



Metasol *Meta Solution*

MCCB/ELCB

Molded Case Circuit Breakers
Earth Leakage Circuit Breakers



LSIS



Green Innovators of Innovation

***Upgraded for the global
best worth!***

Metasol

Molded Case Circuit Breaker / Earth Leakage Circuit Breaker

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Metasol
ABS 203c

250AF		3P
Ue	~	Ics-Icu
690V	~	8kA
480/500V	~	26kA
415/480V	~	37kA
380V	~	42kA
220/240V	~	85kA
500V	~	20kA
250V	~	20kA
Ics = 100%Icu		
50/60Hz		
Cat. A		



Metasol

Meta solution



Metasol	
ABS 203c	
250AF	3P
Ue	
690V	
480/500V	
415/460V	
380V	
220/240V	
500V	
250V	
Ics = 100%Icu	
50/60Hz	
Cat. A	
	Ics/Icu
	8kA
	26kA
	37kA
	42kA
	85kA
	20kA
	20kA

CE
IEC60947-2
LS IS
MADE IN KOREA

MCCB = ELCB

Metasol

Molded Case Circuit Breaker / Earth Leakage Circuit Breaker

Upgrade of Meta-MEC series

... **Metasol** Low Voltage Circuit Breaker

- $U_i = 1,000V$
- $U_{imp} = 8kV$



- ***Compatible and differentiated design***

- Compatible with the Meta-MEC
- Outlook differentiated design

- ***Same external dimension with MCCB and ELCB***

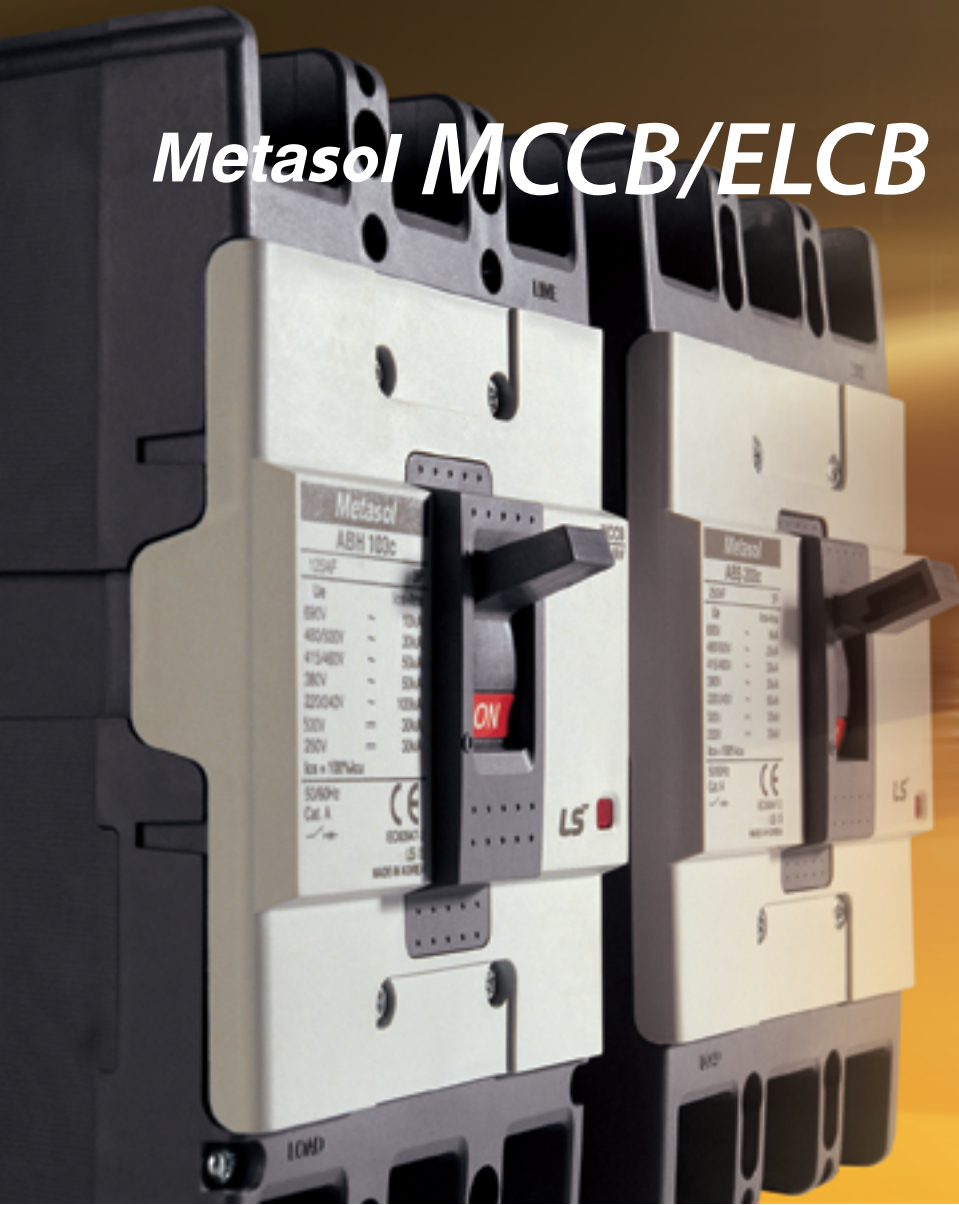
- ***Upgrade the coordination***

- Upgrade the coordination with Susol / Meta-MEC mass capacity

- ***Upgrade breaking capacity***

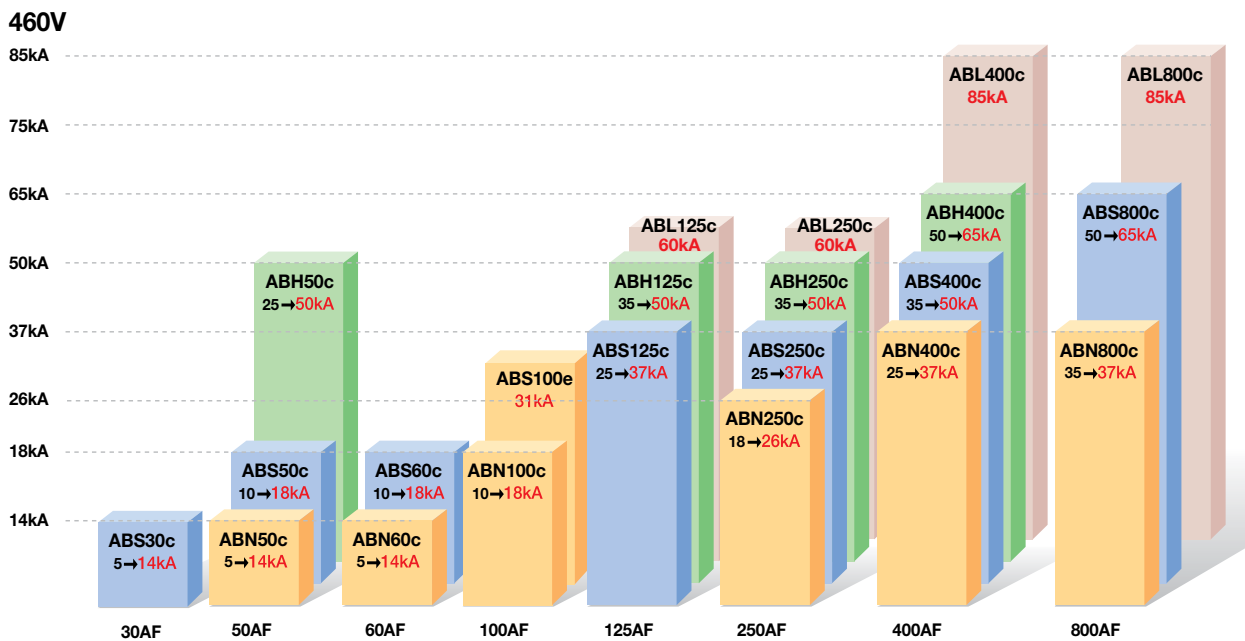
- N100AF : 10 ➔ 18kA
- S125AF : 25 ➔ 37kA
- S250AF : 25 ➔ 37kA
- H250AF : 35 ➔ 50kA
- N400AF : 25 ➔ 37kA
- S400AF : 35 ➔ 50kA
- S800AF : 50 ➔ 65kA

Metasol MCCB/ELCB

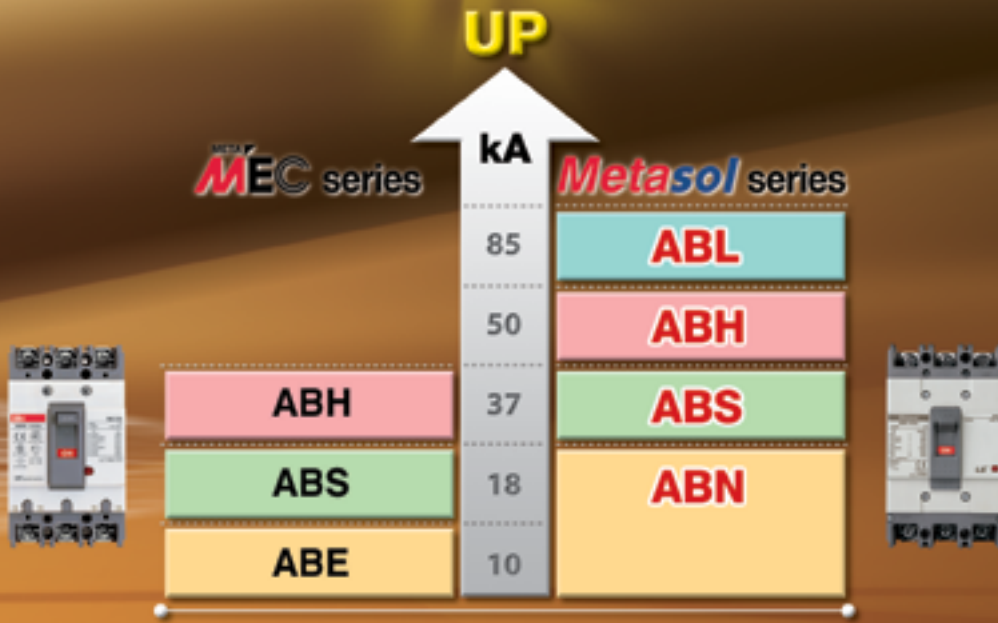


Metasol MCCB

Upgrade breaking capacity



Short-circuit breaking capacity

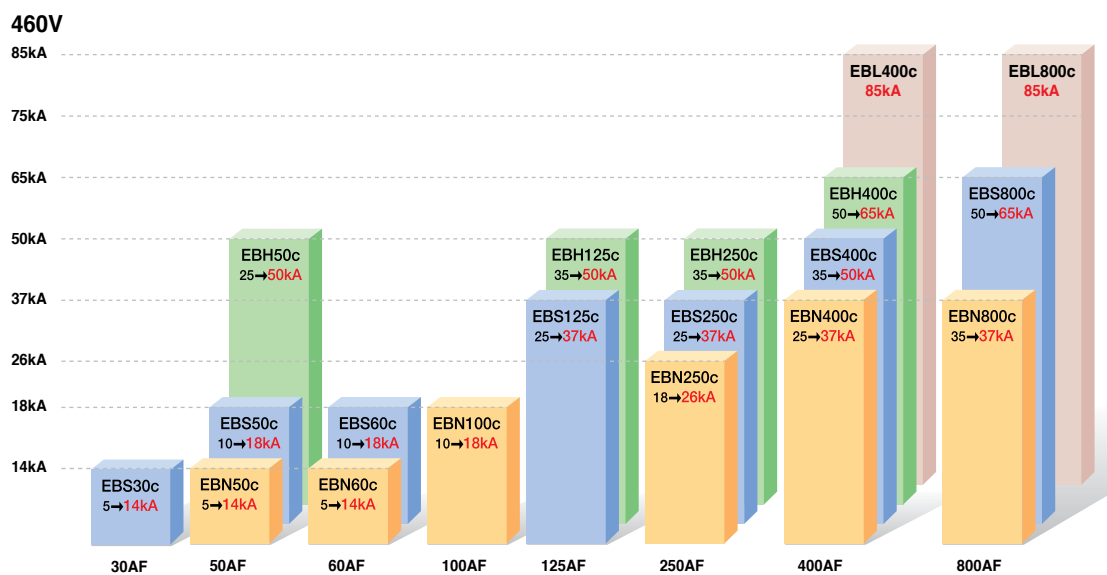


Upgrade breaking capacity

- N100AF :
10 → **18kA**
- S125AF :
25 → **37kA**
- S250AF :
25 → **37kA**
- H250AF :
35 → **50kA**
- N400AF :
25 → **37kA**
- S400AF :
35 → **50kA**
- S630AF :
50 → **65kA**
- S800AF :
50 → **65kA**

Metasol ELCB

Upgrade breaking capacity



Metasol MCCB/ELCB Compatible and standard

- 100% compatible with Meta-MEC series.
- Standardized dimension (Depth, Cutout) when the panel is made.

MCCB (Molded Case Circuit Breaker)



105 × 165 × 60mm



90 × 155 × 60mm



75 × 130 × 60mm

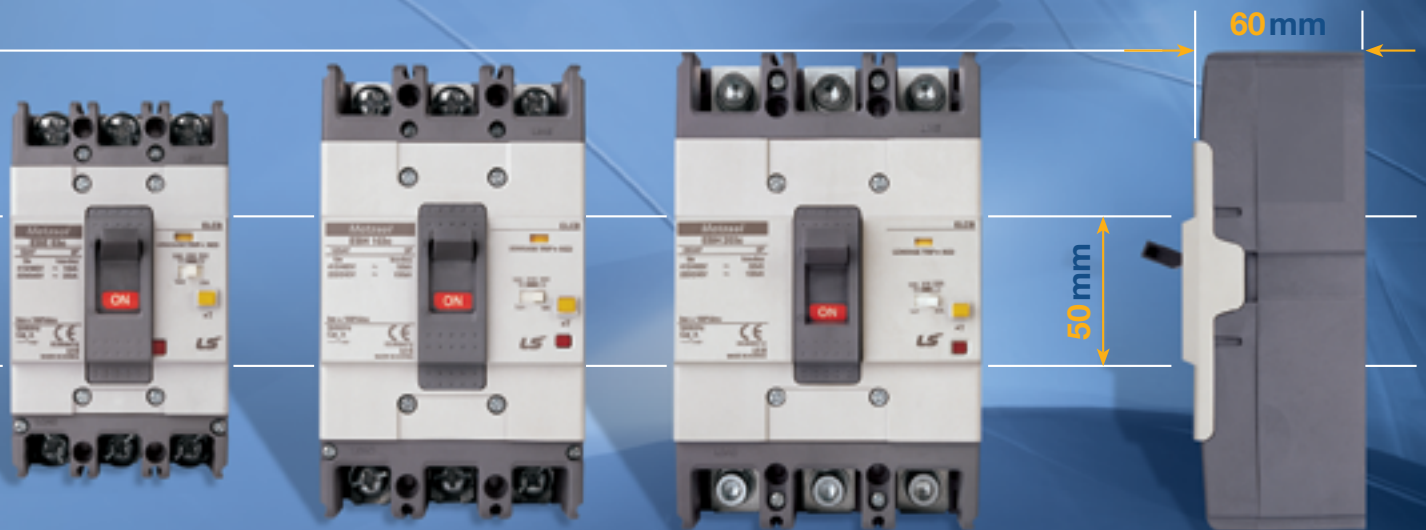
Metasol MCCB

AF Type	30AF	50AF	60AF	100AF	125AF	250AF	400AF	630AF	800AF
ABN		ABN50c 14kA	ABN60c 14kA	ABN100c 18kA ABN100e 31kA		ABN250c 26kA	ABN400c 37kA	ABN630c 37kA	ABN800c 37kA
ABS	ABS30c 14kA	ABS50c 18kA	ABS60c 18kA		ABS125c 37kA	ABS250c 37kA	ABS400c 50kA	ABS630c 65kA	ABS800c 65kA
ABH		ABH50c 50kA			ABH125c 50kA	ABH250c 50kA	ABH400c 65kA		
ABL					ABL125c 60kA	ABL250c 60kA	ABL400c 85kA	ABL630c 85kA	ABL800c 85kA

Note) Dimension is for 3 pole and breaking capacity is for AC460V.

- Same external dimension with MCCB and ELCB.

ELCB (Earth Leakage Circuit Breaker)



75 × 130 × 60mm

90 × 155 × 60mm

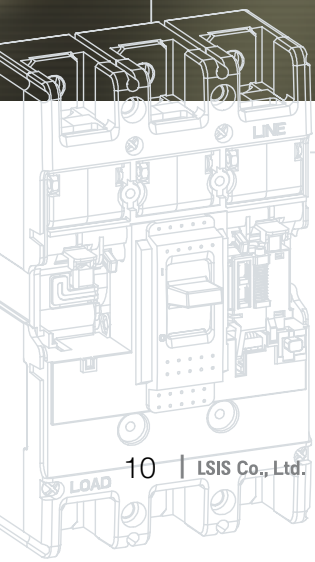
105 × 165 × 60mm

Metasol ELCB

AF Type	30AF	50AF	60AF	100AF	125AF	250AF	400AF	800AF
EBN		EBN50c 14kA	EBN60c 14kA	EBN100c 18kA		EBN250c 26kA	EBN400c 37kA	EBN800c 37kA
EBS	EBS30c 14kA	EBS50c 18kA	EBS60c 18kA		EBS125c 37kA	EBS250c 37kA	EBS400c 50kA	EBS800c 65kA
EBH		EBH50c 50kA			EBH125c 50kA	EBH250c 50kA	EBH400c 65kA	
EBL							EBL400c 85kA	EBL800c 85kA

Note) Dimension is for 3 pole and breaking capacity is for AC460V.

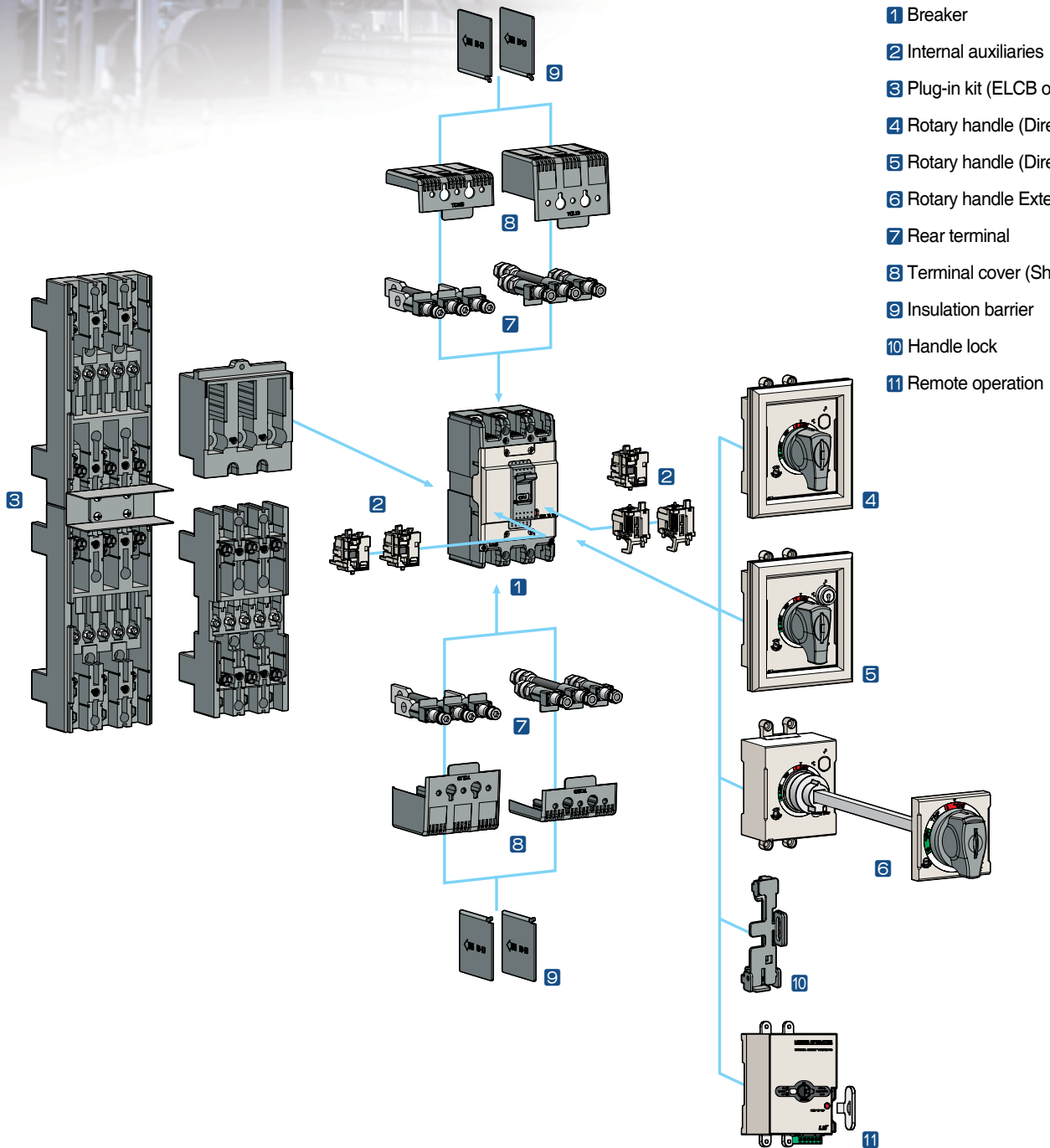
Metasol MCCB/ELCB System overview



■ Various installable accessories

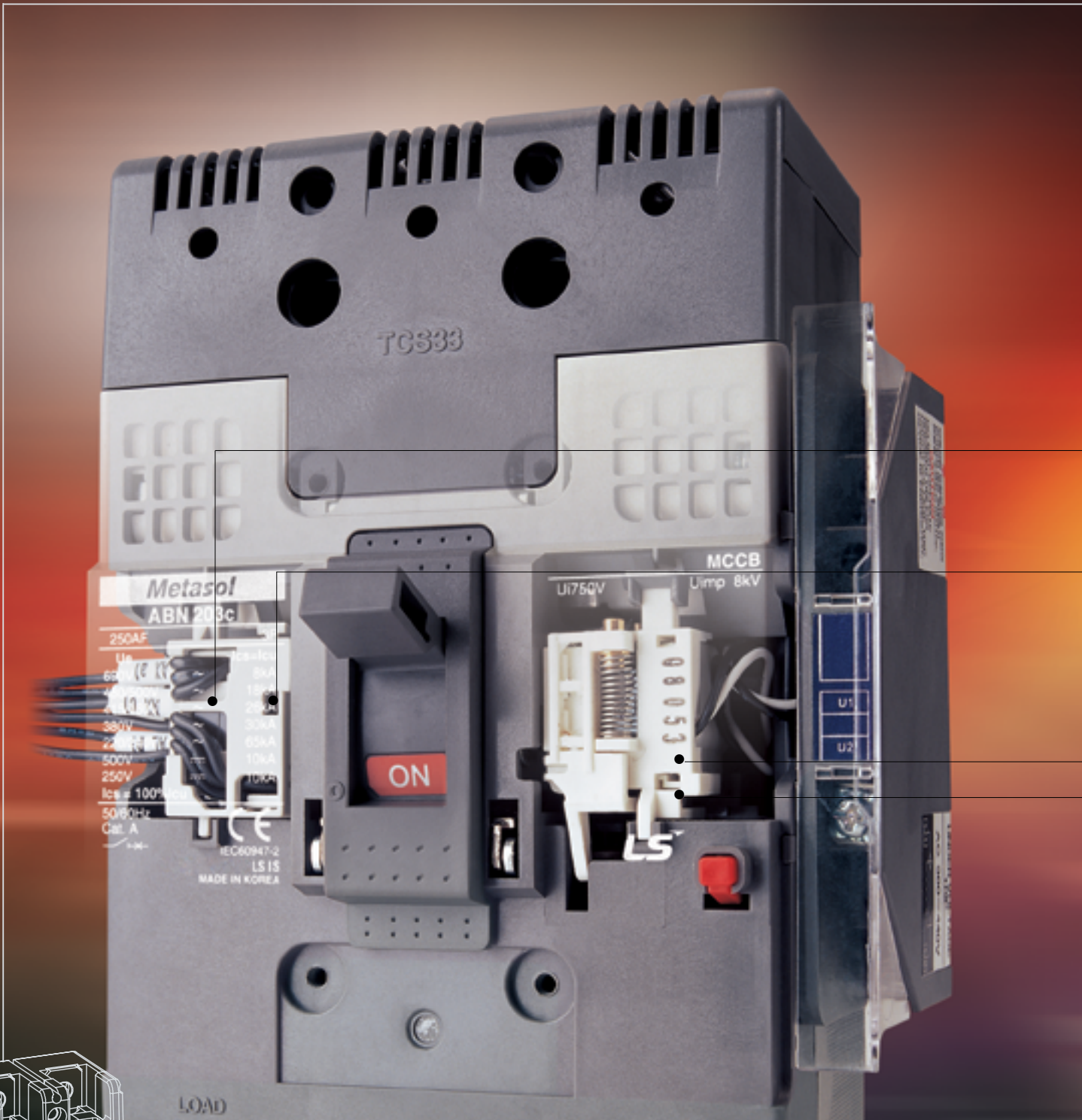
- Wider range of installable accessories compared to Meta MEC series.
- Composed of user friendly method.

