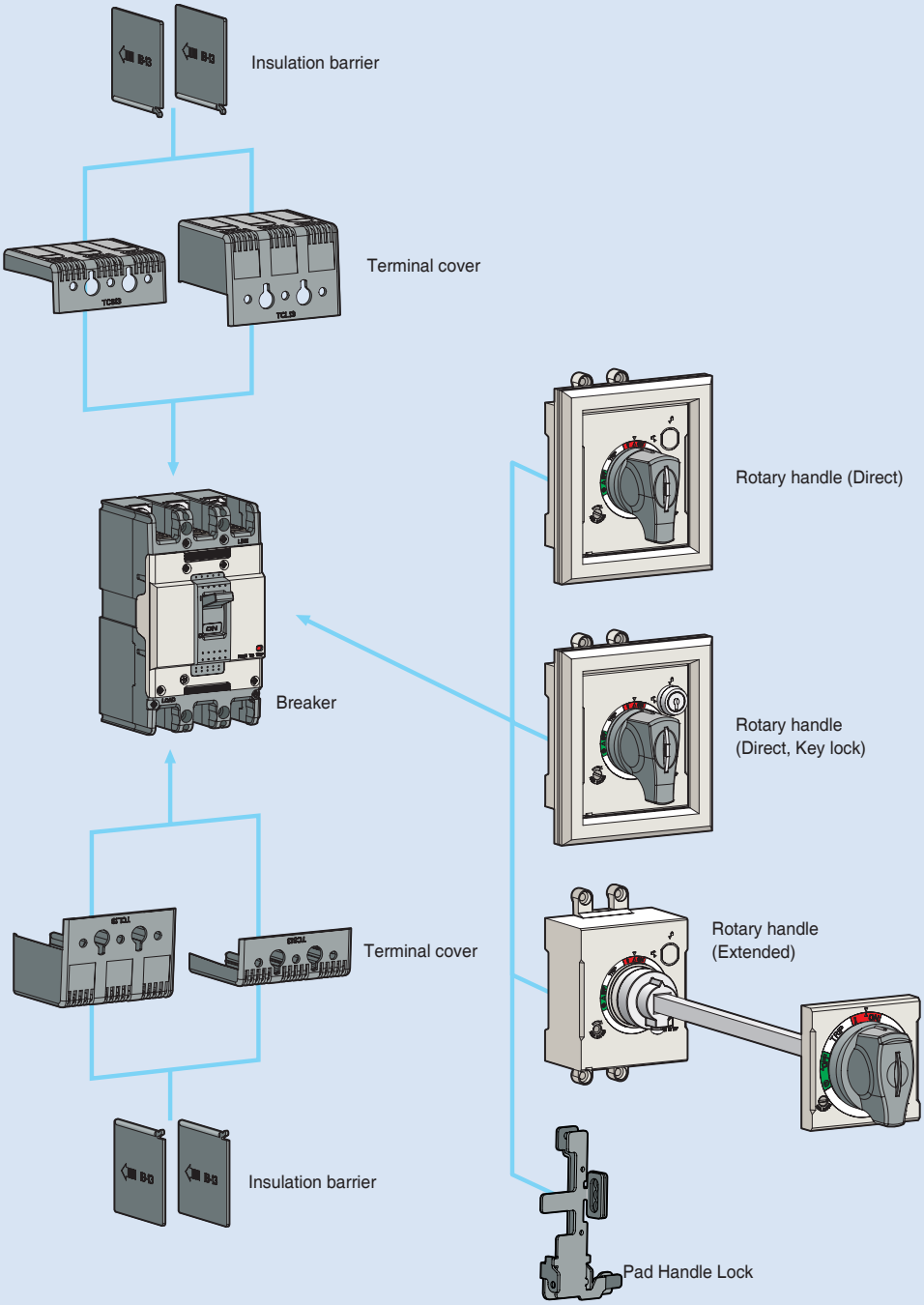
Adjustable Mold Case Circuit Breaker

Adjustable to Three level

Accessories

External accessories

Wide range of external accessories provides user-friendly solution for mounting, cable connection, insulation, safety lock and remote control.



Rotary handles

Direct type

Direct type
(DH 125~250AF)

Key lock
(DH 125~250AF)

(N 125~250AF)

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

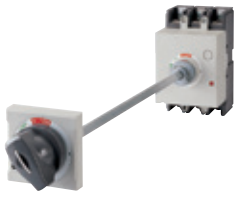
It is used in case direct type handle can not be applied because of the longer distance between the breaker and the panel door.

Type

Direct type	Direct type (Key lock)	Extended type	Breaker type
			MCCB
N-40c	-	-	ABS125c
DH125	DHK125	EH125	
N-50c	-	-	ABS250c
DH250	DHK250	EH250	

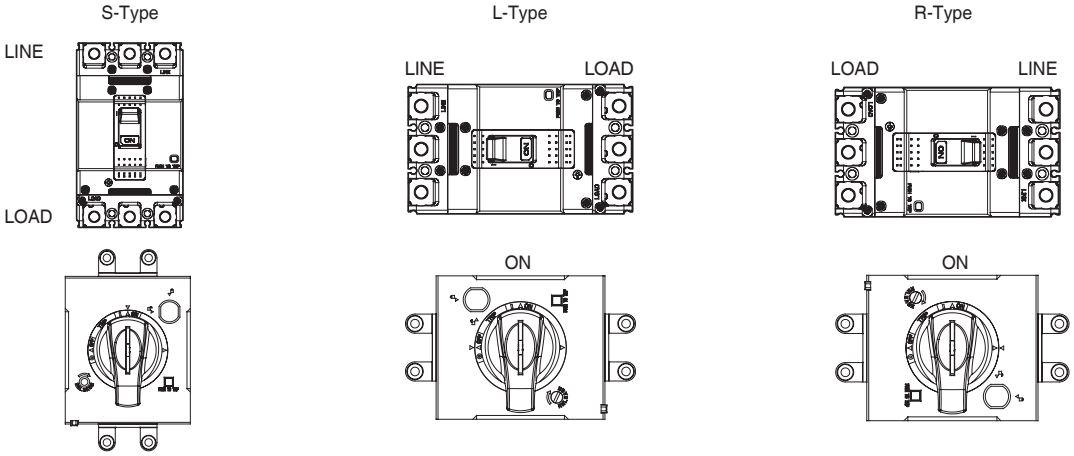
Note: Padlock type for N-handle
- On or OFF state type - Only OFF state type

Extended type



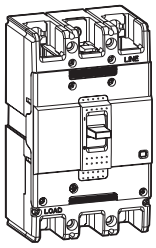
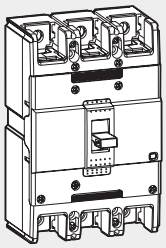
(125~250AF)

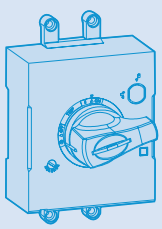
Type suffix according to the mounting position

