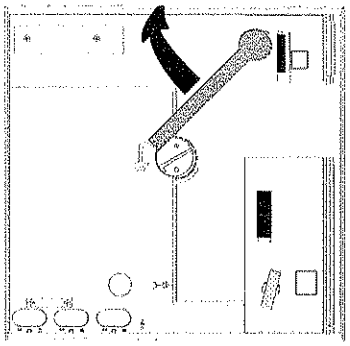
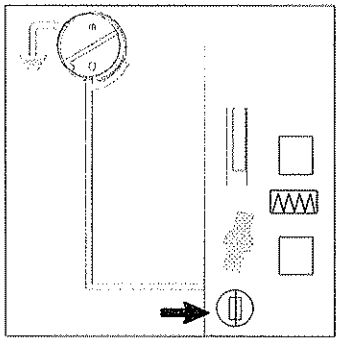
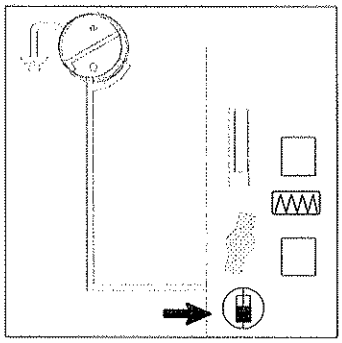


Closing the earthing switch (for operating mechanisms CIT / CI1 / CI2) after verification of voltage status.

visualisation of fuse status in a QM cubicle

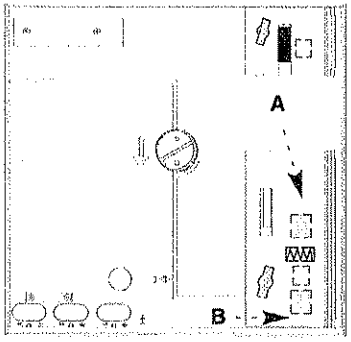


Fuses in operating order.
(white indicator light)

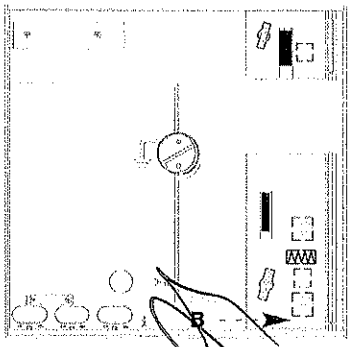


One or more fuses not in operation. **(red indicator light)**

uncharging a CI2 operating mechanism



Cubicle **de–energised:**
Close the switch: button **A**
then open: button **B**

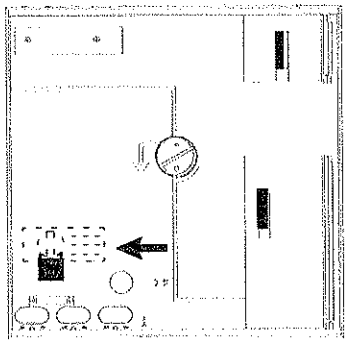


Cubicle **energised:**
Press opening button **B.**

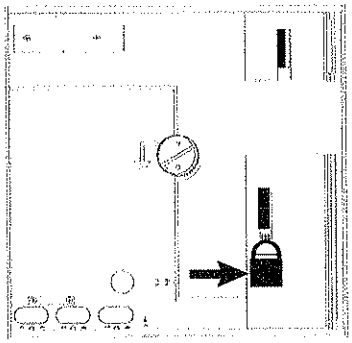
CAUTION: this operation is detrimental to the operating mechanism.

Only use when strictly necessary.

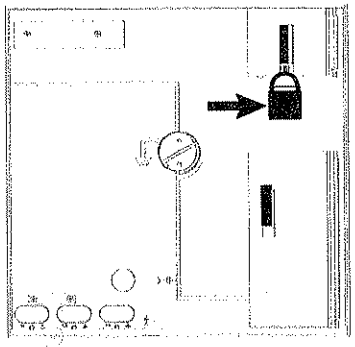
padlocking



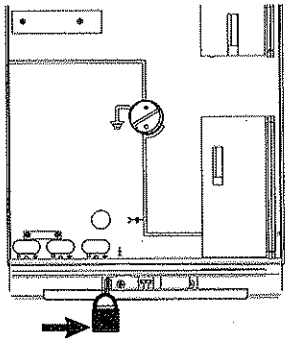
Padlocking the motorisation. (option).
Padlocking the motorisation in the out of operation status before opening the switch. Padlocking possible in the in or out of operation status.



Padlock the switch in the open or closed position by 1, 2 or 3 padlocks ∅ 8 mm.

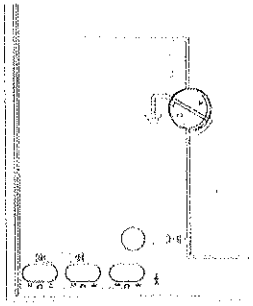


Padlock the earthing switch in the open or closed position by 1, 2 or 3 padlocks ∅ 8 mm.



Padlocking the front panel.

operating safety



The front panel cannot be removed or installed unless the earthing **switch is closed.**

preventive maintenance

If necessary: contact **the Schneider group services centres.**

Never lubricate the operating mechanism.

In normal operating conditions (temperature between **−5°C** and **40°C**) **no special maintenance.**

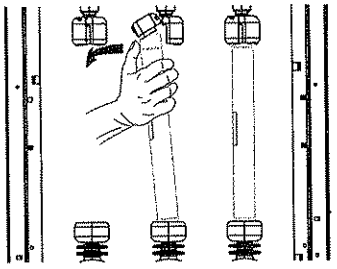
In harsher conditions (aggressive atmosphere, dust, temperature **less than −5°C or greater than 40°C** ,etc) consult **the nearest Schneider group services centre.**

corrective maintenance

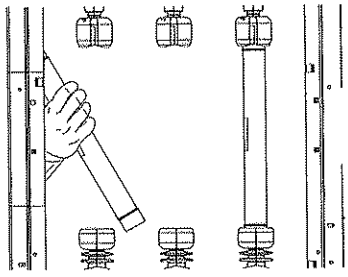
Fuse replacement:

- **cubicle de−energised**
- open the switch
- earthing switch in the closed position

Open the front panel to access the fuses.



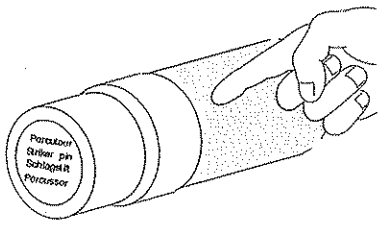
Pull out the fuse from the top.



Then completely remove the fuse from the top.

To install the new fuses, refer to the fuse installation section for a **QM** cubicle.

Important remark: standard IEC 282.1 § 23.2 recommends replacing all 3 fuses should one of them blow.



groupe Schneider 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 groupe Schneider service centers, or call directly in Grenoble, France (33) 04 76 57 60 60

Schneider Electric SA

Merlin Gerin
F–38 050 Grenoble cédex 9
tél: (33) 04 76 57 60 60
télex: merge 320 842 F

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

Conception, rédaction: Service Documentation Technique T&D

7897436EN indice : C

Edition du : **23–Jun–2003**

SM6

MV distribution
factory built assemblies
at your service

Anglais

instructions for use

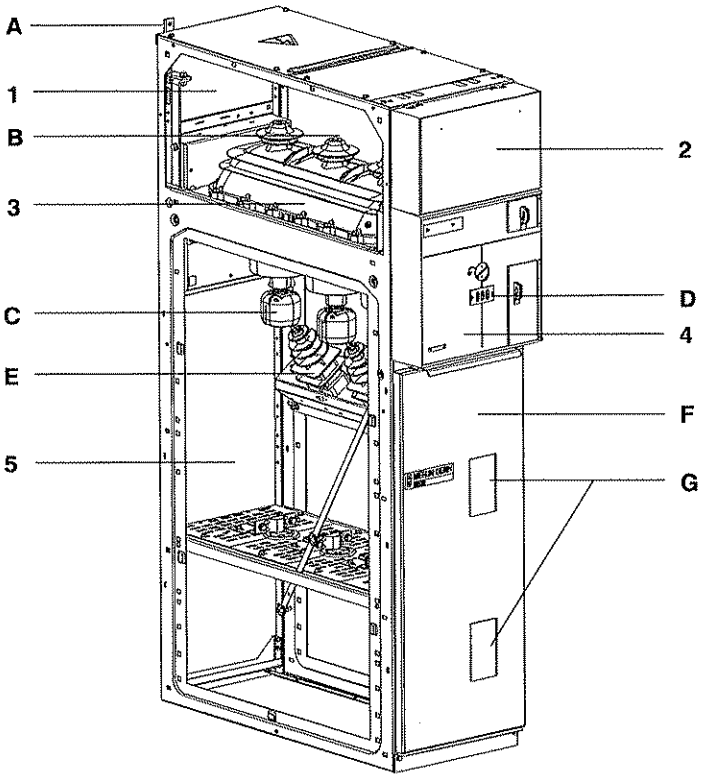
IM–PM–QM cubicles

MERLIN GERIN
mastering electrical power
GROUPE SCHNEIDER

contents

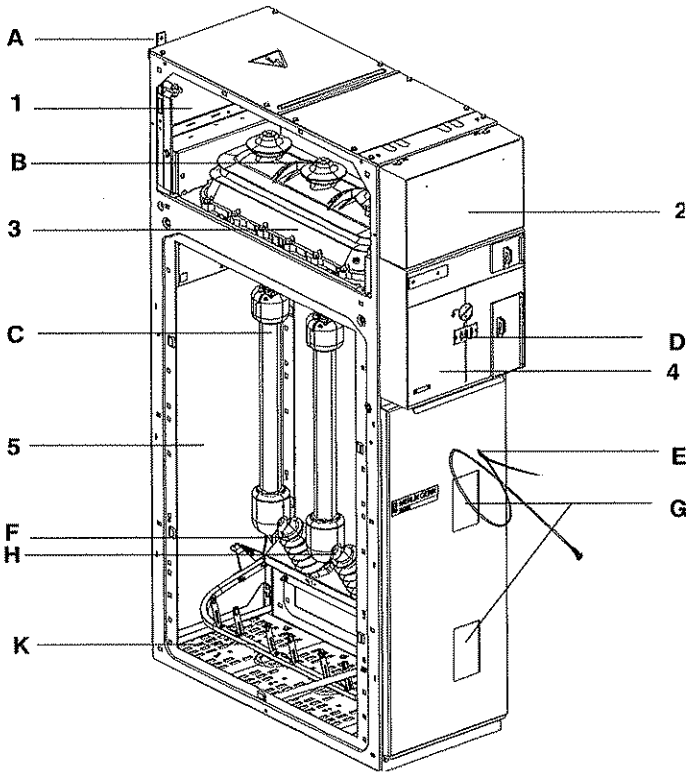
IM : switch cubicle

1 : busbar compartment
2 : control cabinet
3 : switchgear compartment : switch and earthing switch
4 : operating mechanism cabinet
5 : cable connection compartment
A : earth bar connection pad
B : busbar connection pads
C : lower field distributor and cable connection
D : voltage indicator
E : capacitive divider
F : front panel
G : cable connection inspection windows



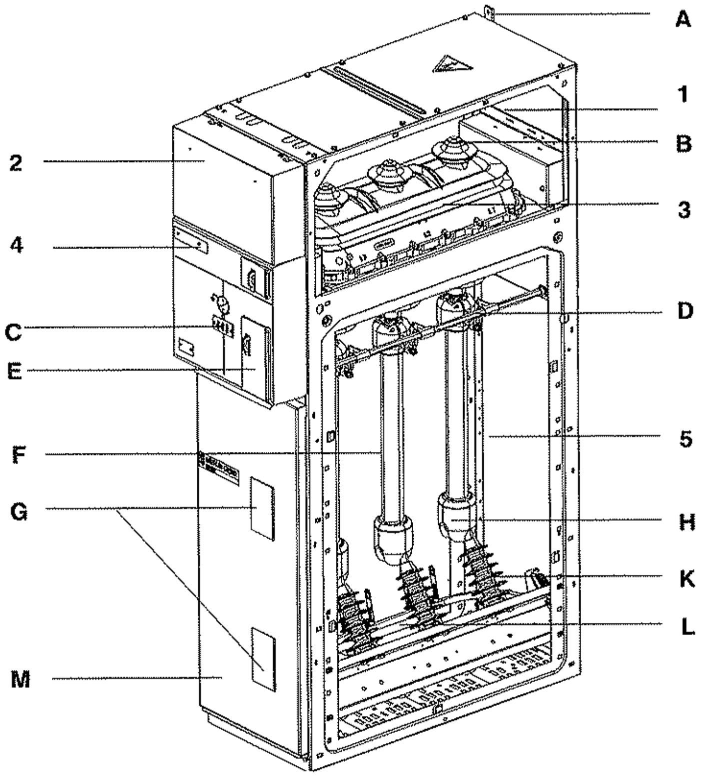
PM : fused switch cubicle

1 : busbar compartment
2 : control cabinet
3 : switchgear compartment : switch and earthing switch
4 : operating mechanism cabinet
5 : cable connection and fuse compartment
A : earth bar connection pad
B : busbar connection pads
C : fuses
D : voltage indicator
E : front panel
F : lower field distributor and cable connection
G : inspection windows for fuses and downstream earthing switch position indicator
H : capacitive divider
K : downstream earthing switch



QM : fuse switch combination cubicle

1 : busbar compartment
2 : control cabinet
3 : switchgear compartment : switch and earthing switch
4 : operating mechanism cabinet
5 : cable connection and fuse compartment
A : earth bar connection pad
B : busbar connection pads
C : voltage indicator
D : mechanism used to open switch when fuse blows (QM)
E : indication of switch opening by blown fuse (QM)
F : fuses
G : inspection windows for fuses and downstream earthing switch
H : lower field distributor and cable connection
K : capacitive divider
L : downstream earthing switch
M : front panel



ВЯРНО С ОРИГИНАЛА

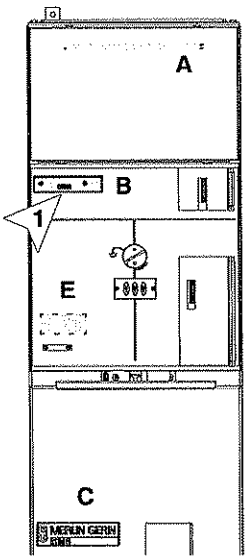
cubicle identification

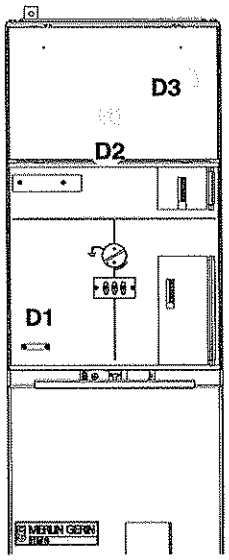
A : indicator plate (for customer use)
B : characteristics and designation
C : manufacturer's name plate
E : motorization plate (option)

serial number

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

1 : instruction for use number





accessories list

Busbar 400–630A version and one phase dry cables connection. For others versions, see specific instructions.

supplied with the cubicle

switchboard accessories:

(may vary depending on the cubicles making up the switchboard)

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

IM accessories:

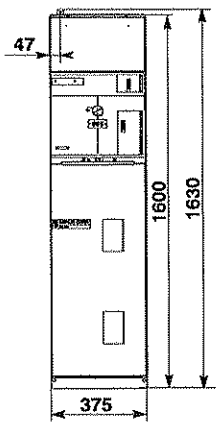
1 bag of intercubicle connection accessories (bag **S1 : 3729745**)
1 bag of field distributors for busbars > 12 kV (bag **S2 : 3729742**)
or 1 bag of fastening accessories for busbars ≤ 12 kV (bag **S6 : 3729746**)
1 bag of bottom plate fastening accessories (bag **S3 : 3729741**)
4 bottom plates
3 cable bushings
3 clamp supports + clamps
1 set of busbars
1 earth bar

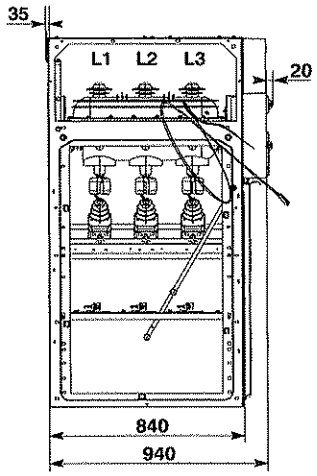
PM and QM accessories:

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**)
1 bag of bottom plate fastening accessories (bag **S5 : 3729743**)
4 bottom plates
3 cable bushings

dimensions and mass

IM :120 kg
PM :130 kg
QM :130 kg





handling by sling

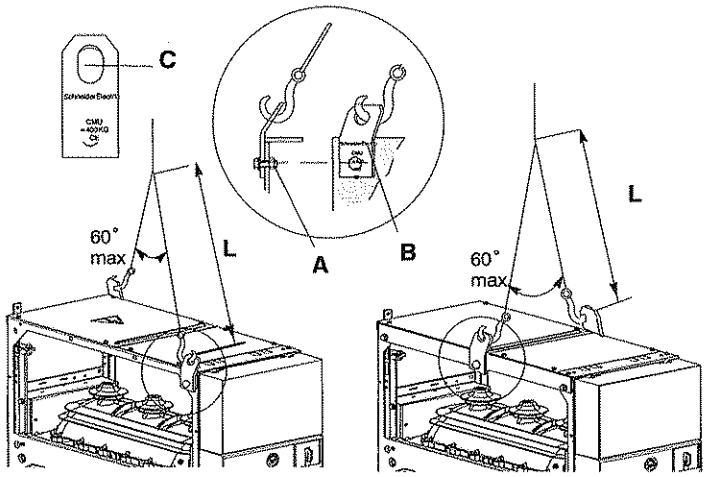
he handling lugs are reserved solely for handling SM6 cubicles.