System overview



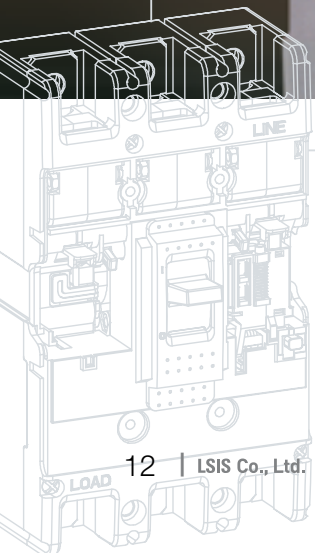
- 1 Breaker
- 2 Internal auxiliaries
- 3 Plug-in kit (ELCB only)
- 4 Rotary handle (Direct)
- 5 Rotary handle (Direct, Key lock)
- 6 Rotary handle Extended
- 7 Rear terminal
- 8 Terminal cover (Short, Long)
- 9 Insulation barrier
- 10 Handle lock
- 11 Remote operation

Metasol MCCB/ELCB Internal accessories



Internal accessories

Internal accessories can be commonly used in all Metasol MCCB and ELCB
(Notice: Exception of SHT, UVT in ELCB)



Common use to all Metasol MCCBs and ELCBs



Alarm switch (AL)

Alarm switches offer provisions for immediate audio or visual indication of a tripped breaker due to overload, short-circuit, operation of shunt trip, or undervoltage trip conditions, operation of push button.

They are particularly useful in automated plants where operators must be signaled about changes in the electrical distribution system. This switch features a closed contact when the circuit breaker is tripped automatically. In other words, this switch does not function when the breaker is operated manually. Its contact is open when the circuit breaker is reset.



Auxiliary switch (AX)

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



Undervoltage trip (UVT)

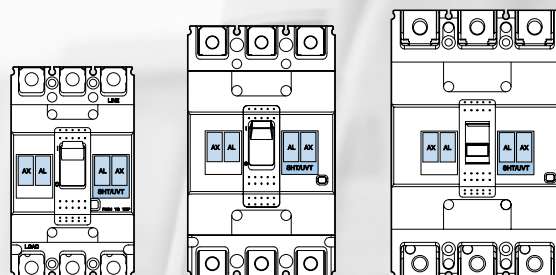
The undervoltage trip automatically opens a circuit breaker when voltage drops to a value ranging between 35% to 70% of the line voltage. The operation is instantaneous, and the circuit breaker cannot be reclosed until the voltage returns to 85% of line voltage.

Continuously energized, the undervoltage trip must be operating before the circuit breaker can be closed.

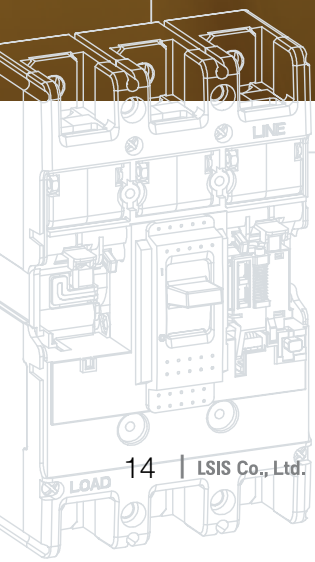


Shunt trip (SHT)

The shunt trip opens the mechanism in response to an externally applied voltage signal. LS shunt trips include coil clearing contacts that automatically clear the signal circuit when the mechanism has tripped. contact with live parts and thereby guarantee protection against direct contacts.

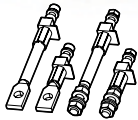


Metasol MCCB/ELCB External accessories



External accessories

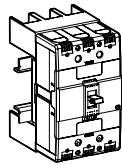
Designed for various mount and user safety.



Front and rear connection

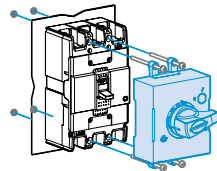
Several kinds of terminals can be equipped with ELCBs as well as MCCBs.

- Terminals for front connection
- Rear connection terminals



Plug-in base

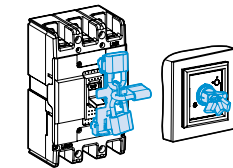
It makes to extract and/or rapidly replace the circuit breaker without having to touch connections. (Easy replacement and maintenance)



Direct & Extended rotary handle

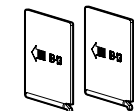
There are two types of rotary handles.

- Direct rotary handle (with or w/o key lock device)
- Extended rotary handle



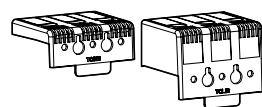
Locking device

- Fixed padlock
- Removable padlock
- Key lock device on direct handle



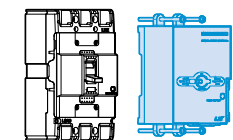
Insulation barrier

These allow the insulation characteristics between the phases at the connections to be increased.



Insulation terminal cover

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



Remote operation

It is a device that makes it possible to turn on / off the breaker even in the remote place. It is safe because it does not have to operate the handle of the circuit breaker by hand, and it is suitable for automation.

Marking and configuration

MCCB

- MCCB model**
- ABN: Economic type
 - ABS: Standard type
 - ABH: High capacity type
- Standardized characteristics**
- Ui: Rated insulation voltage
 - Uimp: Impulse withstand voltage
 - Ue: Rated operational voltage
 - Icu: Ultimate breaking capacity
 - Ics: Service breaking capacity



Rated frequency

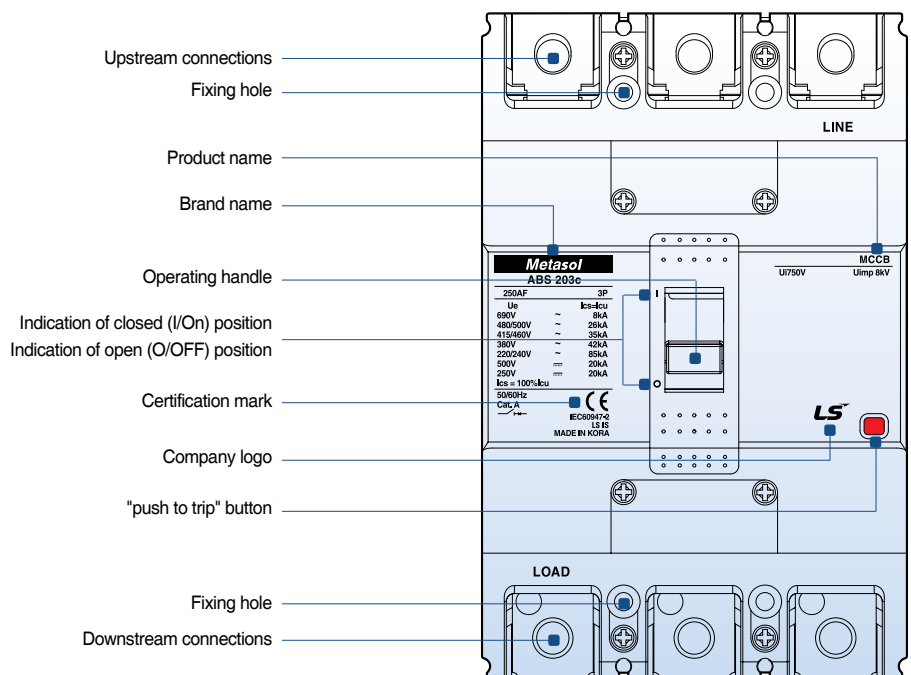
Utilization category

Manufacturer

Standard

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

MCCB



ELCB

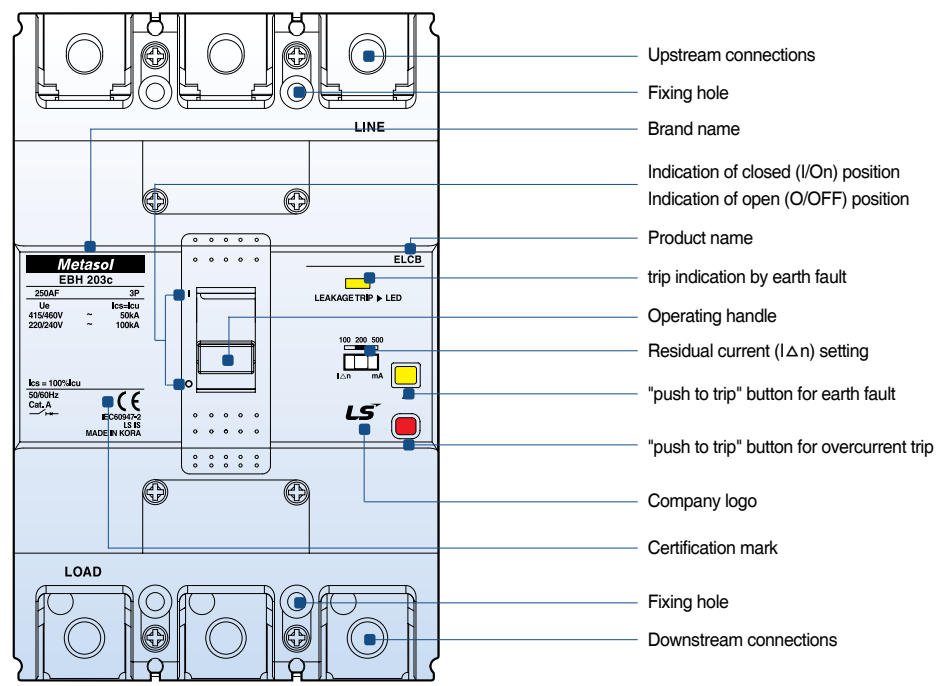


- ELCB model**
- EBN: Economic type
 - EBS: Standard type
 - EBH: High capacity type

Rated frequency Standard Manufacturer Utilization category

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

ELCB



External configuration

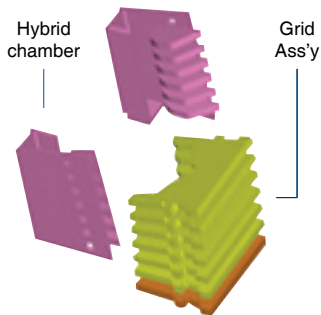
MCCB

① Handle

- Function of indications
- "On" "Off" "Trip"
- Resetting
- When the handle indicates "Tripped" position it must first be reset by moving the handle to the "Off" position and then closing is possible
- trip-Free even if the handle is held at "On", the Breaker will trip if an over current flows
- Suitable for Verification of the main contact position under abnormal conditions because the handle doesn't indicate open position

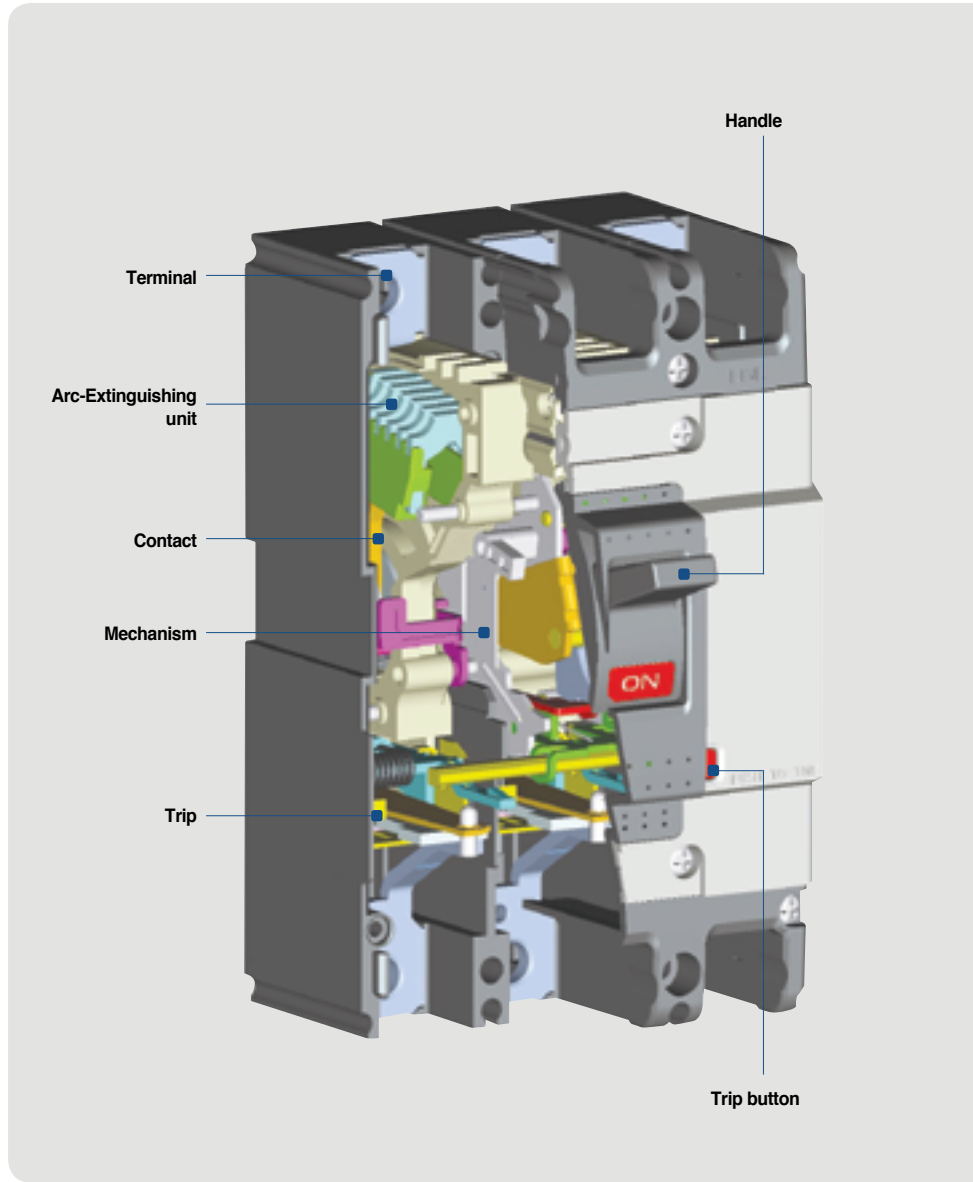
② Arc-Extinguishing unit

- LS patent technique PASQ
- Arc-Extinguishing unit
- PASQ : Puffer Assisted Self-Quenching
- Reduction of arc voltage for a short time



③ Trip button (Push to trip)

- Enables tripping mechanically from outside, for confirming the operation of the accessory switches and the manual resetting function.



A application of PASQ arc extinguishing

The diagram illustrates the PASQ arc extinguishing mechanism. It shows a cross-section of the chamber with various pressure zones: P_{in} (inlet), P_1 , P_2 , P_3 , P_4 , P_{puffer} , and P_{out} . A red starburst indicates the arc being extinguished. A legend below the diagram identifies the components: 1: Grid, 2: Contact, 3: Expansion Chamber(E-Chamber), 4: Arc Chamber(Compression Chamber).

- The reduction of breaking time by applying PASQ arc extinguishing for inhibition of arc voltage for a short time.

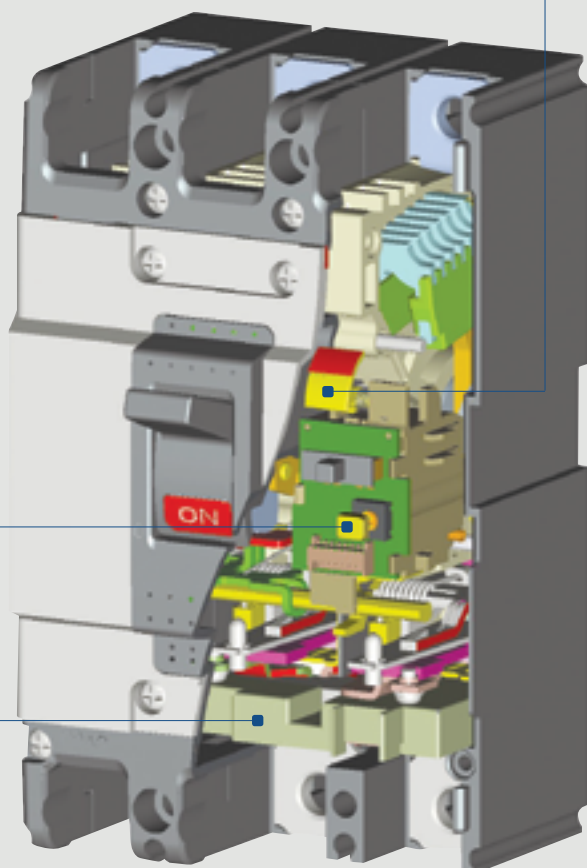
A application of current limiting structure

- Current limiting repulsion structure (U fixed structure)
- Toggle structure
- When the operating unit repulses by short circuit current, repulsion structure at bigger angle.

The diagram shows a repulsion structure (a curved metal piece) and a toggle mechanism (a linkage system). A small graph on the right shows a current limiting curve.

ELCB

① Residual indication LED



② Residual test button

③ Residual detection unit (ZCT + Main board)

① Residual indication LED

- Normal situation is yellow, trio situation is red

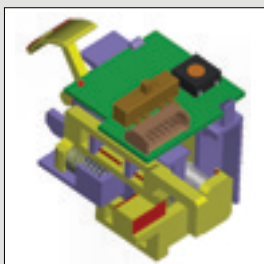
② Residual test button

- Special design for upgrade to prohibit resistance accident

③ Residual detection unit (ZCT + Main board)

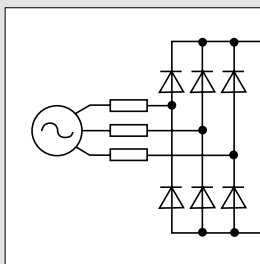
- For upgrade the design is selected the 3 phase input power method and in case of Voltage problem, it can break residual current safely.

Upgrade coil operation by special design



- Sliding structure application of trip lever
- Trip special design by applying design Button method.
- Upgrade the testing unit

3 phase power supply method



- In case of 1 phase loss residual operation upgrade
- New IEC standard

Quick selection table

Earth Leakage Circuit Breakers



ELCBs

AF		30AF	50AF			60AF	
Type		S-type	N-type	S-type	H-type	N-type	S-type
Type and pole	2-pole	EBS32c	EBN52c	-	-	-	-
	3-pole	EBS33c	EBN53c	EBS53c	EBH53c	EBN63c	EBS63c
	4-pole	EBS34c	-	EBS54c	EBH54c	-	EBS64c
Protective function		Overload, Short-circuit and ground fault	Overload, Short-circuit and ground fault		Overload, Short-circuit and ground fault	Overload, Short-circuit and ground fault	
Rated current, I _n	A	(5, 10) ^{Note 1} , 15, 20, 30	15, 20, 30, 40, 50		15, 20, 30, 40, 50	60	
Rated residual current, I _{Δn}	mA	30, 100/200/500mA	30, 100/200/500mA		30, 100/200/500mA	30, 100/200/500mA	
Rated operational voltage, U _e	AC (V)	220/460	220/460		220/460	220/460	
Rated impulse withstand voltage, U _{imp}	kV	6	6		6	6	
Residual current off-time at I _{Δn}	sec	≤0.1 sec	≤0.1 sec		≤0.1 sec	≤0.1 sec	

Rated short-circuit breaking capacity (I_{cu}) kA (Sym) , IEC 60947-2

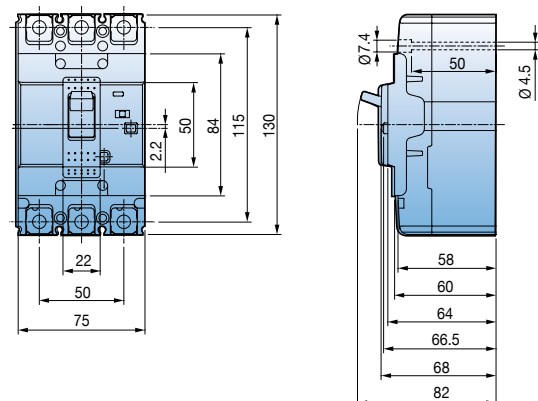
AC	415/460V	14 (10)	14	18	50	14	18
	220/250V	30 (25)	30	35	100	30	35
I _{cs} =% × I _{cu}		100	100	100	100	100	100
Dimensions (mm)	W × H × D (3-pole)	75 × 130 × 60mm (Fig 1)	75 × 130 × 60mm (Fig 1)		90 × 155 × 60mm (Fig 2)	75 × 130 × 60mm (Fig. 1)	
More info.	Ratings	56 page	58 page		58 page	60 page	
	Curves	101 page	101 page		102 page	101 page	
	Drawings	116 page	116 page		117 page	116 page	

Note) 1. MCCBs can be applied to both 50 and 60Hz.

