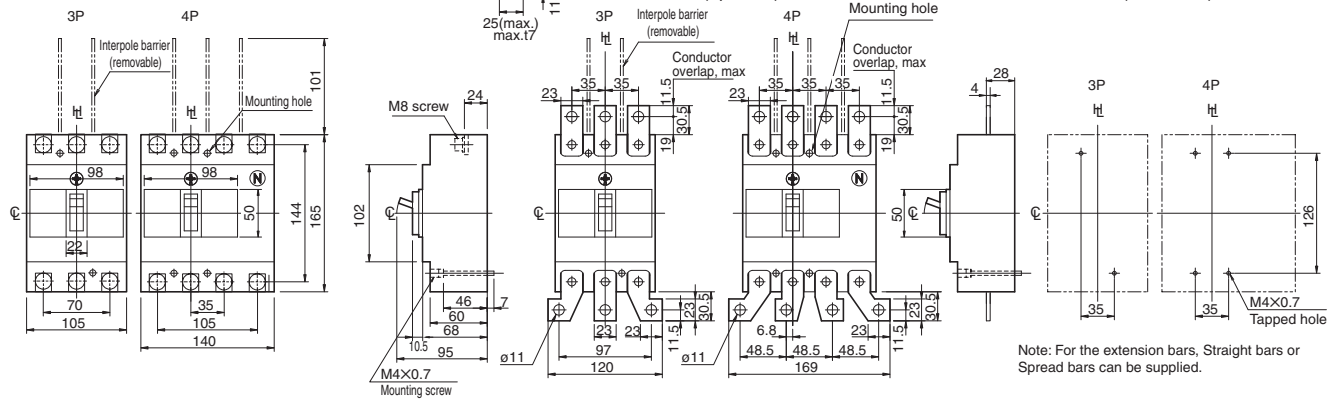


Combinations of Internally Mounted Accessories (Optional)

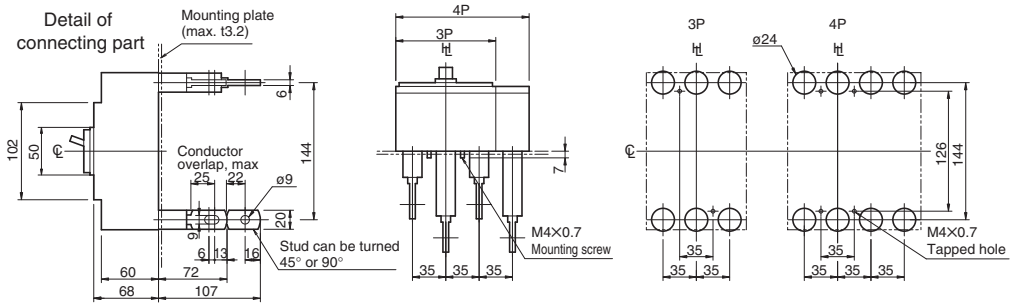


Outline dimensions (mm) E250-SF, S250-SF

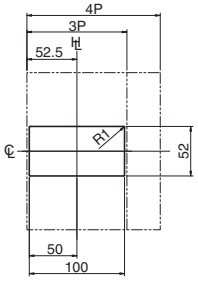
Front-connected



Rear-connected



Panel cutout (front view)



Panel cutout dimensions shown give an allowance of 1.0mm around the handle escutcheon.

