

Low voltage electrical distribution

Compact NS

Circuit breakers and switch-disconnectors
from 630 to 1600 A

User manual

10/2017



Contents

| | |
|--|-----------|
| Discovering Compact NS | 3 |
| Safety information | 3 |
| Rating plate | 4 |
| Manually operated Compact NS with a toggle | 5 |
| Components | 5 |
| Opening, closing, reset | 6 |
| Testing the device | 7 |
| Locking the toggle | 8 |
| Manually operated Compact NS with a rotary handle | 9 |
| Components | 9 |
| Opening, closing, reset | 10 |
| Testing the device | 11 |
| Locking the rotary handle | 12 |
| Locking the switchboard door | 14 |
| Electrically operated Compact NS | 15 |
| Components | 15 |
| Opening and closing the device | 16 |
| Locking the controls | 18 |
| Compact NS chassis | 20 |
| Components | 20 |
| Matching a device with its chassis | 21 |
| Racking | 22 |
| Racking-in the device | 23 |
| Racking-out the device | 24 |
| Locking in the "disconnected" position | 25 |
| Locking the switchboard door | 27 |
| Locking the device when the door is open | 28 |
| Locking the safety shutters | 29 |
| Electrical auxiliaries | 30 |
| Electrical diagrams | 30 |
| Operation | 36 |
| Operating the Compact NS | 37 |
| Start-up | 37 |
| Environmental conditions | 40 |
| What to maintain and why | 42 |
| Maintaining the Compact NS during operation | 48 |
| What to do when the circuit breaker trips | 53 |
| Troubleshooting and solutions | 55 |

Important notes

Restricted liability

Electrical equipment should be serviced and maintained by qualified personnel only. No responsibility is assumed by Schneider Electric for any consequence arising out of the use of this manual. This document is not intended as an instruction manual for untrained persons.

Device operation

The user is responsible for checking that the rated characteristics of the device are suitable for its application. The user is responsible for reading and following the device operating and installation instructions before attempting to commission or maintain it. Failure to follow these instructions can affect device operation and constitute a hazard for people and property.

Safety symbols and messages

Read these instructions carefully and look at the equipment to become familiar with the device before trying to install, operate, service or maintain it. The following special messages may appear throughout this bulletin or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.

Risk of electric shock



ANSI symbol



IEC symbol

The addition of either symbol to a "Danger" or "Warning" safety label on a device indicates that an electrical hazard exists, which will result in death or personal injury if the instructions are not followed.

Safety alert



This is the safety alert symbol. It is used to alert you to potential personal injury hazards and prompt you to consult the manual. Obey all safety instructions that follow this symbol in the manual to avoid possible injury or death.

Safety messages

▲ DANGER

DANGER indicates an imminently hazardous situation, which, if not avoided, **will result in** death, serious injury or property damage.

▲ WARNING

WARNING indicates an imminently hazardous situation, which, if not avoided, **could result in** death, serious injury or property damage.

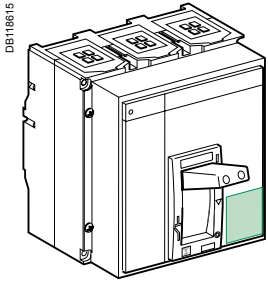
▲ CAUTION

CAUTION indicates a potentially hazardous situation which, if not avoided, **could result in** minor or moderate injury or property damage.

NOTICE

NOTICE is used to address practices not related to physical injury.

Manually operated device



DB118615

DB-403224

Compact NS630b N X1

Ui 800 V Uimp 8 kV

| Ue (V) | Icu(kA) | Ics(kA) |
|-----------|---------|---------|
| 220/240 ~ | 85 | 50 |
| 380/415 ~ | 50 | 37 |
| 440 ~ | 50 | 50 |
| 500/525 ~ | 40 | 40 |
| 660/690 ~ | 30 | 30 |

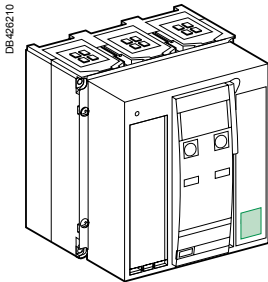
Icw 19.2kA / 1s cat B

64045

50/60Hz IEC 60947-2

- Rated current
- Performance level
- Suitability for isolation
- Type of device: circuit breaker or switch-disconnector
- Ui - rated insulation level
- Uimp - rated impulse withstand voltage
- Ics - rated service breaking capacity
- Icu - rated ultimate breaking capacity
- Ue - rated operational voltage
- Icw - rated short-time withstand current
- Standard

Electrically operated device



DB-403210

DB-403225

Compact NS630b N X1

Ui 800 V Uimp 8 kV

| Ue (V) | Icu(kA) | Ics(kA) |
|-----------|---------|---------|
| 220/240 ~ | 50 | 37 |
| 380/415 ~ | 50 | 37 |
| 440 ~ | 50 | 37 |
| 500/525 ~ | 40 | 30 |
| 660/690 ~ | 30 | 22 |

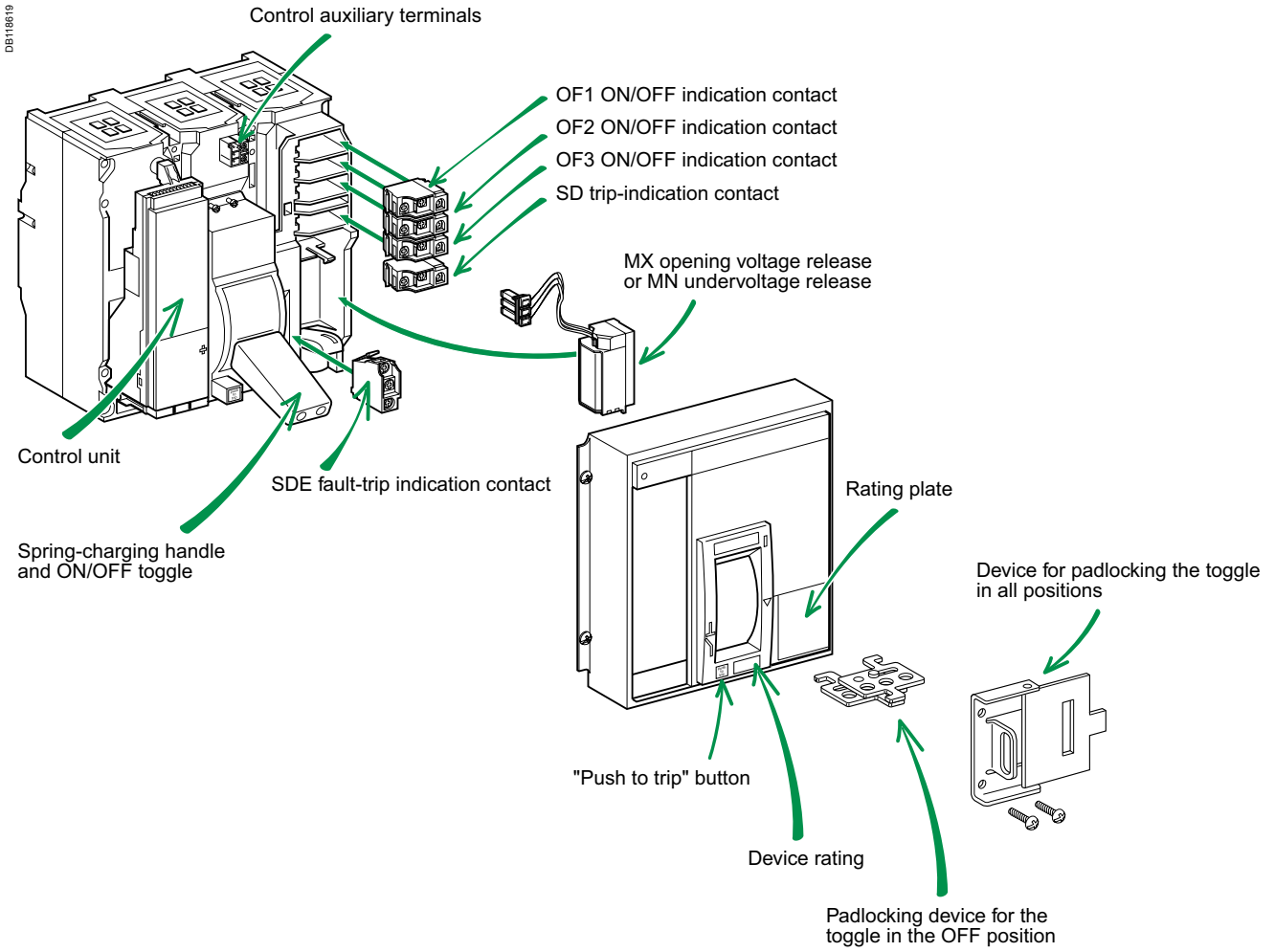
Icw 19.2kA / 1s cat B

33041

50/60Hz IEC 60947-2

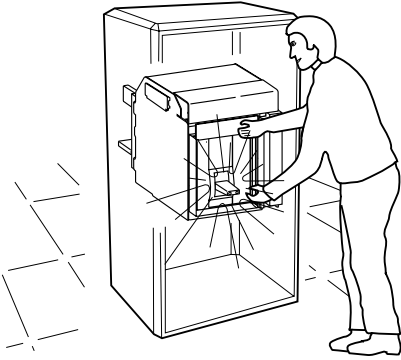
- Rated current
- Performance level
- Suitability for isolation
- Type of device: circuit breaker or switch-disconnector
- Ui - rated insulation level
- Uimp - rated impulse withstand voltage
- Ics - rated service breaking capacity
- Icu - rated ultimate breaking capacity
- Ue - rated operational voltage
- Icw - rated short-time withstand current
- Standard

Note:
For further detailed presentation of the Compact NS offer, refer to the Compact NS catalogue (LVPED211021EN).



Opening, closing, reset with a toggle

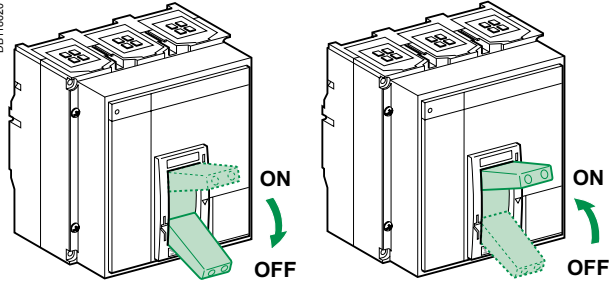
E60436A



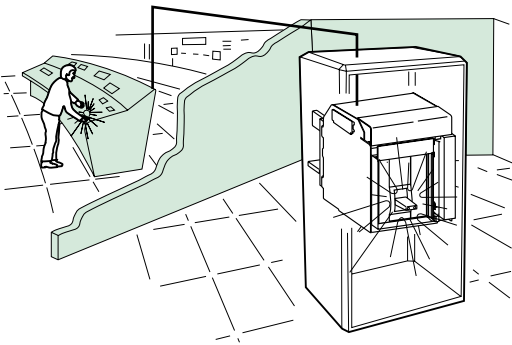
Local opening and closing

■ OFF: breaker open, ON: breaker closed.

DB118620



DB118621



Remote opening

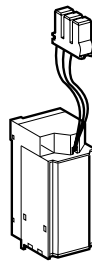
Use either:

- 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.

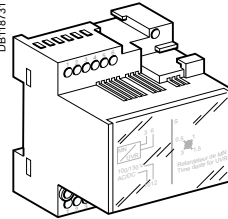
MX, MN

E718605A



MN delay unit

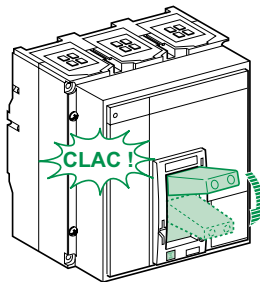
DB118731



Resetting the device following a trip

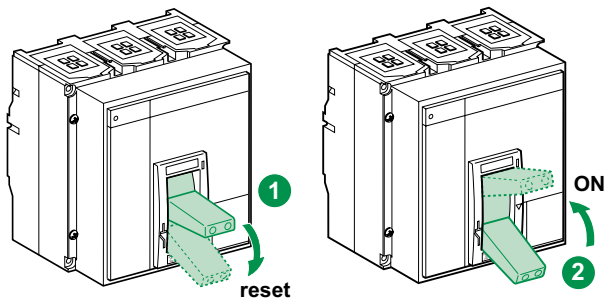
- The device trips.

DB118622

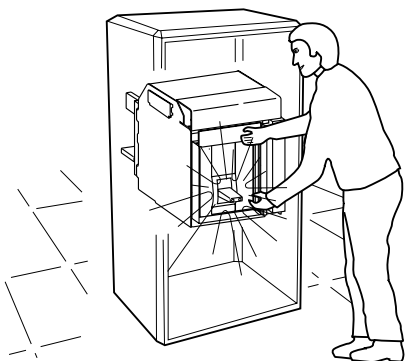


- Follow the recommendations for what to do when the circuit breaker trips (see page 53).
- Reset the device, then close it again.

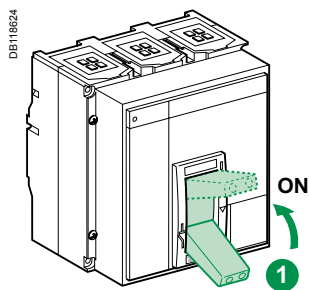
DB118623



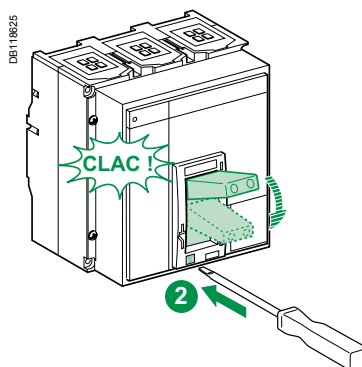
EG0439A



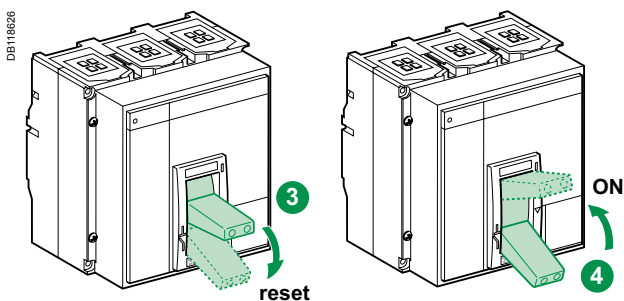
■ Close the device.



■ Press the "Push-to-trip" button.

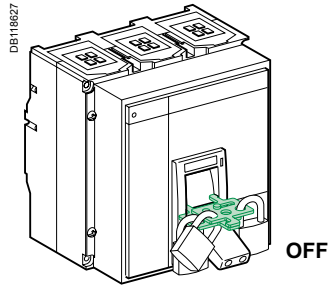
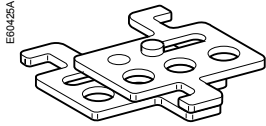


■ Push the toggle down to reset the device, then back up to close it again.

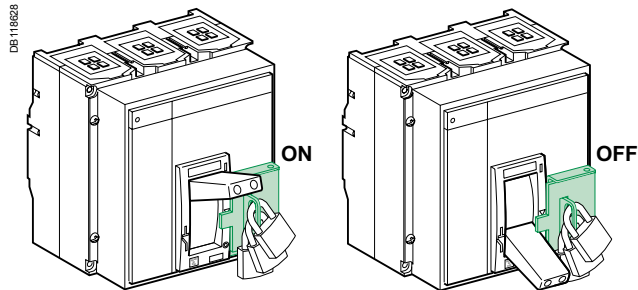
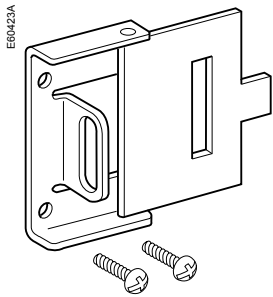


Locking the toggle

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



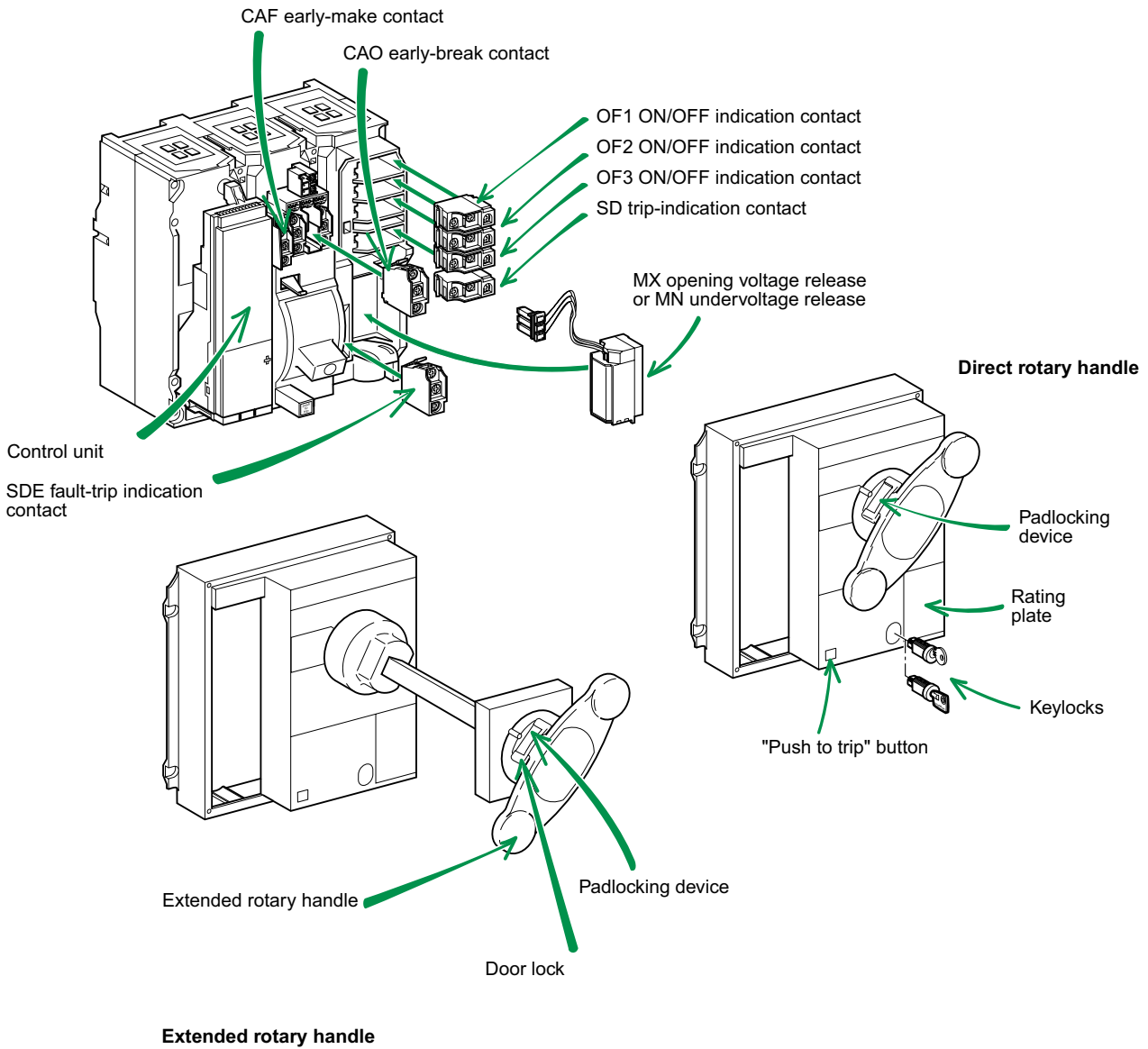
Locking the toggle in the ON or OFF position using one to three padlocks (shackle diameter 5 to 8 mm)

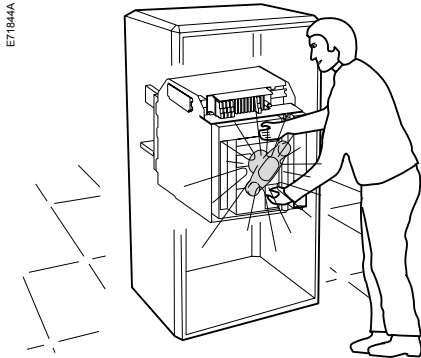


Note:

The circuit breaker trips even when locked in the ON position.

