COMPACT NS630b to 1600 A

Low Voltage Products

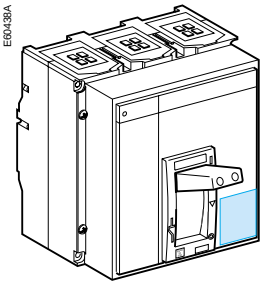
User manual

Merlin Gerin
Modicon
Square D
Telemecanique

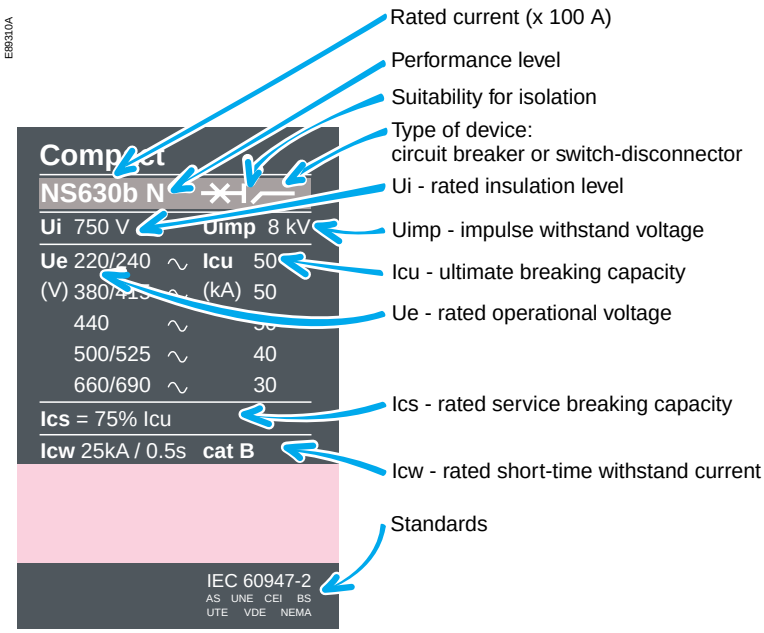
Schneider Electric
We do more with electricity.

User manual for circuit breakers

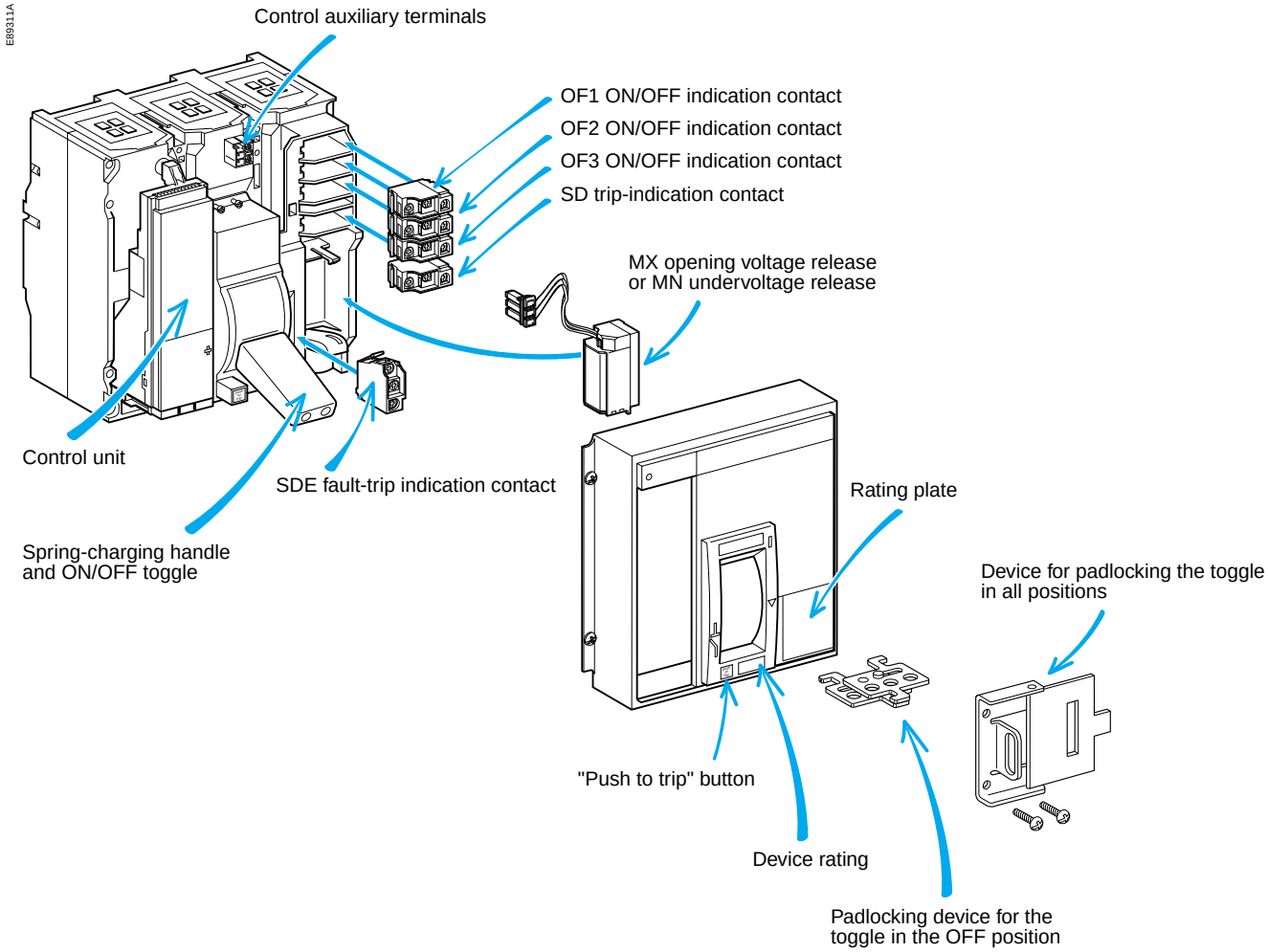
COMPACT NS630b to 1600 A



Rating plate

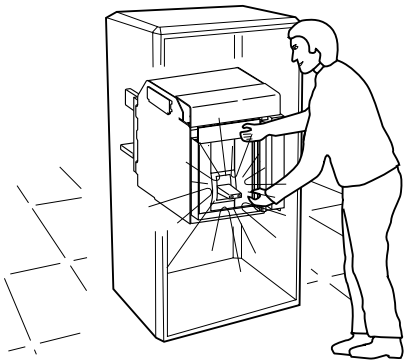


Components


E89311A
Control auxiliary terminals
OF1 ON/OFF indication contact
OF2 ON/OFF indication contact
OF3 ON/OFF indication contact
SD trip-indication contact
MX opening voltage release
or MN undervoltage release
Control unit
SDE fault-trip indication contact
Spring-charging handle
and ON/OFF toggle
Rating plate
Device for padlocking the toggle
in all positions
"Push to trip" button
Device rating
Padlocking device for the
toggle in the OFF position

Opening, closing, reset

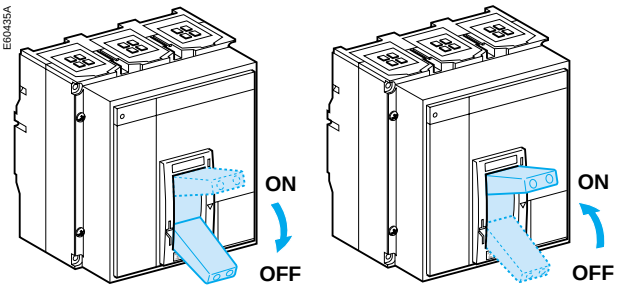
E60436A



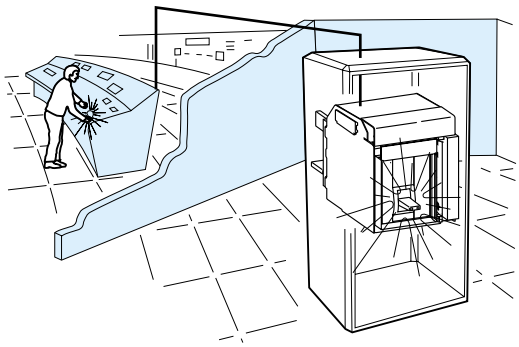
Local opening and closing

■ OFF: breaker open, ON: breaker closed.

E60435A



E60433A



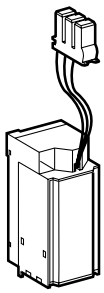
Remote opening

Use either:
■ an MX opening release
■ an MN undervoltage release
■ a delayed MN undervoltage release.

When connected to the control panel, these releases may be used to remotely open the device.

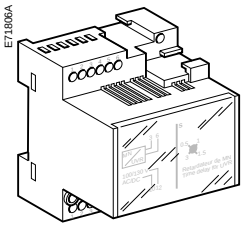
MX, MN

E71805A



Delay unit

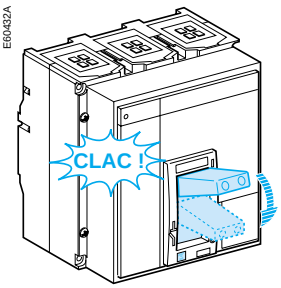
E71806A



Resetting the device following a trip

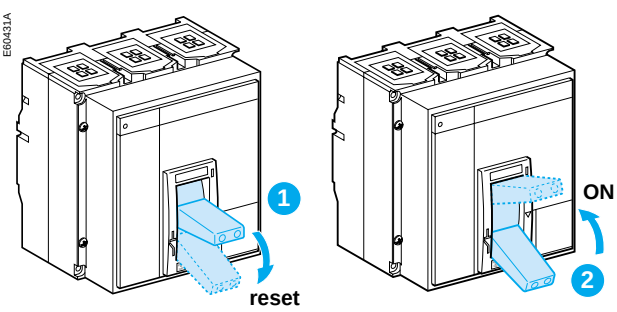
■ the device trips.

E60432A



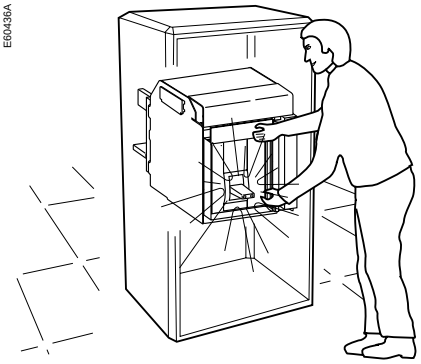
■ reset the device, then close it again.

E60431A



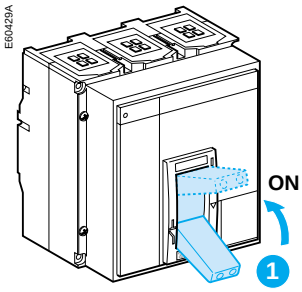
Testing the device

E60436A



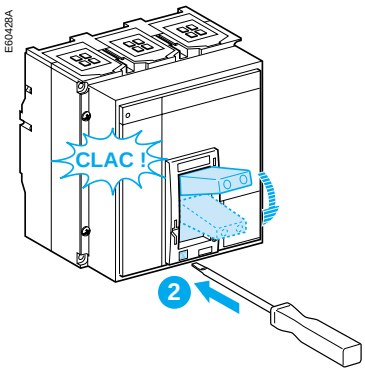
■ close the device.

E60429A



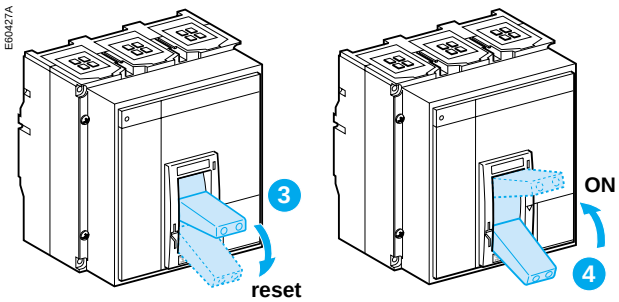
■ press the "Press to trip" button.

E60428A



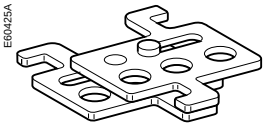
■ push the toggle down to reset the device, then back up close it again.

