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2020

**Metasol** *Meta Solution*

# MCCB/ELCB
















Molded Case Circuit Breakers  
Earth Leakage Circuit Breakers



**LS** *ELECTRIC*

## Standard accessories

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

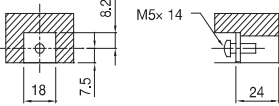
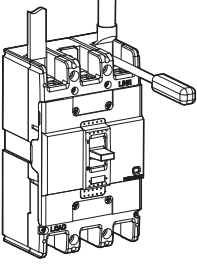
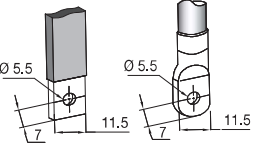
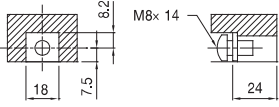
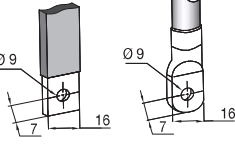
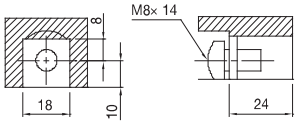
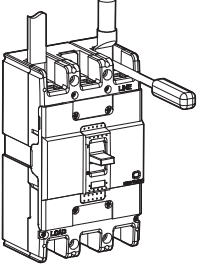
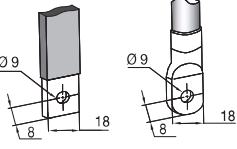
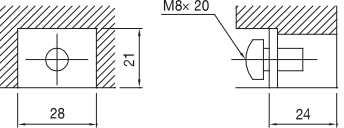
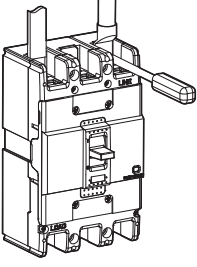
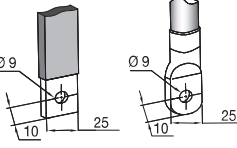
Item	100AF	125AF	250AF	400AF	800AF
Fixing screw					
	2P: 2EA (M4×60) 3P: 2EA (M4×60) 4P: 4EA (M4×60)	2P: 2EA (M4×60) 3P: 2EA (M4×60) 4P: 4EA (M4×60)	2P: 2EA (M4×55) 3P: 2EA (M4×55) 4P: 4EA (M4×55)	2P: 4EA (M6×100) 3P: 4EA (M6×100) 4P: 4EA (M6×100)	2P: 4EA (M6×100) 3P: 4EA (M6×100) 4P: 4EA (M6×100)
Terminal bolt					
	<b>3~50A</b> 2P: 4EA (M5×14) 3P: 6EA (M5×14) 4P: 8EA (M5×14) <b>60~100A</b> 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	<b>[3~50A]</b> 	 M5: 23 ~ 28 M8: 55 ~ 75	<b>[3~50A]</b> 
	<b>[60~100A]</b> 		<b>[60~100A]</b> 
125AF		 M8: 55 ~ 75	
250AF		 M8: 80 ~ 130	

## 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>	

## Aux cover screw connection

Model	Tightening torque (kgf · cm)	Screw position
30AF 50AF 60AF 100AF 125AF 250AF	15	
400AF 630AF 800AF	21	

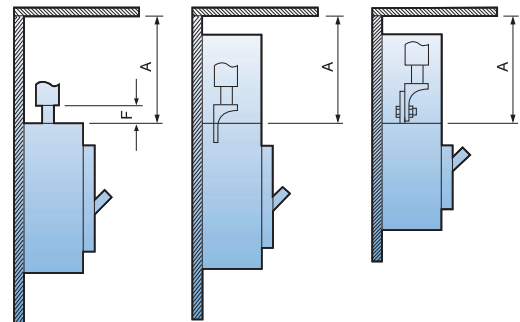
## Safety clearance

When installing a circuit breaker, safety clearances must be kept between the breaker and panels, bars and other protection devices installed nearby. These safety clearances are depend on the ultimate breaking capacity and are defined by tests carried out in accordance with standard IEC 60947-2.

When a short circuit interruption occur, high temperatures pressures are present in and above the arc chambers of the circuit-breaker. In order to allow the pressure to be distributed and to prevent fire and arcing or short-circuit currents, safety clearances are required.

### A: Minimum distance to metallic top panels

Frame size	Description	A (mm)	
		460V	250V
100AF	ABN50c	40	25
	ABN60c	40	25
	ABN100c	50	30
	ABN100e	50	30
	ABS30c	30	25
	ABS50c	40	30
	ABS60c	40	30
125AF	ABS125c	50	40
	ABH50c	50	40
	ABH125c	100	80
	ABL125c	100	80
250AF	ABN250c	100	80
	ABS250c	100	80
	ABH250c	100	80
	ABL250c	100	80
400AF	ABN400c	100	80
	ABS400c	100	80
	ABH400c	100	80
	ABL400c	100	80
800AF	ABN800c	100	80
	ABS800c	100	80
	ABL800c	100	80



