Solid-state trip types, SA1000E, 1200E, 1600E

■ Description

- **Equipped with a load current pre-trip alarm**
  Constantly monitors the load current, and outputs an alarm when the set current is exceeded.
- **Adjustable rated current**
  The rated current is easy to vary in 5 to 6 steps using an adjustment dial.
- **Wide-range-adjustable trip characteristics**
  The current and time for instantaneous tripping and short-/long-time delay tripping can be set by the user.
- Adjustable ground fault tripping determinate and set a current level for ground fault detection in the ranging between 10% to 40% of the rated CT current.

■ Breaking capacities

Series	Breaker ampere frame	Basic type	Pole	Rated current (A)	Insulation voltage Ui (V)	Breaking capacity [Icu/Ics] IEC60947-2 AC (kA) 230V	400V	440V	500V	600V	DC 250V
S	1000	**SA1003E**	3	500-600-700-800-900-1000	690	100/75	65/49	65/49	45/34	25/19	–
		SA1004E	4	500-600-700-800-900-1000	690	100/75	65/49	65/49	45/34	25/19	–
	1200	**SA1203E**	3	600-700-800-1000-1200	690	100/75	65/49	65/49	45/34	25/19	–
		SA1204E	4	600-700-800-1000-1200	690	100/75	65/49	65/49	45/34	25/19	–
	1600	**SA1603E**	3	800-900-1000-1200-1400-1600	690	125/94	85/64	85/64	65/49	45/34	–
		SA1604E	4	800-900-1000-1200-1400-1600	690	125/94	85/64	85/64	65/49	45/34	–

■ Type number nomenclature

SA1203E / 1200 X M WKF F=AC200V I I=AC100V

Basic type

Rated current

Mounting and connection
Blank: Front mounting, front connection
X: Front mounting, rear connection
E: Flush mounting, rear connection

Operating device
Blank: Manual operation
M: Motor operating

Internal accessory
W: Auxiliary switch
K: Alarm switch
F: Shunt trip
R: Undervoltage trip

Control voltage for protection function
I= □ : Adjustable pre-alarm
U= □ : Adjustable ground fault current trip

Rated voltage	Allowable voltage
100 to 120V AC	85 to 132V
200 to 240V AC	170 to 264V

Protection function
Adjustable pre-alarm
Adjustable ground fault current trip

Operating voltage for accessory
F= □ : Shunt trip device
R= □ : Undervoltage trip device
M= □ : Motor operating mechanism

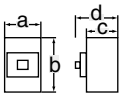
■ Ordering information

Specify the following:

1.Type number

Solid-state trip types
Quick selection guide

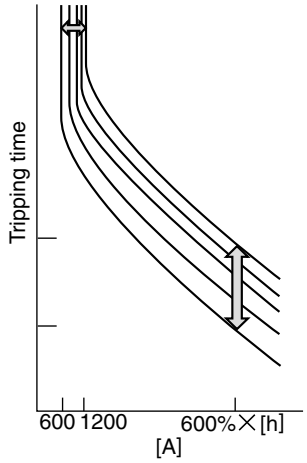
■ S series

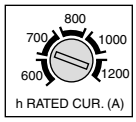
Frame			1000A		1200A		1600A	
Pole			3	4	3	4	3	4
Type			**SA1003E**	**SA1004E**	**SA1203E**	**SA1204E**	**SA1603E**	**SA1604E**
Rated current(A)			Adjustable 500—600—700—800—900—1000		Adjustable 600—700—800—1000—1200		Adjustable 800—900—1000—1200—1400—1600	
Rated insulation voltage(V)		AC	690		690		690	
		DC	—		—		—	
Rated breaking capacity(kA) [IEC 60947-2] (Icu/Ics)		600V AC	25/19	25/19	25/19	25/19	45/34	45/34
		500V AC	45/34	45/34	45/34	45/34	65/49	65/49
		440V AC	65/49	65/49	65/49	65/49	85/64	85/64
		415V AC	65/49	65/49	65/49	65/49	85/64	85/64
		400V AC	65/49	65/49	65/49	65/49	85/64	85/64
		380V AC	85/64	85/64	85/64	85/64	100/75	100/75
		230V AC	100/75	100/75	100/75	100/75	125/94	125/94
		250V DC	—	—	—	—	—	—
Dimensions (mm) *Page 95*		a	210	280	210	280	210	280
		b	370	370	370	370	370	370
		c	120	120	120	120	140	140
		d	171	171	171	171	191	191
Protection function	Long-time delay tripping time (s)		5-30 (at 6In) (Adjustable)					
	Short-time delay tripping current (A)		2In-10In (Adjustable)					
	Short-time delay tripping time (s)		0.1-0.3 (Adjustable)					
	Instantaneous tripping current (kA)		3.0-12 (Adjustable)		3.75-15 (Adjustable)		4.8-19.2 (Adjustable)	
	Ground fault current tripping or pre-alarm		●		●		●	
Mass(kg) Front mounting, front connection			22	28	22	28	27	35
Tripping device			Solid-state		Solid-state		Solid-state	
Trip button			Provided		Provided		Provided	
Mounting								
Front mounting, front connection		No mark	●		●		●	
Front mounting, rear connection		X	● Bar Stud		● Bar stud		● Bar stud	
Flush mounting, rear connection		E	● Bar Stud		● Bar stud		● Bar stud	
Internal accessories								
Auxiliary switch		W	●		●		●	
Alarm switch		K	●		●		●	
Shunt trip		F	●		●		●	
Undervoltage trip		R	●		●		●	
Pre-Alarm		I	▲		▲		▲	
Ground fault trip		U	▲		▲		▲	
External accessories								
Operating handle N-type		N	●		●		●	
G-type		G	●		●		●	
Terminal cover Long		TB	▲		▲		▲	
Insulation barrier Interphase		B	●		●		●	
Handle locking cover		L	●		●		●	
Lead-wire terminal block		A	●		●		●	

●Available – Not available ▲ Factory-mounted accessory

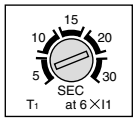
Protection function

• Long-time delay tripping (Rated current adjustable)



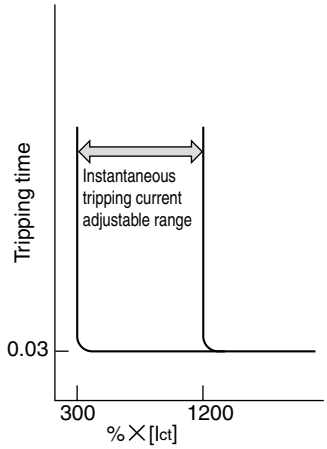


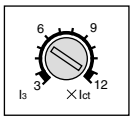
Current setting range



Time setting range, 5 to 30s at 600% of the rated current I_1

• Adjustable instantaneous tripping

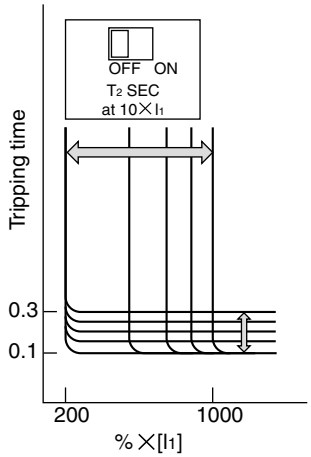


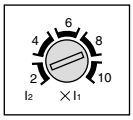


Current setting range, 300 to 1200% of rated primary current I_{ct}

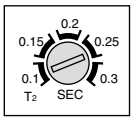
• Adjustable short-time delay tripping

Coordination with solid-state trip type MCCB



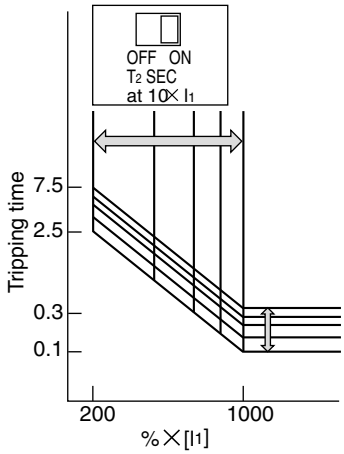


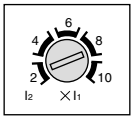
Current setting range, 200 to 1000% of the rated current I_1