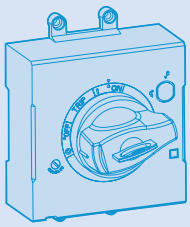


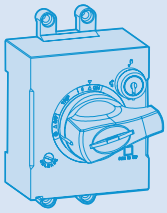
D-handle

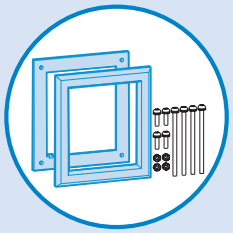
MCCB and D-handle

ABS125c	ABS250c
	

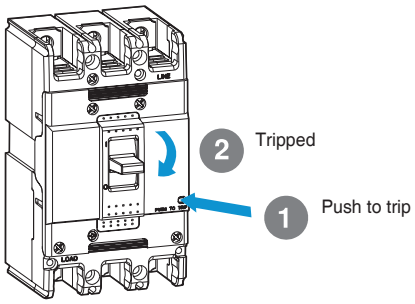

DH125

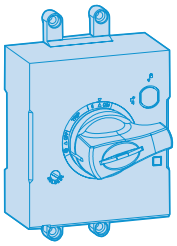

DH250


DHK-Type

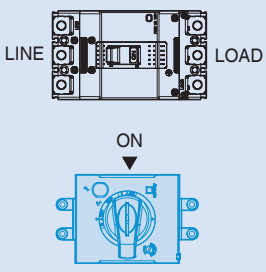


Tripping MCCB & Install type

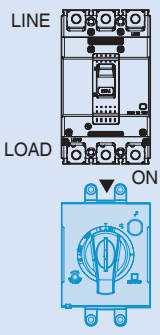




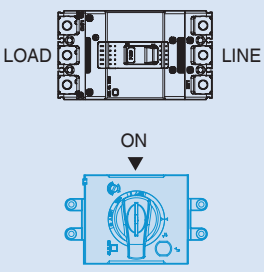
L-Type



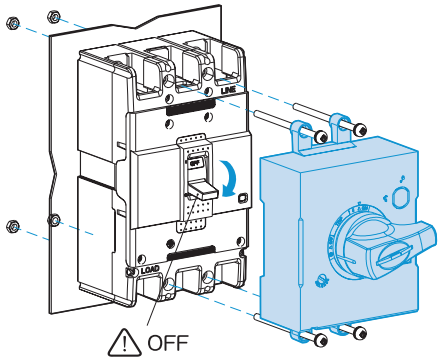
S-Type

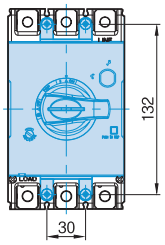
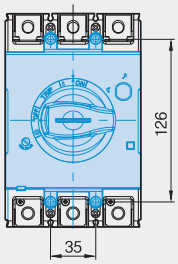


R-Type

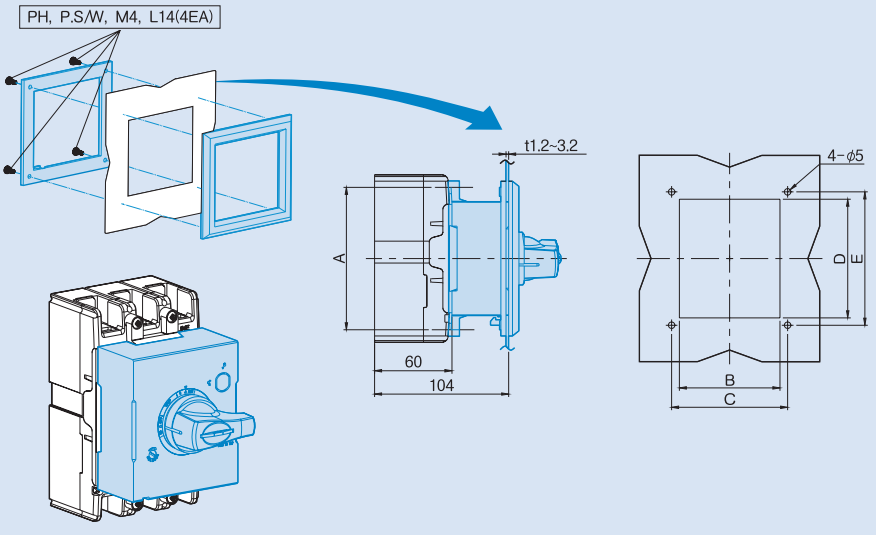


Installing the D-handle



ABS125c	ABS250c
	

Cutting Panel



D-Handle	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	Breaker
DH125	132	94	105	108	120	125AF
DH250	126	108	121	110	122	250AF

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

Accessories

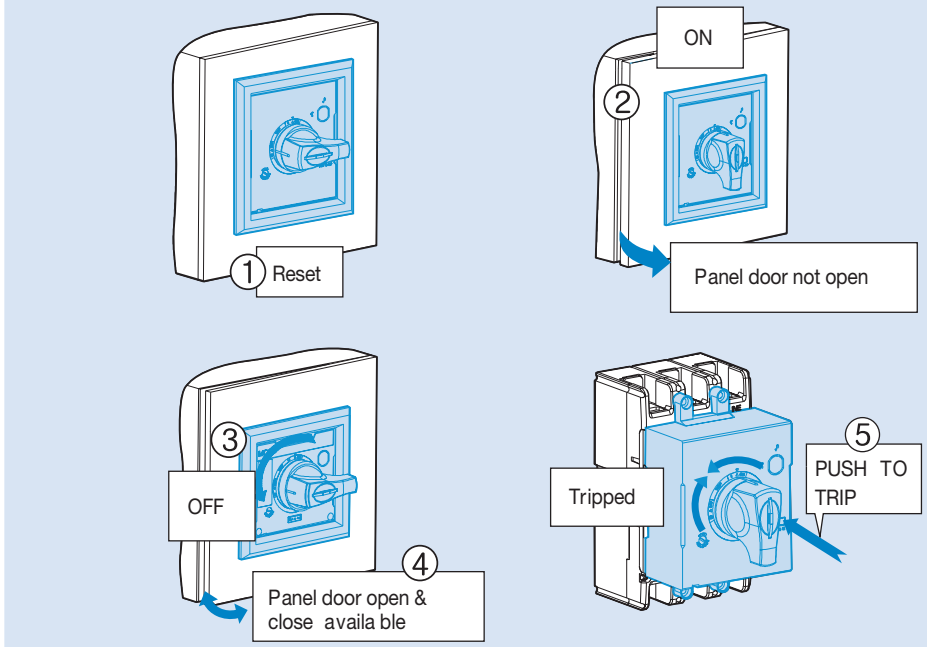
D-handle

Operating test

⚠ CAUTION

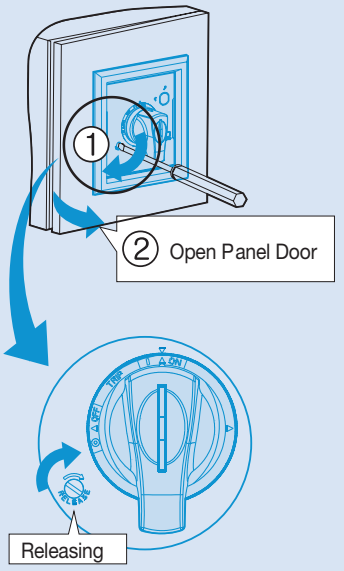
If the door is opened with much pressure when the position of handle is ON or TRIP, the handle lock lever will be demaged.

TRIP position : Panel door can't be opened

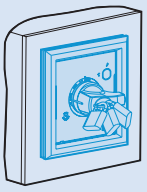


Locking system

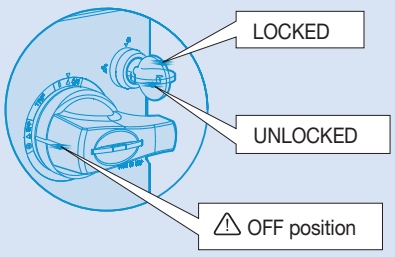
Releasing (at ON position)



Locking (ON, OFF position)



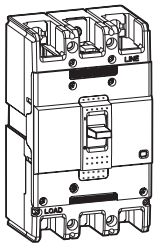
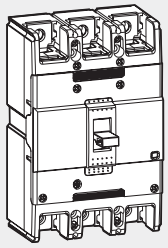
KEY LOCK

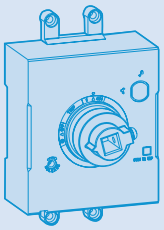


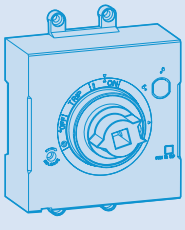
⚠ Remove the key if you operate the handle.

