instructions for use

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symbols and conventions

Caution: you will find all the symbols below throughout the document, indicating the hazard levels depending on the different types of situation.

DANGER

DANGER: failure to follow this instruction will result in death or serious injury.

WARNING

WARNING: failure to follow this instruction may result in death or serious injury.

CAUTION

CAUTION: failure to follow this instruction may result in injuries. This alert signal can also be used to indicate practices that could damage the SM6 unit.

INFORMATION-ADVICE

We draw your attention to this specific point.
contact the Schneider Electric service unit for diagnosis and advice

Call your sales representative who will put you in contact with the closest SCHNEIDER ELECTRIC group service centre. You can log on to: www.schneider--electric.com

distribution rules

The aim of this publication is to enable the SM6 unit to be installed correctly. This document is not a commercial document. It is a strictly technical document drawn up by Schneider Electric.

safety rules

CAUTION

All the operations described below must be performed in compliance with applicable safety standards, under the responsibility of a competent authority.

WARNING

The contractor must be certified and authorised to manipulate and perform work on the SM6 unit.

CAUTION

Only undertake the work after having read and understood all the explanations given in this document. If you have any difficulty complying with these rules, please contact Schneider Electric.
**DM1:**
circuit breaker cubicle
1: busbar compartment  
2: control cabinet  
3: switchgear compartment: line disconnector  
4: operating mechanism cabinet  
5: lower busbar or cable connection compartment  
A: earth bar connection pad  
B: busbar connection pads  
C: inspection windows  
D: SF1 or SFset type MV circuit breaker  
E: front panel  
N: rear extension sheet metal

**DM1 A**
version with SF1 or SFset circuit breaker
1: with SF1 circuit breaker  
2: with SFset circuit breaker  
(front panel removed)  
F: voltage presence indicator  
G: current transformers  
H: capacitive dividers  
J: downstream earthing switch  
K: MV cable connection pads  
L: circuit breaker operating mechanism front plate  
M: special sensors
DM1 D
version with SF1 or SFset circuit breaker

circuit breaker on the left
(front panel removed)

F: voltage présence indicator
G: current transformers
H: circuit breaker operating mechanism front plate
J: lower busbar connection pads
K: capacitive voltage dividers
L: special sensors

1: with SF1 circuit breaker
2: with SFset circuit breaker

DM1–D
circuit breaker on the right
(front panel in place)
cubicle identification

A : indicator plate
   (for customer use)
B : characteristics and designation
C : manufacturer’s name plate

Note : the circuit breaker characteristics are indicated on the manufacturer’s name plate.

Serial number

D1 : riveted to the operating mechanism cover
D2 : glued to the back of the low voltage compartment cover
D3 : glued to the upright of the frame

accessories list

supplied with the cubicle

DM1 A accessories (1 cable version):
1 bag of intercubicle connection accessories (bag S1 : 3729745)
3 dry cable clamps,
1 cable version
3 clamp supports,
1 cable version
1 bag of nuts and bolts (bag S7 : 3731664)
2 earth bars
6 bars
2 bags of field distributors for busbars > 12 kV (bag S2 : 3729742)
or 2 bags of fastening accessories for busbars ≤ 12 kV (bag S6 : 3729746)
2 phase insulators with 8 0-rings (for 25 kA version only)

DM1 A accessories (2 cables version):
1 bag of intercubicle connection accessories (bag S1 : 3729745)
3 dry cable clamps,
2 cables version
3 clamp supports,
2 cables version
1 bag double cable nuts and bolts 3731699
2 earth bars
6 bars
2 bags of field distributors for busbars > 12 kV (bag S2 : 3729742)
or 2 bags of fastening accessories for busbars ≤ 12 kV (bag S6 : 3729746)
2 phase insulators with 8 0-rings (for 25 kA version only)

DM1 D accessories:
1 bag of intercubicle connection accessories (bag S1 : 3729745)
2 earth bars
3 bars
1 bag of field distributors for busbars > 12 kV (bag S2 : 3729742)
or 1 bag of fastening accessories for busbars ≤ 12 kV (bag S6 : 3729746)
2 deflector assemblies
1 bag field distributor nuts 3735750

2 end panels
1 bag of nuts and bolts for the end panels S4 : 3729744

switchboard accessories:
(may vary depending on the cubicles making up the switchboard)
1 operating lever
handling

CAUTION

Do not grasp the operating mechanism front plate to manipulate the cubicle.

dimensions/mass

Overage weight for a fully equipped cubicle: 400 kg

handling by sling

The handling (D) lugs are reserved solely for handling SM6 cubicles.