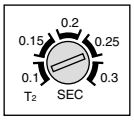
Time setting range, 100 to 300ms

Coordination with thermal-magnetic trip type MCCB



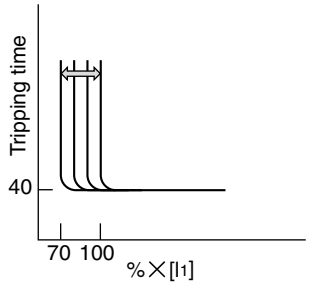


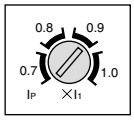
Current setting range, 200 to 1000% of the rated current I_1



Time setting range, 100 to 300ms. ramp characteristic

• Adjustable pre-trip alarm

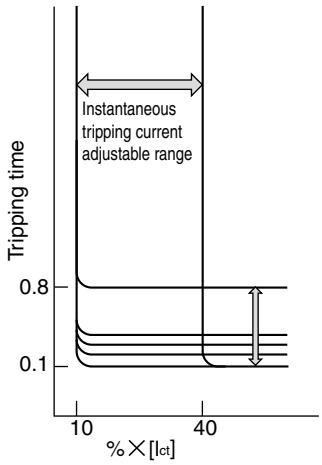


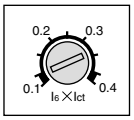


Pre-alarm current setting range, 70 to 100% of the rated current I_1.

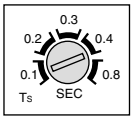
Pre-trip alarm operating time, 40s constant.

• Adjustable ground fault tripping





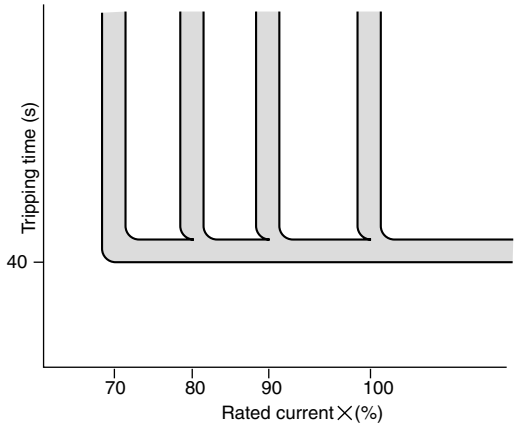
Current setting range, 10 to 40% of the rated primary current



Time setting range, 100 to 800ms

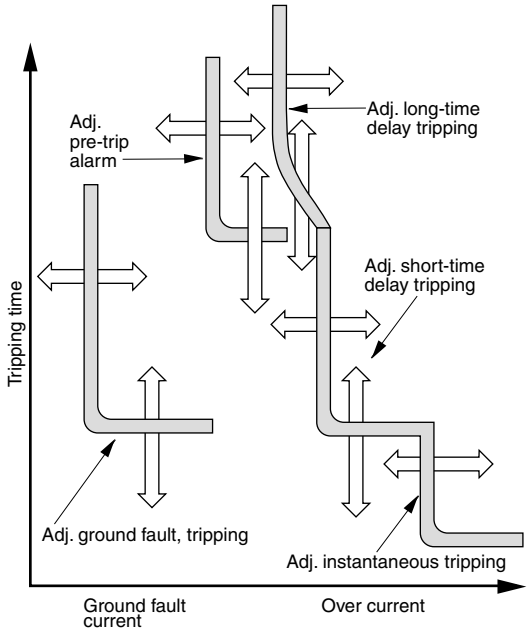
■ Pre-trip alarm function

Constantly monitors the load current, and outputs an alarm when it exceeds the set current. Helpful for preventive maintenance and power management.
The pre-trip alarm operates via an LED on the breaker surface and a contact output. Separate power supply is necessary.
The pre-trip alarm setting range allows adjustment to 70, 80, 90, or 100% of the rated current.

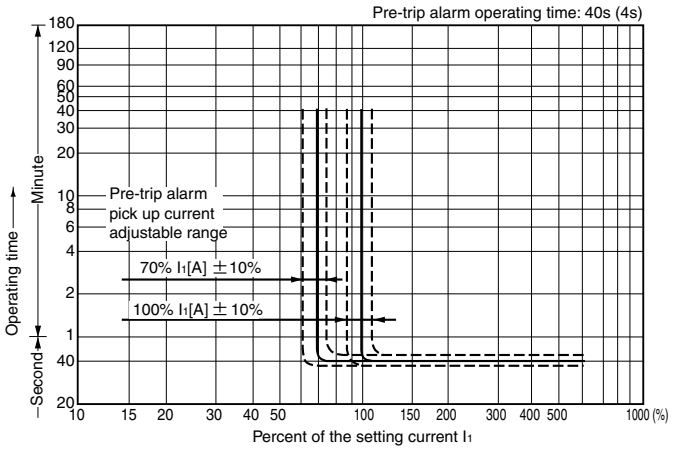


■ Multi protection function

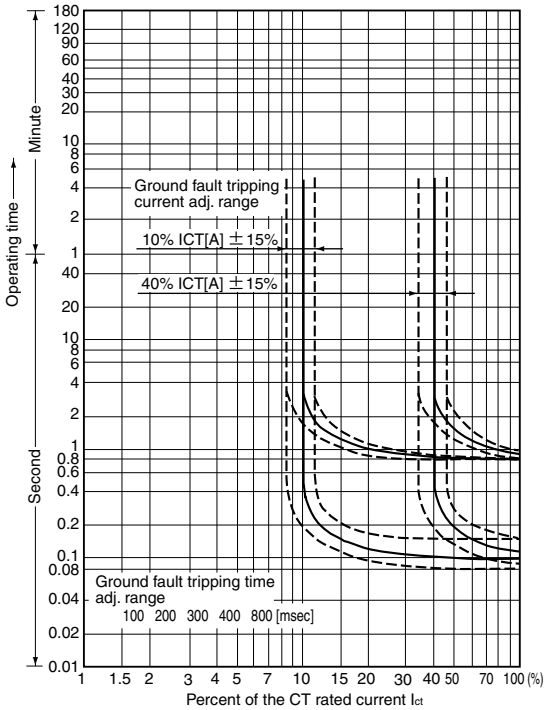
Wide-range-adjustable trip characteristics with high precision. Either ground fault tripping or the pre-trip alarm can be selected as an option (not both).