E60427A



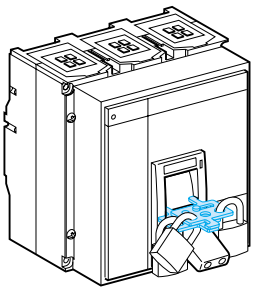
Locking the toggle

E60425A

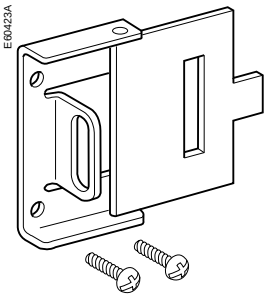


Locking the toggle in the OFF position using one to three padlocks (shackle diameter 5 to 8 mm)

E60424A

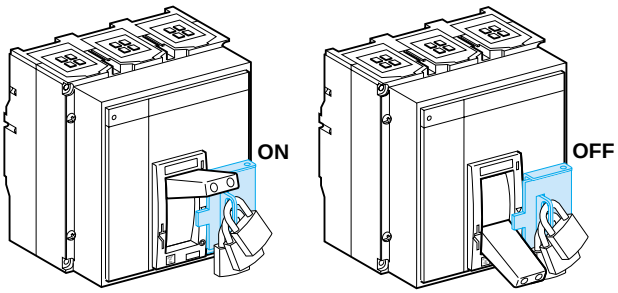


E60423A

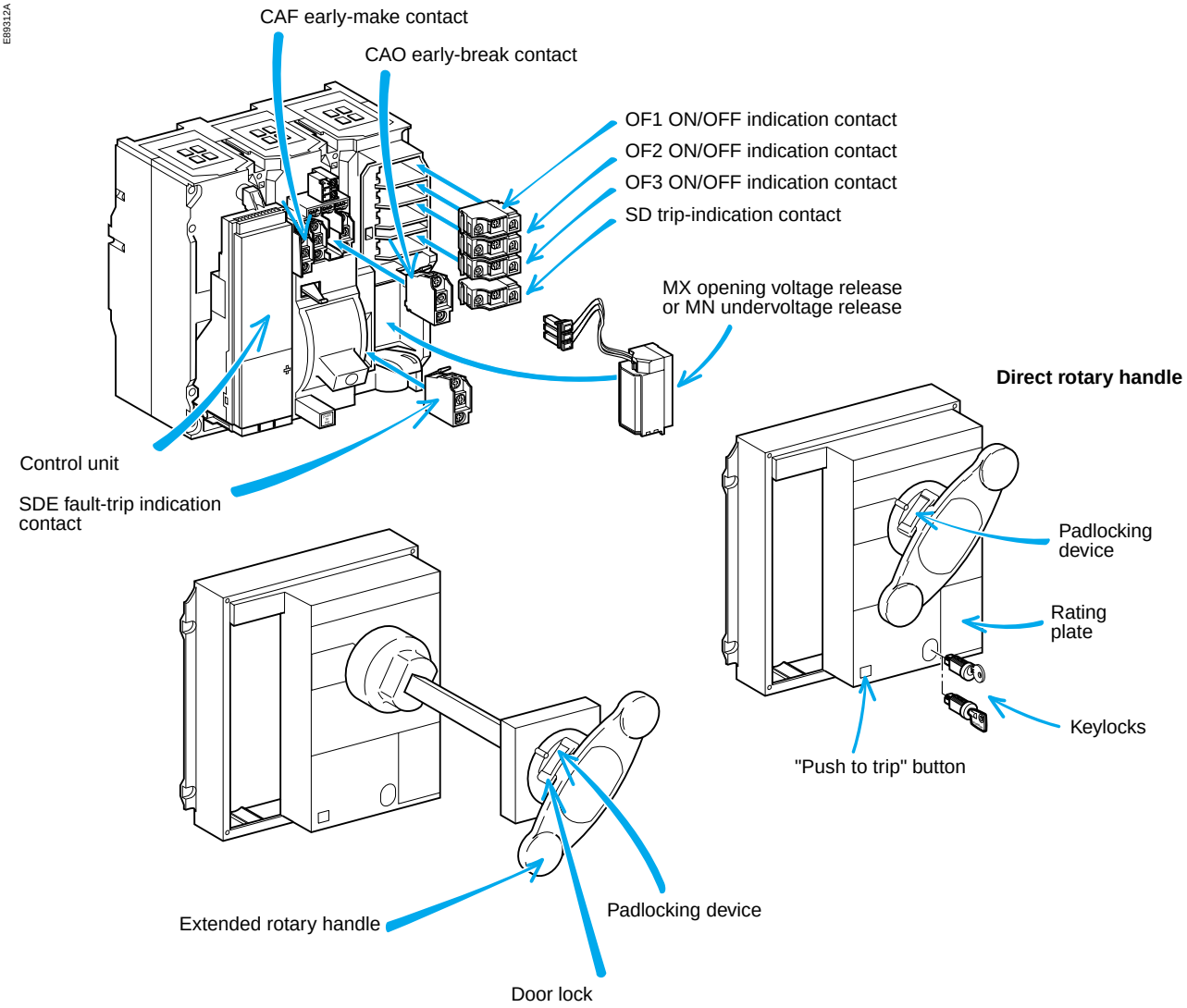


Locking the toggle in the ON or OFF position using one to three padlocks (shackle diameter 5 to 8 mm)

E60422A



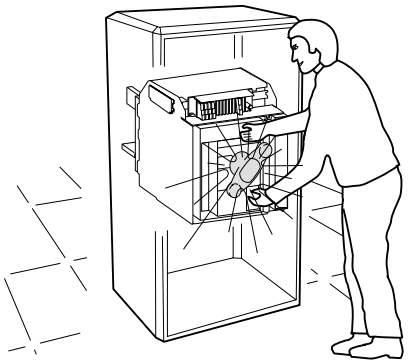
Components



Extended rotary handle

Opening, closing, reset

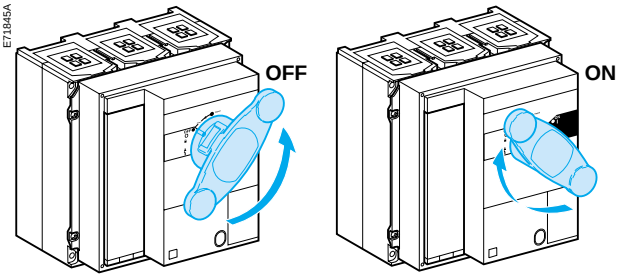
E71844A



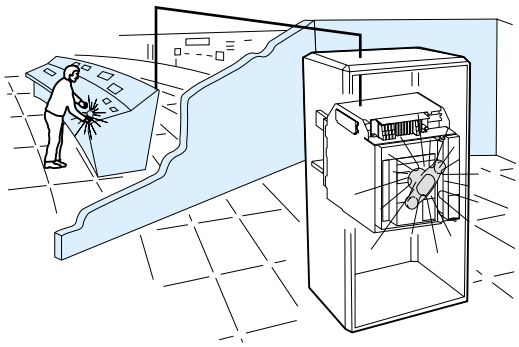
Local opening and closing

■ OFF: breaker open, ON: breaker closed.

E71845A



E71847A



Remote opening

Use either:
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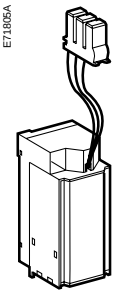
■ an MN undervoltage release
■ a delayed MN undervoltage release.

When connected to the control panel, these releases may be used to remotely open the device.

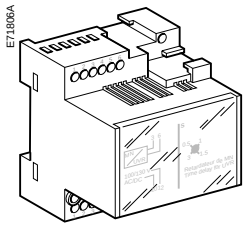
MX, MN

E71805A



Delay unit

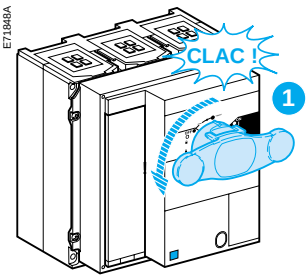
E71806A



Resetting the device following a trip

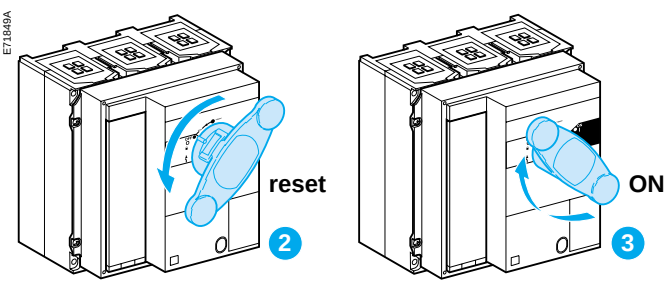
■ the device trips.

E71848A



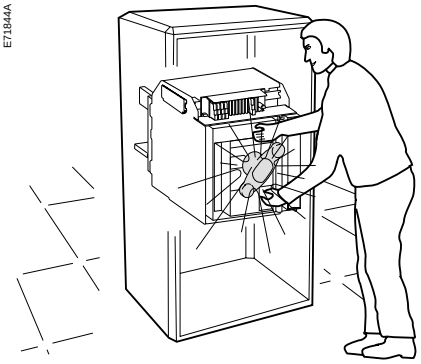
■ reset the device, then close it again.

E71849A



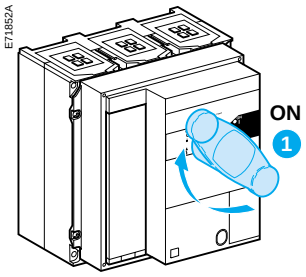
Testing the device

E71844A



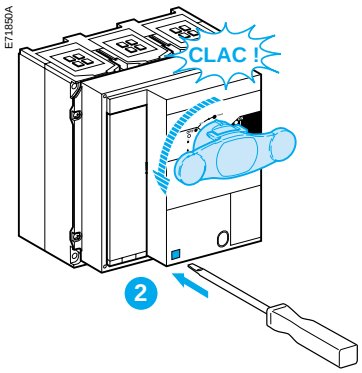
■ close the device.

E71852A



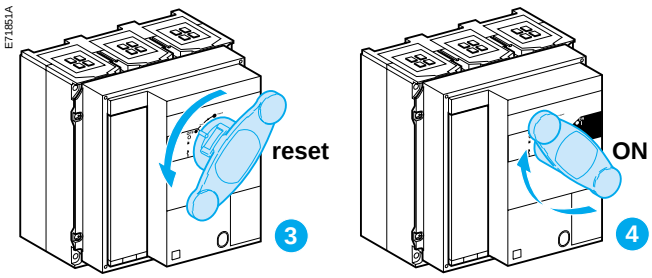
■ press the "Press to trip" button.

E71850A



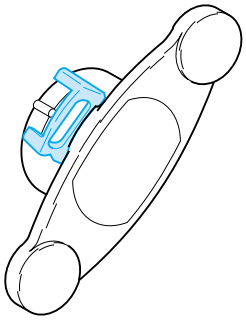
■ turn the handle to reset the device, then back to close it again.

E71851A



Locking the rotary handle

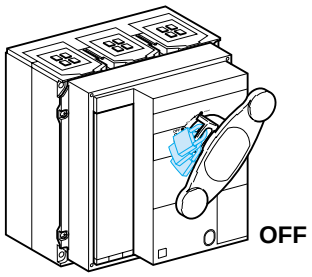
E71854A



Locking the direct or extended rotary handle in all positions using one to three padlocks (shackle diameter 5 to 8 mm)

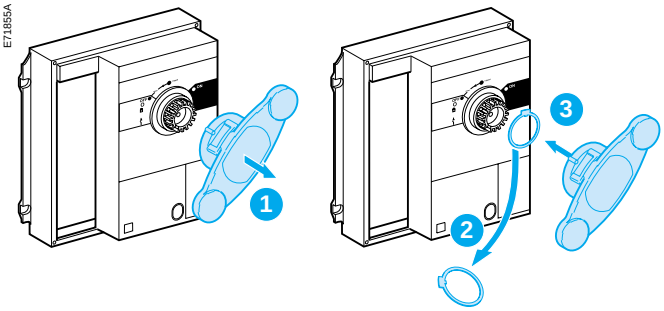
■ in the standard configuration, the device may be locked in the OFF position.