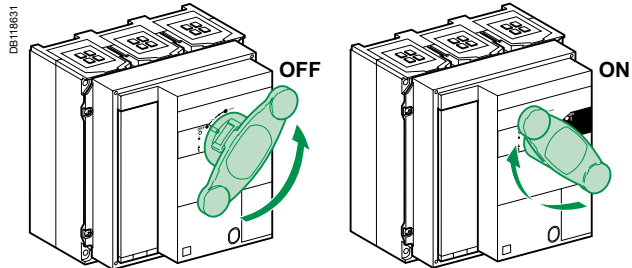
DB116630





Local opening and closing

- OFF: breaker open, ON: breaker closed.

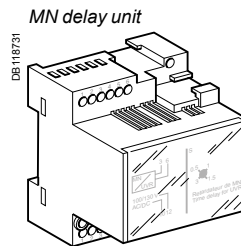
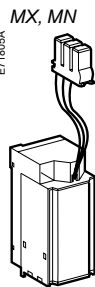
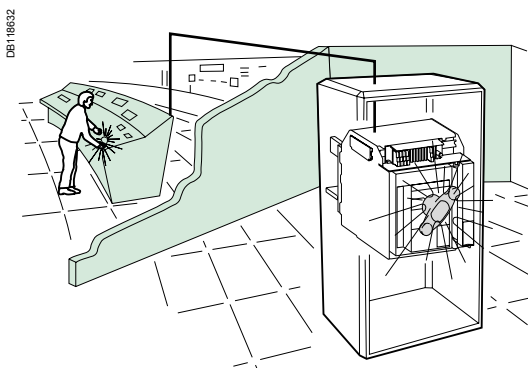


Remote opening

Use one of the following:

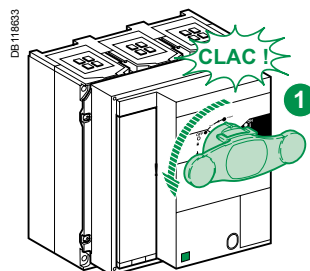
- an MX opening release
- an MN undervoltage release
- a delayed MN undervoltage release.

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

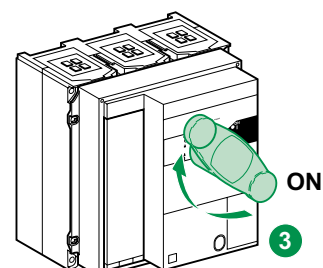
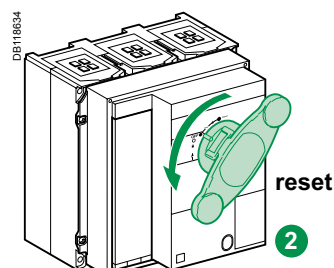


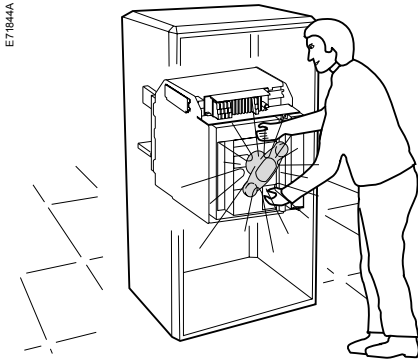
Resetting the device following a trip

- The device trips.

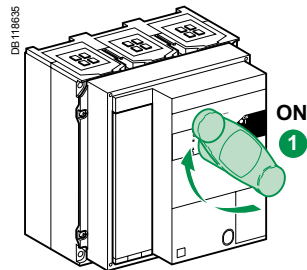


- Follow the recommendations for what to do when the circuit breaker trips (see page 53).
- Reset the device, then close it again.

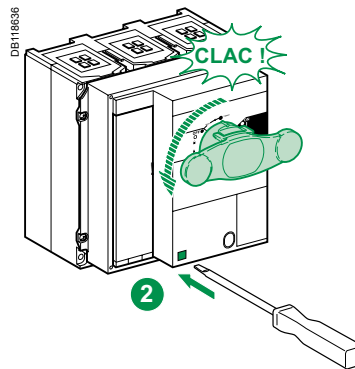




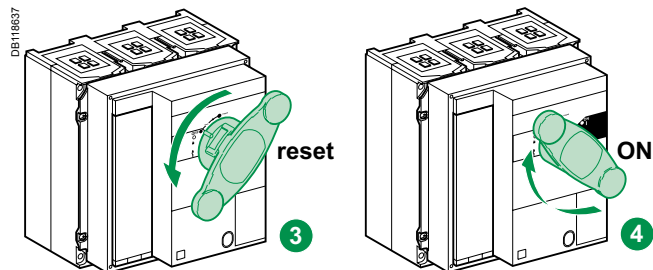
■ Close the device.



■ Press the "Push-to-trip" button.



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

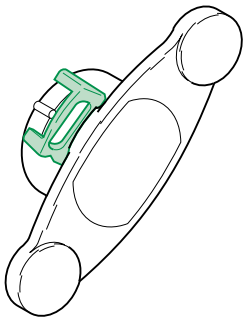


Important:

In the case of circuit breaker with direct rotary handle installed through door, the opening of the door is only possible when the rotary handle is in ON or OFF position.

Locking the rotary handle with padlocks

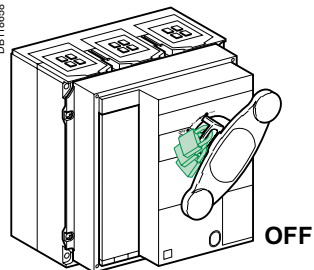
DB118639



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.

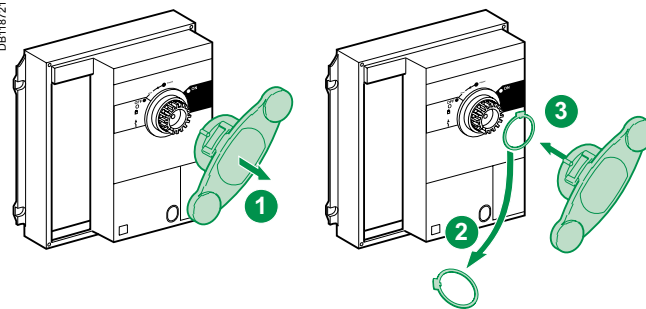
DB118658



OFF

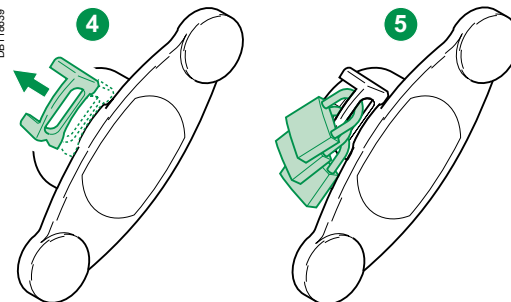
- Remove the ring as indicated below to enable locking in both the ON and OFF positions.

DB118721



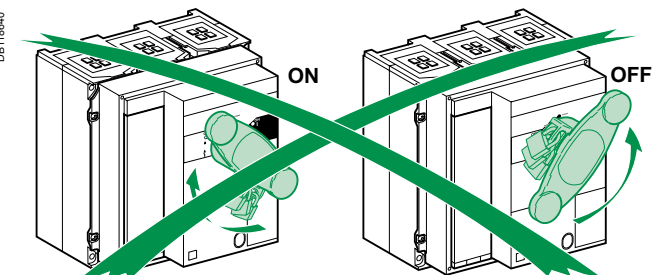
- Lock the handle.

DB118639



- The controls are locked.

DB118640



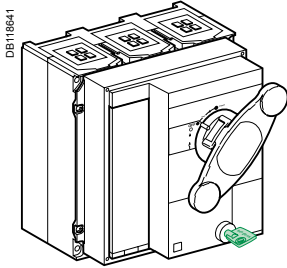
ON

OFF

Note:
The circuit breaker trips even when locked in the ON position.

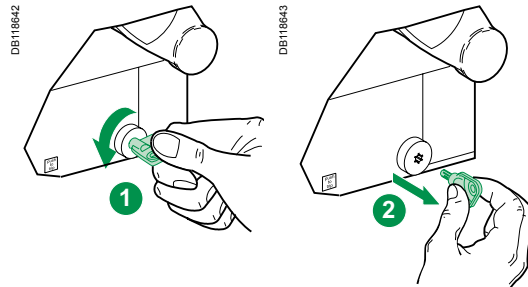
Note:
The rotary handle can be equipped for locking by both padlocks and keylocks.

Locking the rotary handle with keylocks

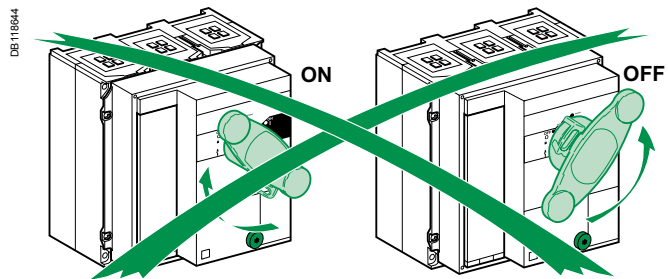


Locking the direct rotary handle in all positions using a keylock

■ Lock.



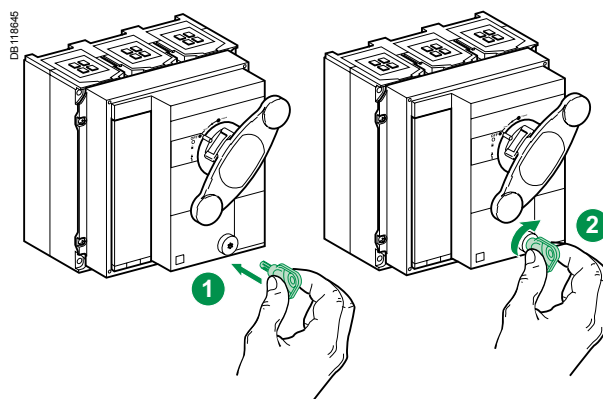
■ The controls are locked.



Note:

The circuit breaker trips even when locked in the ON position.

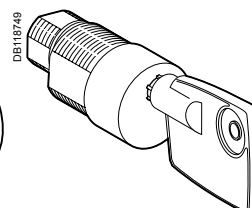
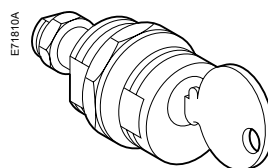
■ Unlock.



Two types of keylocks can be installed

RONIS

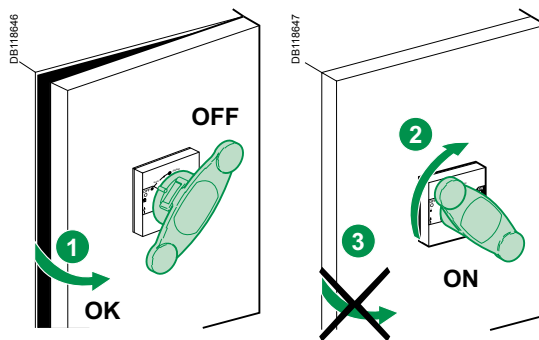
PROFALUX



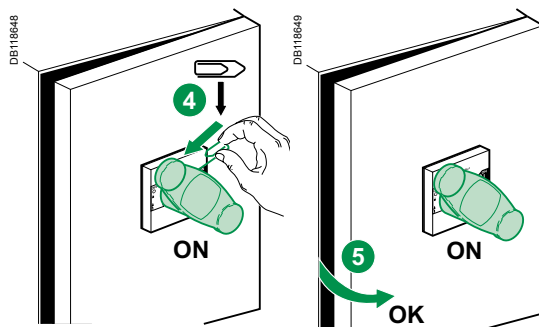
Locking the switchboard door

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

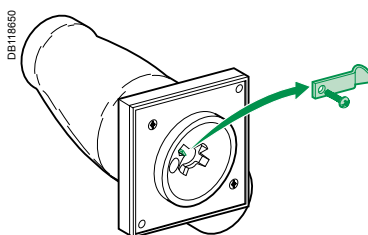
■ In the standard configuration, the door cannot be opened when the rotary handle is set to the ON position.



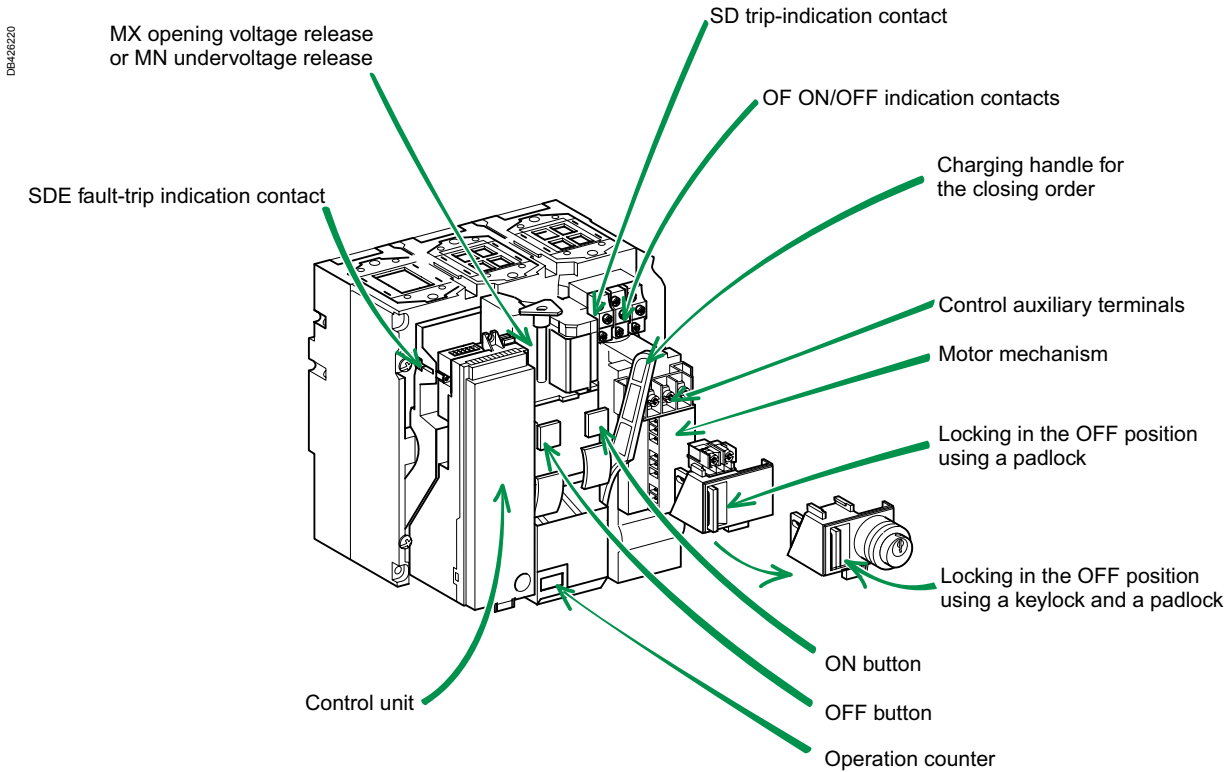
■ It is possible, however, to defeat the door lock.



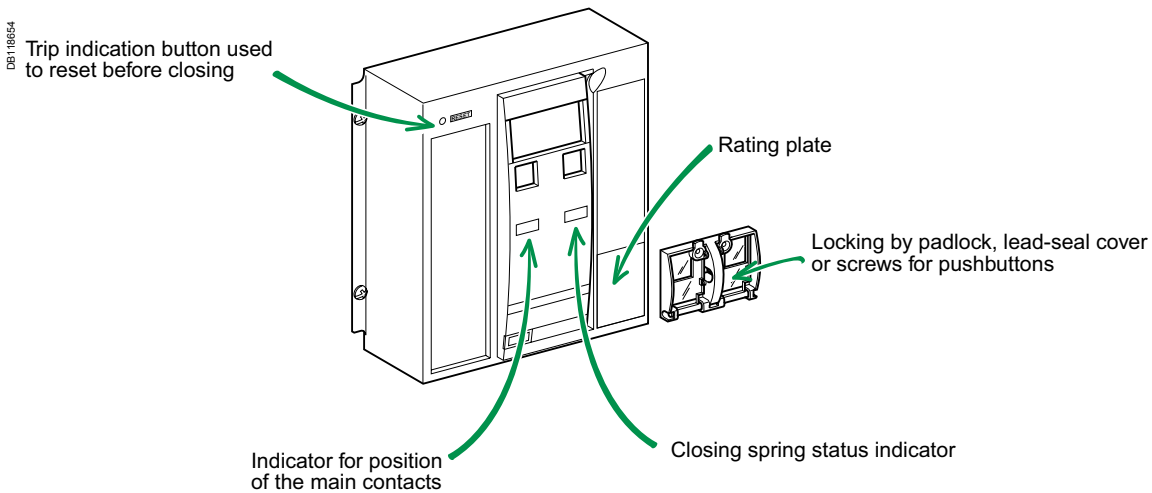
■ The door-lock function may be permanently disabled by removing the lock.