• Pre-trip alarm characteristics



• Ground fault tripping characteristics



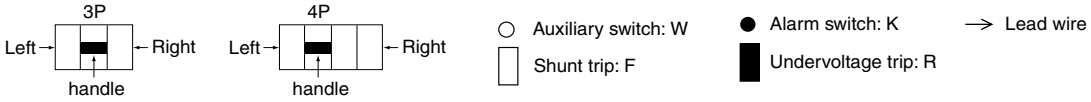
■ Terminal Connection/Front mounting, Front Connection

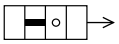
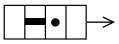
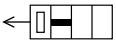
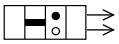
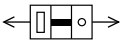
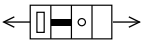
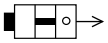
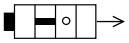
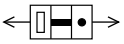
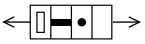
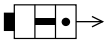
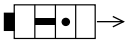
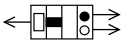
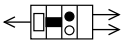
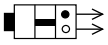
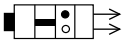
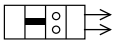
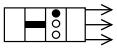
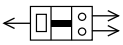
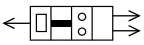
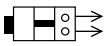
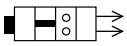
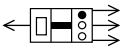
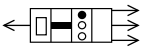
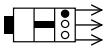
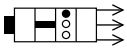
• MCCBs and cables according to the screw size and tightening torque as shown in the table below.

MCCB type	Screw and Bolt	Size [mm]	Tightening torque [N·m]
SA1003E, SA1004E SA1203E, SA1204E	 Hexagonal head bolt	M12 x 55	40.2 to 65.7
SA1603E, SA1604E	Not supplied	–	–

Solid-state trip types
Internal accessories

■ Available configurations



	SA1003E SA1203E SA1603E	SA1004E SA1204E SA1604E
Auxiliary switch SPDT W		
Alarm switch SPDT K		
Shunt trip F		
Under voltage trip R		
W+K		
W+F		
W+R		
K+F		
K+R		
W+K+F		
W+K+R		
W2		
W2+K		
W2+F		
W2+R		
W2+K+F		
W2+K+R		

■ Auxiliary switch and alarm switch

These devices indicate the MCCB's operation status electrically.

- Auxiliary switch (W)
  Auxiliary switch indicates the ON/OFF status of MCCB.
- Alarm switch (K)
  Alarm switch indicates the trip status of MCCB. MCCB trips at the time when the following condition occurs:
  · Overcurrent
  · Short-circuit current

■ Ratings of auxiliary switch (W) and alarm switch (K)

• Standard type

AC			DC			Minimum load
Voltage (V)	Current (A)		Voltage (V)	Current (A)		
	Resistive load	Inductive load		Resistive load	Inductive load	
480	3	2	250	0.3	0.3	30V DC 26.7mA 5V DC 160mA
250	5	5	125	0.3	0.6	
125	5	5	30	5	4	

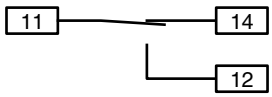
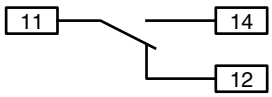
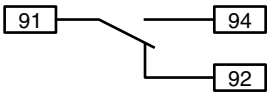
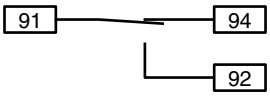
Note: Inductive load condition: Power factor 0.4 or more (AC), time constant 7ms or less (DC)

• For low level circuit

AC		DC		Minimum load
Voltage (V)	Current (A)	Voltage (V)	Current (A)	
	Resistive load		Resistive load	
125	0.1	30	0.1	30V DC 1mA 5V DC 1mA

Note 1: When ordering, specify WD, KD.

• Operation of auxiliary switch and alarm switch

Type of Accessory	Handle position		
	ON	OFF	TRIP
Auxiliary switch (W)			
Alarm switch (K)			

06

■ Shunt trip (F) and undervoltage trip device (R)

• Shunt trip (F)
The purpose of the shunt trip device is to trip the MCCB remotely.
• Undervoltage trip device (R)
The undervoltage trip device trips the MCCB when the MCCB primary voltage is lower than the specified voltage.

• Ratings of shunt trip device (F)

Rated voltage	Coil energized current (A) *1	Allowable voltage fluctuation (V)	Maximum operating time (ms) *2
100-115V AC	1.1	85-126.5	30
200-480V AC	0.93	170-528	
24V DC	2.52	18-26.4	
48V DC	1.55	36-52.8	
100-115V DC	0.67	75-126.5	
200-230V DC	0.35	150-253	

Note *1: The current value at rated voltage maximum value (60Hz AC)
*2: The time period from when the rated voltage is applied to the shunt trip coil until the MCCB main contact opens.
• : The shunt trip device operation is short-time rating. To prevent the device from burning, continuous signal to the device should not be applied.

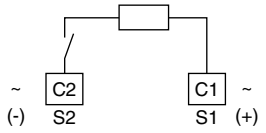
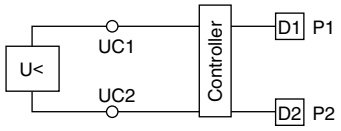
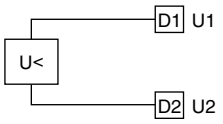
• Ratings of undervoltage trip device (R)

Rated voltage	Coli power consumption (VA)	Tripping voltage range (V)	Closing voltage (V)	Maximum applicable voltage (V)	Maximum operating time (ms) *2
100-120V AC	5 or more	70-20	85 or more	132 or less	30
200-240V AC		140-40	170 or more	264 or less	
380-450V AC		266-76	323 or more	495 or less	

Rated voltage	Coil energized current (A) *1	Tripping voltage range (V)	Closing voltage (V)	Maximum applicable voltage (V)	Maximum operating time (ms) *2
24V DC	22.7	16.8-4.8	20.4 or more	26.4 or less	30
100-115V DC	6.0	70-20	85 or more	126.5 or less	

Note *1: The current value at rated voltage maximum value
*2: The time period from when the rated voltage is applied to the shunt trip coil until the MCCB main contact opens.
• : When you turn on the tripped MCCB, perform the reset operation first and then turn ON the MCCB.

• Wiring diagram and terminal symbol

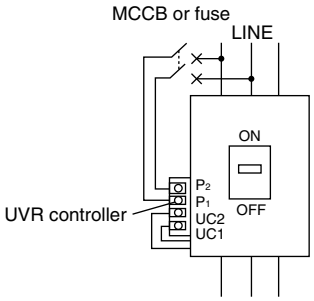
Type of accessory		Wiring diagram and terminal symbol
Shunt trip device	F	With burn-out-preventive contact 
Undervoltage trip device	R	With UVR controller  Without UVR controller 

■ UVR controller

- When using AC type undervoltage trip device (R), be sure to use a UVR controller.
- UVR controllers are equipped with standard type MCCBs at factory shipment. Separately installed type controllers are also available.

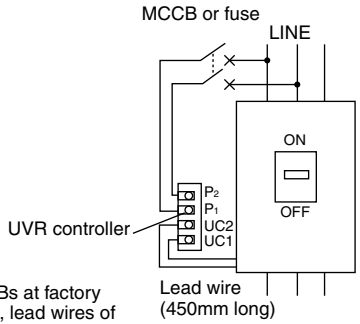
• UVR controller wiring diagram

Installing UVR controller on MCCB

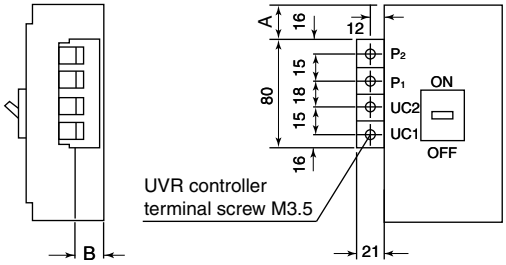


On MCCBs at factory shipment, lead wires of terminals UC1 and UC2 are provided.