E71859A



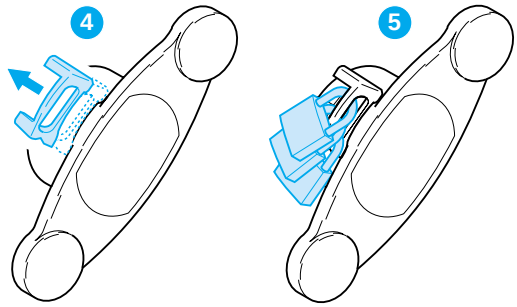
■ remove the ring as indicated below to enable locking in both the ON and OFF positions.

E71855A



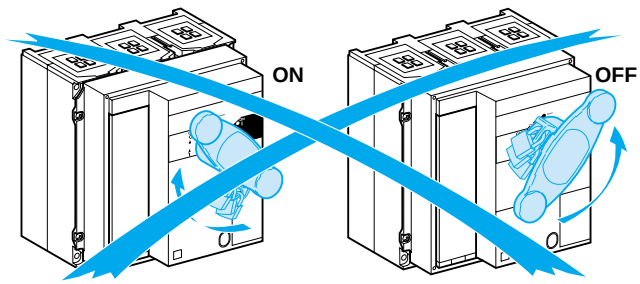
■ lock the handle.

E71857A



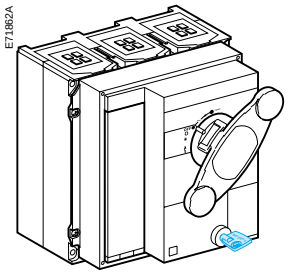
■ the controls are locked.

E71883A



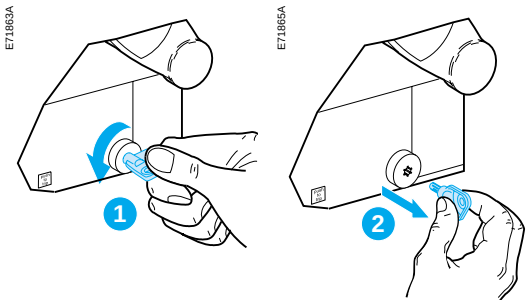
Note:
the rotary handle can equipped for locking by both padlocks and keylocks.

Locking the rotary handle

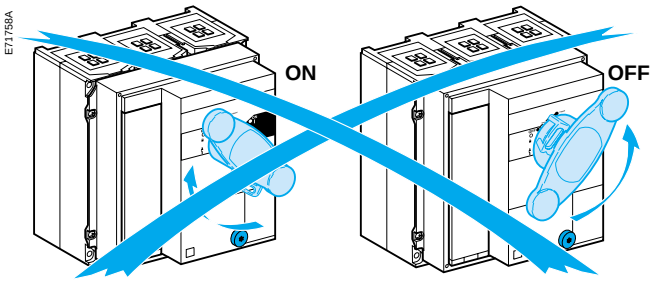


Locking the direct rotary handle in all positions using a keylock

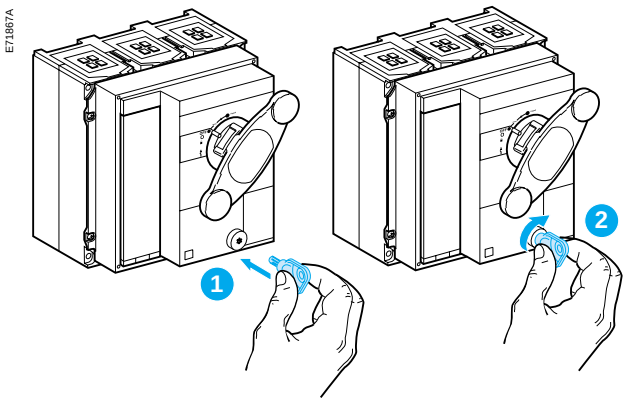
■ lock.



■ the controls are locked.

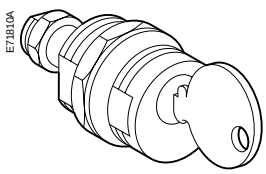


■ unlock.

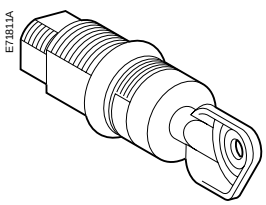


Two types of keylocks are available

RONIS

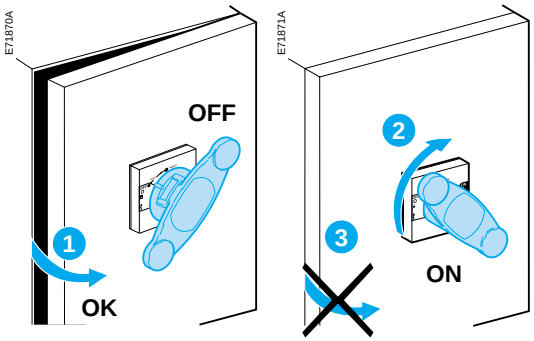


PROFALUX

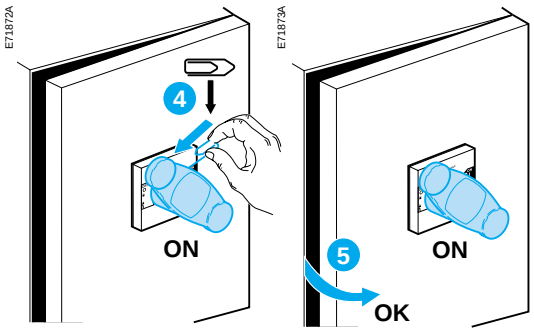


Door locking when the device is in the ON position, using the extended rotary handle

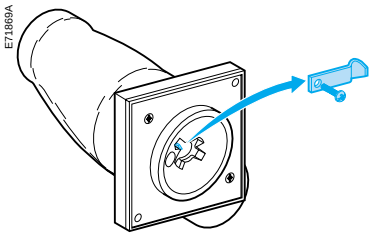
■ in the standard configuration, the door cannot be opened when the rotary handle is set to the ON position.



■ it is possible, however, to defeat the door lock.

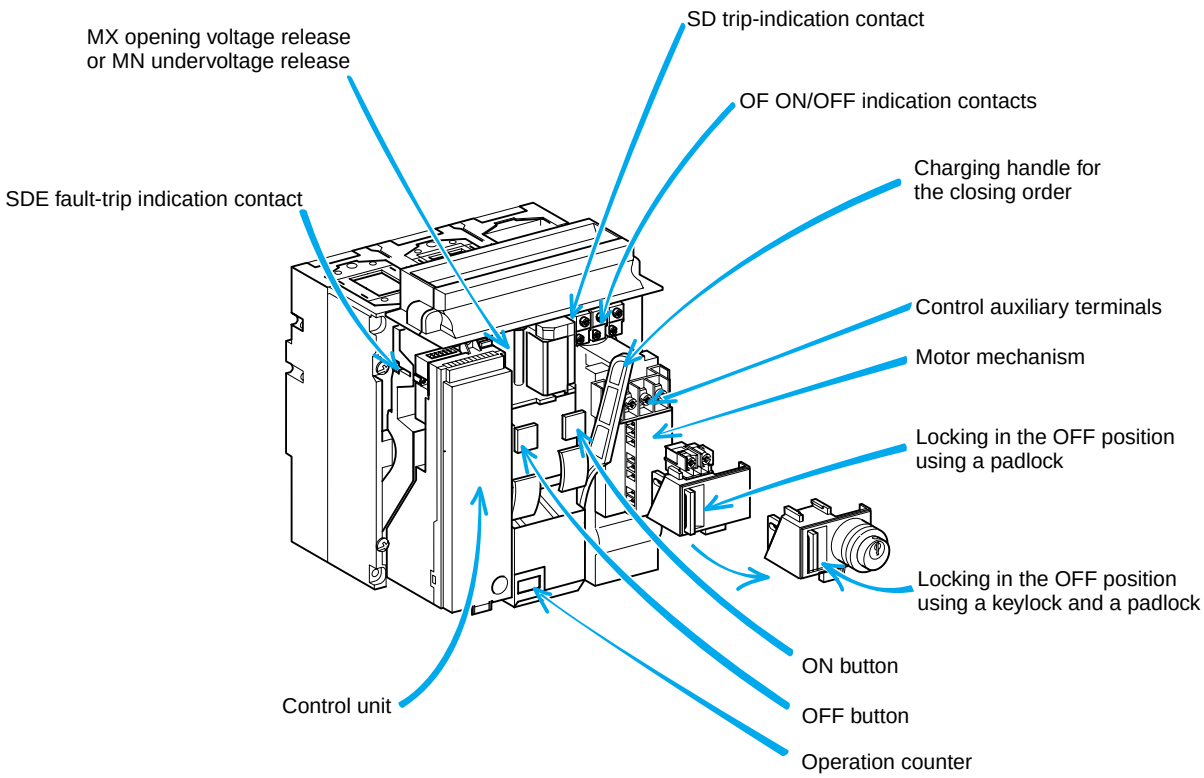


■ the door-lock function may be permanently disabled by removing the lock.