Fixed device



Front

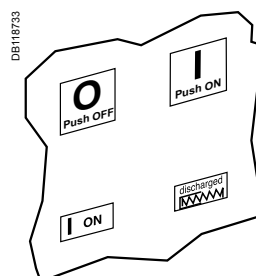
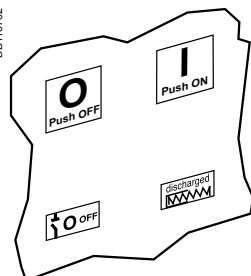


Local opening and closing

The electrically operated device allows local opening and closing via the buttons on the front of the device.

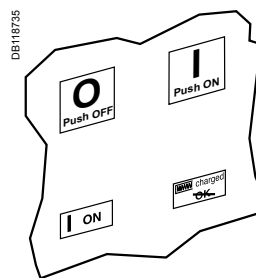
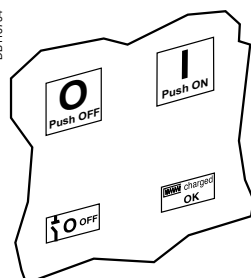
Device open (OFF),
discharged

Device closed (ON), discharged



Device open (OFF), charged
and ready to close

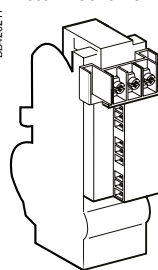
Device closed (ON), charged and
not ready to close



Remote opening and closing

Compact NS is equipped as standard with a motor mechanism, allowing remote opening and closing of the device via opening and closing releases.

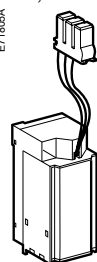
Motor mechanism



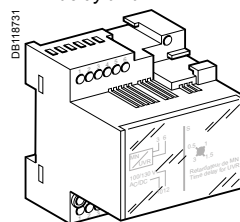
Remote opening options

An MX opening release or an MN undervoltage release can be added as an option to provide a second remote opening function. The MN undervoltage release can be delayed by adding a delay unit.

MX, MN



MN delay unit



DB426219

DB118656

DB118657

DB118732

DB118733

DB118734

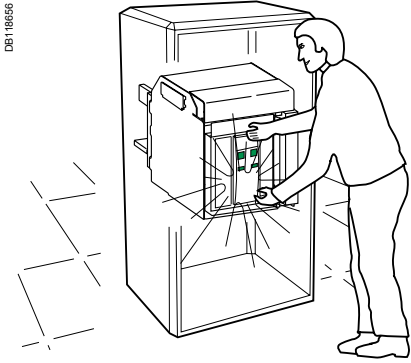
DB118735

DB426211

E71865A

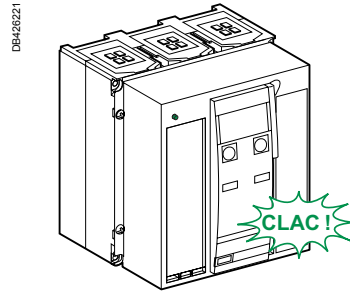
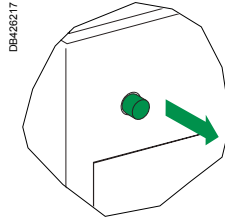
DB118731

Resetting the device With the motor mechanism

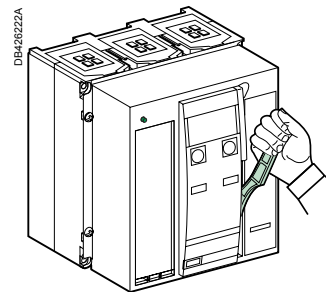
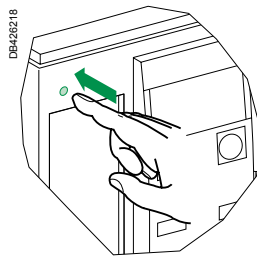
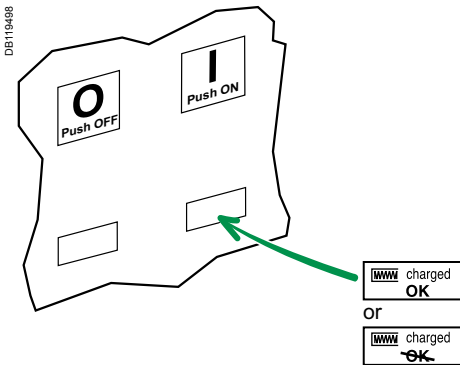


Manually reset the device following a trip

- The device trips. The button pops out.



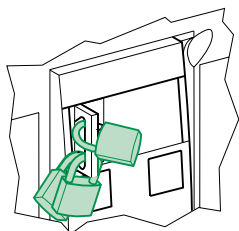
- Follow the recommendations for what to do when the circuit breaker trips (see page 53)
- Reset the device, then, if necessary, recharge it using the charging handle before closing.



Locking the controls

Disabling local or remote closing

DB110663

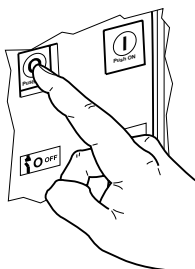


Padlocks and keylocks may be used together.

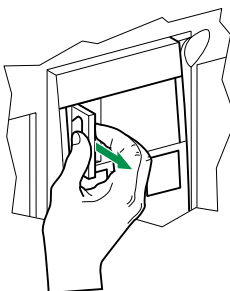
Locking the device using one to three padlocks (shackle diameter 5 to 8 mm)

- Open the device. Keep the OFF button pressed and pull out the tab.
- Install the padlock(s).

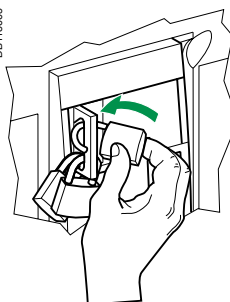
DB110738



DB110664

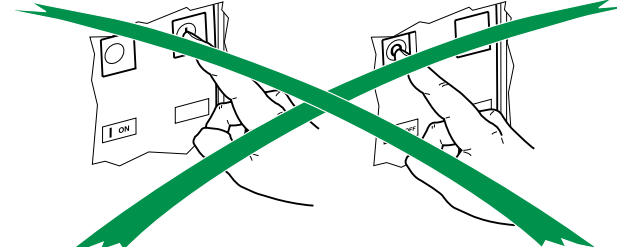


DB110665



- The controls are locked.

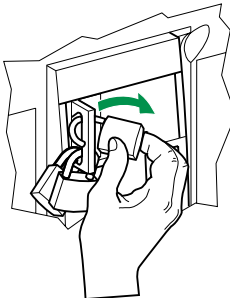
DB110666



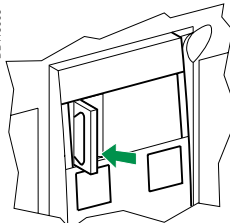
Unlocking the device

- Remove the padlocks.
- Push in the tab.

DB110667

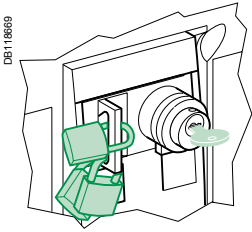


DB110668



Locking the controls

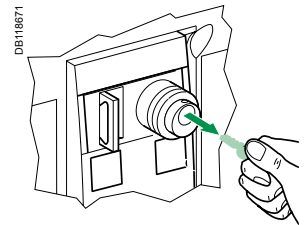
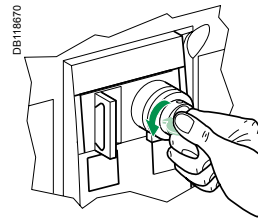
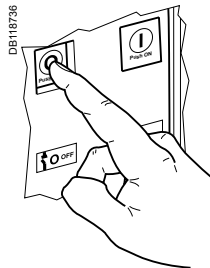
Disabling local or remote closing



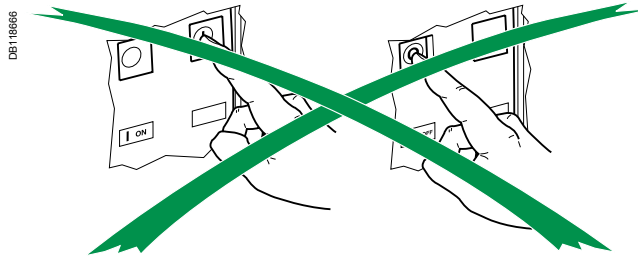
Padlocks and keylocks may be used together. Locking using padlocks is identical to the system on the previous page.

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

- Open the device. Keep the OFF button pressed and turn the key. Remove the key.

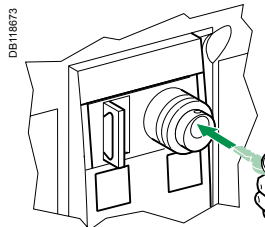


- The controls are locked.

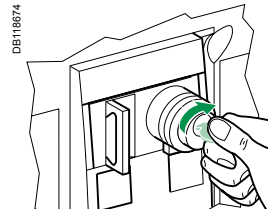


Unlocking the device

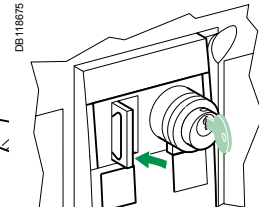
Insert the key.



Turn the key.

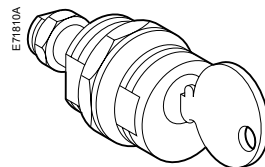


Push in the tab.

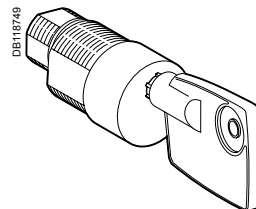


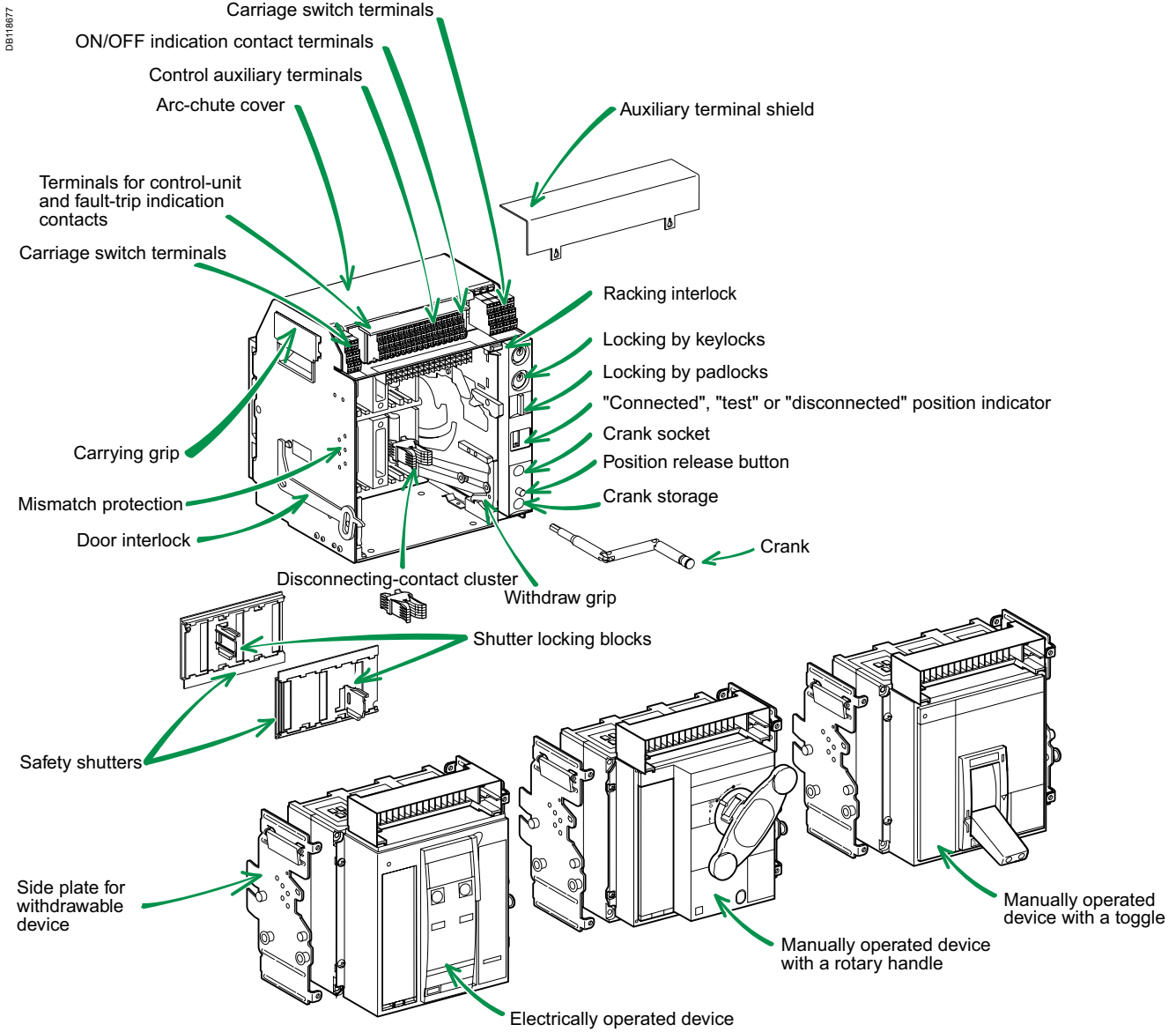
Two types of keylocks can be installed

RONIS



PROFALUX



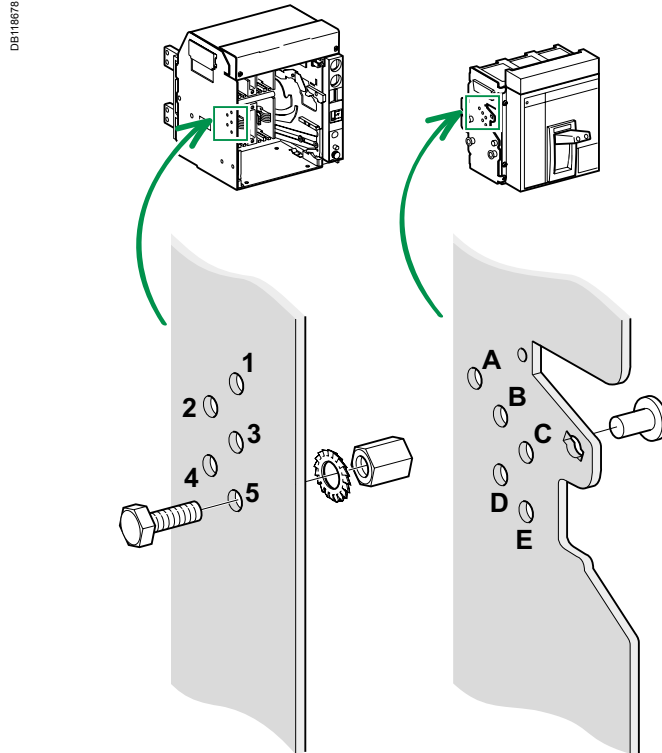






Matching a device with its chassis

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

The mismatch protection helps to ensure that a device is installed only in a chassis with compatible characteristics.

The possible combinations are listed below.



| | | | |
|---|--|---|---|
|  |  |  |  |
| ABC | 45 | BCD | 15 |
| ABD | 35 | BCE | 14 |
| ABE | 34 | BC | 145 |
| AB | 345 | BDE | 13 |
| ACD | 25 | BD | 135 |
| ACE | 24 | BE | 134 |
| AC | 245 | CDE | 12 |
| ADE | 23 | CD | 125 |
| AD | 235 | CE | 124 |
| AE | 234 | DE | 123 |

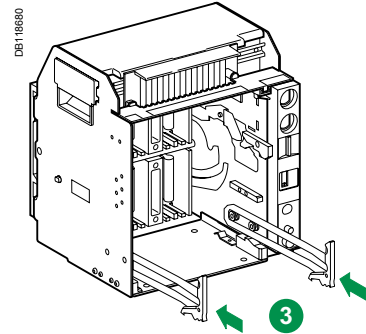
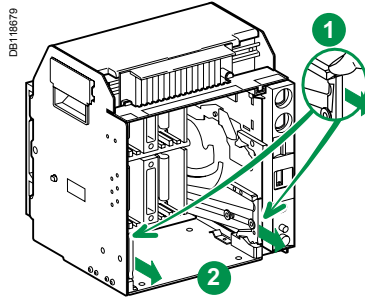
For complete information on Compact NS handling and mounting, see the installation manual(s).

Before mounting Compact NS, make sure it matches the chassis in terms of rated current and performance level.

Extending the rails

Press the release tabs and pull the rails out.

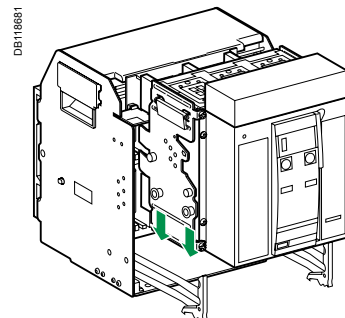
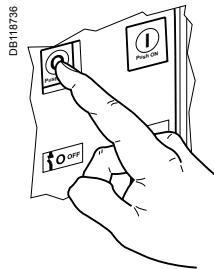
To put the rails back in, press the release tabs and push the rails in.