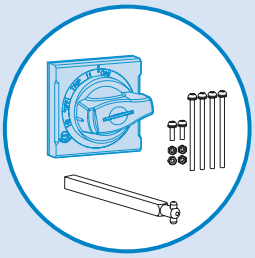
E-handle

MCCB and E-handle

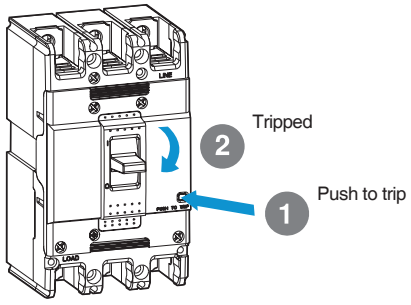
ABS125c	ABS250c
	

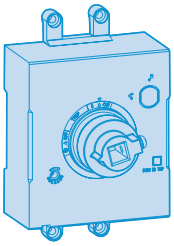


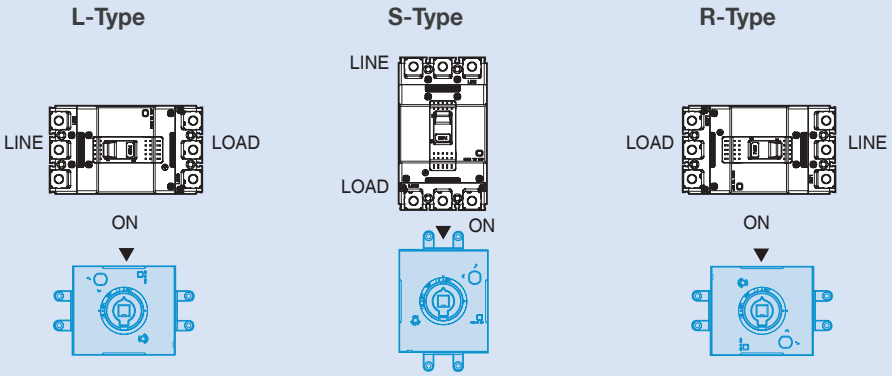




Tripping MCCB & Install type

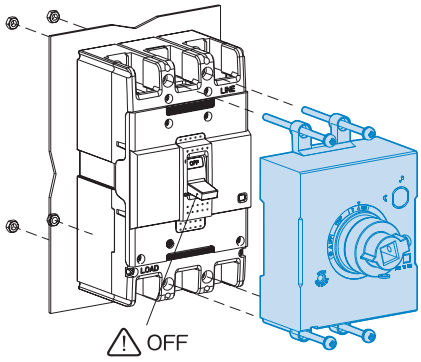


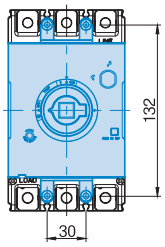
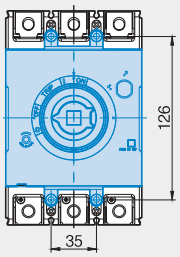




E-handle

Installing the E-handle



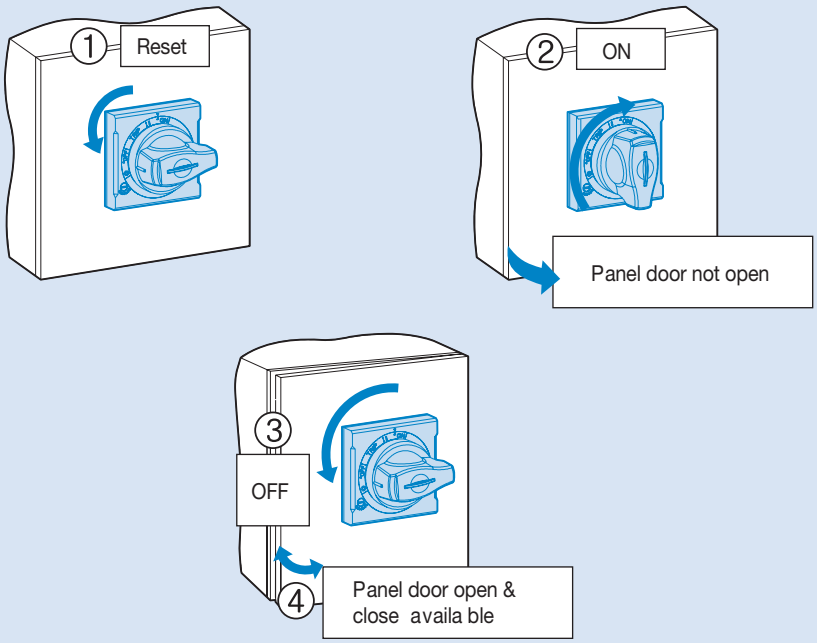
ABS125c	ABS250c
	

Operating Test

⚠ CAUTION

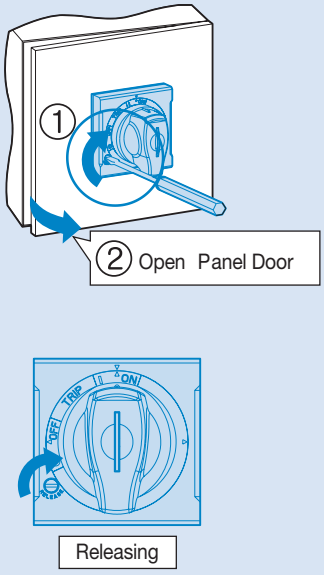
If the door is opened with much pressure when the position of handle is ON or TRIP, the handle lock lever will be demaged.

TRIP position : Panel door can't be opened

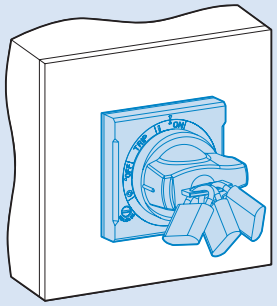


Locking System

Releasing (at ON position)



Locking (ON, OFF position)



Accessories

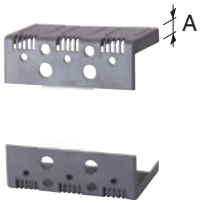
Terminal covers

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 ara classified in to 2 different type: Independent, Attachable and detachable with D or N Handle

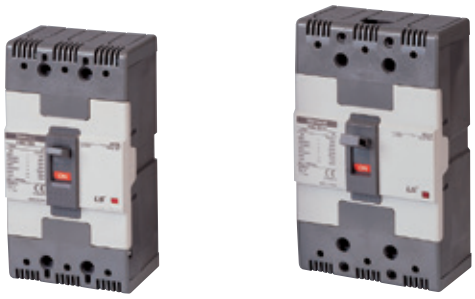
- **Short type covers, TCS:**
  For fixed circuit-breakers with rear terminals and for moving parts of plug-in.

- **Long type covers, TCL:**
  For fixed circuit-breakers with front, front extended, front for cables terminals.