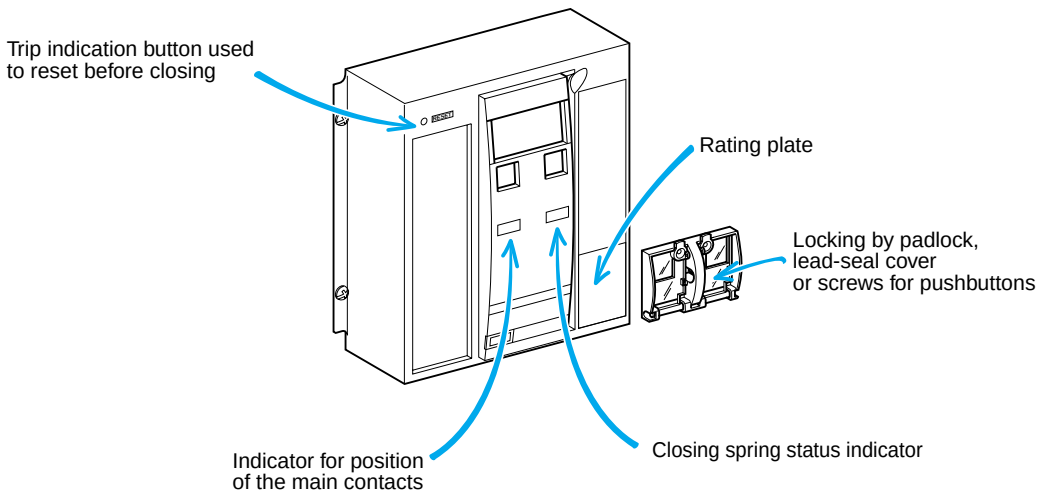
Fixed device

E89313A



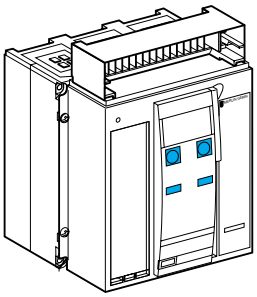
Front

E89314A

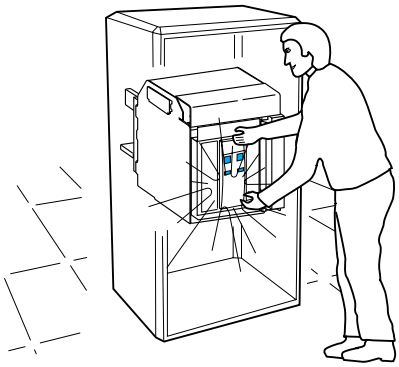


Opening, closing, reset

E71885A



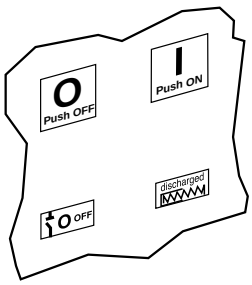
E71759A



Local opening and closing

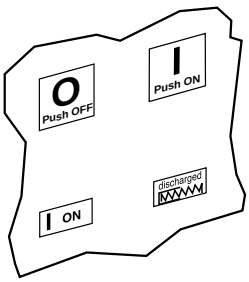
Device open (OFF), discharged

E60405A



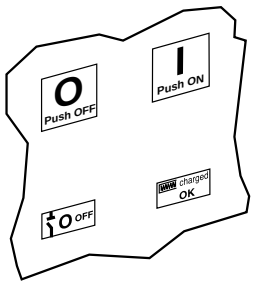
Device closed (ON), discharged

E60404A



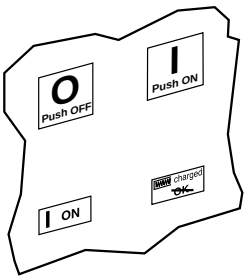
Device open (OFF), charged

E71877A

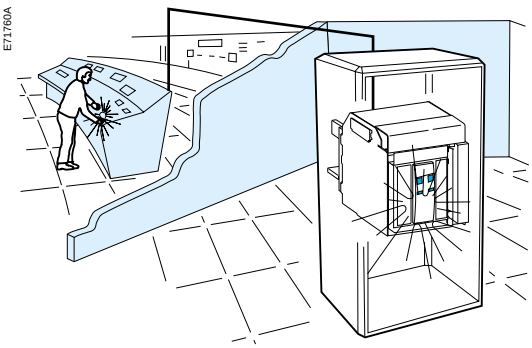


Device closed (ON), charged

E71876A



E71760A



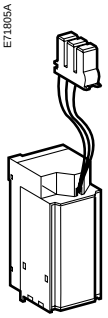
Remote opening

Use either:
- an MX opening release
- an MN undervoltage release
- a delayed MN undervoltage release
- a motor mechanism.

When connected to the control panel, these releases may be used to remotely open the device.

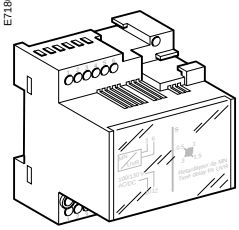
MX, MN

E71805A



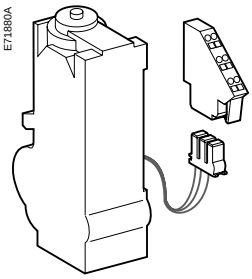
Delay unit

E71806A

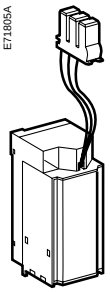


Motor mechanism

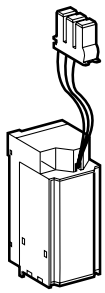
E71880A



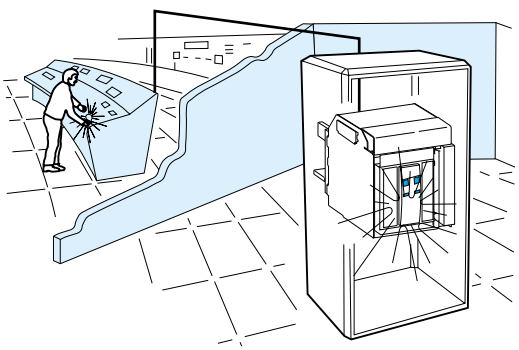
E71805A



E71805A



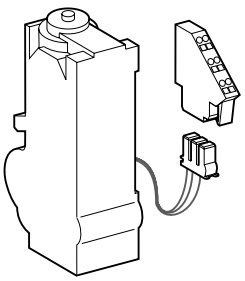
E71760A



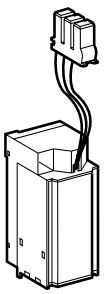
Remotely close

Motor mechanism

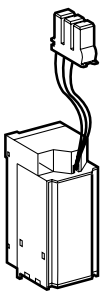
E71880A



E71805A

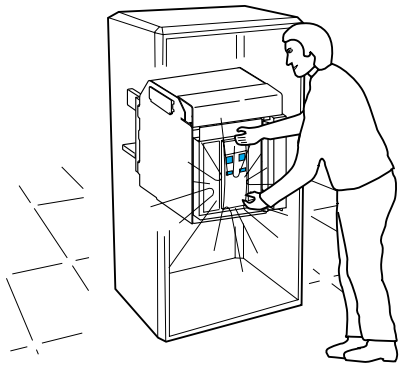


E71805A



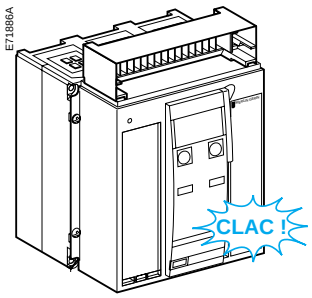
Manually recharge the device following a trip

E71759A

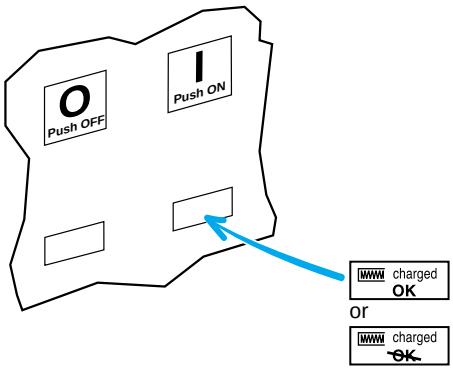


■ the device trips.

E71886A

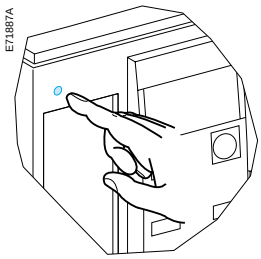


E71878A

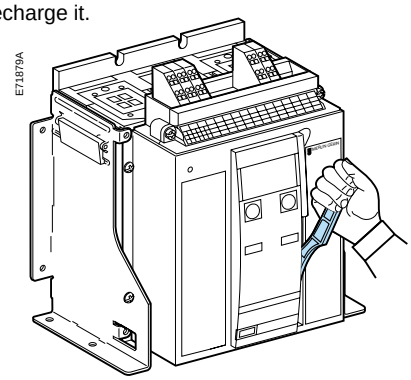


■ reset the device, then recharge it.

E71887A

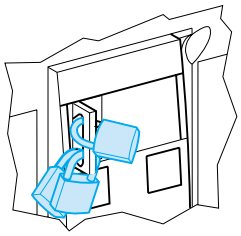


E71879A



Locking the controls
Disabling local or remote closing

E71888A

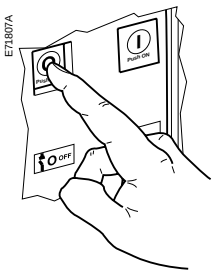


Locking the device using one to three padlocks (shackle diameter 5 to 8 mm)

■ lock.

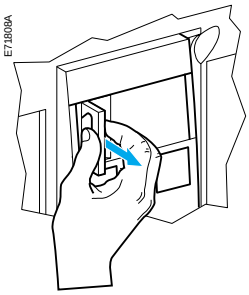
Open the device.

E71807A



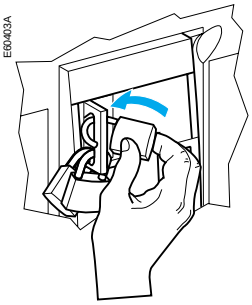
Pull out the tab.

E71808A



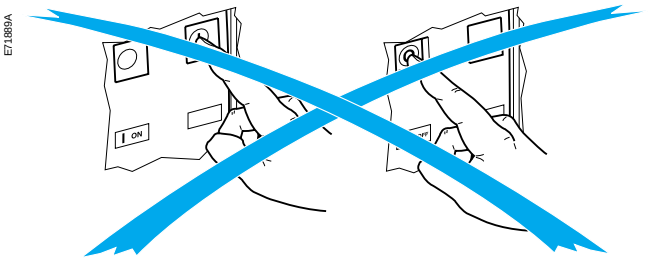
Install the padlock(s).

E60403A



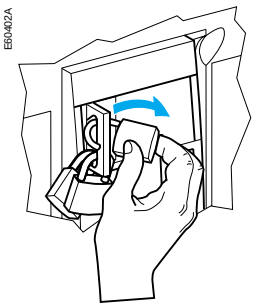
■ the controls are locked.

E71889A



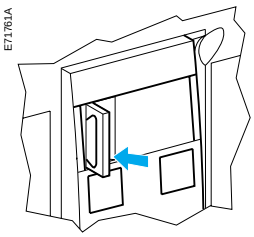
■ unlock.

E60402A



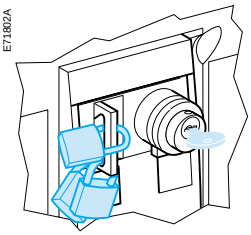
■ push in the tab.

E71761A



Note.
Padlocks and keylocks may be used together.

E71802A



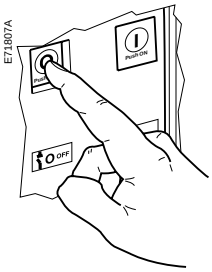
Padlocks and keylocks may be used together.
Locking using padlocks is identical to the system on the previous page.

Locking the device using a keylock and/or one to three padlocks (shackle diameter 5 to 8 mm)

■ keylocking.

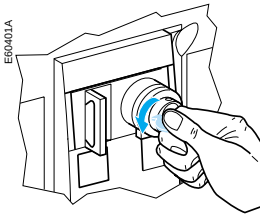
Open the device.

E71807A



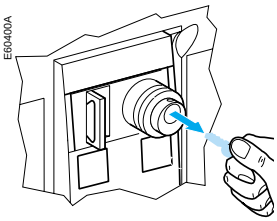
Turn the key.

E60401A



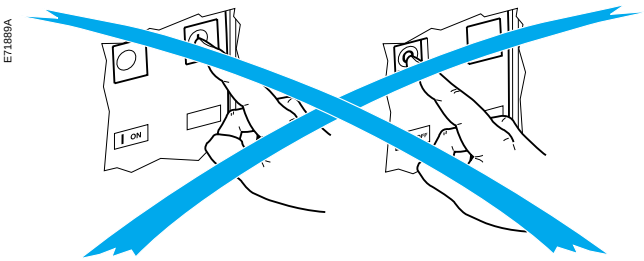
Remove the key.

E60400A



■ the controls are locked.

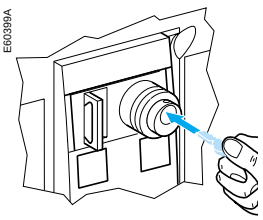
E71889A



■ unlock.

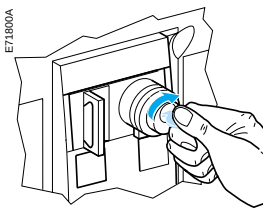
Insert the key.

E60399A



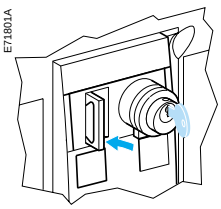
Turn the key.

E71800A



Push in the tab.

