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

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.
Discovering Compact NS

Rating plate

Manually operated device

- 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

Standard

Electrically operated device

- 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

Standard

Note:
For further detailed presentation of the Compact NS offer, refer to the Compact NS catalogue (LVPED211021EN).
Manually operated
Compact NS with a toggle

Components

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

Local opening and closing
- OFF: breaker open, ON: breaker closed.

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.

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.
Testing the device

Manually operated
Compact NS with a toggle

- Close the device.

- Press the "Push-to-trip" button.

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

---

1. Push-to-trip
2. CLAC
3. Reset
4. ON
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.
Manually operated
Compact NS with a rotary handle

Components

- OF1 ON/OFF indication contact
- OF2 ON/OFF indication contact
- OF3 ON/OFF indication contact
- SD trip-indication contact
- SDE fault-trip indication contact
- CAO early-break contact
- CAF early-make contact
- MX opening voltage release or MN undervoltage release
- Extended rotary handle
- Door lock
- Padlocking device
- "Push to trip" button
- Rating plate
- Keylocks
Opening, closing, reset with a rotary handle

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.
Testing the device

- 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

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.

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

- Lock the handle.

- The controls are locked.

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.
Manually operated Compact NS with a rotary handle

**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
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.
Components

Fixed device

MX opening voltage release or MN undervoltage release

SD trip-indication contact

OF ON/OFF indication contacts

Charging handle for the closing order

Control auxiliary terminals

Motor mechanism

Locking in the OFF position using a padlock

Locking in the OFF position using a keylock and a padlock

ON button

OFF button

Operation counter

Front

Trip indication button used to reset before closing

Rating plate

Locking by padlock, lead-seal cover or screws for pushbuttons

Indicator for position of the main contacts

Closing spring status indicator

Control unit

SDE fault-trip indication contact

DB426220

DB118654

RESET

Rating plate

T

rip indication button used to reset before closing

OFF button

Operation counter

MX opening voltage release or MN undervoltage release

SD trip-indication contact

OF ON/OFF indication contacts

Charging handle for the closing order

Control auxiliary terminals

Motor mechanism

Locking in the OFF position using a padlock

Locking in the OFF position using a keylock and a padlock

ON button

OFF button

Operation counter

Control unit

SDE fault-trip indication contact

DB426220

DB118654

RESET

Rating plate

T

rip indication button used to reset before closing

OFF button

Operation counter

Control unit

SDE fault-trip indication contact
Opening and closing the device

With the motor mechanism

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.

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.
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

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).

- The controls are locked.

Unlocking the device

- Remove the padlocks.
- Push in the tab.

Padlocks and keylocks may be used together.
Pushing 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 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.

<table>
<thead>
<tr>
<th>Combination</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>A B C</td>
<td>4</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A B D</td>
<td>3</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A B E</td>
<td>3</td>
<td>4</td>
<td></td>
<td></td>
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<td>A B</td>
<td>3</td>
<td>4</td>
<td>5</td>
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<tr>
<td>A C D</td>
<td>2</td>
<td>5</td>
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<td>A C E</td>
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<tr>
<td>A C</td>
<td>2</td>
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<td>A D E</td>
<td>2</td>
<td>3</td>
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<td></td>
<td></td>
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<tr>
<td>A D</td>
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<td></td>
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<tr>
<td>B C E</td>
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<td>4</td>
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<td></td>
</tr>
<tr>
<td>B C</td>
<td>1</td>
<td>4</td>
<td>5</td>
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<tr>
<td>B D E</td>
<td>1</td>
<td>3</td>
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<tr>
<td>B D</td>
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<tr>
<td>B E</td>
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<tr>
<td>C D</td>
<td>1</td>
<td>2</td>
<td>5</td>
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<td></td>
</tr>
<tr>
<td>C E</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D E</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Compact NS chassis
Compact NS chassis

Racking

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.
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.

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

The device is in "connected" position.
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.

Press the pop-up button and turn the crank.

The device is in "disconnected" position.
Compact NS chassis

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.

1. Pull out the tab.
2. Insert the shackle (diameter 5 to 8 mm) of the padlock(s).
3. The crank cannot be inserted.

Unlocking
Remove the padlock(s).