Installing UVR controller separately



• Installing position of UVR controller on MCCB and terminal arrangement

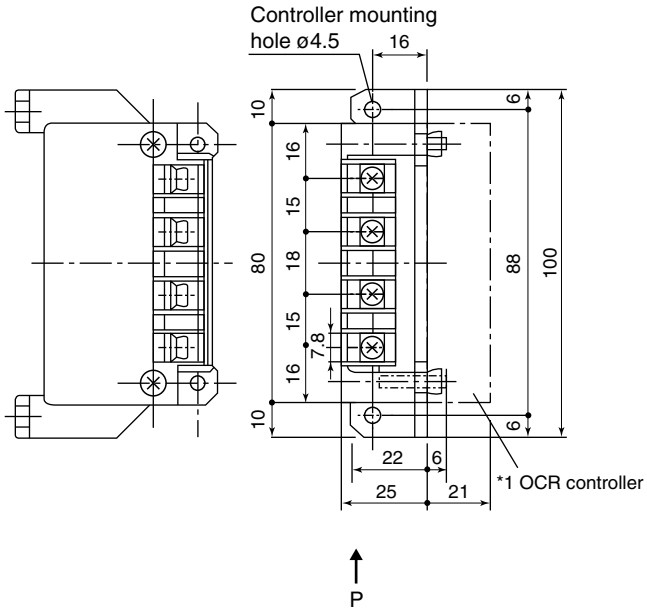


Unit: mm

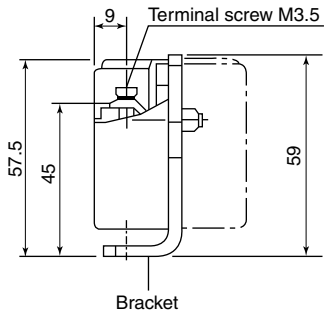
Frame size	MCCB type	A	B
1000, 1200	SA1003E, SA1004E SA1203E, SA1204E	114(138)	72
1600	SA1603E, SA1604E	114(138)	92

Notes: • Terminal screw tightening torque: M3.5 screw, 0.88-1.18N m
• Applicable wire size 2.0mm² max.

• UVR controller outline dimensions, mm

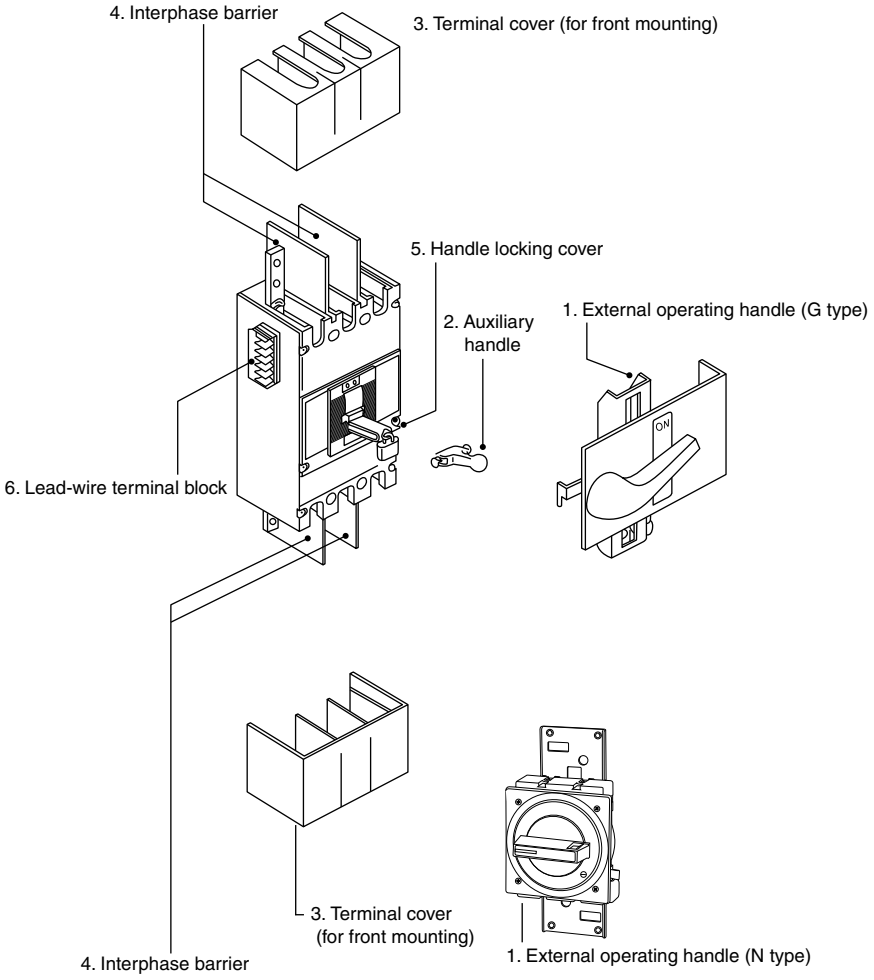


View from P



*1: For separate installation, install an OCR controller together with the UVR controller

■ Variation of external accessory



1. External operating handle
   Mounted on the control panel or switchboard to externally operate MCCB installed inside control panel or switchboard. The following 3 type handles are available.
   · Panel front mounted type (G type)
   The external operating handle is mounted on the control pane or switchboard doors.
   · MCCB mounted type (N type)
   This external operating handle is directly mounted to the MCCB installed inside the panels.

2. Auxiliary handle
   Reduce the required force to turn ON/OFF/RESET the MCCB.

3. Terminal cover (TB)
   Used to protect fingers touching live parts.
   · For front mounting MCCBs

4. Interphase barrier (B)
   The interphase barrier reinforces the insulation between terminals to prevent accidents.

5. Handle padlocking device (L)
   MCCB handles can be locked at either the ON or OFF position with this device. Prepare padlocks commercially available.

6. Lead-wire terminal block (A)
   MCCB side mounted lead-wire terminal block.

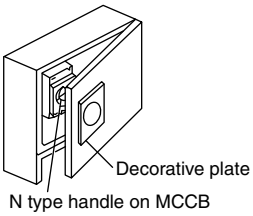
■ Operating handle (N type)

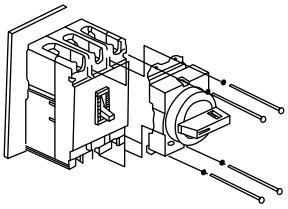
• The N type operating handle is directly mounted on the MCCBs.