Inserting the device

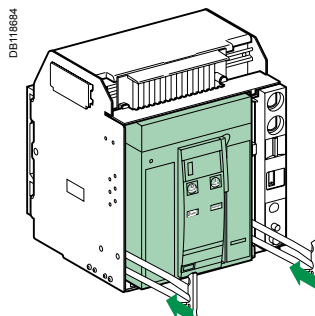
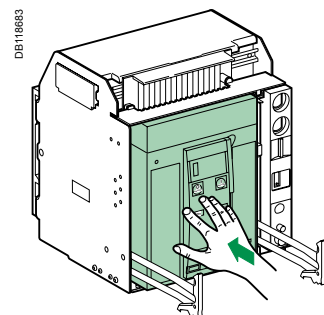
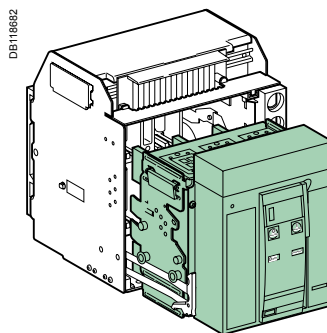
Open the device (in any case, it opens automatically during connection).

Position the device 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.

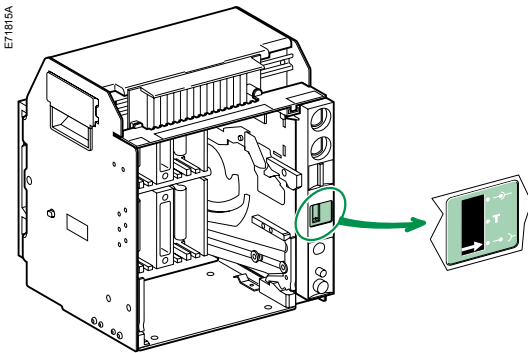


Prerequisites

To connect and disconnect the device:

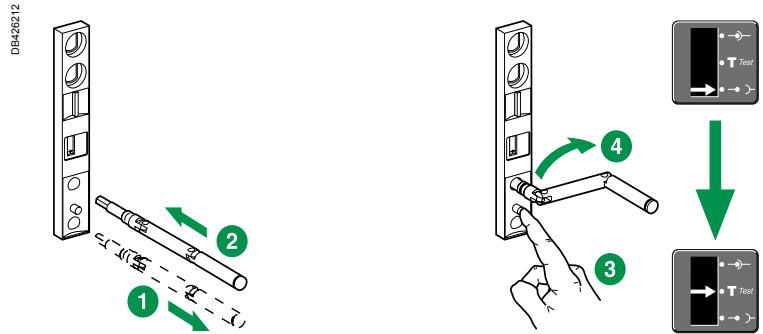
- the crank must be used
- all chassis locking functions must be disabled (see page 25). The chassis locking systems, padlocks and the racking interlock inhibit use of the crank.

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



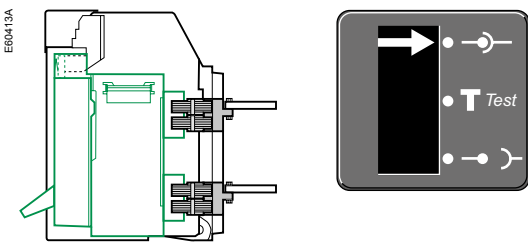
Racking-in the device from the "disconnected" to "test" position, then to "connected" position

The device is in "disconnected" position. Press the pop-up button and turn the crank.

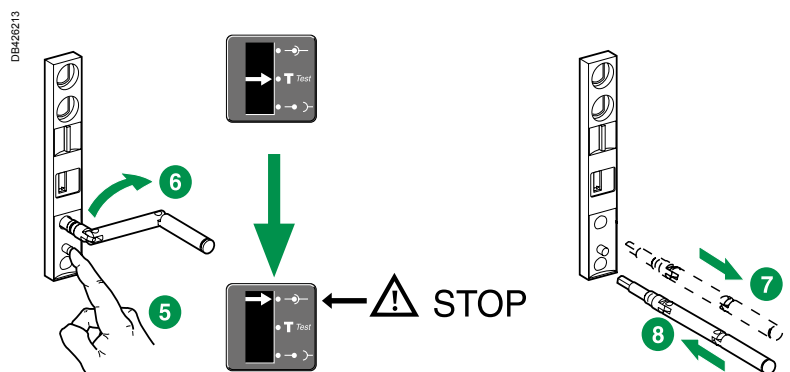


The device is in "test" position. Remove the crank or continue to "connected" position.

■ "connected" position

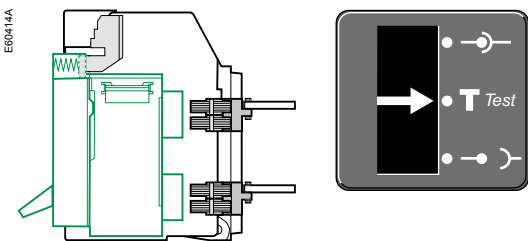


The device is in "test" position. Press the pop-up button and turn the crank.

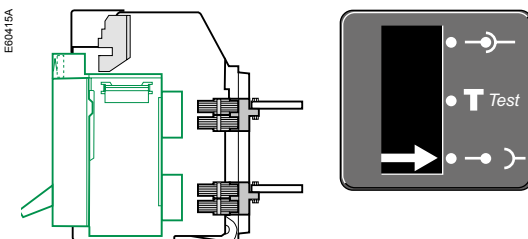


The device is in "connected" position.

■ "test" position



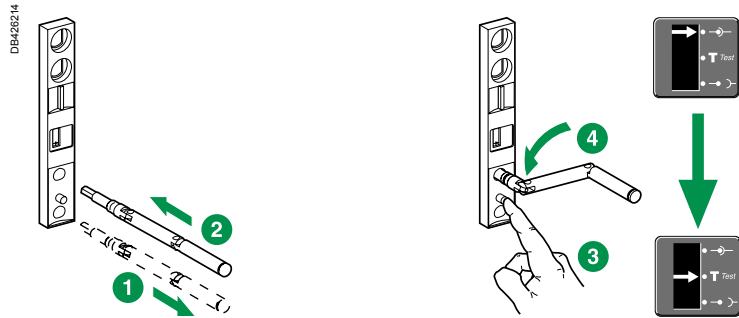
■ "disconnected" position



Racking-out the device

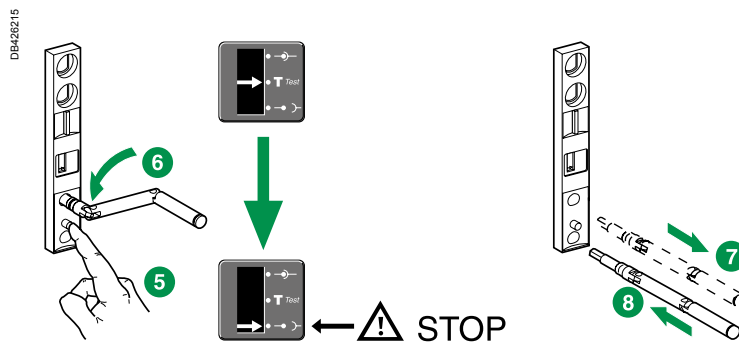
Withdrawing the device from the "connected" to "test" position, then to "disconnected" position

The device is in "connected" position.
Press the pop-up button and turn the crank.



The device is in "test" position.
Remove the crank or continue to "disconnected" position.

The device is in "test" position.
Press the pop-up button and turn the crank.



The device is in "disconnected" position.

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.

Note:

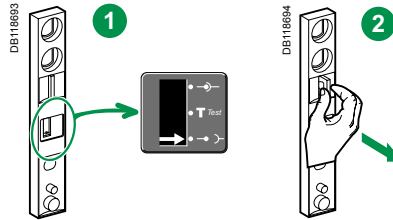
If specified when ordering the chassis, this locking function may be adapted to operate in all positions ("connected", "test" and "disconnected"), instead of in "disconnected" position alone.

Locking

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

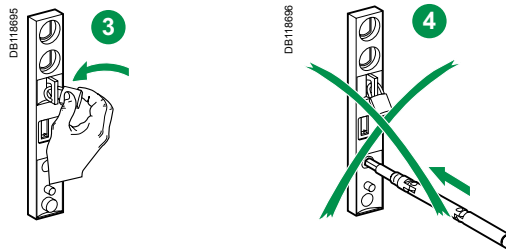
Device in "disconnected" position.

Pull out the tab.



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

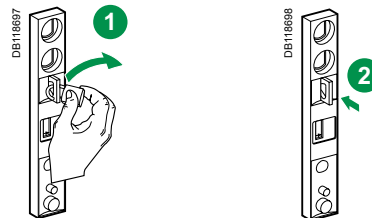
The crank cannot be inserted.



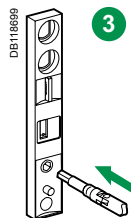
Unlocking

Remove the padlock(s).

Release the tab.



The crank can be inserted.



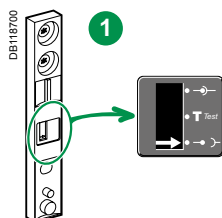
Locking in the "disconnected" position

Using one or two keylocks

Locking

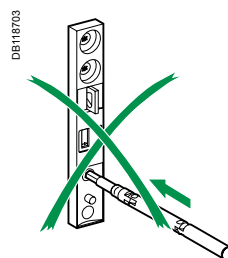
Device in "disconnected" position.

Turn the key(s).



Remove the key(s).

The crank cannot be inserted.

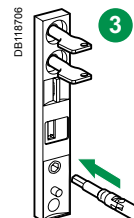
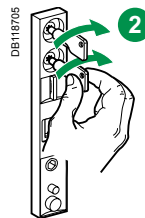
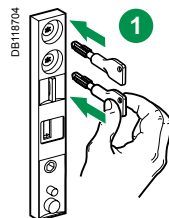


Unlocking

Insert the key(s).

Turn the key(s).

The crank can be inserted.

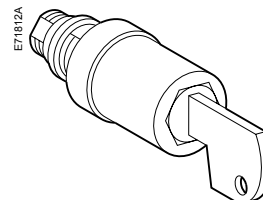
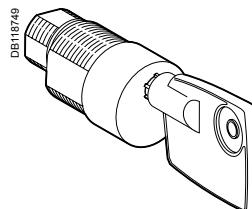
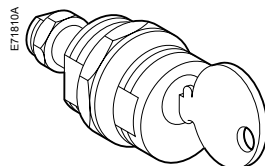


Three types of keylocks can be installed

RONIS

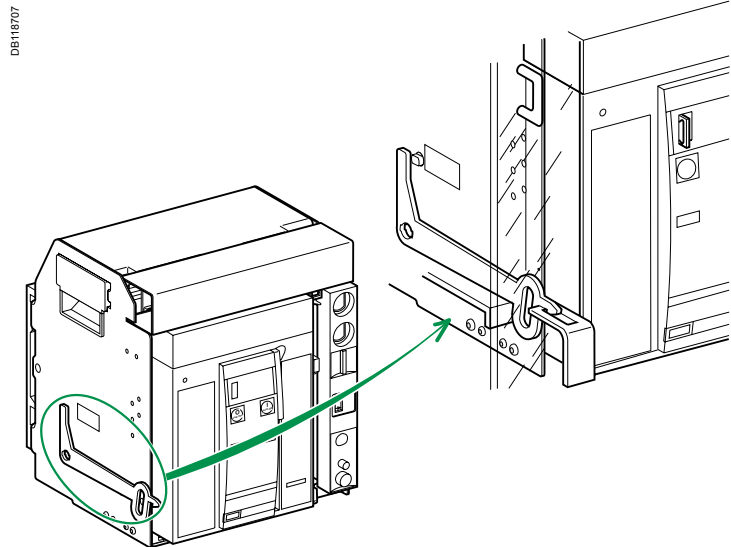
PROFALUX

CASTELL



The locking option 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.

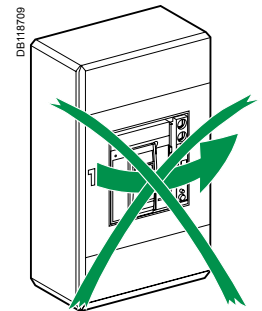
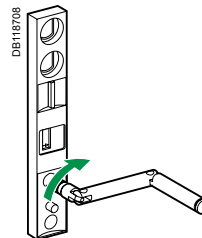
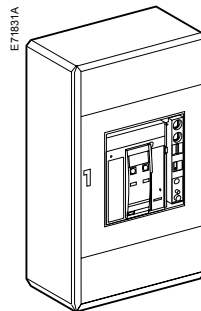


Disabling door opening

Close the door.

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

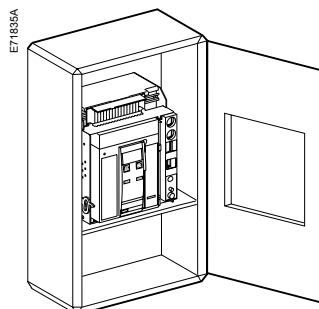
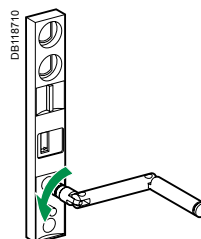
The door is locked.



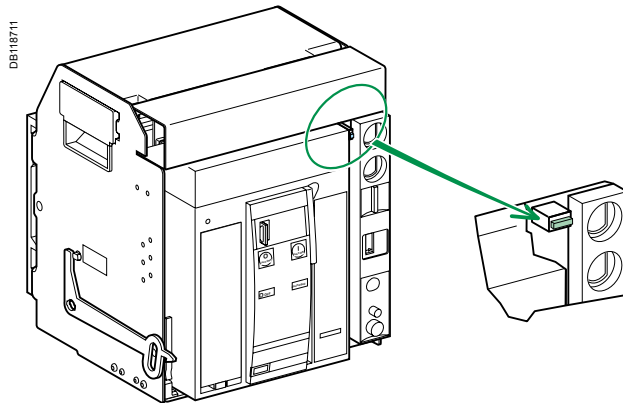
Enabling door opening

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

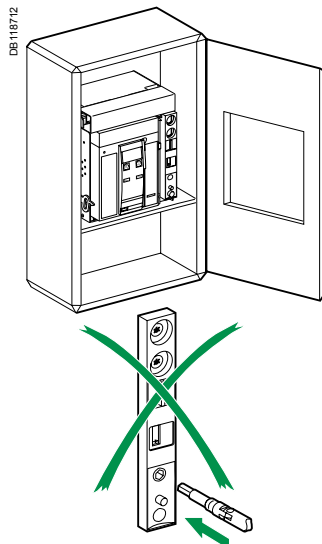
The door is unlocked.



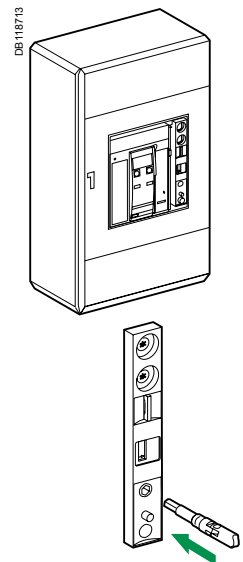
Locking the device when the door is open



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



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

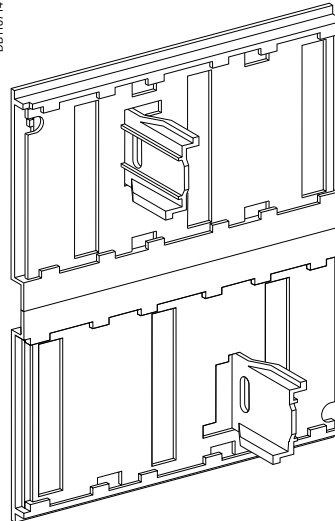


Locking the safety shutters

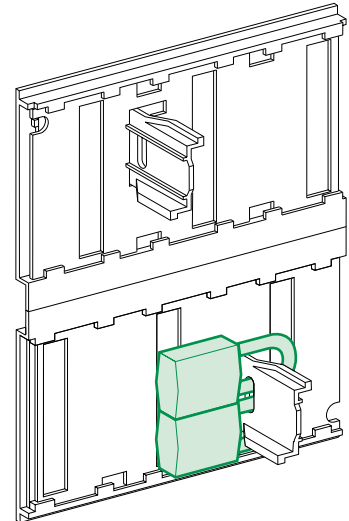
Four locking possibilities inside the chassis using one or two padlocks (shackle diameter 5 to 8 mm) for each shutter

Top and bottom shutters not locked.

DBI18714

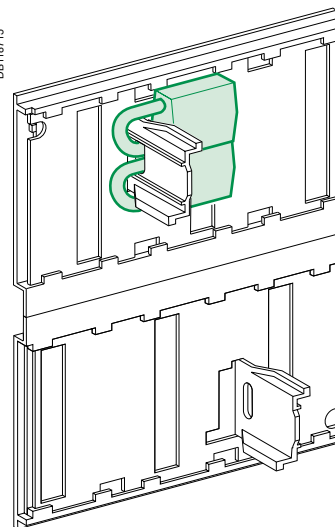


Top shutter not locked.
Bottom shutter locked.

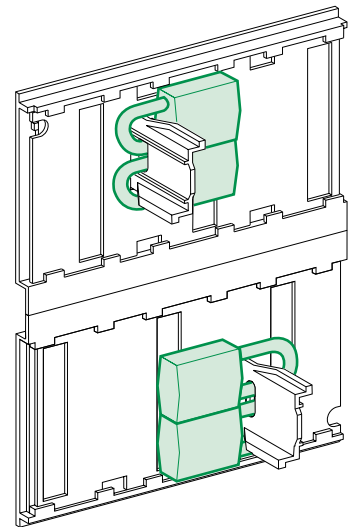


Top shutter locked.
Bottom shutter not locked.