4 Characteristics and Outline Dimensions *TemBreak2*

Molded Case Circuit Breakers （160A Frame）

S160-SCJ, S160-SJ

Ratings and Specifications

Type				S160-SCJ		S160-SJ			
Number of poles				3	4	3	4		
■Ratings									
Rated current, A				25		25			
Calibrated at 45°C				40		40			
				63		63			
				80		80			
				100		100			
				125		125			
				160		160			
Rated insulation voltage〔U_i〕 V			AC	690		690			
Rated impulse withstand voltage〔U_{imp}〕 kV				8		8			
Utilization Category				A		A			
■Rated breaking capacity, kA									
IEC60947-2		AC	690V	—		6/3			
I_{cu}/I_{cs}(sym)			500V	7.5/4		10/7.5			
			440V	15/7.5		25/13			
			415V	25/13		40/20			
			380V	25/13		40/20			
			240V	35/18		50/25			
		① DC	250V	20/10		25/13			
			125V	30/15		40/20			
■Rated short time withstand current, kA				—		—			
Weight (◉ marked standard type) kg				0.8	1.0	0.8	1.0		
■Connections and Mountings									
Front-connected (FC)	Terminal screws			◉		◉			
	With straight extension bars			○		○			
	With spread extension bars			○		○			
	Cable clamps			○		○			
Rear-connected (RC)	Bolt studs			—		—			
	Flat bar studs			○		○			
Plug-in (PM)	For switchboards	Standard (PMC)		—		—			
		High-performance (PMB)		—		—			
	For distribution boards (PMC)			—		—			
Draw-out type (DR)				—		—			
TemPlug70 (PG)				—		—			
TemPlug45B (PG4)				—		—			
DIN rail mount				○ ⑪		○ ⑪			
Clip-in chassis mount				—		—			
■Accessories (optional)			**Symbol**						
Externally mounted	Motor operator		M C	—		—			
	External operating handle	Breaker-mounted	H B	●		●			
		Door-mounted (variable depth)	H P	●		●			
	Toggle extension		H A	—		—			
	Mechanical interlock	Slide type	M S	●		●			
	Toggle holder		H H	●		●			
	Toggle lock		H L	●		●			
	Terminal cover	For front-connected	C F	●		●			
		For rear-connected and plug-in	C R	●		●			
		For cable clamps	C S	●		●			
	Interpole barrier		B A	● ③		● ③			
	Terminal block for lead		T F	●		●			
	Door flange		D F	●		●			
■Standard specifications									
Overcurrent trip mechanism				Thermal-magnetic		Thermal-magnetic			
Trip button (color)				Yes (Red)		Yes (Red)			
Handle position indication (ON: Red, OFF: Green)				Yes		Yes			
Suitability for isolation				Yes		Yes			
CE marking				Yes		Yes			

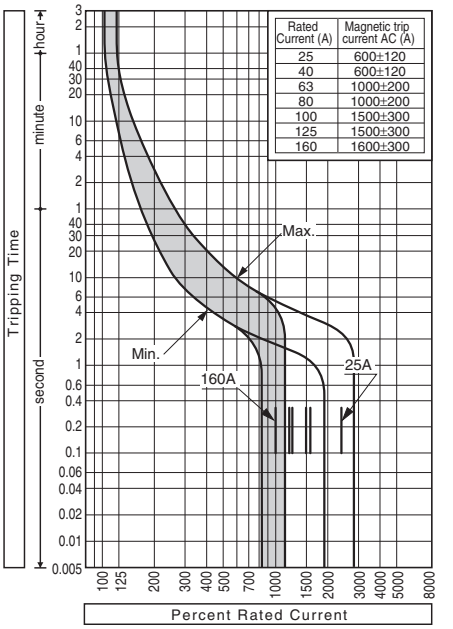
Notes:

◉ : Standard. This configuration used unless otherwise specified. ○ : Optional standard. Specify when ordering.

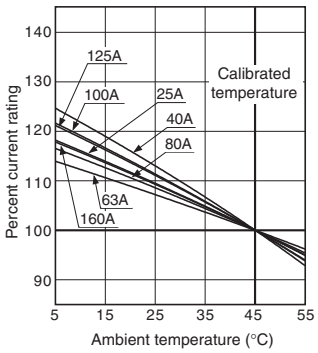
● : "yes" or "available". — : "no" or "not available". ① : DC rating available on request.

③ : Line side interpole barriers are supplied as standard. (Front connection only) ⑪ : Provided with DIN rail adaptor.