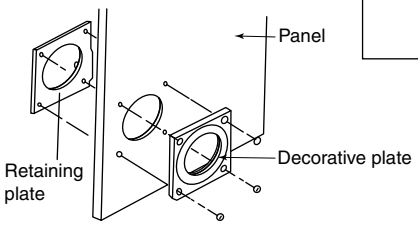
KKD06-278

• N type

MCCB type	Type	Dust-proof packing
SA1003E, SA1004E SA1203E, SA1204E SA1603E, SA1604E	**BZ6N101C**	**BZ-NPC**



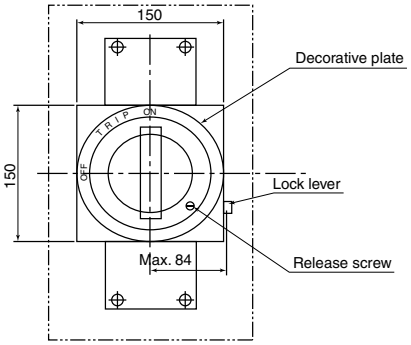


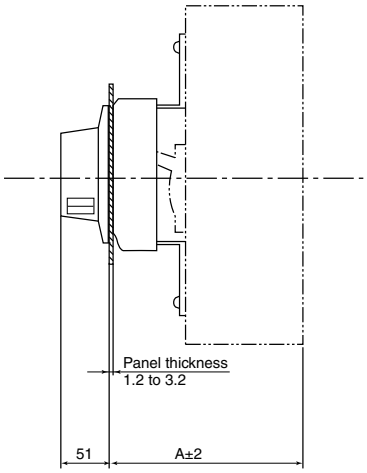


• Operating method

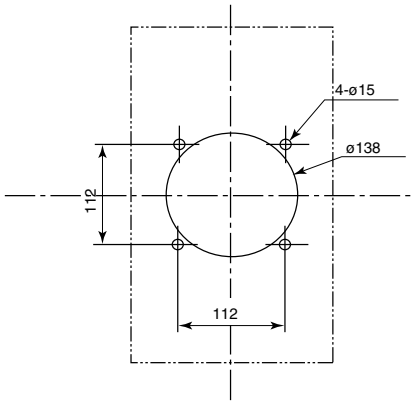
· The MCCB ON, OFF, and RESET operation can be made by turning the handle. When the MCCB trips, the handle moves to the TRIP position.
· If you turn the RELEASE screw with a screwdriver, the door can be opened while the MCCB is closed.
· The handle can be locked using a padlock to hold MCCB at either ON or OFF position. Prepare a commercially available padlock. Recommended padlock shackle size is ø3.5-6mm.

• Dimensions, mm

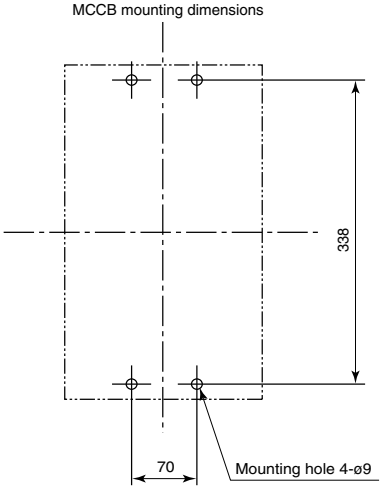




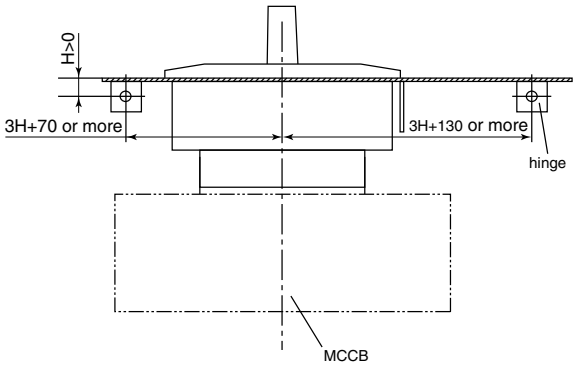
Panel door cutting



MCCB mounting dimensions



Operating handle position viewed from MCCB LOAD side



Applicable MCCB type	A
SA1003E, SA1004E SA1203E, SA1204E	197
SA1603E, SA1604E	217

■ Ordering information

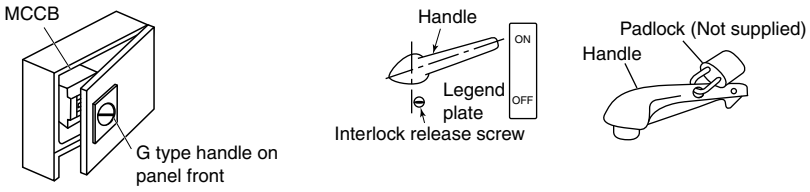
Specify the type number.

■ Operating handle (G type)

• The G type operating handle is mounted on the panel front.

• G type

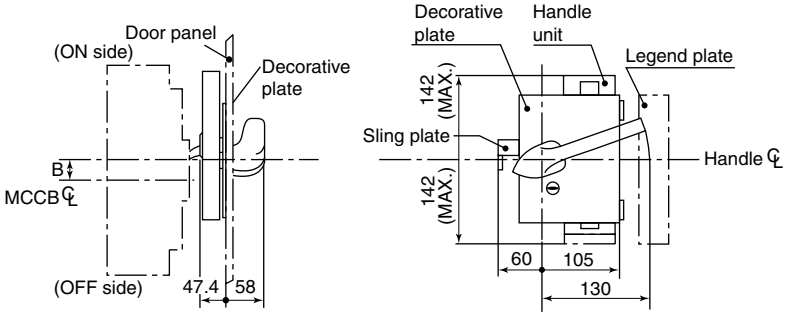
MCCB type	Type
SA1003E, SA1004E SA1203E, SA1204E SA1603E, SA1604E	**BZ6G101C**

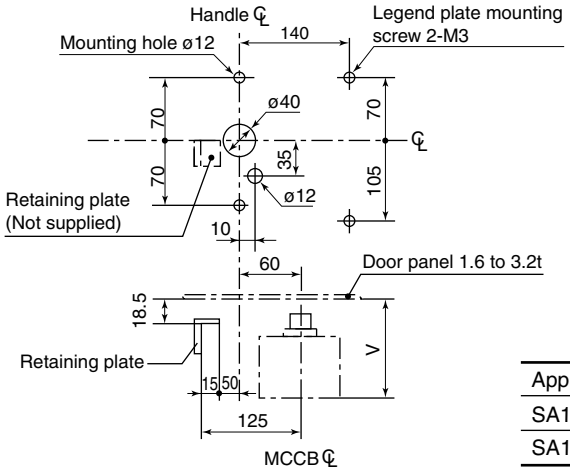


• Operating method

· The MCCB ON, OFF, and RESET operation can be made by turning the handle. When the MCCB trips, the handle moves to the TRIP position.
· If you turn the RELEASE screw with a screwdriver, the door can be opened while the MCCB is closed.
· The handle can be locked using a padlock to hold MCCB at OFF position. Prepare a commercially available padlock. Recommended padlock shackle size is ø8mm.

• Dimensions, mm





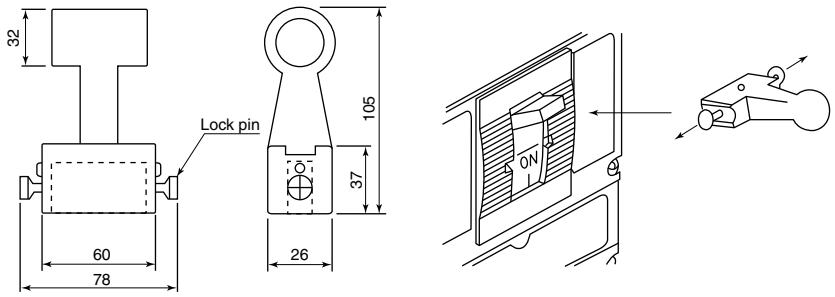
Applicable MCCB type	A	B
SA1000E, SA1200E	199.4	3
SA1600E	219.4	

■ Ordering information

Specify the type number.