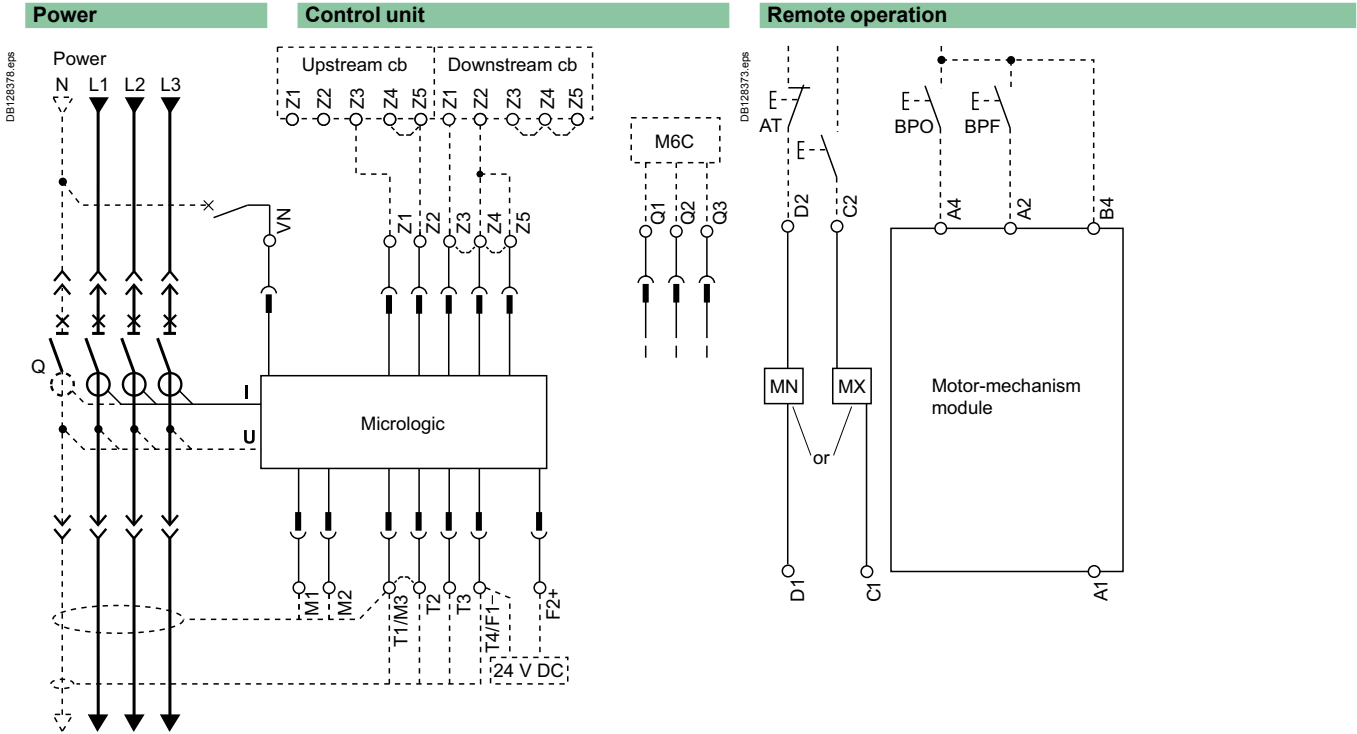
DBI18715



Top and bottom shutters locked.



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

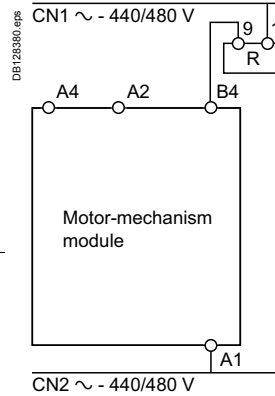


| Basic | A | E | P | Control unit |
|-------|---|---|---|---|
| ■ | ■ | ■ | ■ | E1-E6 communication |
| | ■ | ■ | ■ | Z1-Z5 zone selective interlocking: Z1 = ZSI OUT SOURCE Z2 = ZSI OUT ; Z3 = ZSI IN SOURCE Z4 = ZSI IN ST (short time) Z5 = ZSI IN GF (earth fault) |
| | ■ | ■ | ■ | M1 = Vigi module input (Micrologic 7) |
| | ■ | ■ | ■ | T1, T2, T3, T4 = external neutral; M2, M3 = Vigi module input (Micrologic 7) |
| | ■ | ■ | ■ | F2+, F1- external 24 V DC power supply |
| | | ■ | ■ | VN external voltage connector (must be connected to the neutral with a 3P circuit breaker) |
| | | | ■ | M6C : 6 programmable contacts (to be connected to the external module M6C) ext. 24 V DC power supply required |

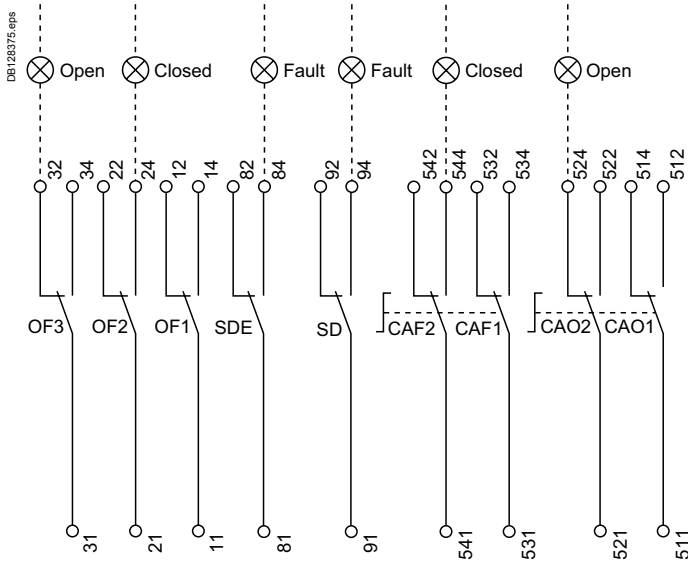
A : digital ammeter
E : energy
P : A + power meter + additional protection.

| Remote operation |
|--|
| MN : undervoltage release |
| or |
| MX : voltage release |
| Motor-mechanism module (*) |
| A4 : electrical opening order |
| A2 : electrical closing order |
| B4, A1 : power supply for control devices and motor mechanism |

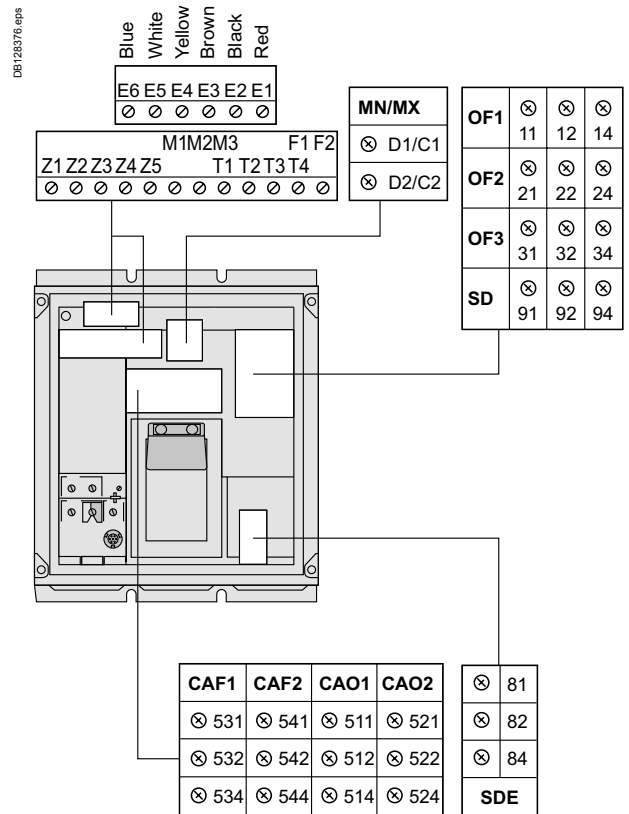
(*) **Spring-charging motor 440/480 V AC**
(380 V motor + additional resistor)



Indication contacts



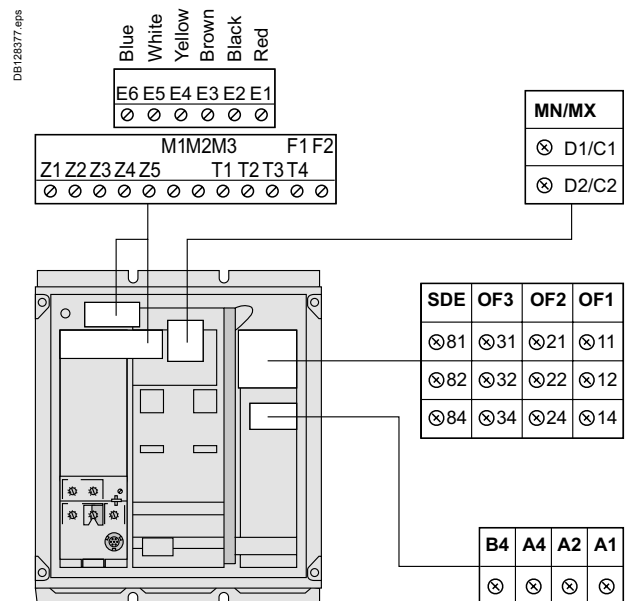
Terminal block marking (manual operation)



Indication contacts

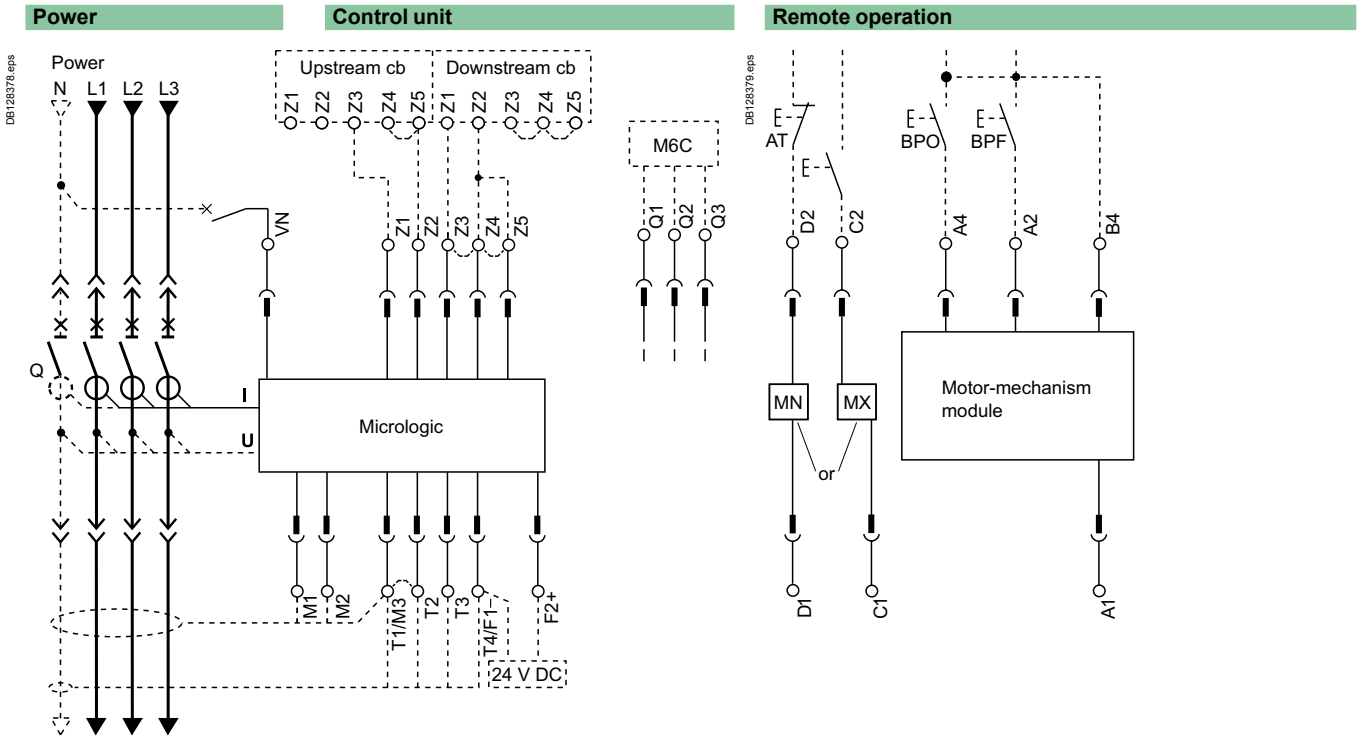
- OF3 / OF2 / OF1** : indication contacts
- SDE** : fault-trip indication contact (short-circuit, overload, earth fault)
- SD** : trip indication contact (manual operation)
- CAF2/CAF1 *** : early-make contact (rotary handle)
- CAO2 / CAO1** : early-break contact (rotary handle)

Terminal block marking (electrical operation)



* CAF2 option is not compatible with M6C option.

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



| Terminal-block marking | Com | UC1 | UC2 | UwC3 | M6C / CAF2 |
|------------------------|-----|-----|-----|------|------------|
| E5 E6 | ○ ○ | ○ ○ | ○ ○ | ○ ○ | ○ ○ |
| E3 E4 | ○ ○ | ○ ○ | ○ ○ | ○ ○ | ○ ○ |
| E1 E2 | ○ ○ | ○ ○ | ○ ○ | ○ ○ | ○ ○ |

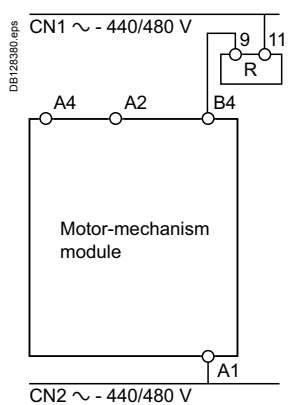
| Remote operation | MT2 | MT1 |
|------------------|-----|-----|
| MN / MX | ○ ○ | ○ ○ |
| D2 / C2 | ○ ○ | ○ ○ |
| D1 / C1 | ○ ○ | ○ ○ |

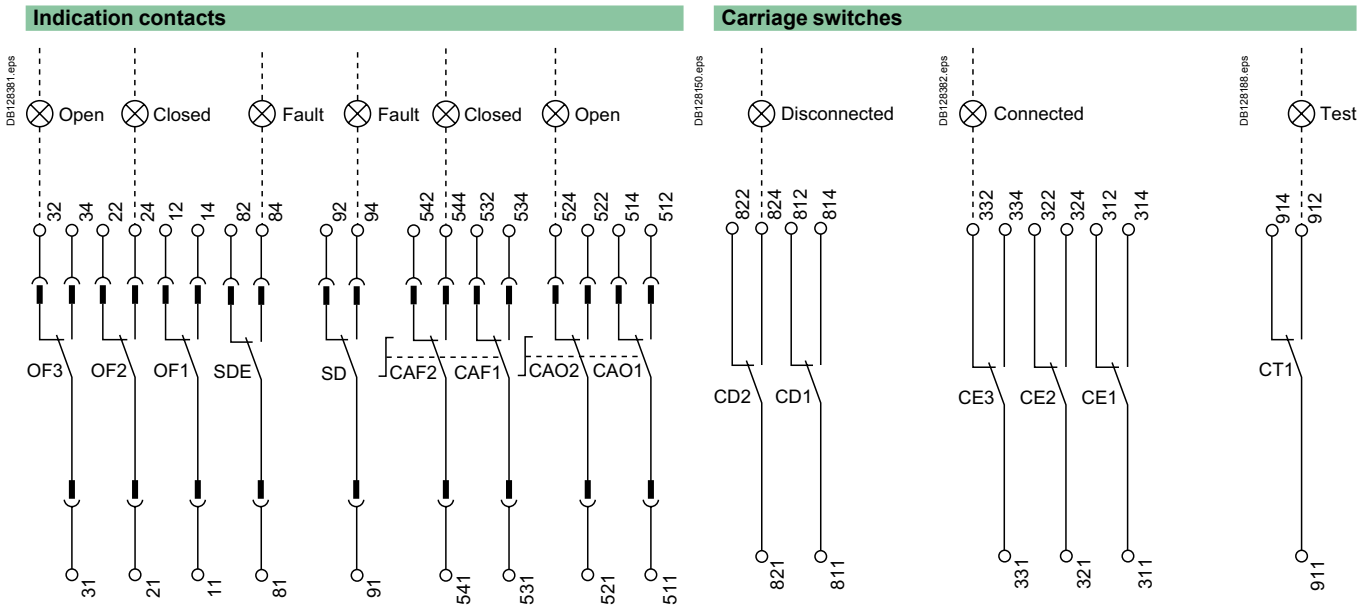
| Basic | A | E | P | Control unit |
|-------|---|---|---|--|
| ■ | ■ | ■ | ■ | Com: E1-E6 communication |
| | | ■ | ■ | UC1: Z1-Z5 zone selective interlocking: Z1 = ZSI OUT SOURCE Z2 = ZSI OUT; Z3 ZSI IN SOURCE Z4 = ZSI IN ST (short time) Z5 = ZSI IN GF (earth fault) |
| | ■ | ■ | ■ | M1 = Vigi module input (Micrologic 7) |
| | ■ | ■ | ■ | 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 (must be connected to the neutral with a 3P circuit breaker) |
| | | | ■ | M6C: 6 programmable contacts (to be connected to the external module M6C) ext. 24 V DC power supply required |

A : digital ammeter
E : energy
P : A + power meter + additional protection.

Remote operation
MN : undervoltage release
or
MX : voltage release
Motor mechanism module (*)
MT2 : **A4** : electrical opening order
MT1 : **A2** : electrical closing order
B4, A1 : power supply for control devices and motor mechanism

(*) Spring-charging motor 440/480 V AC (380 V motor + additional resistor)






| Indication contacts | | | | | | | | | |
|---------------------|------|------|-----|----|------|------|-----|-----|-----|
| M6C / CAF2 | CAF2 | CAF1 | SDE | SD | CAO2 | CAO1 | OF3 | OF2 | OF1 |
| Q3 | 544 | 534 | 84 | 94 | 524 | 514 | 34 | 24 | 14 |
| Q2 | 542 | 532 | 82 | 92 | 522 | 512 | 32 | 22 | 12 |
| Q1 | 541 | 531 | 81 | 91 | 521 | 511 | 31 | 21 | 11 |

| Carriage switches | | | | | |
|-------------------|-----|-----|-----|-----|-----|
| 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** : indication contacts
 - SDE** : fault-trip indication contact (short-circuit, overload, earth fault)
 - SD** : trip indication contact (manual operation)
 - CAF2/CAF1 *** : early-make contact (rotary handle)
 - CAO2 / CAO1** : early-break contact (rotary handle)

- Carriage switches**
- CD2** : disconnected position
 - CD1** : connected position
 - CE3** : connected position
 - CE2** : connected position
 - CE1** : connected position
 - CT1** : test position

Legend
 Connected
 (only one wire per connection point).

* CAF2 option is not compatible with M6C option.

External sensor (CT) for residual earth-fault protection

Connection of current-transformer secondary circuit for external neutral:

Compact equipped with a Micrologic 6 A/E/P:

- shielded cable with 2 twisted pairs
- T1 twisted with T2
- maximum length 4 meters
- cable cross-sectional area 0.4 to 1.5 mm²
- recommended cable: Belden 9552 or equivalent.

