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SM6 – 24kV
Foreword

Important Information

NOTICE

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 documentation or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.

The addition of this symbol to a “Danger” or “Warning” safety message 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 with this symbol to avoid possible injury or death.

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

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

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

<table>
<thead>
<tr>
<th>NOTICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>NOTICE is used to address practices not related to physical injury.</td>
</tr>
</tbody>
</table>

PLEASE NOTE

Electrical equipment should only 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 and operation of electrical equipment and its installation, and has received safety training to recognize and avoid the hazards involved.
Safety Precautions

Diffusion Rules

Total or partial reproduction of this manual is prohibited and only the Schneider Electric agents have an exclusive right to use.

Safety Rules

<table>
<thead>
<tr>
<th>DANGER</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH</strong></td>
</tr>
<tr>
<td>• Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E or CSA Z462.</td>
</tr>
<tr>
<td>• This equipment must only be installed and serviced by qualified electrical personnel.</td>
</tr>
<tr>
<td>• Turn off all power supplies of the equipment before working on or inside equipment.</td>
</tr>
<tr>
<td>• Always use a properly rated voltage sensing device to confirm power is off.</td>
</tr>
<tr>
<td>• Set all devices, doors and covers before turning on power to this equipment. Do not use solvents and alcohol for cleaning.</td>
</tr>
<tr>
<td>• Do not use high-pressure cleaner.</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 equipment.</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>NOTICE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HAZARD OF EQUIPMENT DAMAGE</strong></td>
</tr>
<tr>
<td>Drilling the switchgear is forbidden.</td>
</tr>
</tbody>
</table>

**Failure to follow these instructions can result in equipment damage.**

Disposal of the Equipment at End-of-Life

This equipment contains SF6 gas. SF6 is a powerful greenhouse gas. Prior to disposal of the equipment at end-of-life, the SF6 gas must be recovered in order for it to be recycled, reclaimed or destroyed.

• Do not carry out any dismantling operations unless authorized.
• Do not handle SF6 gas unless certified according to local regulation.
• Do not release SF6 gas to the atmosphere.

Penalties may apply according to local regulations and rules (Regulation (EU) No 517/2014 for all European countries).

Schneider Electric offers a complete service to dismantle and recycle Medium Voltage equipment and SF6 gas at end-of-life. This service is compliant with IEC 62271-4 and conforms to local regulations.

Contact Schneider Electric for more information.
### Generalities

#### Handling Instructions

#### Cubicle Identification

A. Indicator plate **(not on TM cubicle)**

B. Characteristics and designation

C. Manufacturer name plate **(not on CM / CM2 / GAM2 / TM cubicles)**

   **NOTE:** The characteristics of the circuit breaker or contactor are given on its plate.

E. **For IM / IMC / IMB / PM / QM / QMC / QMB / NSM cubicles (optional):** motorization plate

#### Serial number

D1. Riveted to the operating mechanism

D2. Glued to the back of the low voltage compartment

D3. Glued to the upright of the frame

1. Instruction number

### GBC / GBM

A. Manufacturer name plate

#### Serial number

B1. Riveted on to upper right compartment panel

B2. Glued on to frame upright

B3. **For GBC cubicle:** glued behind the upper left compartment panel
Accessories List Supplied With the Cubicle

Switchboard Accessories

May vary depending on the switchboard cubicle configuration:

• 1 operating lever
• 2 end panels
• 1 bag of nuts and bolts for the end panels

Accessories Supplied With the Cubicle

For a complete list of cubicle accessories, refer to the document shipped with the switchboard.

Accessories supplied include:

• Intercubicle connection accessories (bag S1: S1B82890)
• Field distributors for busbars
• Bottom plate(s) with fastening accessories
• Cable bushings
• Cable clamps and clamp supports
• Busbar(s)
• Earth bar

Handling Using Slings

Choose the sling to use according to the type of cubicle

<table>
<thead>
<tr>
<th>Type of cubicle</th>
<th>IM</th>
<th>IMC</th>
<th>IMB</th>
<th>PM, QM</th>
<th>QMB</th>
<th>QMC</th>
<th>QMB</th>
<th>SM</th>
<th>DM1-S</th>
<th>DM1-A, DM1-D, DM1-W, DM1-Z, 1250 A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum length of sling (L) (mm)</td>
<td>920(2)</td>
<td>1130(4)</td>
<td>920(2)</td>
<td>920</td>
<td>1130(4)</td>
<td>920</td>
<td>500</td>
<td>750</td>
<td>1130(4)</td>
<td>750</td>
</tr>
<tr>
<td></td>
<td>375(3)</td>
<td>970(5)</td>
<td>375(3)</td>
<td>375(3)</td>
<td>970(5)</td>
<td></td>
<td></td>
<td></td>
<td>375(3)</td>
<td></td>
</tr>
<tr>
<td>Cubicle width (mm)</td>
<td>375</td>
<td>500</td>
<td>375</td>
<td>500</td>
<td>375</td>
<td>500</td>
<td>375</td>
<td>500</td>
<td>375</td>
<td>750</td>
</tr>
<tr>
<td>Cubicle weight(1) (kg)</td>
<td>120</td>
<td>170</td>
<td>130</td>
<td>150</td>
<td>150</td>
<td>180</td>
<td>130</td>
<td>120</td>
<td>340</td>
<td>400</td>
</tr>
<tr>
<td></td>
<td>150</td>
<td>150</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. Average weight for an equipped cubicle
2. Without low voltage cabinet or wiring duct
3. With low voltage cabinet or wiring duct
4. With 4 handling points
5. With 2 handling points

<table>
<thead>
<tr>
<th>Type of cubicle</th>
<th>DMV-A, DMV-D</th>
<th>DMVL</th>
<th>CVM</th>
<th>DM2</th>
<th>CM</th>
<th>CM2</th>
<th>TM</th>
<th>GBC-A, GBC-B, IMM</th>
<th>GBM</th>
<th>GAM2</th>
<th>GAM</th>
<th>NSM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum length of sling (L) (mm)</td>
<td>750</td>
<td>1130(2)</td>
<td>750</td>
<td>1130(2)</td>
<td>920(2)</td>
<td>970(2)</td>
<td>920(2)</td>
<td>1130</td>
<td>920</td>
<td>920(2)</td>
<td>920</td>
<td>750</td>
</tr>
<tr>
<td></td>
<td>750(3)</td>
<td>750(3)</td>
<td>750(3)</td>
<td>375(3)</td>
<td>500(3)</td>
<td>375(3)</td>
<td></td>
<td></td>
<td></td>
<td>375(3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cubicle width (mm)</td>
<td>625</td>
<td>750</td>
<td>750</td>
<td>750</td>
<td>375</td>
<td>500</td>
<td>375</td>
<td>750</td>
<td>375</td>
<td>375</td>
<td>500</td>
<td>750</td>
</tr>
</tbody>
</table>
### Generalities

<table>
<thead>
<tr>
<th>Type of cubicle</th>
<th>DMV-A, DMV-D</th>
<th>DMVL</th>
<th>CVM</th>
<th>DM2</th>
<th>CM</th>
<th>CM2</th>
<th>TM</th>
<th>GBC-A, GBC-B, IMM</th>
<th>GBM</th>
<th>GAM2</th>
<th>GAM</th>
<th>NSM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cubicle weight(^{(1)}) (kg)</td>
<td>340</td>
<td>400</td>
<td>390</td>
<td>400</td>
<td>190</td>
<td>210</td>
<td>200</td>
<td>290</td>
<td>120</td>
<td>120</td>
<td>160</td>
<td>260</td>
</tr>
</tbody>
</table>

1. Average weight for an equipped cubicle
2. Without low voltage cabinet or wiring duct
3. With low voltage cabinet or wiring duct
4. With 4 handling points
5. With 2 handling points

The handling lugs are reserved solely for handling SM6 cubicles.

Follow the handling instructions below:

A. HM12 nuts and screws
B. Schneider Electric maximum useful load (CMU) = 400 kg CE
C. Hole

In case of hole deformation (ovalisation), replace the lugs.