■ Auxiliary handle

• Reduce the required force to turn ON/OFF/RESET the MCCB.
• One auxiliary handle is supplied with one MCCB as standard.



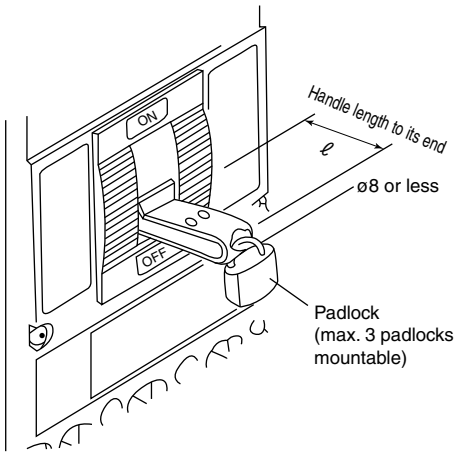
Attaching and removing handle
Pull out the lock pins on both right and left sides in the direction of the arrows, and put the auxiliary handle onto the handle of the MCCB. The auxiliary handle is fixed with spring force. When removing, pull out the lock pins the same way in the direction of arrows and take off the auxiliary handle.

Applicable MCCB type	Type
SA1003E, SA1004E SA1203E, SA1203E SA1603E, SA1603E	Supplied as standard

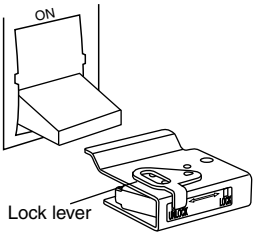
■ Handle padlocking device

• When the handle padlocking device is locked, the MCCB handle can be locked in the OFF (open) position.
• Use the commercially available padlocks with shackle of diameter 4-8mm.

Applicable MCCB type	Type
SA1003E, SA1004E SA1203E, SA1203E SA1603E, SA1603E	**BZ6L101C**



Use of handle padlocking device
Put the handle padlocking device's lock lever at UNLOCK (lock release) position and attach the padlocking device to the MCCB handle. Once the lock lever is turned to the LOCK (locked) position, the MCCB handle ON (closed) operation and OFF (open) operation are prohibited. When using the MCCB with the handle being locked, lock with the padlock(s) in this state.



KKD06-275

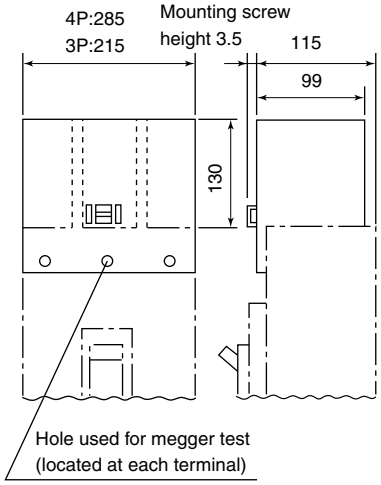
■ Ordering information

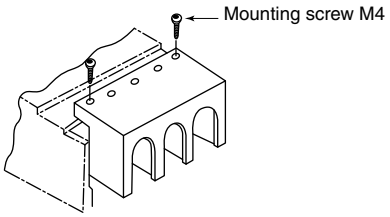
Specify the type number.

■ Terminal cover

• Finger protection guards against electric shock from accidentally touching live terminals.
• Specify when you order the main unit of the MCCB.

Applicable MCCB type	Type	Quantity supplied
SA1003E, SA1203E	**BZ6TB101C**	2 pieces
SA1004E, SA1204E		





*1: Use wire of size 100m² or less. When using wire of 150mm², please cusult with Fuji.
*2: Not applicable to 3-pole MCCBs with terminal block (option)

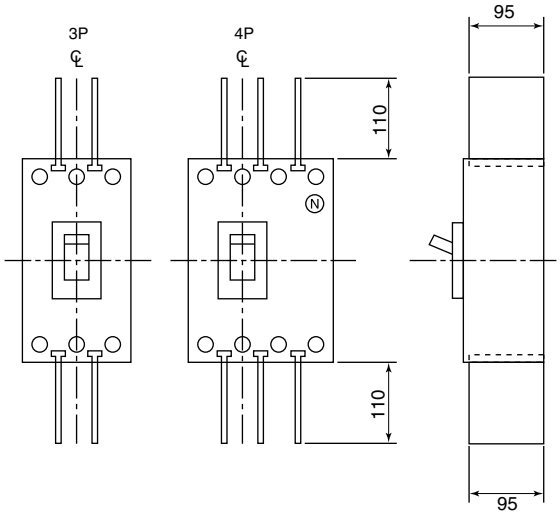
■ Ordering information

Specify the type number.

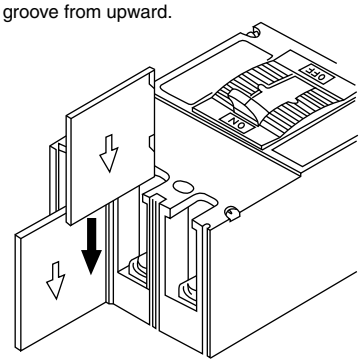
■ Interphase barrier

• The interphase barrier reinforces the insulation between terminals to prevent accidents.

Applicable MCCB type	Type	Quantity supplied
SA1003E, SA1203E, SA1603E	**BZ6B101C3**	2 pieces
SA1004E, SA1204E, SA1604E	**BZ6B101C4**	3 pieces



When mounting the interphase barrier to the MCCB, insert the barrier into the MCCB's groove from upward.



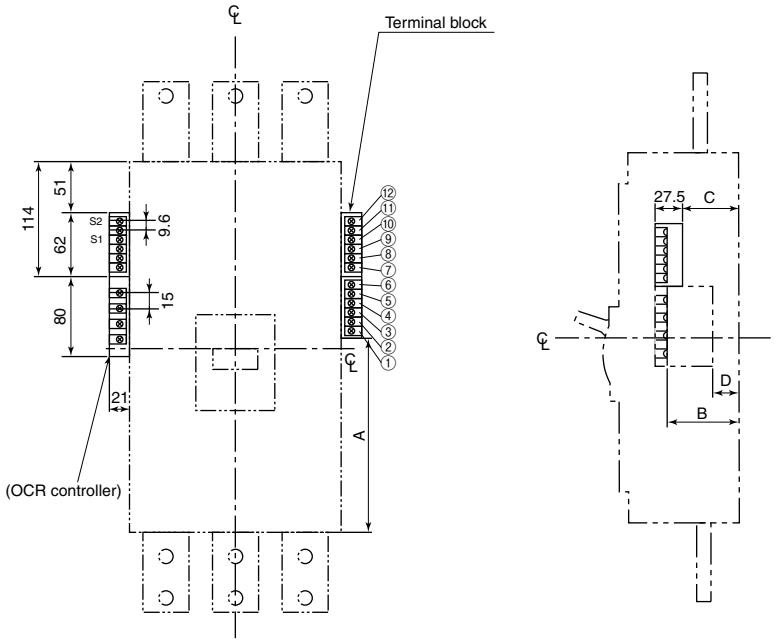
■ Ordering information

Specify the type number.

■ Lead-wire terminal block

The lead-wire terminal blocks are applicable to front-mounting or rear-mounting MCCBs with internal accessories. The lead-wire from internal accessories are already connected to terminals. One terminal block consists of 6 pairs of terminals. The mountable accessories are determined according to the types and quantity of internal accessories.