1. Release the tab.
2. The crank can be inserted.
3. The crank cannot be inserted.
Locking in the "disconnected" position
Using one or two keylocks

Locking
Device in "disconnected" position.

1. Turn the key(s).
2. Remove the key(s).
3. The crank cannot be inserted.

Unlocking
Insert the key(s).

1. Turn the key(s).
2. The crank can be inserted.

Three types of keylocks can be installed

- **RONIS**
- **PROFALUX**
- **CASTELL**
Locking the switchboard door

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.
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.
- Top shutter not locked. Bottom shutter locked.
- Top shutter locked. Bottom shutter not locked.
- 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.

### Power

- **N**: Neutral
- **L1, L2, L3**: Line

### Control unit

- **Upstream cb**: M6C
- **Downstream cb**: Micrologic

### Remote operation

- **MN**: Undervoltage release
- **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)

### Symbols

- **A**: Digital ammeter
- **E**: Energy
- **P**: A + power meter + additional protection

### Notes

- 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

### Micrologic

- 24 V DC power supply required

### Motor-mechanism module

- 24 V DC power supply required
**Electrical diagrams**

**Fixed devices**

**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 (manual operation)**

OF1 / OF2 / OF3 : 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)

*CAF2 option is not compatible with M6C option.
Electrical diagrams
Withdrawable devices

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

**Power**

**Control unit**

**Remote operation**

**Control unit**

**Remote operation**

**Control unit**

Terminal-block marking

<table>
<thead>
<tr>
<th>Basic</th>
<th>A</th>
<th>E</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>UC1</td>
<td>Z1-Z5 zone selective interlocking:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Z1 = ZSI OUT SOURCE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Z2 = ZSI OUT; Z3 ZSI IN SOURCE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Z4 = ZSI IN ST (short time)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Z5 = ZSI IN GF (earth fault)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M1 = Vigi module input</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Micrologic 7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Basic</td>
<td>A</td>
<td>E</td>
<td>P</td>
</tr>
<tr>
<td>UC2</td>
<td>T1, T2, T3, T4 = external neutral;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M2, M3 = Vigi module input</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Micrologic 7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Basic</td>
<td>A</td>
<td>E</td>
<td>P</td>
</tr>
<tr>
<td>UC3</td>
<td>F2+, F1- external 24 V DC power supply</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VN external voltage connector</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(must be connected to the neutral with a 3P circuit breaker)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M6C: 6 programmable contacts (to be connected to the external module M6C) ext. 24 V DC power supply required</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

Motor-mechanism module

- MN: undervoltage release
- MX: voltage release

Motor mechanism module (*)

- MT2: electrical opening order
- MT1: 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)
Electrical auxiliaries

Electrical diagrams
Withdrawable devices

- 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.
**Electrical auxiliaries**

**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
- **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**

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

<table>
<thead>
<tr>
<th>Name</th>
<th>Contact number</th>
<th>Position of indicators and contacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Device status</td>
<td>–</td>
<td>ON</td>
</tr>
<tr>
<td>Main contact position</td>
<td>–</td>
<td>Closed</td>
</tr>
<tr>
<td>Reset button position</td>
<td>–</td>
<td>IN</td>
</tr>
<tr>
<td>OF indication contact position</td>
<td>1–2</td>
<td>Open</td>
</tr>
<tr>
<td>CT</td>
<td>1–4</td>
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<td>SDE indication contact position</td>
<td>1–2</td>
<td>Closed</td>
</tr>
<tr>
<td>CD</td>
<td>1–4</td>
<td>Open</td>
</tr>
</tbody>
</table>

**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:

<table>
<thead>
<tr>
<th>Checks and Inspections</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prior to start-up</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Periodically during operation</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>After carrying out work on the switchboard</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Periodically during lengthy downtime</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Following lengthy downtime</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Following lengthy downtime and modification to the switchboard</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A: Insulation and dielectric strength tests</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B: Inspection of the switchboard</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C: Compliance with the installation diagram</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D: Inspection of mechanical equipment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E: Mechanical operation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F: Check of electronic control units</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**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).
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).
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.
Environmental conditions

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).