A : HM12 nuts and screws

B : Schneider Electric CMU =400 KG CE

CMU : Maximal Using Load

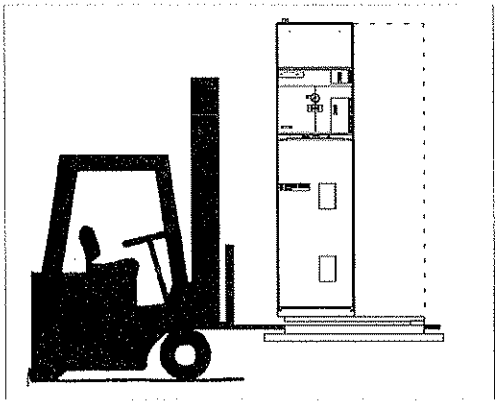
C : should the holes be deformed (ovalisation), replace the lugs, to propose you if required.

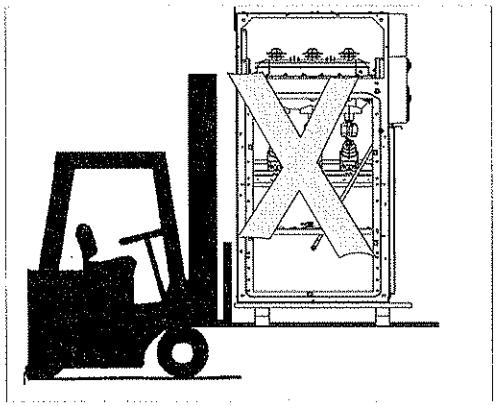


L = 920 mm mini.
Without low voltage case or wiring duct.

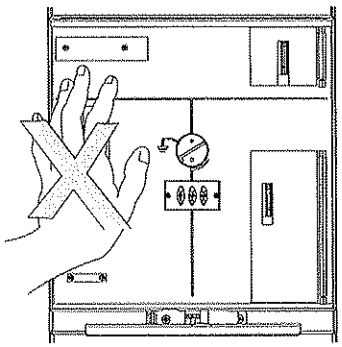
L = 375 mm mini.
With low voltage case or wiring duct.

handling using a forklift

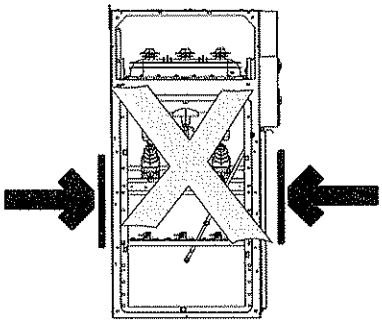


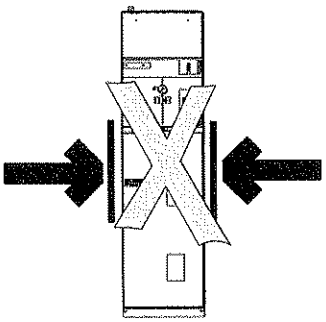


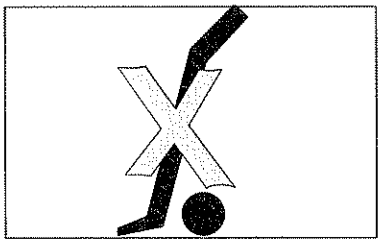
weight



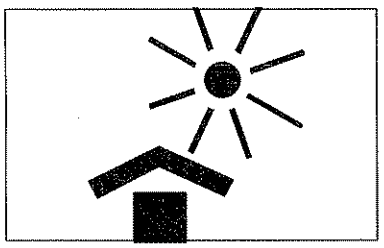
Never attempt to move the cubicle by exerting force on the control panel.

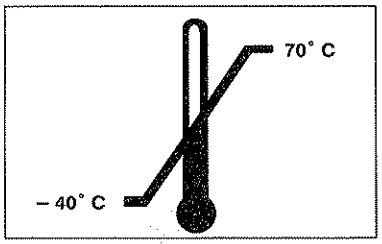






storage





installation and operation recommendation

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

We strongly recommend 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 (between –5°C and 40°C, absence of dust, corrosive gas, etc.), we recommend that you contact our Groupe Schneider service centre in order to examine the measures to be taken to ensure proper installation operation.

Our service centre is at your disposal at all times:

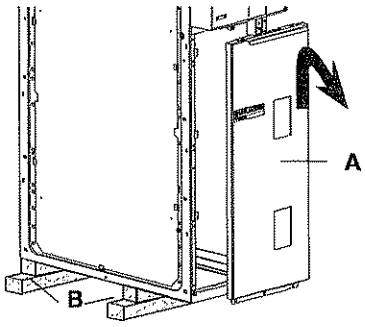
- To conduct an installation diagnosis.
- To suggest the appropriate maintenance operations.
- To offer you maintenance contracts.
- To suggest adaptations.

preparing the cubicles for switchboard assembly

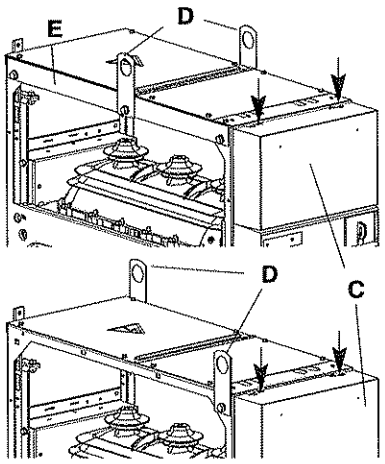
Delivery state :
Earthing switch position upon delivery: **closed.**

→ : bolt + washer

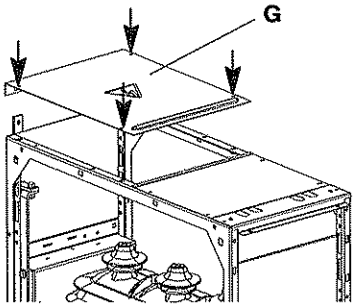
→ : bolt + washer + nylstop nut



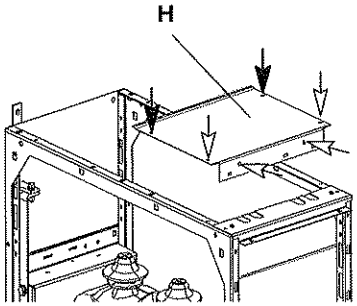
Remove the front panel **A** and then the skids **B.**



Remove the control cabinet cover **C** and the lifting rings **D** and **E.**



Remove top plate **G.** (4 bolts)



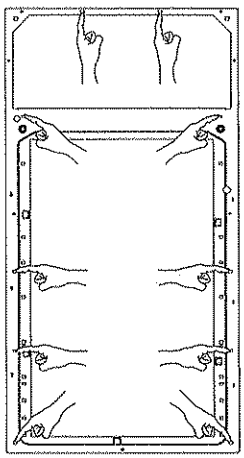
Remove top plate **H.** (6 bolts)

fitting the end panels

preparations

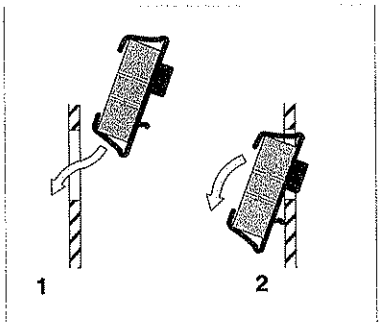
(only if the cubicle is on the end of the switchboard)

Nuts and bolts in bag S4: 3730427. (HM6 x 12 bolts only)



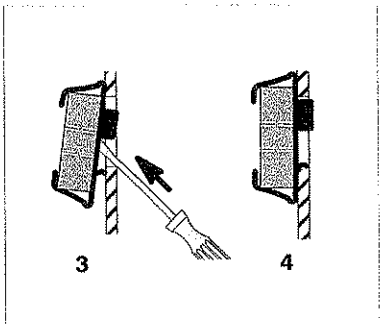
Fit 10 cage nuts on the wall side of the cubicle.
(see instructions below)

In the case of extension with equipment manufactured before february 1995, the end panel of the existing substation must be replaced.



1 from the outside of the cubicle, insert the cage nut in the square hole.

2 rotate the cage nut so that it sits nearly vertically within the cubicle.



3 push the cage nut in the direction of the arrow so that the top of the cage clips behind the panel.

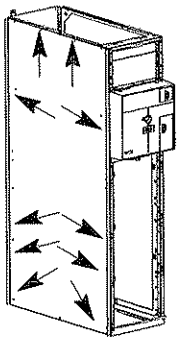
4 the nut is correctly positioned.

securing the end panel

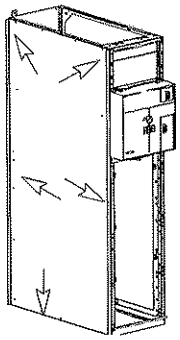
Explication gave for left switchboard extremity, do the same for opposite side.

→ : bolt + washer

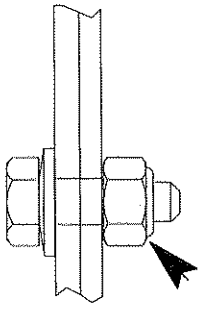
→ : bolt + washers +nylstop nut



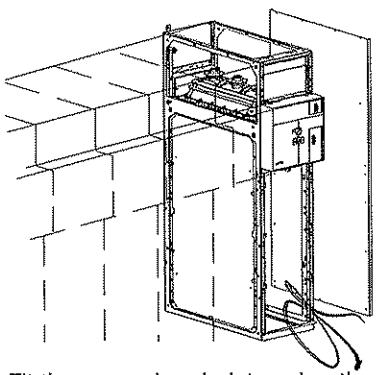
Fit the end plate. Insert the bolts into the captive nuts



Fit the bolts and the Nylstop nuts.



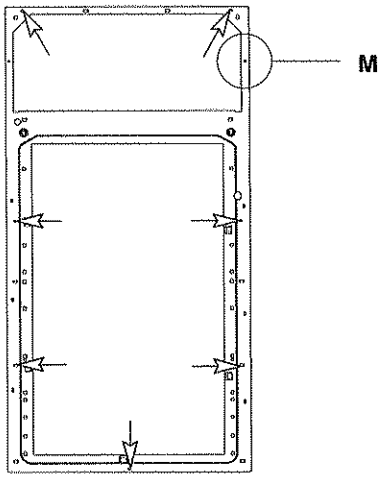
Scew and nylstop nut mounting direction.
(nut into the cubicle)



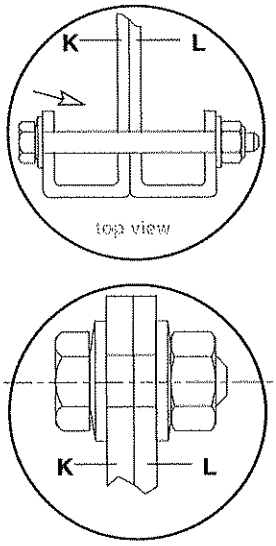
Fit the second end plate using the same procedure.

assembling the switchboard

nuts and bolts in bag
S1: 3729745
(HM6 x 16 bolts only)
→ : screw+washer+ nut



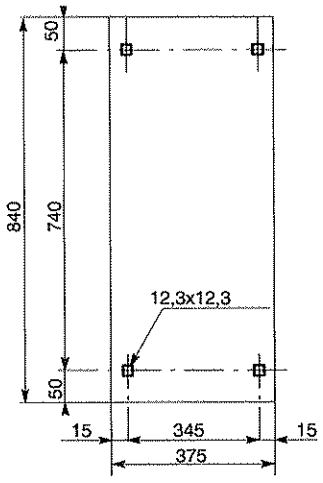
Fix the cubicles together.
(the additional screws are for mounting the earth collector)



Bolt mounting direction.
K : left–hand cubicle
L : right–hand cubicle
M : to join the 2 cubicles.
Screw HM6x60 to tighten moderately.
Tightening torque : 6 Nm.

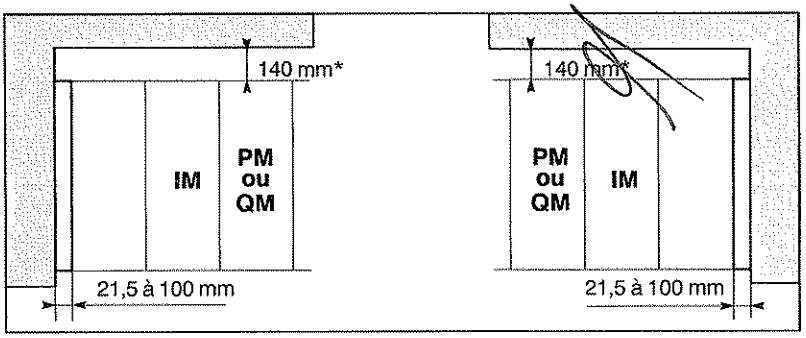
securing to the floor

(nuts and bolts not included)



layout in the substation

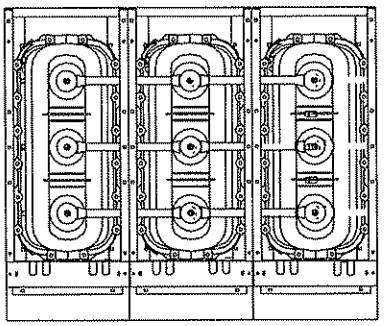
(*) minimum clearance for trouble-free operation
Switchboard installed to the right of a wall.
Switchboard installed to the left of a wall.



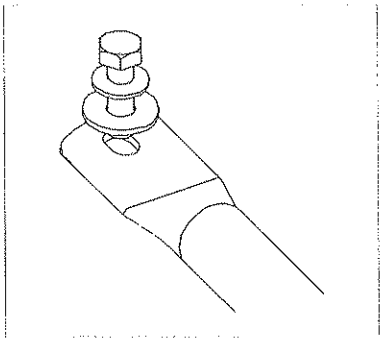
fitting the busbars after installing the cubicles in their operating location

accessories bag
versions >12 kV **S2 : 3729742**
versions ≤12 kV **S6 : 3729746**

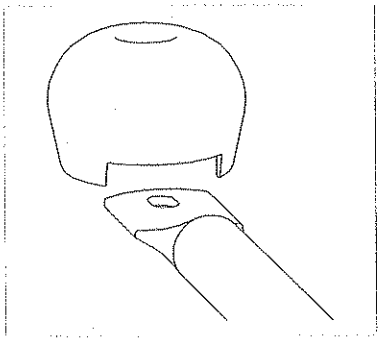
tools:
1 torque wrench (1 to 50 Nm.)
1 reduction gear (1/4 – 3/8)
1 socket connector (6 mm)
1 hexagon male socket (6mm) or
1 hexagonal female socket .



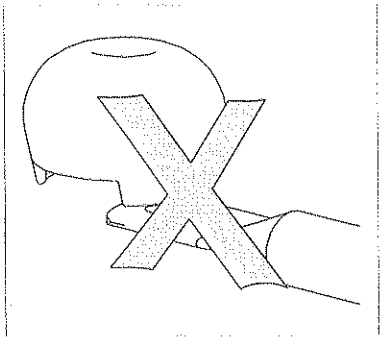
Busbar connection.
Tightening torque : 28 Nm.



Version ≤ 12 kV
(bag **S6 : 3729746**)
mounted without field distributors.

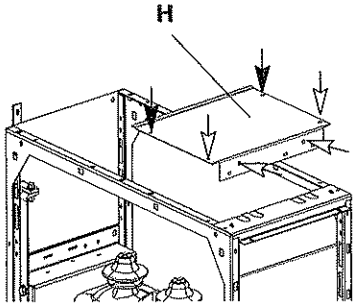


Version > 12 kV
(bag **S2 : 3729742**)
Field distributor positioned correctly.