Mounting position and standard terminal arrangement



Indication	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫
Terminal number	91	94	92	11	14	12	21	24	22			
Terminal symbol	ALc1	ALa1	ALb1	AXc1	AXa1	AXb1	AXc2	AXa2	AXb2	PALc	PALa	
Accessories	K			W1			W2					

Dimensions, mm

MCCB type	A	B	C	D
SA1003E, SA1203E	194	72	57	27
SA1004E, SA1204E	184	72	57	27
SA1603E	194	92	77	47
SA1604E	184	92	77	47

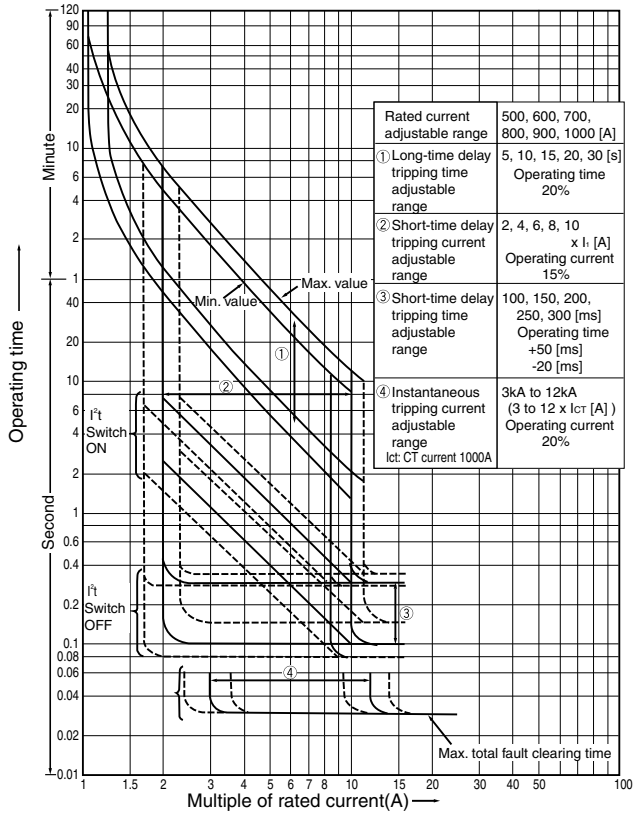
Notes: 1. Terminal screw M3.5
2. Terminal screw tightening torque 0.88-1.18N m
3. Applicable wire size 2.0mm^2 (Max.) x 2 wires

■ Ordering information

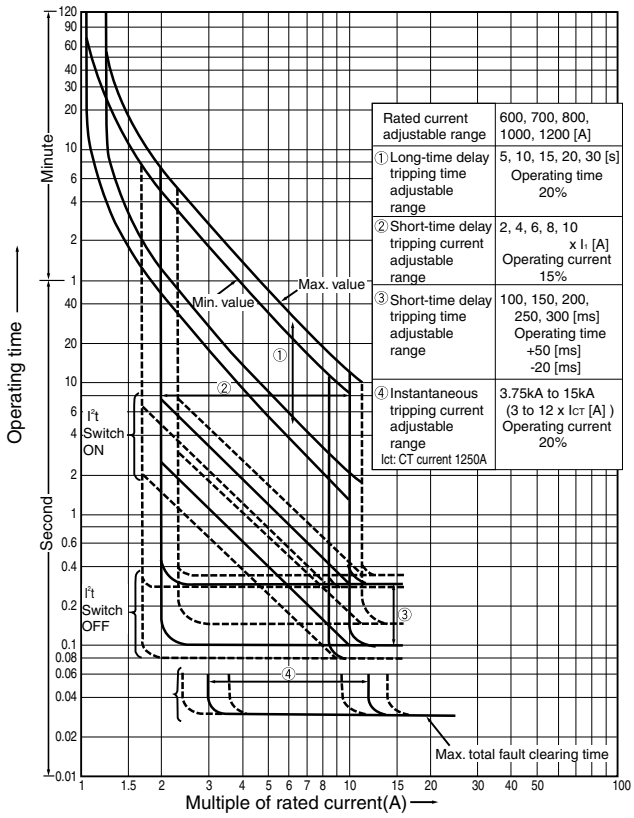
Specify the type number.