<table>
<thead>
<tr>
<th>Compact NS630b to 1600</th>
<th>Profile</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Vibrations, shocks and shakes in operational conditions</td>
<td>3M4 IEC 60721-3-3 compliant</td>
</tr>
</tbody>
</table>
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.

<table>
<thead>
<tr>
<th>Compact NS630b to 1600</th>
<th>2000</th>
<th>3000</th>
<th>4000</th>
<th>5000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impulse withstand voltage Uimp (kV)</td>
<td>8</td>
<td>7.1</td>
<td>6.4</td>
<td>5.6</td>
</tr>
<tr>
<td>Rated insulation voltage (Ui)</td>
<td>800</td>
<td>710</td>
<td>635</td>
<td>560</td>
</tr>
<tr>
<td>Maximum rated operational voltage 50/60 Hz (V)</td>
<td>690</td>
<td>690</td>
<td>635</td>
<td>560</td>
</tr>
<tr>
<td>Rated current 40 °C</td>
<td>1 x In</td>
<td>0.99 x In</td>
<td>0.96 x In</td>
<td>0.94 x In</td>
</tr>
</tbody>
</table>

Intermediate values may be obtained by interpolation.
What to maintain and why

Overview

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).
Operating the Compact NS

What to maintain and why
Maintaining body parts

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 In).

It is recommended to use a vacuum cleaner instead of a cloth to remove dust from the outside of the arc chutes.
What to maintain and why
Maintaining connections

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 (H₂S/SO₂), 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.

⚠️ 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.
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.
Operating the Compact NS

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.

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.

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.

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.
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.

<table>
<thead>
<tr>
<th>Normal operating and environmental conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Temperature</strong></td>
</tr>
<tr>
<td><strong>Percent load</strong></td>
</tr>
<tr>
<td><strong>Harmonics</strong></td>
</tr>
<tr>
<td><strong>Relative humidity</strong></td>
</tr>
<tr>
<td><strong>Corrosive atmosphere</strong></td>
</tr>
<tr>
<td><strong>Salt environment</strong></td>
</tr>
<tr>
<td><strong>Dust</strong></td>
</tr>
<tr>
<td><strong>Vibration</strong></td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Favourable operating and environmental conditions for device installed inside a switchboard</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Temperature</strong></td>
</tr>
<tr>
<td><strong>Percent load</strong></td>
</tr>
<tr>
<td><strong>Relative humidity</strong></td>
</tr>
<tr>
<td><strong>Corrosive atmosphere</strong></td>
</tr>
<tr>
<td><strong>Salt environment</strong></td>
</tr>
<tr>
<td><strong>Dust</strong></td>
</tr>
<tr>
<td><strong>Vibration</strong></td>
</tr>
</tbody>
</table>

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).
Maintaining the Compact NS during operation
Recommended preventive maintenance and time intervals

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

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

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 correct 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.

*(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.

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

(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.

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

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

<table>
<thead>
<tr>
<th>Check</th>
<th>Year</th>
<th>Tool</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Measure insulation resistance</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Measure the voltage drop across main</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>contacts for each pole</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Ommeter</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>Control auxiliaries</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preventive replacement of control</td>
<td></td>
<td></td>
</tr>
<tr>
<td>auxiliaries (1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Micrologic control unit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Micrologic replacement (1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Check DIN/DINF tripping using performer test tool</td>
<td>5</td>
<td>Performer test kit</td>
</tr>
<tr>
<td>Chassis (optional)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Check connection/disconnection torque</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Chassis (optional)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Communication module and accessories</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test the device control, the upload</td>
<td>5</td>
<td>Magicbox + RCU software</td>
</tr>
<tr>
<td>ing of contact status (OF, SD, SDE) operation of optical link, by using the communication network</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Test by using the communication network:</td>
<td>15</td>
<td>Magicbox + RCU software</td>
</tr>
<tr>
<td>■ uploading of chassis position contacts</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>■ synchronisation of the address between BCM ULP and IO module</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>■ forced replication of the BCM address</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(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 your 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.
## Troubleshooting and solutions