2. Do not test withstand voltage or insulation resistance test between poles to avoid the damage of the PCB.

3. The short-circuit breaking capacities in () are applied to the rated current in (5, 10A)

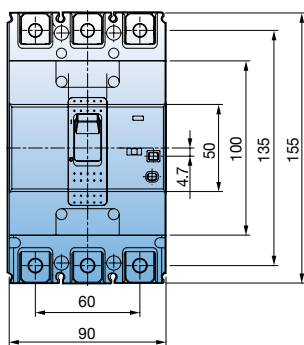
AF Type	30AF	50AF	60AF	100AF	125AF	250AF
EBN		EBN50c 14kA	EBN60c 14kA	EBN100c 18kA		EBN250c 26kA
EBS	EBS30c 14kA	EBS50c 18kA	EBS60c 18kA		EBS125c 37kA	EBS250c 37kA
EBH		EBH50c 50kA			EBH125c 50kA	EBH250c 50kA



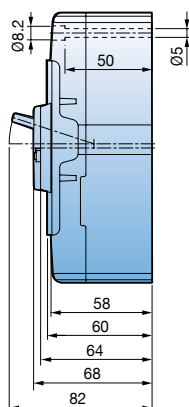
(Fig. 1)



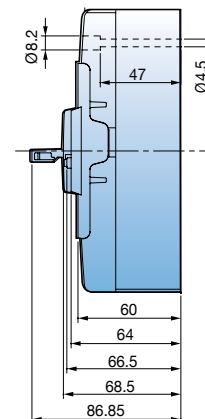
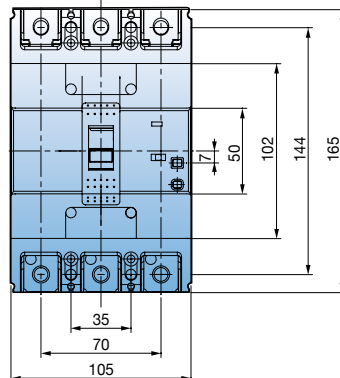
	100AF		125AF		250AF	
	N-type	S-type	H-type	N-type	S-type	H-type
	EBN102c	-	-	EBN202c	-	-
	EBN103c	EBS103c	EBH103c	EBN203c	EBS203c	EBH203c
	EBN104c	EBS104c	EBH104c	-	EBS204c	EBH204c
	Overload, Short-circuit and ground fault	Overload, Short-circuit and ground fault		Overload, Short-circuit and ground fault		
	60, 75, 100	15, 20, 30, 40, 50, 60, 75, 100, 125		100, 125, 150, 175, 200, 225, 250		
	30, 100/200/500mA	30, 100/200/500mA		30, 100/200/500mA		
	220/460	220/460		220/460		
	6	6		6		
	≤0.1 sec	≤0.1 sec		≤0.1 sec		
	18	37	50	26	37	50
	35	85	100	65	85	100
	100	100	100	100	100	100
	75 × 130 × 60mm (Fig. 1)	90 × 155 × 60mm (Fig. 2)		105 × 165 × 60mm (Fig. 3)		
	62 page	64 page		66 page		
	101 page	102 page		103 page		
	116 page	117 page		118 page		



(Fig. 2)



(Fig. 3)



Quick selection table

Earth Leakage Circuit Breakers

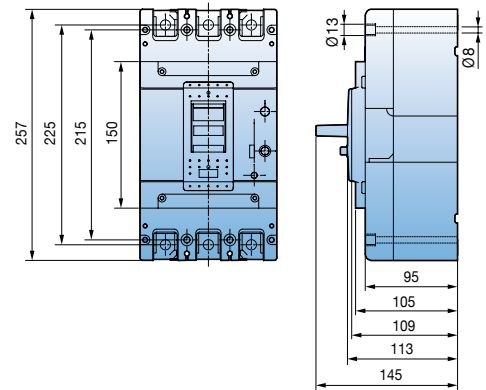


ELCBs

AF		400AF			
Type		N-type	S-type	H-type	L-type
	3-pole	EBN403c	EBS403c	EBH403c	EBL403c
	4-pole	EBN404c	EBS404c	EBH404c	EBL404c
Protective function		Overload, Short-circuit and ground fault			
Rated current, I _n	A	250, 300, 350, 400			
Rated residual current, I _{Δn}	mA	30, 100/200/500mA			
Rated operational voltage, U _e	AC (V)	220/460	220/460	220/460	220/460
Rated impulse withstand voltage, U _{imp}	kV	6	6	6	6
Residual current off-time at I _{Δn}	sec	≤0.1 sec	≤0.1 sec	≤0.1 sec	≤0.1 sec
Rated short-circuit breaking capacity (I_{cu}) kA (Sym) , IEC 60947-2					
AC	415/460V	37	50	65	85
	220/250V	50	75	85	125
I _{cs} =% × I _{cu}		100	100	100	75
Dimensions (mm)	W × H × D (3-pole)	140 × 257 × 109mm (Fig. 4)			
More info.	Ratings	68 page			
	Curves	104 page			
	Drawings	119 page			

Note) 1. MCCBs other than 1,000/1200AF can be applied to both 50 and 60Hz.
 2. Do not test withstand voltage or insulation resistance test between poles to avoid the damage of the PCB.

Type	AF	400AF	800AF	1000AF	1200AF
EBN		EBN400c 37kA	EBN800c 37kA		
EBS		EBS400c 50kA	EBS800c 65kA	EBS1000b 65kA	EBS1200b 65kA
EBH		EBH400c 65kA			
EBL		EBL400c 85kA	EBL800c 85kA		



(Fig. 4)

50AF ELCB

EBN50c, EBS50c, EBH50c



EBN53c



EBS53c

Ratings

Frame size		50AF						
Type and pole		N-type		S-type		H-type		
	2-pole (2-sensor)	EBN52c		-		-		
	3-pole (3-sensor)	EBN53c		EBS53c		EBH53c		
	4-pole (3-sensor)	-		EBS54c		EBH54c		
Rated current, I _n		15-20-30-40-50A						
Rated residual current, I _{Δn}		30, 100/200/500mA (Adjustable)						
Residual current off-time at I _{Δn}		≤ 0.1 sec						
Rated operational voltage, U _e		AC: 220/460V						
Rated impulse withstand voltage, U _{imp}		6kV						
Wiring system	2-pole (2-sensor)	1Ø2W						
	3-pole (3-sensor)	1Ø2W, 1Ø3W, 3Ø3W						
	4-pole (3-sensor)	1Ø2W, 1Ø3W, 3Ø3W, 3Ø4W						
Rated short-circuit breaking capacity, I_{cu}		N-type		S-type		H-type		
AC	460V	14kA		18kA		50kA		
	415V	14kA		18kA		50kA		
	220/250V	30kA		35kA		100kA		
I _{cs} =%×I _{cu}		100%		100%		100%		
Protective function		Overload, Short-circuit and ground fault						
Type of trip unit		Thermal-Magnetic						
Magnetic trip range		12 × I _n (30A and under: 400A)						
Endurance	Mechanical	25,000 operations						
	Electrical	10,000 operations						
Connection	Standard	Front connection						
	Optional	Rear connection						
Mounting		Standard Screw fixing						
Dimensions (mm)		Pole	2p	3p	3p	4p	3p	4p
		a	75	75	75	100	90	120
		b	130		130		155	
		c1 <i>Note</i>	60		60		60	
		c2 <i>Note</i>	64		64		64	
		d	82		82		82	
		Weight, kg	Standard	0.5	0.7	0.7	0.9	1
Certification		Pole	2p	3p	3p	4p	3p	4p
CE marking		CE	○		○		○	

For more information

- Drawings ▶ 116, 117 page
- Trip curves ▶ 101, 102 page
- Accessories ▶ 74 page
- Connection and mounting ▶ 127 page

Note) 1. Depth by door cut size : C1 for large cut, C2 for small cut
 2. Do not test withstand voltage or insulation resistance test between poles to avoid the damage of the PCB.
 3. 4-pole product's ampacity on neutral conductor is equal to or less than 50% of the rated current.
 4. Rated non-trip current sensitivity is equal to or less than 50% of the rated current sensitivity.

Ordering types

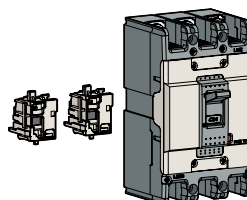
Breaker types

EBN type (14kA/460V)				
Rated current, In	Rated residual current, I Δ n: 30mA		Rated residual current, I Δ n: 100/200/500mA	
	2-pole	3-pole	2-pole	3-pole
15 A	EBN52c/15/30	EBN53c/15/30	EBN52c/15/100	EBN53c/15/100
20 A	EBN52c/20/30	EBN53c/20/30	EBN52c/20/100	EBN53c/20/100
30 A	EBN52c/30/30	EBN53c/30/30	EBN52c/30/100	EBN53c/30/100
40 A	EBN52c/40/30	EBN53c/40/30	EBN52c/40/100	EBN53c/40/100
50 A	EBN52c/50/30	EBN53c/50/30	EBN52c/50/100	EBN53c/50/100

EBS type (18kA/460V)				
Rated current, In	Rated residual current, I Δ n: 30mA		Rated residual current, I Δ n: 100/200/500mA	
	3-pole	4-pole	3-pole	4-pole
15 A	EBS53c/15/30	EBS54c/15/30	EBS53c/15/100	EBS54c/15/100
20 A	EBS53c/20/30	EBS54c/20/30	EBS53c/20/100	EBS54c/20/100
30 A	EBS53c/30/30	EBS54c/30/30	EBS53c/30/100	EBS54c/30/100
40 A	EBS53c/40/30	EBS54c/40/30	EBS53c/40/100	EBS54c/40/100
50 A	EBS53c/50/30	EBS54c/50/30	EBS53c/50/100	EBS54c/50/100

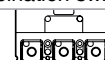
EBH type (50kA/460V)				
Rated current, In	Rated residual current, I Δ n: 30mA		Rated residual current, I Δ n: 100/200/500mA	
	3-pole	4-pole	3-pole	4-pole
15 A	EBH53c/15/30	EBH54c/15/30	EBH53c/15/100	EBH54c/15/100
20 A	EBH53c/20/30	EBH54c/20/30	EBH53c/20/100	EBH54c/20/100
30 A	EBH53c/30/30	EBH54c/30/30	EBH53c/30/100	EBH54c/30/100
40 A	EBH53c/40/30	EBH54c/40/30	EBH53c/40/100	EBH54c/40/100
50 A	EBH53c/50/30	EBH54c/50/30	EBH53c/50/100	EBH54c/50/100

Accessories



Electrical auxiliaries

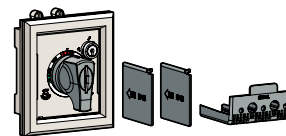
AX	Auxiliary switch
AL	Alarm switch
AX+AL	Combination switch



Maximum possibilities

T-position	Not available
R-position	Option of AX or AL or AX+AL

Note) For more detail see 74 page



External accessories

EBN50c EBS50c	EBH50c	Name
IB13	IB23	Insulation barrier
TCL13	TCL23	Terminal cover (Long) - Inde type, D-handle type, N-handle type
TCS13	TCS23	Terminal cover (Short) - Inde type, D-handle type, N-handle type
DH100	DH125	Rotary handle (Direct)
DHK100	DHK125	Rotary handle (Direct, Key lock)
EH100	EH125	Rotary handle (Extended)
-	RTB2	Rear terminal (Bar)
RTR1	RTR2	Rear terminal (Round)
Handle lock		

Note) For more detail see 82 page

- Inde type: This cover is used without auxiliary handle.
- D-handle type: This cover is used with D-handle.
- N-handle type: This cover is used with N-handle.

125AF ELCB

EBS125c, EBH125c

Metasol



EBS103c



EBH103c

Ratings

Frame size		125AF				
Type and pole		S-type		H-type		
	2-pole (2-sensor)	-		-		
	3-pole (3-sensor)	EBS103c		EBH103c		
	4-pole (3-sensor)	EBS104c		EBH104c		
Rated current, I _n		15-20-30-40-50-60-75-100-125A				
Rated residual current, I _{Δn}		30, 100/200/500mA (Adjustable)				
Residual current off-time at I _{Δn}		≤ 0.1 sec				
Rated operational voltage, U _e		AC: 220/460V				
Rated impulse withstand voltage, U _{imp}		6kV				
Wiring system	2-pole (2-sensor)	-				
	3-pole (3-sensor)	1Ø2W, 1Ø3W, 3Ø3W				
	4-pole (3-sensor)	1Ø2W, 1Ø3W, 3Ø3W, 3Ø4W				
Rated short-circuit breaking capacity, I_{cu}		N-type		S-type		
AC	460V	37kA		50kA		
	415V	37kA		50kA		
	220/250V	85kA		100kA		
I _{cs} =%×I _{cu}		100%		100%		
Protective function		Overload, Short-circuit and ground fault				
Type of trip unit		Thermal-Magnetic				
Magnetic trip range		12×I _n (30A and under: 400A)				
Endurance	Mechanical	25,000 operations				
	Electrical	10,000 operations				
Connection	Standard	Front connection				
	Optional	Rear connection				
Mounting	Standard	Screw fixing				
Dimensions (mm)		Pole	3p	4p	3p	4p
	a		90	120	90	120
	b		155	155	155	155
	c1 <small>Note)</small>		60	60	60	60
	c2 <small>Note)</small>		64	64	64	64
	d		82	82	82	82
Weight, kg	Standard		1	1.2	1	1.2
Certification		Pole	3p	4p	3p	4p
CE marking		CE	○	○	○	○

For more information

- Drawings ▶ 117 page
- Trip curves ▶ 102 page
- Accessories ▶ 74 page
- Connection and mounting ▶ 127 page

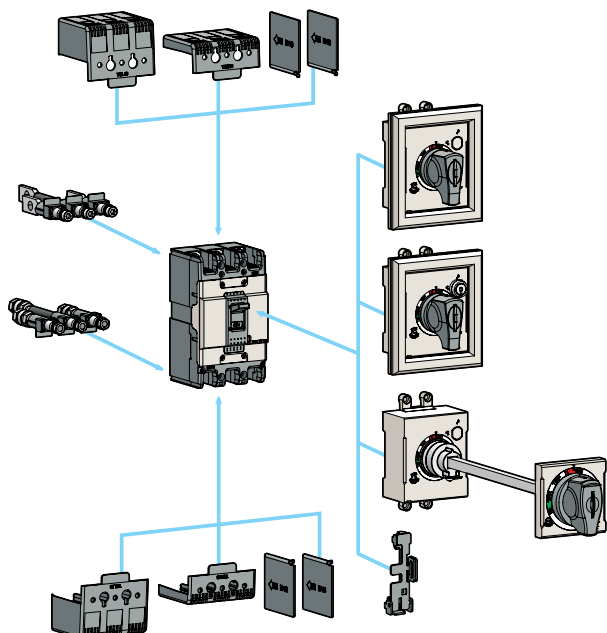
Note) 1. Depth by door cut size : c1 for large cut, c2 for small cut
 2. Do not test withstand voltage or insulation resistance test between poles to avoid the damage of the PCB.
 3. 4-pole product's ampacity on neutral conductor is equal to or less than 50% of the rated current.
 4. Rated non-trip current sensitivity is equal to or less than 50% of the rated current sensitivity.

Ordering types

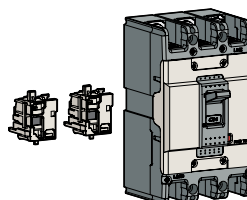
Breaker types

EBS type (37kA/460V)				
Rated current, I _n	Rated residual current, I _{Δn} : 30mA		Rated residual current, I _{Δn} : 100/200/500mA	
	3-pole	4-pole	3-pole	4-pole
15 A	EBS103c/15/30	EBS104c/15/30	EBS103c/15/100	EBS104c/15/100
20 A	EBS103c/20/30	EBS104c/20/30	EBS103c/20/100	EBS104c/20/100
30 A	EBS103c/30/30	EBS104c/30/30	EBS103c/30/100	EBS104c/30/100
40 A	EBS103c/40/30	EBS104c/40/30	EBS103c/40/100	EBS104c/40/100
50 A	EBS103c/50/30	EBS104c/50/30	EBS103c/50/100	EBS104c/50/100
60 A	EBS103c/60/30	EBS104c/60/30	EBS103c/60/100	EBS104c/60/100
75 A	EBS103c/75/30	EBS104c/75/30	EBS103c/75/100	EBS104c/75/100
100 A	EBS103c/100/30	EBS104c/100/30	EBS103c/100/100	EBS104c/100/100
125 A	EBS103c/125/30	EBS104c/125/30	EBS103c/125/100	EBS104c/125/100

EBH type (50kA/460V)				
Rated current, I _n	Rated residual current, I _{Δn} : 30mA		Rated residual current, I _{Δn} : 100/200/500mA	
	3-pole	4-pole	3-pole	4-pole
15 A	EBH103c/15/30	EBH104c/15/30	EBH103c/15/100	EBH104c/15/100
20 A	EBH103c/20/30	EBH104c/20/30	EBH103c/20/100	EBH104c/20/100
30 A	EBH103c/30/30	EBH104c/30/30	EBH103c/30/100	EBH104c/30/100
40 A	EBH103c/40/30	EBH104c/40/30	EBH103c/40/100	EBH104c/40/100
50 A	EBH103c/50/30	EBH104c/50/30	EBH103c/50/100	EBH104c/50/100
60 A	EBH103c/60/30	EBH104c/60/30	EBH103c/60/100	EBH104c/60/100
75 A	EBH103c/75/30	EBH104c/75/30	EBH103c/75/100	EBH104c/75/100
100 A	EBH103c/100/30	EBH104c/100/30	EBH103c/100/100	EBH104c/100/100
125 A	EBH103c/125/30	EBH104c/125/30	EBH103c/125/100	EBH104c/125/100

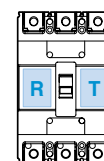


Accessories



Electrical auxiliaries

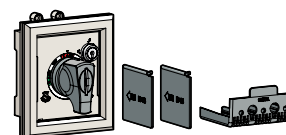
AX	Auxiliary switch
AL	Alarm switch
AX+AL	Combination switch



Maximum possibilities

T-position	Not available
R-position	Option of AX or AL or AX+AL

Note) For more detail see 74 page



External accessories

EBS60c EBN60c	Name
IB23	Insulation barrier
TCL23	Terminal cover (Long) - Inde type, D-handle type, N-handle type
TCS23	Terminal cover (Short) - Inde type, D-handle type, N-handle type
DH125	Rotary handle (Direct)
DHK125	Rotary handle (Direct, Key lock)
EH125	Rotary handle (Extended)
RTB2	Rear terminal (Bar)
RTR2	Rear terminal (Round)
Handle lock	

Note) For more detail see 82 page

- Inde type: This cover is used without auxiliary handle.
- D-handle type: This cover is used with D-handle.
- N-handle type: This cover is used with N-handle.

250AF ELCB

EBN250c, EBS250c, EBH250c



EBN203c



EBS203c

Ratings

Frame size		250AF						
Type and pole		N-type		S-type		H-type		
	2-pole (2-sensor)	EBN202c		-		-		
	3-pole (3-sensor)	EBN203c		EBS203c		EBH203c		
	4-pole (3-sensor)	-		EBS204c		EBH204c		
Rated current, I _n		100-125-150-175-200-225-250A						
Rated residual current, I _{Δn}		30, 100/200/500mA (Adjustable)						
Residual current off-time at I _{Δn}		≤ 0.1 sec						
Rated operational voltage, U _e		AC: 220/460V						
Rated impulse withstand voltage, U _{imp}		6kV						
Wiring system	2-pole (2-sensor)	1Ø2W						
	3-pole (3-sensor)	1Ø2W, 1Ø3W, 3Ø3W						
	4-pole (3-sensor)	1Ø2W, 1Ø3W, 3Ø3W, 3Ø4W						
Rated short-circuit breaking capacity, I_{cu}		N-type		S-type		H-type		
AC	460V	26kA		37kA		50kA		
	415V	26kA		37kA		50kA		
	220/250V	65kA		85kA		100kA		
I _{cs} =%×I _{cu}		100%		100%		100%		
Protective function		Overload, Short-circuit and ground fault						
Type of trip unit		Thermal-Magnetic						
Magnetic trip range		12×I _n						
Endurance	Mechanical	20,000 operations						
	Electrical	5,000 operations						
Connection	Standard	Front connection						
	Optional	Rear connection						
Mounting		Standard Screw fixing						
Dimensions (mm)		Pole	2p	3p	3p	4p	3p	4p
		a	105	105	105	140	105	140
		b	165		165		165	
		c1 <small>Note)</small>	60		60		60	
		c2 <small>Note)</small>	64		64		64	
		d	87		87		87	
		Weight, kg	Standard	1.1	1.2	1.2	1.5	1.2
Certification		Pole	2p	3p	3p	4p	3p	4p
CE marking		CE	○		○		○	

For more information

- Drawings ▶ 118 page
- Trip curves ▶ 103 page
- Accessories ▶ 74 page
- Connection and mounting ▶ 127 page

Note) 1. Depth by door cut size : c1 for large cut, c2 for small cut
 2. Do not test withstand voltage or insulation resistance test between poles to avoid the damage of the PCB.
 3. 4-pole product's ampacity on neutral conductor is equal to or less than 50% of the rated current.
 4. Rated non-trip current sensitivity is equal to or less than 50% of the rated current sensitivity.

Ordering types

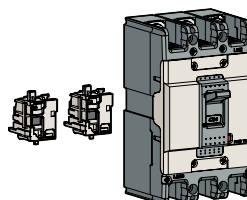
Breaker types

EBN type (25kA/460V)				
Rated current, In	Rated residual current, I Δ n: 30mA		Rated residual current, I Δ n: 100/200/500mA	
	2-pole	3-pole	2-pole	3-pole
100 A	EBN202c/100/30	EBN203c/100/30	EBN202c/100/100	EBN203c/100/100
125 A	EBN202c/125/30	EBN203c/125/30	EBN202c/125/100	EBN203c/125/100
150 A	EBN202c/150/30	EBN203c/150/30	EBN202c/150/100	EBN203c/150/100
175 A	EBN202c/175/30	EBN203c/175/30	EBN202c/175/100	EBN203c/175/100
200 A	EBN202c/200/30	EBN203c/200/30	EBN202c/200/100	EBN203c/200/100
225 A	EBN202c/225/30	EBN203c/225/30	EBN202c/225/100	EBN203c/225/100
250 A	EBN202c/250/30	EBN203c/250/30	EBN202c/250/100	EBN203c/250/100

EBS type (37kA/460V)				
Rated current, In	Rated residual current, I Δ n: 30mA		Rated residual current, I Δ n: 100/200/500mA	
	3-pole	4-pole	3-pole	4-pole
100 A	EBS203c/100/30	EBS204c/100/30	EBS203c/100/100	EBS204c/100/100
125 A	EBS203c/125/30	EBS204c/125/30	EBS203c/125/100	EBS204c/125/100
150 A	EBS203c/150/30	EBS204c/150/30	EBS203c/150/100	EBS204c/150/100
175 A	EBS203c/175/30	EBS204c/175/30	EBS203c/175/100	EBS204c/175/100
200 A	EBS203c/200/30	EBS204c/200/30	EBS203c/200/100	EBS204c/200/100
225 A	EBS203c/225/30	EBS204c/225/30	EBS203c/225/100	EBS204c/225/100
250 A	EBS203c/250/30	EBS204c/250/30	EBS203c/250/100	EBS204c/250/100

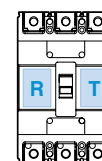
EBH type (50kA/460V)				
Rated current, In	Rated residual current, I Δ n: 30mA		Rated residual current, I Δ n: 100/200/500mA	
	3-pole	4-pole	3-pole	4-pole
100 A	EBH203c/100/30	EBH204c/100/30	EBH203c/100/100	EBH204c/100/100
125 A	EBH203c/125/30	EBH204c/125/30	EBH203c/125/100	EBH204c/125/100
150 A	EBH203c/150/30	EBH204c/150/30	EBH203c/150/100	EBH204c/150/100
175 A	EBH203c/175/30	EBH204c/175/30	EBH203c/175/100	EBH204c/175/100
200 A	EBH203c/200/30	EBH204c/200/30	EBH203c/200/100	EBH204c/200/100
225 A	EBH203c/225/30	EBH204c/225/30	EBH203c/225/100	EBH204c/225/100
250 A	EBH203c/250/30	EBH204c/250/30	EBH203c/250/100	EBH204c/250/100

Accessories



Electrical auxiliaries

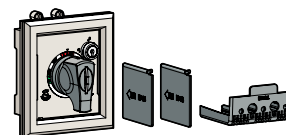
AX	Auxiliary switch
AL	Alarm switch
AX+AL	Combination switch



Maximum possibilities

T-position	Not available
R-position	Option of AX or AL or AX+AL

Note) For more detail see 74 page



External accessories

EBN250c EBS250c EBH250c	Name
IB23	Insulation barrier
TCL33	Terminal cover (Long) - Inde type, D-handle type, N-handle type
TCS33	Terminal cover (Short) - Inde type, D-handle type, N-handle type
DH250	Rotary handle (Direct)
DHK250	Rotary handle (Direct, Key lock)
EH250	Rotary handle (Extended)
RTB3	Rear terminal (Bar)
RTR3	Rear terminal (Round)
Handle lock	

Note) For more detail see 82 page

- Inde type: This cover is used without auxiliary handle.
- D-handle type: This cover is used with D-handle.
- N-handle type: This cover is used with N-handle.