For proper wiring of neutral CT, refer to instruction bulletin 48041-082-03 shipped with it.

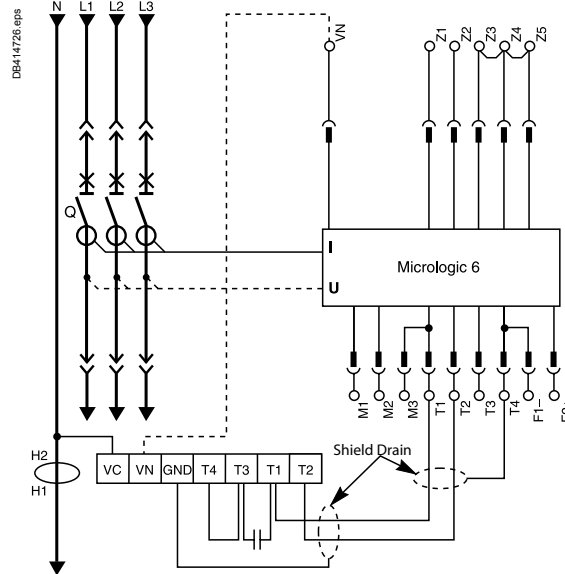
Do not remove Micrologic factory-installed jumper between T1 and T2 unless neutral CT is connected.

If supply is via the top, follow the schematics.

If supply is via the bottom, control wiring is identical; for the power wiring, H1 is connected to the source side, H2 to the load side.

For four-pole versions, for residual earth-fault protection, the current transformer for the external neutral is not necessary.

Connection for signal VN is required only for power measurements (3 Ø, 4 wires, 4CTs).

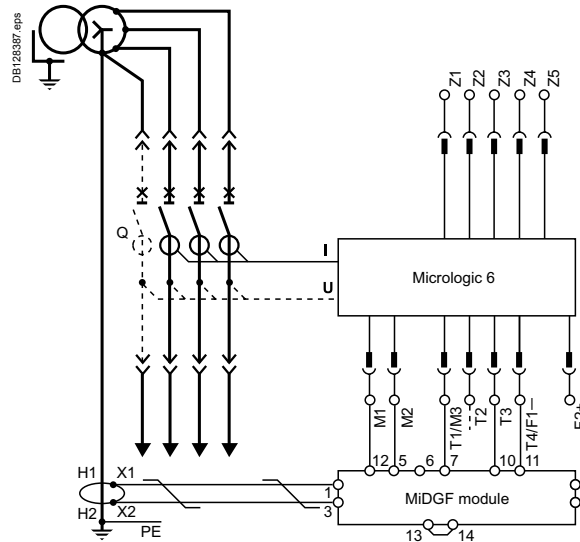


External transformer for source ground return (SGR) earth-fault protection

Connection of the secondary circuit:

Compact equipped with a Micrologic 6 A/E/P:

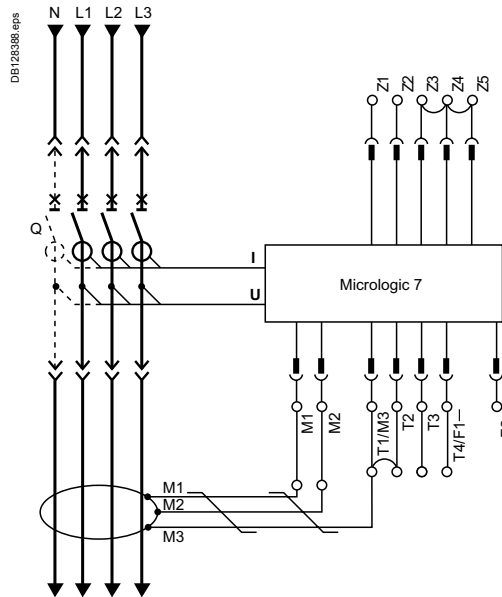
- unshielded cable with 1 twisted pair
- maximum length 150 metres
- cable cross-sectional area 0.4 to 1.5 mm²
- recommended cable: Belden 9409 or equivalent.



Earth-leakage protection

Connection of the rectangular-sensor secondary circuit:

Compact NS equipped with a Micrologic 7 A/P:
use the cable shipped with the rectangular sensor.



Neutral protection

- Three pole circuit breaker:
 - neutral protection is impossible with Micrologic A/E
 - with Micrologic P, an external neutral transformer is necessary; the connection diagram is the same as for residual earth-fault protection.
- Four pole circuit breaker:
 - Compact NS equipped with Micrologic A/E/P
 - the current transformer for external neutral is not necessary.

Zone selective interlocking

Zone-selective interlocking is used to reduce the electrodynamic forces exerted on the installation by shortening the time required to clear faults, while maintaining time discrimination between the various devices.

A pilot wire interconnects a number of circuit breakers equipped with Micrologic A/E/P control units, as illustrated in the diagram above.

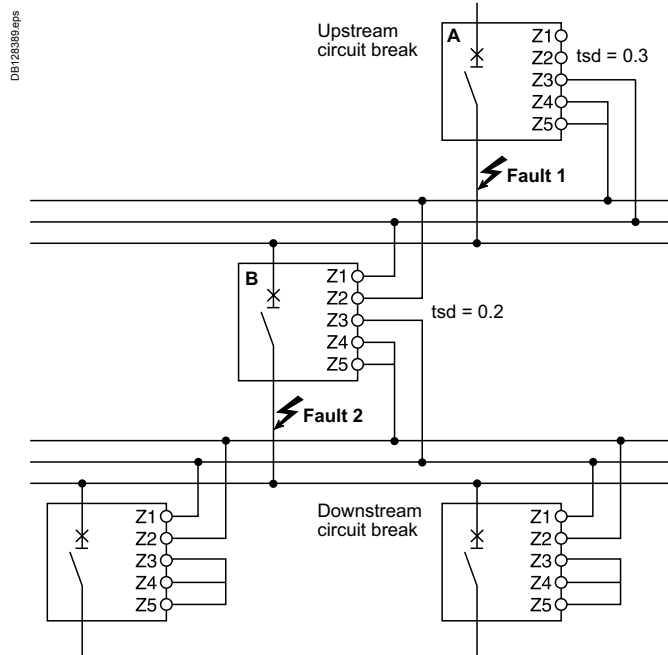
The control unit detecting a fault sends a signal upstream and checks for a signal arriving from downstream. If there is a signal from downstream, the circuit breaker remains closed for the full duration of its tripping delay. If there is no signal from downstream, the circuit breaker opens immediately, regardless of the tripping-delay setting.

Fault 1.

Only circuit breaker A detects the fault. Because it receives no signal from downstream, it immediately opens in spite of its tripping delay set to 0.3.

Fault 2.

Circuit breakers A and B detect the fault. Circuit breaker A receives a signal from B and remains closed for the full duration of its tripping delay set to 0.3. Circuit breaker B does not receive a signal from downstream and opens immediately, in spite of its tripping delay set to 0.2.



Wiring

- Maximum impedance: 2.7 Ω / 300 m.
- Capacity of connectors: 0.4 to 2.5 mm².
- Wires: single or multicore.
- Maximum length: 3000 m.
- Limits to device interconnection:
 - the common ZSI - OUT (Z1) and the output ZSI - OUT (Z2) can be connected to a maximum of 10 upstream devices
 - a maximum of 100 downstream devices may be connected to the common ZSI - IN (Z3) and to an input ZSI - IN CR (Z4) or GF (Z5).

Operation

Indication contacts

Carriage switches

Indication contacts

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

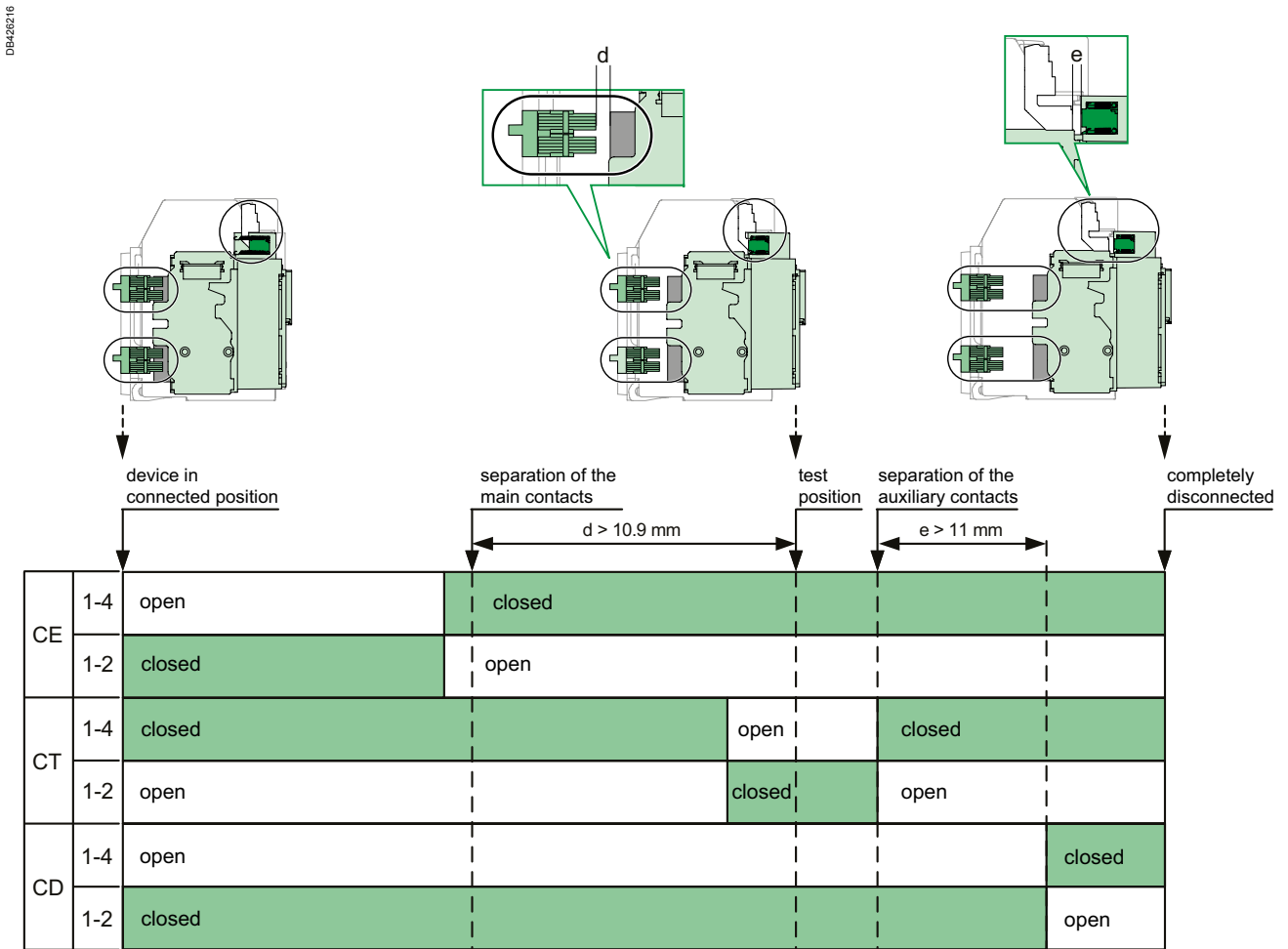
| Name | Contact number | Position of indicators and contacts | | |
|---------------------------------|----------------|-------------------------------------|--------|--------------------------------------|
| Device status | – | ON | OFF | Tripped (by Micrologic control unit) |
| Main contact position | – | Closed | Open | Open |
| Reset button position | – | IN | IN | OUT |
| OF indication contact position | 1–2 | Open | Closed | Closed |
| | 1–4 | Closed | Open | Open |
| SDE indication contact position | 1–2 | Closed | Closed | Open |
| | 1–4 | Open | Open | Closed |

Carriage switches

The position of the device in the chassis is indicated remotely by the position of the following carriage switches:

- CE: connected position
- CT: test position
- CD: disconnected position. The device is in the disconnected position when the minimum isolation distance between the main contacts and the auxiliary contacts is reached.

The state of the carriage switches changes according to the device position during racking-in and racking-out operations, as shown in the following diagram.



Start-up

List of checks and inspections

When starting up new equipment, or following lengthy downtime, a general check takes a few minutes. Such a check helps to remove the risk of a malfunction due to error or oversight.

Many malfunctions result from non-observance of the start-up instructions or lack of knowledge concerning the equipment and/or switchgear procedures. Schneider Electric instruction sheets, supplied with products and equipment, contain clear instructions for operators or maintenance personnel on how to correct malfunctions. The PDF files may be downloaded from the www.schneider-electric.com website.

Note: 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.

The table below indicates the checks and inspections to be performed according to the event:

| Checks and Inspections | | | | | | |
|--|---|---|---|---|---|---|
| | A | B | C | D | E | F |
| Prior to start-up | ■ | ■ | ■ | ■ | ■ | ■ |
| Periodically during operation | | | | ■ | ■ | ■ |
| After carrying out work on the switchboard | | ■ | ■ | ■ | ■ | ■ |
| Periodically during lengthy downtime | | ■ | | ■ | | ■ |
| Following lengthy downtime | | ■ | | ■ | ■ | ■ |
| Following lengthy downtime and modification to the switchboard | ■ | ■ | ■ | ■ | ■ | ■ |

A Insulation and dielectric strength tests
 B Inspection of the switchboard
 C Compliance with the installation diagram
 D Inspection of mechanical equipment
 E Mechanical operation
 F Check of electronic control units

▲ CAUTION

RISK OF EQUIPMENT DAMAGE

Only a trained specialist is authorized to carry out insulation and dielectric strength tests.

Failure to follow these instructions can result in injury or equipment damage.

A: Insulation and dielectric strength tests

Insulation and dielectric strength tests are carried out before the switchboard is delivered. These tests are subject to the currently applicable standards.

Insulation and dielectric tests must be repeated 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 (motor mechanism, MX, MN)
- remove the long-time rating plug on the Micrologic E/P control units.

Removal of the rating plug disconnects the voltage measurement input.

B: Inspection of the switchboard

Check that the devices are installed:

- in a clean environment, where no waste has been left behind from assembling the equipment (wiring, tools, shavings, metallic particles, etc)
- in a properly ventilated switchboard (unobstructed ventilation grilles).

Start-up

List of checks and inspections

C: Compliance with the installation diagram

Check that the devices conform with the installation diagram:

- identification of the feeds on the front of each device
- rating and breaking capacities (indicated on the rating plate)
- identification of the control unit (type, rating)
- presence of additional functions (motor mechanism, Vigirex relay, toroid, rotary handle, control or indication auxiliaries, locking, sealing)
- protection settings (long time, short time, instantaneous, ground fault)
- Micrologic electronic control unit: visually check the position of the dials or the main settings and use the maintenance interface to check in detail
- identification of the protected circuit marked on the front of each device.

D: Inspection of mechanical equipment

■ Check the following body parts (see page 43 for more information):

- case
- arc chute filters
- main contacts.

■ Check the mounting and mechanical strength:

- of devices in the switchboard and of power connections
- of the following auxiliaries and accessories on the devices
 - rotary handles or motor mechanisms
 - installation accessories (terminal shields, escutcheons, etc.)
 - auxiliary circuit connections (see page 46 for more information)
 - chassis and its sliding connections (see page 44 for more information)
 - terminal blocks
 - electrical auxiliaries.

■ Check the tightening of power connectors and tighten any loose connections (see page 44 for more information).

■ Check the arc chute filters (see page 43 for more information).

Start-up

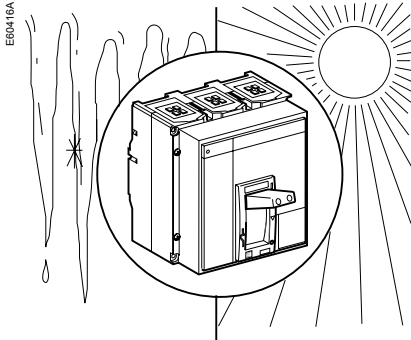
List of checks and inspections

E: Mechanical operation

- Check the following mechanical operations:
 - mechanical opening and closing
 - electrical opening and closing
 - tripping with the push-to-trip button
 - resetting
 - charging
 - complete closing of device poles.
- Check the number of operating cycles by consulting the operation counter.
- Check the locking and unlocking of locking accessories (for example, padlocks and keylocks).
- Check the operation of the motor mechanism (for electrically operated devices) (see page 46 for more information):
 - general condition of the motor mechanism
 - motor mechanism charging time.
- Check the operation of control auxiliaries (for electrically operated devices) including (see page 46 for more information):
 - MX opening voltage release
 - MN undervoltage release
 - MNR delayed undervoltage release.
- Check the auxiliary wiring and insulation of all auxiliaries (see page 46 for more information).
- Check the correct operation of the indication contacts OF (see page 46 for more information).
- Check the service life of all auxiliaries.

F: Operation of electronic control units and communication system

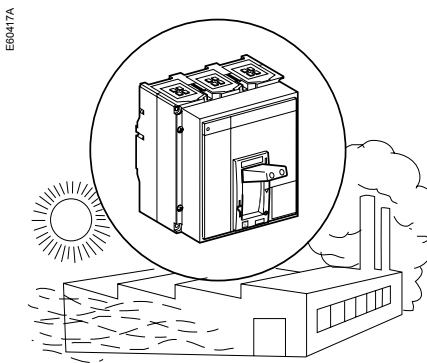
- Check the correct operation of the control unit of each device, by using the respective user manual.
- Check the communication module and accessories (optional) (see page 47 for more information).
- Test device control and uploading of contact status.
- Test the uploading of the chassis position contacts and address synchronization between BCM ULP and IO module.
- Test data writing to the Micrologic control unit via the communication network.



Ambient temperature

Compact NS 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 NS (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.



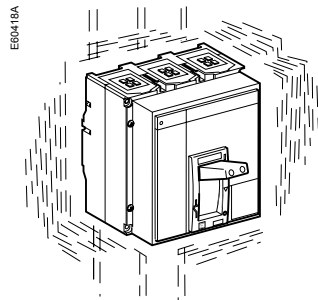
Extreme atmospheric conditions

Compact NS devices have successfully passed the tests defined by the following standards for extreme atmospheric conditions:

- IEC 60068-2-1: dry cold at -55 °C
- IEC 60068-2-2: dry heat at +85 °C
- IEC 60068-2-30: damp heat (temperature +55 °C, relative humidity 95%)
- IEC 60068-2-52 level 2: salt mist.