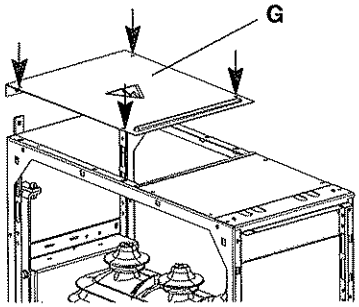


Field distributor positioned incorrectly.
(risk of damage)

bolt+washer+nylstop nut
bolt+washer

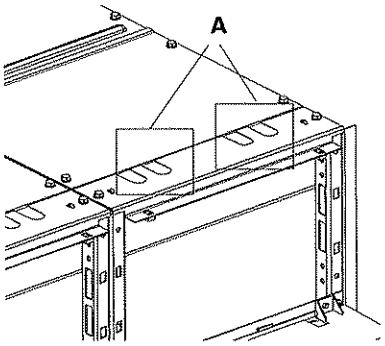


Refit top plate **H**.
(nuts inside the cubicle)

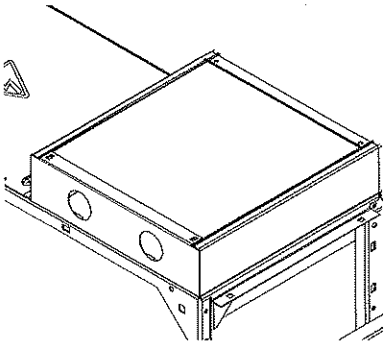


Refit top plate **G**.

cable entry for connection of low voltage auxiliaries



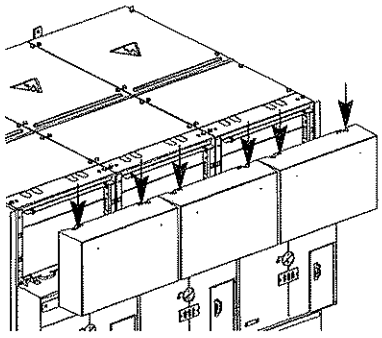
Cable entry to the auxiliary terminal block is via holes **A** on top.



Cubicle equipped with a wiring duct. (option)

Proceed in the same manner after removing the trough top plate.

bolt+washer

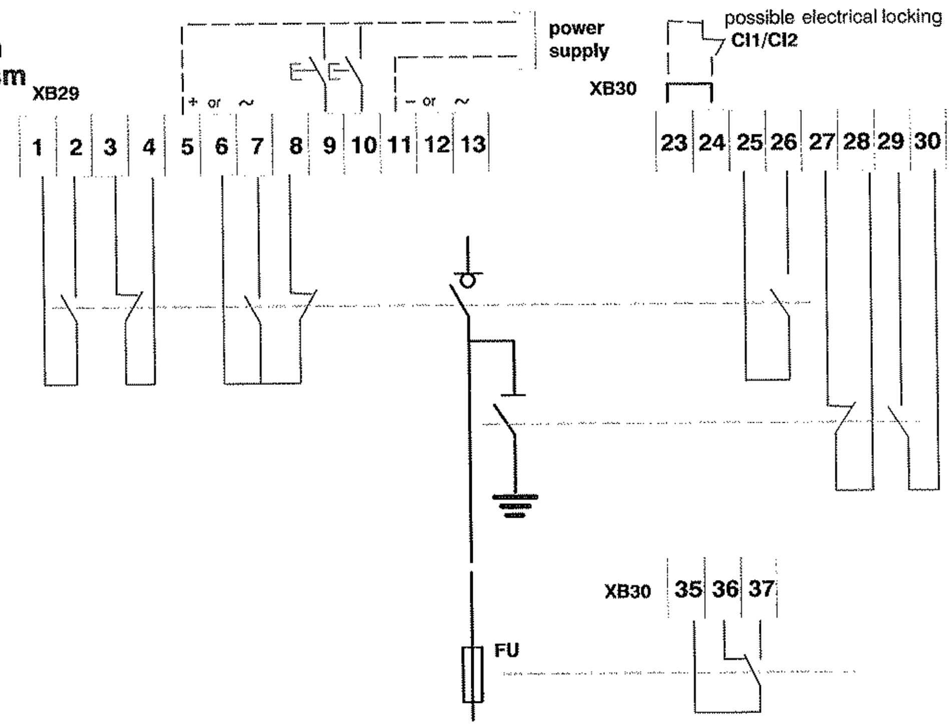


Refit the control cabinet cover, respecting the indications.

cable entry for connection of low voltage standard auxiliaries in optional supply

Nota : for connection of LV auxiliaries, refer to the wiring diagrams of the cubicle with need other than standard.

terminal block of LV auxiliaries with motorized mechanism



marking of terminal block

4 auxiliary contacts :

position of the closed MV switch : terminals **1–2** and **6–7**.

Position of the open MV switch terminals **3–4** and **6–8.**

3 additional auxiliary contacts (optional supply)

Position of the closed MV switch : terminals **25–26.**

Position of the open MV earthing switch : terminals **27–28.**

Position of the closed MV earthing switch : terminals **29–30.**

Motorization :

Power supply : terminals **5–11.**

Opening order : terminal **9.**

Closing order : terminal **10.**

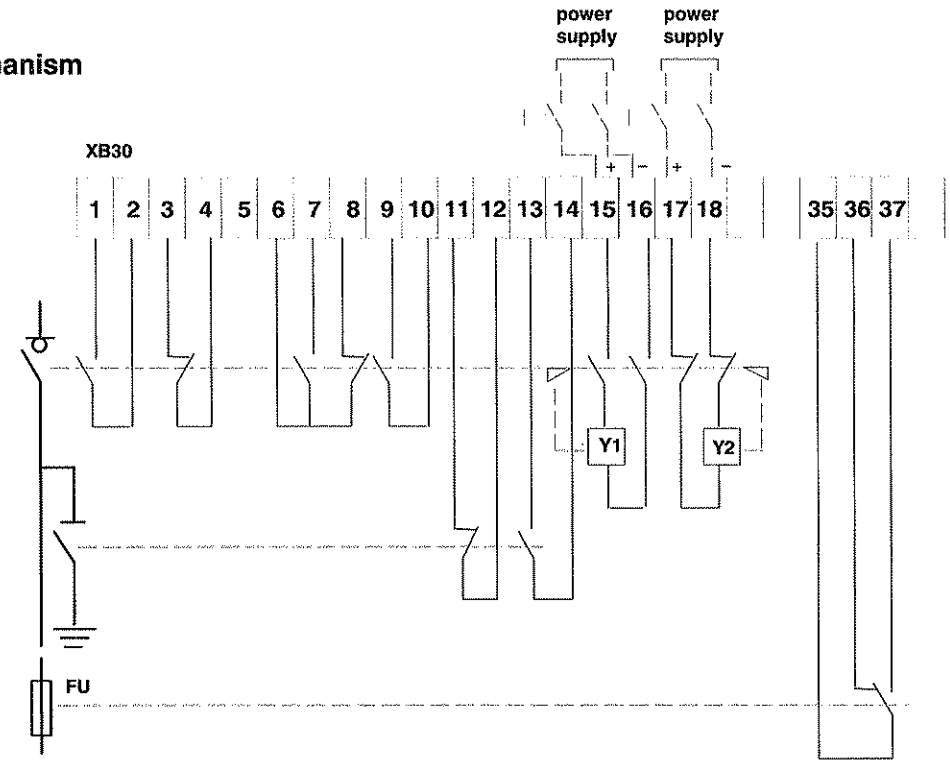
Possible electrical locking for motorization : terminals **23–24.**

Fuse blowing indication.

only for **QM cubicle** : terminals **35–36–37.**

ВЯРНО С ОРИГИНАЛА

terminal block of LV auxiliaries with no–motorized mechanism



marking of terminal block

4 auxiliary contacts :
position of the closed MV switch : terminals **1–2** and **6–7.**
Position of the open MV switch : terminals **3–4** and **6–8.**

3 additional auxiliary contacts :
(optional supply)
position of the closed MV switch : terminals **9–10.**
Position of the open MV earthing switch : terminals **11–12.**
Position of the closed MV earthing switch : terminals **13–14.**

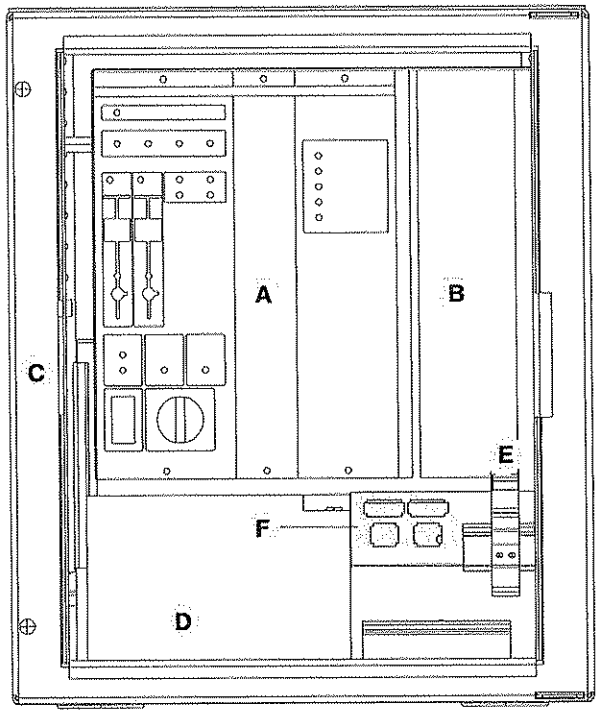
Opening release :
opening order : terminals **15–16.**

Closing release
closing order : terminals **17–18.**

Fuse blowing indication
only for **QM cubicle** : terminals **35–36–37.**

LV connection

A : **T200S** "relay"
B : radio location"in the case of remote control"
C : LV compartment (W : 375mm)
D : battery for independent supply
E : fuse switch for connecting the 230 V AC battery charger supply
F ; malle/femelle connector info SW1, SW2, i.SW1 and i.SW2



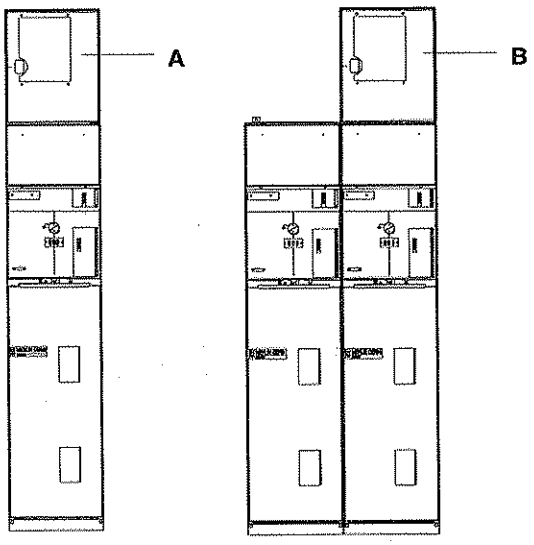
1 : connect the 230 V AC supply to the fuse switch **(E)** and shut off the switch
2 : connect the battery
3 : the automated controller will be fully operationnal after one hour.

commissioning the automated controller

- check the position of the buttoms on the operating mechanism : buttom K in operation position button **D** set to **ON**.
- to configure the automated controller, refer to the **T200S** user manuals **nos. NT00044** and **N° T00045** in English.

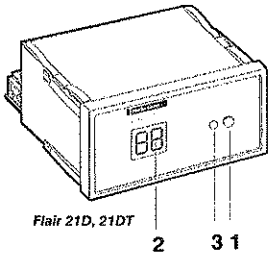
remote control for 1 cubicle switch (A)

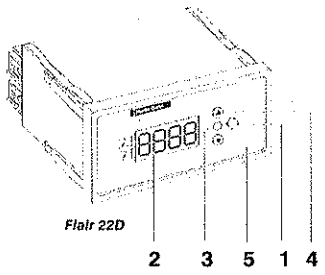
remote control for 2 cubicle switch (B)

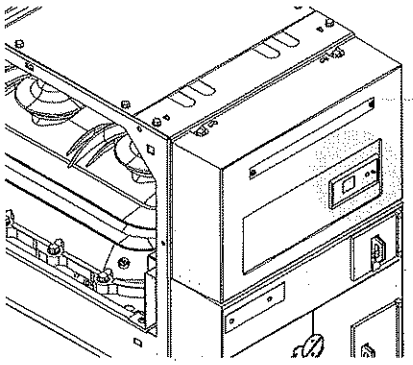


LV connection indicator
Flair Din

operating







Indicators **Flair 21D,21DT, 22D** and **23D** are self–powered from the measurement.

A minimum 3A current is required in the MV cable to start up the **Flair 21D** and **21DT** LCD display, an energy storage guarantees a 4 hours minimum autonomy.

The indicators provide an output SCADA contact (except **Flair 21D** : transistor output).

Flair 22D included a lithium battery for a permament display operating (in case of a load current less than 3A during 4 hours) and for the outdoor lamp supply.

Flair 23D has to be supplied from 12 Vdc to 48Vdc (whith a single zero sequence CT self powering is not possibe.

detector waiting for fault

ammeter function :

In idle mode (no fault detected), a rough load current value is displayed **(2)**.

Each phase load current is successively displayed after its reference : **L1–L2–L3.**

Displayed values must be multiplied by 10 for **Flair 21D** and **21DT.**

Example for a 80A load current :

L1 then 80 (Flair 21D/21DT) 080 (Flair 22D/23D), then L2 and L3)

should **Flair 22D** and **Flair 23D** being fitting with zero sequence CT, L1 currents is replaced by the unbalanced, tagged with : I□

if I >720A ▯▯ (Flair 21D/21DT), ▯▯▯ (Flair 22D/23D)

if I <3A ▯▯ (Flair 21D/21DT), ▯▯ (Flair 22D/23D)

maxmeter function

(**Flair 22D** et **23D** only :)

Press once the **(1)** buttom to get access to the maxmeter function.

For each phase, the maximum load current since the last reset is displayed.

Example for a 500A maximum in phase 1:

The maximeter values are scrolled only once.

The 3 maximeters are reset all together by pushing the **(4)** and **(5)** buttoms during the scrolling.

Should **Flair 22D** and **Flair 23D** fitted with zéro sequence CT, M2 and M3 only are displayed.

detector in fault indication mode

when the current exceeds one the configured thresholds and becomes lower than 3A within 70s the led **(3)** blinks, the output contact is closed and the faulty phase is shown on the LCD display **(2)** :

- **I0> threshold exceed on phase 2 :**

 (or I0 with a zero sequence CT).

LED **(3)** blinks (1 flash every 3s).

The display remains until an automatic reset (>70s) (if configured), or a time out (4 hours for **Flair 21D/21DT,** configurable for **Flair 22D/23D,** or a pulse on external reset input, a manual action on **(1)** buttom.

- **I>treshold exceed** 

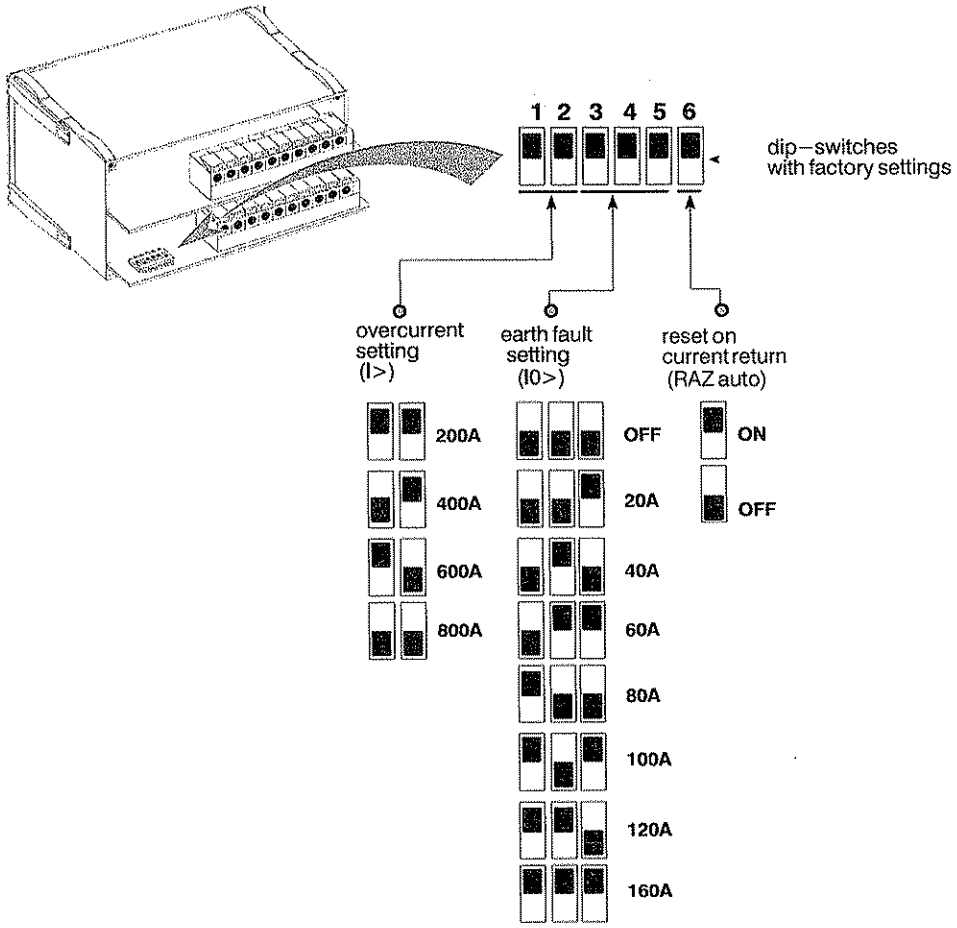
steady with blinking LED **(3)** (2 flashed every 6s).