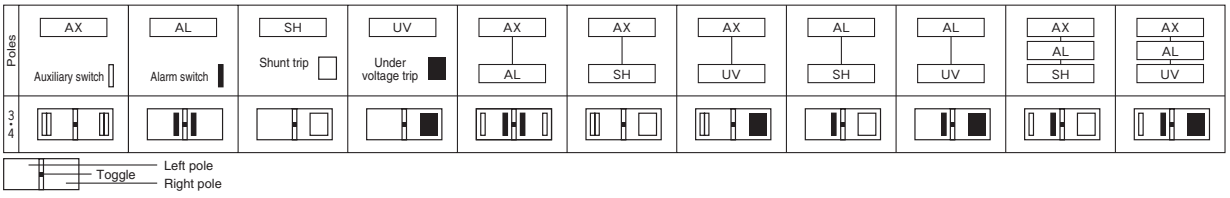
Time/Current characteristic curves



Ambient Compensating Curves

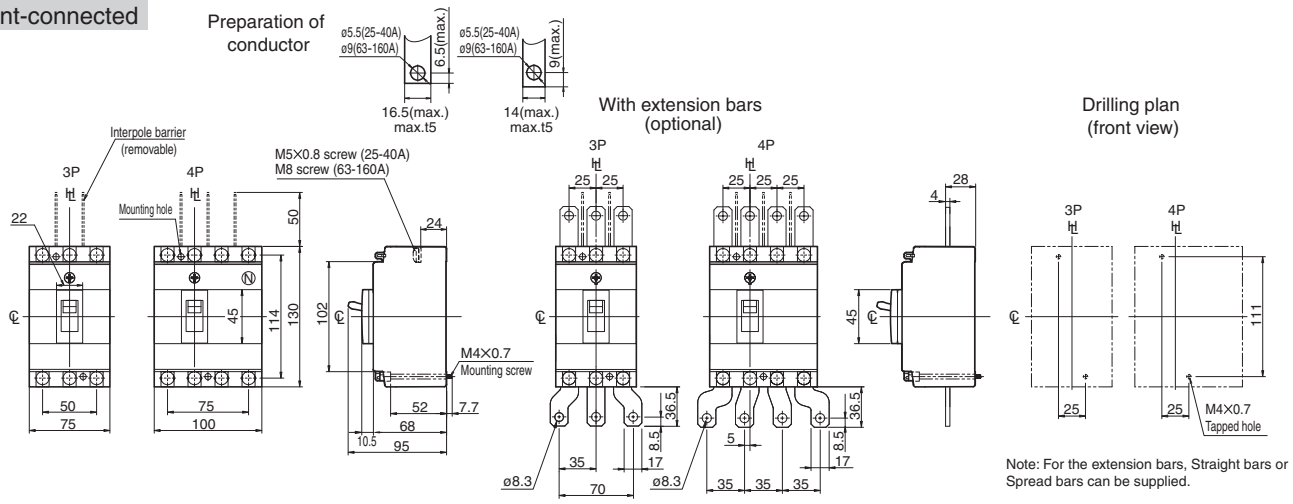


Combinations of Internally Mounted Accessories（Optional）

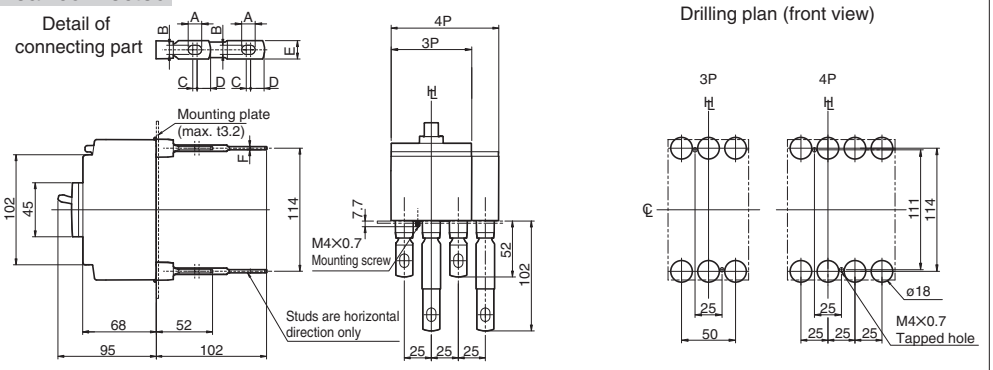


Outline dimensions (mm) S160-SCJ, S160-SJ

Front-connected

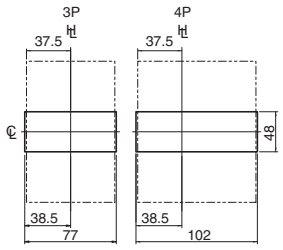


Rear-connected



Rated current (A)	A	B	C	D	E	F
25-40	10.5	6.5	4	13	16	4
63-160	12.5	8.5	4	13	16	5

Panel cutout (front view)



Panel cutout dimensions shown give an allowance of 1.0mm or more around the handle escutcheon.

Molded Case Circuit Breakers (250A Frame)

E250-SJ, S250-SJ

Ratings and Specifications

Type				E250-SJ		S250-SJ	
Number of poles				3	4	3	4
■Ratings							
Rated current, A				100		160	
Calibrated at 45°C				125		200	
				160		250	
				200			
				250			
Rated insulation voltage 〔U_i〕 V			AC	800		800	
Rated impulse withstand voltage 〔U_{imp}〕 kV				8		8	
Utilization Category				A		A	
■Rated breaking capacity, kA							
IEC60947-2		AC	690V	—		4/4	
I_{cu}/I_{cs}(sym)			500V	7.5/6		10/7.5	
			440V	15/12		30/15	
			415V	25/19		40/20	
			380V	25/19		40/20	
			240V	35/27		85/43	
		① DC	250V	15/12		25/13	
			125V	25/19		40/20	
■Rated short time withstand current, kA				—		—	
Weight (◉ marked standard type) kg				1.5	1.9	1.5	1.9
■Connections and Mountings							
Front-connected (FC)	Terminal screws			◉		◉	
	With straight extension bars			○		○	
	With spread extension bars			○		○	
	Cable clamps			○		○	
Rear-connected (RC)	Bolt studs			—		—	
	Flat bar studs			○		○	
Plug-in (PM)	For switchboards	Standard (PMC)		—		—	
		High-performance (PMB)		—		—	
	For distribution boards (PMC)			—		—	
Draw-out type (DR)				—		—	
TemPlug70 (PG)				—		—	
TemPlug45B (PG4)				—		—	
DIN rail mount				—		—	
Clip-in chassis mount				—		—	
■Accessories (optional)			**Symbol**				
Externally mounted	Motor operator		M C	●		●	
	External operating handle	Breaker-mounted	H B	●		●	
		Door-mounted (variable depth)	H P	●		●	
	Toggle extension		H A	—		—	
	Mechanical interlock	Slide type	M S	●		●	
	Toggle holder		H H	●		●	
	Toggle lock		H L	●		●	
	Terminal cover	For front-connected	C F	●		●	
		For rear-connected and plug-in	C R	●		●	
		For cable clamps	C S	●		●	
	Interpole barrier		B A	● ③		● ③	
	Terminal block for lead		T F	●		●	
	Door flange		D F	●		●	
■Standard specifications							
Overcurrent trip mechanism				Thermal-magnetic		Thermal-magnetic	
Trip button (color)				Yes (Red)		Yes (Red)	
Handle position indication (ON: Red, OFF: Green)				Yes		Yes	
Suitability for isolation				Yes		Yes	
CE marking				Yes		Yes	