Compact NS devices can operate in the industrial environments defined by standard IEC 60947-1 (pollution degree up to 3).

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



Vibrations

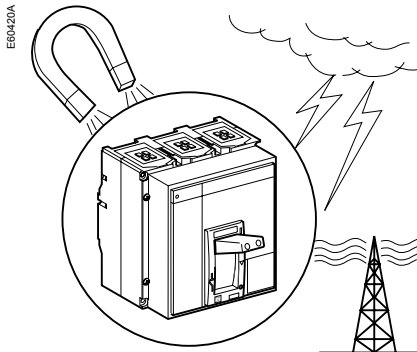
Compact NS devices have successfully passed testing in compliance with standard IEC 60068-2-6 and IEC 60068-2-27 for the following vibration levels:

- 2 to 13.2 Hz: amplitude ±1 mm
- 13.2 to 100 Hz: constant acceleration 0.7 g.

Vibration testing to these levels is required by merchant marine inspection organisations (such as Veritas and Lloyd's).

Compact NS630b to 1600

| Profile | Reference |
|---|-----------------------------|
| Vibrations, shocks and shakes in operational conditions | 3M4 IEC 60721-3-3 compliant |



Electromagnetic disturbances

Compact NS devices are protected against:

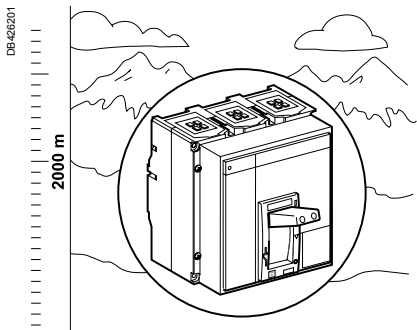
- overvoltages caused by devices that generate electromagnetic disturbances
- overvoltages caused by an atmospheric disturbance or by a distribution system outage (e.g. failure of a lighting system)
- devices emitting radio waves (radios, walkie-talkies, radar, etc.)
- electrostatic discharges produced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

Compact NS devices have successfully passed the electromagnetic compatibility tests (EMC) defined by the following international standards:

- IEC 60947-2, annex F
- IEC 60947-2, annex B (control units with earth-leakage function).

The above tests help to guarantee that:

- no nuisance tripping occurs
- tripping times are respected.



Altitude derating

Altitude does not significantly affect device characteristics up to 2000 m.

Above this altitude, it is necessary to take into account the decrease in the dielectric strength and cooling capacity of air.

The following table gives the corrections to be applied for altitudes above 2000 m. The breaking capacities remain unchanged.

Compact NS630b to 1600

| Altitude (m) | 2000 | 3000 | 4000 | 5000 |
|--|----------------|-------------------|-------------------|-------------------|
| Impulse withstand voltage U_{imp} (kV) | 8 | 7.1 | 6.4 | 5.6 |
| Rated insulation voltage (U_i) | 800 | 710 | 635 | 560 |
| Maximum rated operational voltage 50/60 Hz (V) | 690 | 690 | 635 | 560 |
| Rated current 40 °C | $1 \times I_n$ | $0.99 \times I_n$ | $0.96 \times I_n$ | $0.94 \times I_n$ |

Intermediate values may be obtained by interpolation



This chapter describes the maintenance that needs to be done on the fixed parts and mechanisms of the Compact NS device and Micrologic control unit, and on accessories, as well as why they need to be maintained.

The following topics are described:

- Maintaining body parts (see page 43)
- Maintaining connections (see page 44)
- Maintaining mechanisms of the device and chassis (for the drawout version) (see page 45)
- Maintaining auxiliary circuits (see page 46)
- Maintaining the communication system (see page 47).

Overview

The main body parts to be maintained are:

- case
- arc chutes and filters
- main contacts.

Maintaining the case

The case of the device provides the following functions:

- functional insulation between adjacent phases and between the phases and the exposed conductive parts for protection against transient overvoltage caused by the distribution system.
- an insulation barrier to prevent users from touching live parts.
- protection against the effects of electrical arcs and overpressure caused by short-circuits.

The case also fulfills an operational function by supporting the entire pole operating mechanism as well as the mechanical and electrical accessories of the switch-disconnector.

On the case, there should be:

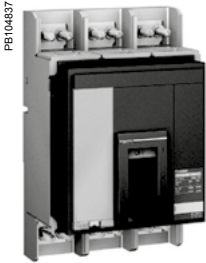
- no traces of grime (grease), no excessive dust, and no condensation which all reduce insulation.
- no signs of burns or cracks which would reduce the mechanical solidity of the case and thus its capacity to withstand short-circuits.

The case must be replaced if there are signs of burns or cracks.

Preventive maintenance for the case consists of:

- a visual inspection of its general condition
- cleaning with a dry cloth or a vacuum cleaner
- measuring the case insulation resistance and the resistance of the breaking unit input/output contact. It is advised to measure the insulation every five years and following trips due to a short-circuit.

All cleaning products with solvents are strictly forbidden.



Inspecting the arc chute filters

During a short-circuit, the arc chute extinguishes the arc and absorbs the high level of energy along the entire path of the short-circuit. Arc chutes also help to extinguish arcs under rated current conditions.

Each time an arc is interrupted by an arc chute, the separator plates of the arc chute are eroded. As the condition of the arc chute deteriorates, it is less effective at clearing short-circuits completely. The device can be damaged or destroyed as a result.

Preventive maintenance for the arc chutes consists in regular inspection of the filters, because blocked filters can cause overpressure. The filters can be slightly blackened (due to the gases produced at I_n).

It is recommended to use a vacuum cleaner instead of a cloth to remove dust from the outside of the arc chutes.

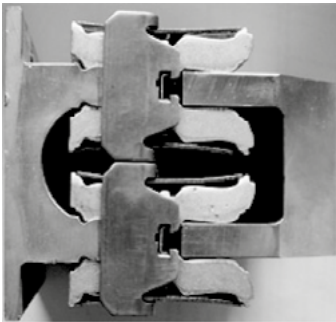
▲ WARNING

RISK OF EQUIPMENT DAMAGE AND THERMAL RUNAWAY

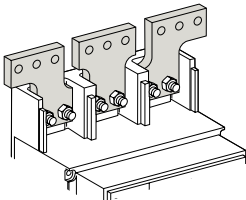
Do not use a combination of different materials for connections (for example, copper and aluminium).

Failure to follow these instructions can result in death, serious injury, or equipment damage.

PAZ7002A-38



DB128101



Overview

This section describes how to maintain the connections of Compact NS devices:

- power connections
- sliding connections between the chassis and the device
- fixed connections to the equipment.

Power connections

Power connections between the various distribution systems in a switchboard (busbars, cables) and the switchgear are a major source of heat loss.

Incorrect tightening can cause thermal runaway, which in turn can damage the device or cable insulation and can cause a short-circuit and even a fire. Damage can be due to disregard for installation requirements during switchboard assembly.

Sliding connections between chassis and device (for drawout devices)

The sliding connections between the chassis and device are made up of two parts: clusters and disconnecting contacts. Grease between the clusters and the disconnecting contacts facilitates the connection and avoids damaging the silver-coated surface by reducing the racking-in friction.

The grease breaks down over time and it is therefore necessary to replace it regularly.

Preventive maintenance for the sliding connections consists in periodically removing grease and applying new grease in compliance with grease types recommended by Schneider Electric.

In sulphurous (corrosive) atmospheres (H_2S/SO_2), it is necessary to implement the cleaning procedure using Thiourea solution, with mandatory regreasing using the specified fluorinated grease. This type of grease protects the silver and copper-coated contacts against sulphuration, which can cause a build-up of silver or copper sulphide on the contacts. The insulating properties of silver or copper sulphide can increase the resistance of the contact and lead to greater temperature rise.

Fixed connections

When connections using lugs or bars are made in compliance with Schneider Electric instructions (tightening torque, class 8.8 steel hardware and contact washer), no particular maintenance is required.

Otherwise, regularly check the temperature-rise points (change in color of copper or tinning), disassemble the connections, clean, and scrape the contact surfaces. Then reassemble the connections using new hardware.

Check the terminals.

What to maintain and why

Maintaining mechanisms for device and chassis

Overview

This section describes how to maintain the moving parts of the chassis and the charging mechanism of Compact NS devices.

Operation capability of the device is improved by dusting and general cleaning, proper greasing, and regular opening and closing.

The device mechanism is used to open and close the main contacts.

The chassis mechanism is used to rack the main body in and out.

Dusting

It is recommended to use a vacuum cleaner to remove dust.

Cleaning

Cleaning must be done using a clean and dry cloth or brush. Do not use solvents. Avoid greased parts of the mechanisms, except for grease on electrical contacts.

Recommendations for 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 soap or any other cleaning product must be used, make sure that it does not come into contact with non-metallic parts.

General recommendations:

Never use pressurized cleaning products or products containing solvents (trichloroethane or trichloroethylene) such as WD40.

Pressurized cleaning products can cause the following problems:

- removal of grease from inaccessible lubrication points. These areas are greased for the life of the product and cannot be regreased
- corrosion of points that are not regreased
- damage caused by the pressure applied by the cleaning product
- temperature rise due to the presence of an insulating solvent in the contact zones
- elimination of special protection
- deterioration of plastic materials.

Greasing

Do not use too much grease. When excess grease mixes with dust it can affect the mechanism operation.

Greasing must be done after cleaning of some mechanical parts as described in the maintenance procedures. Use only grease recommended by Schneider Electric.

- The main contacts must not be greased.

- Under normal operating conditions, the pole-operating mechanism does not need to be regreased (greased for the life of the product).

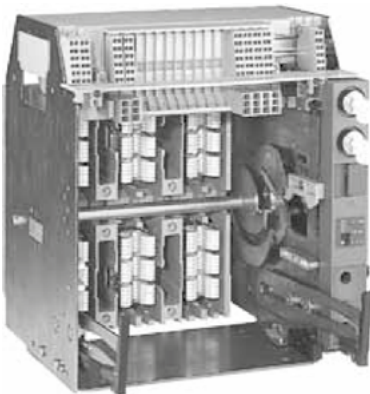
Opening and closing cycles

The need to ensure continuity of service in an installation generally means that power devices are rarely operated. An excessive number of operating cycles accelerates aging and a lack of operation over a long period can result in mechanical malfunctions. Regular operation is required to maintain the normal performance level of all parts involved in the opening and closing cycles.

DB42603



DB426204



What to maintain and why

Maintaining auxiliary circuits

Overview

This section describes how to maintain the connection system:

- control auxiliaries
- auxiliary wiring
- indication contacts
- Motor mechanism.

Control auxiliaries (for electrically operated devices)

Control auxiliaries include:

- MN and MNR delayed undervoltage releases
- MX opening voltage release
- XF closing voltage release.

MX opening voltage releases remotely open the device, and XF closing voltage releases remotely close the device, when they receive an electrical order or an order from a supervisor using the communication network.

The MN and MNR undervoltage releases are used to open the power circuit if the distribution system voltage drops or fails (in the case of an emergency off application, for example).

MX and XF communicating voltage releases and MN and MNR undervoltage releases are continuously connected to the power supply. If the temperature of the device increases, the internal electronic components can accelerate aging.

Preventive maintenance consists in periodically checking operation at minimum values. It is advised to replace control auxiliaries after 15 years of use to avoid any risk of non-operation when they are needed.



056421NA-29

Auxiliary wiring

Auxiliary wiring is used to transmit the following information:

- orders to the control devices
- status condition information.

Incorrect connections or damaged insulation can cause unexpected opening or non-operation of the device. The auxiliary wiring must be regularly inspected and replaced as required, particularly in environments with vibrations, high ambient temperatures, or corrosive atmosphere.



056455NA-37

Indication contacts

Contacts indicate the following information:

- ON/OFF: position of the main contacts (OF)
- PF: the device is ready to close.

This information enables a remote operator to respond as necessary. Incorrect indications can result in erroneous device operation.

Improper contact performance can be caused by vibrations, corrosion, or abnormal temperature rises.

Preventive maintenance consists in regularly checking that contacts conduct or isolate correctly, depending on their position.



DB426205



DB426206

Motor mechanisms (for electrically operated devices)

The motor mechanism automatically recharges the operating mechanism springs as soon as the device is closed.

The motor mechanism makes it possible to close the device immediately after opening. The charging lever serves as a backup if the auxiliary voltage is interrupted. Given the mechanical forces exerted to charge the mechanism, the motor mechanism wears quickly. Periodic checks on the operation of the motor mechanism and the charging time are required to help ensure the device closing function.

056461NA-56



Communication module and accessories

Via the communication network, the communication module transmits data to a remote site for use by various departments (maintenance, management, production, etc.). A break in the transmission of data can result in:

- production losses due to unawareness of the status of the device
- financial losses due to incorrect system management
- diagnostic errors.

Periodic checks on the orders (read, write, commands) transmitted by the communication network are required to maintain a high degree of reliability and confidence in the communication system.

Maintaining the Compact NS during operation

Recommended preventive maintenance and time intervals

Overview

The electrical switchboard and all its equipment continue to age whether they operate or not. This aging process is due mainly to environmental influences and operating conditions.

To ensure that your Compact NS device retains the operating and safety characteristics specified in the catalogue for the whole of its service life, it is recommended that:

- the device is installed in optimum environmental and operating conditions
- routine inspections and regular maintenance are carried out by qualified personnel.

Normal conditions

The maintenance programme that must be carried out every one, two or five years on Compact NS subassemblies and the level of competence required on the part of service agents are described in the tables on page 50 (Level II), page 51 (Level III), and page 52 (Level IV).

At the end of each five year period, the maintenance programme must be systematically repeated.

These maintenance operations apply for normal operating and environment conditions as defined below.

| Normal operating and environmental conditions | |
|---|---|
| Temperature | Average annual temperature < 25 °C outside the switchboard (Ti ⁽¹⁾) |
| Percent load | < 80 % of In 24/24 hours |
| Harmonics | Harmonic current per phase < 30 % of In |
| Relative humidity | < 70 % |
| Corrosive atmosphere | Device installed in environment category 3C1 or 3C2 (IEC 60721-3-3) |
| Salt environment | No salt mist |
| Dust | Low level Device installed in a switchboard equipped with filters or a ventilated IP54 enclosure |
| Vibration | Permanent vibration < 0.2 g |

Beyond the above limits, the device can suffer accelerated aging that may rapidly result in malfunctions. For this reason, periodic checks must be carried out at shorter time intervals. On the other hand, when special efforts are made to improve the operating and environment conditions, preventive maintenance operations can be carried out less often.

Favourable conditions for device installed inside a switchboard

The time interval between two preventive maintenance visits can be doubled **if all the conditions** presented below are met.

The only exception is the check-up program recommended for the fifth year.

| Favourable operating and environmental conditions for device installed inside a switchboard | |
|---|---|
| Temperature | Average annual temperature < 25 °C outside the switchboard (Ti ⁽¹⁾). The device is installed in an air-conditioned room or in a ventilated enclosure. |
| Percent load | < 50 % of In 8/24 hours or 24/24 hours |
| Relative humidity | < 50 % |
| Corrosive atmosphere | Device installed in environment category 3C1 or in a closed room that creates favourable conditions (air is conditioned and purified) |
| Salt environment | None |
| Dust | Negligible Device installed in a switchboard equipped with filters or a ventilated IP54 enclosure |
| Vibration | None |

Example depending on the conditions:

- normal: check on charging time = 2 years
- favourable: check on charging time = 2 x 2 = 4 years

⁽¹⁾ (Ti), see the definition in the Compact NS catalogue (LVPED211021).



059768A-66

Maintaining the Compact NS during operation

Recommended preventive maintenance and time intervals

041201A-66



Harsh conditions and device not installed inside a switchboard

The time interval between two preventive maintenance visits must be reduced by half if any of the conditions presented below are present.

Harsh operating and environmental conditions

| | |
|------------------------------|---|
| Temperature (annual average) | Average annual temperature around the switchboard: 35 °C to 45 °C (Ti ⁽¹⁾) |
| Percent load | > 80 % of In 8/24 hours or 24/24 hours |
| Relative humidity | > 80 % |
| Corrosive atmosphere | Device installed in environment category 3C3 or 3C4 without any particular protection |
| Salt environment | Installation < 10 kilometers from seaside and device without any particular protection |
| Dust | High level Device not installed inside an enclosure equipped with filters or a ventilated IP54 enclosure |
| Vibration | Continuous vibrations between 0.2 and 0.5 g |

Example depending on the conditions:

- normal: check on charging time = every 2 years
- harsh: check on charging time = 0.5 x 2 = 1 (every year)

Device check-up

During the fifth year of operation, it is advised to run a complete check-up on the device to determine its status condition.

This diagnostic check must be carried out by Schneider Electric Service or by certified personnel having received Level IV training.

The complete diagnostic check must be systematically carried out following:

- tripping due to a short-time or instantaneous short-circuit
- five trips due to overloads.

See the Level IV program, see page 52.

Check after prolonged storage

Storage conditions

Devices must be stored in a dry, ventilated room, protected from rain, water and chemical agents.

They must be well protected against dust, rubble, paint, etc.

If storage is for an extended period, the relative humidity in the room must be maintained below 70 %.

Storage conditions:

- devices without their control unit: -40 °C to +85 °C
- devices with their control unit: -25 °C to +85 °C.

Devices must be stored in the open (OFF) position with the charging springs discharged.

Check and maintenance

After extended storage and if the conditions above are respected, the checks below must be carried out to ensure correction device operation.

Storage ≤ 2 years

Run the Level II and III second year program on the subassemblies below:

- mechanism
- device and chassis locking
- chassis (optional).

Storage > 2 years

Run the Level III and IV fifth year diagnostic program on the subassemblies below:

- mechanism
- control auxiliaries
- device and chassis locking
- chassis (optional).

If the devices are stored under harsh conditions (high temperature, corrosive atmosphere), it is necessary to:

- check the surface condition of the metal parts (zinc) and the copper parts (silver coatings (Ag) or tinning (Sn))
- check the greasing for the device and chassis.

⁽¹⁾ (Ti), see the definition in the Compact NS catalogue (LVPED211021).