The display remains until an automatic reset (if configured), or a time out (4 hours for Flair **21D/21DT**, configurable for Flair **22D/23D** or pulse on external reset input, a manual action on **(1)** button.

maintenance

- detectors **Flair 21D,21DT** and **23D** require no maintenance (no periodic battery replacement)
- **Flair 22D** lithium battery has be changed once every 15 years approximatively.
- option **BVP** (external light indicator with battery) : battery life time 15 yeards approximatively.

settings



Settings are performed using dip–switches (all version) : press the (1) buttom to validate and front panel push buttons (**Flair 22D** and **Flair 23D** only), these settings replacing those of the dip–switches.

test/setting mode activation

In order to display the settings (all version) or to modify the settings (Flair 22D and Flair 23D), enter the test/settings mode.

The test mode is activated followed by the setting display mode, act as follow :

- **Flair 21D** and **Flair 21DT** : press the **(1)** button
- **Flair 22D** and **Flair 23D** : press twice **(1)** button

(the first impulse activates the maximeter display mode)

- the led **(3)** blinks, up to the test completion.
- the display shows successively

Flair 21D : 21 then d then XX (version)

Flair 21DT : 21 then dt then XX (version)

Flair 22D : tESt then 22d then 1/XX (version)

Flair 23D : tESt then 23d then 1/XX (version)

- the whole settings are scrolled and 10 s after the last one, is displayed, the indicators returns to ammeter display mode.

With a single press on the **(1)** button during the scrolling returns to the ammeter display mode.

settings mode (Flair 22D and Flair 23D)

Note : the impulses on the buttons are only valided if they last between 1 and 3 seconds.

By pressing simultaneously the **(4)** or **(5)** buttons during the setting scrolling, the scrolling becomes manual.

It becomes possible then, using these buttons, to switch the settings and to define new more accurate settings values which replace those defined with the dip−switches :

- when the setting to be modified is selected, push simultaneously **(4)** and **(5)** buttons
- displayed value blinks (5s max)
- select a new value using buttons + **(4)** or − **(5)**
- confirm by pushing simultaneously on **(4)** and **(5)** buttons.

If the new value not is validated within 5s, the old value is displayed again.

After 10s without action on the **(4)** or **(5)** buttons, the indicator return to ammeter display mode.

setting scrolling

■ CTs mouting (**Flair 22D** and **Flair 23D** only)

 or or (23D only) (=phase CT and =zero sequence CT)

■ **network frequency** (example 50 HZ)

Flair 21D/21DT :  then  Flair 22D/23D 

■ **I> threshold** (example 600A)

Flair 21D/21DT :  then  Flair 22D/23D 

■ **I0> threshold** (example 80A)

Flair 21D/21DT :  then  Flair 22D/23D 

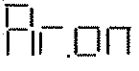
If the dip–switches 3,4 and 5 are on OFF position, no earth fault detection, display :

Flair 21D/21DT :  then  Flair 22D/23D 

■ **reset timer** (example 2 hours)

Flair 22D and Flair 23D only 

■ **automatic reset**

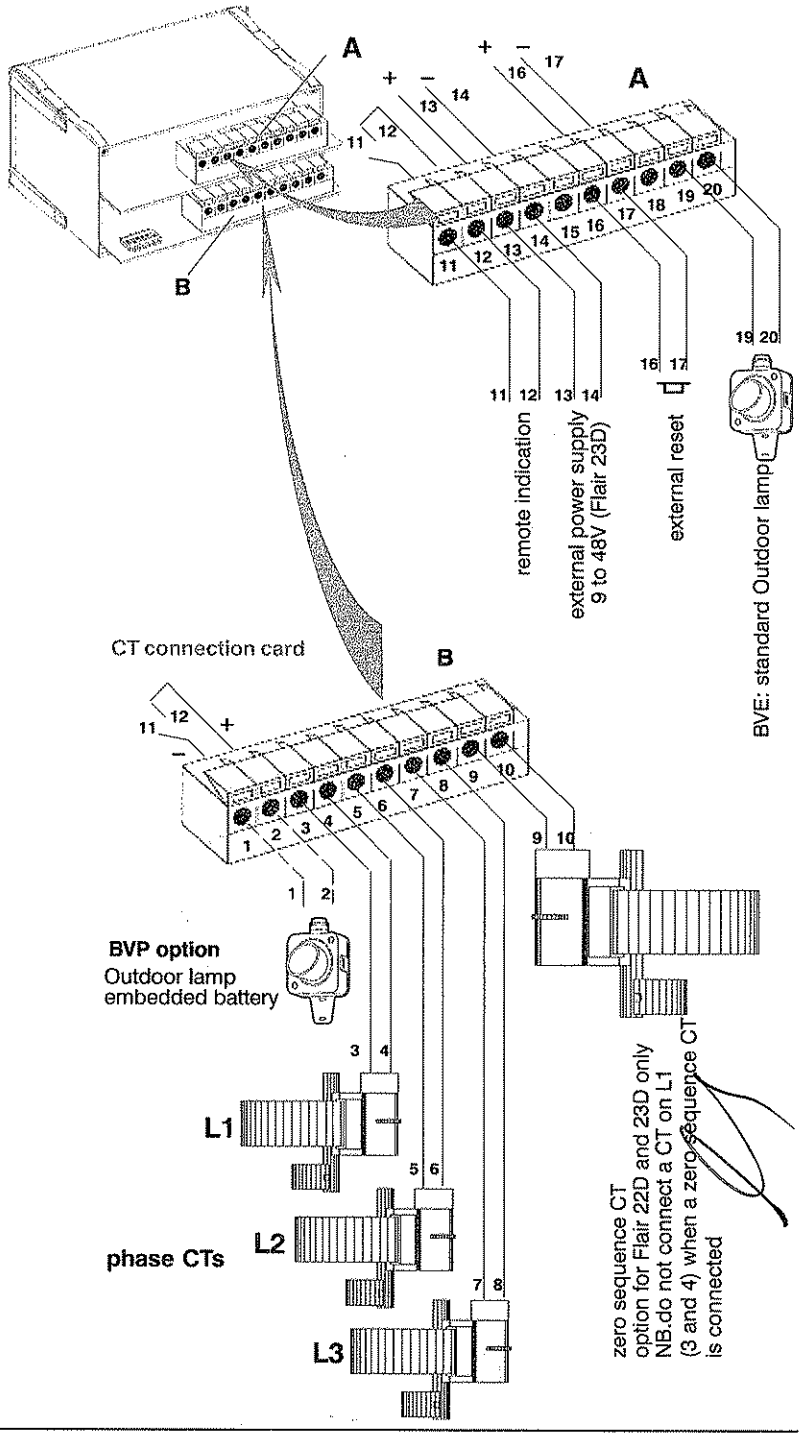
Flair 21D/21DT :  then  or  Flair 22D/23D :  or 

connection

Should the Medium Voltage switchgear being supplied without the CTs installed, the 3 Cts must be mounted the same side up to the busbar.

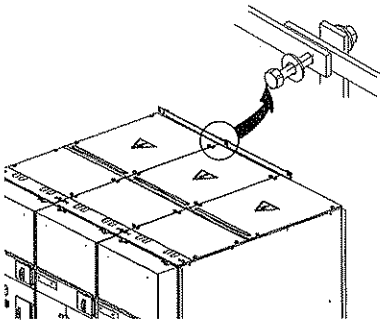
Important :the MV cable earthing braid must be fitted back trough the CT.

remote control interface
Flair 21D
Flair 21DT
Flair 22D
Flair 23D

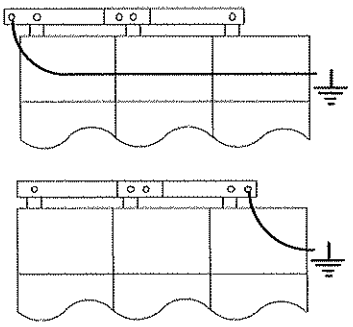


fitting the earth bars

nuts and bolts in bag S1 : 3729745

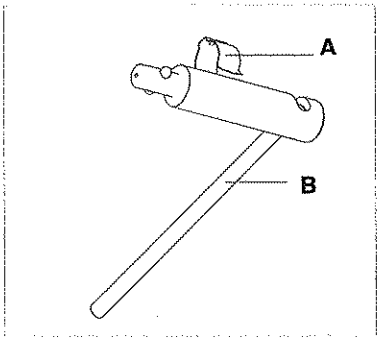


Connect the earth bars together. (HM8 x 30 bolts)



Earth the substation frames in either of these two ways.

storing the operating lever

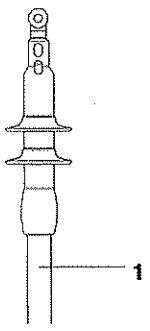


Fix the hook **(A)** and the wall. (screws not supplied)
The operating lever has to be hooked **(B).**

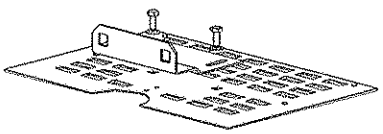
MV cable connection for an IM cubicle

To limit the effort on the cable connection you have to ajust the lenght at the bending radius of the cable.

1 : copper cable or aluminium cable

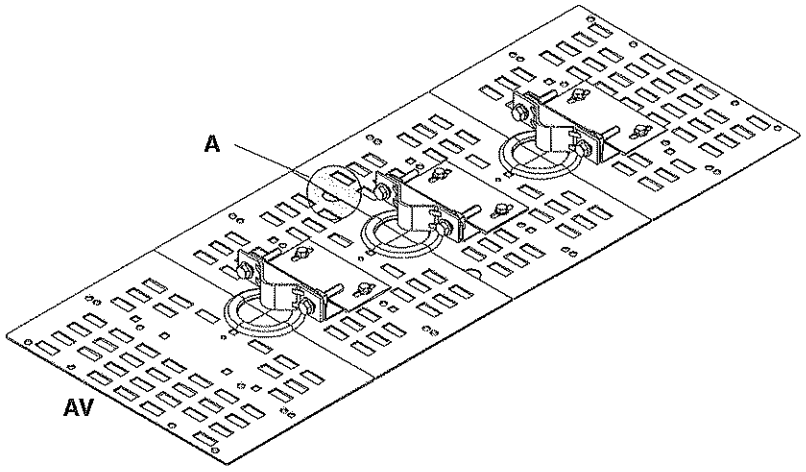


EUIC (short inner end, cold fitted).
They must be manufactured according to the standard :
IEC.60.502



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.

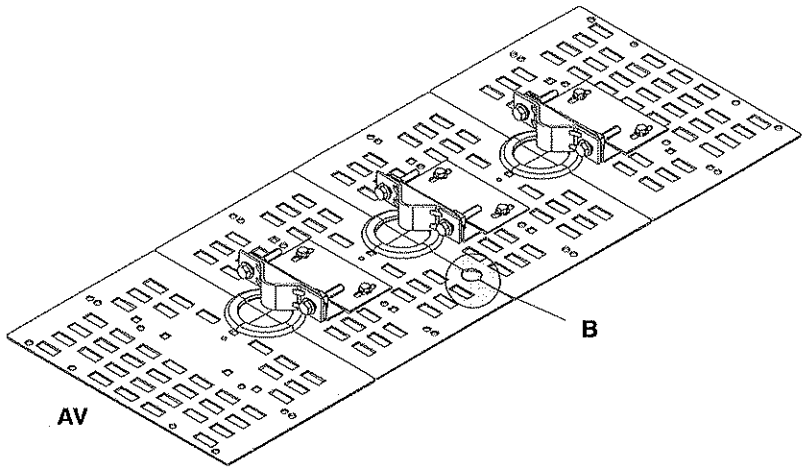
2 mounting possibilities :
A without toroids

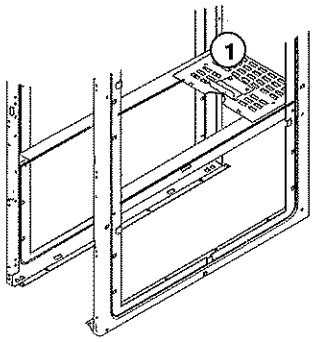


B with toroids

Nota : if the assembly **B** isn't equiped with toroids, the degree of protection **IP2X isn't observed.**

Remind : **IP2X** : degree of protection following protection suivant **IEC60529**.





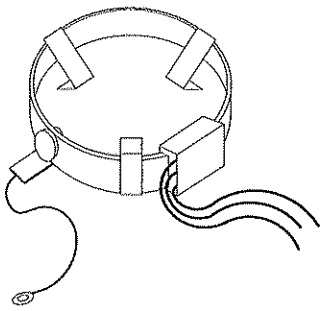
Mount the first bottom plate.

installing the fault detection toroids

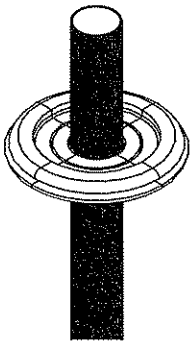
(instructions suggested by **Schneider Electric**)

For IM cubicles only.

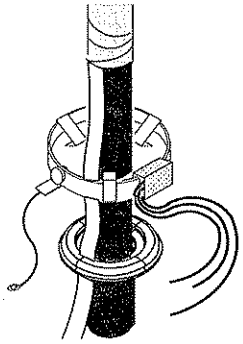
Follow the instructions of the toroid manufacturer.



Prepare the toroids outside the cubicle.

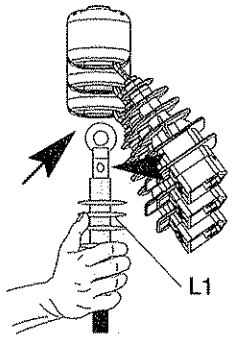


Fit the cable bushing.

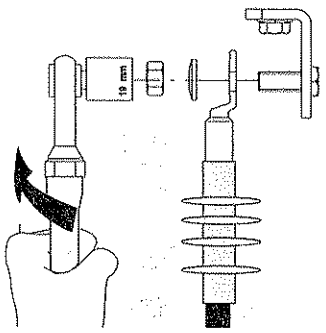


Position and fix the toroid on the cable.

The earthing bread of the cables has (isolated) must go trough the toroids.

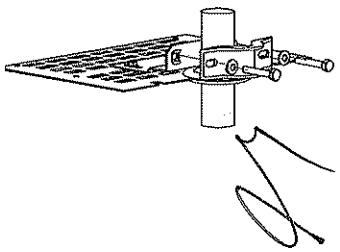


Connect the cable to the bolt provided on the phase **L1** connector.

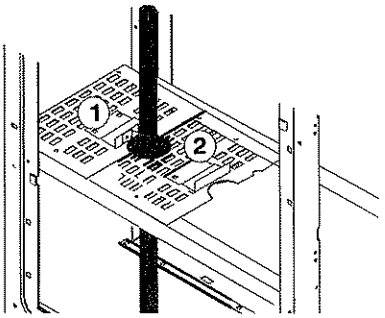


Use a torque wrench and a 19 mm socket to tighten the cable to this bolt.

Tightening torque : 50 Nm.

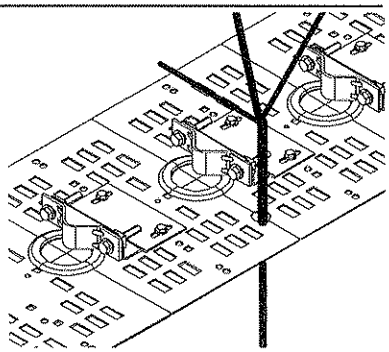


Clamp the cable to the clamp support on the bottom plate. (HM8 x 50 bolts)

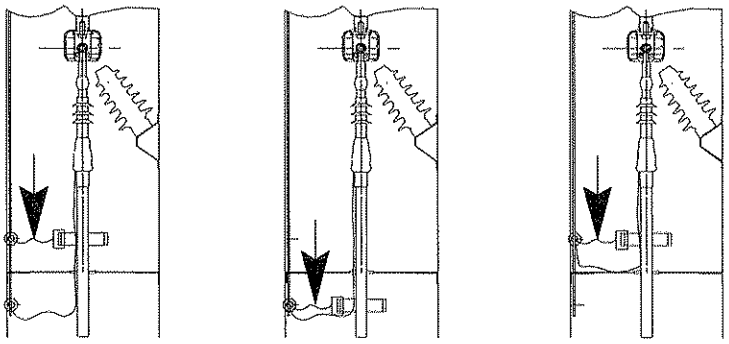


Mount the **second** bottom plate.

- mount phases **L2** and **L3** using the same procedure as for phase **L1**.



Example of low voltage routing : cables pass through the opening.