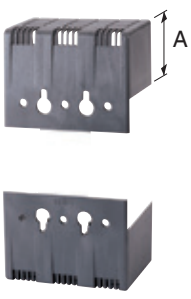
Terminal covers						Pole	Applied breaker	Size extended(A), mm	
Short type			Long type						
Inde	D-Handle	N-Handle	Inde	D-Handle	N-Handle		MCCB	Short type	Long type
TCS23	TCS23		TCL23	TCL23		3P	ABS250c	5.5	40
TCS24	TCS24		TCL24	TCL24		4P			
TCS33	TCS33		TCL33	TCL33		3P	ABS250c	5.5	50
TCS34	TCS34		TCL34	TCL34		4P			



TCS(Short type)



Short type construction



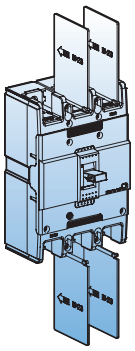
TCL(Long type)

Long type construction

Accessories

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
IB-23	ABS125c
	ABS250c

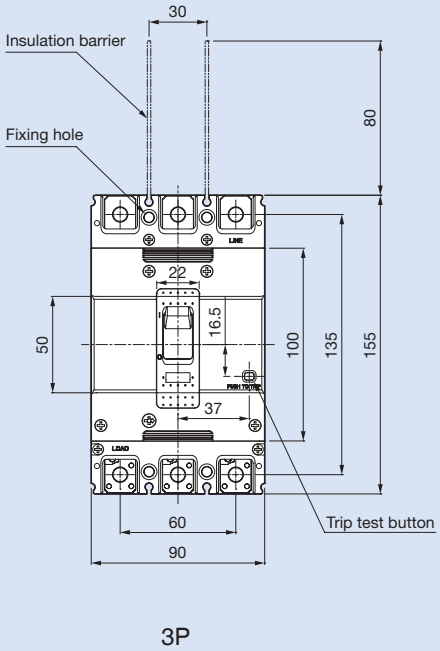
Insulation barriers for line side are provided as standard.

Dimensions

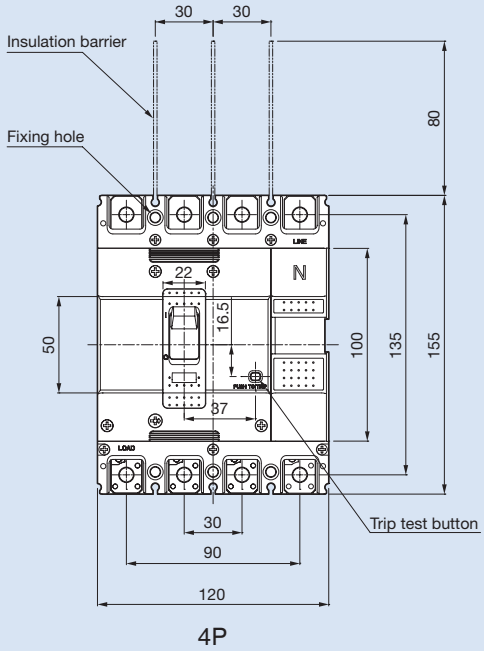
MCCB

ABS125c

(mm)



3P



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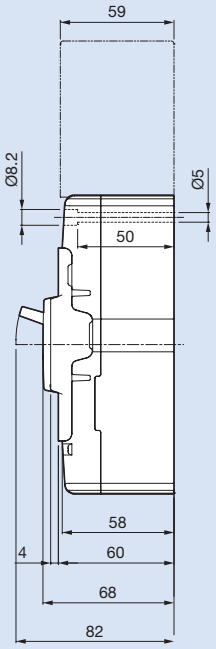
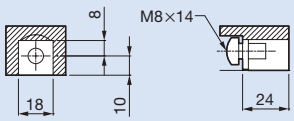
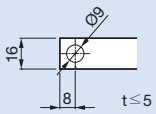


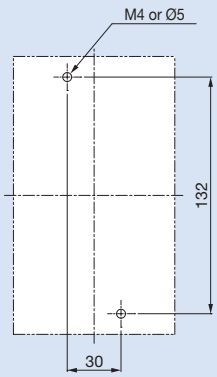
Terminal details



Connecting



Panel drilling



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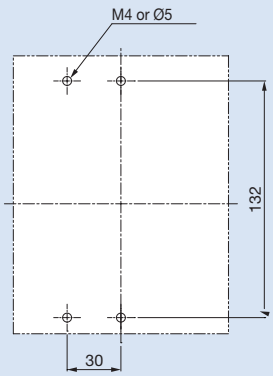
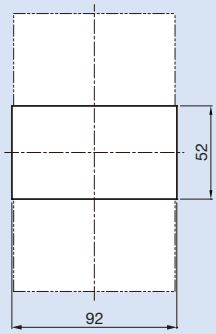


4P

Front panel cutting



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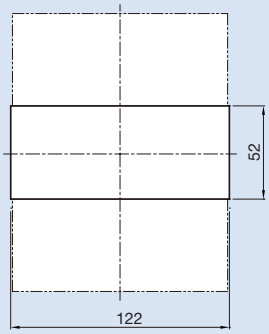


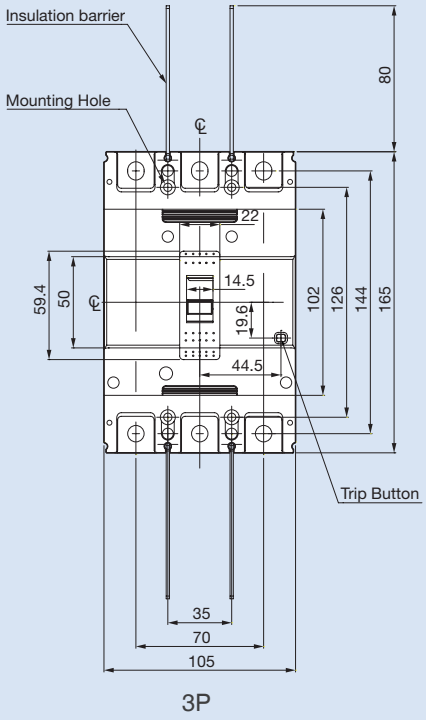
4P

Dimensions

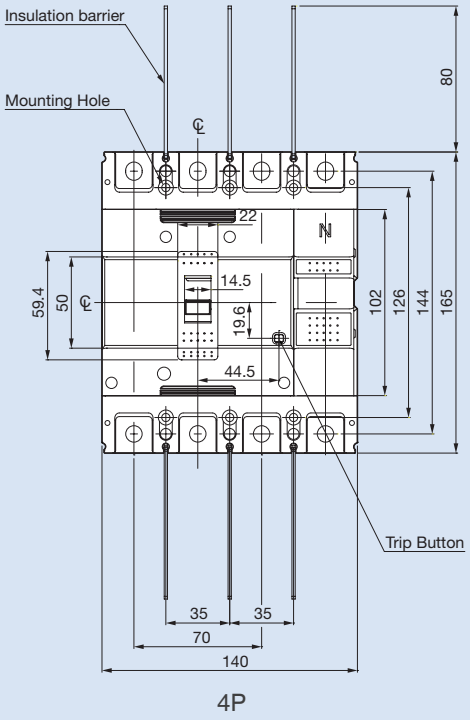
MCCB

ABS250c

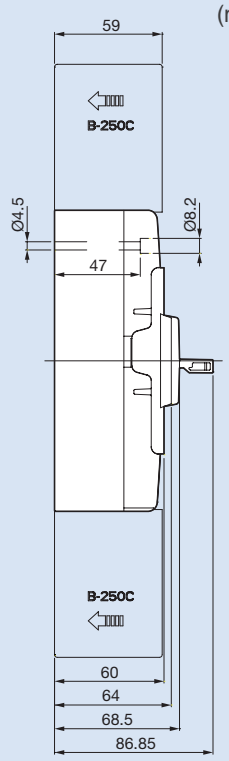
(mm)