Maintaining the Compact NS during operation

Recommended preventive maintenance and time intervals

Level II (yearly)

Minor preventive maintenance operations such as greasing and operating checks, as well as repairs by standard exchange of certain assemblies, carried out by a certified customer employee according to the manufacturer maintenance instructions.

| Check | Year | | | | | Tool |
|--|------|---|---|---|------------------|-------------------|
| | 1 | 2 | 3 | 4 | 5 ⁽¹⁾ | |
| Device | | | | | | |
| Check the general condition of the device (escutcheon, case, chassis, connections, terminal shields) | ■ | ■ | ■ | ■ | ■ | None |
| Mechanism | | | | | | |
| Open/close device manually and electrically | ■ | ■ | ■ | ■ | ■ | None |
| Charge device electrically | ■ | ■ | ■ | ■ | ■ | None |
| Check complete closing of device poles | ■ | ■ | ■ | ■ | ■ | None |
| Check number of device operating cycles | ■ | ■ | ■ | ■ | ■ | Operation counter |
| Breaking unit | | | | | | |
| Check the cleanliness of the filters | ■ | ■ | ■ | ■ | ■ | None |
| Control auxiliaries (electrical operated device) | | | | | | |
| Check auxiliary wiring and insulation | ■ | ■ | ■ | ■ | ■ | None |
| Device locking | | | | | | |
| Open and close keylocks installed on device | ■ | ■ | ■ | ■ | ■ | None |
| Open and close padlocking system installed on device | ■ | ■ | ■ | ■ | ■ | None |
| Chassis (optional) | | | | | | |
| Remove device from chassis and put it back | ■ | ■ | ■ | ■ | ■ | None |
| Check operation of position contacts (CE, CT, CD) | ■ | ■ | ■ | ■ | ■ | None |
| Check operation of safety shutters | ■ | ■ | ■ | ■ | ■ | None |
| Chassis locking (optional) | | | | | | |
| Open and close keylocks installed on chassis | ■ | ■ | ■ | ■ | ■ | None |
| Operate padlocking system | ■ | ■ | ■ | ■ | ■ | None |

(1) These checks will be carried out by Schneider Electric Services during the diagnostic check every fifth year (see page 52).

Maintaining the Compact NS during operation

Recommended preventive maintenance and time intervals

Level III (every 2 years)

General preventive maintenance operations such as general adjustments, troubleshooting and diagnosis of breakdowns, repairs by exchange of components or functional parts, minor mechanical repairs, carried out by a qualified customer technician using the tools and measurement/setting devices specified in the manufacturer maintenance instructions.

| Check | Year | | | | | Tool |
|--|------|---|---|---|------------------|--|
| | 1 | 2 | 3 | 4 | 5 ⁽¹⁾ | |
| Mechanism | | | | | | |
| Check motor mechanism charging time at 0.85 Un | | ■ | | ■ | ■ | Stopwatch + external power supply |
| Check general condition of mechanism | | ■ | | ■ | ■ | Screwdriver |
| Control auxiliaries (electrical operated device) | | | | | | |
| Check operation of indication contacts (OF / motor mechanism) | | ■ | | ■ | ■ | Ohmmetre |
| Check closing operation of control auxiliary XF at 0.85 Un | | ■ | | ■ | ■ | External power supply |
| Check opening operation of control auxiliary MX at 0.70 Un | | ■ | | ■ | ■ | External power supply |
| Check operation of control auxiliary MN/MNR between 0.35 and 0.70 Un | | ■ | | ■ | ■ | External power supply |
| Check delay of MNR devices at 0.35 and 0.70 Un | | ■ | | ■ | ■ | External power supply |
| Check MX tripping time | | ■ | | ■ | ■ | Tester |
| Chassis (optional) | | | | | | |
| Dust and regrease chassis | | ■ | | ■ | ■ | Mobilith SHC100 |
| Regrease disconnecting-contact clusters (specific case of corrosive atmospheres) | | ■ | | ■ | ■ | Mobilith SHC100 |
| Power connections | | | | | | |
| Check and tighten loose connections | | | | | | Only after a visual inspection showing overheating marks Dynamometric crank |

(1) These checks will be carried out by Schneider Electric Services during the diagnostic check every fifth year (see page 52).

Maintaining the Compact NS during operation

Recommended preventive maintenance and time intervals

Level IV (every 5 years)

All major preventive and corrective maintenance work carried out by the Schneider Electric after-sales support department.

| Check | Year | | | | | Tool |
|--|------|----|----|----|----|---------------------------|
| | 5 | 10 | 15 | 20 | 25 | |
| Case | | | | | | |
| Measure insulation resistance | ■ | ■ | ■ | ■ | ■ | Ohmmeter |
| Breaking unit | | | | | | |
| Measure the voltage drop across main contacts for each pole | ■ | ■ | ■ | ■ | ■ | Ohmmeter + injection unit |
| Control auxiliaries | | | | | | |
| Preventive replacement of control auxiliaries ⁽¹⁾ | | | ■ | | | None |
| Micrologic control unit | | | | | | |
| Micrologic replacement ⁽¹⁾ | | | ■ | | | |
| Check DIN/DINF tripping using performer test tool | ■ | ■ | ■ | ■ | ■ | Performer test kit |
| Chassis (optional) | | | | | | |
| Check connection/disconnection torque | ■ | ■ | ■ | ■ | ■ | Dynamometric crank |
| Communication module and accessories | | | | | | |
| Test the device control, the uploading of contact status (OF, SD, SDE) operation of optical link, by using the communication network | ■ | ■ | ■ | ■ | ■ | Magicbox + RCU software |
| Test by using the communication network: <ul style="list-style-type: none"> ■ uploading of chassis position contacts ■ synchronisation of the address between BCM ULP and IO module ■ forced replication of the BCM address | ■ | ■ | ■ | ■ | ■ | Magicbox + RCU software |
| Test the writing of data into Micrologic by using the communication network | ■ | ■ | ■ | ■ | ■ | Magicbox + RCU software |

(1) For critical power applications it is recommended to replace the Micrologic control unit and the control auxiliaries after 10 years. In case of harsh environmental conditions, it may be required to reduce this time: please refer to «Harsh conditions and device not installed inside a switchboard», page 49 of this manual. Schneider Electric will help you to define the most appropriate and adequate maintenance plan specific to you application.

What to do when the circuit breaker trips

Identifying the cause

Overview

Local and remote indication provides information on the probable cause of a trip. In particular, the indications specific to the Micrologic control unit provide a high level of certainty about the cause of the fault (see Micrologic control unit user manuals).

There are several types of cause:

- faults on the installation
- faults due to a malfunction
- intentional tripping.

Note the fault

Faults are signalled locally and remotely by the indicators and auxiliary contacts installed on devices (depending on each configuration). See page 36 in this manual and the user manual of the control unit for information on the fault indications available with your device.

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 device

The device can be reset locally. See page 6, page 10 and page 16 in this manual for information on how the device can be reset.

What to do when the circuit breaker trips

Maintenance of the equipment following trip on fault

The fact that the protection has tripped does not remedy the cause of the fault on the downstream equipment.

⚠ CAUTION

RISK OF CLOSING ON ELECTRICAL FAULT

Do not close the circuit breaker again without first inspecting and, if necessary, repairing the downstream electrical equipment.

Failure to follow these instructions can result in injury or equipment damage.

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices.
- This equipment must be installed and serviced by qualified electrical personnel.
- Disconnect all power sources before performing maintenance inspections.
- Assume that all circuits are live until they are completely de-energized, tested, grounded and tagged.
- Consider all sources of power, including the possibility of backfeeding and control power.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors and covers before turning on power to this equipment.

Failure to follow these instructions will result in death or serious injury.

Depending on the type of fault, maintenance inspections must be carried out on all or part of the equipment where the fault occurred (see Start-up, page 37):

- Minor faults:
 - Tripped by long time protection
 - Tripped by earth leakage protection

Following repairs, checks D, E and F must be carried out.
- Serious or destructive faults:
 - Tripped due to unknown electrical fault
 - Tripped by short time protection
 - Tripped by ground fault protection

Following repairs, checks A, B, D, E and F must be carried out. The device that tripped must be specifically checked (see Maintaining the Compact NS During Operation, page 48) before being returned to service.

Note: Checks, tests and inspections must be carried out by qualified personnel. If restarting is a high priority (for example, a safety installation), the defective part of the installation must be isolated and locked in OFF position in order to carry out this maintenance.

| Problem | Probable cause | Solutions |
|--|---|---|
| Device cannot be closed locally or remotely | <ul style="list-style-type: none"> ■ Device padlocked or keylocked in the «open» position ■ Device not completely connected ■ MX opening release permanently supplied with power ■ MN undervoltage release not supplied with power ■ Permanent trip order in the presence of a Micrologic P control unit with minimum voltage and minimum frequency protection in Trip mode and the control unit powered | <ul style="list-style-type: none"> ■ Disable the locking function ■ Terminate racking in (connection) of the device ■ There is an opening order. Determine the origin of the order. The order must be cancelled before the device can be closed ■ There is an opening order. Determine the origin of the order. <ul style="list-style-type: none"> ■ Check the voltage and the supply circuit ($U > 0.85 U_n$). If the problem persists, replace the release ■ Disable these protection functions on the Micrologic P control unit |
| Unexpected tripping | <ul style="list-style-type: none"> ■ MN undervoltage release supply voltage too low ■ Load-shedding order sent to the MX opening release by another device ■ Unnecessary opening order from the MX opening release | <ul style="list-style-type: none"> ■ Check the voltage and the supply circuit ($U > 0.85 U_n$) ■ Check the overall load on the distribution system <ul style="list-style-type: none"> ■ If necessary, modify the settings of devices in the installation ■ Determine the origin of the order |
| Device cannot be opened remotely, but can be opened locally | <ul style="list-style-type: none"> ■ Opening order not executed by the MN undervoltage release | <ul style="list-style-type: none"> ■ Drop in voltage insufficient or residual voltage ($> 0.35 U_n$) across the terminals of the undervoltage release. If the problem persists, replace the MN release |
| Device cannot be opened locally | <ul style="list-style-type: none"> ■ Operating mechanism malfunction or welded contacts | <ul style="list-style-type: none"> ■ Contact a Schneider Electric service centre |
| Impossible to insert the crank in connected, test or disconnected position | <ul style="list-style-type: none"> ■ A padlock or keylock is present on the chassis or a door interlock is present | <ul style="list-style-type: none"> ■ Disable the locking function |
| Impossible to turn the crank | <ul style="list-style-type: none"> ■ The reset button has not been pressed | <ul style="list-style-type: none"> ■ Press the reset button |
| Device cannot be removed from chassis (optional) | <ul style="list-style-type: none"> ■ Device not in disconnected position ■ The rails are not completely out | <ul style="list-style-type: none"> ■ Turn the crank until the device is in disconnected position and the reset button is out ■ Pull the rails all the way out |
| Device cannot be connected (racked in) (optional) | <ul style="list-style-type: none"> ■ Chassis/device mismatch protection ■ The safety shutters are locked ■ The disconnecting-contact clusters are incorrectly positioned ■ Chassis locked in disconnected position ■ The device has not been sufficiently inserted in the chassis | <ul style="list-style-type: none"> ■ Check that the chassis corresponds with the device ■ Remove the lock(s) ■ Reposition the clusters ■ Disable the chassis locking function ■ Insert the device completely so that it is engaged in the racking mechanism |
| Device cannot be locked in disconnected position (optional) | <ul style="list-style-type: none"> ■ The device is not in the right position ■ The crank is still in the chassis | <ul style="list-style-type: none"> ■ Check the device position by making sure the reset button is out ■ Remove the crank and store it |
| Device cannot be locked in connected, test, or disconnected position | <ul style="list-style-type: none"> ■ Check that locking in any position is enabled ■ The device is not in the right position ■ The crank is still in the chassis | <ul style="list-style-type: none"> ■ Contact a Schneider Electric service centre ■ Check the device position by making sure the reset button is out ■ Remove the crank and store it |

| Problem | Probable cause | Solutions |
|--|--|---|
| Device cannot be closed locally or remotely | <ul style="list-style-type: none"> ■ Device padlocked or keylocked in the «open» position ■ Device interlocked mechanically in a source changeover system ■ Device not completely connected ■ The reset button signalling the fault has not been reset ■ Stored energy mechanism not charged ■ MX opening release permanently supplied with power ■ MN undervoltage release not supplied with power ■ Closing release continuously supplied with power, but device not "ready to close" ■ Permanent trip order in the presence of a Micrologic P control unit with minimum voltage and minimum frequency protection in Trip mode and the control unit powered | <ul style="list-style-type: none"> ■ Disable the locking fonction ■ Check the position of the other device in the changeover system ■ Modify the situation to release the interlock ■ Terminate racking in (connection) of the device ■ Clear the fault ■ Push the rest button on the front of the device ■ Charge the mechanism manually ■ If it is equipped with a motor mechanism, check the supply of power to the motor. If the problem persists, replace the motor mechanism ■ There is an opening order. Determine the origin of the order. The order must be cancelled before the device can be closed ■ There is an opening order. Determine the origin of the order. ■ Check the voltage and the supply circuit ($U > 0.85 U_n$). If the problem persists, replace the release ■ Cut the supply of power to the closing release, then send the closing order again, but only if the device is "ready to close" ■ Disable these protection functions on the Micrologic P control unit |
| Device cannot be closed remotely but can be opened locally using the closing pushbutton | <ul style="list-style-type: none"> ■ Closing order not executed by the closing release | <ul style="list-style-type: none"> ■ Check the voltage and the supply circuit ($0.85 - 1.1 U_n$) ■ If the problem persists, replace the closing release |
| Unexpected tripping without activation of the reset button signalling a fault trip | <ul style="list-style-type: none"> ■ MN undervoltage release supply voltage too low ■ Load-shedding order sent to the MX opening release by another device ■ Unnecessary opening order from the MX opening release | <ul style="list-style-type: none"> ■ Check the voltage and the supply circuit ($U > 0.85 U_n$) ■ Check the overall load on the distribution system ■ If necessary, modify the settings of devices in the installation ■ Determine the origin of the order |
| Unexpected tripping with activation of the rest button signalling a fault trip | <ul style="list-style-type: none"> ■ A fault is present: <ul style="list-style-type: none"> □ overload □ earth-fault □ short-circuit detected by the control unit | <ul style="list-style-type: none"> ■ Determine and clear the causes of the fault ■ Check the condition of the device before putting it back into service |
| Instantaneous opening after each attempt to close the device with activation of the reset button signalling a fault trip | <ul style="list-style-type: none"> ■ Thermal memory ■ Transient overcurrent when closing ■ Closing on a short-circuit | <ul style="list-style-type: none"> ■ See the user manual of the control unit ■ Press the rest button ■ Modify the distribution system or the control unit settings ■ Check the condition of the device before putting it back into service ■ Press the reset button ■ Clear the fault ■ Check the condition of the circuit breaker before putting it back into service ■ Press the rest button |

| Problem | Probable cause | Solutions |
|---|---|--|
| Device cannot be opened remotely, but can be opened locally | <ul style="list-style-type: none"> ■ Opening order not executed by the MX opening release ■ Opening order not executed by the MN undervoltage release | <ul style="list-style-type: none"> ■ Check the voltage and the supply circuit (0.7 - 1.1 Un) If the problem persists, replace the MX release ■ Drop in voltage insufficient or residual voltage (> 0.35 Un) across the terminals of the undervoltage release. If the problem persists, replace the MN release |
| Device cannot be opened locally | <ul style="list-style-type: none"> ■ Operating mechanism malfunction or welded contacts | <ul style="list-style-type: none"> ■ Contact a Schneider Electric service centre |
| Device can be reset locally but not remotely | <ul style="list-style-type: none"> ■ Insufficient supply voltage for the motor mechanism | <ul style="list-style-type: none"> ■ Check the voltage and the supply circuit (0.7 - 1.1 Un) If the problem persists, replace the motor mechanism release |
| Nuisance tripping of the device with activation of the reset button signalling a fault trip | <ul style="list-style-type: none"> ■ Reset button not pushed in completely | <ul style="list-style-type: none"> ■ Push the reset button in completely |
| Impossible to insert the crank in connected, test or disconnected position | <ul style="list-style-type: none"> ■ A padlock or keylock is present on the chassis or a door interlock is present | <ul style="list-style-type: none"> ■ Disable the locking function |
| Impossible to turn the crank | <ul style="list-style-type: none"> ■ The reset button has not been pressed | <ul style="list-style-type: none"> ■ Press the reset button |
| Device cannot be removed from chassis | <ul style="list-style-type: none"> ■ Device not in disconnected position ■ The rails are not completely out | <ul style="list-style-type: none"> ■ Turn the crank until the device is in disconnected position and the reset button is out ■ Pull the rails all the way out |
| Device cannot be connected (racked in) | <ul style="list-style-type: none"> ■ Chassis/device mismatch protection ■ The safety shutters are locked ■ The disconnecting contact clusters are incorrectly positioned ■ Chassis locked in disconnected position ■ The reset button has not been pressed, preventing rotation of the crank ■ The device has not been sufficiently inserted in the chassis | <ul style="list-style-type: none"> ■ Check that the chassis corresponds with the device ■ Remove the lock(s) ■ Reposition the clusters ■ Disable the chassis locking function ■ Press the reset button ■ Insert the device completely so that it is engaged in the racking mechanism |
| Device cannot be locked in disconnected position (optional) | <ul style="list-style-type: none"> ■ The device is not in the right position ■ The crank is still in the chassis | <ul style="list-style-type: none"> ■ Check the device position by making sure the reset button is out ■ Remove the crank and store it |
| Device cannot be locked in connected, test, or disconnected position | <ul style="list-style-type: none"> ■ Check that locking in any position is enabled ■ The device is not in the right position ■ The crank is still in the chassis | <ul style="list-style-type: none"> ■ Contact a Schneider Electric service centre ■ Check the device position by making sure the reset button is out ■ Remove the crank and store it |

Notes

Notes

Notes

Schneider Electric Industries SAS
35, rue Joseph Monier
CS 30323
F - 92506 Rueil Malmaison Cedex

As standards, specifications and designs change from time to time, please ask for confirmation of the information given in this publication.



This document has been printed on ecological paper

Design: Schneider Electric
Photos: Schneider Electric
Printed: