Medium Voltage Earthing Switch (E/S)

Up to 17.5 kV
For MCset Air insulated switchgear with EasyPact EXE

User Guide

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10/2019
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Safety Information

Important Information

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.

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

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

<table>
<thead>
<tr>
<th><strong>DANGER</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>WARNING</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>CAUTION</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>NOTICE</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>NOTICE is used to address practices not related to physical injury. The safety alert symbol shall not be used with this signal word.</td>
</tr>
</tbody>
</table>

Please Note

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

A qualified person is one who has skills and knowledge related to the construction, installation, and operation of electrical equipment and has received safety training to recognize and avoid the hazards involved.
Before You Begin

- This user guide is meant for qualified person who will operate the Earthing Switch: panel builder, installer or end user. The generic term used in this guide for any such person is the USER.
- This user guide cannot be used to define or check the device’s compatibility with every single user’s application, nor its reliability within it. It is the duty of every user or panel builder to perform a complete risk analysis, evaluation and testing of the products in specific applications in accordance with applicable standards.
- When the products are used in applications with specific technical and safety rules, you must follow the integration and protection rules for the specific application.

<table>
<thead>
<tr>
<th>DANGER</th>
</tr>
</thead>
<tbody>
<tr>
<td>HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH</td>
</tr>
<tr>
<td>• Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See standards or local equivalent.</td>
</tr>
<tr>
<td>• This Earthing Switch and the MCset equipment must only be installed and serviced by qualified electrical personnel.</td>
</tr>
<tr>
<td>• Perform work only after reading and understanding all of the instructions contained in this guide.</td>
</tr>
<tr>
<td>• Turn off all power supplying this Earthing Switch before working on the Earthing Switch elements.</td>
</tr>
<tr>
<td>• Always use a properly rated voltage sensing device to confirm power is off.</td>
</tr>
<tr>
<td>• Use only genuine Schneider Electric specific tools (operating crank, ...).</td>
</tr>
<tr>
<td>• Check all devices, covers and doors are in correct position before turning on power to the circuit breaker and MCset equipment.</td>
</tr>
<tr>
<td>• Beware of potential hazards and carefully inspect the work area for tools and objects that may have been left inside the circuit breaker and the MCset equipment.</td>
</tr>
<tr>
<td>• Do not modify the mechanical or electrical parts.</td>
</tr>
<tr>
<td>• Do not operate the system with interlocks and protective barriers removed.</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>CAUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>HAZARD OF DEGRADED EQUIPMENT PERFORMANCE</td>
</tr>
<tr>
<td>• Respect the handling rules and avoid any shocks to the device.</td>
</tr>
<tr>
<td>• Perform the maintenance and servicing operations described in the maintenance section of this guide.</td>
</tr>
<tr>
<td>• Observe the normal service conditions described in this manual.</td>
</tr>
<tr>
<td>• If the Earthing Switch, or the MCset equipment in which the Earthing Switch is mounted, is stored before its final installation, observe the storage conditions.</td>
</tr>
</tbody>
</table>

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

Purpose of the document
This user guide is an integral part of the device. It describes the operation and use of the EasyPact EXE Earthing Switch, as well as its Basic Level Preventive Maintenance operations. This document must be available at any time to those required to use or work on the Earthing Switch. If the device is sold after installation, this document must be given to the new owner.

It is required to read this manual carefully and follow its recommendations. However, this manual cannot describe every single condition of use or every variant specific to the customer.

Access to the technical documentation
Visit our website www.se.com:
• for downloading additional documents
• for contacting Schneider Electric customer support if you need information not contained in this document
• if you have any suggestions on how to improve this document.

Connect to https://saferepository.schneider-electric.com:
• for downloading product related documents
• for downloading generic documentation.

Limitation of liability
Schneider Electric cannot be held responsible for damage due to:
• failure to follow the instructions in this guide and additional documents
• improper use of the device
• improper assembly, testing, installation, connection or misuse of the device
• use of components or spare parts other than those recommended by Schneider Electric.
Introduction to Earthing Switch

Presentation of Earthing Switch (E/S)

Function

This device is used to short circuit and earth the cable ends. When associated to Easypact EXE Circuit Breaker or Disconnecting Device, the mechanical interlock prevents:

- to rack-in the device, if the Earthing Switch is closed
- to close the Earthing Switch, if the withdrawable device (Breaker, Disconnector, Earthing device) is in "Service" position.

This device can also be used to earth the busbar in TT or CL-GL type cubicle.

Earthing Switch data

The Earthing Switch is always delivered installed in the MCset cubicle. Any Earthing Switch replacement, modification or upgrade on the user site must be carried out only by Schneider Electric Services.

The QR code located on the cubicle nameplate grants access to all the data relating to your MCset cubicle. Flash the QR code with your Smartphone or your connected tablet and you will be directed to the website containing all the data. For detailed information, please refer to your MCset documentation.

Earthing Switch elements

Two views of MCset cubicle including an Earthing Switch with motorized option.

1. Operating mechanism box
2. Earthing Switch Power part
3. Earthing Switch Motorization (option)
4. Cubicle nameplate
Front view of the operating mechanism box including VPIS

The operating mechanism box allows:
- close or open the Earthing Switch
- padlocking or keylocking the Earthing Switch in open or closed position
- padlocking or keylocking the withdrawable device in "Disconnected/test" position
- support the VPIS system.