Notes:

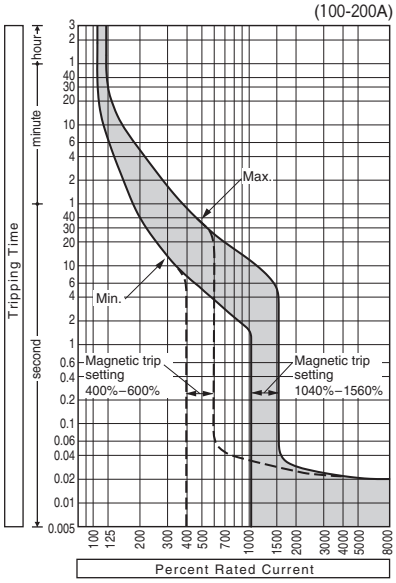
◉ : Standard. This configuration used unless otherwise specified. ○ : Optional standard. Specify when ordering.

● : "yes" or "available". — : "no" or "not available". ① : DC rating available on request.

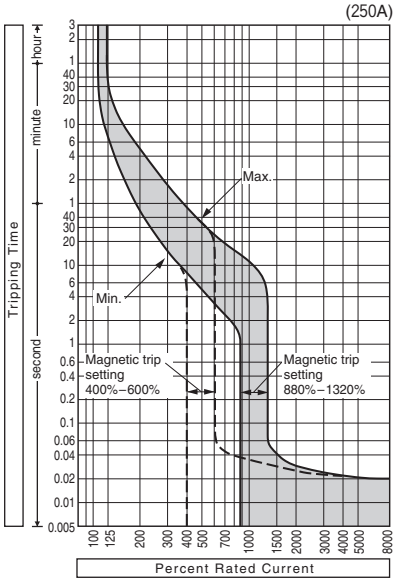
③ : Line side interpole barriers are supplied as standard. (Front connection only)

Time/Current characteristic curves

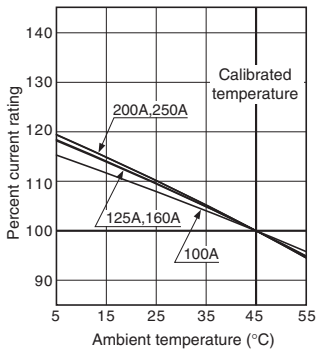
(100-200A)



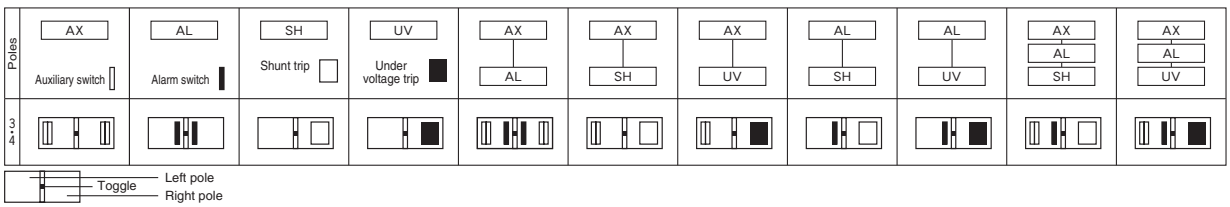
(250A)