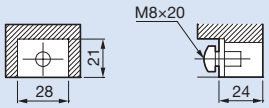
3P



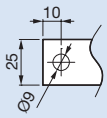
4P



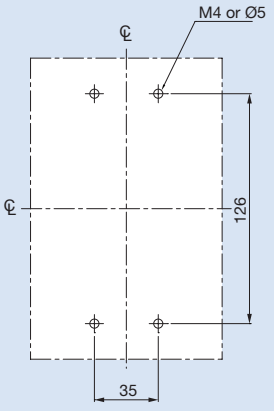
Terminal details



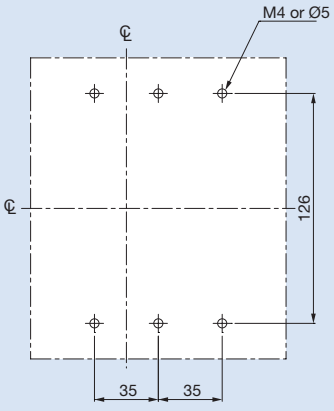
Connecting



Panel drilling

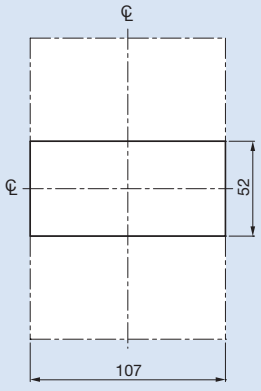


3P



4P

Front panel cutting



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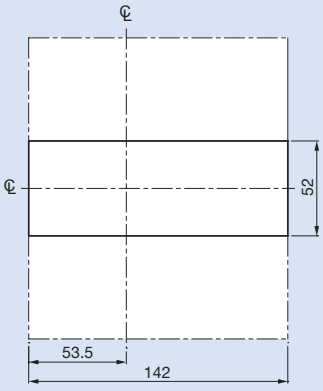


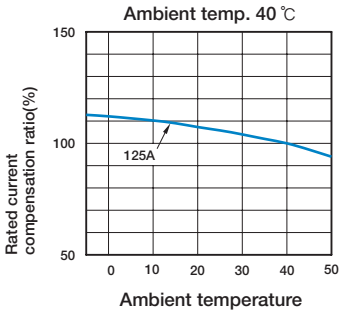
4P

Characteristics curves

Breaker types

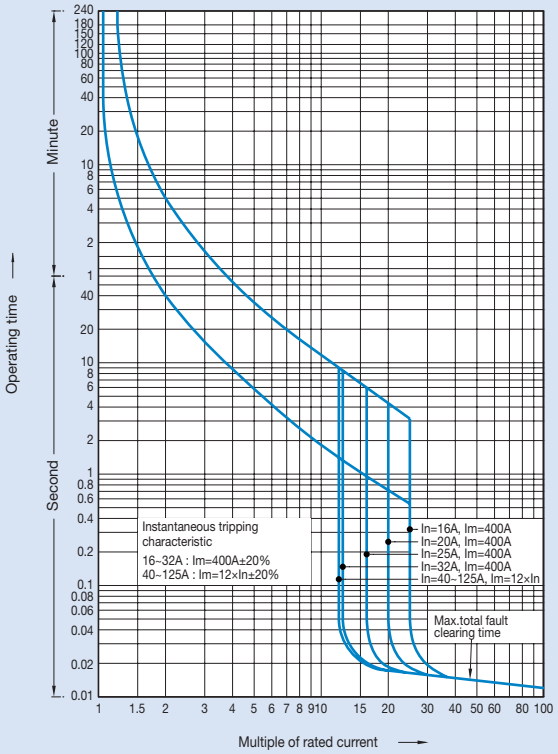
MCCB
ABS125c

Compensation curves



Rated current: 125A

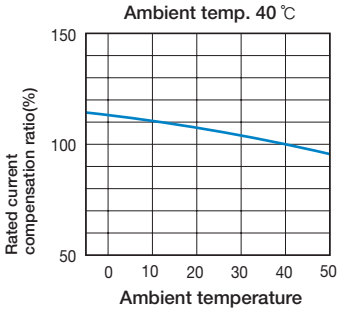
Rated current: 125A



Breaker types

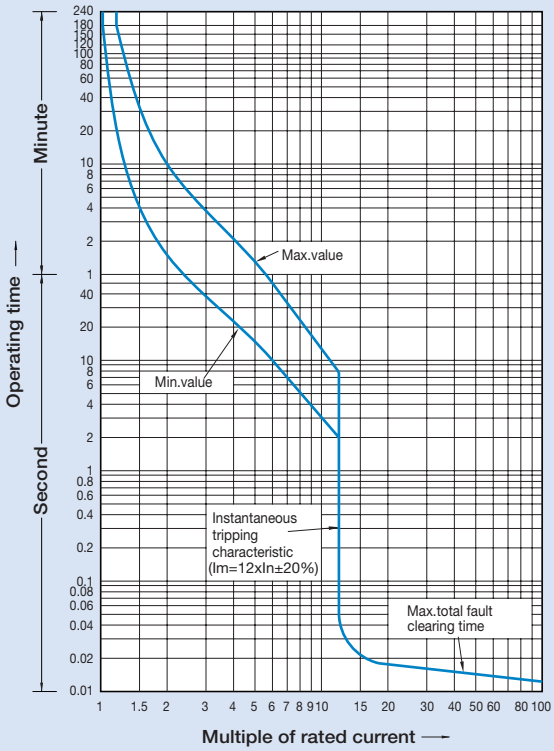
MCCB
ABS250c

Compensation curves



Rated current: 250A

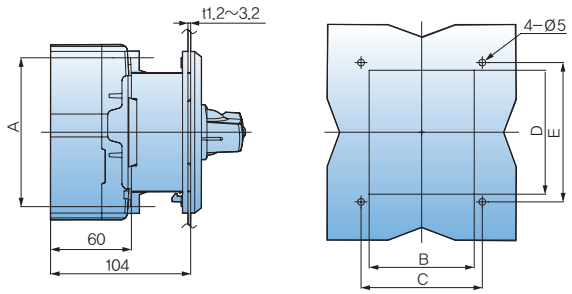
Rated current: 250A



Dimensions

Rotary handles

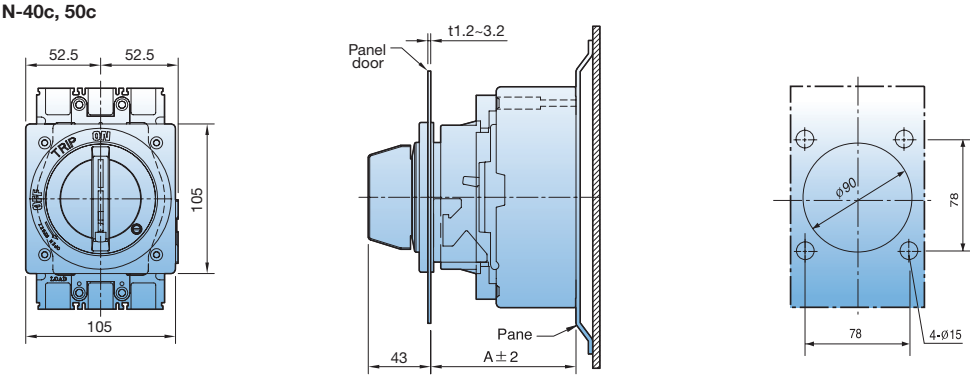
Direct mounting type (D-Handle, 125~250AF)



Type	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	Remarks
DH125	132	94	105	108	120	125AF
DH250	126	108	121	110	122	250AF

Direct mounting type (N-Handle, 125~250AF)