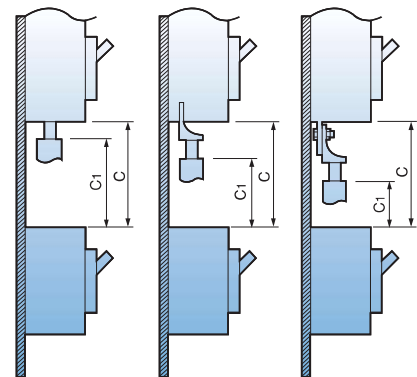
## Safety clearance

### B: Minimum distance between the lower and the upper breakers

- C1: Minimum distance between the lower breaker and the bare terminal of the upper breaker
- C: C1+ the dimension of bare part of conductor

Frame size	Description	C1 (mm)		C (mm)
		460V	250V	
100AF	ABN50c	40	25	
	ABN60c	40	25	
	ABN100c	50	30	
	ABN100e	50	30	
	ABS30c	30	25	
	ABS50c	40	30	
	ABS60c	40	30	
125AF	ABS125c	50	40	
	ABH50c	50	40	
	ABH125c	100	80	
	ABL125c	100	80	
250AF	ABN250c	100	80	
	ABS250c	100	80	
	ABH250c	100	80	
	ABL250c	100	80	
400AF	ABN400c	100	80	
	ABS400c	100	80	
	ABH400c	100	80	
	ABL400c	100	80	
800AF	ABN800c	100	80	
	ABS800c	100	80	
	ABL800c	100	80	

The dimension of bare conduct + C1



Direct connection of cable

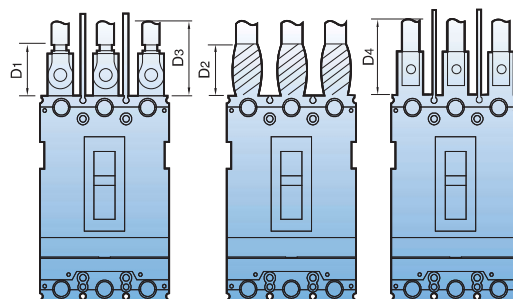
Connection by using a crimp-type terminal lug

Connection by using a crimp-type terminal lug to the extended terminal

### Insulated length of main terminal of circuit breaker

- D1: Connection by solderless terminal with taping
- D2: Connection by busbar with taping
- D3: Connection by solderless terminal and using insulation barrier
- D4: Connection by busbar and using insulation barrier

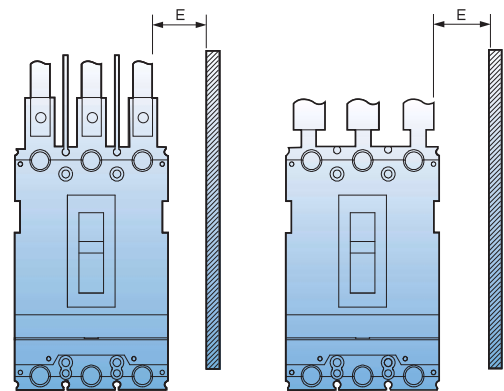
Frame size	Description	D1 (mm)	D2 (mm)	D3 (mm)	D4 (mm)
100AF	ABN50c	The dimension of bare conduct + 20	40	The dimension of bare conduct + 20	40
	ABN60c		40		40
	ABN100c		50		50
	ABN100e		50		50
	ABS30c		30		30
	ABS50c		40		40
	ABS60c		40		40
125AF	ABS125c		50		50
	ABH50c		50		50
	ABH125c		50		50
	ABL125c		50		50
250AF	ABN250c		50		50
	ABS250c		50		50
	ABH250c		50		50
	ABL250c	50	50		
400AF	ABN400c	100	100		
	ABS400c	100	100		
	ABH400c	100	100		
	ABL400c	100	100		
800AF	ABN800c	150	150		
	ABS800c	150	150		
	ABL800c	150	150		



## Safety clearance

### Minimum distance to metallic side panels

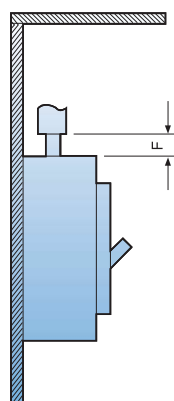
Frame size	Description	E (mm)	
		460V	250V
100AF	ABN50c	25	15
	ABN60c	25	15
	ABN100c	25	15
	ABN100e	25	15
	ABS30c	20	15
	ABS50c	25	15
	ABS60c	25	15
125AF	ABS125c	25	15
	ABH50c	25	15
	ABH125c	50	20
	ABL125c	50	20
250AF	ABN250c	50	15
	ABS250c	50	15
	ABH250c	50	15
	ABL250c	50	15
400AF	ABN400c	80	40
	ABS400c	80	40
	ABH400c	80	40
	ABL400c	80	40
800AF	ABN800c	80	40
	ABS800c	80	40
	ABL800c	80	40