■ Operating characteristic

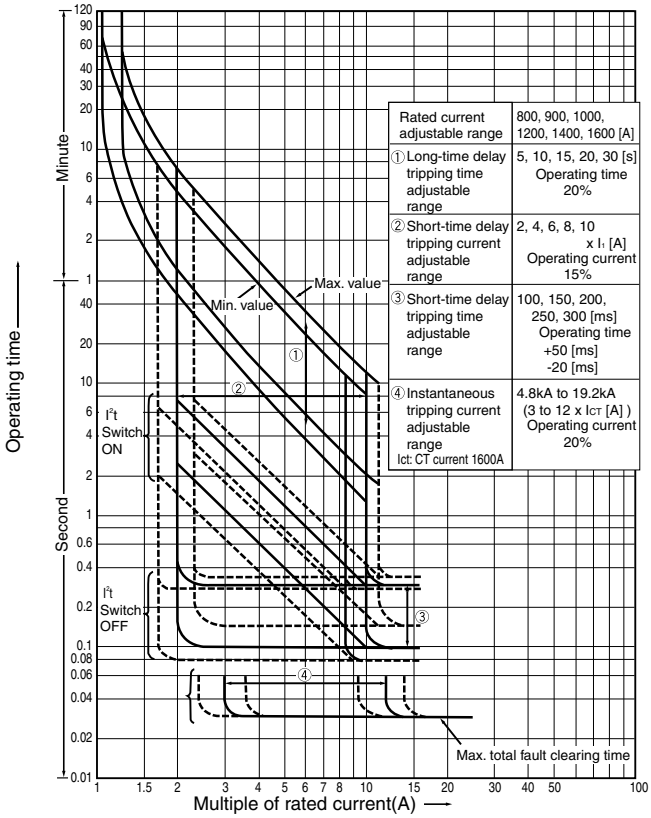
SA1000E



SA1200E



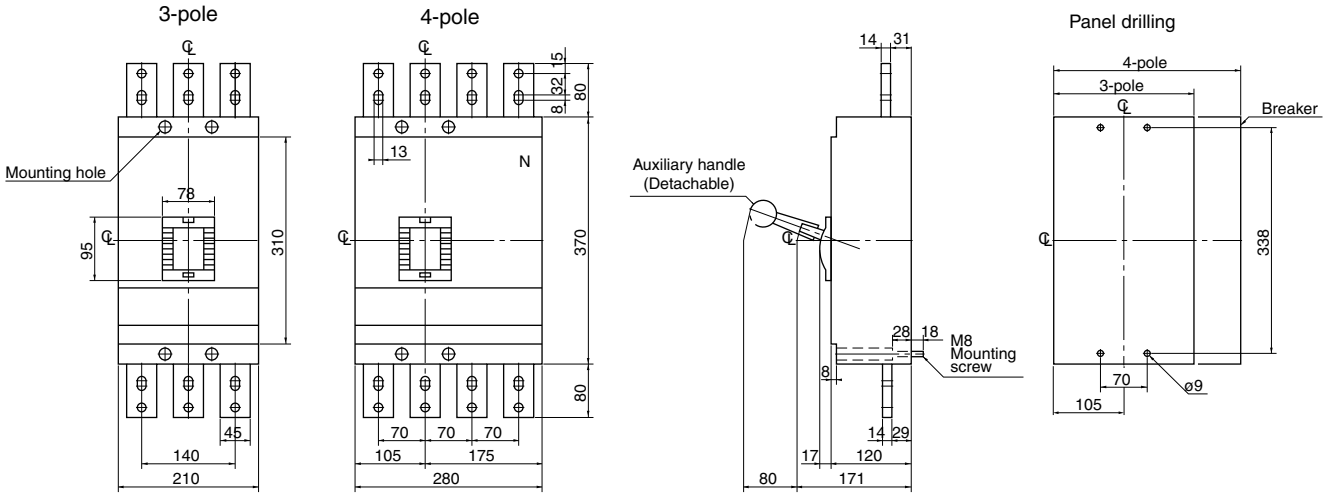
SA1600E



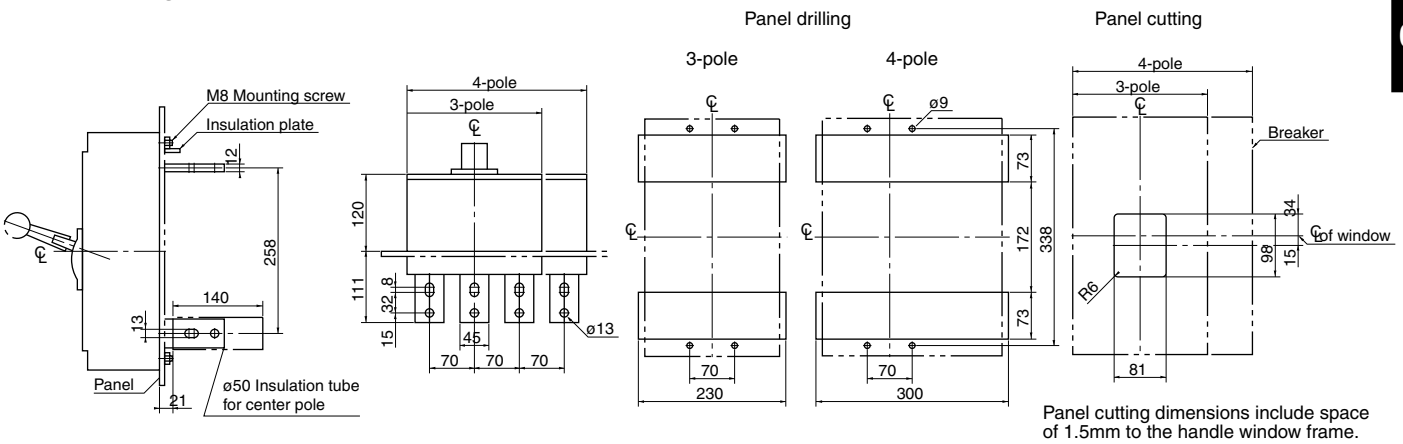
■ Dimensions, mm

SA1000E, 1200E

Front mounting, front connection



Front mounting, rear connection



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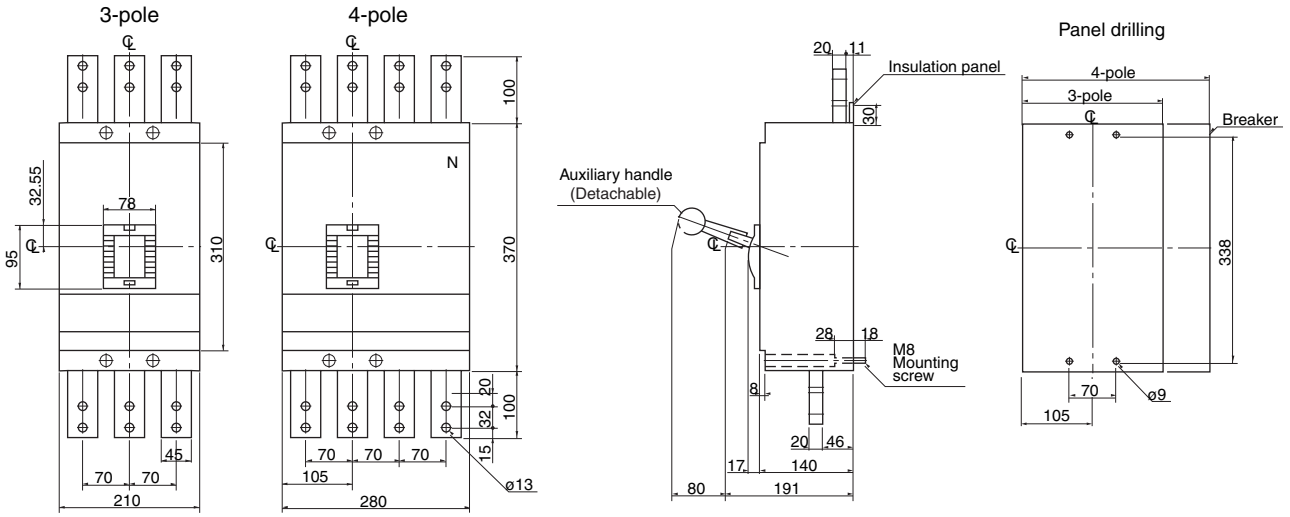
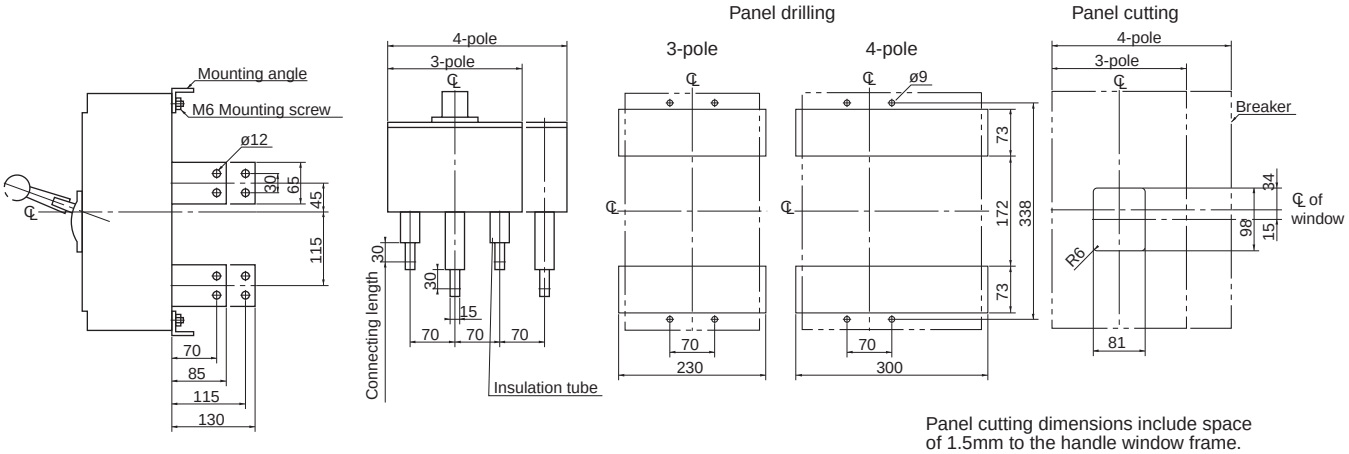
■ Dimensions, mm

SA1600E

Front mounting, front connection



Front mounting, rear connection



Panel cutting dimensions include space of 1.5mm to the handle window frame.