N-40c, 50c

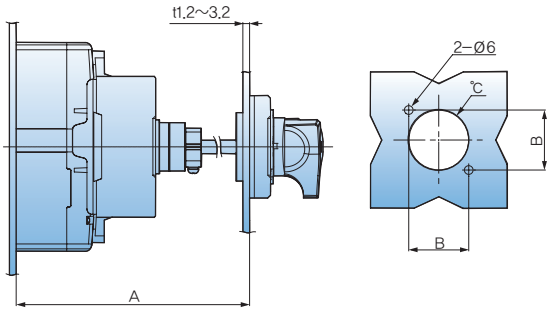


N-Handle	N-40c	N-50c
Note	125AF	250AF
A (mm)	103	103

Dimensions

Rotary handles

Extended mounting type (E-Handle) (125~250AF)



Type	A (mm)	D (mm)	E (mm)	Remarks
EH125	min 150, max 573.5 (SHAFT469mm)	108	120	125AF
EH250	min 150, max 571.5 (SHAFT469mm)	110	122	250AF

Note: 1. An extension shaft that must be adjusted to the distance.
2. The min/max distance between the back of circuit breaker and door is 150~573.5 mm
3. An extension shaft that must be adjusted to the distance between back of circuit breaker and door

Standard accessories

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

Item	125AF	250AF
Fixing screw		
	3P: 2EA (M4×60) 4P: 4EA (M4×60)	3P: 2EA (M4×55) 4P: 4EA (M4×55)
Terminal bolt		
	3P: 6EA (M8×14) 4P: 8EA (M8×14)	3P: 6EA (M8×20) 4P: 8EA (M8×20)
Insulation barrier		
	3P: 2EA 4P: 3EA	3P: 2EA 4P: 3EA

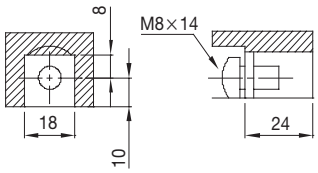
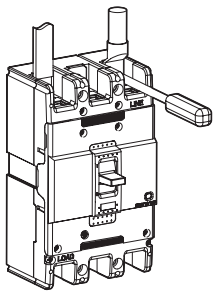
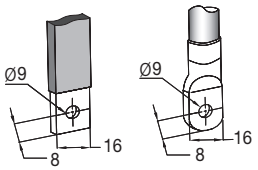
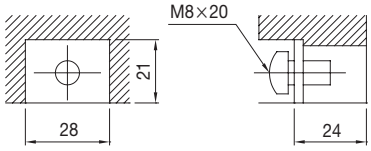
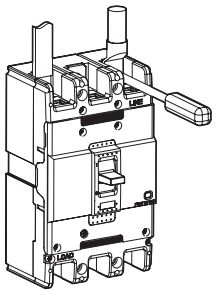
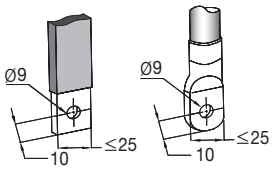
Fixing screws for rotary handles

Handle type	N-40c	N-50c
Applied MCCB	ABS 125c	ABS 250c
Fixing screw(short)	-	-
Fixing screw(long)	M4×85	M4×85

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

Technical Information

Connection

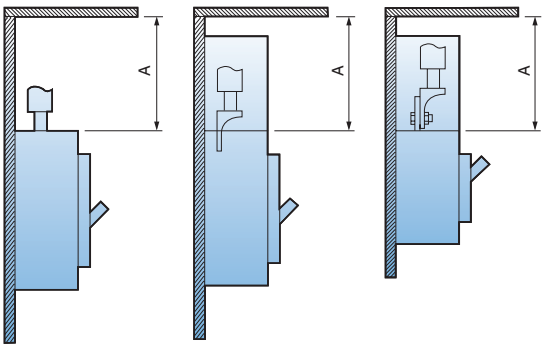
MCCB	Terminal (mm)	Tightening torque (kgf·cm)	Conductor (mm)
125AF		M8 : 55 ~ 75 	
250AF		M8 : 80 ~ 130 	

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

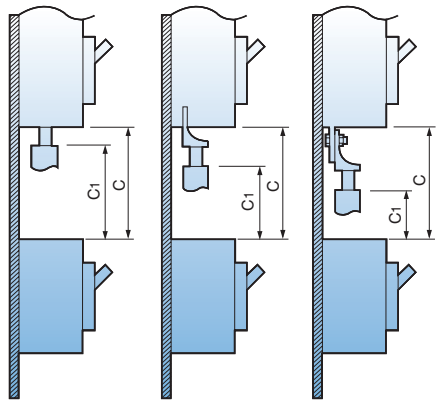
Frame size	Description	A(mm)	
		415/460V	220/240V
125AF	ABS125c	100	80
250AF	ABS250c	100	80



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)
		415/460V	220/240V	
125AF	ABS125c	100	80	The dimension of bare conduct + C1
250AF	ABS250c	100	80	



Direct connection of cable

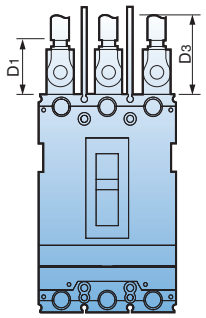
Connection by using a crimp-type terminal lug

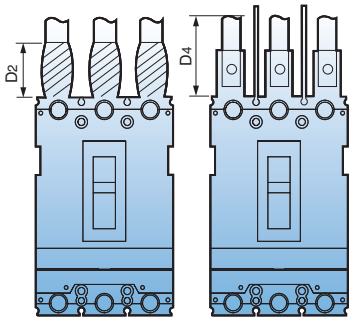
Connection by using a crimp-type terminal lug to the extended terminal

Safety clearance

Insulated length of main terminal of circuit breaker

- D1: Connection by solerless 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

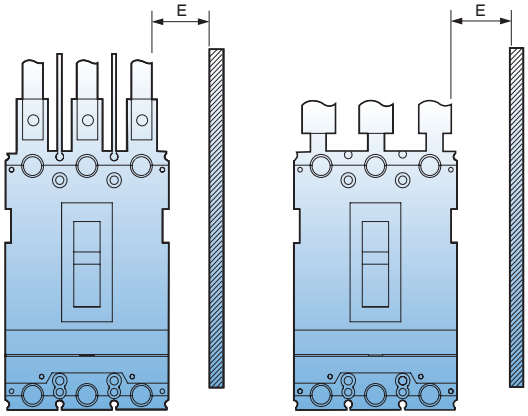




Frame size	Description	D1 (mm)	D2 (mm)	D3 (mm)	D4 (mm)
125AF	ABS125c	The dimension of bare conduct + 20	50	The dimension of bare conduct + 20	50
250AF	ABS250c		50		50

Minimum distance to metallic side panels

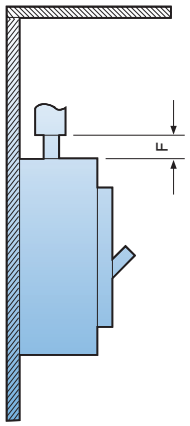
Frame size	Description	E(mm)	
		415/460V	220/240V
125AF	ABS125c	50	20
250AF	ABS250c	50	15



Safety clearance

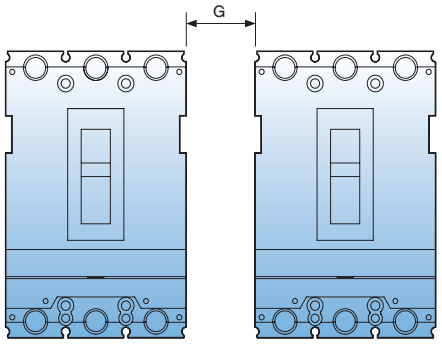
Distance of bare cables or busbars

Frame size	Description	F(mm)
125AF	ABS125c	10
250AF	ABS250c	10



Minimal distance between two adjacent breakers (With terminal covers)