### Manually operated Compact NS

<table>
<thead>
<tr>
<th>Problem</th>
<th>Probable cause</th>
<th>Solutions</th>
</tr>
</thead>
</table>
| Device cannot be closed locally or remotely | - 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 | - 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. Check the voltage and the supply circuit $(U > 0.85 \text{ Un})$. If the problem persists, replace the release  |

| Unexpected tripping | 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 | Check the voltage and the supply circuit $(U > 0.85 \text{ Un})$. Check the overall load on the distribution system. 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 | Opening order not executed by the MN undervoltage release | Drop in voltage insufficient or residual voltage $(> 0.35 \text{ Un})$ across the terminals of the undervoltage release. If the problem persists, replace the MN release |

| Device cannot be opened locally | Operating mechanism malfunction or welded contacts | Contact a Schneider Electric service centre |

| Impossible to insert the crank in connected, test or disconnected position | A padlock or keylock is present on the chassis or a door interlock is present | Disable the locking function |

| Impossible to turn the crank | The reset button has not been pressed | Press the reset button |

| Device cannot be removed from chassis (optional) | Device not in disconnected position  
- The rails are not completely out | 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) | 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 | 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) | The device is not in the right position  
- The crank is still in the chassis | 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 | Check that locking in any position is enabled  
- The device is not in the right position  
- The crank is still in the chassis | Contact a Schneider Electric service centre  
- Check the device position by making sure the reset button is out  
- Remove the crank and store it |
## Troubleshooting and solutions
### Electrically operated Compact NS