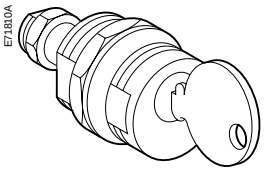
E71801A



Two types of keylocks are available

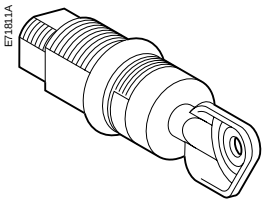
RONIS

E71810A

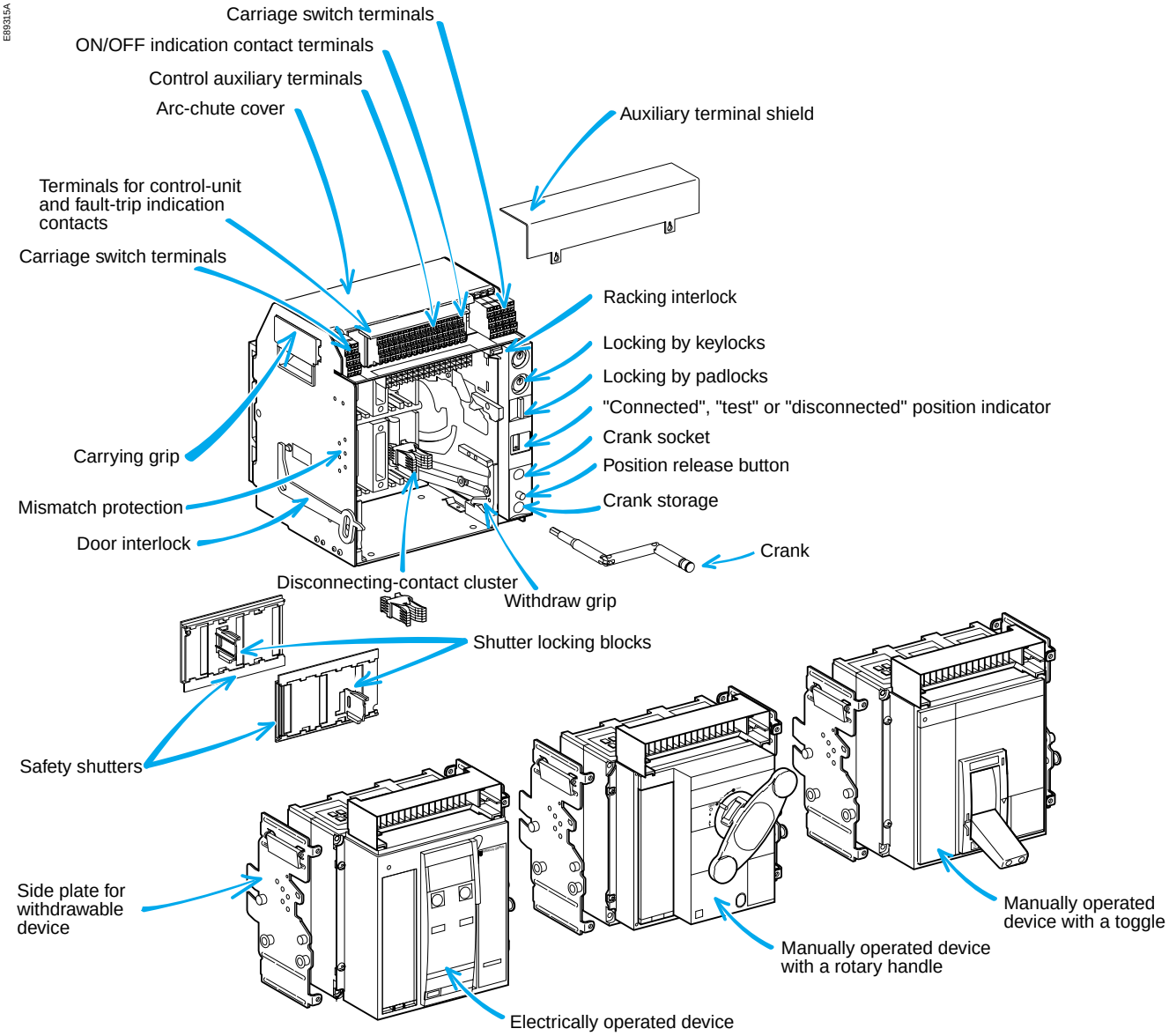


PROFALUX

E71811A



Components

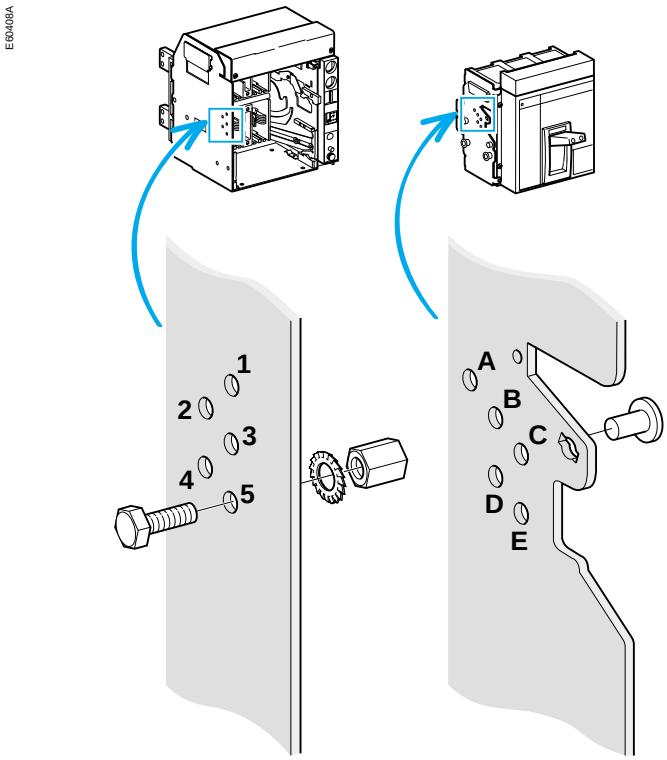

E89315A
Carriage switch terminals
ON/OFF indication contact terminals
Control auxiliary terminals
Arc-chute cover
Auxiliary terminal shield
Terminals for control-unit and fault-trip indication contacts
Carriage switch terminals
Racking interlock
Locking by keylocks
Locking by padlocks
"Connected", "test" or "disconnected" position indicator
Crank socket
Position release button
Crank storage
Carrying grip
Mismatch protection
Door interlock
Crank
Disconnecting-contact cluster
Withdraw grip
Shutter locking blocks
Safety shutters
Side plate for withdrawable device
Manually operated device with a toggle
Manually operated device with a rotary handle
Electrically operated device

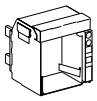
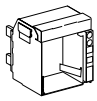
Matching a device with its chassis

To set up a mismatch-prevention combination for the device and the chassis, see the mismatch-prevention installation manual.

The mismatch protection ensures that a device is installed only in a chassis with compatible characteristics.

The possible combinations are listed below.



			
A B C A B D A B E A B A C D A C E A C A D E A D A E	4 5 3 5 3 4 3 4 5 2 5 2 4 2 4 5 2 3 2 3 5 2 3 4	B C D B C E B C B D E B D B E C D E C D C E D E	1 5 1 4 1 4 5 1 3 1 3 5 1 3 4 1 2 1 2 5 1 2 4 1 2 3

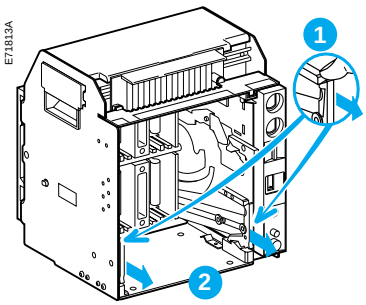
Racking

For complete information on Compact handling and mounting, see the installation manual(s).

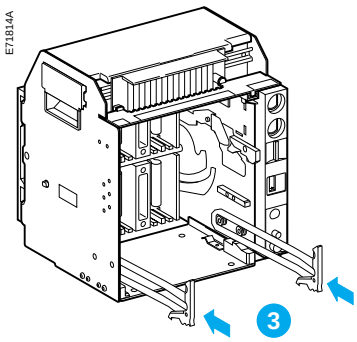
Before mounting Compact NS, make sure it matches the chassis.

Removing the rails

Press the release tabs and pull the rails out.

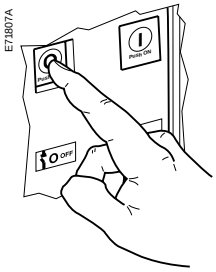


To put the rails back in, press the release tabs and push the rails in.

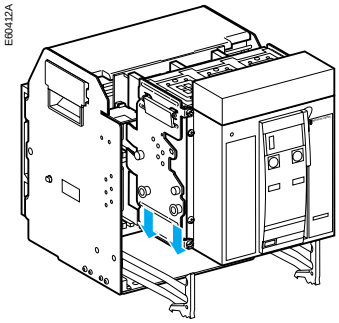


Inserting the device

Open the circuit breaker (in any case, it opens automatically during connection).

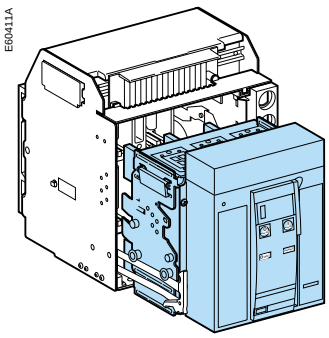


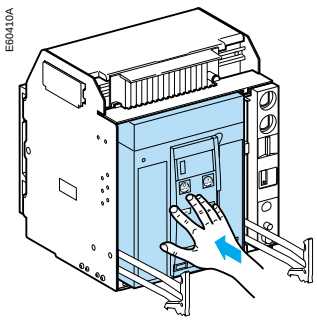
Position the circuit breaker on the rails. Check that it rests on all four supports.

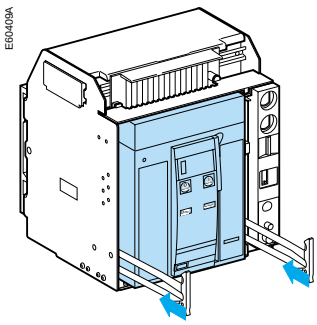


If you cannot insert the device in the chassis, check that the mismatch protection on the chassis corresponds to that on the device.

Push the device into the chassis, taking care not to push on the control unit.

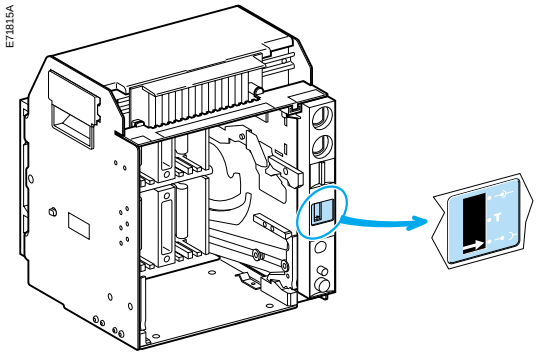




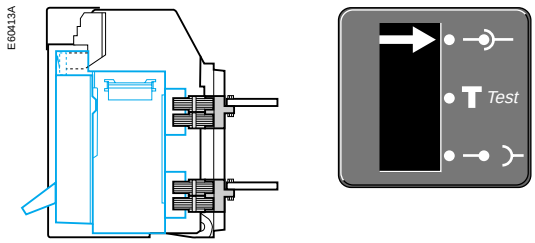


Racking

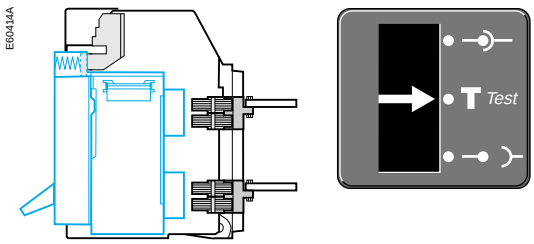
Prerequisites
To connect and disconnect the device, the crank must be used.
The locking systems, padlocks and the racking interlock all inhibit use of the crank.