Frame size	Description	G(mm)
125AF	ABS125c	0
250AF	ABS250c	0



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

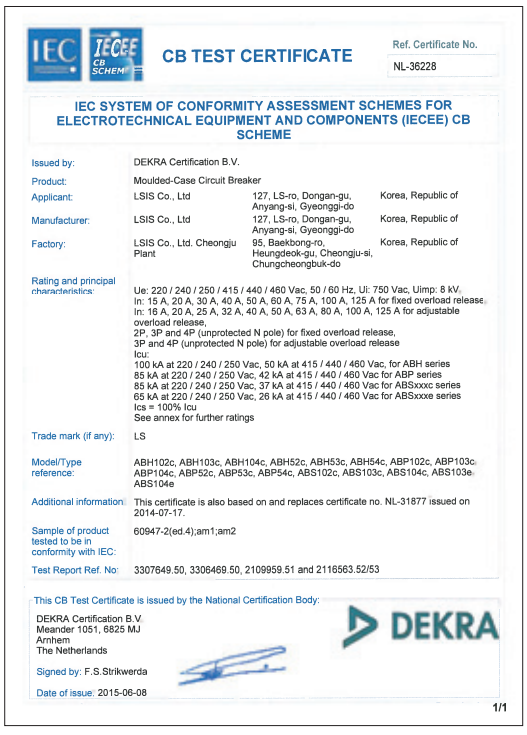
- IEC 60947-2
  Low-voltage switchgear and controlgear - Part 2: Circuit-breakers

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.



CB TEST CERTIFICATE

Ref. Certificate No. NL-36228

IEC SYSTEM OF CONFORMITY ASSESSMENT SCHEMES FOR ELECTROTECHNICAL EQUIPMENT AND COMPONENTS (IECEE) CB SCHEME

Issued by:	DEKRA Certification B.V.		
Product:	Moulded-Case Circuit Breaker		
Applicant:	LSIS Co., Ltd	127, LS-ro, Dongan-gu, Anyang-si, Gyeonggi-do	Korea, Republic of
Manufacturer:	LSIS Co., Ltd	127, LS-ro, Dongan-gu, Anyang-si, Gyeonggi-do	Korea, Republic of
Factory:	LSIS Co., Ltd. Cheongju Plant	95, Baekbong-ro, Heungdeok-gu, Cheongju-si, Chungcheongbuk-do	Korea, Republic of
Rating and principal characteristics:	Ue: 220 / 240 / 250 / 415 / 440 / 460 Vac, 50 / 60 Hz, Ui: 750 Vac, Uimp: 8 kV In: 15 A, 20 A, 30 A, 40 A, 50 A, 60 A, 75 A, 100 A, 125 A for fixed overload release In: 16 A, 20 A, 25 A, 32 A, 40 A, 50 A, 63 A, 80 A, 100 A, 125 A for adjustable overload release, 2P, 3P and 4P (unprotected N pole) for fixed overload release, 3P and 4P (unprotected N pole) for adjustable overload release Icu: 100 kA at 220 / 240 / 250 Vac, 50 kA at 415 / 440 / 460 Vac, for ABH series 85 kA at 220 / 240 / 250 Vac, 42 kA at 415 / 440 / 460 Vac for ABP series 85 kA at 220 / 240 / 250 Vac, 37 kA at 415 / 440 / 460 Vac for ABSxxxc series 65 kA at 220 / 240 / 250 Vac, 26 kA at 415 / 440 / 460 Vac for ABSxxxe series Ics = 100% Icu See annex for further ratings		
Trade mark (if any):	LS		
Model/Type reference:	ABH102c, ABH103c, ABH104c, ABH52c, ABH53c, ABH54c, ABP102c, ABP103c, ABP104c, ABP52c, ABP53c, ABP54c, ABS102c, ABS103c, ABS104c, ABS103e, ABS104e		
Additional information:	This certificate is also based on and replaces certificate no. NL-31877 issued on 2014-07-17.		
Sample of product tested to be in conformity with IEC:	60947-2(ed.4);am1;am2		
Test Report Ref. No:	3307649.50, 3306469.50, 2109959.51 and 2116563.52/53		

This CB Test Certificate is issued by the National Certification Body:

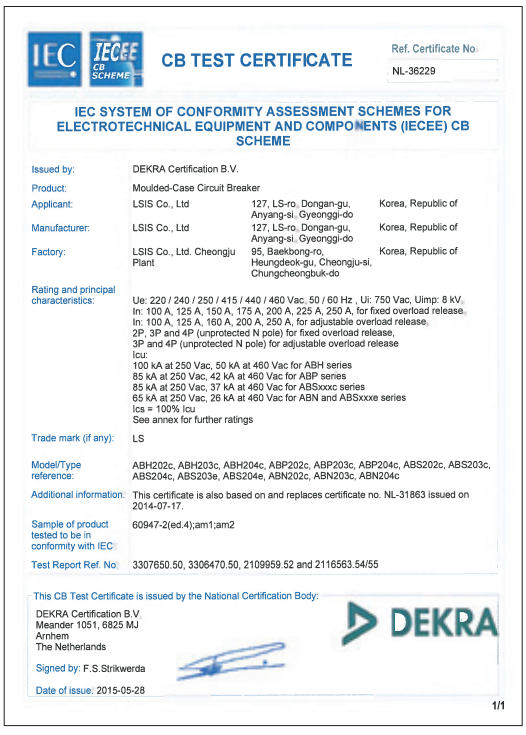
DEKRA Certification B.V.
Meander 1051, 6825 MJ
Arnhem
The Netherlands

Signed by: F.S.Strikwerda

Date of issue: 2015-06-08

DEKRA

1/1



CB TEST CERTIFICATE

Ref. Certificate No. NL-36229

IEC SYSTEM OF CONFORMITY ASSESSMENT SCHEMES FOR ELECTROTECHNICAL EQUIPMENT AND COMPONENTS (IECEE) CB SCHEME

Issued by:	DEKRA Certification B.V.		
Product:	Moulded-Case Circuit Breaker		
Applicant:	LSIS Co., Ltd	127, LS-ro, Dongan-gu, Anyang-si, Gyeonggi-do	Korea, Republic of
Manufacturer:	LSIS Co., Ltd	127, LS-ro, Dongan-gu, Anyang-si, Gyeonggi-do	Korea, Republic of
Factory:	LSIS Co., Ltd. Cheongju Plant	95, Baekbong-ro, Heungdeok-gu, Cheongju-si, Chungcheongbuk-do	Korea, Republic of
Rating and principal characteristics:	Ue: 220 / 240 / 250 / 415 / 440 / 460 Vac, 50 / 60 Hz , Ui: 750 Vac, Uimp: 8 kV In: 100 A, 125 A, 150 A, 175 A, 200 A, 225 A, 250 A, for fixed overload release In: 100 A, 125 A, 160 A, 200 A, 250 A, for adjustable overload release 2P, 3P and 4P (unprotected N pole) for fixed overload release, 3P and 4P (unprotected N pole) for adjustable overload release Icu: 100 kA at 250 Vac, 50 kA at 460 Vac for ABH series 85 kA at 250 Vac, 42 kA at 460 Vac for ABP series 85 kA at 250 Vac, 37 kA at 460 Vac for ABSxxxc series 65 kA at 250 Vac, 26 kA at 460 Vac for ABN and ABSxxxe series Ics = 100% Icu See annex for further ratings		
Trade mark (if any):	LS		
Model/Type reference:	ABH202c, ABH203c, ABH204c, ABP202c, ABP203c, ABP204c, ABS202c, ABS203c, ABS204c, ABS203e, ABS204e, ABN202c, ABN203c, ABN204c		
Additional information:	This certificate is also based on and replaces certificate no. NL-31863 issued on 2014-07-17.		
Sample of product tested to be in conformity with IEC:	60947-2(ed.4);am1;am2		
Test Report Ref. No:	3307650.50, 3306470.50, 2109959.52 and 2116563.54/55		