400AF ELCB

EBN400c, EBS400c, EBH400c, EBL400c



EBS403c



EBL404c

Ratings

Frame size		400AF								
Type and pole		N-type		S-type		H-type		L-type		
	3-pole (3-sensor)	EBN403c		EBS403c		EBH403c		EBL403c		
	4-pole (3-sensor)	EBN404c		EBS404c		EBH404c		EBL404c		
Rated current, I _n		250-300-350-400A								
Rated residual current, I _{Δn}		30, 100/200/500mA (Adjustable)								
Residual current off-time at I _{Δn}		≤0.1 sec								
Rated operational voltage, U _e		220/460V								
Rated impulse withstand voltage, U _{imp}		6kV								
Wiring system	2-pole (2-sensor)	1Ø2W, 1Ø3W, 3Ø3W								
	3-pole (3-sensor)	1Ø2W, 1Ø3W, 3Ø3W, 3Ø4W								
	4-pole (3-sensor)	1Ø2W, 1Ø3W, 3Ø3W, 3Ø4W								
Rated short-circuit breaking capacity, I_{cu}		N-type		S-type		H-type		L-type		
AC	415V/460V	37kA		50kA		65kA		85kA		
	220/250V	50kA		75kA		85kA		125kA		
I _{cs} =%×I _{cu}		100%		100%		100%		75%		
Protective function		Overload, Short-circuit and ground fault								
Type of trip unit		Thermal-Magnetic								
Magnetic trip range		8~12I _n								
Endurance	Mechanical	4,000 operations								
	Electrical	1,000 operations								
Connection	Standard	Front connection								
Mounting	Standard	Screw fixing								
Dimensions (mm)	Pole	3p	4p	3p	4p	3p	4p	3p	4p	
	a	140	184	140	184	140	184	140	184	
	b	257		257		257		257		
	c1 <small>Note)</small>	109		109		109		109		
	c2 <small>Note)</small>	113		113		113		113		
	d	145		145		145		145		
Weight, kg	Standard	7	8.4	7	8.4	7	8.4	7	8.4	
Certification		Pole	3p	4p	3p	4p	3p	4p	3p	4p
CE marking			-	-	-	-	-	-	-	-

For more information

- Drawings ▶ 119 page
- Trip curves ▶ 104 page
- Accessories ▶ 75 page
- Connection and mounting ▶ 128 page

Note) 1. Depth by door cut size : c1 for large cut, c2 for small cut
 2. Do not test withstand voltage or insulation resistance test between poles to avoid the damage of the PCB.
 3. 4-pole product's ampacity on neutral conductor is equal to or less than 50% of the rated current.
 4. Rated non-trip current sensitivity is equal to or less than 50% of the rated current sensitivity.

Ordering types

Breaker types

EBN type (25kA/460V)

Rated current, In	Rated residual current, I Δ n: 30mA		Rated residual current, I Δ n: 100/200/500mA	
	3-pole	4-pole	3-pole	4-pole
250 A	EBN403c/250/30	EBN404c/250/30	EBN403c/250/100	EBN404c/250/100
300 A	EBN403c/300/30	EBN404c/300/30	EBN403c/300/100	EBN404c/300/100
350 A	EBN403c/350/30	EBN404c/350/30	EBN403c/350/100	EBN404c/350/100
400 A	EBN403c/400/30	EBN404c/400/30	EBN403c/400/100	EBN404c/400/100

EBS type (50kA/460V)

Rated current, In	Rated residual current, I Δ n: 30mA		Rated residual current, I Δ n: 100/200/500mA	
	3-pole	4-pole	3-pole	4-pole
250 A	EBS403c/250/30	EBS404c/250/30	EBS403c/250/100	EBS404c/250/100
300 A	EBS403c/300/30	EBS404c/300/30	EBS403c/300/100	EBS404c/300/100
350 A	EBS403c/350/30	EBS404c/350/30	EBS403c/350/100	EBS404c/350/100
400 A	EBS403c/400/30	EBS404c/400/30	EBS403c/400/100	EBS404c/400/100

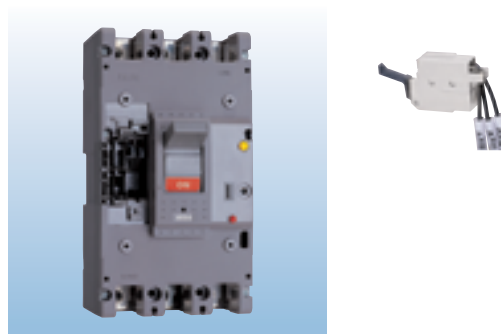
EBH type (65kA/460V)

Rated current, In	Rated residual current, I Δ n: 30mA		Rated residual current, I Δ n: 100/200/500mA	
	3-pole	4-pole	3-pole	4-pole
250 A	EBH403c/250/30	EBH404c/250/30	EBH403c/250/100	EBH404c/250/100
300 A	EBH403c/300/30	EBH404c/300/30	EBH403c/300/100	EBH404c/300/100
350 A	EBH403c/350/30	EBH404c/350/30	EBH403c/350/100	EBH404c/350/100
400 A	EBH403c/400/30	EBH404c/400/30	EBH403c/400/100	EBH404c/400/100

EBL type (85kA/460V)

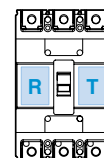
Rated current, In	Rated residual current, I Δ n: 30mA		Rated residual current, I Δ n: 100/200/500mA	
	3-pole	4-pole	3-pole	4-pole
250 A	EBL403c/250/30	EBL404c/250/30	EBL403c/250/100	EBL404c/250/100
300 A	EBL403c/300/30	EBL404c/300/30	EBL403c/300/100	EBL404c/300/100
350 A	EBL403c/350/30	EBL404c/350/30	EBL403c/350/100	EBL404c/350/100
400 A	EBL403c/400/30	EBL404c/400/30	EBL403c/400/100	EBL404c/400/100

Accessories



Electrical auxiliaries

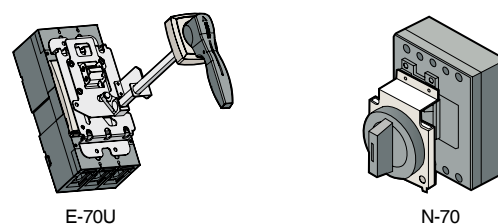
AX	Auxiliary switch
AL	Alarm switch
SHT	Shunt trip
UVT	Undervoltage trip



Maximum possibilities

T-position	Not available
R-position	Option of 2AX, 2AL and SHT or UVT

Note) For more detail see 75 page



External accessories

IBL400	Insulation barrier
T1-43A	Terminal cover (Long) - 2, 3pole
T1-44A	Terminal cover (Long) - 4pole
N-70	Rotary handle (Direct)
E-70U	Rotary handle (Extended)
MI-43	Mechanical interlock - 2, 3pole
MI-44	Mechanical interlock - 4pole

Note) For more detail see 82 page

Electrical auxiliaries of 100~250AF

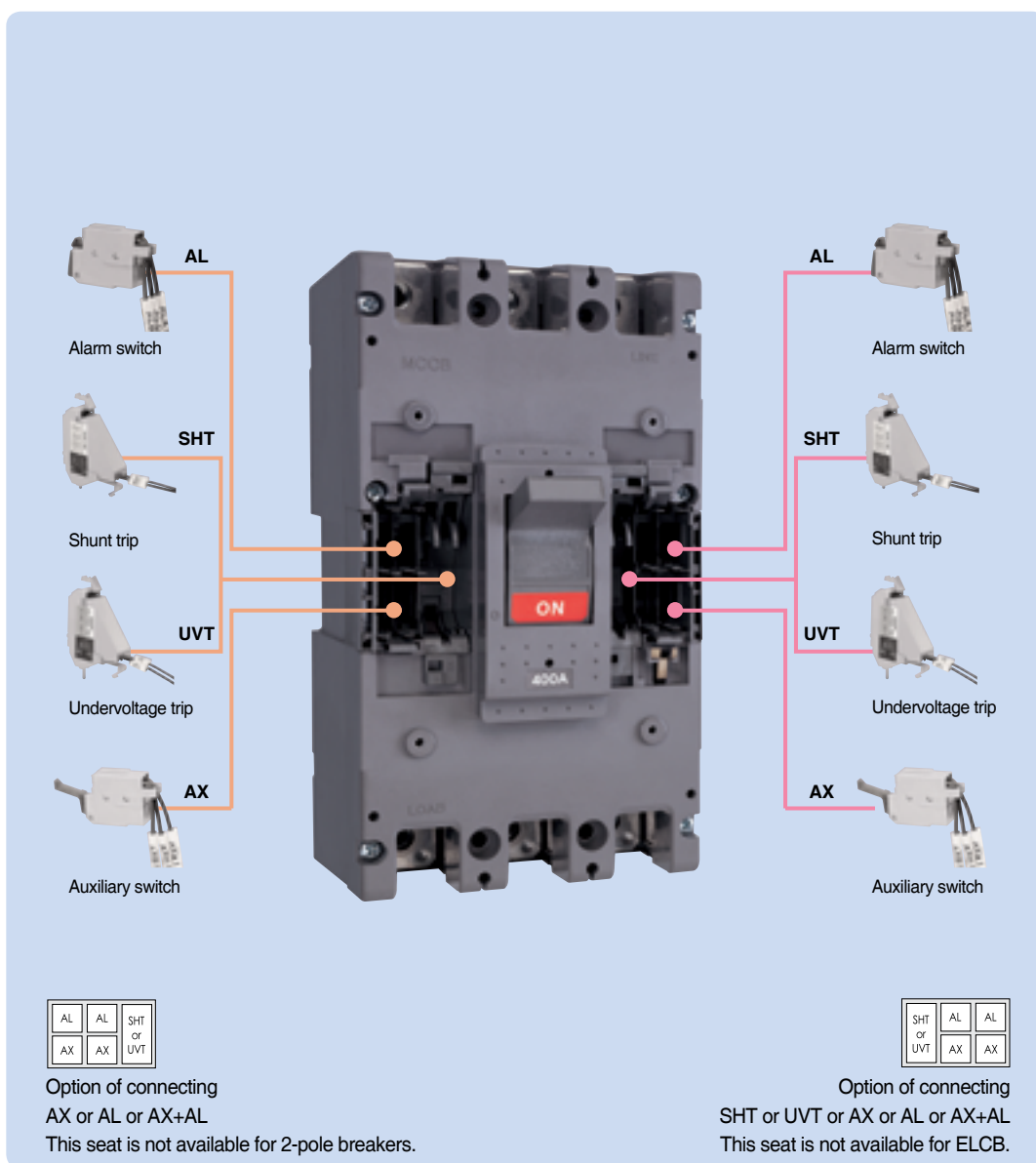
Option of connecting AX or AL or AX+AL
This seat is not available for 2-pole MCCB.

Option of connecting SHT or UVT or AX or AL or AX+AL
This seat is not available for ELCB.

Maximum possibilities

Position	Type	ABN100c		ABH125c		ABH250c	EBN100c	EBH125c	EBH250c
		2p	3/4p	2p	3/4p	2/3/4p	2/3/4p	3/4p	2/3/4p
Left-hand seat	AX	-	1	-	1	1	1	1	1
	AL	-	1	-	1	1	1	1	1
	AX+AL	-	1	-	1	1	1	1	1
Right-hand seat	AX	1	1	1	1	1	-	-	-
	AL	1	1	1	1	1	-	-	-
	AX+AL	1	1	1	1	1	-	-	-
	SHT/UVT	1	1	1	1	1	-	-	-

Electrical auxiliaries of 400~800AF



Maximum possibilities

Position	Type	MCCB (400~800AF)	ELCB (400~800AF)
Left-hand seat	AX	2	2
	AL	2	2
	SHT/UVT	1	1
Right-hand seat	AX	2	-
	AL	2	-
	SHT/UVT	1	-

Rotary handles

Direct type



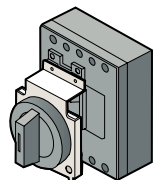
Direct type
(DH 30~250AF)



Key lock
(DH 30~250AF)

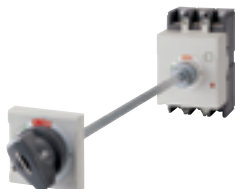


(N 30~250AF)

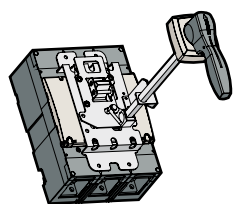


(N 400~800AF)

Extended type



(30~250AF)



(400~800AF)

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

Direct type , D-handle and N-handle

-D-handle : Directly mountable to a circuit breaker. Trip button is built as standard. Key lock type is optional.

-N-handle : Directly mountable to a circuit breaker. Door is locked in the Off state. handle size is greater than D-handle.

Extended type, E-handle

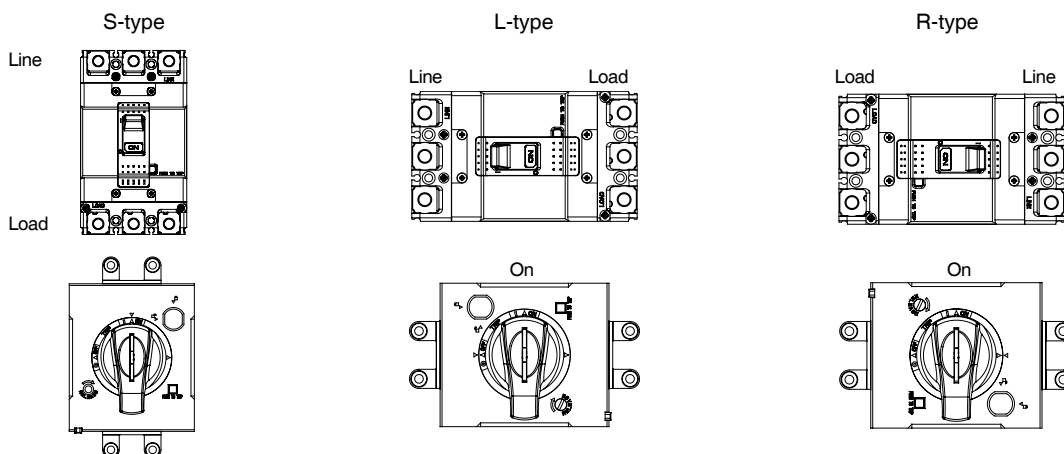
It is used in case direct type handle can not be applied because of the longer distance between the breaker and the panel door.

Type

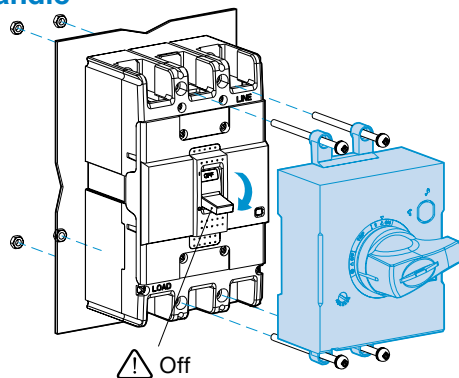
Direct type	Direct type (Key lock)	Extended type	Breaker type	
			MCCB	ELCB
N-30c	-	-	ABN50c/60c/100c/100e	EBN50c/60c/100c
DH100	DHK100	EH100	ABS30c/50c/60c	EBS30c/50c/60c
N-40c	-	-	ABS125c ABH50c/125c ABL125c	EBS125c EBH50c/125c
N-50c	-	-	ABN/S/H/L250c	EBN/S/H250c
DH250	DHK250	EH250	ABN/S/H/L400c	EBN/S/H/L400c
N-70	-	E-70U	ABN/S/L800c	EBN/S/L800c
N-80	-	E-80U	ABN/S/L800c	EBN/S/L800c

Note: Padlock type for N-handle
- On or OFF state type - Only OFF state type

Type suffix according to the mounting position

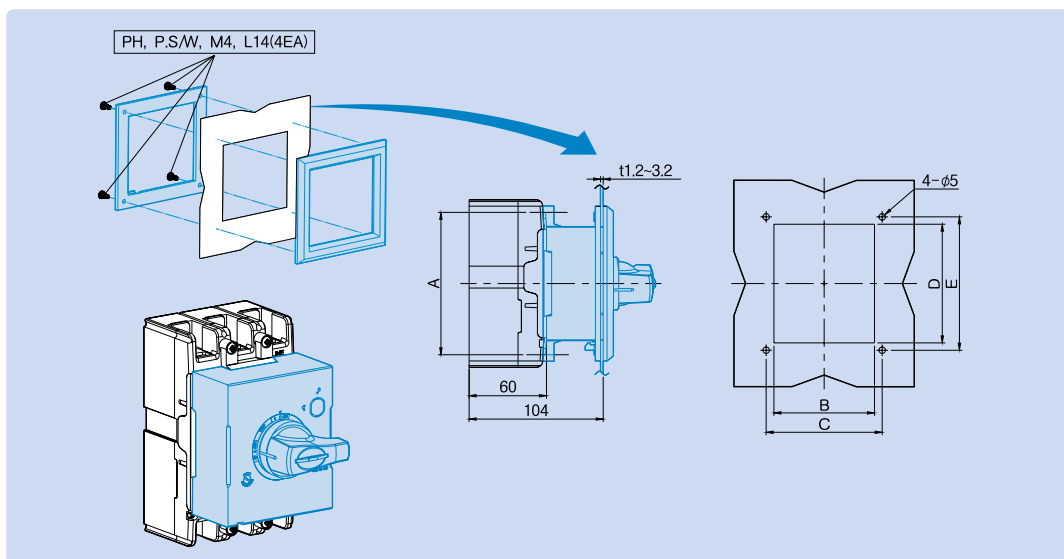


Installing the D-handle



ABN100c, EBN100c	ABH125c, EBH125c	ABH250c, EBH250c

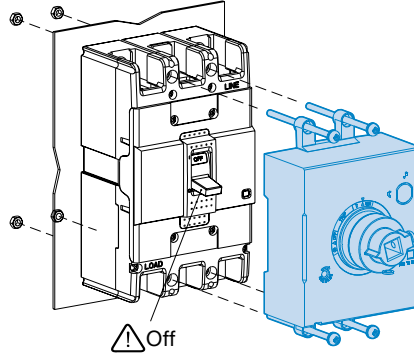
Cutting panel



Direct type	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	Breaker
DH100	110.5	78	90	92	103.4	100AF
DH125	132	94	105	108	120	125AF
DH250	126	108	121	110	122	250AF

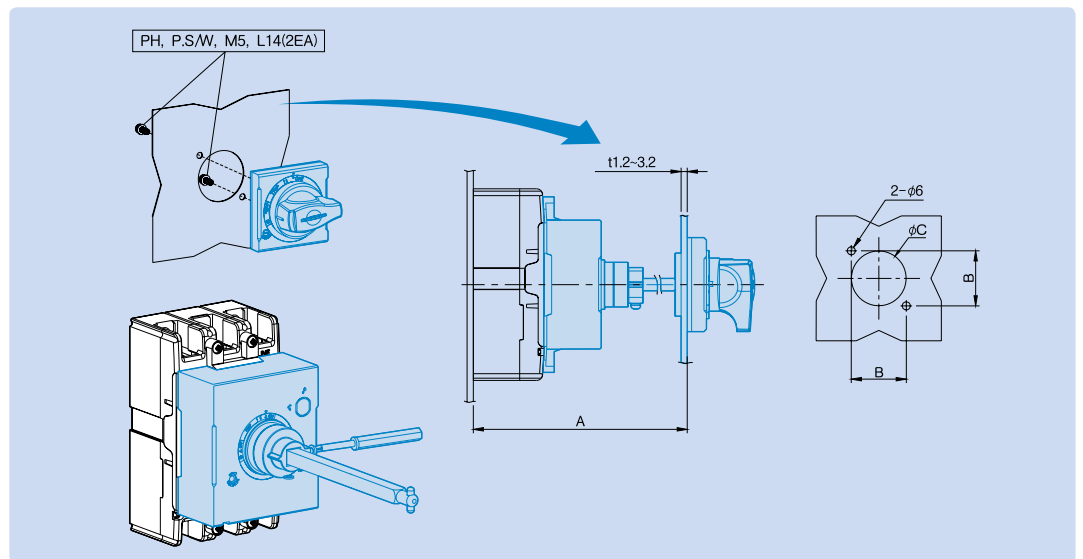
E-handle

Installing the E-handle



ABN100c, EBN100c	ABH125c, EBH125c	ABH250c, EBH250c

Cutting panel



E-handle	A (mm)	B (mm)	C (mm)	Breaker
EH100	min 150, max 573.5 (Shaft469mm)	47	Ø53	100AF
EH125	min 150, max 573.5 (Shaft469mm)	47	Ø53	125AF
EH250	min 150, max 571.5 (Shaft469mm)	47	Ø53	250AF

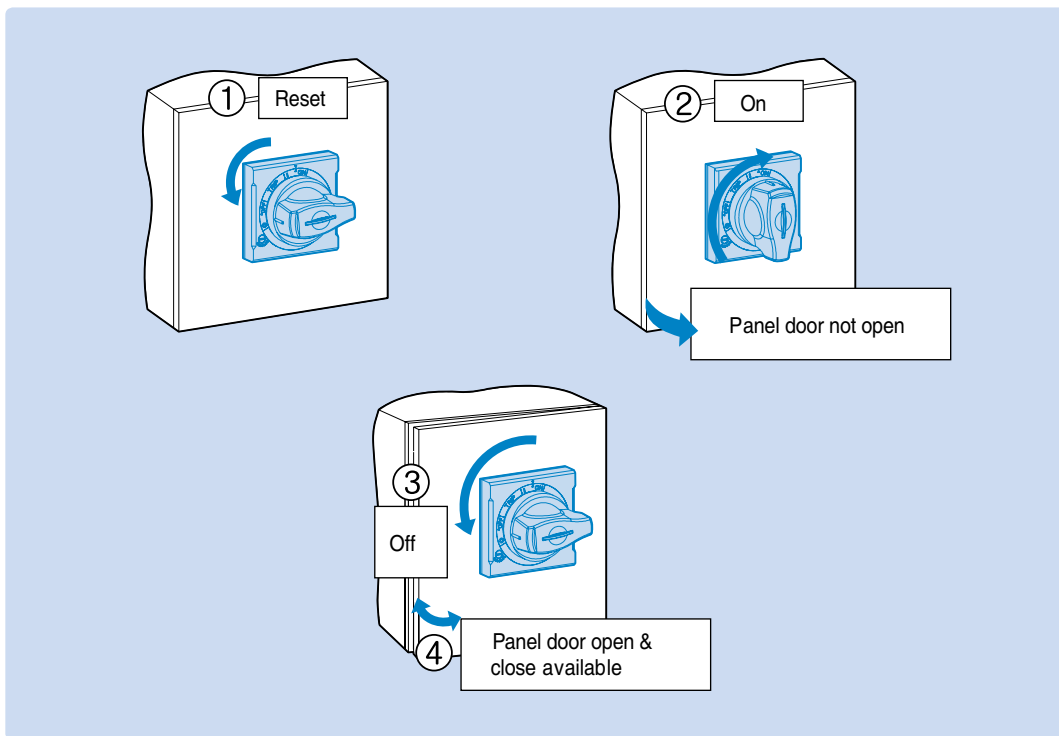
Note: An extension shaft that must be adjusted to the distance between back of circuit breaker and door

Operating test

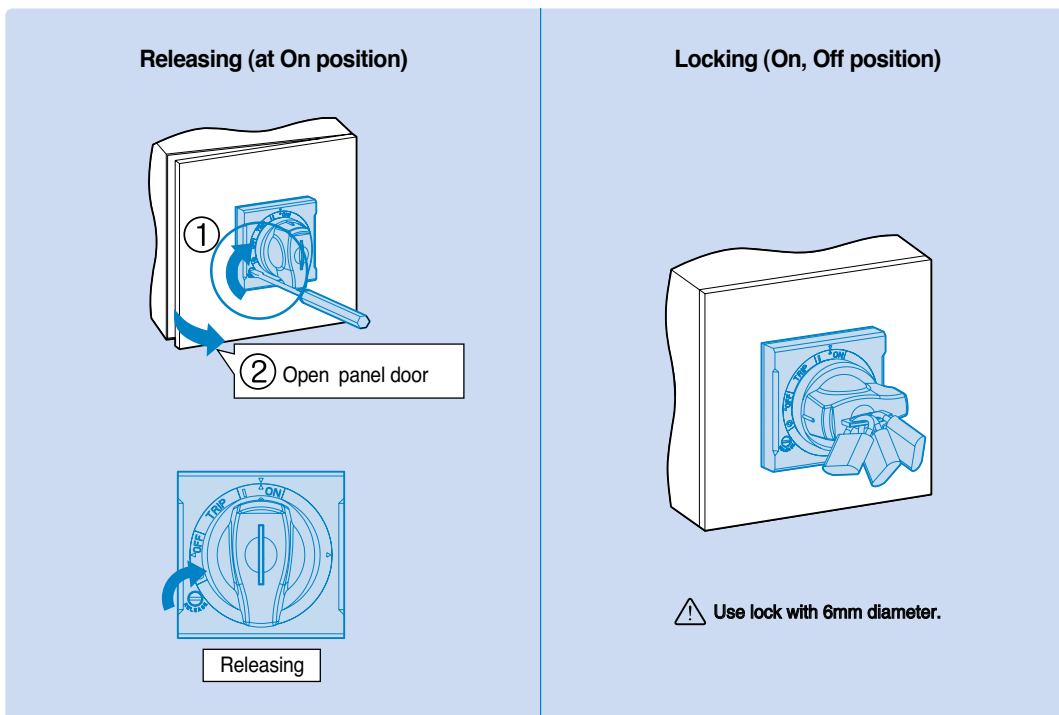
CAUTION

If the door is opened with much pressure when the position of handle is On or Trip, the handle lock lever will be damaged.