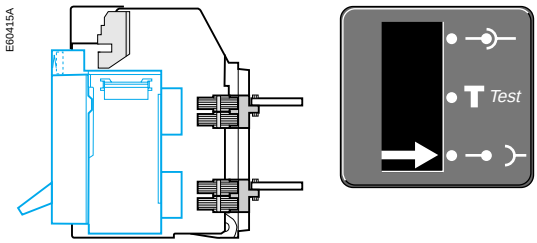
■ *"connected" position*



■ *"test" position*

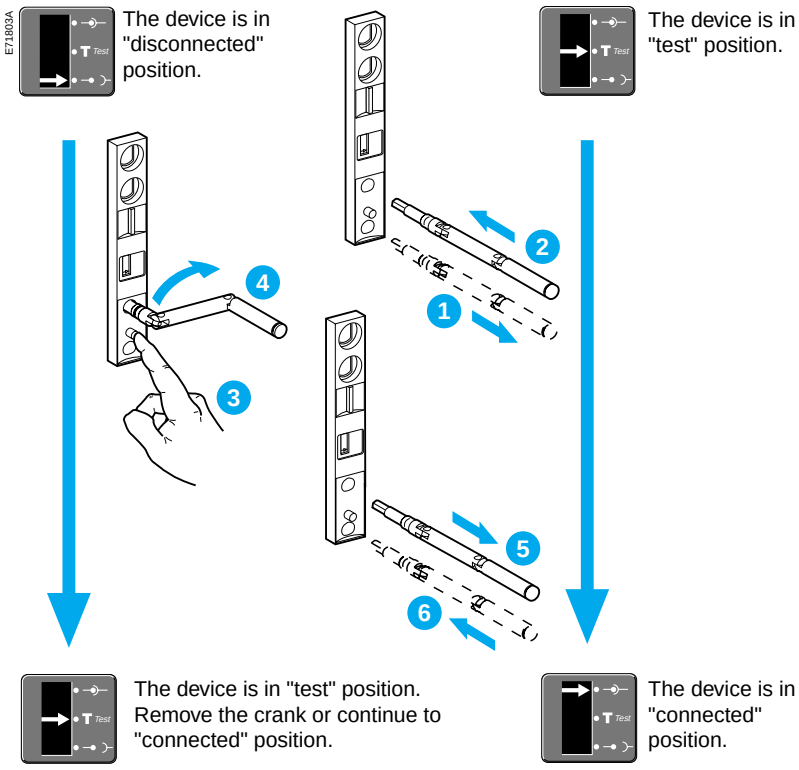


■ *"disconnected" position*

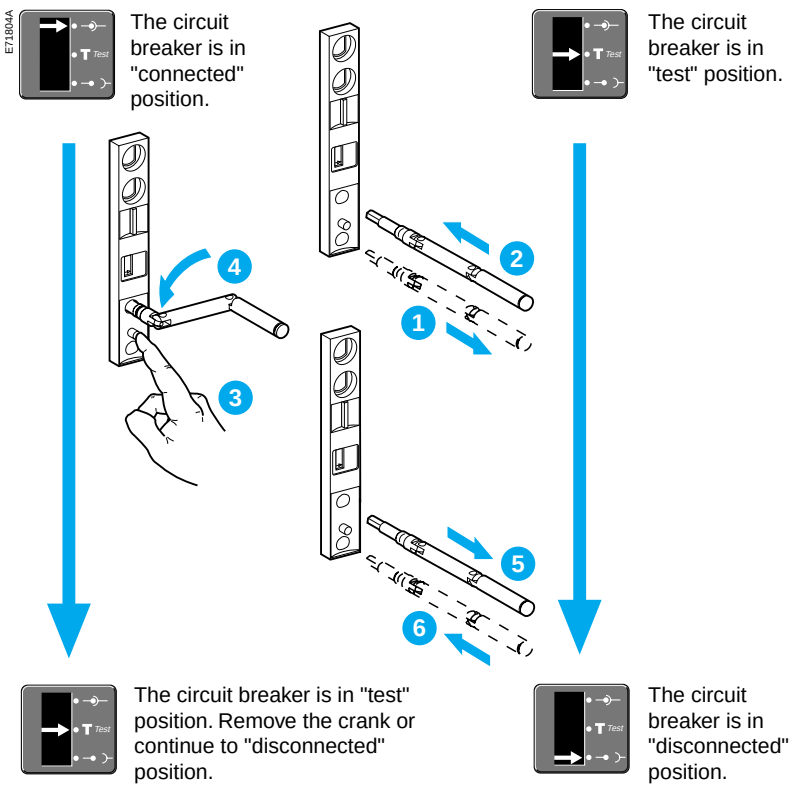


The indicator on the front signals the position of the circuit breaker in the chassis.

Racking the circuit breaker from the "disconnected" to "test" position, then to "connected" position



Withdrawing the circuit breaker from the "connected" to "test" position, then to "disconnected" position



Note.
These operations require that all chassis-locking functions be disabled (see page 24).

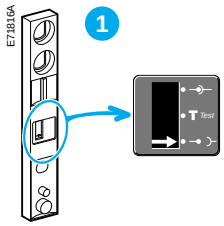
Locking in the "disconnected" position
Using one to three padlocks

Combination of locking systems.
It is possible to lock the device on the chassis in the "disconnected" position using:
- *one to three padlocks*
- *one or two keylocks*
- *a combination of both.*

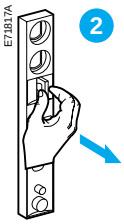
Locking

Use padlocks with a maximum shackle diameter of 5 to 8 millimetres.

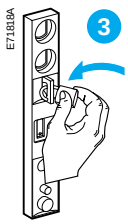
Device in "disconnected" position.



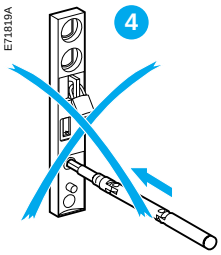
Pull out the tab.



Insert the shackle (max. diameter 5 to 8 mm) of the padlock(s).

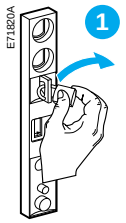


The crank cannot be inserted.

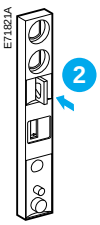


Unlocking

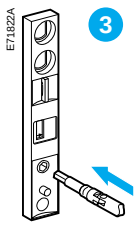
Remove the padlock(s).



Release the tab.



The crank can be inserted.

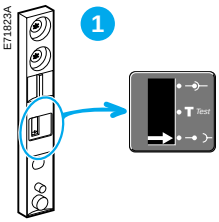


Note.
Padlocks and keylocks may be used together.
If specified when ordering the chassis, this locking function may be adapted to operate in all positions ("connected", "test" and "disconnected"), instead of in "disconnected" position alone.

Using one or two keylocks

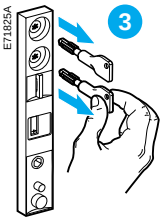
Locking

Device in "disconnected" position.

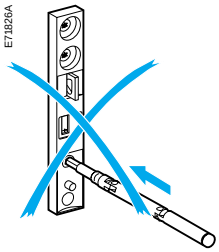


Turn the key(s).

Remove the key(s).

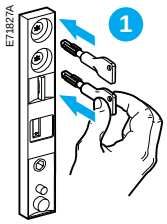


The crank cannot be inserted.



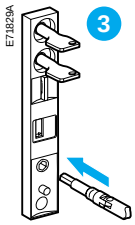
Unlocking

Insert the key(s).



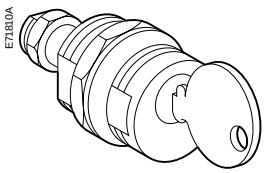
Turn the key(s).

The crank can be inserted.

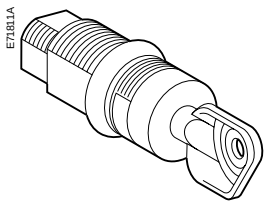


Three types of keylocks are available.

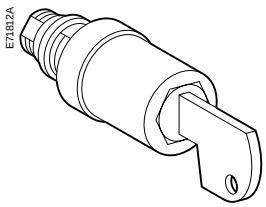
RONIS



PROFALUX



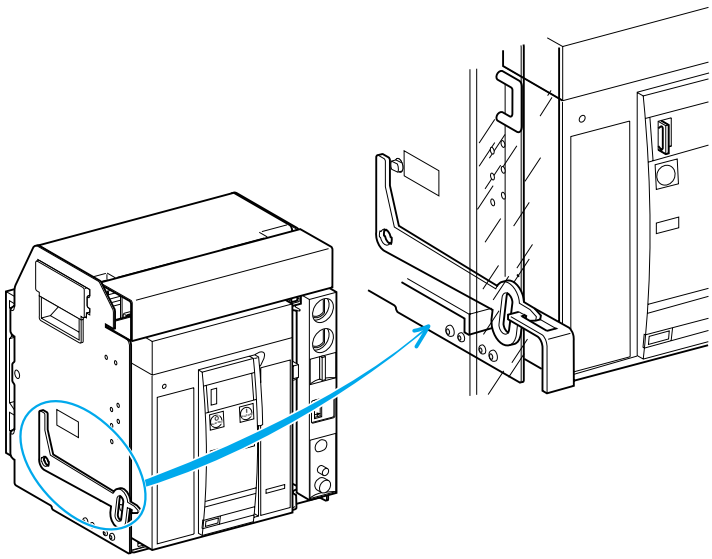
CASTELL



Locking the switchboard door

The locking device is installed on the left or right-hand side of the chassis.
■ when the device is in "connected" or "test" position, the latch is lowered and the door is locked.
■ when the device is in "disconnected" position, the latch is raised and the door is unlocked.

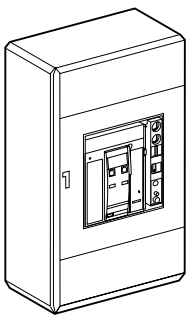
E71830A



Disabling door opening

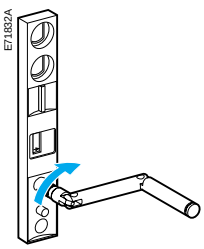
Close the door.

E71831A



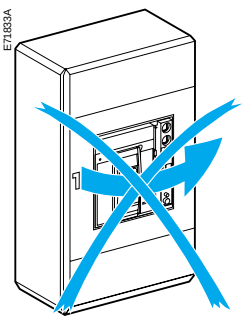
Turn the crank until the device is in "test" or "connected" position.

E71832A



The door is locked.

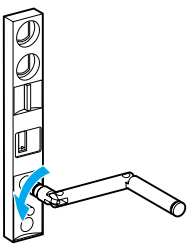
E71833A



Enabling door opening

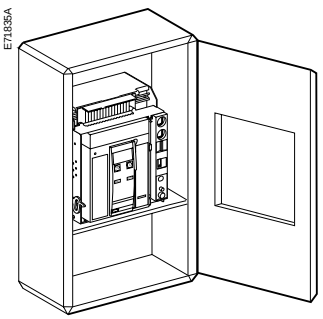
Turn the crank until the device is in "disconnected" position.

E71834A

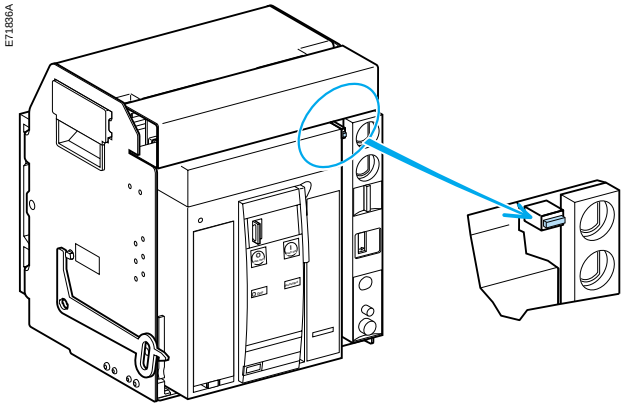


The door is unlocked.

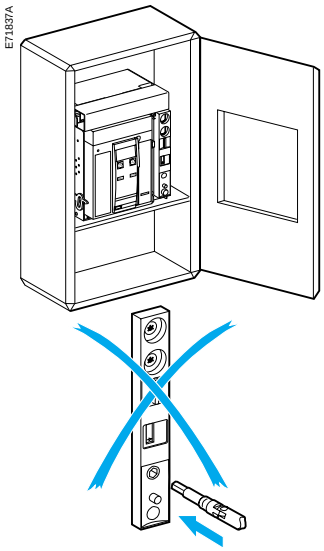
E71835A



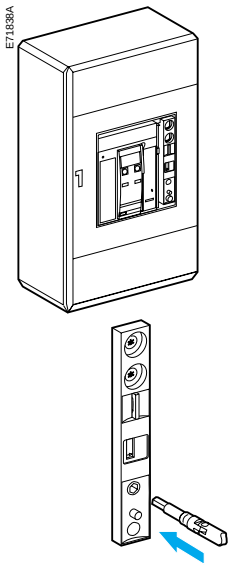
Locking the device when the door is open



When the door is open,
the crank cannot be inserted.