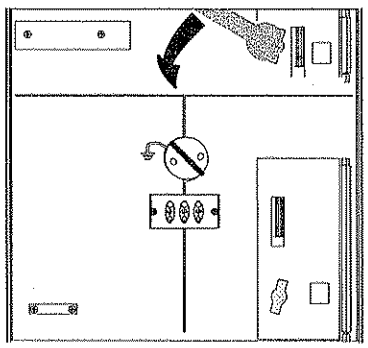


Connect the cable and toroid earthing braids in either of these 3 ways.
(the bolts are already installed)

MV cable connection for PM and QM cubicles

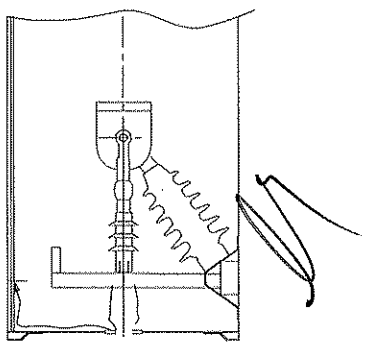
do not use the cable clamp supports.

Nuts and bolts in bag S5 : 3729743.

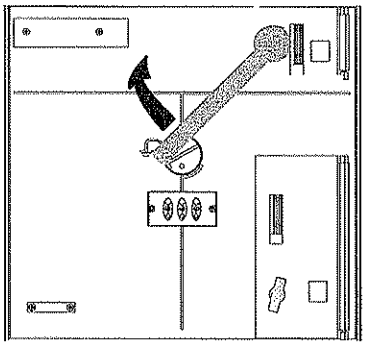


Open the earthing switch using the operating lever.

To see manual operations section.



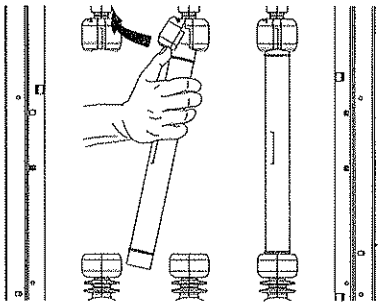
Fit the cables in the same order as for the **IM cubicle**.
Use a torque wrench and a 16 mm socket to tighten the bolts.
Tightening torque : 50 Nm.



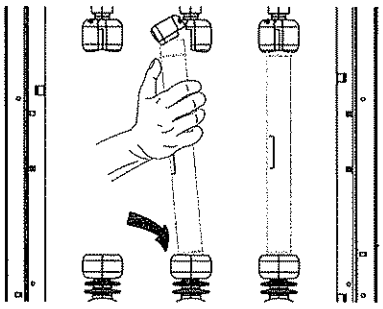
Close the earthing switch.

fitting fuses in PM and QM cubicles

Reminder :
Check the condition of the fuses before fitting them .



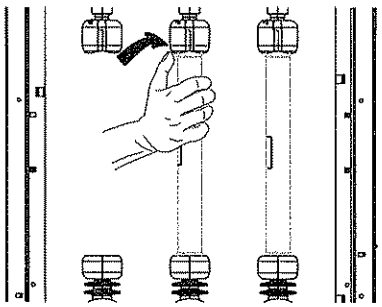
Lift the cover of the upper field distributor with the top of the fuse.



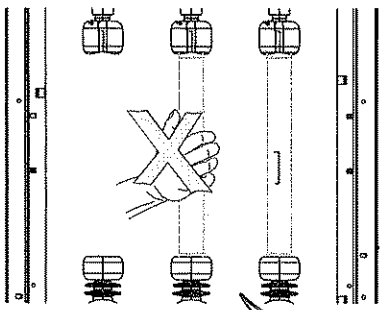
Insert the bottom of the fuse all the way into the lower annular contact.

Nota :
– When changing a fuse, change all 3 fuses .

– Do not re–used fuses that have already been used.



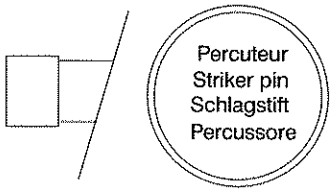
Then fit the top of the fuse in the upper contact and check that the field distributor cover is properly closed.
Turn the fuse so that the label appears in front.



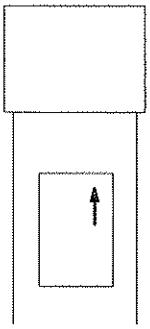
We advise against holding the fuse in the middle.

in a QM cubicle

Fit striker type fuses that actuate the opening of the switch when they blow.



The striker end of the fuse is marked.



The fuse characteristics and direction of mounting are printed on the fuse.
Turn the fuse so that the label is in front.
(striker at the top)

transformer protection

Fuse ratings for **SM6** protection units such as the **PM** and **QM** depend, among other things, on the following criteria :

- Service voltage
- Transformer rating.
- Fuse technology (manufacturer).

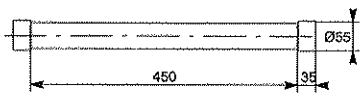
- Different types of fuses with medium loaded striker may be installed:
  –Solefuse fuses as per standard **UTE NFC 64.210**.
  –CF Fusarc fuses as per **IEC** recommendation **282.1 and DIN** dimensions **43.625.**

dimensions of fuses

Example: for the protection of a 400 kVA transformer at 10 kV, select either Solefuse fuses rated 43A or CF Fusarc fuses rated 50A.

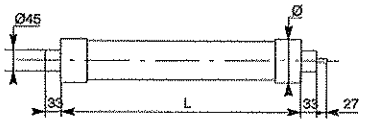
Please consult us on installation

soléfuse (UTE standard)



rated voltage (kV)	rating (A)	weight (Kg)
7,2	6,3 à 125	2
12	100	2
17,5	80	2
24	6,3 à 63	2

CF Fusarc (DIN standard)



rated voltage (kV)	rating (A)	L (mm)	Ø (mm)	weight (Kg)
7,2	125	292	88	3,3
12	6,3 à 63	292	55	1,4
	80 à 100	292	88	3,3
24	6,3 à 40	442	55	1,4
	50 à 80	442	88	3

selection table

(rating in (A), no overload, $-5°C < \theta < 40°C$)

Please consult us for overloads and operation over 40°C. please, consult us.

type of fuse	service voltage (kV)	transformer rating (KVA) 25	50	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	rated voltage (kV)
UTE NFC standards: 13.100, 64.210																			
Solefuse																			
	5.5	6.3	16	31.5	31.5	63	63	63	63	63									7.2
	10	6.3	6.3	16	16	31.5	31.5	31.5	63	63	63	63							24
	15	6.3	6.3	16	16	16	16	16	43	43	43	43	43	63					
	20	6.3	6.3	6.3	6.3	16	16	16	16	43	43	43	43	43	63				
General case, UTE NFC standard 13.200																			
Solefuse																			
	3.3	16	16	31.5	31.5	31.5	63	63	100	100									7.2
	5.5	6.3	16	16	31.5	31.5	63	63	63	80	80	100	125						
	6.6	6.3	16	16	16	31.5	31.5	43	43	63	80	100	125	125					
	10	6.3	6.3	16	16	16	31.5	31.5	31.5	43	43	63	80	80	100				12
	13.8	6.3	6.3	6.3	16	16	16	16	31.5	31.5	31.5	43	63	63	80				17.5
	15	6.3	6.3	6.3	16	16	16	16	31.5	31.5	31.5	43	43	63	80				
	20	6.3	6.3	6.3	6.3	16	16	16	16	31.5	31.5	31.5	43	43	63				24
	22	6.3	6.3	6.3	6.3	16	16	16	16	16	31.5	31.5	31.5	43	63	63			
CF Fusarc																			
	3,3	16	25	40	50	50	80	80	100	125*	125*	160*	200*						7,2
	5,5	10	16	31,5	31,5	40	50	50	63	80	100	125	125	160*	160*				
	6,6	10	16	25	31,5	40	50	50	63	80	80	100	125	125	160*				
	10	6,3	10	16	20	25	31,5	40	50	50	63	80	80	100	100	125*	200*		12
	13,8	6,3	10	16	16	20	25	31,5	31,5	40	50	50	63	80	80	100*	125*	125*	17,5
	15	6,3	10	10	16	16	20	25	31,5	40	50	50	63	80	80	100	125*	125*	
	20	6,3	6,3	10	10	16	16	25	25	31,5	40	40	50	50	63	80	100*	125*	24
	22	6,3	6,3	10	10	10	16	20	25	25	31,5	40	40	50	50	80	80	100*	

reference list

Reference list of fuse inside **QM cubicle** according to **IEC 62271–105** standard.

Please consult us for all other type of fuses.

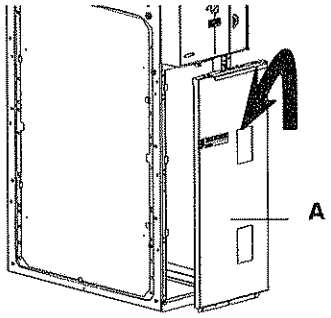
Ur.7,2 Kv		Ur.12 Kv		Ur.24 Kv		Ur.7,2 Kv		Ur.12Kv		Ur.17,5Kv		Ur.24 Kv	
Ir(A)	ref	Ir(A)	ref	Ir(A)	ref	Ir(A)	ref	Ir(A)	ref	Ir(A)	ref	Ir(A)	ref
125	757352BN	6,3	51006511M0	6,3	51006538M0	160	3736720	125	3736722	125	3736725	100	3736726
		10	51006512M0	10	51006539M0	200	3736721	160	3736723			125	3736727
		16	51006513M0	16	51006540M0			200	3637724				
		20	51006514M0	20	51006541M0								
		25	51006515M0	25	51006542M0								
		31,5	51006516M0	31,5	51006543M0								
		40	51006517M0	40	51006544M0								
		50	51006518M0	50	51006545M0								
		63	51006519M0	63	51006546M0								
		80	51006520M0	80	51006547M0								
		100	51006521M0	100									

checks before energizing

Check that nothing has been left in the connection compartment.

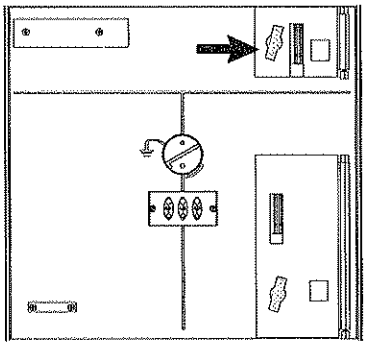
For all phases:

- check that the fuse has been properly fitted.
- check that the field distributor covers have been properly closed on all phases.
- check that the fault detector has been properly connected.

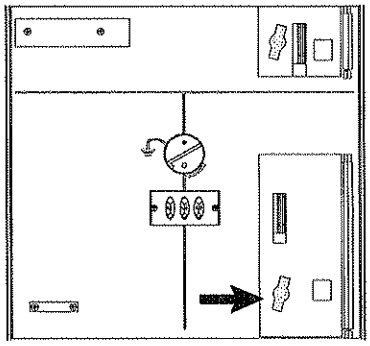


Refit the front panel **A.**

operating test before energizing

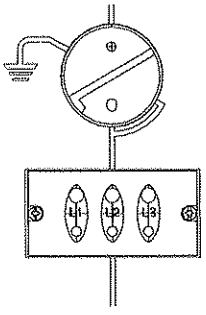


Operate the switch several times.



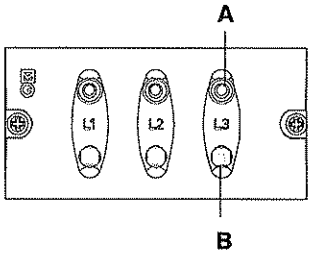
Operate the earthing switch several times.

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.

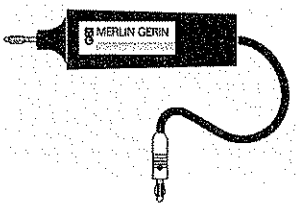
characteristics

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

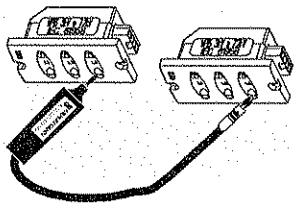
phase concordance test

Remack:
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

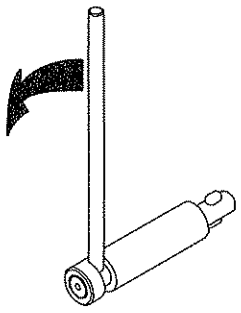


Phase concordance unit of the simplified **Merlin Gerin** type.

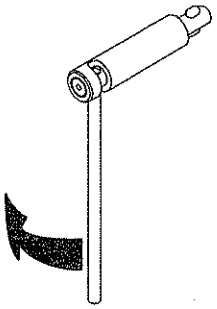


If the phases concord,
the concordance unit lamp remains off.
If the phases do no concord,
the concordance unit lamp goes on.

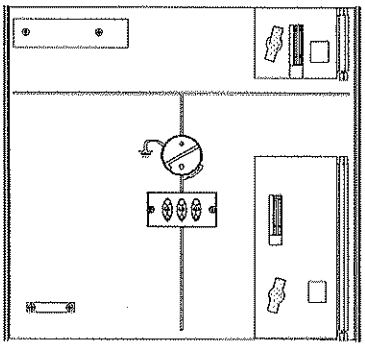
IM, PM and QM cubicle operation and position indication



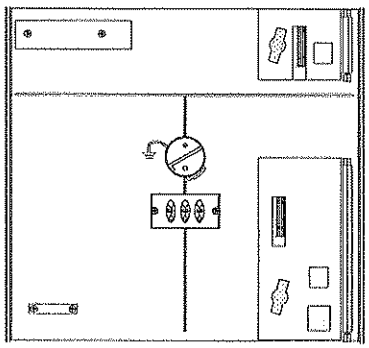
Position the lever as indicated for downward **(opening)** operations.



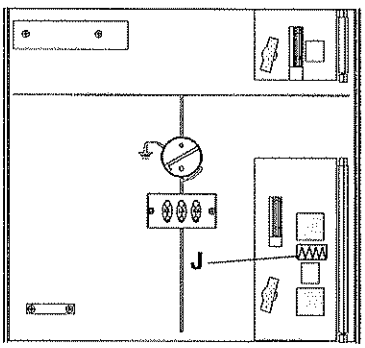
Position the lever as indicated for upward **(closing)** operations.



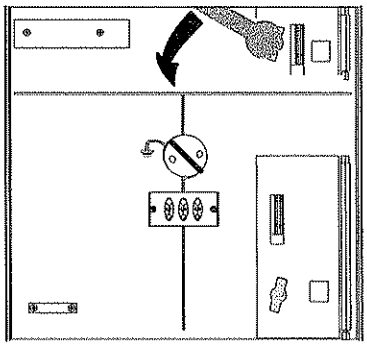
CIT operating mechanism front plate.



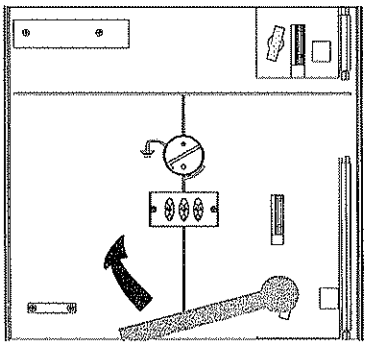
CI1 operating mechanism front plate.



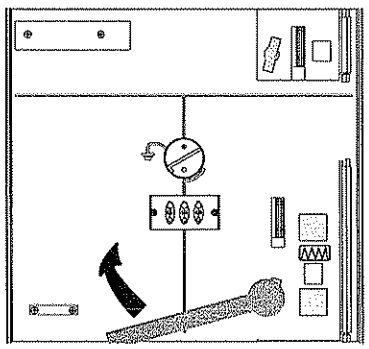
CI2 operating mechanism front plate.
J : charged/uncharged indication.