Trip position : Panel door can't be opened



Locking system



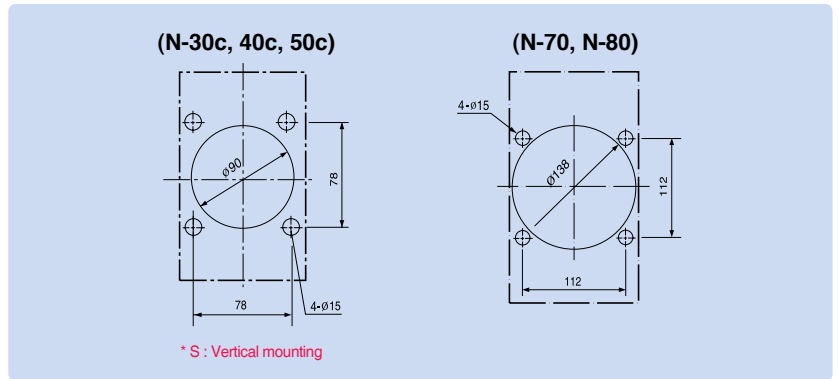
Note : In case of EH100/125/250 Semi Type, it is possible to lock E-handle only in the condition of OFF.

N-handle

How to mount

1) Drilling on the panel door

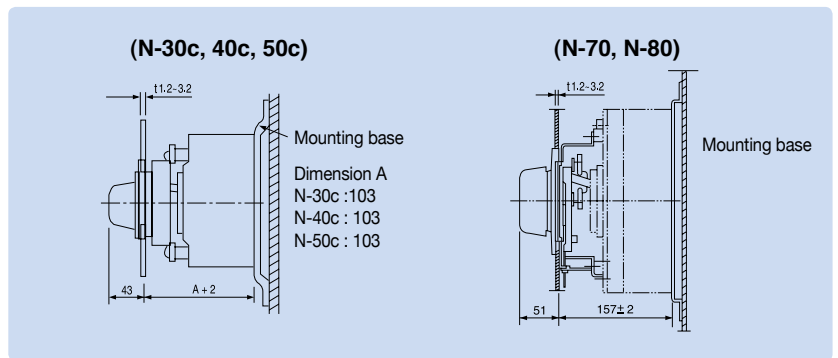
- ① All the N handles require the same size of mounting hole.
- ② Drill the holes according to the Fig. 1



<Fig 1>

(2) Mounting base

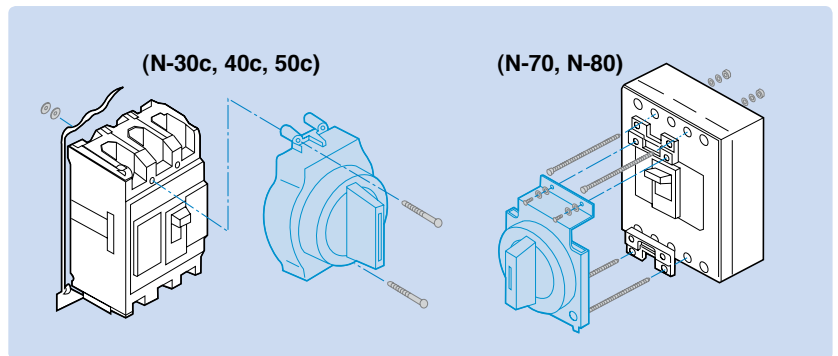
- ① Prepare a mounting base according to the Fig. 2.
The distance between the door panel and the mounting base should be A+2.
Dimension A is shown in the Fig.
- ② In the case of horizontal mounting turn the breaker mounting holes by 90 degrees



<Fig 2>

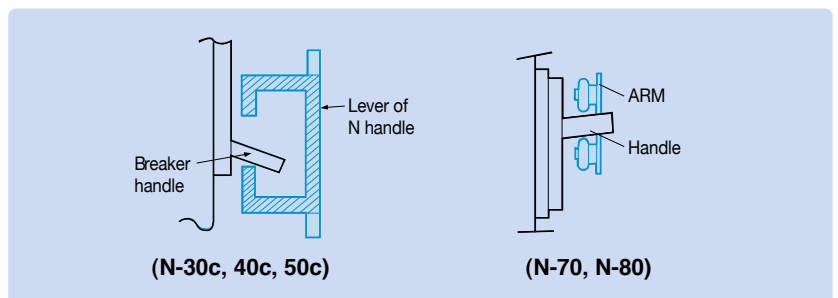
(3) Fixing

- ① Fixing a breaker and a handle at the same time.
 - a) As shown in the Fig. 3 a breaker and a handle can be fixed at the same time on a mounting base with the 4 (long) screws enclosed.



<Fig 3>

- b) Have the breaker handle and the lever of N handle be located in the position shown in Fig. 4.

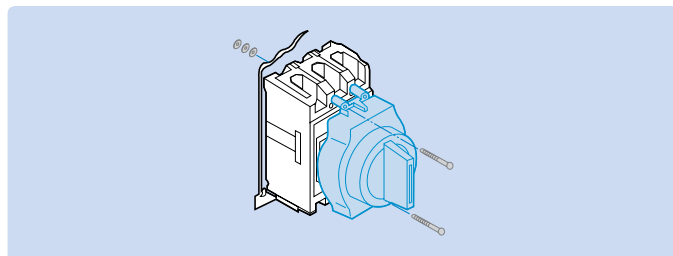


<Fig 4>

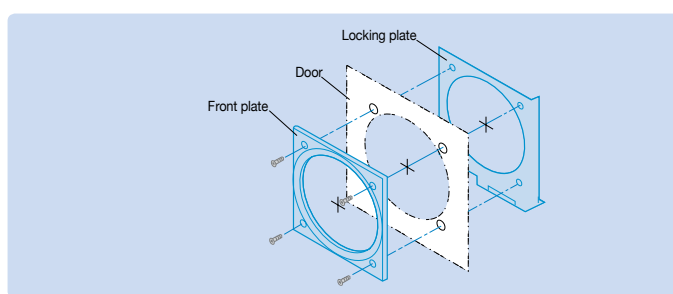
- ② Fixing a handle and a breaker step by step
- Check if there is any thin membrane in the mounting hole of the breaker cover and remove it, if exists.
 - Have the breaker handle and the lever of N handle be located in the position shown in Fig. 4.
 - Fix the N handle on the breaker with the 2 (short) screws enclosed.
 - Fix the breaker on a mounting base with the 2 (long) screws

(4) Fixing front plate and lock plate

- Set the front plate and the locking plate on the door as shown in Fig. 6 fix them with screws.

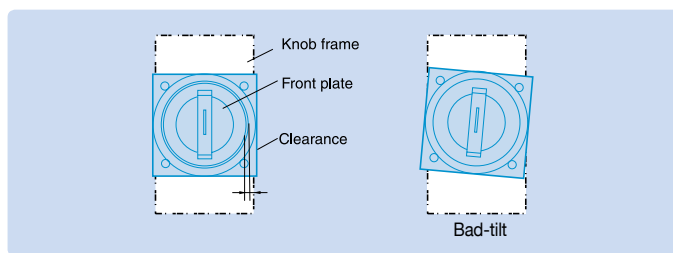


<Fig 5>



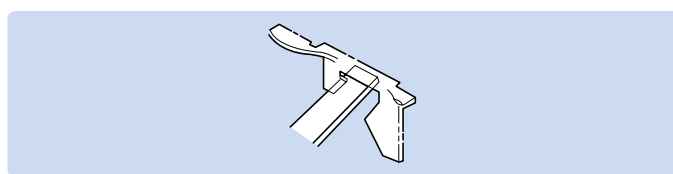
<Fig 6>

- Adjust if front plate or handle is at tilt against the breaker .



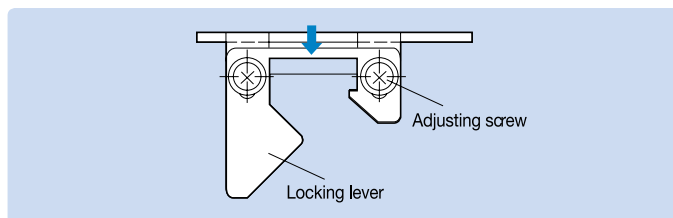
<Fig 7>

- Verify that locking plate and locking lever interact on each other properly when the panel door is closed.
If necessary adjust them by following instructions.



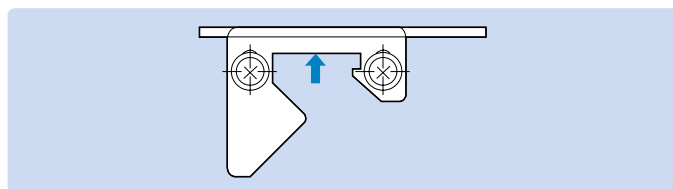
<Fig 8>

- In the event the panel door is not fully closed
This happens if the distance between the door panel and the mounting base the panels of the door is short.
Loosen the adjusting screw in the lock plate and move the plate in the direction of the arrow as shown in Fig. 9.



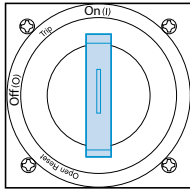
<Fig 9>

- In the event the door does not lock after closing the door
This happens if the distance between the door panel and the mounting base the panels of the door is long.
Loosen the adjusting screw in the lock plate and move the plate in the direction of the arrow as shown in Fig. 10.

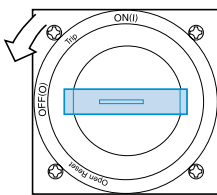


<Fig 10>

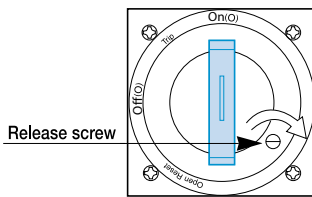
N-handle



<Fig 11>



<Fig 12>



<Fig 13>

(1) Operation in the door closed

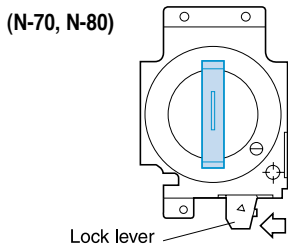
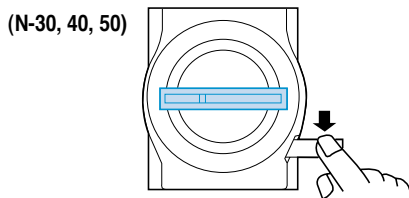
- ① To have the breaker On turn the handle to be vertical. <Fig. 11>
- ② To have the breaker Off turn the handle to be horizontal. <Fig. 12>
- ③ If the breaker is tripped, the handle points to the Trip position.
- ④ To reset the breaker turn the handle to Reset position.

(2) Unlocking the panel door

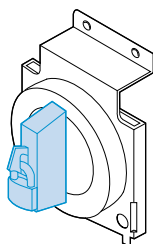
- ① The door is locked and will not open at On, Off and Trip status.
- ② To unlock the door from Off or Trip status turn the handle toward OPEN direction. (Unlocked after taking the hand off the handle.)
- ③ To unlock the door from on state turn the Release screw clockwise <Fig. 13>

(3) Operation of the breaker in the door open

- ① When the door is open the breaker will not be on as the lock lever operates.
- ② To release the locking pull the lock lever to be nearly horizontal position. Then the breaker can be closed. <Fig. 14>
- ③ If the door is closed the lock lever will be reset automatically.



<Fig 14>



<Fig 15>

Padlocking

- ① Lockable at On or Off state with a padlock. (Padlock is not supplied)
 - Lockable at Off state with a padlock is an optional spec.
- ② Pull the lock plate on the front of the handle and fasten the lock. <Fig. 15>
- ③ If the breaker is tripped after padlocking at on state, the handle will point to the Trip.
- ④ Padlock diameter should be 3.5 ~ 6mm

Note: Terminal covers for 400AF and 800AF MCCBs are in acrylic.

Terminal covers

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

Two types by length are available and provide IP20 degree of protection.

Also, covers are classified into 2 different types: Independent, Attachable and detachable with D or N handle

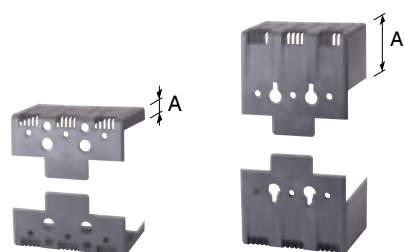
- **Short type covers, TCS:**

For fixed circuit-breakers with rear terminals and for moving parts of plug-in.

- **Long type covers, TCL:**

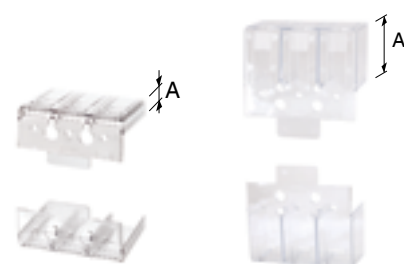
For fixed circuit-breakers with front, front extended, front for cables terminals.

Terminal covers						Pole	Applied breaker		Size extended (A), mm	
Short type			Long type				MCCB	ELCB	Short type	Long type
Inde	D-handle	N-handle	Inde	D-handle	N-handle					
TBS22	-	-	-	-	-	2P	ABE30b	-	10	-
TBS23	-	-	-	-	-	3P				
TCS12	-	-	TCL12	-	-	2P	ABN50c/60c/100c/100e	EBN50c/60c/100c	5.5	30
TCS/T-12	-	-	TCL/T-12	-	-					
TCS13	TCS13	TCS13	TCL13	TCL13	TCL13	3P	ABS30c/50c/60c	EBS30c/50c/60c	5.5	30
TCS/T-13	TCS/T-13	TCS/T-13	TCL/T-13	TCL/T-13	TCL/T-13					
TCS14	TCS14	TCS14	TCL14	TCS14	TCS14	4P	ABS125c	EBS125c	5.5	40
TCS/T-14	TCS/T-14	TCS/T-14	TCL/T-14	TCL/T-14	TCL/T-14					
TCS22	-	-	TCL22	-	-	2P	ABH50c/125c	EBH50c/125c	5.5	40
TCS/T-22	-	-	TCL/T-22	-	-					
TCS23	TCS23	TCS23	TCL23	TCL23	TCL23	3P	ABL125c	EBS250c	5.5	50
TCS/T-23	TCS/T-23	TCS/T-23	TCL/T-23	TCL/T-23	TCL/T-23					
TCS24	TCS24	TCS24	TCL24	TCL24	TCL24	4P	ABN250c, ABS250c	EBN250c,	5.5	50
TCS/T-24	TCS/T-24	TCS/T-24	TCL/T-24	TCL/T-24	TCL/T-24					
TCS33	TCS33	TCS33	TCL33	TCL33	TCL33	2, 3P	ABH250c, ABL250c	EBS250c	5.5	50
TCS/T-33	TCS/T-33	TCS/T-33	TCL/T-33	TCL/T-33	TCL/T-33					
TCS34	TCS34	TCS34	TCL34	TCL34	TCL34	4P	EBN250c,	EBS250c	5.5	50
TCS/T-34	TCS/T-34	TCS/T-34	TCL/T-34	TCL/T-34	TCL/T-34					
-	-	-	T1-43A	-	-	2, 3P	ABN/S/H/L400c	EBN/S/H/L400c	-	120
-	-	-	T1-44A	-	-	4P				
-	-	-	T1-63A	-	-	2, 3P	ABN/S/L630c/800c	EBN/S/L630c/800c	-	141
-	-	-	T1-63A	-	-	4P				



TCS (Short type)

TCL (Long type)



TCS/T (Short type)

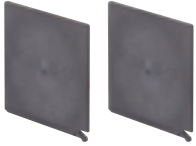
TCL/T (Long type)



Short type construction

Long type construction

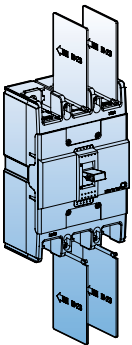
Insulation barriers



Insulation barrier allows the insulation characteristics between the phases at the connections to be increased. They are mounted from the front, even with the circuit-breaker already installed, inserting them into the corresponding slots.

They are incompatible with both the insulating terminal covers.

It is possible to mount the phase separating partitions between two circuit-breakers side by side.



Type	Breaker	
	MCCB	ELCB
IB-13	ABN50c/60c/100c/100e ABS30c/50c/60c	EBN50c/60c/100c EBS30c/50c/60c
IB-23	ABS125c ABH50c/125c ABN250c, ABS250c ABH250c ABL125c, ABL250c	EBS125c EBH50c/125c EBN250c, EBS250c EBH250c
IBL400	ABN/S/H/L400c	EBN/S/H/L400c
IBL800	ABN/S/L800c	EBN/S/L800c



Insulation barriers for line side are provided as standard.

Rear connection terminals

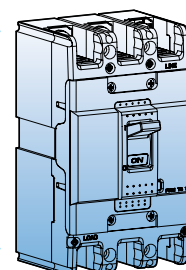
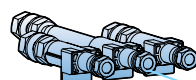
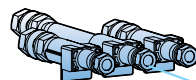
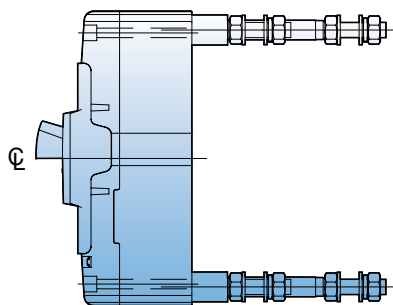
Rear connection terminals are used to adapt the circuit breakers to switchboards or other applications that require rear connection. There are two kinds of rear connection terminals.

- Flat type
- Round type

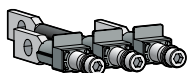
Round type terminals



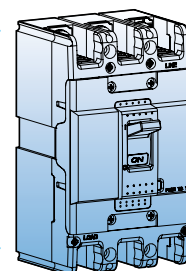
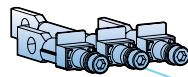
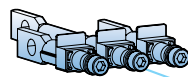
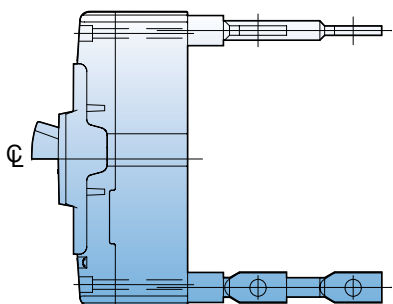
Breaker	For 2-pole	For 3-pole	For 4-pole
ABN100c 50AF	RTR1-52	RTR1-53	-
ABN100c 100AF	RTR1-102	RTR1-103	RTR1-104
ABH125c	RTR2-102	RTR2-103	RTR2-104
ABH250c	RTR3-202	RTR3-203	RTR3-204



Flat type terminals



Breaker	For 2-pole	For 3-pole	For 4-pole
ABN100c	RTB1-102	RTB1-103	RTB1-104
ABH125c	RTB2-102	RTB2-103	RTB2-104
ABH250c	RTB3-202	RTB3-203	RTB3-204



Mechanical interlock

The mechanical interlock is installed on the front of two breakers mounted side by side, in either the 3-pole or 4-pole version and prevents simultaneous closing of the two breakers. So it is suitable for consisting of manual sourcechangeover system.

Type numbering system

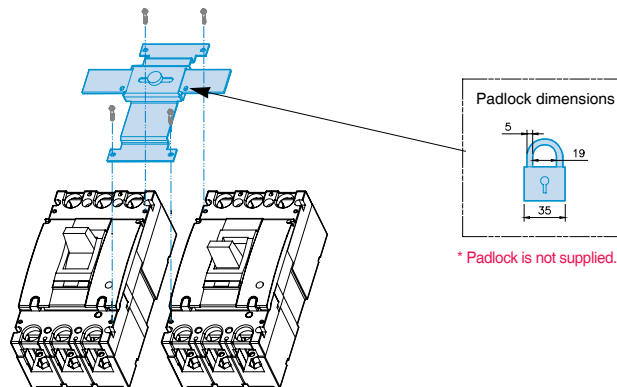
MI	—	4	3														
Type		AF	Pole														
Mechanical interlock		<table border="1"> <tr><td>1</td><td>100AF</td></tr> <tr><td>2</td><td>125AF</td></tr> <tr><td>3</td><td>250AF</td></tr> <tr><td>4</td><td>400AF</td></tr> <tr><td>8</td><td>800AF</td></tr> </table>	1	100AF	2	125AF	3	250AF	4	400AF	8	800AF	<table border="1"> <tr><td>3</td><td>3P</td></tr> <tr><td>4</td><td>4P</td></tr> </table>	3	3P	4	4P
1	100AF																
2	125AF																
3	250AF																
4	400AF																
8	800AF																
3	3P																
4	4P																

Types and applicable breakers

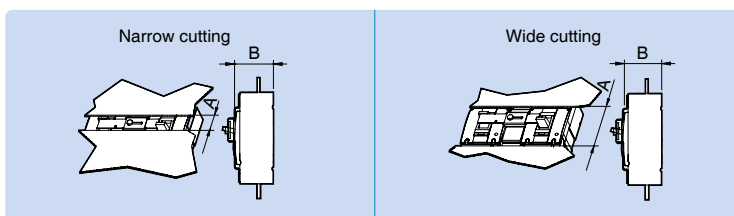
Type	MCCB	ELCB
MI-13, 14	ABS30c, ABS50c, ABS60c, ABN50c, ABN60c, ABN100c, ABN100e	EBS30c, EBS50c, EBS60c, EBN50c, EBN60c, EBN100c
MI-23, 24	ABS125c, ABH50c, ABH125c, ABL125c	EBS125c, EBH50c, EBH125c
MI-33, 34	ABN/S/H/L250c	EBN/S/H250c
MI-43, 44	ABN/S/H/L400c	EBN/S/H/L400c
MI-83, 84	ABN/S/L800c	EBN/S/L800c

Note) MI is not applicable to 2-pole version breakers of 100AF and 125AF.

Layout



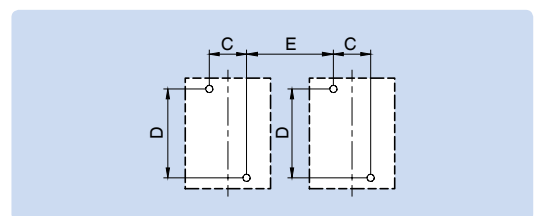
MCCB panel cutting



(Unit in: mm)

Cutting	MI-13, 14		MI-23, 24		MI-33, 34		MI-43, 44		MI-83, 84	
	A	B	A	B	A	B	A	B	A	B
Narrow	52	66	52	66	52	66	100	111	100	111
Wide	86	62	102	62	104	62	152	97	152	97

MCCB panel drilling



(Unit in: mm)

Breaker	C		D		E	
	3P	4P	3P	4P	3P	4P
100AF	25	25	110.5	110.5	70	95
125AF	30	30	132	132	84	114
250AF	35	35	126	126	99	134
400AF	44	44	215	215	166	210
800AF	70	70	243	243	210	280



Plug-in base

Plug-in devices

Plug-in device makes it possible to extract and/or rapidly replace the circuit breaker without having to touch connections for ship and important installations.

The plug-in base is the fixed part of the plug-in version of the circuit-breaker.

It will be installed directly on the back plate of panel.

The circuit-breaker is racked out by unscrewing the top and bottom fixing screws.