### Handling Using a Forklift

![Handling Using a Forklift Diagram]

**Warning:** Do not lift the SM6 cubicle without proper handling equipment and instructions.
Handling Implementation

Never attempt to move the cubicle by exerting force on the control panel.

Handling the cubicle carefully, in order not to cause deformation or degradation of the cubicle.

Storage

Storage conditions:

- When cubicles are stored, the equipment must remain in its original packing.
- The equipment must be stored under shelter, on a dry floor or on a material insulating it from the damp.
Cubicle Description

Switch and Fuse Protection Cubicles

**IM / IMB / IMC / PM / QM / QMB / QMC / SM**

1. **Switchgear:** switch-disconnector and earthing switch in an enclosure filled with SF6 and satisfying "sealed pressure system" requirements.

2. **Busbars:** all in the same horizontal plane, thus enabling later switchboard extensions and connection to existing equipment.

3. **Connection:** accessible through front, connection to the lower switch-disconnector and earthing switch terminals (IM cubicles) or the lower fuse-holders (PM and QM cubicles). This compartment is also equipped with an earthing switch downstream from the MV fuses for the protection units.

4. **Operating mechanism:** contains the elements used to operate the switch-disconnector and earthing switch and actuate the corresponding indications (positive break).

5. **Low voltage:** installation of a terminal block (if motor option installed), LV fuses and compact relay devices. If more space is required, an additional enclosure may be added on top of the cubicle.

---

**SF6 Circuit Breaker Protection Cubicles**


1. **Switchgear:** disconnector(s) and earthing switch(es), in enclosures filled with SF6 and satisfying "sealed pressure system" requirements.

   One circuit breaker offer is possible:

   - SF1: combined with an electronic relay and standard sensors (with or without an auxiliary power supply).

2. **Busbars:** all in the same horizontal plane, thus enabling later switchboard extensions and connection to existing equipment.

3. **Connection:** accessible through front.

4. **Operating mechanism:** contains the elements used to operate the disconnector(s), the circuit breaker and the earthing switch, and actuate the corresponding indications.

5. **Low voltage:** installation of compact relay devices and test terminal boxes. If more space is required, an additional enclosure may be added on top of the cubicle.
Frontal Vacuum-Type Circuit Breaker Protection Cubicles
DMV-A / DMV-D

1. **Switchgear**: load break switch and earthing switch(es), in an enclosure filled with SF6, and one vacuum circuit breaker, satisfying “sealed pressure system” requirements.
   - Evolis: device associated with an electronic relay and standard sensors (with or without auxiliary source).

2. **Busbars**: all in the same horizontal plane, thus enabling later switchboard extensions and connection to existing equipment.

3. **Connection**: accessible through front, connection to the downstream terminals of the circuit breaker.

4. **Operating mechanism**: contains the elements used to operate the disconnector(s), the circuit breaker, and the earthing switch and actuate the corresponding indications.

5. **Low voltage**: installation of compact relay devices (VIP) and test terminal boxes. If more space is required, an additional enclosure may be added on top of the cubicle.

Lateral Vacuum-Type Circuit Breaker Protection Cubicles
DMVL-A / DMVL-D

1. **Switchgear**: one or several disconnectors and earthing switches, in an enclosure filled with SF6, and one vacuum circuit breaker, satisfying “sealed pressure system” requirements.
   - Evolis: device associated with an electronic relay and standard sensors (with or without auxiliary source).

2. **Busbars**: all in the same horizontal plane, thus enabling later switchboard extensions and connection to existing equipment.

3. **Connection**: accessible through front, connection to the downstream terminals of the circuit breaker.

4. **Operating mechanism**: contains the elements used to operate the disconnector(s), the circuit breaker, and the earthing switch and actuate the corresponding indications.

5. **Low voltage**: installation of compact relay devices and test terminal boxes. If more space is required, an additional enclosure may be added on top of the cubicle.
Contactor Cubicle

CVM

1. **Switchgear**: disconnector and earthing switch in enclosures filled with SF6 and satisfying “sealed pressure system” requirements. Two types may be used for the contactor:
   - Vacuum with magnetic holding
   - Vacuum with mechanical latching
2. **Busbars**: all in the same horizontal plane, thus enabling later switchboard extensions and connection to existing equipment.
3. **Connection**: accessible through front. This compartment is also equipped with an earthing switch downstream. The contactor may be equipped with or without fuses.
4. **Operating mechanism**: contains the elements used to operate the disconnector(s), the contactor, and the earthing switch and actuate the corresponding indications.
5. **Low voltage**: installation of compact relay devices and test terminal boxes. With basic equipment, an additional enclosure is added on top of the cubicle.

Casings Cubicles

GAM / GAM2 / GBM

1. **Switchgear**: no equipment.
2. **Busbars**: all in the same horizontal plane, thus enabling later switchboard extensions and connection to existing equipment.
3. **Connection**: accessible through front, on the busbars or cables. This compartment may be equipped with an earthing switch downstream.
Metering Cubicles

CM / CM2 / GBC-A / GBC-B / IMM / TM

1. **Switchgear**
   - **CM / CM2 / IMM / TM**: switch-disconnector and earthing switch in an enclosure filled with SF6 and satisfying “sealed pressure system” requirements.
   - **GBC-A / GBC-B**: no equipment.

2. **Busbars**: all in the same horizontal plane, thus enabling later switchboard extensions and connection to existing equipment.

3. No equipment.

4. **Operating mechanism**
   - **CM / CM2 / IMM / TM**: contains the elements used to operate the disconnector(s), the circuit breaker, and the earthing switch and actuate the corresponding indications.
   - **GBC-A / GBC-B**: no equipment.

5. **Low voltage**
   - **CM / CM2 / TM / IMM**: installation of compact relay devices and test terminal boxes. If more space is required, an additional enclosure may be added on top of the cubicle.
   - **GBC-A / GBC-B**: no equipment.

Other Cubicles

Cables NSM, busbar NSM

1. **Switchgear**: switch-disconnector and earthing switch in an enclosure filled with SF6 and satisfying “sealed pressure system” requirements

2. **Busbars**: all in the same horizontal plane, thus enabling later switchboard extensions and connection to existing equipment.

3. **Connection**: accessible through front, on the busbars or cables.

4. **Operating mechanism**: contains the elements used to operate the switch-disconnector and earthing switch and actuate the corresponding indications (positive break).

5. **Low voltage**: contains the device rated voltage sensing VD23. An additional enclosure may be added on top of the cubicle and contains the control unit T200S and its battery.
Installation and Operation Recommendation

Switchgear Ageing Withstand

Switchgear ageing withstand in an MV substation depends on 3 main factors:

- The need for proper implementation of connections:
  the new cold slip-on and retractable technologies offer ease of installation, thereby promoting withstand over time.
  Their design enables operation in polluted environments with harsh atmospheres.

- The influence of the relative humidity factor:
  installation of heating resistors is essential in climates with high relative humidity and large temperature differences.

- Ventilation control:
  the grids must be sized according to power loss in the substation.
  These grids must only be placed near the transformer, so as to prevent air circulating on the MV switchboard.

Operation

Schneider Electric strongly recommends that you carry out at regular intervals (at least roughly every 2 years) a few operating cycles on the switching devices.

Outside normal operating conditions (from −5 °C to +40 °C (from 23 °F to 104 °F), absence of dust, corrosive gas, for example), Schneider Electric recommends that you contact your Schneider Electric service center in order to examine the measures to be taken to ensure proper installation operation.

Our service center is at your disposal at all times:

- To conduct an installation diagnosis.
- To suggest the appropriate maintenance operations.
- To offer you maintenance contracts.
- To suggest adaptations.
Installation Instructions

Preparing the Cubicles Before Assembling the Switchboard

Position upon delivery:
- Circuit breaker open.
- Feeder disconnector in earth position.
- Earthing switch in closed position.

Illustrations used in the procedure below:
- Bolt + washer
- Bolt + washer + nylstop nut

1. **For GBC / GBM / IMM cubicles:** Remove the upper panel (A1) and (A2) to access the locking angle bracket.

2. Swivel the angle bracket 90° to the left. Remove the front panel (A3) and then the pallet (A4). The bolts cannot be re-used.
3. **For all cubicles:** Remove the 2 bolts (1) (for DM1–D and DM1–Z cubicles) then remove the front panel (A) by lifting it and pulling it forward.

4. Remove the pallet (B). The bolts cannot be re-used.

5. Unscrew the bolts fixing the low voltage compartment cover(s) (C) (2 bolts per cover) and remove the cover(s).

6. Remove the 2 half-cross bars (D) of the low voltage compartment (cubicle without low voltage (LV) cabinet).

7. Remove the two top plates (E) and (E') of the cubicle (8 to 16 bolts depending on the cubicle).
8. Remove the part(s) (F) (6 bolts per top plate of cubicle without low voltage cabinet).

9. Remove the 2 or 4 handling parts (G) (cross bars and lifting rings).
Installation Instructions — SM6 – 24kV

Switchboard Assembly — GBC / GBM / IMB / QMB

1. Before assembling the cubicles together, remove the 2 screws.

2. Verification before assembling switchboard: Make sure that the metal partitioning plates are present according to the switchboard configuration.

End Sheet Assembly

The internal arc additive of parcel for 12 kA / 1 s internal arc switchboard is presented below.
Preparation of Switchboard End Cubicles

- Preparation of switchboard end cubicles, after removal of part (G). Removal of HM6x12 bolt and removal of the 3 cage nuts.
- Position the protection plate (busbar) (F) at both ends (first cubicle positioned against the wall).

**Example:** right cubicle

- Temporarily fix (do not lock the screws in position) the steel protection plate at both ends of the switchboard.
- Position the insulating plate (D) at both ends of the switchboard.
Before Fitting the End-of-Switchboard Steel Plates

Preparation (only for the cubicle of the end of the switchboard)

- Bag of screws S4: 51238949FA
- Fit 10 x HM6 cage nuts (H) on the cubicle (see mounting below)

Mount on the ends of the switchboard

- Fit the 4 x HM8 cage nuts (H1).

Detail of mounting

1. Insert the cage nut outside the cubicle in the specially provided rectangular hole.
2. Topple the cage nut inside the cubicle.
3. Push the cage nut in the direction of the arrow in order to place the top part of the cage behind the plate.
Assembling the cubicle separating plate to fix a switchboard right end

- Slide the plate (K) into the 5 cubicle hooks (K').

Assembling the end plate

- Position the end plate (J).
  Fit but do not lock in position the screws.
- When inserting the screw in the front upright of the cubicle, take care not to damage the wiring inside this upright.
- Tighten screws (G) before putting the roof back into place.

- 2 screws HM6x40 + washers + nuts (to be tightened moderately)
- 4 screws HM8x20
- 3 screws HM6x12 + washers + nylstop nuts

K. Inside of cubicle
L. End plate
Tightening torque: 6 N.m
Assembling the roof and the corner pieces

- Reassemble the roof (G).
- Screw the 3 screws (C) that you kept at the first step.

  \[\rightarrow\text{HM6x12 screws + washers}\]

- Place the corner piece (P) and screw the 3 screws (M).
- Place the screw (Q).

  \[\rightarrow\text{HM6x12 screws + washers}\]

- Remove the screws (N) and (N’) to place the corner piece (S).
- Put in and tighten the screws (N) and (N’).
- Screw the screws (Q) and (Q’).

  \[\rightarrow\text{HM6x12 screws + washers + nylstop nuts}\]
  \[\rightarrow\text{HM6x12 screws + washers}\]

Options

- Cubicle fitted with a wiring tray or low voltage compartment:
  Only fit the reinforcement angle bracket (P).

  \[\rightarrow\text{HM6x12 screws + washers}\]
Fixing the end plate screws

- Fix the 10 screws on the end plate.
- Assemble the screw and nut at the bottom of the end plate. If you cannot fix the screw and nut on the circuit breaker side, set the plastic rivet.
- Tighten and check all the screws on the end plate.
  Tightening torque: 6 N.m

- 10 x HM6x12 screws + washers
- Plastic rivet
- 1 x HM8x20 screw + washer + nylstop nut

Assembling the rear plate

- Re-install part (G') on all the cubicles of the switchboard.
  - 2 x HM6x12 screws + washers
  Tightening torque: 6 N.m
- Install the rear vertical reinforcement (V):
  - 7 x HM6x20 screws+ washers (R).
  Tightening torque: 6 N.m
- View with the finalized end:
  The front (T) of the rear vertical reinforcement (V) must be flat against the wall.

Assembling the Switchboard

Nuts and bolts in bag S1 (S1B82890)
1. Fix the cubicles together. The additional screws are for mounting the earth collector.

A. Mount these 3 screws first.
B. Five HM8x16 screws + CS washers + nuts
C. One HM6x60 screw + 2 CS washers + nuts
D. Two HM6x16 screws + CS washers + PL washers cage nuts
E. Four HM8x16 screws + CS washers + PL washers + nuts

Tightening torque:
• M6 screw: 6 N.m
• M8 screw: 18 N.m

2. **For DM1–A and DM1–D cubicles:** Remove the wiring metallic shield (N).

3. Fit the bolt (P) to assemble the cubicles (take care to LV wires).

4. Re-install the wiring metallic shield.
Fixing to the Floor

Nuts and bolts not included.

Do not place the bolts for securing to the floor on the circuit breaker side.

The shaded part represents the bottom pan underneath the cubicle.

The shaded part represents the bottom pan underneath the cubicle.
Layout in the Substation

Minimum dimension for correct operation of the equipment.

Switchboard installed to the right of the wall

Switchboard installed to the left of a wall

(*) Minimum clearance for trouble-free operation

Fitting the Busbars after Installing Cubicles in Final Position

Busbar Connection in 630 A

Standard Busbar Connection

The following illustrations show the standard busbar connection.

Accessories:

• Bag S2: 3729742

Tools:

• One torque wrench (1 to 50 N.m)
• One 1/4-3/8 adapter
• One 6 mm extension fitting
• One 6 mm male Torx fitting
Fitting of busbars:

Top busbar connections

Position of the field distributor
Bag S2: 3729742

If the field distributor is positioned incorrectly, it can be damaged.

Busbar Connection With Silicon Field Distributor (Optional)

WARNING
DIELECTRIC OR INTERNAL ARC HAZARD
The silicon field distributor can only be replaced by a similar silicon field distributor.

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

Before assembling the busbar, make sure that it complies with use of the switchboard for a rated current of 630 A (only).
The following illustration shows the busbar connection for cubicles operating in severe environmental conditions.

A. Bag BBV10523
B. Bag BBV10603

End busbar connections to use with silicon field distributors:

630 A rating

Additional for Performance Ik/tk 25 kA / 1 s

1. Install the two spacers between the phases at the mid-point of the busbar section.
2. Fit O-rings (B) on each side of the spacers.

The following illustration shows the cross-sectional view of spacer.

A. Busbar
B. 2 O-rings
Busbar Connection in 1250 A

Tools

- One torque wrench (1 to 50 N.m)
- One 1/4-3/8 adapter
- One 6 mm extension fitting
- One 6 mm male hexagonal (Allan) fitting (for busbars for voltages >12 kV)
- One 6 mm female hexagonal socket (for busbars for voltages ≤12 kV)

Standard Busbar Connection

The following illustrations show the standard busbar connection.

Mounting of U-brackets:

Mount the 3 U-brackets on the supporting insulators using M8x30 female socket screws without locking.

Single-hole U-bracket

Two-hole U-bracket

A. Two HM8x30 screws + CS washers
Fitting of busbars:

To be followed exactly.

Bars must be positioned as shown below.

Position of the field distributor for a cubicle version ≤12 kV

Fitting is identical for single-hole or two-hole U-brackets.

Fit the bars and then the screws and bolts.

Lock the fixing screw(s) (V) on the connection U-bracket after assembling all the bars.

Position of the field distributor for a cubicle version >12 kV

Fitting is identical for single-hole or two-hole U-brackets.

Position the field distributors correctly on the connection U-bracket. Use locating pins to immobilise them.

If the field distributor is positioned incorrectly, it can be damaged.
Additional for Performance Ik/tk 25 kA / 1 s

Install the spacer as follows:

Bottom Busbar Connections for GBC / GBM / IMB / QMB Cubicles
Bottom Busbar Connection for DM1-D 630 A Cubicles

Reception

Removing

Bars connection

Mount the 2 deflectors on the bus riser cubicle as indicated below.

28 N.m
Bottom Busbar Connection for DM1-D 1250 A Cubicles and DM1-Z Cubicles

- It is imperative to assemble the bottom busbar in the right direction.

![Diagram of busbar connection]

M. Spring washer
N. Flat style washer
P. 10.2 diameter hole on GBM / GBC cubicles
Q. D11x16 oblong hole on DM1–D / DM1–Z cubicles
R. Keep to the position of the distributor rib

- Fit the two field distributors on the cubicle after fitting bars as shown above.

![Diagram of field distributor]

A. Two M6 cage nuts
B. Two HM 6x16 bolts + washers
C. Two HM 6x30 bolts
D. Two M6 nuts + washers
Lower busbar connection for DMV-D cubicles

Reception

Removing

Bar connection

Dimensions to be checked after connecting the busbars to the right cubicle for angular positioning.

- 62.5 mm
- 50 mm
- 28 N.m

⚠️ 28 N.m
Assembling the Fuses

Assembling the Fuses for CM / CM2 / CVM / PM / QM / QMB / QMC / TM Cubicles

When changing a fuse, change all 3 fuses. Do not re-used fuses that have already been used.

- Schneider Electric advises against holding the fuse in the middle.

- Insert the bottom of the fuse all the way into the lower annular contact.

- Then put the top of the fuse in the upper contact
- Check that the upper field repartitor is properly placed.
- Turn the fuse so that the label appears in front.
**Striker fuse mounting direction**

- Install the striker fuses which trip the switch when they blow. The end of the fuse with the striker pin (A) is marked as shown beside.

- The specifications and the mounting orientation of the fuse are printed on the fuse body. Turn the label to face the front (striker pin at the top).

**Assembling the Fuses for GBC / IMM Cubicles**

**For GBC-A and GBC-B cubicles:** Assembling the fuses to-earth voltage VT.

- Remove the plugs protecting the fuse chambers.
- Connect a wire to each of the current transformers.

**Example:** connect on the top
• Connect a wire to each of the current transformers.

Example: connect on the down

• Screw the fuse into the fuse chamber.

• Connect the wire coming from the current step-down transformer.
• Fit the special nut and tighten it moderately by hand.
Reassembling a Cubicle

Re-use and replace in the same places the nuts and bolts removed during dismantling.

Illustrations used in the procedure:

→ Bolt + washer

→ Bolt + washer + nylstop nut

1. Re-install the two front top plates (F) (6 bolts per top plate of cubicle without low voltage cabinet).

2. Re-install the two rear top plates (E) and (E') (8 to 16 bolts depending on the cubicle).

3. Re-install the 2 half-cross bars (D) on the low voltage compartment (cubicle without low voltage cabinet).
4. Re-install the low voltage compartment cover(s) (C) (2 bolts per cover).

5. For GBC / GBM / IMM cubicles: Make sure that nothing has been inadvertently left in the busbar compartment. Re-install the front panel (A3) and then swivel the angle bracket 90° to the right. Re-install the upper panels (A2) and (A1) of the compartment.
Fitting the Earth Bars

Nuts and bolts in bag S1: 3729745

- Connect the earth bars together (HM8 x 30 mm bolts).
- Bar length = 375 or 750 mm (between hole centers), depending on the cubicle.

- Connect to substation earth in either of these two ways.

Low Voltage Connections

- Open the low voltage compartment. Cable entry to the auxiliary terminal block is via holes (A) on top.
- Remove knock outs.

- Make the connections to the terminal block according to the low voltage diagram of your installation.
- Close the low voltage compartment.
Connection of MV Cables

Connection of MV Cables in IM / SM / NSM / GAM2 Cubicles Equipped With TH110 Thermal Sensors

Mounting of the Cables on the Connections in IM / SM / NSM / GAM2 Cubicles Equipped With TH110 Sensor

Make sure that the self-gripping tape is correctly positioned so that it is not between the cable lug and the connection when tightening. Check for 5 mm of clearance between the lug and the self-gripping tape.

⚠️ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

Make sure of 5 mm clearance between self-gripping tape and the cable lug when tightening.

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

Installation Diagram

For IM375 / IM500 / SM / NSM cubicles

A. Gap between connector and self-gripping tape
B. Width of the self-gripping tape installed over the sensor.
   IMPORTANT: Place the buckle of the self-gripping tape on the sensor.
C. Minimum position of the self-gripping tape from M12 screw (use a jig for positioning)
D. Diameter of cable connector. Schneider Electric specifications: cables from 50 to 240 mm² maximum
**Only for GAM2 cubicle**

A. Gap between connector and self-gripping tape

B. Width of the self-gripping tape installed over the sensor.

**IMPORTANT:** Place the buckle of the self-gripping tape on the sensor.

C. Minimum position of the self-gripping tape from M12 screw (use a jig for positioning)

D. Diameter of cable connector. Schneider Electric specifications: cables from 50 to 240 mm² maximum

---

**Connection of MV Cables in IM / SM / PM / QM Cubicles**

- Mount the cable clamp supports.

  Nuts and bolts in bag S3: 3729741 (HM6 x 16 bolts).

  The remaining nuts and bolts are for cable clamping.

**Mounting possibilities**

- **A:** Without toroids
• **B:** With toroids

**NOTE:** If the assembly (B) is not equipped with toroids, the degree of protection IP2X is not observed.

**Remind:** IP2X: degree of protection following standard IEC 60529.

Mount the first bottom plate.

**Installing the Fault Detection Toroids**

Instructions suggested by Schneider Electric.

**For IM cubicles only.**

Follow the instructions of the toroid manufacturer.

• Prepare the toroids outside the cubicle.

• Fit the cable bushing.
• Position and fix the toroid on the cable. The (isolated) earthing bread of the cables must go through the toroids.

• Connect the cable to the bolt provided on the phase L1 connector.

• Use a torque wrench and a 19 mm socket to tighten the cable to this bolt. Tightening torque: 50 N.m.

• Clamp the cable to the clamp support on the bottom plate (HM8 x 50 bolts).

• Mount the second bottom plate. Mount phases L2 and L3 using the same procedure as for phase L1.
Example of low voltage routing: cables pass through the opening.

- Connect the cable and toroid earthing braids in either of these 3 ways.
  NOTE: The bolts are already installed.

Specific Operations for PM / QM Cubicles

Do not use the cable clamp supports.
Nuts and bolts in bag S5: 3729743.

- Make sure to fully complete the operating cycle before removing the lever.
- Open the earthing switch using the operating lever. See manual operations, page 83.

- Fit the cables in the same order as for the IM cubicle.
- Use a torque wrench and a 16 mm socket to tighten the bolts. Tightening torque: 50 N.m.
• Make sure to fully complete the operating cycle before removing the lever.
• Close the earthing switch.

Connection of MV Cables in DM1-A 630 A Cubicles

1–Cable Version Cubicle

Nuts and bolts in bag S7: 3731664

• Remove the plinth (4 bolts).
• Remove the bottom plates.

• Mount the cable clamps on the 3 bottom plates (1), (2), and (3) (HM6x16 bolts).

NOTE: The remaining nuts and bolts are for cable clamping.
• Fix plates (2) and (3) as shown beside.

• Mount the first bottom plate (for phase L1) in the back of the cubicle.

• Fit the cable bushing.

• **DM1-A cubicle with SF1 circuit breaker**: The head of the bolt of the cable connection must be on the sensor side.
• Secure the first cable on the first sheet metal floor then, place the second sheet metal floor (HM8x50 bolts).
• Assemble the L2 and L3 phases the same way as L1 phase.

• Secure the earthing braids to the earth bar.

2–Cable Version Cubicle

Nuts and bolts in bag S7: 3731664

• Remove the plinth (4 bolts).
• Remove the bottom plates.

• Mount the cable clamps on the 3 bottom plates (1), (2), and (3) (HM6x16 bolts).

**NOTE:** The remaining nuts and bolts are for cable clamping.
• Fix plates (2), and (3) as shown beside.

• Mount the first bottom plate (for phase L1) in the back of the cubicle.

• Fit the cable bushing.

• Clamp the first cable then, mount the second bottom plate (HM8x50 bolts).

• Assemble the L2 and L3 phases the same way as L1 phase.

• Secure the earthing braids to the earth bar.
Connection Alternative 1 Three-Pole Cable in a DM1-A Cubicle

Clamping

- The tab of part (1) secures part (2).

Assembling the Connection Basin

1. Assembling the connection basin:
   - Fasten together the various plates making up the basin kit.
   - Fit the cage nuts to fix the bottom plates.
   - Fit the flange support and the cable gland.

2. Fitting the basin and the earth bar:
   - Install and fix the basin (10 screws).
   - Position the earth bar (A) on the right hand side of the basin (2 clips) and fix it to the earth bar already placed in the cubicle (HM6 x 30 screws).
Installing the Cable

Cut out the cable gland and flange the cable to the bottom of the basin.

Specificity

The head of the bolt should be on the sensor side.

Connection of MV Cables in DM1-A / DM1-D Cubicles 1250 A

Clamping

- The tab of part (1) secures part (2).
Fitting the Bottom Panels

- Mount the 2 side panels (D) on the bottom panels using the 8 bolts without locking.

- Clamp the 2 front and back panels (E) on panels (D).

Fitting the Earth Bars

- Place the earth bar (F) on the right side of the bottom panel (2 clamps) and fix it to the earth bar already in the cubicle (HM6x30 bolts).

Fitting the Cables in a 2-Cable Version Cubicle

2 cables version + fitting insulating shields

1. Install the 2 connection cables (R).
   Tightening torque: 28 N.m.
2. Install the cable-bushings on the cables.
3. Install the insulating shield support (G) by clamping.
4. Fix the clamp supports under the bottom plates.
Installation of fixings

1. Position to be followed for a correct assembly
2. Fixing in place

- Place the first bottom plate (phase 1) (4 bolts) as well as the shield (H).

- Fasten the first 2 cables to the connection pad.
- Install the cables of phases 2 and 3 in the same way, as well as the shields.

- Place the bottom plates so that the notches (P) are not opposite each other.
- Install and fix the 3 cable clamp supports.
Fitting the Cables in a 1-Cable Version Cubicle

- Install the cable-bushings on the cables.
- Fix the clamp supports under the bottom plates.
- For insulating shield fitting see the 2-cable version.

Mount the first bottom plate (phase 1) (4 bolts).

- Position the cable-bushing.
- Proceed in the same way for phases 2 and 3.
- Install and secure the 3 cables clamps.
- Place the bottom plates so that the notches (P) are not opposite each other.

Connection of Earthing Braids

- Connect the earthing braids to earth bar (F) at the bottom of the pan (HM6x30 bolts).
Connection of MV Cables for DM1-S Cubicle

- Disassemble plinth (A) (4 screws).
- Disassemble the toroid wiring protection plate (B).
- Cut the toroid provisional fixing bindings.
- Place the toroids on their side.
- Disassemble the bottom plates.

- View of the 4 bottom plates: the clamps supports are mounted under the bottom plate.

- Mount the flange supports under the three plates 1, 2, and 3 with the HM6x16 screws.
  The remaining screws are intended for cable flanging.

- Install the cable bushing (C) and pass the toroid (D) around the cable (E).
• Connect the cable to phase L1. The screws are already fitted.
   Tightening torque: 50 N.m

• Place the clamp on the clamp support, without tightening (HM8x50 screws).
• Fix plate 1 at the bottom of the cubicle.
   The toroid must be inside the cubicle, and the cable bushing in place on the plate.
• Tighten the clamp.

• **NOTE:** Plates 2 and 3 must be fixed as shown.

• Fix plate 2 having first mounted the fixing support (G) on it.
• Mount phases L2 and L3 following the same instructions as for phase L1.
• Fix the toroids (D) by folding back the fixing metal foils (H).
  Tightening torque: 8 N.m

• Put back the toroid wiring protection plate (B).
• Put back plinth (A).
Connection of MV Cables in DMV-A 630 A Cubicles

- Disassemble the basin (D) (6 screws).

- Turn over and reassemble the basin (D). Use the same screws.
- Disassemble the bottom plates (1 and 2).
  These operations can be performed before putting back the basin.

- View of the 2 bottom plates (1 and 2), the flange supports are mounted beneath the bottom plate.

- Mount the flange supports (A) under the plate (2) with the HM6x16 screws.
  The remaining screws are provided for cable flanging.

- Install the cable bushing (A).
  The cable braid (B) must pass in the toroid and in the cable bushing.
• Connect the cables. The screws are already in place.

• Place the 3 flanges on the flange supports, but do not tighten them (HM8X50 screws).

• Fix plate (2) at the bottom of the basin.
  The cable bushing must be in position on the plate.

• Tighten the flange.

• Insert the cable braids (D) in the oblong holes of the plate (2).

• Fix the plate (1).

• Fix the cable earthing braids on the earth bar (G).

Connection of MV Single-Pole Cables for DMV-A Cubicles with VT (Option)

VT disassembly instructions for DMV-A cubicles
• Remove the panel (A) on the front face.

• Disconnect the metal foils (B) and the wires of the VT secondaries (C).

• Disconnect MV cables by unscrewing the VT screws.

• Slide the VT beam outside the cubicle and rest it on the floor or on a base positioned at the same level as the bottom of the cubicle.
• Remove the VTs from the support beam.

• Fit the tank and MV cables (see connection of MV single-pole cables in the installation instructions).

• Once the tank is in position and MV cables connected, put the VTs back on the support beam.

• Put the VT beam back inside the cubicle.
• Reconnect the metal foils and the wires of the VT secondaries.
Installation Instructions SM6 – 24kV

• Reconnect the VT MV cables.
• Put the front face panel (A) back in position.

Connection of MV 1 P Cables in DMV-A / DMV-D Cubicles 1250 A

Accessories:
• Basin kit delivered on cubicle pallet: 51238290FA
• Bag of screws (1 or 2 cable version): 51238314FA
• Bag of 3P cable screws: 51238357FA

Preparing the Basin Plate

• Side plates (A):
  ◦ Fit the cage nuts to fix the basin plates.
• Rear plates (B):
  ◦ Fit the cage nuts to fix the rear bottom plates.
  ◦ Fit HM8X40 screws+ M8 nut (V) to fix the cable earthing braid earth bar.
• Front plate (C):
  ◦ Fit cage nuts to fix the front bottom plates.
Mounting the Basin on the Cubicle

- Fit the 2 side plates (A) on cubicles (fixing four M6 x 16 screws).

- Fit the rear plate (B) and fix it by 2 screws (M6 x 16). Fit the earth bar (D).

- Fit the front plate (C) and fix all the plates to one another by 12 screws (M6 x 16).
1P Cables (1 or 2 Cable Version)

Preparing and mounting the bottom plate

→ Screw + washer

→ Cage nuts
   • On the front bottom plate (E), fit 3 cage nuts.
   • On the rear bottom plate (F), fit 3 cage nuts.
   • Fix the bottom plates (E) and (F) by 4 screws (M6 x 16).

• Fit the 3 cable glands (G) (1 or 2 cable version)

• Fit the cable flange brackets (H) phase 1 (1 or 2 cable version).
  • Fix by 2 screws (M6 x 16).
  • Fit by three M8 cage nuts on the cable flange bracket (H).
1 cable version
• Installing 1 cable.

2 cable version
• Installing 2 cables.

1 cable version
• Connecting the L1 phase cable.

2 cable version
• Connecting the L1 phase cable.
1 or 2 cable version

- Fit the cable flange (J) (three HM8 X 60 screws).
- Fit phases L2 and L3 as per the same instructions as phase L1.

- Fix the cable braids on the earth bar.

Installing the 3P Cable

- On the bottom plates (E) and (F), cut or break the edges of the middle phase for 3P cable by 4 screws (M6 x 16).
- Fix the plates (E) and (F)

- Fit the 2 cable glands (G).
- Fit the cable gland (K).
• Fit the cable flange bracket (L) with HM8 screws.

• Installing the 3P cable.

• Connect the strand of phase L1 then L2, and L3.

• Fit the cable flange (M8 screws).
• Fix the cable braid or braids on the earth bar.

Environmental Monitoring Option

Two functional units inside the switchboard are equipped with environmental sensors CL110:
• One unit equipped in cable compartment.
• One unit equipped in busbar compartment.

In each unit there are two sensors, that are physically identical. However their assembly and software configuration is different, therefore must not be swapped.

The positions of CL110 sensors are the same in all functional units and always marked with positioning label.

A. CL110 sensors
B. Positioning label
C. The position of pair of CL110 sensors in the cable compartment with the positioning label. Example of DM1-A functional unit.
D. The position of pair of CL110 sensors in the busbar compartment with the positioning label. Example of DM1-A functional unit.

The CL110 sensors are fixed inside the cubicles by magnets. Due to potential risks (dielectric perturbation), their positions must not be changed. After each intervention, visually check that all sensors are on their designed positions.

⚠️ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

Keep the environmental monitoring sensors only in the position defined.

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

Handle carefully the roofs, which are equipped with environmental sensors.

That roofs are marked with a sticker on top (shown below).

Avoid any shocks on the roof during commissioning or any maintenance operations on that functional unit.
Flair DIN Option

LV connection indicator Flair DIN

Operating

The Flair devices (after 2010) are a fault passage indicator without settings (automatic mode). However, it is possible to perform specific override settings.

In manual mode, settings are made as follows:

• By using the 3 buttons located under the display (Flair 22D/23DM).
• By micro-switches (Flair 21D).

The changes are taken into account after a press on the Test/Reset button.

In AUTO I>; I0> mode, the manual settings are not active.

Test Mode

A press on the Test/Reset button activates Test mode.
• The indicator lamp \( \uparrow \) flashes and the BVP and the OUT output are activated until the end of the test.
• The display successively shows EESE and F2-1d and w 100 (software version).
• Then, all parameters followed by their values scroll and indicator switch back in ammeter mode, 10 s after displaying the last value (a press on Test/Reset allows to return immediately ammeter mode).

**Setting Parameter Scrolling Sequence in Test Mode for Flair 21D (Automatic on Test Mode)**

<table>
<thead>
<tr>
<th>Automatic fault detection setting (*)</th>
<th>Network frequency</th>
<th>Imax threshold</th>
<th>Zero sequence threshold</th>
<th>Timer reset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auto to OFF</td>
<td>Fr 50</td>
<td>200</td>
<td>EF to 40</td>
<td>tr to 40</td>
</tr>
<tr>
<td>or on Fr 60</td>
<td>or to 800</td>
<td>to 160</td>
<td>Earth Fault</td>
<td></td>
</tr>
</tbody>
</table>

When Auto is ON, Flair 21D uses the following values for fault detection:
• Frequency = self-detection
• Zero sequence threshold = automatic fault detection for any fault >20 A
• Imax threshold = automatic fault detection for any fault >200 A
• Acknowledge time = 40 ms
• Inrush= 3 s
• CT type = CT1 (can be changed to CT2 by actuating the bottoms)
• Automatic reset = 70 s (if automatic reset = on)
• Timer reset = 4 hours

**Settings Mode (Flair 22D and Flair 23DM)**

During the Test mode, a press on the \( \uparrow \) button provides access to Settings mode (display EESE).

1. A press on the \( \downarrow \) button displays the first parameter to be set.
2. Several presses on the \( \uparrow \) button scroll the parameters in a loop.
   - At this stage, with no actuation of \( \uparrow \) or \( \downarrow \) during 10 s, the indicator returns to ammeter mode.
3. Press the \( \downarrow \) button to display the current value of the selected parameter.
4. Press the \( \uparrow \) button again to activate setting of this value: the display flashes for 5 s.
5. During flashing, press \( \uparrow \) successively to display the desired value.
6. Confirm by pressing the \( \downarrow \) button. Without confirmation within a period of 15 s, return to display of the parameters without change in the value.
   - Each press on the Esc (return) button takes you back to the preceding stage.

**Setting parameter scrolling sequence**

- Zero sequence threshold \( I_0 > \) (Earth Fault) (A)
  - CTs type A
  - CTs type B (10 A increments)
SM6 – 24kV Installation Instructions

Imax threshold ▶ (Overcurrent) (A)

CT mounting:
- Phase CTs
- Earth CT

CT type

Acknowledge time (Fault duration) (ms)
- 40 to 100 ms (20 ms increments)
- 100 to 300 ms (50 ms increments)

Inrush (s)

Automatic reset (s)

Fault VALIDation (s)

Timer reset (h)

Standard settings:
- Fault detection = self-calibration
  - Frequency = self-detection
  - Zero sequence threshold = automatic fault detection for any fault >20 A
  - Imax threshold = automatic fault detection for any fault >200 A
  - Acknowledge time = 40 ms
- Inrush = 3 s
- CT mounting = Type A
- CT type = CT1
- Automatic reset = 70 s
- Timer reset = 4 hours

Useful Links
- NT00240: FLAIR 21D User Manual
- NT00231: FLAIR 22D User Manual
- NT00328: FLAIR 23DM User Manual
Start-up and Operating Instructions

Circuit Breaker Protection Relays

VIP40 / VIP45

Application

VIP40 and VIP45 are protection relays with a self-powered supply. They are powered by their current sensor and operate without an auxiliary power supply.

- The VIP40 protects against phase faults.
- The VIP45 protects against phase faults and earth faults.
- VIP40 and VIP45 display currents measurement.

Presentation

The User-Machine Interface (UMI) on the front panel of VIP relays consists of a display, LEDs and keys. A sealable pivoting flap can prevent access to the setting keys by unauthorized persons.

1. Display
2. Lugs for opening the transparent protective flap
3. Transparent protective flap
4. Imax. peak demand display button
5. Sealing ring
6. Test/Reset button
7. Status LED
8. Space for a user-customizable label
9. Trip fault indication LED
10. Identification label
11. Symbol indicating that it is necessary to read the manual
12. Battery

Identification Label

The identification label on the front panel is used to identify the VIP:

- Product name
- Product reference
- Serial number
Status LED

The status LEDs provide information about the VIP general status.

<table>
<thead>
<tr>
<th>Pictogram</th>
<th>Color</th>
<th>Function</th>
</tr>
</thead>
</table>
| ![icon](image) | Red | • LED permanently on: The VIP has gone into the fail-safe position following detection by the embedded self-tests of the failure of one of its internal components, involving a risk of nuisance tripping. In this case, the VIP is no longer operational.
• NOTE: This LED may light up briefly when the VIP is energized: this is normal and does not indicate a failure.
• LED flashing: The VIP has detected a failure not involving a risk of nuisance tripping. In this case, the VIP has not gone into the fail-safe position. Intervention is required as soon as possible (refer to document referenced NRJED311207EN.) The LED stops flashing as soon as the failure disappears. |

VIP40 / VIP45 Settings

When the protective flap is opened, you can enter the protection settings by means of the rotary switches. To do this, use a 3 mm flat blade screwdriver.

**VIP40**

1. Phase overcurrent protection adjustment dial
2. Setting range selector switch
3. Advanced settings protective cover
4. Connection port for the pocket battery module
5. Trip test button
VIP45
1. Phase overcurrent protection adjustment dial
2. Setting range selector switch
3. Earth fault protection set point adjustment dial
4. Earth fault protection time delay adjustment dial
5. Advanced settings protective cover
6. Connection port for the pocket battery module
7. Trip test button

VIP400 / VIP410

Application
VIP400/410 are suitable for substations without an auxiliary power supply. They can be used for the following applications:
- Protection of incomers and feeders
- Protection of MV/LV transformers
They offer the following functions:
- Phase over current protection
- Earth fault protection
- Thermal overload protection
- Current metering display

Presentation
The User-Machine Interface (UMI) on the front panel of VIP relays consists of a display, LEDs and keys. A sealable pivoting flap can prevent access to the setting keys by unauthorized persons.
A. Flap open
B. Flap closed
1. Display
2. Status LEDs
3. Fault indication LEDs
4. Zone for a user-customizable label with pictograms of the fault indication LEDs
5. Acknowledgement key
6. Identification label
7. Sealing ring
8. Selection keys
9. Key for selecting menus and testing LEDs. When the VIP is not supplied with power, this key can also be used to start the VIP from the battery in order to enter settings
10. Menu pictograms
11. Menu selection pointer
12. Battery compartment and socket for connecting the pocket battery module
13. Settings protective flap
14. Confirm entry key
15. Abort entry key
16. Setting keys

Identification Zone

The identification zone on the front panel enables a VIP to be identified.

1. Product name
2. Product reference
3. Serial number
4. Supply voltage
**Status LEDs**

The status LEDs provide information about the VIP general status.

<table>
<thead>
<tr>
<th>Pictogram</th>
<th>Function</th>
<th>VIP400</th>
<th>VIP410</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Green LED" /></td>
<td>Green LED: auxiliary power supply present</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td><img src="image" alt="Red LED" /></td>
<td>Red LED permanently on: VIP unavailable (VIP in the fail-safe position)</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td><img src="image" alt="Red LED" /></td>
<td>Red LED flashing: a failure has been detected but does not involve the VIP going into the fail-safe position</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td><img src="image" alt="Yellow LED" /></td>
<td>Yellow LED flashing: communication active</td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

**Fault Indication LEDs**

VIP relays have fault indication LEDs. They flash to indicate a fault, as shown in the following table.

<table>
<thead>
<tr>
<th>Pictogram</th>
<th>Fault</th>
<th>VIP400</th>
<th>VIP410</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Detection" /></td>
<td>Detection of a fault by the phase overcurrent protection or in the event of tripping by the temporary test mode</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td><img src="image" alt="Detection" /></td>
<td>Detection of a fault by the earth fault protection</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td><img src="image" alt="Detection" /></td>
<td>Detection of a fault by the thermal overload protection</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Ext.</td>
<td>Tripping by a volt-free contact connected to the external trip input</td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

After a trip, the fault indication LEDs are powered by the battery embedded in the VIP or by the VIP410 auxiliary power supply.

Fault indication by the LEDs can be stopped:
- by pressing the **Reset** key,
- automatically by the reappearance of a current in the network higher than the pick-up current,
- automatically after 24 hours,
- by remote control order via the communication (VIP410).

**Useful Link**

NRJED311206EN: reference manual
Easergy P3U

⚠️ CAUTION

HAZARD OF ELECTROCUTION, BURNS OR EXPLOSION

- Cut the power supply to the P3U and the equipment in which it is installed prior to intervention.
- Always use a suitable voltage detection device to check that the power supply has been cut.
- Re-install all devices, doors and protection covers before re-energizing the SEPAM.
- Re-install all the protection devices before re-energizing the primary equipment.

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

Presentation

Front panel

1. LCD
2. Navigation push-buttons
3. Object control buttons
4. LED indicators
5. Local port
6. Function push-buttons and LEDs showing their status
7. INFO push-button
Identification label

To identify an Easergy P3U protection relay, see the labels on the package and on the side of the relay.

1. Rated voltage UN
2. Rated frequency fN
3. Rated phase current IN
4. Rated earth fault current I0N
5. Power consumption
6. Power supply operating range UAUX
7. Type designation
8. Serial number
9. Manufacturing date
10. MAC address for TCP/IP communication
11. Order reference
12. Production identification

Connectors

All the P3U connectors can be accessed on the rear panel. They are removable and are attached to the P3U casing with 2 screws.

The connectors are supplied separately: fix them in place using a flat blade screwdriver. Identification of the Connectors on the Rear Panel

P3U with screw clamp connector P3U with ring-lug connector

A. Plug for phase current and earth fault overcurrent
B. Plug for trip contact 5-7, signal contact and digital input 11-16
C. Plug for digital input 3-10 with communication port
D. Plug for Trip contact 1-4, signal contact and digital input 1-2
E. Plug for auxiliary voltage
Useful Links

P3U/en M/xxxx: User manual
P3U_EN_QS_xxxx : Quick Start
NRJCAT17764EN : Manual Easergy P3
*xxxx = revision number

Automation System for NSM Cubicles

Identifying the Control Mechanisms on NSM Cubicle

A. Switch operating locking flap
B. Position of switch operating lever
C. Switch position indicator
D. Electrical charging locking button
E. Indication of operating mechanism status*
F. Voltage presence lamp
G. Earthing switch locking flap
H. Position of earthing switch operating lever
J. Switch manual closing selector
K. Selector for parallel-connection authorisation by mechanical push-button
L. Switch closing push button
M. Switch opening bush button

- Detail of button (D) (electrical charging locking)
  - ON position: electrical charging by motorized reduction gear.
  - OFF position: manual charging.

- Detail of button (K) (selector for parallel-connection authorisation)
LV Connection for Talus T200S

A. T200S changeover relay
B. Radio location In the case of remote control
C. LV cabinet (width: 375 mm)
D. Battery for independent supply
E. Fuse switch for connecting the 230 Vac battery charger supply
F. Terminals for information on Group voltage and startup in the event of group changeover
G. Male/female connector, info SW1, SW2, i.SW1 and i.SW2

To connect low voltage to Talus T200S:
1. Connect the 230 Vac supply to the fuse switch (E) and shut off the fuse switch.
2. Connect the battery.
3. The automated controller will be fully operational after one hour.

Commissioning the Automated Controller

Check the position of the buttons on the operating mechanism: button (K) in normal operation position, button (D) set to ON.

To configure the automated controller, refer to the T200S user manuals referenced NT00044 and NT00045 in English.

Automated Control Equipment

The NSM unit is available with several operating types.

By convention, the priority source is the left-hand cubicle.

Network changeover operating sequences:
• Changeover to emergency supply
1. No Ua voltage present on the normal network controlled for a length of time that can be set to 0.1-0.2-0.4-0.6-0.8-1-1.5-2 s (T1) and Us voltage present on the emergency supply incomer.

2. Changeover.
   • Return to the original operating conditions
     1. Ua voltage present on the normal network controlled for a length of time that can be set to 5-10-20-40-80-100-120 s (T2).
     2. Changeover.
   • Tr: changeover switch response time (70 to 80 ms)

**NOTE:** The default settings are:
- T1: 2 s
- T2: 120 s

To change the parameters, see the T200S user manuals no. NT00044 and NT00045 in English.

### Checks Before Energizing

**Checks for DM1 / DM1-M / DM2 / DMV-A / DMV-D / DMVL / GAM / IM / IMB / IMC / IMM / PM / QM / SM Cubicles**

- Check that nothing has been left inadvertently in the connection cabinet.
- **For DM1-D cubicle:** re-install the 2 bolts.
- Re-install the front panel.
- **For NSM cubicle:** check that the changeover relay is operational.

**Checks for CM / CM2 / CVM / QMC / TM Cubicles**

- Check that nothing has been left inadvertently in the connection cabinet.
- Check for all phases that:
  - the fuse has been properly fitted,
  - the field distributor have been properly positioned on all phases.
- Re-install the front panel.
Operating the Equipment When De-Energized

Line Disconnector Operating Lever Positions

- Position the lever as indicated for downward (opening) operations.
- Position the lever as indicated for upward (closing) operations.

IMC, QMC Cubicles

- Operate the earthing switch several times.
- Operate the switch several times.
CM, CM2, TM Cubicles
Operate the disconnector and the earthing switch several times.

IMB Cubicles
Operate the switch and the earthing switch several times.

DM1, DMVL Cubicles
- Operate the earthing switch several times.
- Operate the switch several times.
GAM Cubicles

Operate the earthing switch several times

SM Cubicles

Operate the disconnector and the earthing switch several times.

IM Cubicles

- Operate the earthing switch several times.
- Operate the switch several times.
IM, PM, QM Cubicles

- CIT operating mechanism front plate.

- CI1 operating mechanism front plate.

- CI2 operating mechanism front plate.

Energizing the MV Incoming Cables

The devices must be in the open position.
VPIS

Presentation of VPIS

VPIS: Voltage Presence Indicating System, a case with 3 built-in lights.

A. VPIS

Characteristics

Conforming to IEC 62271-206, relative to voltage presence.

Operating instructions

⚠️ DANGER

HAZARD OF ELECTRIC SHOCK

The indication provided by a VPIS alone is not sufficient to ensure that the system is de-energized.

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

NOTE: When the ambient lighting is particularly bright, it may be necessary to improve visibility by protecting the indication.

B: voltage presence indicator light (one for each phase)
C: connection point designed for phase concordance unit (one for each phase)

Phase Concordance Unit

Phase Concordance

Phase concordance testing for VPIS must be carried out each time a cable is connected to a cubicle. It is a way of making sure that all 3 cables are each connected to the corresponding phase of the switchboard.

Principle

The principle of the phase concordance unit is that it allows a check of the phase concordance between 2 cubicles input units on the same switchboard.
## Reminder of Accessories That Can Be Used for Phase Concordance Testing

### Balanced phase

The phase concordance unit light (1) is unlit.

![VPI62421](image)

### Check Before Phase Concordance Test

<table>
<thead>
<tr>
<th>Test</th>
<th>Result</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual checking of the indicator lights</td>
<td>The 3 indicator lights of each VPIS are on.</td>
<td>The 2 functional units are energized, the VPIS units are operating and the check can continue.</td>
</tr>
<tr>
<td>on the VPIS units of functional unit 1</td>
<td>The 3 indicator lights of the VPIS are off. The functional unit is not energized or the VPIS is malfunctioning.</td>
<td>Apply power to the functional unit. If VPIS remains unlit, replace it.</td>
</tr>
<tr>
<td>and of functional unit 2</td>
<td>1 or 2 switches are off.</td>
<td>The VPIS is probably defective, replace it.</td>
</tr>
<tr>
<td>Phase concordance unit check choice</td>
<td>Functional unit 1</td>
<td>You can test.</td>
</tr>
<tr>
<td>On each functional unit, test phases 1</td>
<td>Functional unit 2</td>
<td>You cannot test them.</td>
</tr>
<tr>
<td>and 3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Rules for the Use of Phase Concordance Unit**

**Phase Concordance Test**

The 3 indicator lights of the VPIU are lit and the phase concordance unit is correct, meaning that the phase concordance test can be performed.

![Phase concordance unit LED lit](image)

![Phase concordance unit LED unlit](image)

<table>
<thead>
<tr>
<th>FUNCTIONAL UNIT 1</th>
<th>L1</th>
<th>L2</th>
<th>L3</th>
<th>Conclusion regarding phase concordance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FUNCTIONAL UNIT 2</strong></td>
<td></td>
<td></td>
<td></td>
<td>Connection is satisfactory.</td>
</tr>
<tr>
<td>L1</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>Reverse the MV cables connected to L1 and L2 on one of the 2 functional units.</td>
</tr>
<tr>
<td>L2</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>Reverse the MV cables connected to L2 and L3 on one of the 2 functional units.</td>
</tr>
<tr>
<td>L3</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>Change the position of each MV cable on one of the 2 functional units.</td>
</tr>
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**FUNCTIONAL UNIT 2**

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<td>Change the position of each MV cable on one of the 2 functional units.</td>
</tr>
</tbody>
</table>
Off-Load Operations


Initial conditions:
- Line disconnector in closed position.
- Circuit breaker closed.
- Lock the lever entry (E) of the line disconnector with the wrench in (B).
- Remove the wrench in (B) then place it in C.
- Release then charge the circuit-breaker.
- Close the circuit breaker by pressing the push-button I.
• Open the circuit breaker by pressing the push-button O.

• Lock the circuit breaker in the open position in (C) by pressing the push-button (O).

• Remove the key in (C) and place it in (B).
• Release the lever entry (E) of the line disconnector.
Energizing


Initial conditions:
- Line disconnector in closed position.
- Circuit breaker closed.
- Front panel in place.

- Move the line disconnector to the open position using the operating lever.

**NOTE:** The downstream earthing switch opens simultaneously expect for DMVL-D, DM1-D, and DM2 cubicles.

- Move the line disconnector to the closed position then lock the entry (E) of the line disconnector with the wrench in (A).

- Remove the wrench in (A), place it in (C) and release the circuit breaker.
- Charge the latter.
• Close the circuit-breaker by pressing on push-button I.
• The downstream part of the installation is energized.
De-Energizing


Initial conditions:
- Line disconnector in closed position.
- Circuit breaker closed.
- Open the circuit breaker by pressing the push-button O.
- Lock the circuit-breaker in the open position with the key in (C) by pressing the push-button O.
- Remove the wrench in (C) and place it in (A).
- Release the lever entry (E) of the line disconnector.
• Move the line disconnector to the open position (A).
• Move the line disconnector to the earth position (B).
• The front panel can be removed.

**NOTE:** The downstream earthing switch closes simultaneously expect DMVL-D, DM1-D, and DM2 cubicles.

---

Discharging a CI2 Operating Mechanism for IMC / QMC / IMB / IM / IMM / PM / QM Cubicles

- **Cubicle de-energized:**
  Close the switch (button A) then open it (button B).

- **Cubicle energized:**
  Press the open button (B).

---

⚠️ **CAUTION**

**HAZARD OF DAMAGE TO OPERATING MECHANISM**

Perform this operation only when strictly necessary.

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

For GAM Cubicles

- Padlock the earthing switch in open or closed position using 1, 2 or 3 padlocks (shackle diameter 8 mm).

- Padlocking the front panel.

For SM Cubicles

- Padlock the switch in open or closed position using 1, 2 or 3 padlocks (shackle diameter 8 mm).
For IM / IMB / IMC / IMM / IM500 / PM / QM / QMC Cubicles

- Padlocking the motor drive (option).
- Padlock the motor drive out of service before opening the switch. It can be padlocked in service or out of service.

- Padlock the switch open or closed using 1, 2 or 3 padlocks (shackle diameter 8 mm).

- Padlock the switch open or closed using 1, 2 or 3 padlocks (shackle diameter 8 mm).

- Padlocking the front panel.

- Padlock the line disconnector in earthed position using 1, 2 or 3 padlocks (shackle diameter 8 mm).

- Padlock the line disconnector in open position using 1, 2 or 3 padlocks (shackle diameter 8 mm).

- Padlock the line disconnector in closed position using 1, 2 or 3 padlocks (shackle diameter 8 mm).

- Padlocking the front panel.
For NSM Cubicles

- Padlock A: blocks switch operations.
- Padlock B: blocks earthing switch operations.
- Padlock C: blocks cable cabinet access panel.
- Padlock D: blocks operating mechanism electrical charging.
- Padlock E: disables parallel-connection of the two switches.

Keylocks

For General Information

See the key interlock installation and operating instructions no. S1B8651001.

To install a keylock on the circuit breaker, see the instruction manual for the unit concerned. If the keylock option was not specified with the order, contact your Schneider Electric service center.
Operating Safety

Operating Safety for DM• Cubicles

- Operation impossible when the circuit-breaker is closed.

- Line disconnector in the open or closed position.
  It is impossible to remove the front panel.

**NOTE:** The front panel can only be removed or fitted when the line disconnector is in the earth position.

**NOTE:** Once the front panel has been removed, you can move the line disconnector to the open position. However, you cannot move it to the closed position.