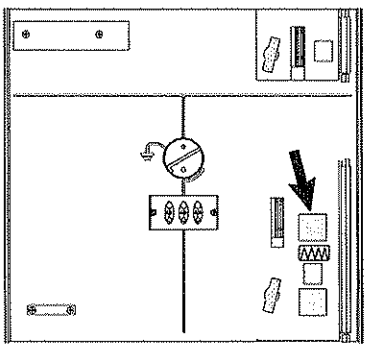
Opening the earthing switch.
(CIT, CI1 and CI2 operating mechanisms)



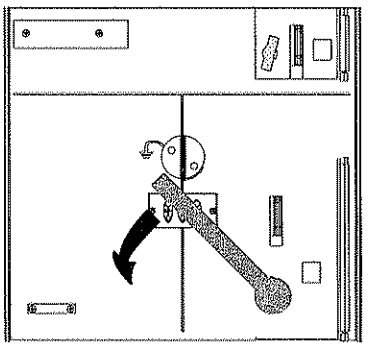
Closing the switch.
(CIT and CI1 operating mechanisms)



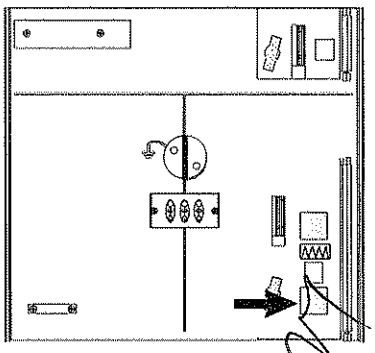
Charging the spring.
(CI2 operating mechanism)



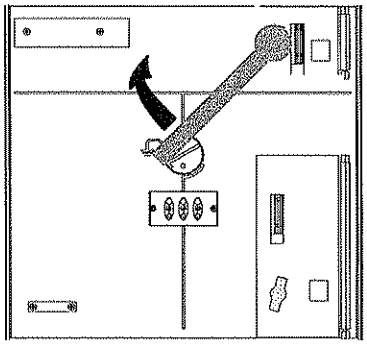
Closing the switch.
(CI2 operating mechanism)



Opening the switch.
(CIT operating mechanism)

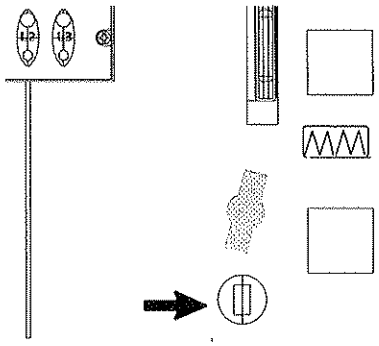


Opening the switch.
(CI1 and CI2 operating mechanisms)

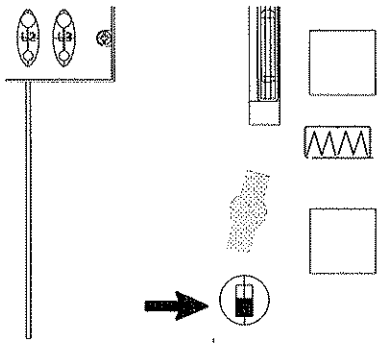


Closing the earthing switch (for CIT, CI1 or CI2 operating mechanisms) after checking the voltage status.
(see **voltage indicators**)

fuse indications on QM cubicles

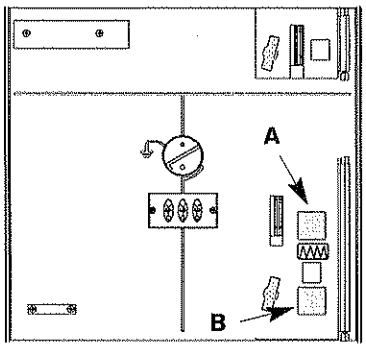


Fuses OK.
(white indicator)

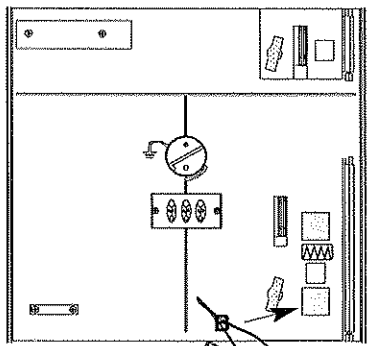


One or more fuses not OK.
(red indicator)

discharging a CI2 operating mechanism

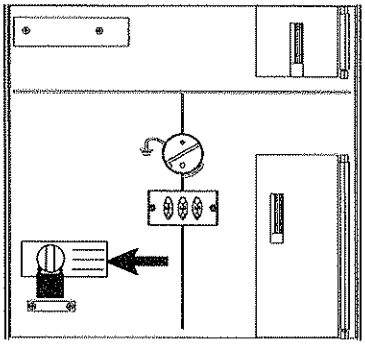


Cubicle **de−energised** :
Close the switch: button **A** then open: button **B.**

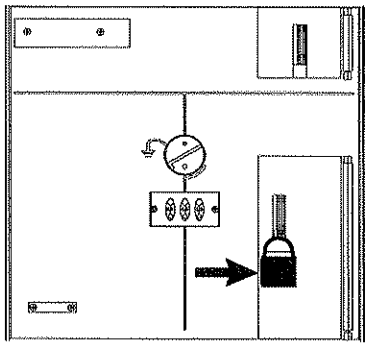


Cubicle **energised** :
Press the open button **B.**
ATTENTION : this operation can damage the operating mechanism.
Perform only when strictly necessary.

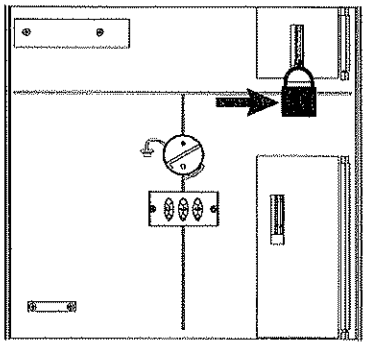
padlocking



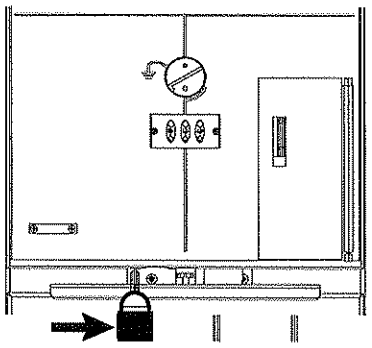
Padlocking of motor mechanism. (option)
Lock out the motor mechanism using a padlock before opening the switch.
The motor mechanism can be locked in or out using the padlocks.



Padlock the switch in open or closed position using 1, 2 or 3 padlocks. (dia. 8 mm)



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

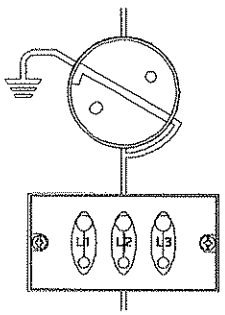


Padlocking the front panel.

keyed interlocks

See the keyed interlock installation and operating instructions **7896785**.

operating safety



The front panel can only be removed or fitted if the earthing switch is closed.

preventive maintenance

for problems :
see **groupe Schneider service centers.**

Never lubricate the operating mechanism.
No particular maintenance is required under normal operating conditions.
(temperature between **−5°C and 40°C**)

For severe operating conditions (aggressive environments, dust, temperatures **below −5°C or above 40°C**, etc.) consult **your nearest groupe Schneider service centers.**

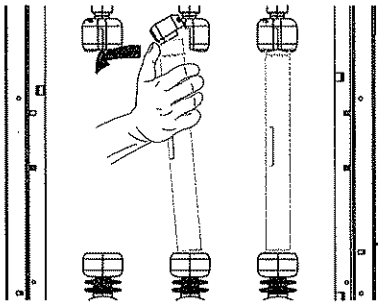
corrective maintenance

Replacing the fuses:

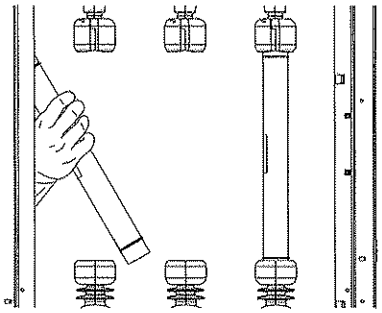
- the cubicle must be de-energized.
- the switch must be open.
- the earthing switch must be closed.

Open the front panel for access to the fuses.

Important:
standard IEC 282.1 § 23.2 states that all three of the MV fuses should be changed whenever one of them blows.

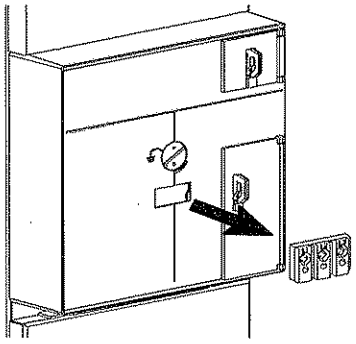


First remove the top of the fuse.



Then lift the fuse out of its bottom support and remove it completely. To fit the new fuses, refer to the section on fitting fuses in **PM** and **QM** cubicles.

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



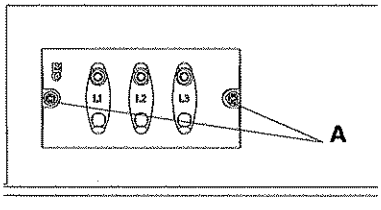
Pull out the voltage indicator block. (the switchboard can remain energized)

replacing a voltage indicator block

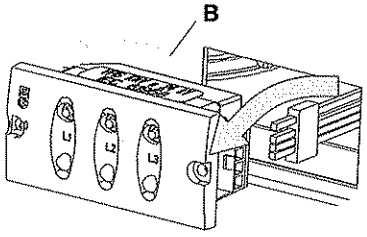
VIPS type on a cubicle after 0040001U

removal

This operation can be conducted with an enegised switch.



remove the 2 fixing screws from the voltage indicator block (**A**).



Remove the voltage indicator block and unplug the incoming connector from it.

install

On the electrical data label (**B**), make sure that the new block correctly corresponds to the rated network voltage

- 1,7 kV à 3 kV
- 3 kV à 7,2 kV
- 10 kV à 24 kV

Install the new voltage indicator bock in the reverse order for removal.

Tightening torque 0,1 mdaN.

trouble-shooting chart

IM, PM and QM cubicles

▪ voltage indicator not illuminated	▪ check that the incoming cables are live ▪ check the voltage indicator block ▪ check that the switch (PM cubicle) is **closed** ▪ check that the fuses have been fitted ▪ check that the fuses are in working order
▪ front panel cannot be opened or closed	▪ check that the earthing switch is **closed**
▪ earthing switch cannot be operated	▪ check that the switch is **open**
▪ switch cannot be operated	▪ check that the earthing switch is **open**

motor mechanism (option)

▪ electrical operation impossible S13 = switch lever input S14 = earth switch lever input	▪ check the LV fuses (CIP2) ▪ check electrical interlocks S13–14 (lever insertion) ▪ check that the earthing switch operating shaft has reached its end position ▪ check that contact S14 has not disabled the power supply and re-adjust if necessary ▪ check the configuration of the CIP1 subassembly (see diagram)
▪ (*) manual operation impossible following an electrical closing cycle for a voltage level less than −15% rated value	▪ use the operating lever to apply a torque in the closing direction until the end position is reached; manual operation should now be possible
▪ (*) insertion of lever impossible following an electrical closing cycle for a voltage level greater than +15% rated value	▪ if possible, carry out an electrical operation, using a backup power source if necessary ▪ to allow insertion of the operating lever, push the back of the switch shaft in the closing direction using a large screwdriver; (for safety reasons, remember to first lock out the electrical operating mechanism; if necessary, push up and hold the locking blade that actuates contact S13)

(*) Operation is guaranteed for rated voltage ±15%.

spare parts

- fuses (**UTE** or **DIN**)
- voltage indicator

For other parts, please consult us: see **groupe Schneider service centers**

options

(please consult us)

For IM cubicles

- motor mechanism
- auxiliary contacts
- phase concordance tester
- keyed interlocks
- enlarged LV compartment
- 50 W heating element
- LV compartment or incoming cables compartment from top
- extra height plinth
- kit two dry single cables a phase
- low voltage cabinet
- T200S for remote control
- relay Flair Din

For QM cubicles

- motor mechanism with shunt trip release
- auxiliary contacts
- keyed interlocks
- 50 W heating element
- extra height plinth
- contact for "fuse blown" indication
- undervoltage or shunt type opening release
- enlarged LV compartment
- LV compartment or incoming cables compartment from top
- relay Flair Din

For PM cubicles

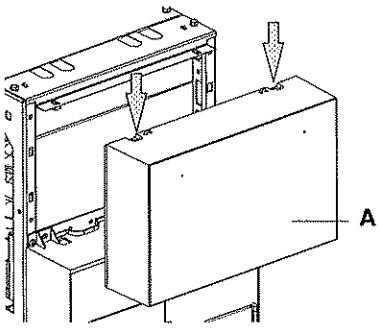
- motor mechanism
- auxiliary contacts
- low voltage cabinet
- LV compartment or incoming cables compartment from top
- keyed interlocks
- 50 W heating element
- extra height plinth
- "fuse blown" mechanical signalling
- relay Flair Din

recovery of SF6 gas at end of life

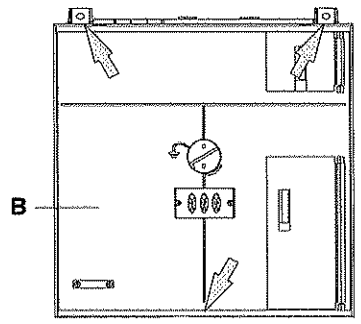
The SF6 must be removed before any dismantling operation can be carried out in compliance with the procedures described in IEC−61634 and according to the following instructions.

The gas must be treated in compliance with IEC−60480.

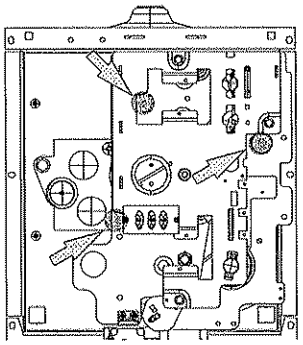
- **volume of gas to be recovered: 35 litres**
- **internal gauge pressure: 40 kPa**



Remove the cover **(A)** from the control cabinet.

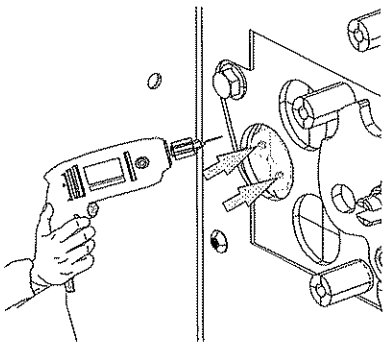


Remove the control cover **(B)**.



Remove the 3 screws retaining the operating mechanism.

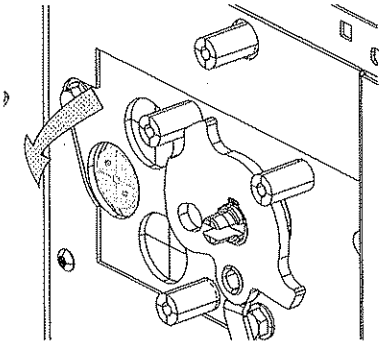
Cut the wiring to remove the operating mechanism.



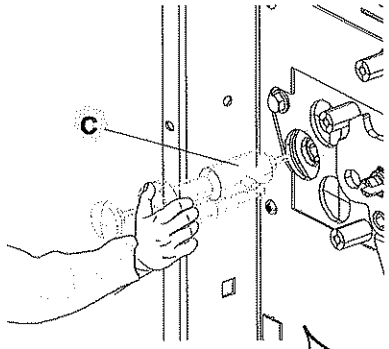
Drill 2 holes in the filler valve safety cap

Ø 4 mm, centreline 20 mm, max. depth 4 mm

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)**.

options and spare parts

- voltage indicator
- CIT operating mechanism
- Kit machansim 48Vcc
- Fuses

(For other parts, please consult us: see **groupe Schneider service centers.**)

groupe Schneider 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 groupe Schneider service centers, or call directly in Grenoble, France (33) 04 76 57 60 60

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Conception, rédaction: Service Documentation Technique T&D

7896682EN indice : P

Edition du : **15–Dec–2004**

697

SM6

MV distribution
factory built assemblies
at your service

Anglais

instructions for use

IM–PM–QM cubicles

Schneider Electric

Released for Manufacturing
Printed on 2010/07/21

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7896682EN revision : 03

Conception, rédaction: Service Documentation Technique T&D

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Edition du : **11/12/2009**

696

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 — as per iso 3864−2

DANGER: failure to follow this instruction <u>will result</u> in death or serious injury.

WARNING — as per iso 3864−2

WARNING: failure to follow this instruction <u>may result</u> in death or serious injury.

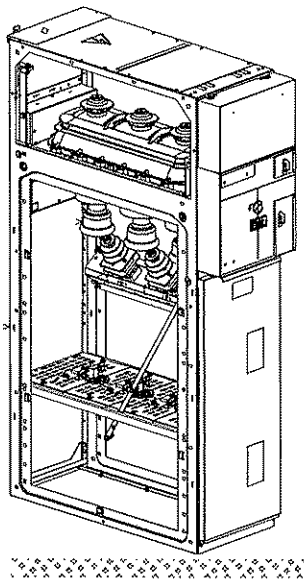
CAUTION — as per iso 3864−2

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** service centre.
You can log on to:
www.schneider-electric.com



distribution rules

CAUTION

The aim of this publication is to enable the SM6 unit to be installed correctly.