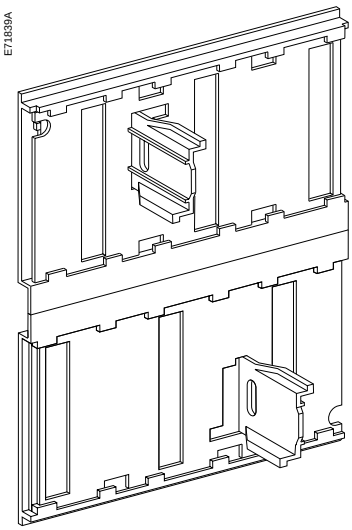
When the door is closed,
the crank can be inserted.



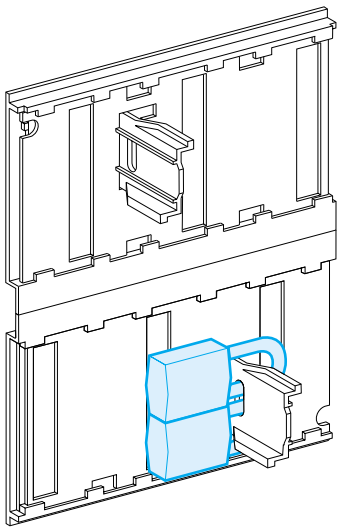
Locking the safety shutters

Four locking possibilities inside the chassis using one or two padlocks (maximum shackle diameter 5 to 8 mm) for each shutter

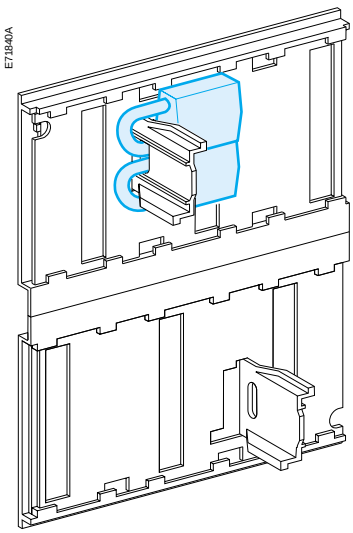
Top and bottom shutters not locked.



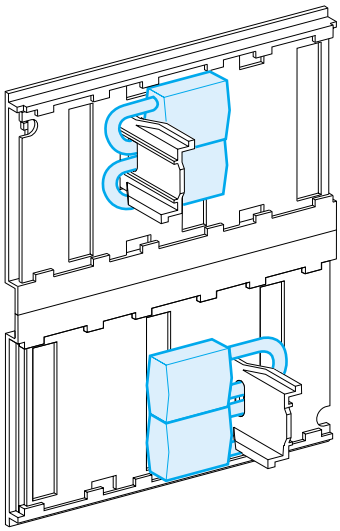
Top shutter not locked.
Bottom shutter locked.



Top shutter locked.
Bottom shutter not locked.



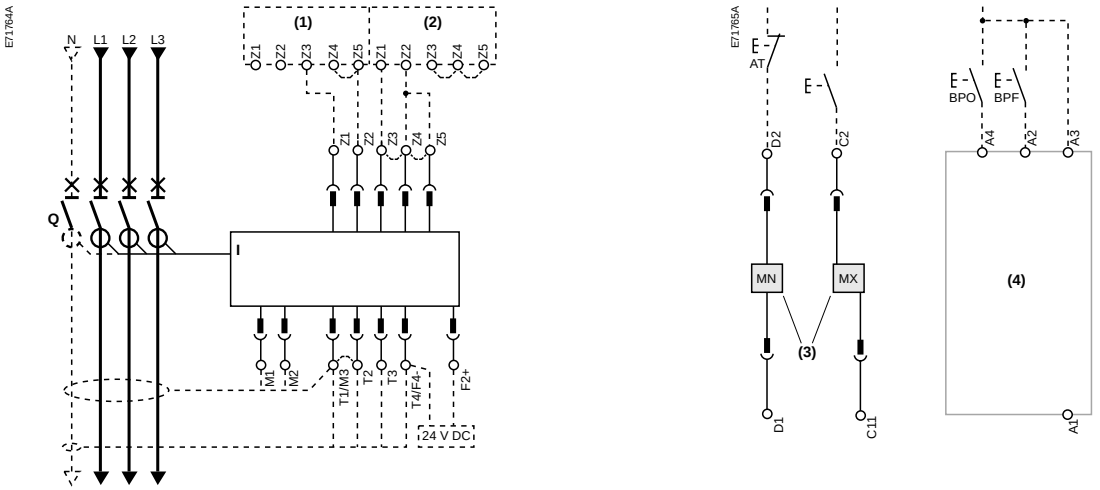
Top and bottom shutters locked.



Electrical diagrams
Fixed and withdrawable devices

The diagram is shown with circuits de-energised, all devices open, connected and charged and relays in normal position.

Power | **Control unit** | **Remote operation**



Control unit

Com		UC1		UC2		UC3
E5	E6	Z5	M1	M2	M3	F2+
E3	E4	Z3	Z4	T3	T4	
E1	E2	Z1	Z2	T1	T2	F1 –

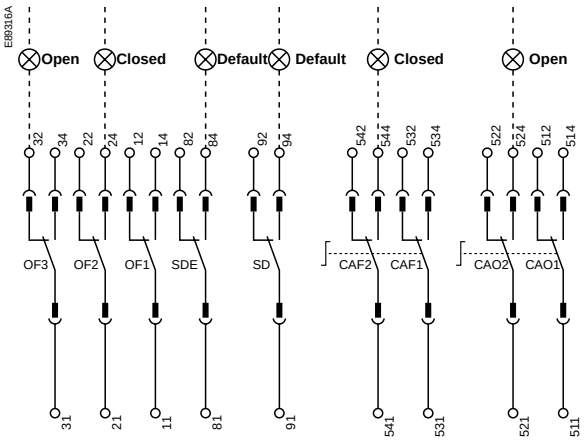
Remote operation

CAF2 / CAF1				SDE	SD
D2	/	C12		A4	A2
					B4
D1	/	C11			A1

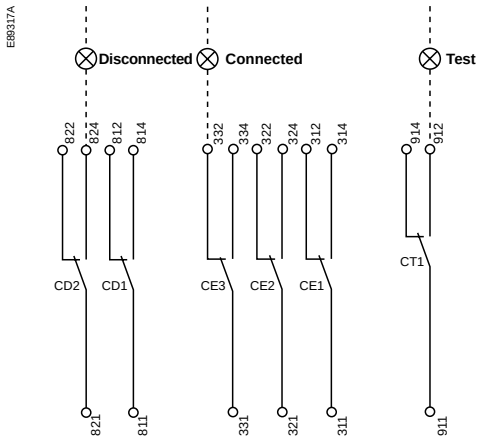
A	P	H	Control unit	Remote operation
■	■	■	**Com**: E1-E6 communication	**SDE** : Fault-trip indication contact (supplied as standard)
■	■	■	**UC1** : Z1-Z5 zone selective interlocking; Z1 = ZSI = ZSI OUT SOURCE Z2 = ZSI OUT; Z3 = ZSI IN SOURCE Z4 = ZSI IN ST (short time) Z5 = ZSI IN GF (ground fault) M1 = Vigi module input (Micrologic 7)	**SD** : Trip-indication contact (supplied as standard)
				MN : Undervoltage release **or** **MX** : Shunt release (standard or communicating)
■	■	■		
■	■	■	**UC2** : T1, T2, T3, T4 = external neutral; M2, M3 = Vigi module input (Micrologic 7)	
■	■	■		
■	■	■	**UC3** : F2+, F1- external 24 V DC power supply VN external voltage connector	
	■	■		

A: *Digital ammeter*
P: *A + power meter + programmable protection*
H: *P + harmonics*

Indication contacts



Chassis contacts



Indication contacts

CAF1	CAF2	SDE	SD	CAO2	CAO1	OF3	OF2	OF1
544	534	84	94	544	514	34	24	14
542	532	82	92	522	512	32	22	12
542	531	81	91	521	511	31	21	11

Chassis contacts

CD2	CD1	CE3	CE2	CE1	CT1
824	814	334	324	314	914
822	812	332	322	312	912
821	811	331	321	311	911

Indication contacts

OF3 / OF2 / OF1: ON/OFF indication contacts

Chassis contacts

CD2: Disconnected-
CD1 position contacts

CE3: Connected-
CE2 position contacts
CE1

CT1: Test-position contacts

Key:

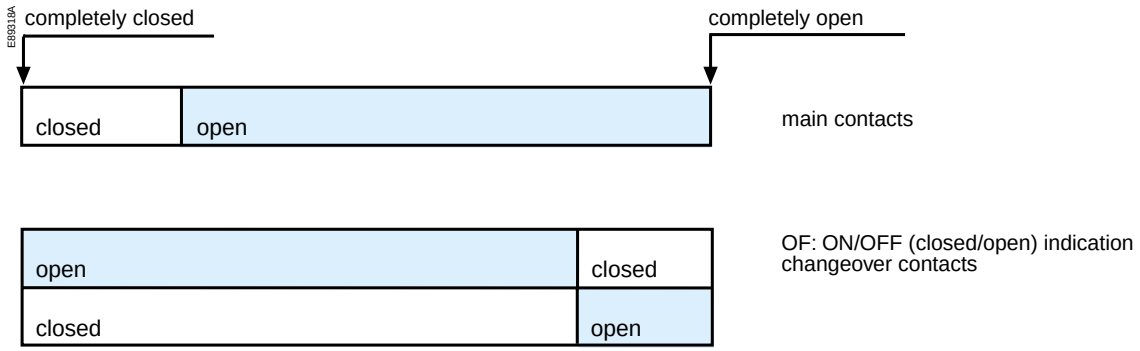
Withdrawable device only

XXX *SDE1, OF1, OF2, OF3, OF4 supplied as standard*

Interconnected connections
(only one wire per connection point)

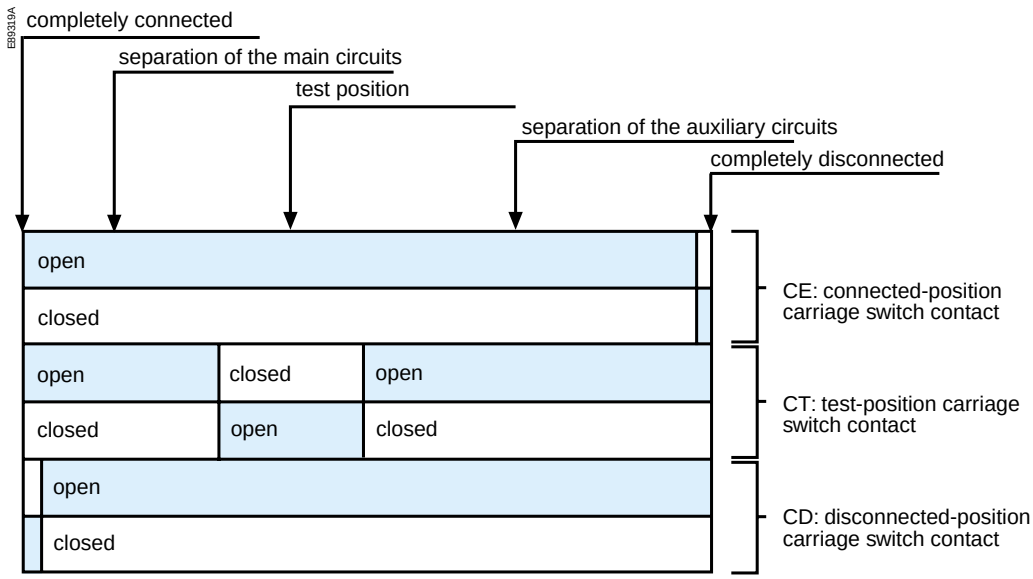
Device

The ON/OFF indication contacts signal the status of the device main contacts.



Chassis

The carriage switches indicate the "connected", "test" and "disconnected" positions.