This CB Test Certificate is issued by the National Certification Body:

DEKRA Certification B.V.
Meander 1051, 6825 MJ
Arnhem
The Netherlands

Signed by: F.S.Strikwerda

Date of issue: 2015-05-28

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1/1

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℃~+40℃ (However, the average for the duration of 24 hours must not exceed 35℃.)
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 and other corrosive materials do not exist

- If a standard circuit breaker is used in high temperature exceeding 40℃, 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℃.
- Passing or storage in stone-cold area is allowed in the temperature of 40℃.
- The operating characteristic of the breaker with a thermal magnetic trip element changes as the base ambient temperature is adjusted to 40℃.

- 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.

Special Use Environment

Environment where Ambient Temperature Exceeds 40℃

The temperate of each module of a Molded Case Circuit Breaker is the sum of temperature increase by conduction and ambient temperature and if the ambient temperature exceeds 40℃ the passing current needs to be reduced so that the temperature of such element as internal insulator of MCCB exceed the maximum allowable temperature.

The base ambient temperature of Metasol breaker is set as 40℃ so if it has to be used in conditions with higher temperature than this, the rated current is required to be reduced a little as described in the table below.

Table of Rated Current for Metasol MCCB Corrected according to Ambient Temperature

Model Name of Breaker	Rated current	Table of Rated Current Corrected according to Ambient Temperature (A)						
		10℃	20℃	30℃	40℃	45℃	50℃	55℃
ABS125c	16	16	16	16	16	15	15	14
	20	20	20	20	20	19	19	17
	25	25	25	25	25	24	23	21
	32	32	32	32	32	31	30	27
	40	40	40	40	40	39	37	34
	50	50	50	50	50	48	46	43
	63	63	63	63	63	61	58	54
	80	80	80	80	80	77	74	68
	100	100	100	100	100	97	93	86
	125	125	125	125	125	121	116	107
ABS250c	100	100	100	100	100	96	93	86
	125	125	125	125	125	121	117	107
	160	160	160	160	160	154	149	137
	200	200	200	200	200	193	186	171
	250	250	250	250	250	241	233	214

Special Use Environment

Environment where Ambient Temperature is -5℃ 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℃, 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℃ is allowed but it is recommend 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 (rated voltage) × 0.82 (correction parameter) = 492V.

2) How to Correct Current:
   - If the rated voltage is AC 800A at above 4,000m sea level, 800A (rated current) × 0.96(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.

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

* αg: multiple of gravitational acceleration (g=9.8m/sec2)

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.

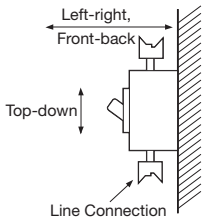
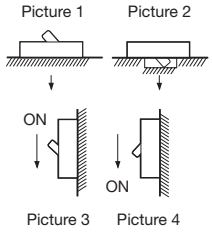
Impact of High Frequency

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 less 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.
  $Ph = \sigma f Bmn$
  Bm: 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	● Vertical mounting ● Top–down, Left–right, Front–back 	● Picture 1, 2, 3, 4 (→ represents the direction of drop) 
	Status of MCCB	(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	● 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	

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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.

- According to The WEEE Directive, please do not discard the device with your household waste.

LS ELECTRIC

www.ls-electric.com

■ Headquarter
127 LS-ro (Hogye-dong) Dongan-gu, Anyang-si, Gyeonggi-Do, 14119, Korea

■ Seoul Office
LS Yongsan Tower, 92, Hangang-daero, Yongsan-gu, Seoul, 04386, Korea
Tel. 82-2-2034-4916, 4684, 4429

■ Overseas Subsidiaries

- LS ELECTRIC Japan Co., Ltd. (Tokyo, Japan)
  Tel: 81-3-6268-8241 E-Mail: japan@ls-electric.com
- LS ELECTRIC (Dalian) Co., Ltd. (Dalian, China)
  Tel: 86-411-8730-5872 E-Mail: china.dalian@lselectric.com.cn
- LS ELECTRIC (Wuxi) Co., Ltd. (Wuxi, China)
  Tel: 86-510-6851-6666 E-Mail: china.wuxi@lselectric.com.cn
- LS ELECTRIC Vietnam Co., Ltd. (Hanoi, Vietnam)
  Tel: 84-222-2221-110 E-Mail: vietnam@ls-electric.com
- LS ELECTRIC Middle East FZE (Dubai, U.A.E.)
  Tel: 971-4-886-5360 E-Mail: middleeast@ls-electric.com
- LS ELECTRIC Europe B.V. (Hoofddorp, Netherlands)
  Tel: 31-20-654-1424 E-Mail: europartner@ls-electric.com
- LS ELECTRIC America Inc. (Chicago, USA)
  Tel: 1-800-891-2941 E-Mail: sales.us@lselectricamerica.com
- LS ENERGY SOLUTIONS LLC (Charlotte, USA)
  Tel: 1-704-587-4051 E-Mail: cmfeldman@ls-es.com
- LS ELECTRIC Türkiye Co., Ltd. (Istanbul,Türkiye)
  Tel: 90-212-806-1252 E-Mail: turkiye@ls-electric.com
- LS ELECTRIC IBERIA S.L.U. (Madrid, Spain)
  Tel: 34-910-28-02-74 E-Mail: iberia@ls-electric.com

■ Overseas Branches

- LS ELECTRIC Tokyo Office (Japan)
  Tel: 81-3-6268-8241 E-Mail: tokyo@ls-electric.com
- LS ELECTRIC Beijing Office (China)
  Tel: 86-10-5095-1631 E-Mail: china@lselectric.com.cn
- LS ELECTRIC Shanghai Office (China)
  Tel: 86-21-5237-9977 E-Mail: china@lselectric.com.cn
- LS ELECTRIC Guangzhou Office (China)
  Tel: 86-20-3818-2883 E-Mail: china@lselectric.com.cn
- LS ELECTRIC Chengdu Office (China)
  Tel: 86-28-8670-3201 E-Mail: china@lselectric.com.cn
- LS ELECTRIC Qingdao Office (China)
  Tel: 86-532-8501-2065 E-Mail: china@lselectric.com.cn
- LS ELECTRIC Nanjing Office (China)
  Tel: 86-25-8467-0005 E-Mail: china@lselectric.com.cn
- LS ELECTRIC Bangkok Office (Thailand)
  Tel: 66-90-950-9683 E-Mail: thailand@ls-electric.com
- LS ELECTRIC Jakarta Office (Indonesia)
  Tel: 62-21-2933-7614 E-Mail: indonesia@ls-electric.com
- LS ELECTRIC Moscow Office (Russia)
  Tel: 7-499-682-6130 E-Mail: info@lselectric-ru.com
- LS ELECTRIC America Western Office (Irvine, USA)
  Tel: 1-949-333-3140 E-Mail: america@ls-electric.com
- LS ELECTRIC India Office (India)
  Tel: 91-80-6142-9108 E-Mail: Info_india@ls-electric.com
- LS ELECTRIC Singapore Office (Singapore)
  Tel: 65-6958-8162 E-Mail: singapore@ls-electric.com

2022. 12

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