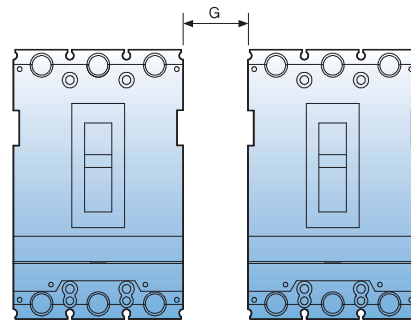
### Distance of bare cables or busbars

Frame size	Description	F (mm)
100AF	ABN50c	10
	ABN60c	10
	ABN100c	-
	ABN100e	-
	ABS30c	5
	ABS50c	10
	ABS60c	10
125AF	ABS125c	-
	ABH50c	10
	ABH125c	20
	ABL125c	
250AF	ABN250c	-
	ABS250c	-
	ABH250c	-
	ABL250c	
400AF	ABN400c	10
	ABS400c	10
	ABH400c	10
	ABL400c	10
800AF	ABN800c	10
	ABS800c	10
	ABL800c	10



## Minimal distance between two adjacent breakers (With terminal covers)

Frame size	Description	G (mm)
100AF	ABN50c	0
	ABN60c	0
	ABN100c	0
	ABN100e	0
	ABS30c	0
	ABS50c	0
	ABS60c	0
125AF	ABS125c	0
	ABH50c	0
	ABH125c	0
	ABL125c	0
250AF	ABN250c	0
	ABS250c	0
	ABH250c	0
	ABL250c	0
400AF	ABN400c	0
	ABS400c	0
	ABH400c	0
800AF	ABN800c	0
	ABS800c	0
	ABL800c	0



## Insulation resistance (IR) testing & withstand voltage testing (For ELCB)

### Insulation resistance (IR) testing

Insulation resistance marked as  $\Delta$  in table1 is not destroyed when 500V is applied using insulation tester but when 1000V is applied. Conduct the testing when the indicator needle of insulation tester wavers greatly. Make sure ELCB is Off before testing.

### Withstand voltage testing

When conducting IR testing and withstand voltage testing, Do Not apply voltage for those marked as X in Table1.

**Table1. insulation resistance (IR) testing & withstand voltage testing**

Application circuit breaker	Application circuit breaker	Insulation resistance (IR) testing		Withstand voltage testing	
		On	Off	On	Off
handle status		On	Off	On	Off
Charge-earth		○	○	○	○
R-S, S-T, R-T	Line	$\Delta$	$\Delta$	×	○
	Load	$\Delta$	$\Delta$	×	×
Line-load		—	○	—	○

## Standards & approval

**Metasol series circuit breakers and auxiliaries comply with the following international standard:**

- IEC 60947-1  
Low-voltage switchgear and controlgear - Part 1: General rules
- IEC 60947-2  
Low-voltage switchgear and controlgear - Part 2: Circuit-breakers

**The following certificates are available on a request.**

- CE Declaration of conformity
- Certificate of conformance test (CB) - IEC 60947

### CE conformity marking

The CE conformity marking shall indicate conformity to all the obligations imposed on the manufacturer, as regards his products, by virtue of the European Community directives providing for the affixing of the CE marking.

When the CE marking is affixed on a product, it represents a declaration of the manufacturer or of his authorized representative that the product in question conforms to all the applicable provisions including the conformity assessment procedures.



## Standard use environment

### Standard use environment for molded case circuit breaker

The operation characteristic of Molded Case Circuit Breaker including short-circuit, overload, endurance and insulation is often influenced largely by external environment and thus should be applied appropriately with conditions of the place where it is used taken into consideration. In particular, the operation characteristic of the circuit breaker with a thermal magnetic trip element (FTU, FMU, ATU) applied changes a bit with the ambient temperature so you have to adjust the value of power rating accordingly when it is actually in use.

- 1) Ambient temperature: Within the range of  $-5^{\circ}\text{C}$ ~ $+40^{\circ}\text{C}$  (However, the average for the duration of 24 hours must not exceed  $35^{\circ}\text{C}$ .)
- 2) Relative humidity: Within the range of 45~85%
- 3) Altitude: 2,000m or less (However, if it exceeds 1,000m, atmosphere correction through humidity test and withstand voltage test can be considered.)
- 4) Atmosphere where excessive steam, oil steam, smoke, dust, salt, conductive powder and other corrosive materials do not exist



- If a standard circuit breaker is used in high temperature exceeding  $40^{\circ}\text{C}$ , you are advised to use it according to the current corrected for each level of ambient temperature in catalog.
- If used in conditions of highly humidity, the dielectric strength or electric performance may be degraded.



- There is no problem in conduction switch, trip or short circuit isolation in the temperature of  $-20^{\circ}\text{C}$ .
- Passing or storage in stone-cold area is allowed in the temperature of  $40^{\circ}\text{C}$ .
- The operating characteristic of the breaker with a thermal magnetic trip element changes as the base ambient temperature is adjusted to  $40^{\circ}\text{C}$ .



- It is highly recommended to use a dust cover or anti-humid agent if it is used in dusty and humid conditions.
- Excessive vibration may cause a trip break such as connection fault or flaw on mechanical parts.



- If it is left On or Off for a long time, it is recommended to switch load current on a regular basis.
- It is recommend to put it in the sealed protection if corrosive gas is prevalent.