CAUTION

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

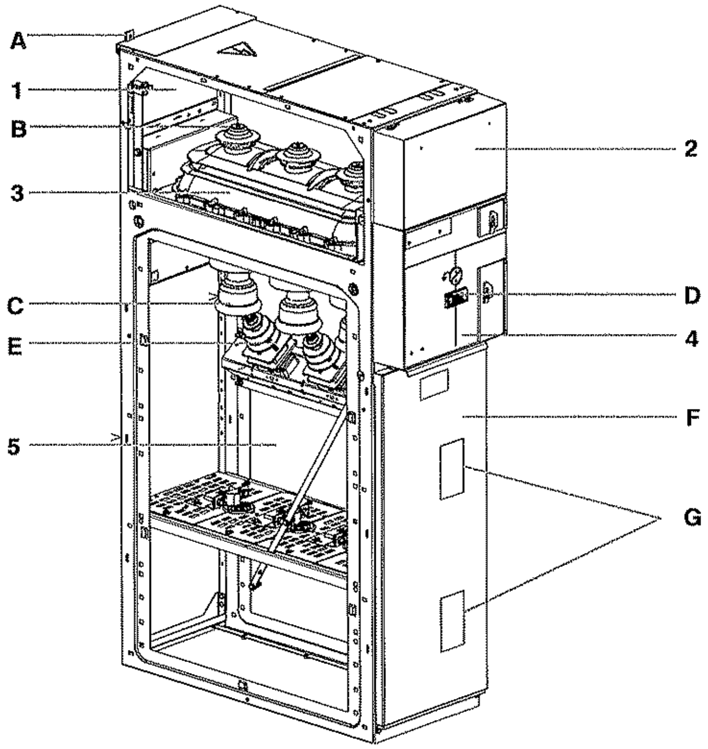
The contractor must be certified and authorised to manipulate and perform work on the SM6 unit.

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.**

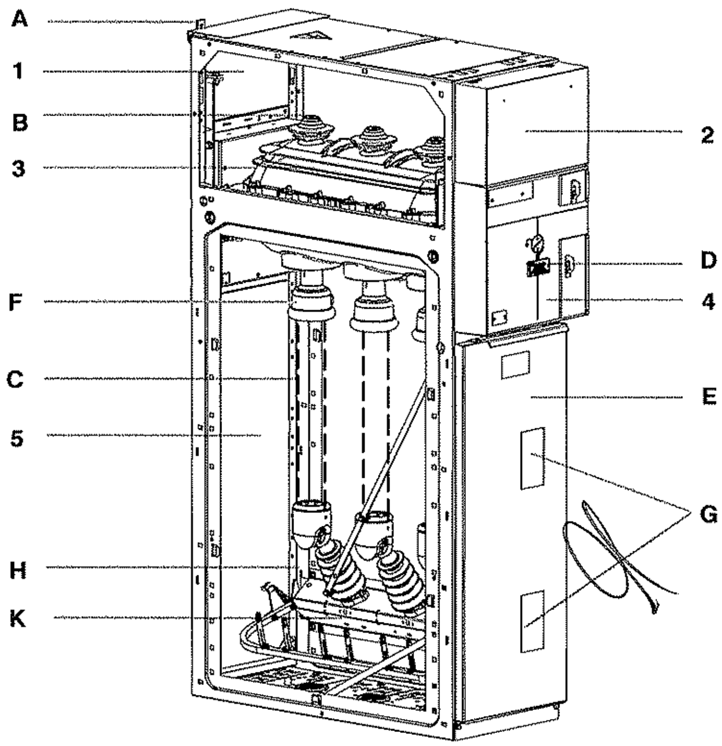
IM : switch cubicle

1 : busbar cabinet
2 : control cabinet
3 : switchgear cabinet : switch and earthing switch
4 : operating mechanism cabinet
5 : cable connection cabinet
A : earth bar connection pad
B : busbar connection pads
C : lower field distributor and cable connection
D : voltage indicator
E : capacitive divider
F : front panel
G : cable connection inspection windows



PM : fused switch cubicle

1 : busbar cabinet
2 : control cabinet
3 : switchgear cabinet : switch and earthing switch
4 : operating mechanism cabinet
5 : cable connection and fuse cabinet
A : earth bar connection pad
B : busbar connection pads
C : fuses
D : voltage indicator
E : front panel
F : lower field distributor and cable connection
G : inspection windows for fuses and downstream earthing switch position indicator
H : capacitive divider
K : downstream earthing switch

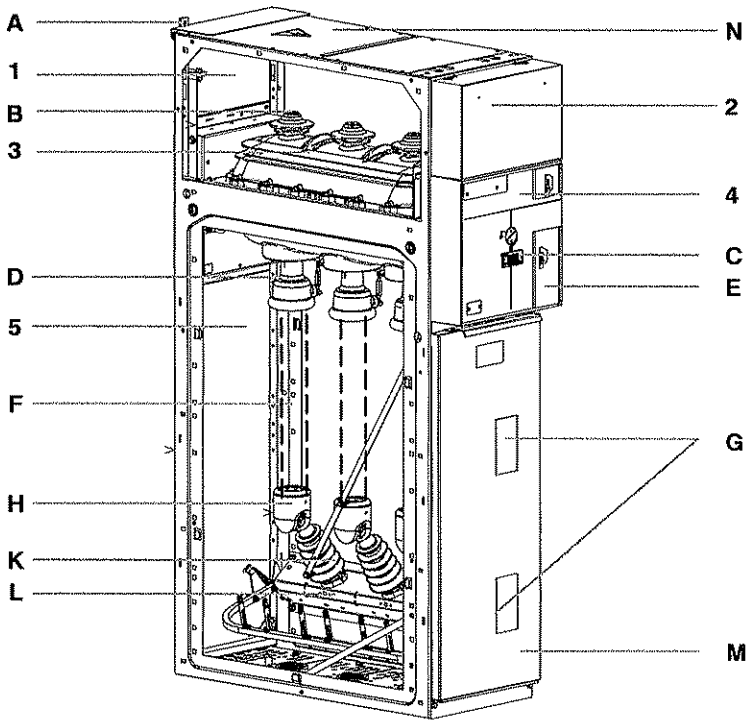


ВЯРНО С ОРИГИНАЛА

Released for Manufacturing
Printed on 2010/07/21

1°QM : fuse switch combination cubicle

1 : busbar cabinet
2 : control cabinet
3 : switchgear cabinet : switch and earthing switch
4 : operating mechanism cabinet
5 : cable connection and fuse cabinet
A : earth bar connection pad
B : busbar connection pads
C : voltage indicator
D : mechanism used to open switch when fuse blows (QM)
E : indication of switch opening by blown fuse (QM)
F : fuses
G : inspection windows for fuses and downstream earthing switch
H : lower field distributor and cable connection
K : capacitive divider
L : downstream earthing switch
M : front panel
N : rear extension sheet metal



cubicle identification

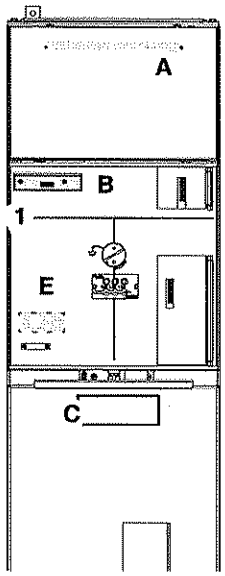
A : indicator plate (for customer use)
B : characteristics and designation
C : manufacturer's name plate
E : motorization plate (option)

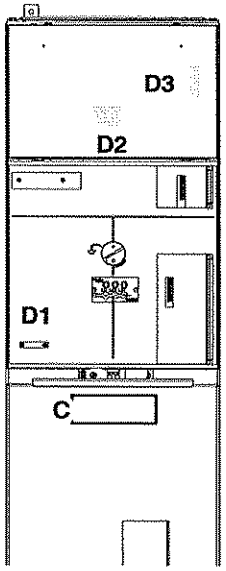
serial number

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

B

1 instruction for use number





accessories list

Busbar 400–630A version and one phase dry cables connection. For others versions, see specific instructions.

supplied with the cubicle

switchboard accessories:
(may vary depending on the cubicles making up the switchboard)

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

IM accessories:

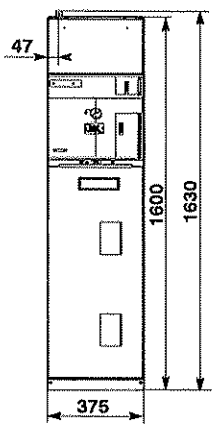
1 bag of intercubicle connection accessories (bag **S1 : 3729745**)
1 bag of field distributors for busbars > 12 kV (bag **S2 : 3729742**)
or 1 bag of fastening accessories for busbars ≤ 12 kV (bag **S6 : 3729746**)
1 bag of bottom plate fastening accessories (bag **S3 : 3729741**)
4 bottom plates
3 cable bushings
3 clamp supports + clamps
1 set of busbars
1 earth bar

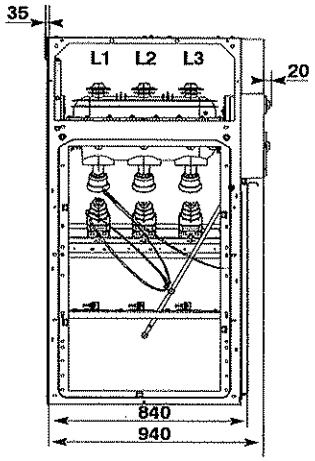
PM and QM accessories:

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**)
1 bag of bottom plate fastening accessories (bag **S5 : 3729743**)
4 bottom plates
3 cable bushings

dimensions and mass

IM :120 kg
PM :130 kg
QM :130 kg





handling by sling

he handling lugs are reserved solely for handling SM6 cubicles.

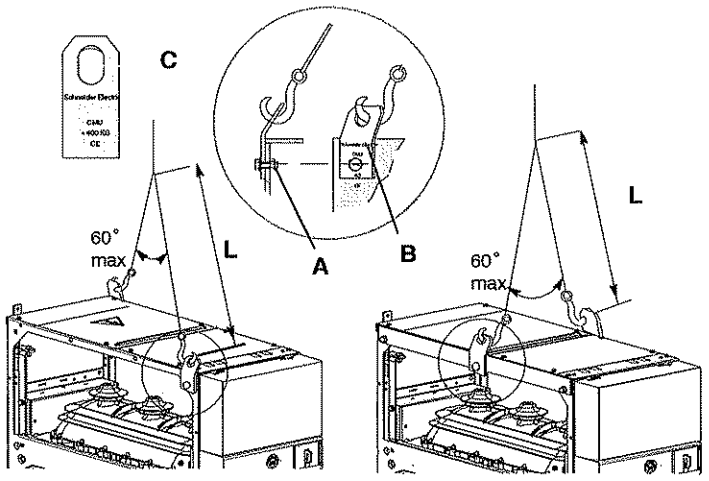
A : HM12 nuts and screws

B : Schneider Electric CMU =400 KG CE

CMU : Maximal Using Load

CAUTION

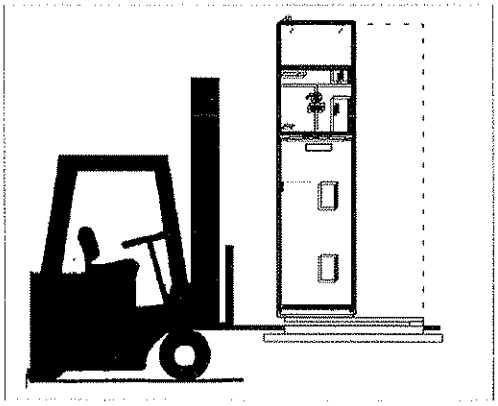
C : should the holes be deformed (ovalisation), replace the lugs, to propose you if required.

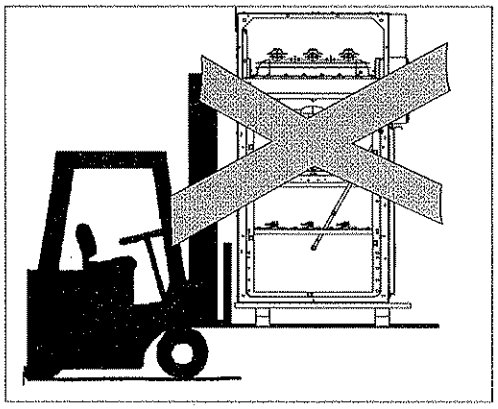


L = 920 mm mini.
Without low voltage case or wiring duct.

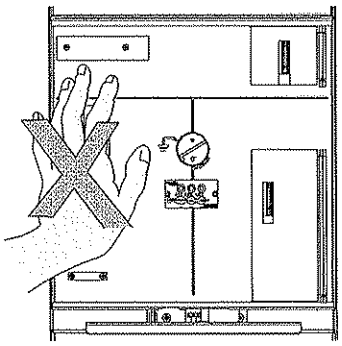
L = 375 mm mini.
With low voltage case or wiring duct.

handling using a forklift

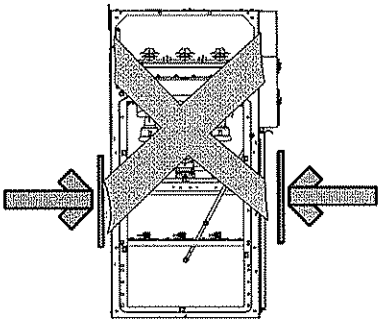


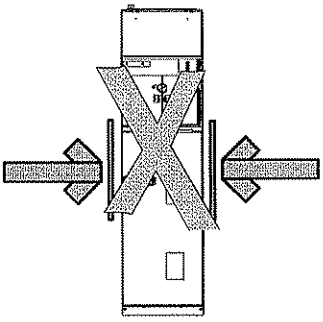


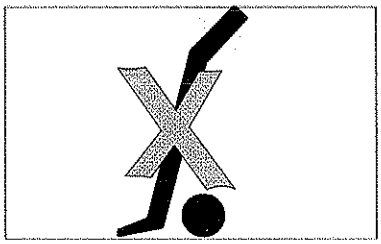
handling



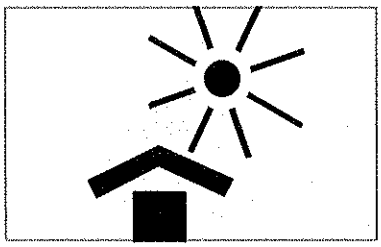
Never attempt to move the cubicle by exerting force on the control panel.

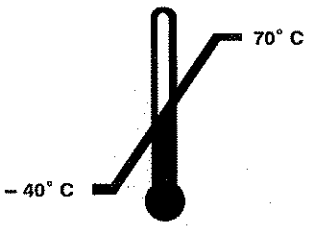






storage





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

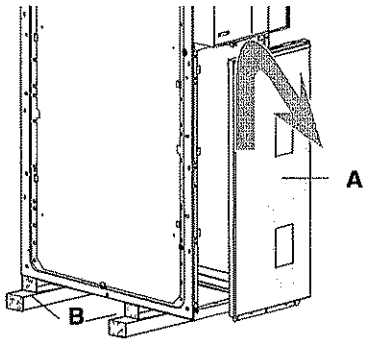
Our service centre is at your disposal at all times:

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

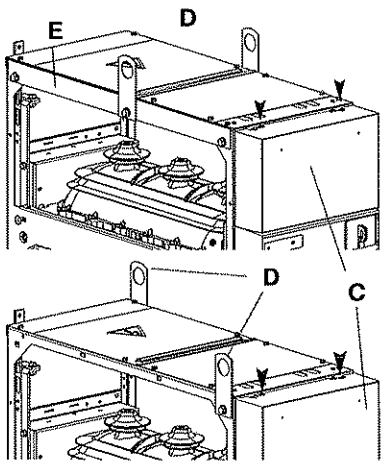
preparing the cubicles for switchboard assembly

Delivery state :
Earthing switch position upon delivery: **closed.**

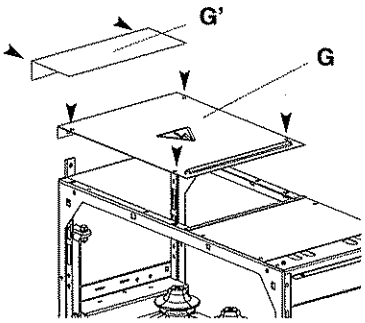
→	: bolt + washer
→	: bolt + washer + nylstop nut



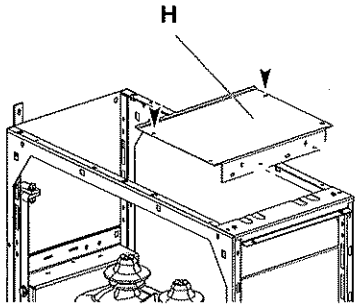
Remove the front panel **A** and then the skids **B.**



Remove the control cabinet cover **C** and the lifting rings **D** and **E.**



Remove top plate **G and G'.** (6 bolts)



Remove top plate **H.** (6 bolts)

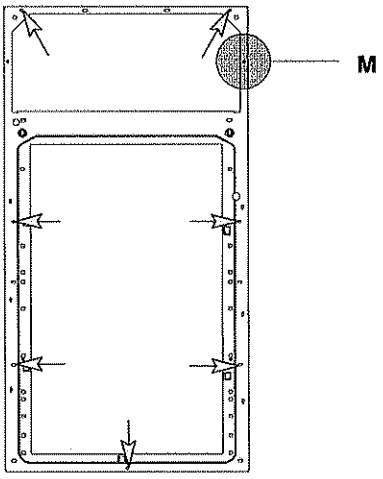
assembly the end panels

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

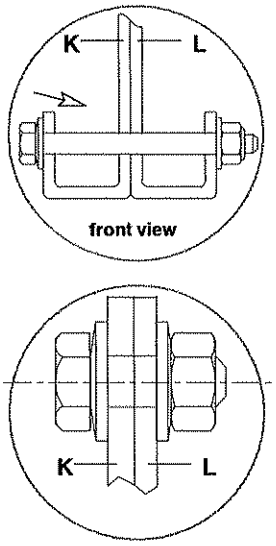
assembling the switchboard

nuts and bolts in bag
S1: 3729745
(HM6 x 16 bolts only)

→ : screw+washer+ nut



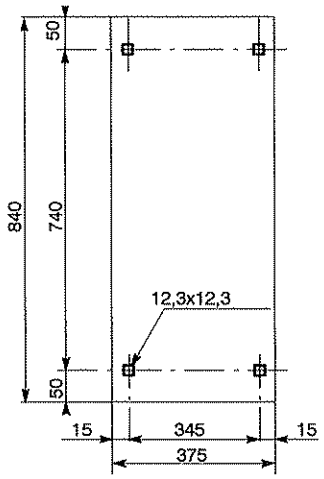
Fix the cubicles together.
(the additional screws are for mounting the earth collector)



Bolt mounting direction.
K : left–hand cubicle
L : right–hand cubicle
M : to join the 2 cubicles.
Screw HM6x60 to tighten moderately.
Tightening torque : 6 Nm.

securing to the floor

(screws to be provided by the contractor according to civil engineering)

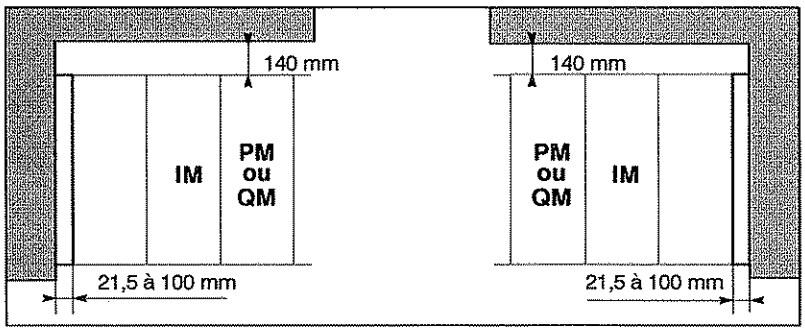


layout in the substation

(minimum clearance for trouble-free operation)

Switchboard installed to the right of a wall.