Electrical characteristics of contacts and control auxiliaries

Device indication contacts

designation	type	standard, minimum current 100 mA 24 V			low level, minimum current 2 mA 15 V		
OF ON/OFF contact	3 changeover contacts breaking capacity (AC 12 / DC 12 as per 947-5-1)	V AC	240/380	6 A (rms)	V AC	24/48	5 A (rms)
			480	6 A (rms)		240	5 A (rms)
			690	6 A (rms)		380	5 A (rms)
		V DC	24/48	2.5 A	V DC	24/48	5 / 2.5 A
			125	0.5 A		125	0.5 A
			250	0.3 A		250	0.3 A
SD fault indication	1 changeover contact breaking capacity (AC 12 / DC 12 as per 947-5-1)	V AC	240/380	6 A (rms)	V AC	24/48	5 A (rms)
			480	6 A (rms)		240	5 A (rms)
			690	6 A (rms)		380	5 A (rms)
		V DC	24/48	2.5 A	V DC	24/48	5 / 2.5 A
			125	0.5 A		125	0.5 A
			250	0.3 A		250	0.3 A
SDE fault-trip indication for device with motor mechanism	1 changeover contact breaking capacity (AC 12 / DC 12 as per 947-5-1)	V AC	240/380	6 A (rms)	V AC	24/48	5 A (rms)
			480	6 A (rms)		240	5 A (rms)
			690	6 A (rms)		380	5 A (rms)
		V DC	24/48	2.5 A	V DC	24/48	5 / 2.5 A
			125	0.5 A		125	0.5 A
			250	0.3 A		250	0.3 A
CAO early-break switch for device with rotary handle	2 changeover contacts breaking capacity (AC 12 / DC 12 as per 947-5-1)	V AC	240/380	6 A (rms)	V AC	24/48	5 A (rms)
			480	6 A (rms)		240	5 A (rms)
			690	6 A (rms)		380	5 A (rms)
		V DC	24/48	2.5 A	V DC	24/48	5 / 2.5 A
			125	0.5 A		125	0.5 A
			250	0.3 A		250	0.3 A
CAF early-make switch for device with rotary handle	2 changeover contacts breaking capacity (AC 12 / DC 12 as per 947-5-1)	V AC	240/380	6 A (rms)	V AC	24/48	5 A (rms)
			480	6 A (rms)		240	5 A (rms)
			690	6 A (rms)		380	5 A (rms)
		V DC	24/48	2.5 A	V DC	24/48	5 / 2.5 A
			125	0.5 A		125	0.5 A
			250	0.3 A		250	0.3 A

Device control auxiliaries

designation	power supply	threshold	consumption	response time
MX opening release	V AC: 50/60 Hz: 24/48 - 100/130 - 200/250 - 277 - 380/480 V DC: 12 - 24/30 - 48/60 - 100/130 - 200/250	0.7 to 1.1 Un	pick-up: 200 VA or W (80 ms) hold: 4.5 VA or W	device at Un: 50 ms ± 10
MN undervoltage release	V AC: 50/60 Hz: 24/48 - 100/130 - 200/250 - 380/480 V DC: 24/30 - 48/60 - 100/130 - 200/250	open: 0.35 to 0.7 Un close: 0.85 Un	pick-up: 200 VA or W (80 ms) hold: 4.5 VA or W	device at Un: 40 ms ± 10
Delay unit for undervoltage release	V AC: 50/60 Hz V DC not adjustable: 100/130 - 200/250 V DC adjustable: 48/60 - 100/130 - 200/250 - 380/480	open: 0.35 to 0.7 Un close: 0.85 Un	200 VA	device at Un: not adjustable: 0.25 s adjustable: 0.5 - 0.9 - 1.5 - 3 s

Motor mechanism

designation	power supply	threshold	consumption and motor overcurrent	recharge time and operating rate
Motor mechanism	V AC: 50/60 Hz: 48/60 - 100/130 - 200/240 - 277 - 400/440 - 480 V DC: 24/30 - 48/60 - 100/125 - 200/250	0.85 to 1.1 Un	consumption: 180 VA or W overcurrent: 2 to 3 In for 0.1 s	3 seconds max. 3 cycles per minute

"Connected", "test" and "disconnected" position carriage switches

designation	type	standard, minimum current 100 mA 24 V			low level, minimum current 2 mA 15 V		
CE, CT, CD	3 changeover contacts breaking capacity (AC 12 / DC 12 as per 947-5-1)	V AC	240	8 A (rms)	V AC	24/48	5 A (rms)
			380	8 A (rms)		240	5 A (rms)
			480	8 A (rms)		380	5 A (rms)
			690	6 A (rms)			
		V DC	24/48	2.5 A	V DC	24/48	2.5 A
			125	0.8 A		125	0.8 A
			250	0.3 A		250	0.3 A

Electrical characteristics of contacts and control auxiliaries

Wiring of control auxiliaries

Under pick-up conditions, the level of consumption is approximately 150 to 200 VA. Consequently, for low supply voltages (12, 24, 48 V), cables must not exceed a maximum length determined by the supply voltage and the cross-section of the cables.

Indicative values for maximum cable lengths (in meters)

		12 V		24 V		48 V	
		2.5 mm²	1.5 mm²	2.5 mm²	1.5 mm²	2.5 mm²	1.5 mm²
MN	100% source voltage	—	—	58	36	280	165
	85% source voltage	—	—	16	10	75	45
MX-XF	100% source voltage	21	12	115	70	550	330
	85% source voltage	10	6	75	44	350	210

Note.
The indicated length is that for each of the two supply wires.

Start-up operations
Procedure

These operations must be carried out before using a device for the first time.

A general check of the device takes only a few minutes and avoids any risk of mistakes due to errors or negligence.
A general check must be carried out:
- prior to initial use
- following an extended period during which the device is not used.

A check must be carried out with the entire switchboard de-energised.
In switchboards with compartments, only those compartments that may be accessed by the operators must be de-energised.

Electrical tests

Insulation and dielectric-withstand tests must be carried out immediately after delivery of the switchboard. These tests are precisely defined by international standards and must be directed and carried out by a qualified expert.

Prior to running the tests, it is absolutely necessary to:
- disconnect all the electrical auxiliaries of the device (MCH, MX, MN)
- remove the long-time rating plug on the 7.0 A control units.

Removal of the rating plug disconnects the voltage measurement input.

Switchboard inspection

Check that the devices are installed in a clean environment, free of any installation scrap or items (tools, electrical wires, broken parts or shreds, metal objects, etc.).

Conformity with the installation diagram

Check that the devices conform with the installation diagram:
- breaking capacities indicated on the rating plates
- identification of the control unit (type, rating)
- presence of any optional functions (motor mechanism)
- protection settings (long time, short time, instantaneous, ground fault)
- identification of the protected circuit marked on the front of each device.

Condition of connections and auxiliaries

Check device mounting in the switchboard and the tightness of power connections.
Check that all auxiliaries and accessories are correctly installed:
- electrical auxiliaries
- terminal blocks
- connections of auxiliary circuits.

Operation

Check the mechanical operation of the devices:
- opening of contacts
- closing of contacts.

Check on the control unit

Check the control unit of each circuit breaker using the respective user manuals.

What to do when the circuit breaker trips?

Note the fault

Faults are signalled locally and remotely by the indicators and auxiliary contacts installed on devices (depending on each configuration). See page 32 in this manual and the user manual of the control unit for information on the fault indications available with your circuit breaker.

Identify the cause of tripping

A circuit must never be reclosed (locally or remotely) before the cause of the fault has been identified and cleared.

Depending on the type of fault and the criticality of the loads, a number of precautionary measures must be taken, in particular the insulation and dielectric tests on a part of or the entire installation. These checks and test must be directed and carried out by qualified personnel.

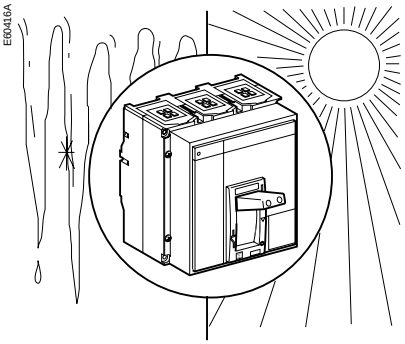
Inspect the circuit breaker following a short-circuit

- check the tightness of connections (see the device installation manual)
- check the disconnecting-contact clusters.

Reset the circuit breaker

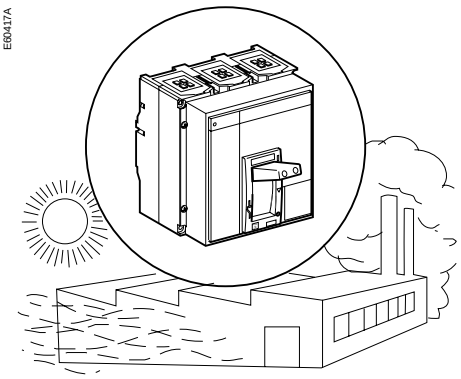
The circuit breaker can be reset locally or remotely. See pages 5, 9 and 15 in this manual for information on how the device can be reset.

Compact operating conditions


E60416A

Ambient temperature

Compact devices can operate under the following temperature conditions:
- the electrical and mechanical characteristics are stipulated for an ambient temperature of -5° C to +70° C
- circuit-breaker closing is guaranteed down to -35° C
- Compact (without the control unit) can be stored in an ambient temperature of -40° C to +85° C
- the control unit can be stored in an ambient temperature of -25° C to +85° C.

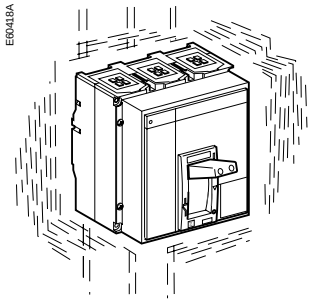

E60417A

Extreme atmospheric conditions

Compact devices have successfully passed the tests defined by the following standards for extreme atmospheric conditions:
- IEC 68-2-1: dry cold at -55° C
- IEC 68-2-2: dry heat at +85° C
- IEC 68-2-30: damp heat (temperature +55° C, relative humidity 95%)
- IEC 68-2-52 level 2: salt mist.

Compact devices can operate in the industrial environments defined by standard IEC 947 (pollution degree up to 3).

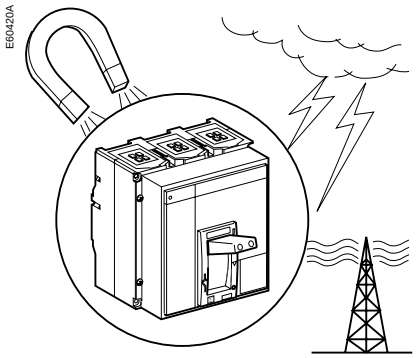
It is nonetheless advised to check that the devices are installed in suitably cooled switchboards without excessive dust.


E60418A

Vibrations

Compact devices resist electromagnetic or mechanical vibrations.
Tests are carried out in compliance with standard IEC 68-2-6 for the levels required by merchant-marine inspection organisations (Veritas, Lloyd's, etc.):
- 2 to 13.2 Hz: amplitude ±1 mm
- 13.2 to 100 Hz: constant acceleration 0.7 g.

Excessive vibration may cause tripping, breaks in connections or damage to mechanical parts.


E60420A

Electromagnetic disturbances

Compact devices are protected against:
□ overvoltages caused by devices that generate electromagnetic disturbances
□ overvoltages caused by an atmospheric disturbance or by a distribution-system outage (e.g. failure of a lighting system)
□ devices emitting radio waves (radios, walkie-talkies, radar, etc.)
□ electrostatic discharges produced by users.

Compact devices have successfully passed the electromagnetic-compatibility tests (EMC) defined by the following international standards:
■ IEC 947-2, appendix F
■ IEC 947-2, appendix B (trip units with earth-leakage function).

The above tests guarantee that:
■ no nuisance tripping occurs
■ tripping times are respected.

Cleaning

□ non-metallic parts:
never use solvent, soap or any other cleaning product. Clean with a dry cloth only
□ metal parts:
clean with a dry cloth whenever possible. If solvent, soap or any other cleaning product must be used, make sure that it does not come into contact with non-metallic parts.

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