Normal type plug-in MCCB

- MCCB current rating upto 250A
- Generally used in switchgears

Double-row type plug-in MCCB

- For 125AF MCCB
- Generally used in branch circuits



Plug-in type MCCB (Plug-in terminal built)

Type names of blocks

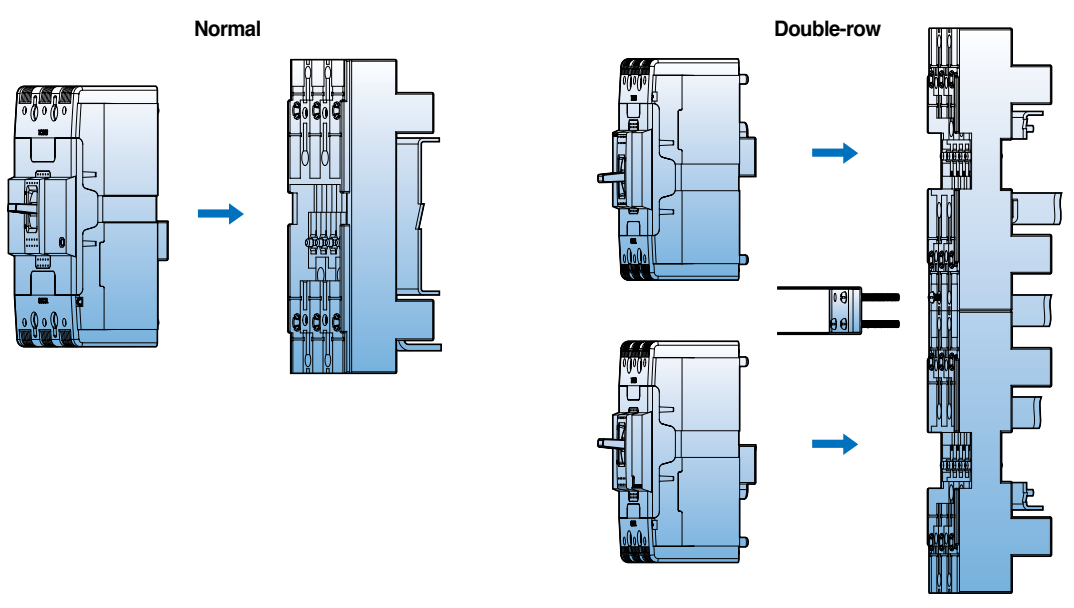
Breaker	Arrangement	Plug-in block	Remark
ABN100c	Normal	PB-A3-FR	
	Single-row	PB-A3-1DB	
	Double-row	PB-A3-2DB	
	Line-only	PB-A3-FRL	
ABH125c	Normal	PB-C3-FR	
	Single-row	PB-C3-1DB	
	Double-row	PB-C3-2DB	
	Line-only	PB-C3-FRL	
ABH250c	Normal	PB-D3-FR	
400AF	Normal/Line-only	PB-I3-FR/PB-I3-FRL	
800AF	Normal	PB-J3-FR	



ABH103c plug-in type



ABH203c plug-in type



Remote operation

Motor operator

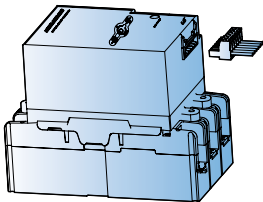


Motor operators can also be operated by manual. The motor drives a mechanism which switches TD & TS toggle handle to the "On" and "Off/Reset" positions.

- The manual actuator handle is located on the front of the cover.
- Manual or Automatic operation can be selected.
- Applicable to 2, 3 and 4-pole breakers.

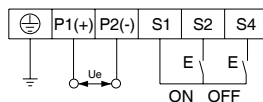
MCCB			Type	Control voltage	Actuation current (A)	Response time (ms)		Mechanical service life (operations)	No. of operations per hour
2P	3P	4P				Closing	Opening		
-	ABN53c, ABN63c, ABN103c, ABN103d, ABN103e, ABS33c, ABS53c, ABS63c	ABN54c, ABN64c, ABN104c, ABN104d, ABN104e, ABS34c, ABS54c, ABS64c	MOP-M1	① DC24V ② AC110V~DC110V ③ AC230V/DC220V	≤3A (DC24V) ≤0.5A (AC)	700	700	10,000	120
-	ABS103c, ABH53c, ABH103c, ABL103c	ABS104c, ABH54c, ABH104c, ABL104c	MOP-M2	① DC24V ② AC110V~DC110V ③ AC230V/DC220V	≤3A (DC24V) ≤0.5A (AC)	840	840	10,000	120
ABN202c, ABS202c, ABH202c, ABL202c	ABN203c, ABS203c, ABH203c, ABL203c	ABN204c, ABS204c, ABH204c, ABL204c	MOP-M3	① DC24V ② AC110V~DC110V ③ AC230V/DC220V	≤3A (DC24V) ≤0.5A (AC)	840	840	10,000	120
ABN402c, ABS402c, ABH402c, ABL402c	ABN403c, ABS403c, ABH403c, ABL403c	ABN404c, ABS404c, ABH404c, ABL404c	MOP-M4	① DC24V ② AC110~DC110V ③ AC230V/DC220V	≤6A (DC24V) ≤0.8A (AC)	1,200	1,200	4,000	60
ABN802c, ABS802c, ABL802c	ABN803c, ABS803c, ABL803c	ABN804c, ABS804c, ABL804c	MOP-M5	① DC24V ② AC110~DC110V ③ AC230V/DC220V	≤6A (DC24V) ≤0.8A (AC)	1,200	1,200	2,500	60
-	ABS1003b, ABS1203b, ABL1003b, ABL1203b	ABS1004b, ABS1204b, ABL1004b, ABL1204b	MOP-M6	① AC230V/DC220V	≤6A (DC24V) ≤0.8A (AC)	1,500	1,500	2,500	20

Remote operation



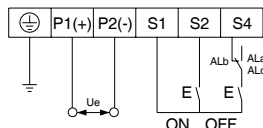
Standard connection

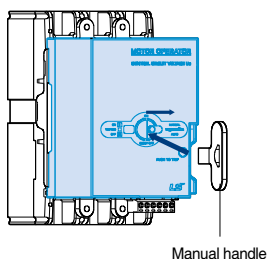
- 1) Remote On and Off of MCCB and manual operation
- 2) Be careful not to change the polarity at DC24V



Connection with alarm switch (AL)

- 1) The connection diagram is the method of using a alarm switch (AL) without shunt or undervoltage trip. A trip due to a fault or trip button prevent a remote reset.
- 2) The fault must be cleared surely and reset it with manual operation.





Manual operation

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

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

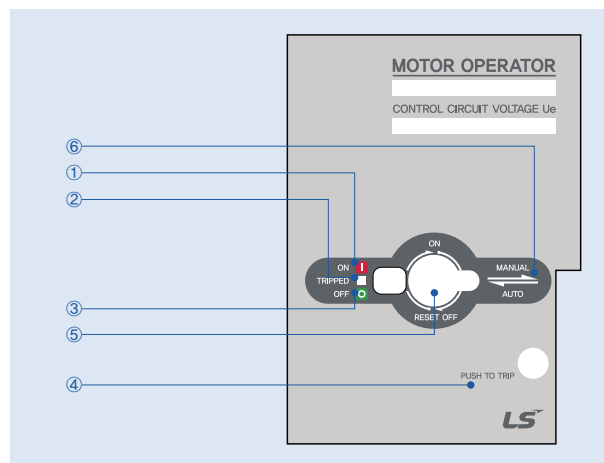
Automatic operation

- 1) Set the slide switch to Auto, then internal power is closed automatically.
- 2) Operating frequency should be less than these below regulated values.
MOP-M1~M3, M7 (120 operations per hour) , MOP-M4 (60 operations per hour) ,
MOP-M5, M6 (20 operations per hour)
- 3) Use the On/Off switch in the range of regulated values.
- 4) It may interfere near communication equipments because of internal switching power supply.
It's recommended that a noise filter be installed to power supply.
- 5) Please do not input On/Off signals at the same time during the automatic operation.
- 6) If the circuit breaker has a UVT attached inside, charge a UVT on the rated voltage before performing Motor operator.

Motor operator

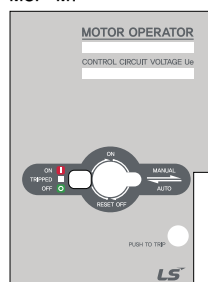
Feature

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

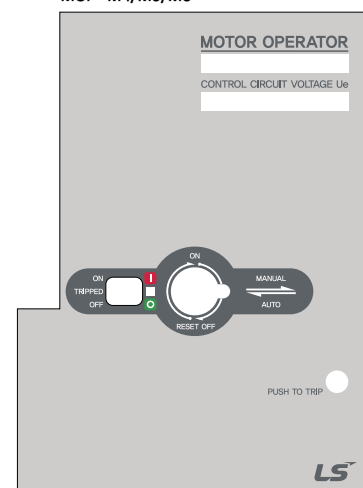
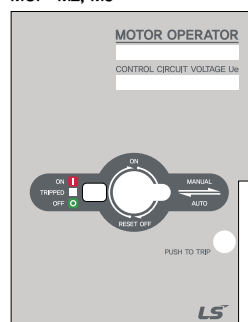


MOP-M4/M5/M6

MOP-M1



MOP-M2, M3



Type numbering system

MCCB

AB	S	10	3	C	M / 100A	AX	T	SHT=220V	
MCCB	Type	Ampere frame		Pole	Series	Application	Rated current	Position & Type	Control voltage of accessory
N	N-type	3	30AF	2	2-pole	-	General purpose	T LWT Right Side Mounting	Lead Wire type AC/DC 12V
S	S-type	5	50AF	3	3-pole	M	Motor protection		
H	H-type	6	60AF	4	4-pole			T TBT Right side mounting	Terminal Block type AC/DC 100V~130V
L	L-type	10	100/125AF						
		20	225/250AF						AC 380V~450V
		40	400AF						AC 440V~500V
		80	800AF						UVT AC/DC 24V
		100	1,000AF						AC/DC 48V
		120	1200AF						AC/DC 100V~110V
									AC/DC 200V~220V
									AC 380V~440V
									AC 440V~480V

Rated current		Accessory	
3A	150A	AX	Auxiliary switch
5A	175A	AL	Alarm switch
10A	200A	SHT	Shunt trip
15A	225A	UVT	Undervoltage trip
20A	250A	DH	Rotary handle (Direct)
30A	300A	EH	Rotary handle (Extended)
40A	350A	RTR	Rear terminal
50A	400A	RTB	Rear terminal
60A	500A		
75A	630A		
100A	700A		
125A	800A		
150A	1200A		

* Warning: Mounting accessories is not available at the left side of 2pole MCCB (Up to 125AF)

ELCB

EB	S	10	3	C / 100A	30mA	AX	R
ELCB	Type	Ampere	Pole	Series	Rated residual current	Accessory	Position & Type
N	N-type	3	30AF		30mA	AX	Auxiliary switch
S	S-type	5	50AF		100/200/500mA	AL	Alarm switch
H	H-type	6	60AF			DH	Rotary handle (Direct)
L	L-type	10	100/125AF			EH	Rotary handle (Extended)
		20	225/250AF			RTR	Rear terminal
		40	400AF			RTB	Rear terminal
		80	800AF				
		100	1000AF				
		120	1200AF				

Rated current	
15A	225A
20A	250A
30A	300A
40A	350A
50A	400A
60A	500A
75A	630A
100A	700A
125A	800A
150A	1000A
175A	1200A
200A	

Position & Type		
R LWT	Left Side Mounting	Lead Wire type
R TBT	Left Side Mounting	Terminal Block type

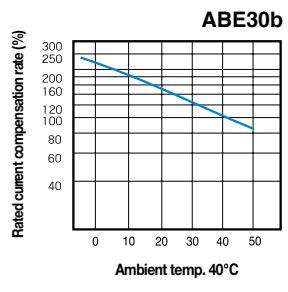
* Warning: Mounting accessories is not available at the right side ELCB (Up to 250AF)

Characteristics curves

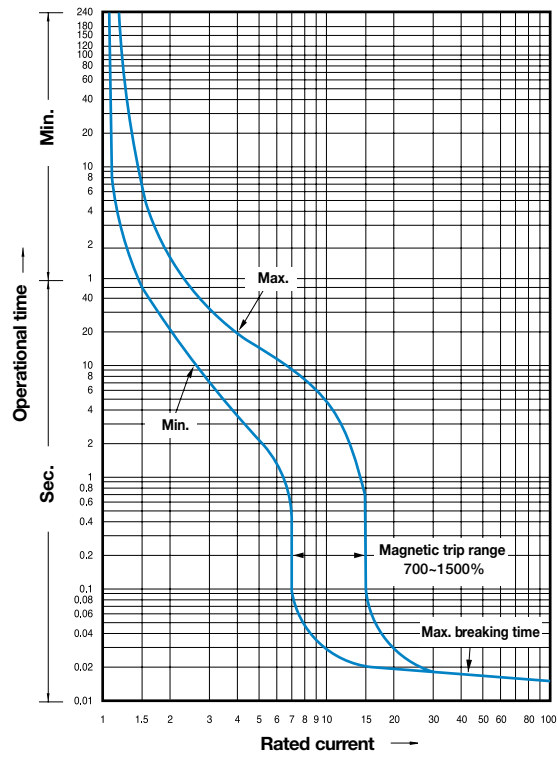
Breaker types

MCCB
ABE30b

Compensation curves



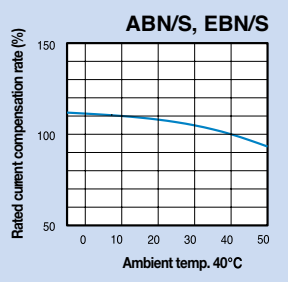
Rated current: 3~30A (ABE)



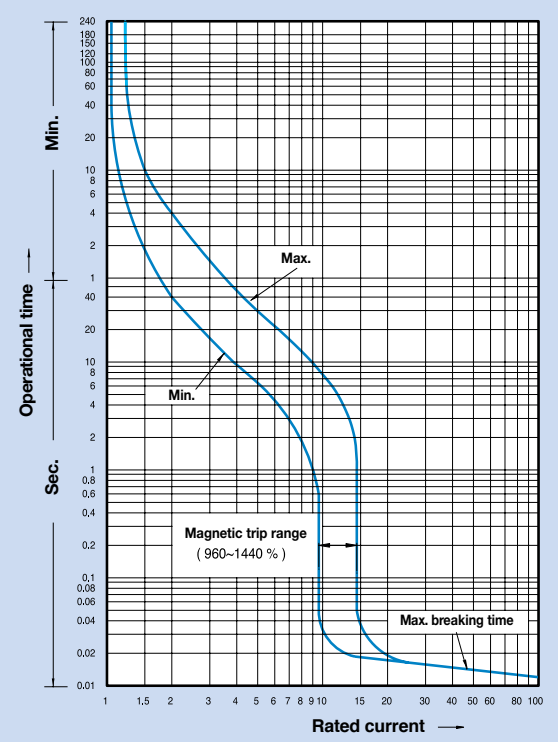
Breaker types

MCCB
ABN50c/60c/100c/100e
ABS30c/50c/60c
ELCB
EBN50c/60c/100c
EBS30c/50c/60c

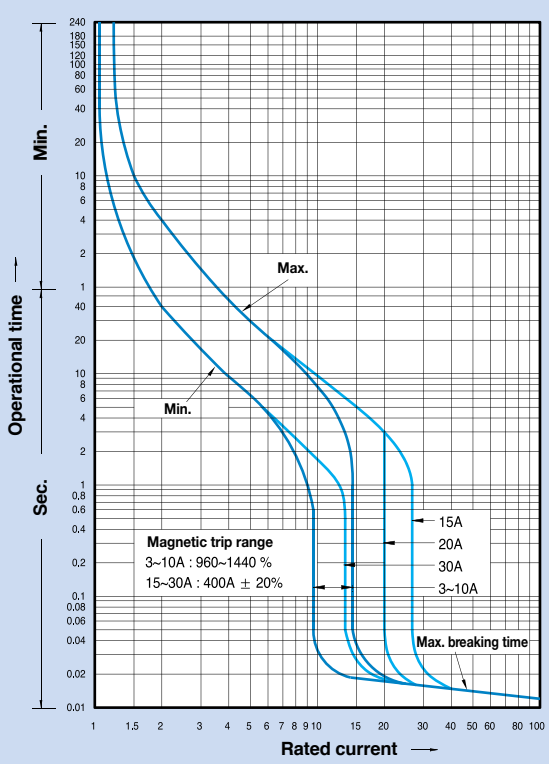
Compensation curves



Rated current: 40~100A (ABN/S,EBN/S)



Rated current: 3~30A (ABN/S,EBN/S)

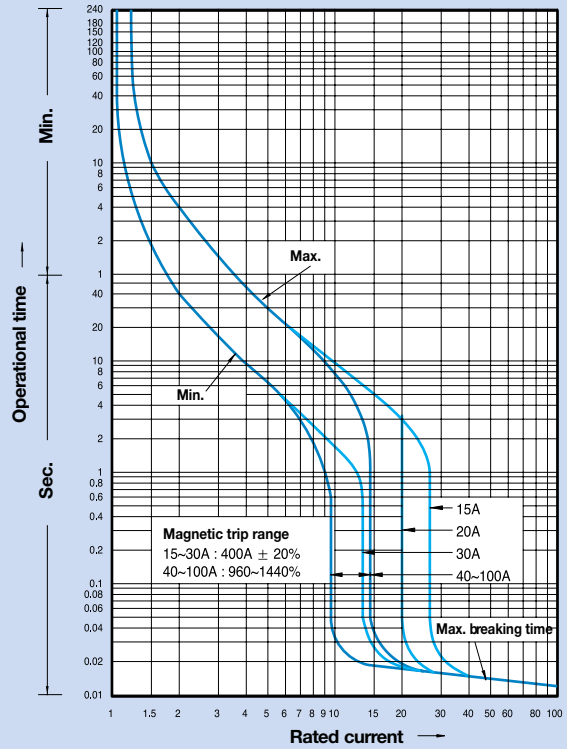


Characteristics curves

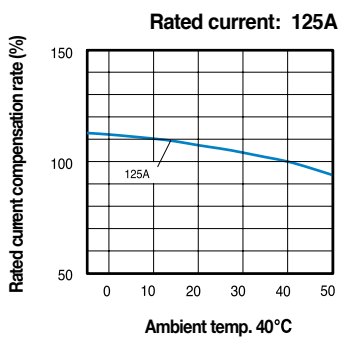
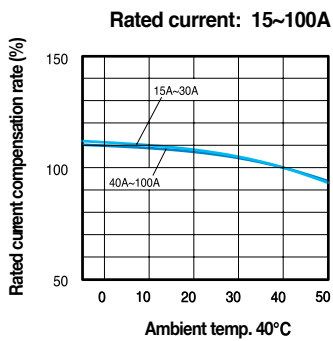
Breaker types

MCCB
ABS125c
ABH50c/125c
ABL125c
ELCB
EBS125c
EBH50c/125c

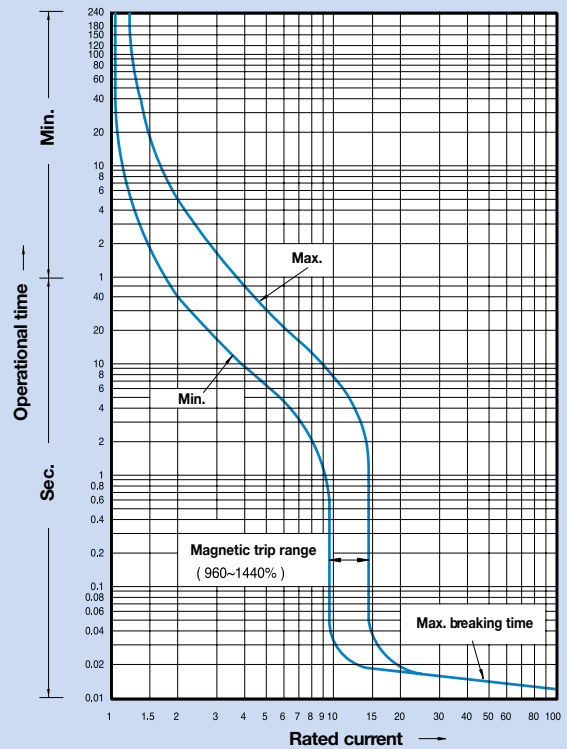
Rated current: 15~30A, 40~100A



Compensation curves



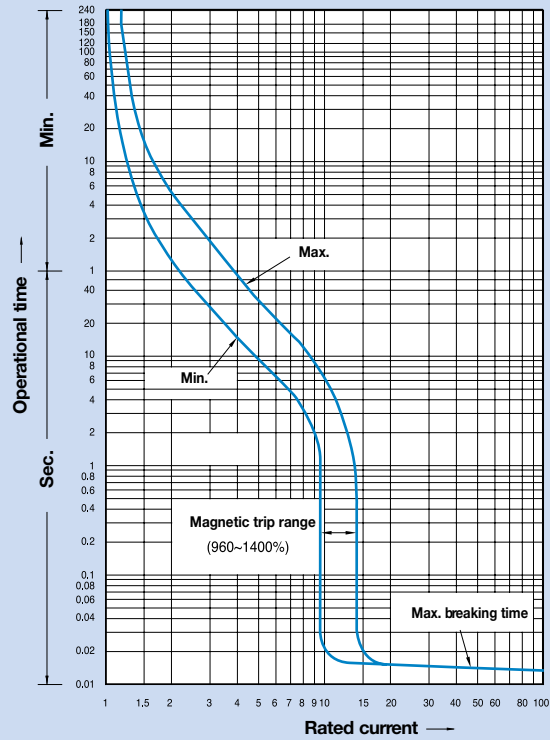
Rated current: 125A



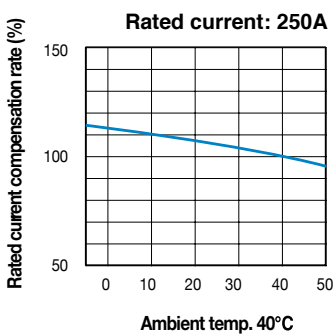
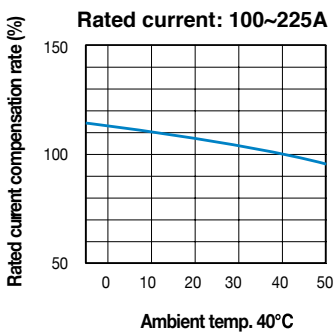
Breaker types

MCCB
ABN250c, ABS250c
ABH250c, ABL250c
ELCB
EBN250c, EBS250c
EBH250c

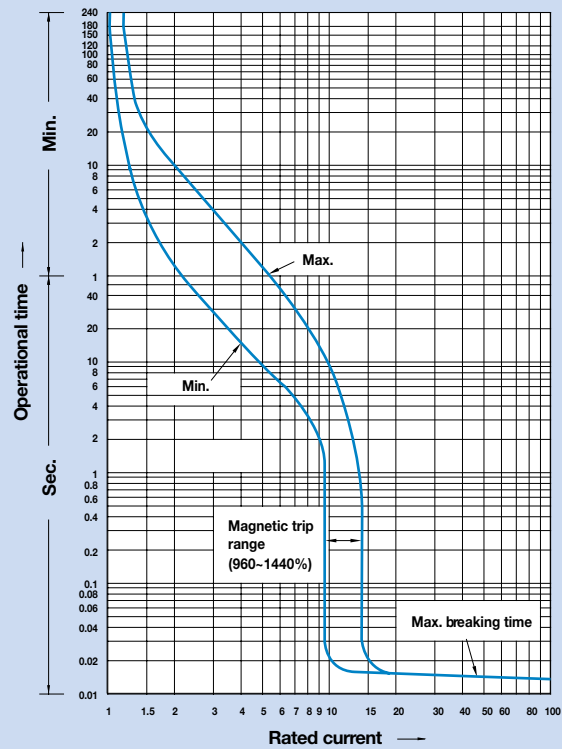
Rated current: 100~225A



Compensation curves



Rated current: 250A

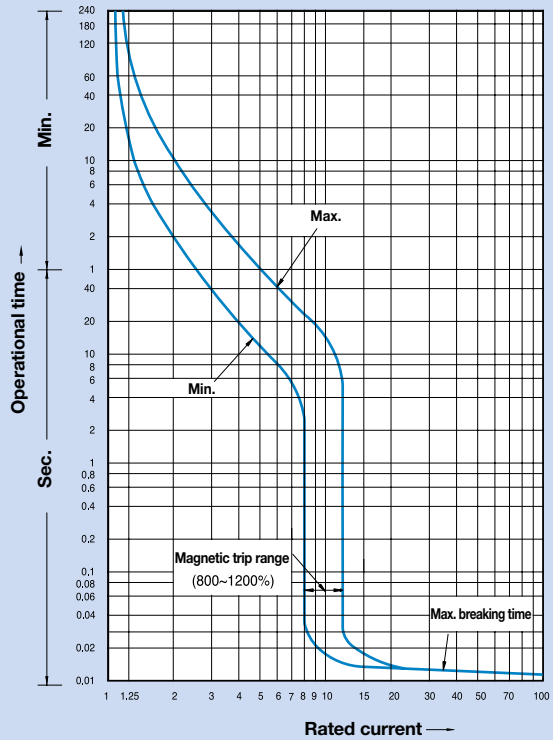


Characteristics curves

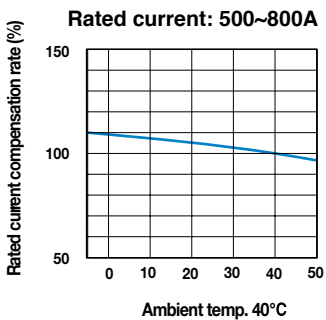
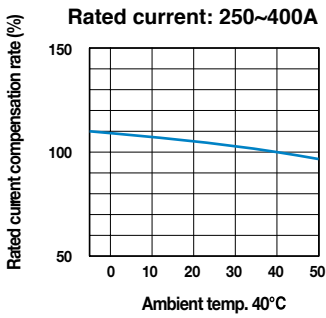
Breaker types