Ambient Compensating Curves

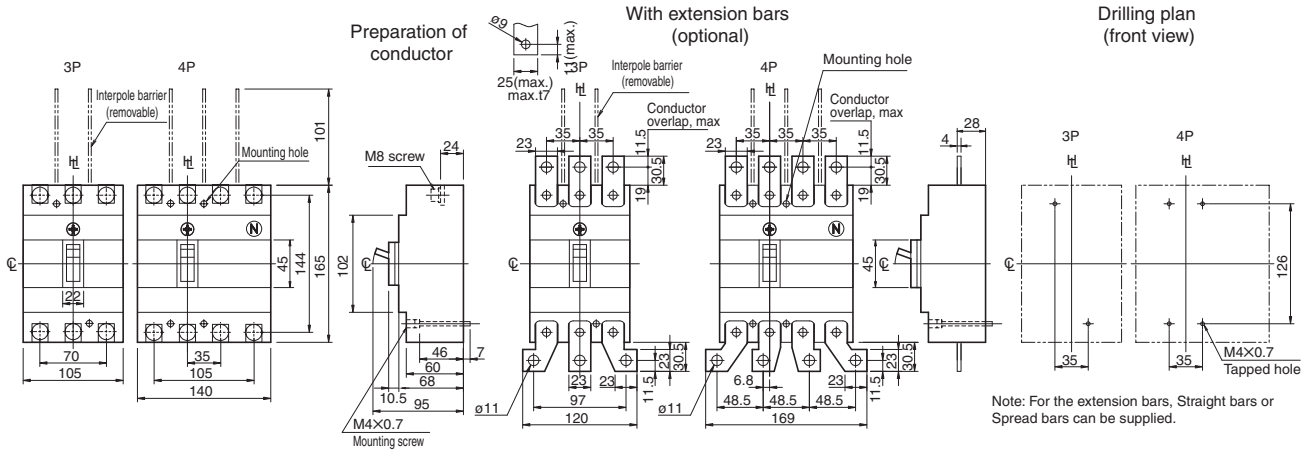


Combinations of Internally Mounted Accessories (Optional)



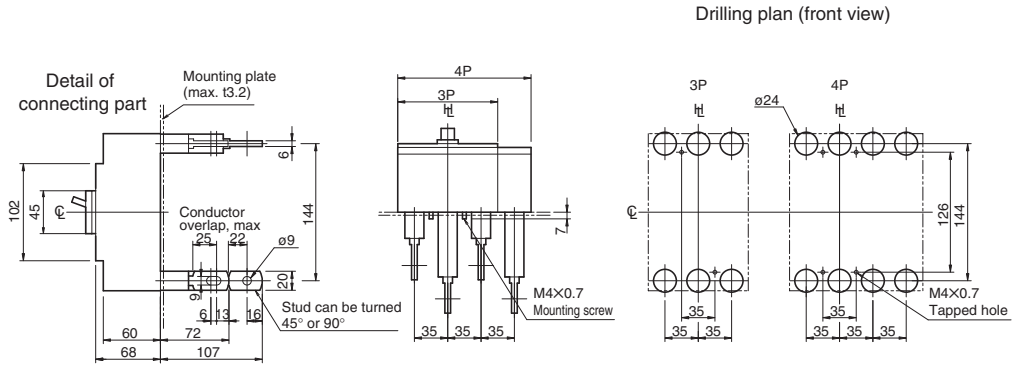
Outline dimensions (mm) E250-SJ, S250-SJ

Front-connected

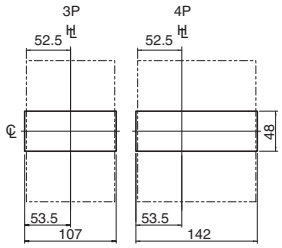


Note: For the extension bars, Straight bars or Spread bars can be supplied.

Rear-connected



Panel cutout (front view)



Panel cutout dimensions shown give an allowance of 1.0mm around the handle escutcheon.

Molded Case Circuit Breakers (160A Frame)