<table>
<thead>
<tr>
<th>Problem</th>
<th>Probable cause</th>
<th>Solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Device cannot be closed locally or remotely</td>
<td>■ Device padlocked or keylocked in the «open» position&lt;br&gt; ■ Device interlocked mechanically in a source changeover system&lt;br&gt; ■ Device not completely connected&lt;br&gt; ■ The reset button signalling the fault has not been reset&lt;br&gt; ■ Stored energy mechanism not charged&lt;br&gt; ■ MX opening release permanently supplied with power&lt;br&gt; ■ MN undervoltage release not supplied with power&lt;br&gt; ■ Closing release continuously supplied with power, but device not &quot;ready to close&quot;&lt;br&gt; ■ 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</td>
<td>■ Disable the locking function&lt;br&gt; ■ Check the position of the other device in the changeover system&lt;br&gt; ■ Modify the situation to release the interlock&lt;br&gt; ■ Terminate racking in (connection) of the device&lt;br&gt; ■ Clear the fault&lt;br&gt; ■ Push the rest button on the front of the device&lt;br&gt; ■ There is an opening order. Determine the origin of the order. The order must be cancelled before the device can be closed&lt;br&gt; ■ There is an opening order. Determine the origin of the order.&lt;br&gt; ■ Check the voltage and the supply circuit (U &gt; 0.85 Un). If the problem persists, replace the release&lt;br&gt; ■ Cut the supply of power to the closing release, then send the closing order again, but only if the device is &quot;ready to close&quot;&lt;br&gt; ■ Disable these protection functions on the Micrologic P control unit</td>
</tr>
<tr>
<td>Device cannot be closed remotely but can be opened locally using the closing pushbutton</td>
<td>■ Closing order not executed by the closing release</td>
<td>■ Check the voltage and the supply circuit (0.85 - 1.1 Un) If the problem persists, replace the closing release</td>
</tr>
<tr>
<td>Unexpected tripping without activation of the reset button signalling a fault trip</td>
<td>■ MN undervoltage release supply voltage too low&lt;br&gt; ■ Load-shedding order sent to the MX opening release by another device&lt;br&gt; ■ Unnecessary opening order from the MX opening release</td>
<td>■ Check the voltage and the supply circuit (U &gt; 0.85 Un)&lt;br&gt; ■ Check the overall load on the distribution system&lt;br&gt; ■ If necessary, modify the settings of devices in the installation&lt;br&gt; ■ Determine the origin of the order</td>
</tr>
<tr>
<td>Unexpected tripping with activation of the reset button signalling a fault trip</td>
<td>■ A fault is present: □ overload □ earth-fault □ short-circuit detected by the control unit</td>
<td>■ Determine and clear the causes of the fault&lt;br&gt; ■ Check the condition of the device before putting it back into service</td>
</tr>
<tr>
<td>Instantaneous opening after each attempt to close the device with activation of the reset button signalling a fault trip</td>
<td>■ Thermal memory&lt;br&gt; ■ Transient overcurrent when closing&lt;br&gt; ■ Closing on a short-circuit</td>
<td>■ See the user manual of the control unit&lt;br&gt; ■ Modify the distribution system or the control unit settings&lt;br&gt; ■ Check the condition of the device before putting it back into service&lt;br&gt; ■ Press the reset button&lt;br&gt; ■ Clear the fault&lt;br&gt; ■ Check the condition of the circuit breaker before putting it back into service&lt;br&gt; ■ Press the reset button</td>
</tr>
<tr>
<td>Problem</td>
<td>Probable cause</td>
<td>Solutions</td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Device cannot be opened remotely, but can be opened locally</td>
<td>■ Opening order not executed by the MX opening release&lt;br&gt;■ Opening order not executed by the MN undervoltage release</td>
<td>■ Check the voltage and the supply circuit (0.7 - 1.1 Un)&lt;br&gt;If the problem persists, replace the MX release&lt;br&gt;■ Drop in voltage insufficient or residual voltage (&gt; 0.35 Un) across the terminals of the undervoltage release. If the problem persists, replace the MN release</td>
</tr>
<tr>
<td>Device cannot be opened locally</td>
<td>■ Operating mechanism malfunction or welded contacts</td>
<td>■ Contact a Schneider Electric service centre</td>
</tr>
<tr>
<td>Device can be reset locally but not remotely</td>
<td>■ Insufficient supply voltage for the motor mechanism</td>
<td>■ Check the voltage and the supply circuit (0.7 - 1.1 Un)&lt;br&gt;If the problem persists, replace the motor mechanism release</td>
</tr>
<tr>
<td>Nuisance tripping of the device with activation of the reset button signalling a fault trip</td>
<td>■ Reset button not pushed in completely</td>
<td>■ Push the rest button completely</td>
</tr>
<tr>
<td>Impossible to insert the crank in connected, test or disconnected position</td>
<td>■ A padlock or keylock is present on the chassis or a door interlock is present</td>
<td>■ Disable the locking function</td>
</tr>
<tr>
<td>Impossible to turn the crank</td>
<td>■ The reset button has not been pressed</td>
<td>■ Press the reset button</td>
</tr>
<tr>
<td>Device cannot be removed from chassis</td>
<td>■ Device not in disconnected position&lt;br&gt;■ The rails are not completely out</td>
<td>■ Turn the crank until the device is in disconnected position and the reset button is out&lt;br&gt;■ Pull the rails all the way out</td>
</tr>
<tr>
<td>Device cannot be connected (racked in)</td>
<td>■ Chassis/device mismatch protection&lt;br&gt;■ The safety shutters are locked&lt;br&gt;■ The disconnecting contact clusters are incorrectly positioned&lt;br&gt;■ Chassis locked in disconnected position&lt;br&gt;■ The reset button has not been pressed, preventing rotation of the crank&lt;br&gt;■ The device has not been sufficiently inserted in the chassis</td>
<td>■ Check that the chassis corresponds with the device&lt;br&gt;■ Remove the lock(s)&lt;br&gt;■ Reposition the clusters&lt;br&gt;■ Disable the chassis locking function&lt;br&gt;■ Press the reset button&lt;br&gt;■ Insert the device completely so that it is engaged in the racking mechanism</td>
</tr>
<tr>
<td>Device cannot be locked in disconnected position (optional)</td>
<td>■ The device is not in the right position&lt;br&gt;■ The crank is still in the chassis</td>
<td>■ Check the device position by making sure the reset button is out&lt;br&gt;■ Remove the crank and store it</td>
</tr>
<tr>
<td>Device cannot be locked in connected, test, or disconnected position</td>
<td>■ Check that locking in any position is enabled&lt;br&gt;■ The device is not in the right position&lt;br&gt;■ The crank is still in the chassis</td>
<td>■ Contact a Schneider Electric service centre&lt;br&gt;■ Check the device position by making sure the reset button is out&lt;br&gt;■ Remove the crank and store it</td>
</tr>
</tbody>
</table>