MCCB
ABN400c, ABS400c, ABH400c, ABL400c
ABN800c, ABS800c, ABL800c
ELCB
EBN400c, EBS400c, EBH400c, EBL400c
EBN800c, EBS800c, EBL800c

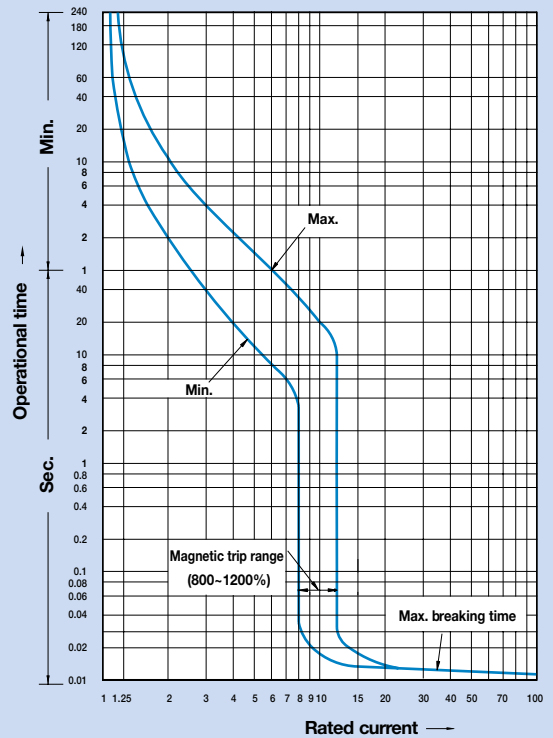
Rated current: 250~400A



Compensation curves



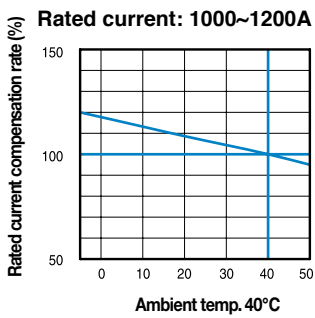
Rated current: 500~800A



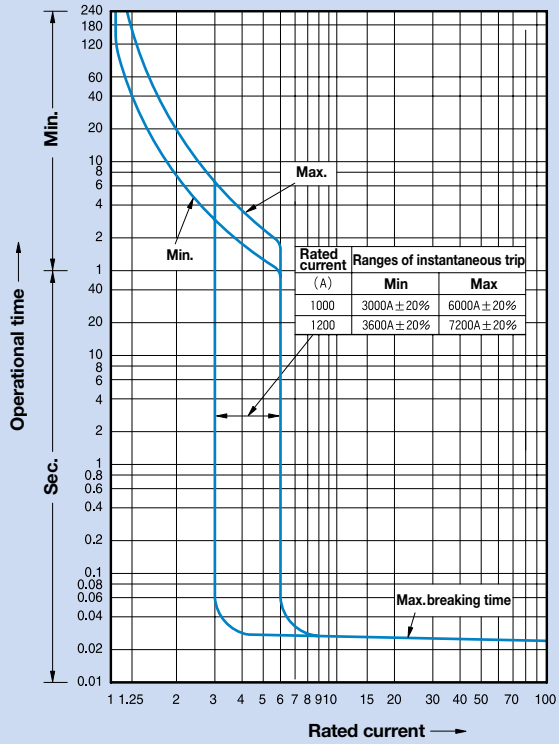
Breaker types

MCCB
ABS1000b, ABL1000b
ABS1200b, ABL1200b
ELCB
EBS1003b, EBS1203b

Compensation curves



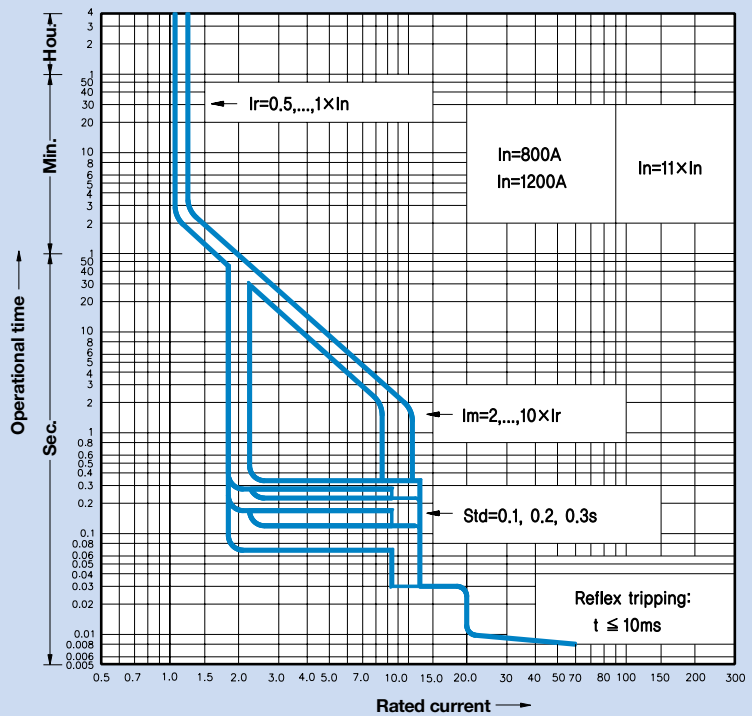
Rated current: 1000~1200A



Breaker types

MCCB
ABS1200bE

Rated current: 1200A



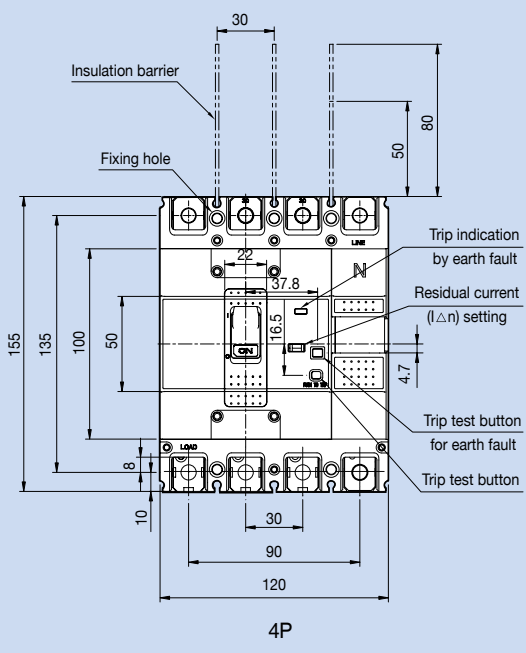
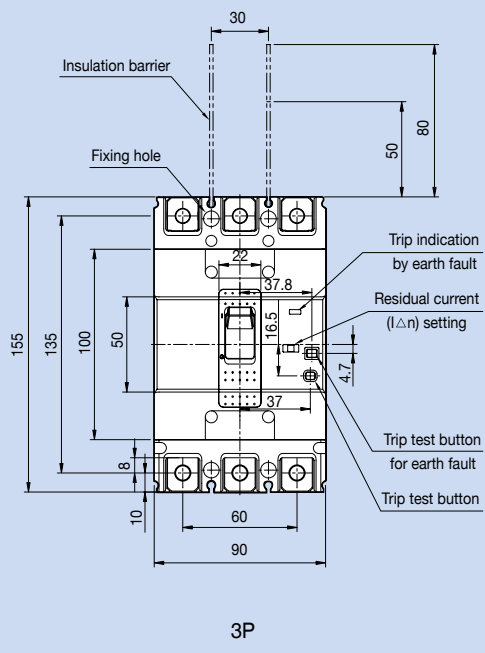
ELCB

EBS125c

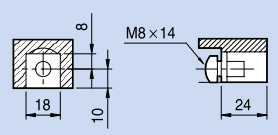
EBH50c

EBH125c

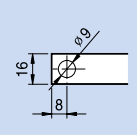
(mm)



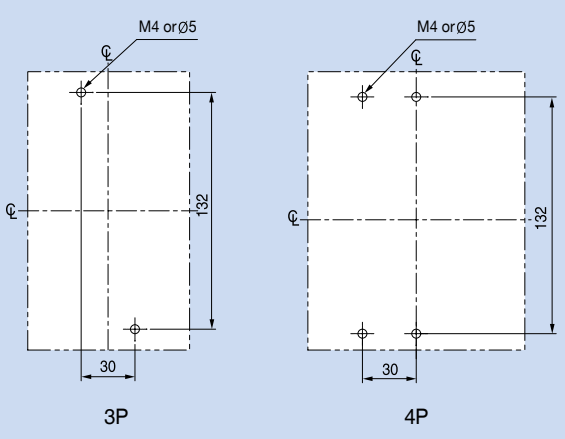
Terminal details



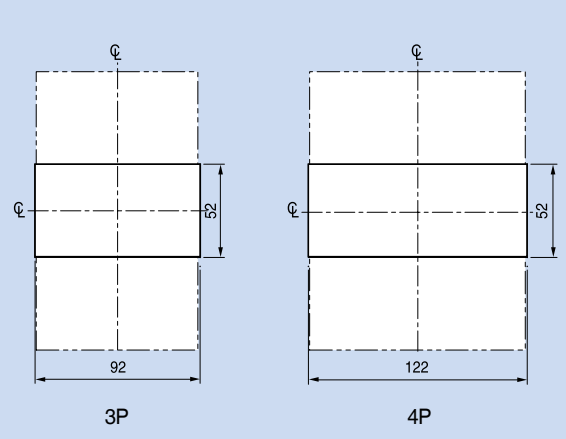
Connecting



Panel drilling



Front panel cutting



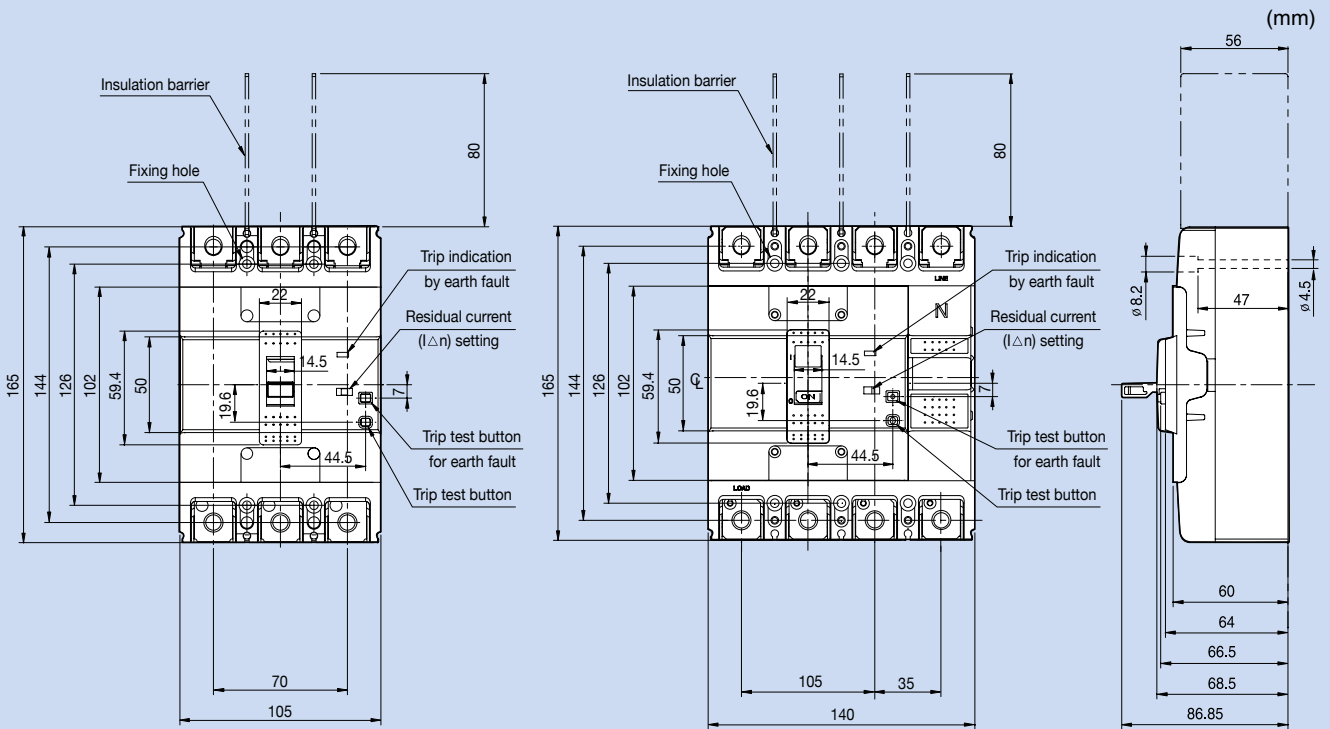
Dimensions

ELCB

EBN250c

EBS250c

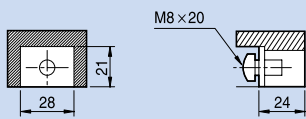
EBH250c



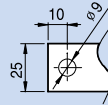
2, 3P

4P

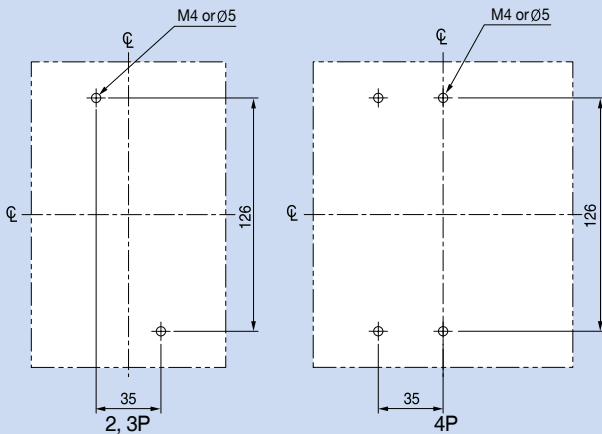
Terminal details



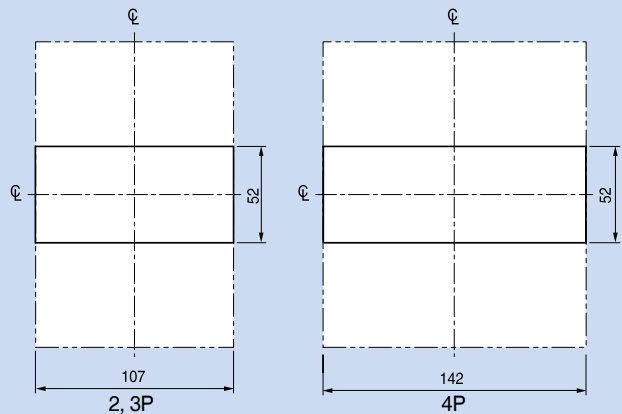
Connecting



Panel drilling



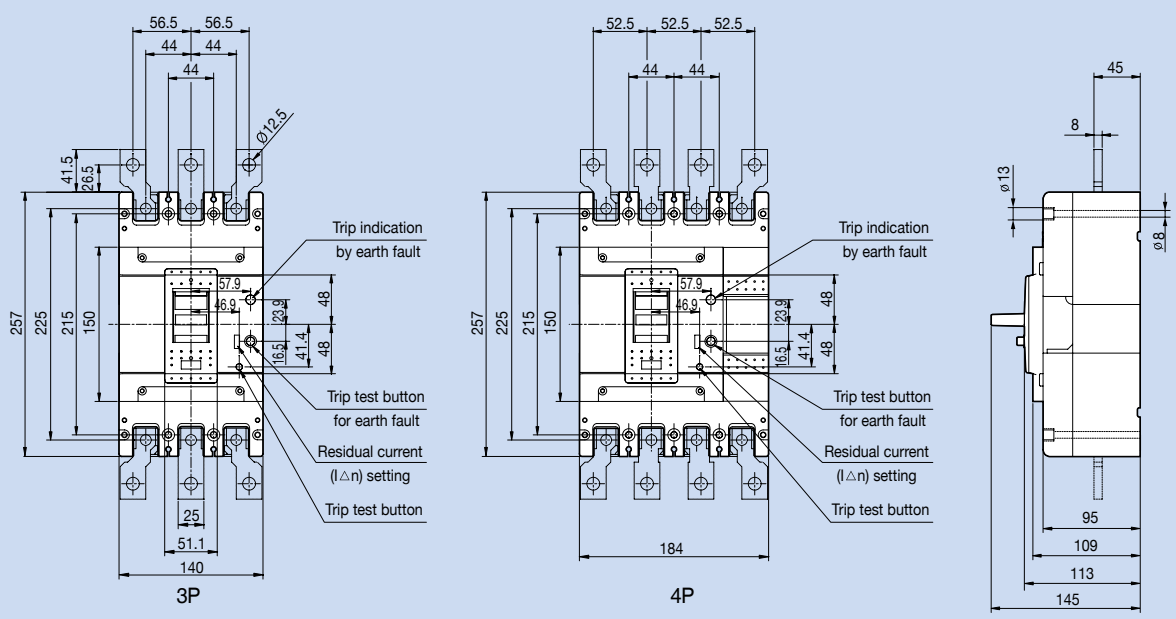
Front panel cutting



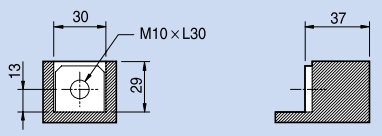
ELCB

- EBN400c
- EBS400c
- EBH400c
- EBL400c

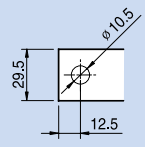
(mm)



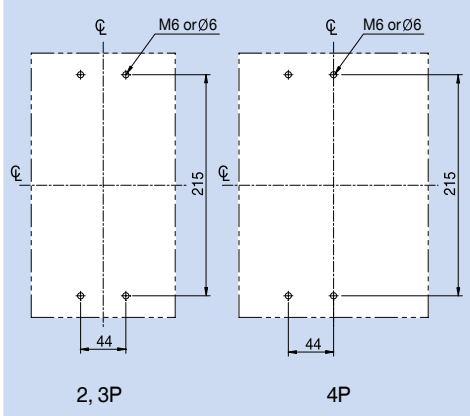
Terminal details



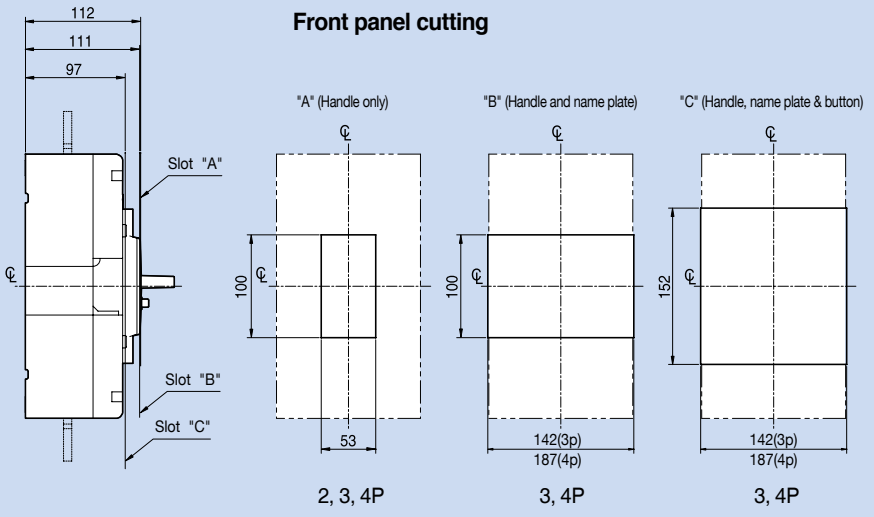
Connecting



Panel drilling

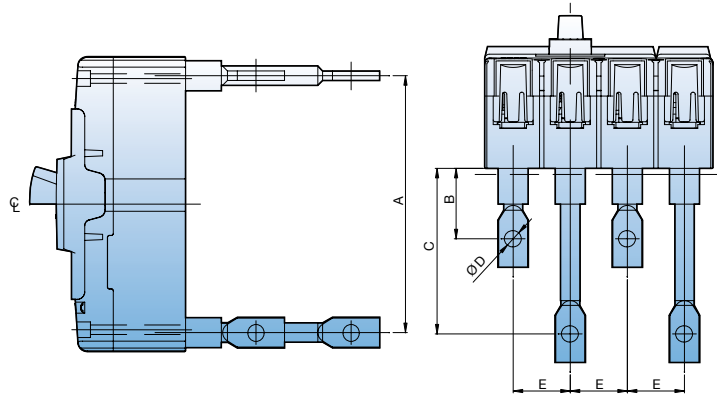


Front panel cutting



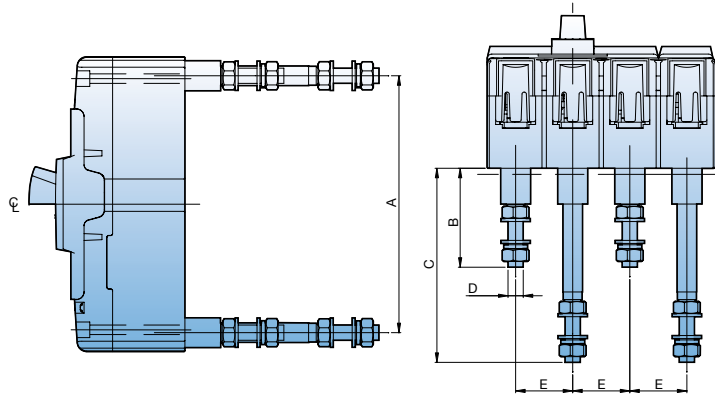
Rear connection terminals

Bar type



MCCB	A	B	C	D	E
ABN100c	115	37	87	Ø8.5	25
ABH125c	135	37	87	Ø8.5	30
ABH250c	144	57.5	93.5	Ø8.5	35

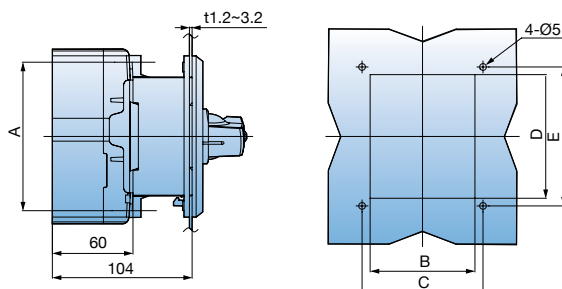
Round type



MCCB	A	B	C	D	E
ABN100c 50AF	115	42	92	M6	25
ABN100c 100AF	115	52	102	M8	25
ABH125c	135	52	102	M8	30
ABH250c	144	70	106	M8	35

Rotary handles

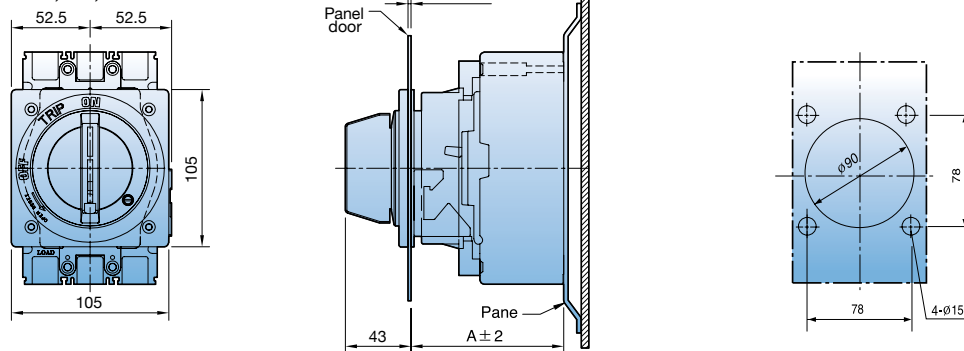
Direct mounting type (D-handle, 30~250AF)



Type	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	Remarks
DH100	110.5	78	90	92	103.4	100AF
DH125	132	94	105	108	120	125AF
DH250	126	108	121	110	122	250AF

Direct mounting type (N-handle, 30~250AF)

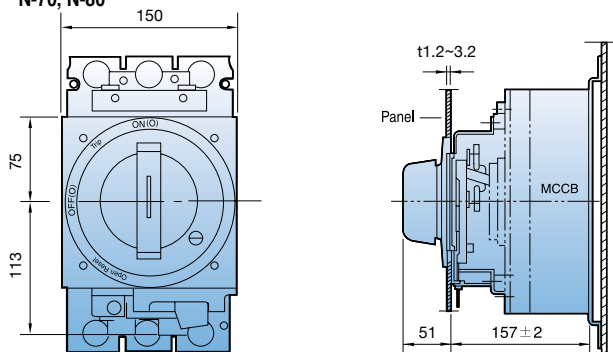
N-30c, 40c, 50c



N-handle	N-30c	N-40c	N-50c
Note	100AF	125AF	250AF
A (mm)	103	103	103

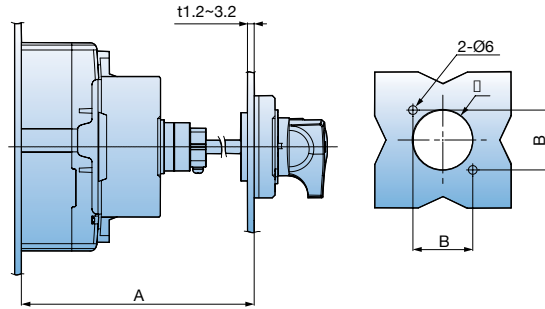
Direct mounting type (N-handle, 400~800AF)

N-70, N-80



Rotary handles

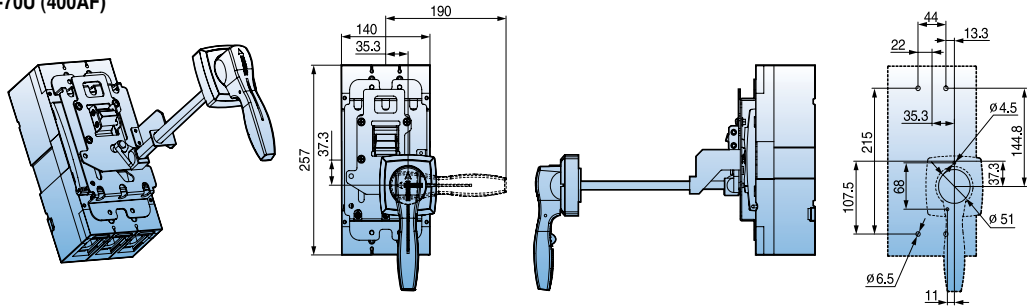
Extended mounting type (E-handle) (30~250AF)



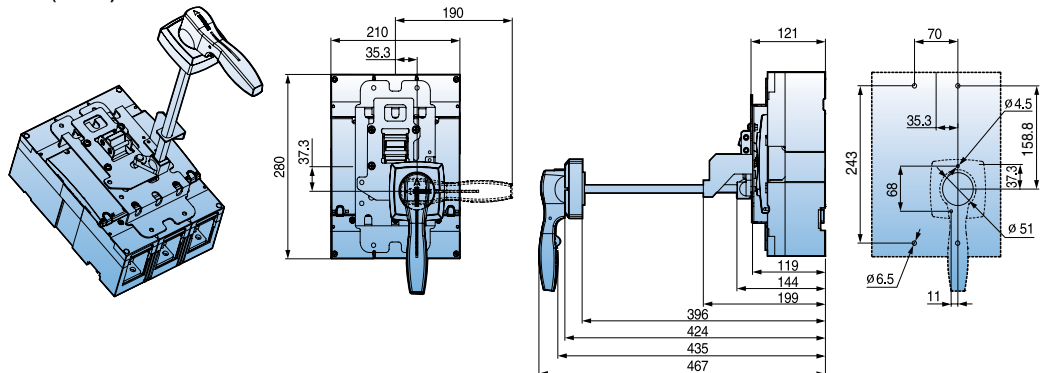
Type	A (mm)	B (mm)	C (mm)	Remarks
EH100	min 150, max 573.5 (Shaft 469mm)	47	Ø53	100AF
EH125	min 150, max 573.5 (Shaft 469mm)	47	Ø53	125AF
EH250	min 150, max 571.5 (Shaft 469mm)	47	Ø53	250AF

Extended mounting type (N-handle, 400~800AF)

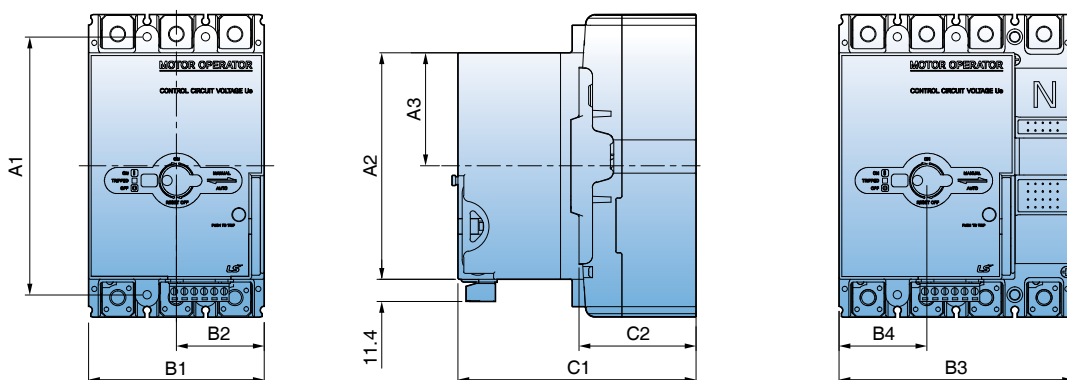
E-70U (400AF)



E-80U (800AF)


















Remote operation



	A1	A2	A3	B1	B2	B3	B4	C1	C2
MOP-M1	110.5	102	51	75	37.5	100	37.5	128	60
MOP-M2	132	116	58	90	45	120	45	122	60
MOP-M3	126	116	55	105	52.5	140	52.5	125	60
MOP-M4	215	176	88	140	70	184	70	198	109
MOP-M5	243	176	88	210	105	280	105	198	109
MOP-M6	322.5	176	65.5	220	110	289	110	210	105

Standard accessories

The following accessories for mounting, connection and insulation are standard items and are packed with Metasol series circuit breakers.

Item	100AF	125AF	250AF	400AF	800AF
Fixing screw					
	2P: 2EA (M4 × 60) 3P: 2EA (M4 × 60) 4P: 4EA (M4 × 60)	2P: 2EA (M4 × 60) 3P: 2EA (M4 × 60) 4P: 4EA (M4 × 60)	2P: 2EA (M4 × 55) 3P: 2EA (M4 × 55) 4P: 4EA (M4 × 55)	2P: 4EA (M6 × 100) 3P: 4EA (M6 × 100) 4P: 4EA (M6 × 100)	2P: 4EA (M6 × 100) 3P: 4EA (M6 × 100) 4P: 4EA (M6 × 100)
Terminal bolt					
	3~50A 2P: 4EA (M5 × 14) 3P: 6EA (M5 × 14) 4P: 8EA (M5 × 14) 60~100A 2P: 4EA (M8 × 14) 3P: 6EA (M8 × 14) 4P: 8EA (M8 × 14)	2P: 4EA (M8 × 14) 3P: 6EA (M8 × 14) 4P: 8EA (M8 × 14)	2P: 4EA (M8 × 20) 3P: 6EA (M8 × 20) 4P: 8EA (M8 × 20)	2P: 4EA (M10 × 30) 3P: 6EA (M10 × 30) 4P: 8EA (M10 × 30)	2P: 4EA (M12 × 35) 3P: 6EA (M12 × 35) 4P: 8EA (M12 × 35)
Insulation barrier					
	2P: 1EA 3P: 2EA 4P: 3EA	2P: 1EA 3P: 2EA 4P: 3EA	2P: 1EA 3P: 2EA 4P: 3EA	2P: 1EA 3P: 2EA 4P: 3EA	2P: 1EA 3P: 2EA 4P: 3EA

Fixing screws for rotary handles

Handle type	N-30c	N-40c	N-50c	N-70	N-80
Applied MCCB	ABN 50c/60c/100c ABS 30c/50c/60c ABN100e	ABS 125c ABH 50c ABH 125c ABL 125c	ABN 250c ABS 250c ABH 250c ABL 250c	ABN 400c ABS 400c ABH 400c ABL 400c	ABN 800c ABS 800c ABL 800c
Applied ELCB	EBN 50c/60c/100c EBS 30c/50c/60c	EBS 125c EBH 50c EBH 125c	EBN 250c EBS 250c EBH 250c	EBN 400c EBS 400c EBH 400c EBL 400c	EBN 800c EBS 800c EBL 800c
Fixing screw (short)	-	-	-	M6 × 16	M6 × 16
Fixing screw (long)	M4 × 85	M4 × 85	M4 × 85	M6 × 110	M6 × 110

Handle type	DH/EH100	DH/EH125	DH/EH250
Fixing screw	M4 × 70	M4 × 70	M4 × 70

Connection

MCCB	Terminal (mm)	Tightening torque (kgf · cm)	Conductor (mm)
100AF	[3~50A] <p>Terminal dimensions: 18mm width, 7.5mm height, 8.2mm hole offset. Screw: M5x14. Mounting hole offset: 24mm.</p>	<p>M5 : 23 ~ 28 M8 : 55 ~ 75</p>	[3~50A] <p>Conductor dimensions: 7mm width, Ø5.5 hole, ≤11.5mm hole offset.</p>
	[60~100A] <p>Terminal dimensions: 18mm width, 7.5mm height, 8.2mm hole offset. Screw: M8x14. Mounting hole offset: 24mm.</p>		[60~100A] <p>Conductor dimensions: 7mm width, Ø9 hole, ≤16mm hole offset.</p>
125AF	<p>Terminal dimensions: 18mm width, 10mm height, 8mm hole offset. Screw: M8x14. Mounting hole offset: 24mm.</p>	<p>M8 : 55 ~ 75</p>	<p>Conductor dimensions: 8mm width, Ø9 hole, ≤18mm hole offset.</p>
250AF	<p>Terminal dimensions: 28mm width, 21mm height, 8mm hole offset. Screw: M8x20. Mounting hole offset: 24mm.</p>	<p>M8 : 80 ~ 130</p>	<p>Conductor dimensions: 10mm width, Ø9 hole, ≤25mm hole offset.</p>

Connection

MCCB	Terminal (mm)	Tightening torque (kgf · cm)	Conductor (mm)
400AF		<p>M10 : 240~300 (Terminal) M12 : 400~500 (Busbar)</p>	
800AF		<p>M12 : 400~500 (Terminal, Busbar)</p>	

Special use environment

Table of rated current for Metasol ELCB corrected according to ambient temperature

Ampere frame	Rated current	Model name of Breaker	Rated current	Table of rated current corrected according to ambient temperature (A)							
				10℃	20℃	30℃	40℃	45℃	50℃	55℃	
30	15	EBS30c	15	15	15	15	15	15	15	15	15
	20		20	20	20	20	20	19	19	18	
	30		30	30	30	30	30	29	28	27	
	50	40	EBN50c, EBS50c	40	40	40	40	40	39	38	36
		50		50	50	50	50	49	47	45	
	60	60	EBN60c, EBS60c	60	60	60	60	60	58	56	55
		75	EBN100c	75	75	75	75	75	73	71	68
	100	100		100	100	100	100	97	94	91	
125	125	EBH50c, EBS125c, EBH125c	125	125	125	125	125	121	116	107	
250	150	EBN250c, EBS250c, EBH250c	150	150	150	150	150	145	140	128	
	175		175	175	175	175	169	163	150		
	200		200	200	200	200	193	186	171		
	225		225	225	225	225	217	209	193		
	250		250	250	250	250	241	233	214		
400	250	EBN400c, EBS400c, EBH400c, EBL400c	250	250	250	250	246	242	238	238	
	300		300	300	300	295	291	287	287		
	350		350	350	350	345	339	332	332		
	400		400	400	400	394	388	381	381		
800	700	EBN800c, EBS800c	700	700	700	700	689	679	668	668	
	800	EBL800c	800	800	800	800	788	776	764	764	

Special use environment

Environment where ambient temperature is -5°C or less

Molded Case Circuit Breaker is subject to the effect of low temperature brittle of metal part inside and insulator, or changes in viscosity of lubricating oil in device, extra care should be taken not to have the temperature drop extremely with the use of such device as space heater. In addition, in case of using a thermal magnetic trip element (FTU, FMU, ATU), the operating characteristic changes toward the difficult direction, so you should identify the relationship of protection and correct accordingly.

Although MCCB is not affected by conduction switch, trip, or short circuit isolation in the temperature of -20°C, it is highly recommended to use a temperature maintaining device such as space heater. In addition, transportation and passing in stone-cold area in the temperature as low as -40°C is allowed but it is recommended to leave the status of MCCB off or tripped in order to minimize the effect of brittle due to a low temperature.

High humidity condition (Relative humidity 85% or more)

Using Molded Case Circuit Breaker in a place of high humidity requires a rigorous maintenance including installation of anti-humidity agent within the structure in order to prevent the insulation sag of insulator or corrosion of mechanical parts as a result of high humidity. Also, in case of installing MCCB within the enclosed equipment, a space heater needs to be installed as well to prevent dew condensation that might occur due to a drastic temperature change.

Environment where petrochemical gas exists

The contact material of Molded Case Circuit Breaker is silver or silver alloy which develops creation of petrochemical coat that might cause a poor connection if it gets in contact with petrochemical gas.

However, it is easy for petrochemical coat to be mechanically taken off so it is no problem if make-and-break operation occurs frequently but it needs to be switched back and forth between make and break if the operation rarely occurs.

The lead wire of moving contact of Molded Case Circuit Breaker can be disconnected as it is corroded or hardened by petrochemical gas. The silver coating is effective to prevent this from occurring and there is a need to increase durability of MCCB with the use of silver coated lead wire if it is used in environment with thick petrochemical gas.

Environment where potentially explosive gas exists

It is advised, in principle, not to install a Molded Case Circuit Breaker that switches and inhibits current in a dangerous place such as this one.

Impact of altitude

If an MCCB is used in an elevated area higher than 2000m sea level, its operating performance is subject to dramatic drop in atmospheric pressure and temperature. For example, the air pressure is reduced to 80% of ordinary pressure at 2,200m and further 50% at 5,500m although the short-circuit performance is not affected. If it is used in areas of high sea level, you can do correction based on the correction parameter table in high altitude environment, as described below

* Refer to the correction parameter table in high altitude environment (ANSI C37. 29-1970)

- 1) How to correct voltage:
 - If the rated voltage is AC 600V at 4,000m above sea level,
 $600V \text{ (rated voltage)} \times 0.82 \text{ (correction parameter)} = 492V.$
- 2) How to correct current:
 - If the rated current is AC 800A at above 4,000m sea level,
 $800A \text{ (rated current)} \times 0.96 \text{ (correction parameter)} = 768A.$

[Correction parameter table for altitude]

Altitude	Voltage correction parameter	Current correction parameter
2,000m	1.00	1.00
3,000m	0.91	0.98
4,000m	0.82	0.96
5,000m	0.73	0.94
6,000m	0.65	0.92

Environment with vibration and impulse exercised

Impact of vibration and impulse

An excessive vibration and impulse may cause damage on breaker or other security problems including dynamic strength. An appropriate consideration is required to select a right MCCB for an adverse environmental stress such as this one. Moreover, this stress may incur from vibration during transportation, magnetic impulse while manipulating a switch or may be affected by equipment in surrounding area.

There is a standard call [Vibration Testing Method for Small Electric Appliances] for vibration and impulse test for electric equipment and the seismic and endurance tests of Molded Case Circuit Breaker are conducted in accordance with this standard, considering the circumstance mentioned above.

Vibration

The magnitude of vibration is measured by double amplitude and frequency with the following equation with accelerator.

$$\alpha g = 0.002 \times \text{frequency (Hz)} \times \text{double amplitude (mm)}$$

* αg : multiple of gravitational acceleration ($g=9.8\text{m/sec}^2$)

There are three types of vibration tests including resonance test, vibration endurance test, and malfunction test as described below.

1) Resonant test

Alter the frequency of sinusoidal wave within the range of 0~55Hz gradually with 0.5~1mm of double amplitude applied to see if there is any occurrence of vibration on a specific part of MCCB.

2) Vibration endurance test

A sinusoidal wave with double amplitude of 0.5~1mm and frequency of 55Hz (resonant frequency obtained in previous clause if there is a resonant point) is manually created to check the operational status.

3) Malfunction test

Apply vibration for 10 minutes for each condition of altering double amplitude and frequency to check if there is any malfunction in MCCB.

Impulse

The magnitude of impulse is denoted by the multiple of gravitational acceleration imposed on the equipment and part. The test is conducted through a drop impulse test.

Impact of high frequency

In case of high frequency current, you are required to reduce the rated current of the breaker with a thermal magnetic trip element embedded due to heat incurred by the skin effect of conductor and/or core loss of structure. The reduction rate varies according to the frame Size and rated current and decreases down to 70~80% at 400Hz. In addition, the core loss decreases attractive force, which leads to increase of instantaneous trip current.

* Core loss: It refers to the electrical loss in a transformer caused by magnetization of the core that changes over time and is categorized into hysteresis loss and eddy current loss.

* Hysteresis loss: It takes up the majority portion of no-load loss of electric equipment and is calculated like this.

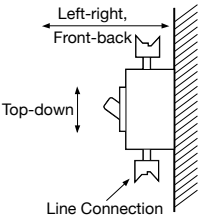
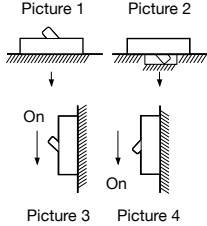
$$P_h = \sigma f B_m n$$

B_m : maximum value of magnetic flux density, n : constant (1.6~2.0), f : frequency, σ : hysteresis constant

* Eddy current: It refers to an induced electric current formed within the body of a conductor when it moves through a non-uniform or changing magnetic field. The eddy current that incurs at winding of transformer or core is considered as one of the transformer losses as a part of exciting current. It is also called 'eddy current loss'.




Use environment with vibration and impulse applied

[Table of seismic performance and internal impulse performance]




		Test	Internal impulse
Test Condition	Mounting vibration, direction of impulse	<ul style="list-style-type: none"> Vertical mounting Top-down, Left-right, Front-back 	<ul style="list-style-type: none"> Picture 1, 2, 3, 4 (→ Represents the direction of drop) 
	Status of MCCB	<ul style="list-style-type: none"> (1) Non-conduction (On or Off status) (2) Status where rated current is conducted until the temperature of MCCB becomes constant and keeps being conducted 	Non-conduction (On or Off status)
Test result	Judgment condition	<ul style="list-style-type: none"> If it is On, it should not be Off If it is Off, it should not be On No abnormal status such as damage, transformation, or annealing of nut part Characteristics of switch and trip after the test must be normal 	




Certifications

MCCB

Type	Approvals		Certificates
	Safet certi	IEC	KEMA
Mark and name			
Type	Korea	Europe	Netherlands
ABS32c	●	●	●
ABS33c	●	●	●
ABS34c	●	●	●
ABN52c	●	●	●
ABN53c	●	●	●
ABN54c	●	●	●
ABS52c	●	●	●
ABS53c	●	●	●
ABS54c	●	●	●
ABN62c	●	●	●
ABN63c	●	●	●
ABN64c	●	●	●
ABS62c	●	●	●
ABS63c	●	●	●
ABS64c	●	●	●
ABN102c	●	●	●
ABN103c	●	●	●
ABN104c	●	●	●
ABS32d	●	●	●
ABS33d	●	●	●
ABS34d	●	●	●
ABN52d	●	●	●
ABN53d	●	●	●
ABN54d	●	●	●
ABS52d	●	●	●
ABS53d	●	●	●
ABS54d	●	●	●
ABN62d	●	●	●
ABN63d	●	●	●
ABN64d	●	●	●
ABS62d	●	●	●
ABS63d	●	●	●
ABS64d	●	●	●
ABN102d	●	●	●
ABN103d	●	●	●
ABN104d	●	●	●
ABP52c	●	●	●
ABP53c	●	●	●
ABP54c	●	●	●
ABH52c	●	●	●
ABH53c	●	●	●
ABH54c	●	●	●
ABS102c	●	●	●
ABS103c	●	●	●
ABS104c	●	●	●
ABP102c	●	●	●
ABP103c	●	●	●

ELCB

Type	Approvals		Certificates
	Safet certi	IEC	KEMA
Mark and name			
Type	Korea	Europe	Netherlands
ABP104c	●	●	●
ABH102c	●	●	●
ABH103c	●	●	●
ABH104c	●	●	●
ABN202c	●	●	●
ABN203c	●	●	●
ABN204c	●	●	●
ABS202c	●	●	●
ABS203c	●	●	●
ABS204c	●	●	●
ABP202c	●	●	●
ABP203c	●	●	●
ABP204c	●	●	●
ABH202c	●	●	●
ABH203c	●	●	●
ABH204c	●	●	●
ABN402c	●	●	●
ABN403c	●	●	●
ABN404c	●	●	●
ABS402c	●	●	●
ABS403c	●	●	●
ABS404c	●	●	●
ABH402c	●	●	●
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ABN602c	●	●	●
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ABL602c	●	●	●
ABL603c	●	●	●
ABL604c	●	●	●
ABN802c	●	●	●
ABN803c	●	●	●
ABN804c	●	●	●
ABS802c	●	●	●
ABS803c	●	●	●
ABS804c	●	●	●
ABL802c	●	●	●
ABL803c	●	●	●
ABL804c	●	●	●

Type	Approvals		Certificates
	Safet certi	IEC	KEMA
Mark and name			
Type	Korea	Europe	Netherlands
EBS32c	●	●	●
EBS33c	●	●	●
EBS34c	●	●	●
EBN52c	●	●	●
EBN53c	●	●	●
EBS53c	●	●	●
EBS54c	●	●	●
EBN63c	●	●	●
EBS63c	●	●	●
EBS64c	●	●	●
EBN102c	●	●	●
EBN103c	●	●	●
EBN104c	●	●	●
EBS33d	●	●	●
EBS34d	●	●	●
EBN52d	●	●	●
EBN53d	●	●	●
EBS53d	●	●	●
EBS54d	●	●	●
EBN63d	●	●	●
EBS63d	●	●	●
EBS64d	●	●	●
EBN102d	●	●	●
EBN103d	●	●	●
EBN104d	●	●	●
EBP53c	●	●	●
EBP54c	●	●	●
EBH53c	●	●	●
EBH54c	●	●	●
EBS103c	●	●	●
EBS104c	●	●	●
EBP103c	●	●	●
EBP104c	●	●	●
EBH103c	●	●	●
EBH104c	●	●	●
EBN202c	●	●	●
EBN203c	●	●	●
EBS203c	●	●	●
EBS204c	●	●	●
EBP203c	●	●	●
EBP204c	●	●	●
EBH203c	●	●	●
EBH204c	●	●	●

Note: ● (Completion)



Safety Instructions

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



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