S160-SN

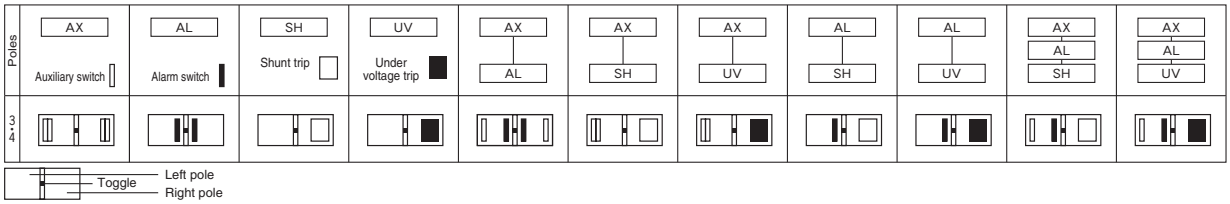
Ratings and Specifications

Type				S160-SN				
Number of poles				3	4			
■Ratings								
Rated current, A				160				
Rated insulation voltage 〔U_i〕 V			AC	690				
Rated operational voltage V			AC	690				
			DC	250				
Rated short circuit making capacity, kA peak				2.8				
Rated short time withstand current, kA				2 (0.3sec)				
Rated impulse withstand voltage 〔U_{imp}〕 kV				8				
■Performance								
Utilization category		AC	690V	AC-23A				
IEC 60947-3		DC	250V	DC-22A				
Upstream breaker (OCPD) ㉙				S160-SF				
Weight (◉ marked standard type) kg				0.7	0.9			
■Connections and Mountings								
Front-connected (FC)	Terminal screws			◉				
	With straight extension bars			○				
	With spread extension bars			○				
	Cable clamps			○				
Rear-connected (RC)	Bolt studs			—				
	Flat bar studs			○				
Plug-in (PM)	For switchboards Standard (PMC)			—				
	High-performance (PMB)			—				
	For distribution boards (PMC)			—				
Draw-out type (DR)				—				
TemPlug70 (PG)				—				
TemPlug45B (PG4)				—				
DIN rail mount				○ ⑪				
Clip-in chassis mount				—				
■Accessories (optional)			**Symbol**					
Externally mounted	Motor operator		M C	—				
	External operating handle	Breaker-mounted	H B	●				
		Door-mounted (variable depth)	H P	●				
	Toggle extension		H A	—				
	Mechanical interlock	Slide type	M S	●				
	Toggle holder		H H	●				
	Toggle lock		H L	●				
	Terminal cover	For front-connected	C F	●				
		For rear-connected and plug-in	C R	●				
		For cable clamps	C S	●				
	Interpole barrier		B A	● ③				
	Terminal block for lead		T F	●				
	Door flange		D F	●				
■Standard specifications								
Trip button (color)				Yes (Red)				
Handle position indication (ON: Red, OFF: Green)				Yes				
Suitability for isolation				Yes				
CE marking				Yes				

Notes:

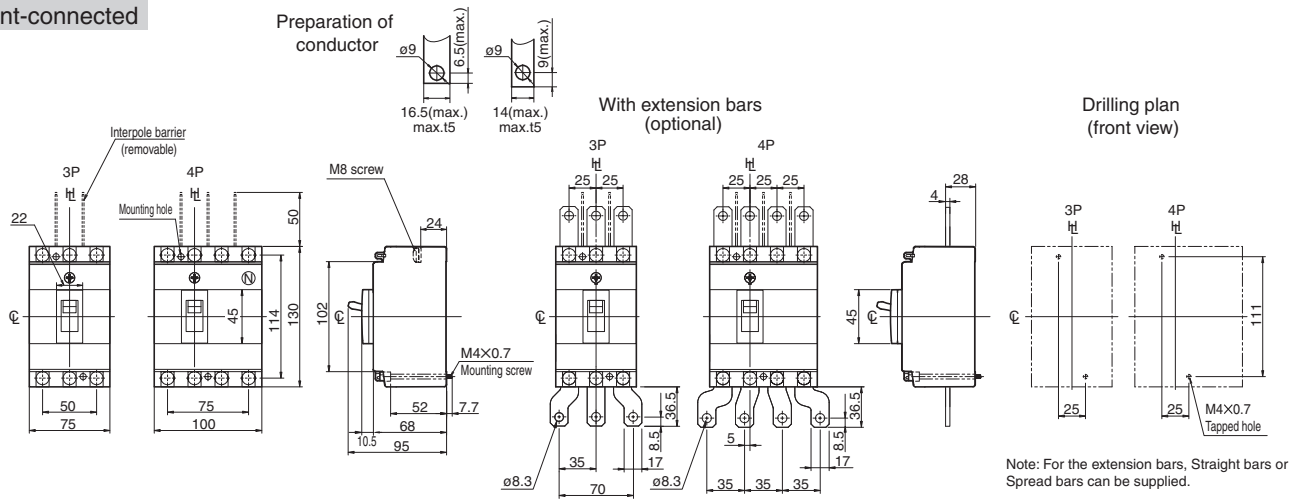
◉ : Standard. This configuration used unless otherwise specified.
○ : Optional standard. Specify when ordering.
● : "yes" or "available".
— : "no" or "not available".
③ : Line side interpole barriers are supplied as standard. (Front connection only)
⑪ : Provided with DIN rail adaptor.
㉙ : Required for overcurrent protection. Rated conditional short-circuit current [I_{cc}] will be the same as Rated short-circuit breaking capacity of upstream breaker.

Combinations of Internally Mounted Accessories (Optional)



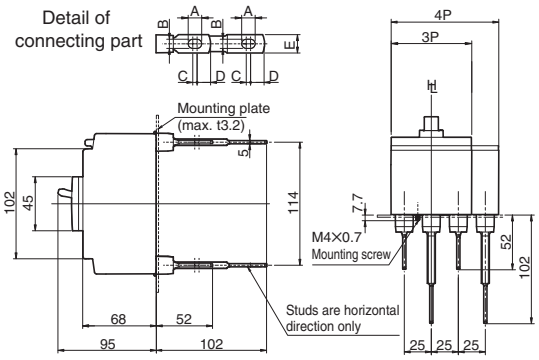
Outline dimensions (mm) S160-SN

Front-connected



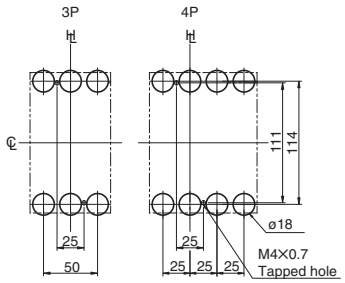
Note: For the extension bars, Straight bars or Spread bars can be supplied.

Rear-connected

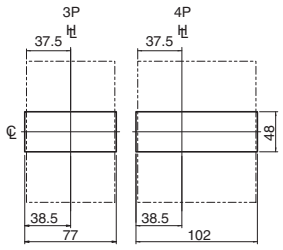


A	B	C	D	E
12.5	8.5	4	13	16

Drilling plan (front view)



Panel cutout (front view)



Panel cutout dimensions shown give an allowance of 1.0mm or more around the handle escutcheon.

Molded Case Circuit Breakers (250A Frame)

S250-SN

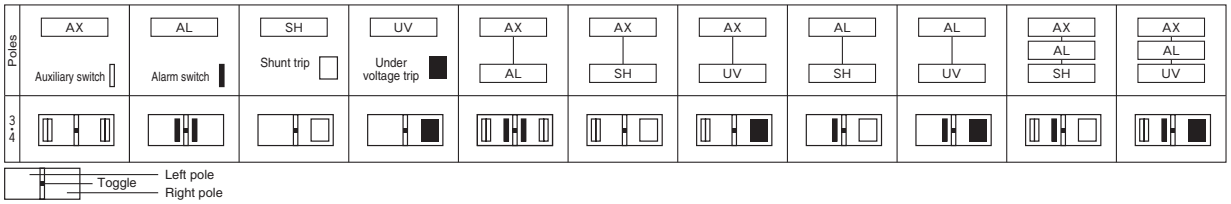
Ratings and Specifications

Type				S250-SN				
Number of poles				3	4			
■Ratings								
Rated current, A				250				
Rated insulation voltage 〔U_i〕 V			AC	800				
Rated operational voltage V			AC	690				
			DC	250				
Rated short circuit making capacity, kA peak				6				
Rated short time withstand current, kA				3 (0.3sec)				
Rated impulse withstand voltage 〔U_{imp}〕 kV				8				
■Performance								
Utilization category		AC	690V	AC-23A				
IEC 60947-3		DC	250V	DC-22A				
Upstream breaker (OCPD) ㉙				S250-SF				
Weight (◉ marked standard type) kg				1.5	1.9			
■Connections and Mountings								
Front-connected (FC)	Terminal screws			◉				
	With straight extension bars			○				
	With spread extension bars			○				
	Cable clamps			○				
Rear-connected (RC)	Bolt studs			—				
	Flat bar studs			○				
Plug-in (PM) For switchboards	Standard (PMC)			—				
	High-performance (PMB)			—				
For distribution boards (PMC)				—				
Draw-out type (DR)				—				
TemPlug70 (PG)				—				
TemPlug45B (PG4)				—				
DIN rail mount				—				
Clip-in chassis mount				—				
■Accessories (optional)			**Symbol**					
Externally mounted: Motor operator			M C	●				
Externally mounted: External operating handle	Breaker-mounted		H B	●				
	Door-mounted (variable depth)		H P	●				
Externally mounted: Toggle extension			H A	—				
Externally mounted: Mechanical interlock	Slide type		M S	●				
Externally mounted: Toggle holder			H H	●				
Externally mounted: Toggle lock			H L	●				
Externally mounted: Terminal cover	For front-connected		C F	●				
	For rear-connected and plug-in		C R	●				
	For cable clamps		C S	●				
Interpole barrier			B A	● ③				
Terminal block for lead			T F	●				
Door flange			D F	●				
■Standard specifications								
Trip button (color)				Yes (Red)				
Handle position indication (ON: Red, OFF: Green)				Yes				
Suitability for isolation				Yes				
CE marking				Yes				

Notes:

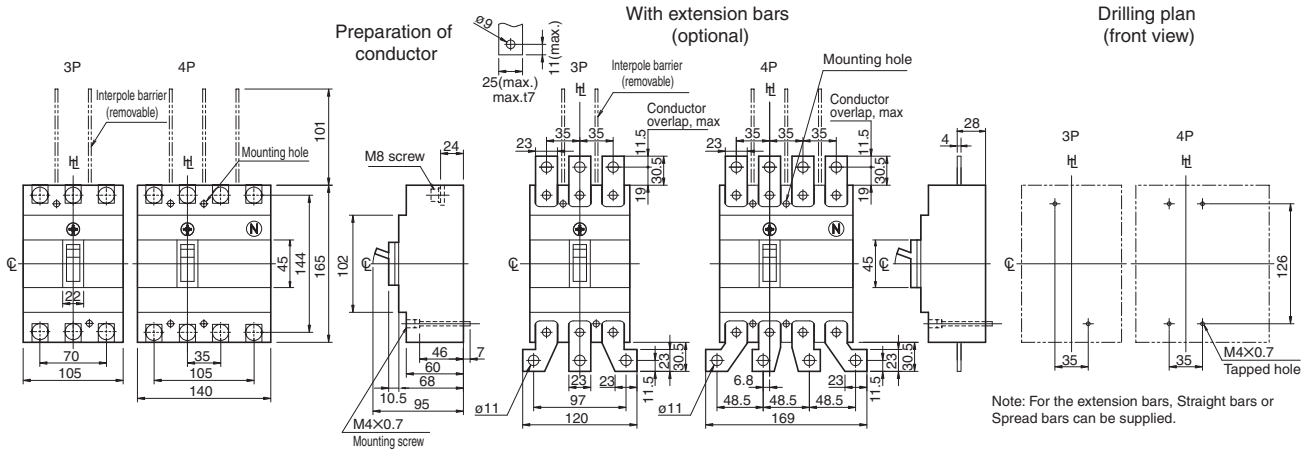
◉ : Standard. This configuration used unless otherwise specified.
○ : Optional standard. Specify when ordering.
● : "yes" or "available".
— : "no" or "not available".
③ : Line side interpole barriers are supplied as standard. (Front connection only)
㉙ : Required for overcurrent protection. Rated conditional short-circuit current [I_{cc}] will be the same as Rated short-circuit breaking capacity of upstream breaker.

Combinations of Internally Mounted Accessories (Optional)

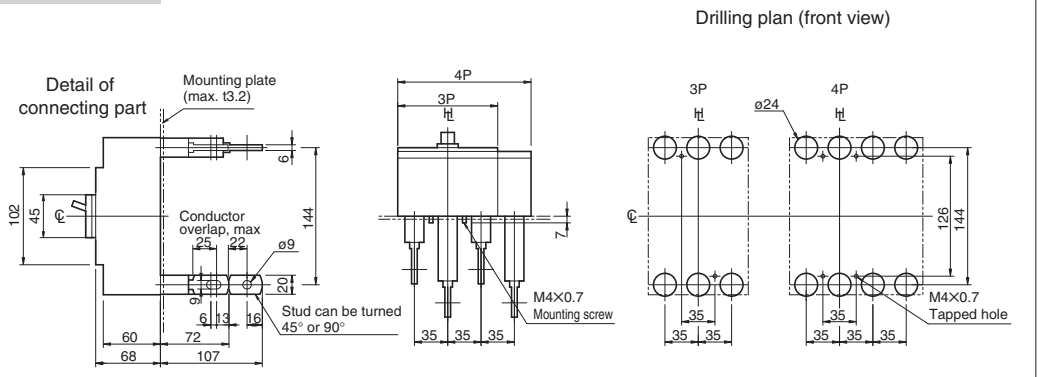


Outline dimensions (mm) S250-SN

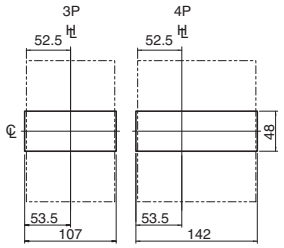
Front-connected



Rear-connected



Panel cutout (front view)



Panel cutout dimensions shown give an allowance of 1.0mm around the handle escutcheon.

TERASAKI
SKANDINAVISKA AB
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TERASAKI ELECTRIC (EUROPE) LTD.
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TERASAKI ELECTRIC (EUROPE) LTD.
FILIALE ITALIA
(Italy)

TERASAKI Global Network

TERASAKI ELECTRIC CO., LTD.
(Head Quarters, Japan)

TERASAKI ELECTRIC
(M) SDN. BHD.
(Malaysia)

TERASAKI CIRCUIT
BREAKERS (S) PTE. LTD.
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TERASAKI DO BRASIL LTDA.
(Brazil)

Since 1971 when we established TERASAKI ELECTRIC Europe, our first overseas subsidiary, in the UK, we have assembled a global network of 10 overseas subsidiaries and 58 agents to provide sales and technical supports to customers worldwide.

⚠ Safety Notice

Carefully read instruction manual to ensure proper installation, connection, operation, handling and maintenance of the product.

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