A: HM12 nuts and screws
B: Schneider Electric
MUL = 400 KG CE
MUL: Maximal Using Load

CAUTION

C: Should the holes be deformed (ovalisation), replace the lugs, to propose you if required.

L = 1130 mm mini.
Without low voltage case or wiring duct.

L = 750 mm mini.
Without low voltage case or wiring duct.
handling using a forklift

storage

--- 4 0 °C

70 °C

– 40 °C
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

Our service centre 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.
preparing the cubicles for switchboard assembly

Status upon delivery:
- circuit breaker open.
- line disconnector in earthed position.

: bolt+washer

Remove the 2 bolts A (only for DM1–D) and then front panel B by lifting it and pulling it forward. Remove the pallet C. (the bolts cannot be re-used)

Unscrew the four screw fixing the control cabinet cover D and remove them.

Remove the two half cross nembers E on the control cabinet (cubicle without low voltage case).

Remove the parts F and F’. (top plate of cubicle, 16 bolts)

Remove the parts G. (top plate of cubicle, 12 bolts)

Remove the 2 or the 4 lifting ring bars H.
fitting the end panel

Refer to the switchboard parcel manual, as per the upgrade of the new standard IEC 62271-200.

assembling the switchboard

Bag of nuts and bolts
S1 : 3729745.
(HM 6x16 bolts only)

.Join the various cubicles.
(the remaining nuts and bolts are for the earth bars).

Bolt mounting direction
K : lefthand cubicle
L : righthand cubicle
M : to join the 2 cubicles.
Screw HM6x60 to tighten moderately

Tightening torque : 6 Nm.

Remove the wiring metallic shield N.
Fit the bolt P to assemble the cubicles. (take care to LV wires)
Refit the wiring metallic shield.

securing to the floor

(nuts and bolts to be provided by the installer according to the civil works)

Do not secure the cubicle to the floor on the circuit breaker side.
layout in the substation

Switchboard installed to the right of a wall. (minimum clearance)

Switchboard installed to the left of a wall.

fitting the busbars after installing the cubicles
in their operating location

general

bag accessories:

S2 : 3729742 or S6 : 3729746

tools :

1 torque wrench. (1 to 50 Nm)
1 1/4-3/8 adapter.
1 6 mm extension fitting.
1 6 mm male hexagonal (Allan) fitting 1 6 mm female hexagonal socket.

Version ≤ bag S6 : 3729746
Mounted without field distributors.

Version > 12 kV bag S2 : 3729742
Field distributor positioned correctly.

Field distributor positioned incorrectly. (risk of damage)
busbars

Note:
The spacers are for installation on the 25 kA version only and for the busbar section located between the line disconnector and the circuit breaker compartment insulators.

Install the two spacers between the phases at the mid-point of the busbar section.

Fit O-rings A on each side of the spacers.

Busbar connection.
Tightening torque: 28 Nm.
upper busbar of a DM1 D

Busbar connection.
Tightening torque : 28 Nm.

lower busbar of a DM1 D

customer reception

customer removing

bars connection

Busbar connection.
Tightening torque : 28 Nm.
Mount the two deflectors on the bus riser cubicle as indicated above.

Deflector assembly.
A: 2 M6 cage nuts
B: 2 HM6 x 16 bolts
C: 2 HM6 x 30 studs
D: 2 M6 nuts

Refit the two front top plates.

Refit the two rear top plates F and F'.

mounting the earth bars
nuts and bolts in bag S1: 3729745

Interconnect the earth bars.
(using the HM 8 x 30 bolts)

Earth the substation frames in either of these two ways.
cable entry for connection of low voltage auxiliaries

Cable entry to the auxiliary terminal block is via two holes A.

B : Statimax type autonomous protection relay. For adjustments, see the instructions provided with the relay.
C : user connection terminal block.

After connection, refit the two half-width cross members of the low voltage control cabinet. (cubicle without additional LV case).

Refit the low voltage control cabinet covers.

MV cable connection in a DM1 A
(1 cable)
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. (the remaining nuts and bolts are for cable clamping)
**Note:** fix plates 2 and 3 as shown above.

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: connection of phase L1 cable.  
**Tightening torque:** 50 Nm.

For **DM1 A** cubicle with SF set circuit breaker: for cable connection, the head of the bolt should be on the sensor side.  
**Tightening torque:** 75 Nm.

Clamp the first cable and mount the second bottom plate.  
(HM8x50 bolts)  
Mount phases L2 and L3 following the same procedure as for L1.
Secure the earthing braids to the earth bar.

MV cable connection in a DM1 A
(2 cables)
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. (the remaining nuts and bolts are for cable clamping)

Note: fix plates 2 and 3 as shown above.

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: connection of phase L1 cable. 
**Tightening torque: 50 Nm.**

For DM1 A cubicle with SFset circuit breaker: for cable connection, the head of the bolt should be on the sensor side. 
**Tightening torque: 75 Nm.**

Clamp the first cable and mount the second bottom plate. (HM8x50 bolts) 
Mount phases L2 and L3 following the same procedure as for L1.

Secure the earthing braids to the earth bar.
connection alternative
1 three-pole cable
in a DM1-A

clamping
the tab of part 1 secures part 2

assembling the
collection 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.
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.

connection
Connect the cable earthing braid(s) to the earth bar (HM6 x 30 screws).

Connect the strand of phase L1, L2 and L3. The screws are permanent. Tightening torque: 50 Nm. (SF1)

Connect the strand of phase L1, L2 and L3. The screws are permanent. Tightening torque: 75 Nm. (SFSET)
checks before energising
Check that nothing has been left in the connection compartment.

Refit the front panel in place. For the DM1–D refit the 2 bolts A. Tightening torque: 8 Nm.

operating test before energizing
Operate the switch several times. Operate the earthing switch several times.

energizing the incoming MV cables
The switchgear must be in open position. (see: operating instructions)
voltage indicators

As soon as the cables have been energized, the voltage indicator lamps should go on.

A: voltage presence indicator lamp (1 for each phase).

B: connection point used to connect a phase concordance unit.

characteristics

The voltage presence indication is ensured in the voltage range defined by IEC 61958

phase concordance test

Remarque:
the control unit is similar to the concordance unit used for RM6.

Nota:
in the case of a control between old presence of tension and new VPIS to use the adaptater:
51238293 FA

Phase concordance unit of the simplified type.

If the phases concord, the concordance unit lamp remains off.
If the phases do no concord, the concordance unit lamp goes on.
disconnector operating handle positions

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

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

circuit breaker operating tests before energising

initial conditions:
line disconnector in open or earthed position.
circuit breaker locked in open position.

Lock the lever hole E of the line disconnector with the key in lock B.

Remove the key from B and insert it in C.
Unlock and then charge the operating mechanism of the circuit breaker.
(see circuit breaker manual)

Press the I (ON) pushbutton to close the circuit breaker.

Press the O (OFF) pushbutton to open the circuit breaker.
With the key in C, lock the circuit breaker in **open** position by pressing the O (OFF) pushbutton.

Remove the key from C and insert it in B. Unlock the line disconnector lever hole E.

---

**energising the downstream part of the installation**

**initial conditions:**
- Line disconnector in **earthed** position.
- Circuit breaker locked in **open** position.
- Front panel in place.

Set the line disconnector to **open** position using the operating lever. **Note:** for a DM1 A cubicle, the downstream earthing switch opens at the same time.

Set the line disconnector to **closed** position and then, with the key in A, lock the lever hole E of the line disconnector.

Remove the key from A, insert it in C and unlock the circuit breaker. Charge the circuit breaker operating mechanism. (see the circuit breaker manual)

Press the I (ON) pushbutton to close the circuit breaker. The downstream part of the installation is now energised.
de-energising the downstream part of the installation

**Initial conditions:**
- Line disconnector in **closed** position.
- Circuit breaker in **closed** position.

Press the **O (OFF)** pushbutton to open the circuit breaker.

With the key in **C**, lock the circuit breaker in open position by pressing the **O (OFF)** pushbutton.

Remove the key from **C** and insert it in **A**.
Unlock the line disconnector lever hole **E**.

Set the line disconnector to **open** position.

Set the line disconnector to **earthed** position. The front panel can now be removed.

**Note**: For a DM1 A cubicle, the downstream earthing switch closes at the same time.
operating safety

Operation impossible with the circuit breaker closed.

With the line disconnector in open or closed position, it is impossible to remove the front panel.

The front panel can only be removed or fitted with the line disconnector in earthed position.

With the front panel removed, the line disconnector can be set to open position. It cannot however be set to closed position.

padlocking

With one to three 8 mm padlocks per padlocking point.

Padlocking of the line disconnector in earthed position.

Padlocking of the line disconnector in open position.

Padlocking of the line disconnector in closed position.

Padlocking of the front panel. (1 padlock only)
keylocks
(option)

- see the instruction manual for installation and operation of keylocks. *(manual N° 7896785)*
- 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, call your Schneider Electric services center.
preventive maintenance, cleaning instructions and power-up

If necessary: contact the Schneider Electric group service centre.

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

---

CAUTION

Never lubricate the disconnector operating mechanism. If necessary: contact the Schneider Electric group service centre. In normal operating conditions (temperature between – 5°C and 40°C) no special maintenance is required.

---

CAUTION

Never use solvents and alcohol. We recommend that you inspect each compartment (cable, fuse, busbar)* at regular intervals according to environmental conditions.

If the insulating parts are dusty, that you remove the dust using a dry cloth.

---

example:

In harsher conditions (aggressive atmosphere, dust, temperature less than – 5°C or greater than 40°C) consult the nearest Schneider Electric service centre.
**corrective maintenance**

*replacing a voltage indicator block on a cubicle prior to 0040001U*

Manually extract the voltage indicator, the switchboard may be on.

---

**corrective maintenance**

*replacement of a voltage indicator pack type VPIS on cubicle at later date 0040001U*

*removal*

This operation can be performed with power on.

---

**fitting**

Check on the characteristics label (C) that the new pack matches the rated voltage of your network.
- 10 kV to 24 kV.
- 3 kV to 7.2 kV

Fit the new voltage indicator pack in the reverse direction to removal.  
*Tightening torque: 0.1 mdaN.*
# trouble-shooting chart

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<th>Resolution</th>
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<td>Voltage indicator not illuminated</td>
<td>- check the voltage indicator block</td>
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<tr>
<td></td>
<td>- check that the line disconnector and the circuit breaker are <strong>closed</strong> (for an outgoing cubicle)</td>
</tr>
<tr>
<td></td>
<td>- check that the incoming cables are live</td>
</tr>
<tr>
<td>Front panel cannot be opened or <strong>closed</strong></td>
<td>- check that the line disconnector is in earthed position</td>
</tr>
<tr>
<td>Line disconnector cannot be set to earthed position</td>
<td>- check that the line disconnector is in <strong>open</strong> position</td>
</tr>
<tr>
<td>Line disconnector cannot be set to <strong>closed</strong> position</td>
<td>- check that the line disconnector is in <strong>open</strong> position</td>
</tr>
<tr>
<td>Circuit breaker cannot be operated</td>
<td>- see the circuit breaker manual</td>
</tr>
<tr>
<td>Accidental manual closing of the downstream earthing switch arm</td>
<td>- reopen the earthing switch using the contact arm and then reset the system using a screwdriver to allow insertion of the lever</td>
</tr>
</tbody>
</table>

## options

(please consult us)

- auxiliary contacts on the line disconnector.
- additional LV enclosure.
- protection by Statimax relays, Vigirack or by a SEPAM programmable electronic protection unit.

## spare parts

- voltage indicator.
- CIT mechanism.
- mechanism kit 48Vcc.
- fuses.

For other parts, please consult us (see groupe Schneider Electric services center)
recovery of SF6 gas at end of life for disconnector cubicle

The SF6 must be removed before any dismantling operation can be carried out in compliance with the procedures described in IEC–61634 and according to the following instructions.

The gas must be treated in compliance with IEC–60480.
- volume of gas to be recovered: 35 litres
- internal gauge pressure: 40 kPa

NB: SF6 gas recycling at the end of circuit-breaker life, refer to its instruction for use.

control cover access

Remove the cover (A) from the control cabinet.

Remove the control cover (B).

Remove the 3 screws retaining the operating mechanism.
Cut the wiring to remove the operating mechanism.

Drill 2 holes in the filler valve safety cap
∅ 4 mm, centreline 20 mm, max. depth 4 mm
**CAUTION**

pump the gas for at least 15 minutes.

Using a spanner wrench, remove the safety cap from the valve.

Connect the special pumping equipment (C).
The Schneider Electric service centers are there for:

- Engineering and technical assistance
- Start-up
- Training
- Preventive and corrective maintenance
- Adaptation work
- Spare parts

Call your sales representative who will put you in touch with your nearest group Schneider Electric service centers.

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

Schneider Electric Industries SAS
89, boulevard Franklin Roosevelt
F-92500 Rueil-Malmaison (France)
Tel : +33 (0)1 41 29 85 00
http://www.schneider-electric.com