Manual version.
- A Voltage Presence Indicator System (VPIS)
- B Opening for the insertion of the operating crank
- C Location for rack-in prevention keylock
- D "Earthing Switch position" selector
- E "Rack-in prevention padlocking" slider

Motorized version.
- F "Manual/motorized operation" slider
- G Location for Earthing Switch locks
- H Mechanical indicator of Earthing Switch status
- I Locking system for the door of the MV cable compartment

E/S Power part

E/S Motorization (option)

The motorization is located at the rear of Earthing Switch operating mechanism box.
Operating instruction label

Label of Earthing Switch manual operating instructions

This label gives a pictorial guide to the manual operation of the Earthing Switch. For detailed instructions, please refer to "Using Earthing Switch" chapter.

Label of rack-in prevention padlocking

This label gives a pictorial guide to the operation of the racking device lock.
Service conditions

Normal service conditions

The device, including the auxiliary and control circuits is designed to operate according to its rated characteristics and the service conditions below:

<table>
<thead>
<tr>
<th>Indoor device</th>
<th>IEC 62271-102: 2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambient air temperature:</td>
<td></td>
</tr>
<tr>
<td>• minimum value</td>
<td>-25 °C</td>
</tr>
<tr>
<td>• maximum value</td>
<td>+40 °C</td>
</tr>
<tr>
<td>• average measured over a 24-hour period</td>
<td>≤ 35 °C</td>
</tr>
<tr>
<td>Average relative humidity:</td>
<td></td>
</tr>
<tr>
<td>• measured over a 24-hour period</td>
<td>≤ 95 %</td>
</tr>
<tr>
<td>• measured over a 1-month period</td>
<td>≤ 90 %</td>
</tr>
<tr>
<td>Average water vapor pressure:</td>
<td></td>
</tr>
<tr>
<td>• measured over a 24-hour period</td>
<td>≤ 2.2 kPa</td>
</tr>
<tr>
<td>• measured over a 1-month period</td>
<td>≤ 1.8 kPa</td>
</tr>
<tr>
<td>Altitude above sea level</td>
<td>≤ 1000 m</td>
</tr>
<tr>
<td>Atmosphere</td>
<td>The ambient air is not significantly polluted by dust, smoke, corrosive and/or flammable gases, vapours or salt.</td>
</tr>
</tbody>
</table>

Other service conditions

If operated beyond the normal service conditions, the Earthing Switch is submitted to accelerated aging.

The Earthing Switch may only be used under conditions other than the normal service conditions with express written permission from Schneider Electric.
Using Earthing Switch

Understanding Earthing Switch and indicators

The different states

<table>
<thead>
<tr>
<th>Status indicator</th>
<th>Electrical state</th>
<th>State description</th>
<th>Operations possible</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Earthing Switch is in open position</td>
<td>• Closing the Earthing Switch [refer to page 20]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Racking-in or racking-out the withdrawable device</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Earthing switch is in closed position</td>
<td>• Opening the Earthing Switch [refer to page 17]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Opening the MV cable door</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Circuit breaker test operations (Open/Close)</td>
</tr>
</tbody>
</table>

The different symbols

Pictogram for Earthing Switch

- Operating position
- Earthing Switch open position
- Earthing Switch closed position
- Earthing Switch position selector lockable with padlock
- Motorized operation is not permitted
- Manual operation is possible using the crank
- Motorised operation

Pictogram for withdrawable device

- The rack-in prevention locking is retracted and the withdrawable device can be racked-in/racked-out.
- The rack-in prevention locking is pulled out and can be padlocked. The withdrawable device is in "Disconnected/test" position and cannot be racked-in.
Local control

A control of an operation is performed at a point on or adjacent to the controlled device.

Mechanical control

A mechanical operation allows you:
- to turn the Earthing Switch position selector
- to manipulate the rack-in prevention locking
- to open/close Earthing Switch using crank handle
- to operate key interlocks.

Electrical control

In order to use the electrical control functions, either local or remote, the remote control auxiliaries with associated pushbutton and commutators must be installed.

Refer to the MCset equipment's documentation to find out where the circuit breaker control buttons are located.

Remote electrical control

A control of an operation is performed at a point distant from the controlled device.
In order to use the electrical control functions, the remote control auxiliaries with associated pushbutton and commutators must be installed.

Refer to your MCset equipment's documentation and supervision system's documentation to find out the available communication functions.
Cable earthing using Earthing Switch

Closing the Earthing Switch

Closing conditions
Closing of the Earthing Switch is possible only if the withdrawable device is in "Disconnected/test" position or has been removed from the switchboard.

Additionally the following conditions must be fulfilled:
- no indicator lights showing on the voltage presence device
- if present, all the lock-out devices (keylock, padlock and electromagnet) are in the states that allow the Earthing Switch closing.

Manual closing
Change the position of the Earthing Switch position selector to , by pulling it and turning it once in a clockwise direction.
• For the Manual version, the insertion hole is cleared.
• For the Motorized version, lift the manual operation slider to clear the insertion hole.

Insert the operating crank into the hole. Turn the operating crank clockwise until the status indicator changes. The closing is quick and makes a noise.

<table>
<thead>
<tr>
<th>E/S version</th>
<th>Nos. of crank turns</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>17</td>
</tr>
<tr>
<td>Motorized</td>
<td>19</td>
</tr>
</tbody>
</table>

Remove the operating crank.

Confirm the position of the Earthing Switch by pulling and turning the selector in a clockwise direction to the position. The Earthing Switch is closed and the MV cable connections are short-circuited and earthed. Under the operating mechanism box, the locking system for the door of MV cable compartment is up. The door of MV cable compartment is un-lock and it is possible to extract the VT cabinet (if any).
Remote closing

The remote closing can be carried out if:
- all closing conditions are respected
- the Earthing Switch position selector is in "operating position"
- the manual operation slider is in "Motorized position".

The duration of the remote closing is less than 30 seconds.

Launch Earthing Switch close operation order via the HMI.

Pin in upper position:
- Cable compartment
- Access possible
Opening the Earthing Switch

Opening conditions
The following conditions are fulfilled:
• the Earthing Switch is closed
• if any, all lock-out devices (keylock, padlock and electromagnet) are in the states that allows the Earthing Switch opening
• the MV cable door is present.

Manual opening

Change the position of the Earthing Switch position selector to , by pulling it and turning it in counter clockwise direction.

• For the Manual version, the insertion hole is cleared.
• For the Motorized version, lift the manual operation slider to clear the insertion hole.
Insert the operating crank into the hole. Turn the operating crank counter-clockwise until the status indicator changes. The opening makes a noise.

<table>
<thead>
<tr>
<th>E/S version</th>
<th>Nos. of crank turns</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>17</td>
</tr>
<tr>
<td>Motorized</td>
<td>19</td>
</tr>
</tbody>
</table>

Remove the operating crank.

Confirm the position of the Earthing Switch by pulling and turning the selector once in a counter clockwise direction to the position. The Earthing Switch is now open. Under the operating mechanism box, the locking system for the door of MV cable compartment is down. The door of MV cable compartment is lock and it is not possible to extract the VT cabinet (if any).
Remote opening
The remote opening can be carried out if:
- all opening conditions are respected
- the Earthing Switch position selector is in "operating position"
- the manual operation slider is in "Motorized position".
The duration of the remote opening is less than 30 seconds.

Launch Earthing Switch opening operation order via a tablet or the HMI.

Pin in lower position:
Cable compartment
Access not possible
Locking the Earthing Switch selector

Preventing Earthing Switch operation using padlocks
To prevent the Earthing Switch operation (opening or closing) it is possible to place 1 to 3 padlocks (Ø 6 to 8 mm) into the hole of the Earthing Switch position selector.

Padlocking in open position
The Earthing Switch must be in open position (Earthing Switch position selector on O).

Padlocking in closed position
The Earthing Switch must be in closed position (Earthing Switch position selector on I). This locking also prevent the rack-in of the withdrawable device.

Locking the Earthing Switch operation using keylocks (option)
2 locations on the front of the operating mechanism box are provided to prevent the Earthing Switch operations. There are different possibilities for locking the Earthing Switch position selector:

- 1 keylock for open position (1 O)
- 1 keylock for closed position (1 C)
- 2 keylocks; one for open position and another for closed position (1 O and 1 C)
- 2 keylocks for open position (2 O)
- 2 keylocks for closed position (2 C).

The recommended locations for keylock are given in the following interlocking table. For more details, refer to interlocking diagram.

<table>
<thead>
<tr>
<th>Interlocking</th>
<th>G1 location</th>
<th>G2 location</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 O</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 O and 1 C</td>
<td>(1 C)</td>
<td>(1 O)</td>
</tr>
<tr>
<td>2 O</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 C</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**1 keylocking in open position**

The Earthing Switch must be in open position (Earthing Switch position selector on 0) and it is locked when the keylock is in vertical position.

In this position the key can be removed.

To unlock the Earthing Switch, turn the keylock counter clockwise. In this position the key is captive and can not be removed.

**Recommended keylock location for E/S locked in open position.**

---

**1 keylocking in closed position**

The Earthing Switch must be in closed position (Earthing Switch position selector on 1) and it is locked when the keylock is in vertical position.

In this position the key can be removed.

This locking also prevent the rack-in of the withdrawable device.

To unlock the Earthing Switch, turn the keylock counter clockwise. In this position the key is captive and can not be removed.

**Recommended keylock location for E/S locked in closed position.**
**Locking with two keylocks**

The Earthing Switch is locked when the keylocks are vertical according to X axis, please refer to the locking table on previous page.

1 O and 1 C locking.

2 keylocks for Earthing Switch locked in open position. 2 keylocks for Earthing Switch locked in closed position.

**Locking of "Earthing Swith position" selector with an electromagnet (option) in case of a manual Earthing Switch**

The Earthing Switch position can be locked with an electromagnet (R1) located inside the operating mechanism box, which blocks manual switching operation:

- when the electromagnet is un-energized, the "Earthing Switch position" selector is locked in closed or open position
- when the electromagnet is energized, the "Earthing Swith position" selector can be rotated in any position.

![Diagram of electromagnet locking mechanism](image-url)
**Locking of "Rack-in prevention padlocking" slider with an electromagnet (option) in case of a manual Earthing switch**

This operation is done in Local Control, as the operator have to:

- pull out the "Rack-in prevention padlocking" slider.

The "Rack-in prevention padlocking" slider can be locked with an electromagnet (R2) located inside the operating mechanism box:

- when the electromagnet is un-energized, the "Rack-in prevention padlocking" slider is locked in outside position so the withdrawable device is locked in disconnect/test position
- when the electromagnet is energized, the "Rack-in prevention padlocking" slider is unlocked and can be pushed so the withdrawable device can be racked in.

When the slider is in pulled out position, rack-in operations manual and motorized are not possible.

**Locking of "Manual/Motorised operation" slider with an electromagnet (option) in case of Motorised Earthing Switch**

The “Manual/motorised operation” slider can be locked with an electromagnet (R3) located inside the operating mechanism box:

- when the electromagnet is un-energized, the "Manual/Motorised operation" slider is locked in motorised position
- when the electromagnet is energized, the "Manual/Motorised operation" slider can be moved in any position manual or motorized.
Prevent the rack-in of a withdrawable device

The racking-in of the withdrawable device can be prevented by locking the rack-in prevention slider with a padlock or a keylock. Thus the withdrawable device is blocked in "Disconnected/test" position. When the slider is in pulled out position, rack-in operations manual and motorized are not possible.

Padlocking

Pull out the rack-in prevention padlocking and place in the rectangular opening 1 to 3 padlocks (Ø 6 to 8 mm).

Keylocking

The withdrawable device is locked when the keylock is in vertical position. To unlock the withdrawable device, turn the keylock counter clockwise.

Voltage Presence Indicator System (VPIS)

**DANGER**

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

- Do not use the Voltage Presence Indicator System (VPIS) as a Voltage Detecting System.
- When the ambient light is bright, it may be necessary to improve visibility by protecting the indication lights.

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

The Voltage Presence Indicator System is a case with 3 built-in LEDs designed to indicate the voltage presence: once the cables are energized, the voltage indicator LEDs should light up. The plugs located under the cover joint allows the use of the phase concordance unit VPI62421. Never inject any current or voltage signal in these plugs.

The indication of VPIS alone is not enough to ensure that the system is de-energized. If the operating rules require this, then suitable voltage detectors in compliance with standard IEC 61243 must be used.

A = voltage presence indicator LEDs (one for each phase)
B = protection cover
C = plugs
VPIS components.

Threshold
In compliance with the IEC 62271-206:2011 standard, the 3 VPIS indication LEDs are lit or flashing when the network voltage or the relevant phase is > 45 % of the rated voltage.

<table>
<thead>
<tr>
<th>IEC 62271-206: percentage of network voltage U</th>
<th>Equivalent percentage of rated voltage V</th>
<th>Status of VPIS indicator LEDs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage value</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phase-to-phase</td>
<td>Phase-to-ground (earth)</td>
<td></td>
</tr>
<tr>
<td>10 %</td>
<td>17 %</td>
<td>Extinguished</td>
</tr>
<tr>
<td>45 %</td>
<td>78 %</td>
<td>Lit or flashing</td>
</tr>
</tbody>
</table>

Case of Earthing Switch
The VPIS, combined with the capacitive insulating supports on the power circuit unit, uses lights to provide an indication of voltage present on each phase of the main circuit.

The voltage presence indicator unit is installed on the front of the Earthing Switch operating mechanism box.

The voltage presence indicator unit covers two voltage ranges, in accordance with standard IEC 62271-206:2011:

- 3.2 to 7.2 kV
- 10 to 24 kV.

Case of no Earthing Switch
The VPIS is provide with Earthing Switch. However, this system can also be installed when there is no Earthing Switch. Then it includes:

- a set of three capacitive divider insulators, which:
  - provide mechanical support and insulation up to 17.5 kV or 24 kV
  - integrate capacitors able to supply a voltage signal;
- a voltage presence indicator unit with LEDs connected to the capacitor signal to indicate the voltage presence on each phase. This indicator covers two voltage ranges, in accordance with standard IEC 62271-206:2011:
  - 3.2 to 7.2 kV
  - 10 to 24 kV.

In addition to the VPIS function above described, an interlocking feature with EasyPact EXE withdrawable device is available. When these 2 functions are required, they can be installed in a specific box to be mounted on the front of the cubicle. This box is similar to the operating mechanism box of the Earthing Switch, partially equipped. The interlocking is achieved using padlocks, keylocks or electromagnet.
Checking the phase concordance

It is possible to check the phase concordance between 2 energised functional input units on the same cubicle using a phase concordance unit (Ref. VPI62421). It is a way of making sure that all three cables are each connected to the corresponding phase of the cubicle.

**Phase concordance unit operation:**
- **balanced phase:** the phase concordance unit LED remains unlit
- **unbalanced phase:** the phase concordance unit LED is lit.

**Example of phase concordance checking.**
Preliminary checking before phase concordance test

Apply power to the 2 functional units and check that the 3 indicator LEDs of each VPIS are on. If one or two indicator LEDs of one VPIS unit, this VPIS is probably defective.

Remove the cover joint of one VPIS. Connect the ends of the phase concordance unit VPI62421 to plugs L1 and L3 of the same VPIS:
- the LED of the phase concordance unit is lit or blinking; you can compare
- the LED is unlit; you cannot compare.
**Phase concordance test**

Perform the phase concordance test: connect one end of the phase concordance unit to one plug of VPIS no.1 and the other end to one plug of VPIS no. 2, then watch the phase concordance unit LED. Repeat for all possible combinations of the two functional units.

To interpret the test results please refer to the table below.

<table>
<thead>
<tr>
<th>Functional unit no. 1</th>
<th>Functional unit no. 2</th>
<th>Conclusion</th>
<th>Action to be done</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1</td>
<td>L1</td>
<td>Wiring is OK</td>
<td></td>
</tr>
<tr>
<td>L2</td>
<td>L2</td>
<td></td>
<td>L1 ↔ L2</td>
</tr>
<tr>
<td>L3</td>
<td>L3</td>
<td></td>
<td>L1 ↔ L3</td>
</tr>
</tbody>
</table>

**Legend:**
- ○ Phase concordance unit LED unlit
- ✭ Phase concordance unit LED lit or blinking

*Phase concordance test table.*
Busbar Earthing using Earthing Switch

Earthing Switch in TT type and in CL-GL type cubicles

**DANGER**

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

Ensure the busbar section is de-energized before closing Earthing Switch.

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

---

Before any operation, please refer to the interlocking diagram of your switchboard

Earthing Switch in TT and in CL are not motorized as they are used to earth the busbar. It is necessary to use key exchange unit ensuring that all circuit breakers are racked-out before connecting busbars to earth.

![Key exchange unit image]

*Key exchange unit.*

Initial status of the Earthing switch in Busbar Section A on TT Cubicle and in Busbar Section B on Coupling Cubicle

The Earthing Switch must be in open position (Earthing Switch position selector on O) and it is locked when the keylock is in vertical position.

In this position the key is removed and is captive in the key exchange unit.
**DANGER**

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

- Do not use the Voltage Presence Indicator System (VPIS) as a Voltage Detecting System.
- When the ambient light is bright, it may be necessary to improve visibility by protecting the indication lights.

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

The Voltage Presence Indicator System is a case with 3 built-in LEDs designed to indicate the voltage presence: once the cables are energized, the voltage indicator LEDs should light up.

The plugs located under the cover joint allow the use of the phase concordance unit VPI62421. Never inject any current or voltage signal in these plugs.

The indication of VPIS alone is not enough to ensure that the system is de-energized. If the operating rules require this, then suitable voltage detectors in compliance with standard IEC 61243 must be used.

**Earthing of busbar section A**

This operation has to be carried out as following:

- de-energize switchboard section A by racking-out all the circuit breakers on the half-switchboard corresponding to the busbar section A:
  - from cubicles 1-2 and from bus sectioning cubicle 3
- lock these circuit breakers in "test/disconnected" position:
  - using the keylock placed in front of the racking device
  - or using the keylock of the Earthing Switch operating mechanism box

- Remove the released keys (D1, D2 & C) and place them in the key exchange unit. This will release the TTA key, removal of this key will in turn lock the circuit breaker keys in the key exchange unit.

- Insert the TTA key in the locking mechanism of the Earthing Switch of TT type cubicle. Turning the key will allow the closing of the Earthing Switch.

- Close the Earthing Switch of TTA type cubicle.
- Padlock the Earthing Switch of TTA cubicle in Closed Position
  - To prevent the opening Earthing Switch operation, place a padlock into the hole of the Earthing Switch position selector.
Carry out the maintenance on the earthed half-switchboard section A.
After maintenance, return the half-switchboard section A to service.

**Earthing of busbar section B**
This operation has to be carried out as following:

- de-energize switchboard section B by racking-out all the circuit breakers on the half-switchboard corresponding to the busbar section B:
  - from cubicles 5-6 and from bus sectioning cubicle 3
- lock these circuit breakers in "test/disconnected" position:
  - using the keylock placed in front of the racking device
  - or using the keylock of the Earthing Switch operating mechanism box
- Remove the released keys (D5, D6 & C) and place them in the key exchange unit. This will release the CLB key, removal of this key will in turn lock the circuit breaker keys in the key exchange unit.

- Insert the CLB key in the locking mechanism of the Earthing Switch of CL type cubicle. Turning the key will allow the closing of the Earthing Switch.

- Close the Earthing Switch located on CLB type cubicle.
- Padlock the Earthing Switch of CLB cubicle in Closed Position
  - To prevent the opening Earthing Switch operation, place a padlock into the hole of the Earthing Switch position selector.

- Carry out the maintenance on the earthed half-switchboard section B.
- After maintenance, return the half-switchboard section B to service.
Earthing Switch in TT type

**DANGER**

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH
Ensure the busbar section is de-energized before closing Earthing Switch.
Failure to follow these instructions will result in death or serious injury.

Before any operation, please refer to the interlocking diagram of your switchboard
It is necessary to use key exchange unit ensuring that all circuit breakers are racked-out before connecting busbars to earth.

*Key exchange unit.*

**Initial status of the Earthing switch in Busbar Section A on TT Cubicle and in Busbar Section B on TT Cubicle**
The Earthing Switch must be in open position (Earthing Switch position selector on ) and it is locked when the keylock is in vertical position.
In this position the key is removed and is captive in the key exchange unit.
DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

- Do not use the Voltage Presence Indicator System (VPIS) as a Voltage Detecting System.
- When the ambient light is bright, it may be necessary to improve visibility by protecting the indication lights.

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

The Voltage Presence Indicator System is a case with 3 built-in LEDs designed to indicate the voltage presence: once the cables are energized, the voltage indicator LEDs should light up. The plugs located under the cover joint allow the use of the phase concordance unit VPI62421. Never inject any current or voltage signal in these plugs.

The indication of VPIS alone is not enough to ensure that the system is de-energized. If the operating rules require this, then suitable voltage detectors in compliance with standard IEC 61243 must be used.

Earthing of busbar section A

This operation has to be carried out as following:

- de-energize switchboard section A by racking-out all the circuit breakers on the half-switchboard corresponding to the busbar section A:
  - from cubicles 1-2 and from bus sectioning cubicle 3
- lock these circuit breakers in "test/disconnected" position:
  - using the keylock placed in front of the racking device
  - or using the keylock of the Earthing Switch operating mechanism box

- Remove the released keys (D1, D2 & C) and place them in the key exchange unit. This will release the TTA key, removal of this key will in turn lock the circuit breaker keys in the key exchange unit.

- Insert the TTA key in the locking mechanism of the Earthing Switch of TT type cubicle. Turning the key will allow the closing of the Earthing Switch.

- Close the Earthing Switch of TTA type cubicle.
- Padlock the Earthing Switch of TTA cubicle in Closed Position
  - To prevent the opening Earthing Switch operation, place a padlock into the hole of the Earthing Switch position selector.
• Carry out the maintenance on the earthed half-switchboard section A.
• After maintenance, return the half-switchboard section A to service.

**Earthing of busbar section B**

This operation has to be carried out as following:

• de-energize switchboard section B by racking-out all the circuit breakers on the half-switchboard corresponding to the busbar section B:
  - from cubicles 5-6 and from bus sectioning cubicle 3
• lock these circuit breakers in "test/disconnected" position:
  - using the keylock placed in front of the racking device
  - or using the keylock of the Earthing Switch operating mechanism box
• Remove the released keys (D5, D6 & C) and place them in the key exchange unit. This will release the TTB key, removal of this key will in turn lock the circuit breaker keys in the key exchange unit.

| C | D6 | D5 | TTB |

• Insert the TTB key the locking mechanism of the Earthing Switch of TT type cubicle. Turning the key will allow the closing of the Earthing Switch.

• Close the Earthing Switch located on TTB type cubicle.
• Padlock the Earthing Switch of TTB cubicle in Closed Position
  - To prevent the opening Earthing Switch operation, place a padlock into the hole of the Earthing Switch position selector.

• Carry out the maintenance on the earthed half-switchboard section B.
• After maintenance, return the half-switchboard section B to service.
Electrical diagrams for Earthing Switch

Manual operating mechanism box

The following electrical diagrams show a standard application for manual Earthing Switch. For more details please refer to the LV diagram delivered for each MCset cubicle.

Auxiliary contacts

EC1 - EC4: Earthing Switch in closed position
EO1 - EO4: Earthing Switch in open position

Contacts to control the box and the racking device

SC8: Rack-in prevention padlocking slider and presence of MV cable door (open if padlock present or/and if MV cable door opened)
SC10: Rotating selector in operation mode

Other components

R1: Electromagnet locks the Earthing Switch selector in closed or open position when the R1 magnet is not energized
R2: Electromagnet locks the Racking device in rack-out position when R2 magnet is not energized

[1] 2 pin connectors for R1
[2] 2 pin connectors for R2
[3] Earthing Switch wiring diagram

Option
Motorized operating mechanism box

The following electrical diagrams show a standard application for motorized Earthing Switch. For more details please refer to the LV diagram delivered for each MCset cubicle.

Auxiliary contacts

**EC1 - EC4:** Earthing Switch in closed position

**EO1 - EO4:** Earthing Switch in open position

Contacts to control the box and the racking device
- **SC8:** Rack-in prevention padlocking slider and presence of MV cable door (open if padlock present or/and if MV cable door opened)
- **SC9:** Manual operation opens microswitch
- **SC10:** Rotating selector in operation mode
- **SC11:** Rack-in prevention padlocking slider and presence of MV cable door (open if padlock present or/and if MV cable door opened)

Motor stop contacts
- **SP3:** Motor stop when Earthing Switch is closed position contacts
- **SP4:** Motor stop when Earthing Switch is open position contacts

Other components
- **R3:** Electromagnet locks the Earthing Switch selector in closed or open position when the R1 magnet is not energized
- **M11:** Earthing Switch motor

Option

Reminder
The motor monitoring must be carried out only by the SP3 and SP4 microswitches. EC1-4 & RO1-4 are only used for position information and not for racking device motor control.
Before working on the Earthing Switch

<table>
<thead>
<tr>
<th>DANGER</th>
</tr>
</thead>
<tbody>
<tr>
<td>HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH</td>
</tr>
<tr>
<td>• Do not use the Voltage Presence Indicator System (VPIS) as a Voltage Detecting System.</td>
</tr>
<tr>
<td>• When the ambient light is bright, it may be necessary to improve visibility by protecting the indication lights.</td>
</tr>
<tr>
<td>Failure to follow these instructions will result in death or serious injury.</td>
</tr>
</tbody>
</table>

1. Check there is no voltage on the MV cables.
2. Close the Earthing Switch and make sure it is in closed position.
Maintenance

General information

DANGER
HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

- Electrical equipment may only be maintained by qualified personnel.
- The circuit breaker must not be completely disassembled for maintenance work, except of those accessories described in this maintenance section.

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

Medium-Voltage devices must be installed in accordance with appropriate professional practices. Similarly, preventive maintenance operations must be strictly and regularly observed.

Certain maintenance operations can be carried out independently by the User.
Two skills are essential:
- electrical qualifications,
- knowledge of the equipment to be maintained.

This user guide is not intended to be used by anyone who has not completed the relevant training.

Other very complex operations are however exclusively the responsibility of Schneider Electric. This allows our customers to benefit from optimized maintenance with regards of the economic perspective and the availability of electric power:
- Schneider Electric's engineers are highly qualified and have a thorough knowledge of Schneider Electric's equipment and its various technical levels; they have all the methods and procedures specific to the different types of devices at their disposal, as well as the advantage of feedback from the whole company,
- they have the relevant diagnostic tools and equipment for the system they are working on,
- they carry with them the appropriate consumables and spare parts for each device, which are available from local or regional stocks.

On request, Schneider Electric will be able to provide at any time:
- an installation diagnosis,
- if required, an appropriate maintenance programme,
- an appropriate maintenance contract,
- adjustments, where necessary.

Maintenance definitions

Preventive
Preventive maintenance consists in carrying out, at predetermined intervals or according to prescribed criteria, checks intended to reduce the probability of a failure or deterioration in the operation of a system.

Corrective
Corrective maintenance repairs a system in view of fulfilling a required function.
**Intervention levels**

Different skill levels have been established to define the persons who are qualified to work on Medium-Voltage equipment.

**Level 1**

Maintenance operations that can be carried out by persons with basic electrician skills doing operations according to instructions provided with the device by Schneider Electric (Open, Close, Racking-in/out...)

**Level 2**

Preventive maintenance operations requiring simple procedures and / or support equipment that can be carried by professional electrical persons performing actions according to Schneider Electric documentation.

**Level 3**

Preventive or curative maintenance operations that can be carried out by an authorized person performing actions delegated by Schneider Electric.

**Level 4**

Preventive or curative maintenance operations that may affect the device performances that can be carried out by Schneider Electric local entities, either in charge of adaptation or Services.

**Level 5**

Curative maintenance operations that can be carried out by the Schneider Electric global entities. The device will generally have to be returned to the factory.

**Trainings**

Schneider Electric offers a wide choice of training courses on how to operate or maintain its equipment. Level 1-2 operations require training on the equipment. This training is delivered in our training centres by Schneider Electric’s accredited qualified staff.
Adaptation of the device and component replacement

Schneider Electric shall not be held responsible for damage which occurs if:
- the instructions provided in the instruction document were not followed,
- any other component than genuine Schneider Electric was installed.

Schneider Electric supplies original spare parts and can provide assistance with identifying the spare parts required for your electrical distribution equipment.
To order spare parts, please contact your Schneider Electric local representative or your MCset manufacturer.
For any modification or upgrade of the Earthing Switch, contact Schneider Electric or your MCset manufacturer.

Products and consumables

<table>
<thead>
<tr>
<th>Supplier</th>
<th>Designation</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOCAL</td>
<td>Mobilith SCH100 grease to be applied to moving parts</td>
<td>-</td>
</tr>
<tr>
<td>SCHNEIDER ELECTRIC</td>
<td>Mechanical lubricant Isoflex Topas L 152</td>
<td>18315110</td>
</tr>
<tr>
<td>LOCAL</td>
<td>Dry lint-free wipe or brush free foam</td>
<td>-</td>
</tr>
<tr>
<td>LOCAL</td>
<td>Brush for lubricant application</td>
<td>-</td>
</tr>
</tbody>
</table>

[1] To order products, please contact your Schneider Electric local representative.
Recommended maintenance program

Preventive maintenance operations

<table>
<thead>
<tr>
<th>WARNING</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HAZARD OF DEVICE DAMAGE OR ELECTRICAL FAILURE</strong></td>
</tr>
<tr>
<td>• Comply with specified maintenance intervals.</td>
</tr>
<tr>
<td>• Perform maintenance according to the actual operating and ambient conditions.</td>
</tr>
<tr>
<td>• Contact your Schneider Electric local representative or your MCset manufacturer for any queries.</td>
</tr>
<tr>
<td><strong>Failure to follow this instruction can result in death or serious injury.</strong></td>
</tr>
</tbody>
</table>

Different maintenance program must be carried out:

- Basic level of preventive maintenance: every year [1]
- Advanced level of preventive maintenance: every two years [1]
- Exclusive level of preventive maintenance: every five years [1].

[1] Recommended under normal operating conditions. However, this recommended frequency should be increased according to the level of criticality (low, major, critical) and the severity of environment conditions.

To define appropriate Maintenance program for your MCset equipment, contact your Schneider Electric Maintenance Service local representative.

Earthing Switch installed in normal service condition and with preventive maintenance program is designed up to:

<table>
<thead>
<tr>
<th>Earthing Switch</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000 open/close operation [2]</td>
</tr>
</tbody>
</table>

[2] The number of open/close operation can be monitored by relay in LV cabinet.
Basic level preventive maintenance program to be performed every year

Basic level preventive maintenance tasks

Basic preventive maintenance corresponds to maintenance levels 1 and 2. Basic preventive maintenance tasks such as operational checks, as well as repairs by standard exchange of certain assemblies can be carried out by qualified customer personnel with basic training.

There is no dismounting of parts of the circuit breaker.

<table>
<thead>
<tr>
<th>Part</th>
<th>Check</th>
<th>Frequency: every year[1]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanism</td>
<td>Operate (Open/Close) the device manually</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Operate (Open/Close) the device electrically</td>
<td></td>
</tr>
<tr>
<td>Locking</td>
<td>Operate the key-operated interlocks</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Operate the padlocking systems</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Operate the rack-in inhibition mechanism</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Operate the electromagnet of the operating mechanism box</td>
<td></td>
</tr>
</tbody>
</table>

[1] Every fifth year diagnostic checks is carried out by Schneider Electric Services.

Tools

Performing the procedure of the maintenance program requires the following:

- a standard toolbox with electrical tools and equipment for an electrician
- specific tools, detailed in the Instruction Sheet and Maintenance Procedure.

Time Required

The global time required to perform this maintenance program is 15 minutes.

Safe Repository

For better follow-up of your MCset equipment, upload your Maintenance Reports in Safe Repository.
Operating limits for Earthing Switch

Before reaching 2000 operations contact your Schneider Electric Service Local representative.

End of life

Schneider Electric is concerned about issues that impact the environment. We offer complete end-of-life recycling solutions to our customers to safely dispose of equipment. Contact your Schneider Electric Service team for further information.
# Troubleshooting and solutions

## Earthing Switch

<table>
<thead>
<tr>
<th>Diagnose the problem</th>
<th>E/S type</th>
<th>Identify the probable causes</th>
<th>Find the solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Manual Closing</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Impossible to insert the crank in open position</td>
<td>Manual</td>
<td>Manual operation slider in not lifted to manual mode</td>
<td>Lift manual operation slider</td>
</tr>
<tr>
<td></td>
<td>Manual</td>
<td>Manual operation slider is locked in motorized mode by the electromagnet</td>
<td>Energize the electromagnet and then lift manual operation slider</td>
</tr>
<tr>
<td>Impossible to turn selector from Open (O) to operation position</td>
<td>Manual</td>
<td>Circuit breaker not in racked-out position</td>
<td>Rack-out circuit breaker and then turn to operation position</td>
</tr>
<tr>
<td></td>
<td>Manual</td>
<td>E/S selector locked in open position with keylock</td>
<td>Unlock and then turn to operation position</td>
</tr>
<tr>
<td></td>
<td>Manual</td>
<td>Selector is pad-locked</td>
<td>Remove padlock and then turn to operation position</td>
</tr>
<tr>
<td></td>
<td>Manual</td>
<td>Selector is locked in open position by the electromagnet</td>
<td>Energize the electromagnet and then turn to operation position</td>
</tr>
<tr>
<td>Impossible to turn selector to Closed (I) position after opening</td>
<td>Manual</td>
<td>Crank is still inserted</td>
<td>Remove crank and turn to closed position</td>
</tr>
<tr>
<td></td>
<td>Manual</td>
<td>E/S indication is incorrectly adjusted</td>
<td>Contact Schneider Electric</td>
</tr>
</tbody>
</table>
| Electromagnet does not unlock as intended | Manual | Electromagnet under voltage opening release not supplied with power | • Check that there is an opening order  
• Check that voltage and the supply circuit conformity. If the problem persists, replace electromagnet |
| Very high torque needed to turn the crank | Manual | Short circuit on motor | Check electrical circuit  
If problem persists, repair circuit or replace motor |
| **Manual Opening**   |          |                             |                   |
| Impossible to insert the crank in closed position | Manual | Manual operation slider in not lifted to manual mode | Lift manual operation slider |
|                      | Manual | Manual operation slider is locked in motorized mode by the electromagnet | Energize the electromagnet and then lift manual operation slider |
| Impossible to turn selector from closed to operation position | Manual | E/S locked in closed position with keylock | Unlock and then turn to operation position |
|                      | Manual | Selector is pad-locked | Remove padlock and then turn to operation position |
|                      | Manual | Selector is locked in closed position with electromagnet | Energize the electromagnet and then turn to operation position |
| Impossible to turn selector to Open (O) position after opening | Manual | Crank is still inserted | Remove crank and turn to open position |
|                      | Manual | E/S indication is incorrectly adjusted | Contact Schneider Electric |
| Electromagnet does not unlock as intended | Manual | Electromagnet under voltage opening release not supplied with power | • Check that there is an opening order  
• Check that voltage and the supply circuit conformity. If the problem persists, replace electromagnet |
| Very high torque needed to turn the crank | Manual | Short circuit on motor | Check electrical circuit  
If problem persists, repair circuit or replace motor |
| **Racking-in prevention** |          |                             |                   |
| Impossible to pull out the rack-in prevention locking | Manual | Withdrawable part in "Intermediate" or "Service" position | Entirely rack-out and remove it from the cubicle withdrawable part |
## Diagnose the problem

<table>
<thead>
<tr>
<th>E/S type</th>
<th>Identify the probable causes</th>
<th>Find the solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>Motorized</td>
<td></td>
</tr>
</tbody>
</table>

### Motorized Closing (Remote operation)

<table>
<thead>
<tr>
<th>Earthing Switch doesn’t close</th>
<th>Manual operation slider is stuck in manual operation mode</th>
<th>Motor is not running</th>
</tr>
</thead>
<tbody>
<tr>
<td>Selector not in operation position</td>
<td>Ensure that slider is moving properly and move slider to motorized mode position</td>
<td>Check if there is a closing order to the motor</td>
</tr>
<tr>
<td>Circuit breaker is not in “Disconnected/test” position</td>
<td></td>
<td>Check that voltage and supply circuit conformity, If the problem persists, replace the motor</td>
</tr>
<tr>
<td>Rack circuit breaker out and then close E/S</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Motorized Opening (Remote operation)

<table>
<thead>
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<th>Earthing Switch doesn’t open</th>
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<tr>
<td>Selector not in operation position</td>
<td>Ensure that slider is moving properly and move slider to motorized mode position</td>
<td>Check if there is a opening order to the motor</td>
</tr>
<tr>
<td>Manual operation slider is stuck in manual operation mode</td>
<td></td>
<td>Check that voltage and supply circuit conformity, If the problem persists, replace the motor</td>
</tr>
</tbody>
</table>

### Voltage Presence Indicator System

<table>
<thead>
<tr>
<th>Diagnose the problem</th>
<th>Identify the probable causes</th>
<th>Find the solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>All three LEDs are off</td>
<td>The functional unit is not energised</td>
<td>Apply power to the functional unit</td>
</tr>
<tr>
<td>One or more LEDs unlit</td>
<td>Incorrect wiring of MV cable</td>
<td>Perform phase concordance test and check the wiring</td>
</tr>
<tr>
<td></td>
<td></td>
<td>If wiring is correct and the defect persists, contact your Schneider Electric representative to replace it.</td>
</tr>
</tbody>
</table>
Earthing Switch operation in a nutshell

Manual version

Locking

Clack!

Open position

Pin in lower position
Cable compartment access not possible

Close position

Pin in upper position
Cable compartment access possible

Locking
Motorized version

Press “Earth ON” HMI or distant

Press “Earth OFF” HMI or distant

Close position

Open position

Motorized Operation

Manual Operation

Motorized Operation

Motorized Operation

Manual Operation

Motorized Operation

Close position

Open position

Close position

Open position

Clack!

Clack!

Clack!