Switchboard installed to the left of a wall.



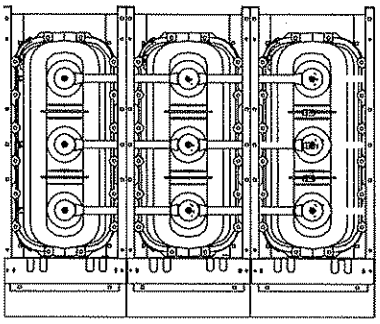
assembly the busbars

installing the cubicles in their operating location

accessories bag
S2 : 3729742

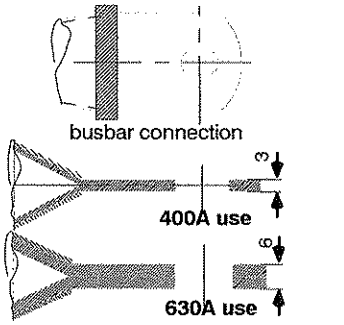
- **Outillage :**

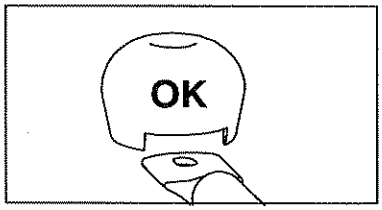
1 torque wrench (1 to 50 Nm.)
1 reduction gear (1/4 – 3/8)
1 socket connector (6 mm)
1 hexagon male socket (6mm)



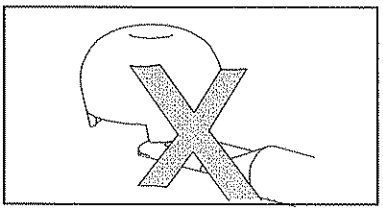
Busbar connection.
Tightening torque : 28 Nm.

Before assembling the busbar, ensure that it complies with use of the switchboard for a rated current of 400A or 630A.





Field distributor **positioned correctly**



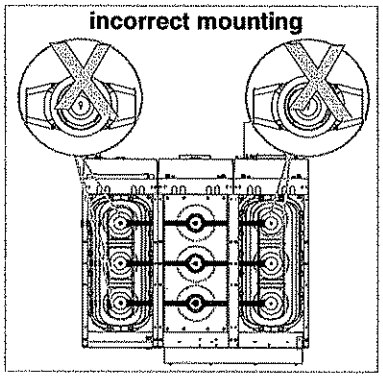
Field distributor **positioned incorrectly.**

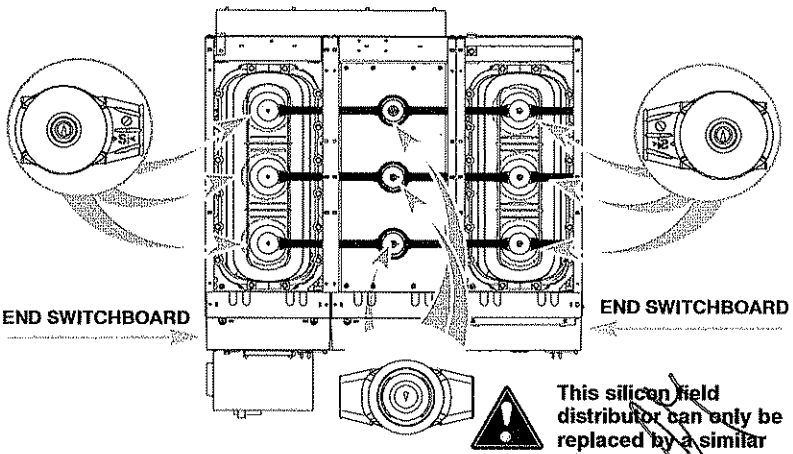
assembly the busbars with lower field distributor silicon optional (Optional only 630A)

installing the cubicles in their operating location

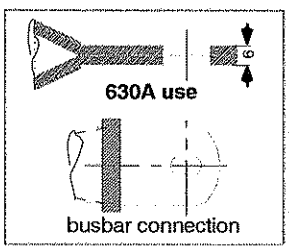
Refer to the above tools

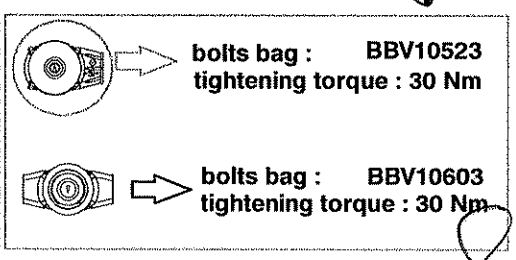
Before assembling the busbar, ensure that it complies with use of the switchboard for a rated current of 630A (only).



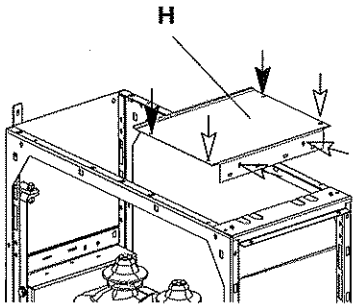


This silicon field distributor can only be replaced by a similar silicon field distributor.

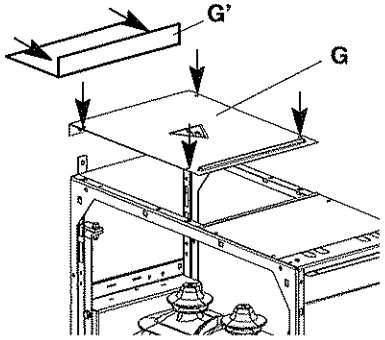




bolt+washer+nylstop nut
bolt+washer



Refit top plate **H.**
(nuts inside the cubicle)



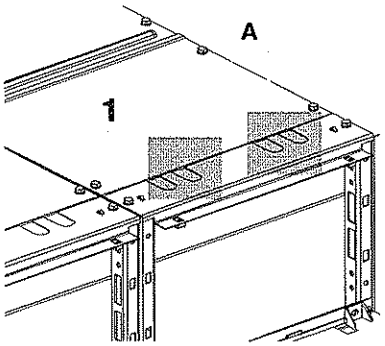
Refit top plate **G and G'.**

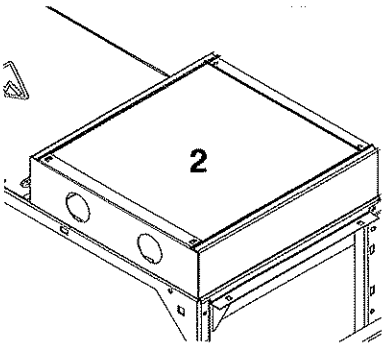
cable entry for connection of low voltage auxiliaries

1 : Cable entry to the auxiliary terminal block is via holes **A** on top.

2 :Cubicle equipped with a wiring duct. (option)

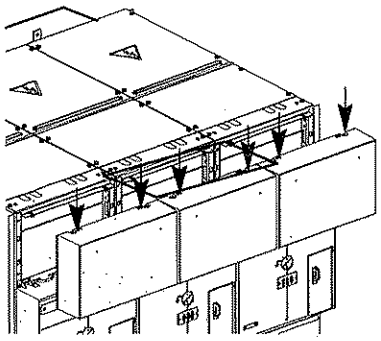
Proceed in the same manner after removing the trough top plate.





bolt+washer

Refit the control cabinet cover, respecting the indications.

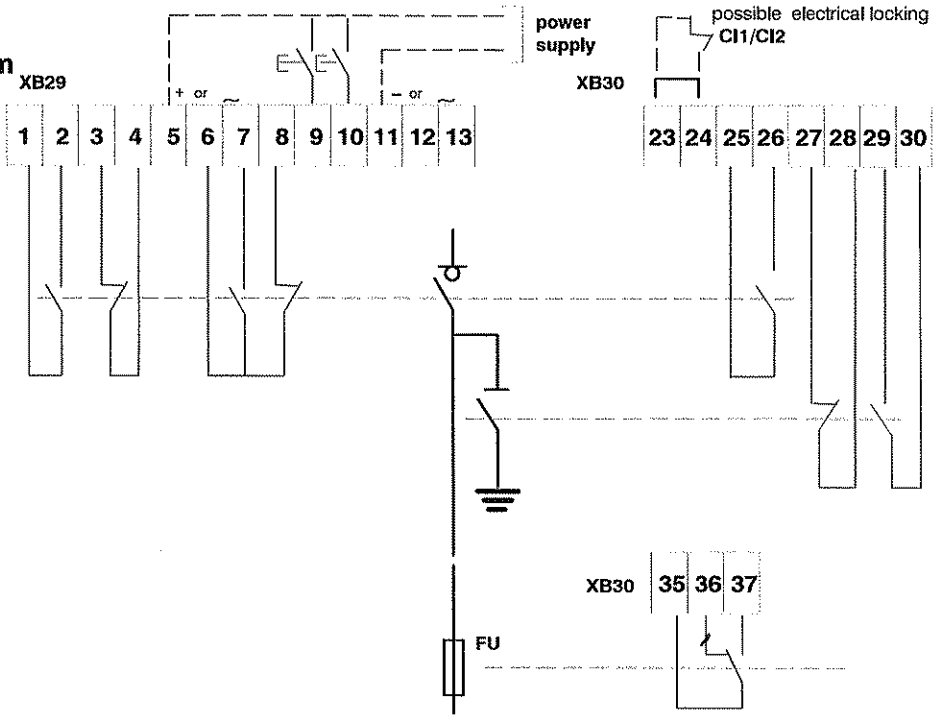


cable entry for connection of low voltage standard auxiliaries in optional supply

Nota : for connection of LV auxiliaries, refer to the wiring diagrams of the cubicle with need other than standard.

cable entry for connection of low voltage standard auxiliaries in optional supply

terminal block of LV auxiliaries with motorized mechanism



marking of terminal block

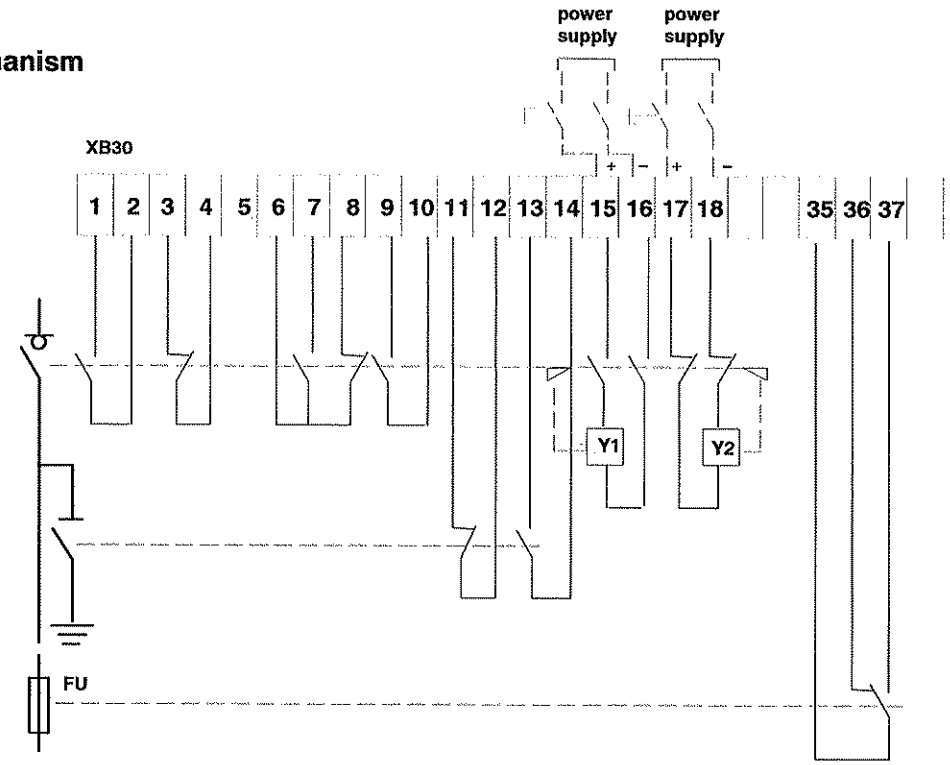
4 auxiliary contacts :
position of the closed MV switch : terminals **1–2** and **6–7.**
Position of the open MV switch terminals **3–4** and **6–8.**

3 additional auxiliary contacts
(optional supply)
Position of the closed MV switch : terminals **25–26.**
Position of the open MV earthing switch : terminals **27–28.**
Position of the closed MV earthing switch : terminals **29–30.**

Motorization :
Power supply : terminals **5–11.**
Opening order : terminal **9.**
Closing order : terminal **10.**
Possible electrical locking for motorization : terminals **23–24.**

Fuse blowing indication.
only for **QM cubicle** : terminals **35–36–37.**

terminal block of LV auxiliaries with no–motorized mechanism



marking of terminal block

4 auxiliary contacts :
position of the closed MV switch : terminals **1–2** and **6–7.**
Position of the open MV switch : terminals **3–4** and **6–8.**

3 additional auxiliary contacts :
(optional supply)
position of the closed MV switch : terminals **9–10.**
Position of the open MV earthing switch : terminals **11–12.**
Position of the closed MV earthing switch : terminals **13–14.**

Opening release :
opening order : terminals **15–16.**

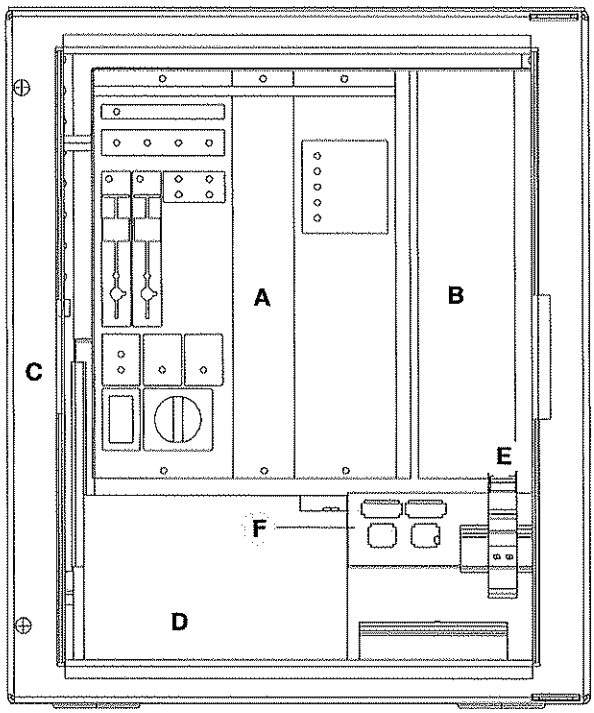
Closing release
closing order : terminals **17–18.**

Fuse blowing indication
only for **QM cubicle** : terminals **35–36–37.**

Released for Manufacturing
Printed on 2010/07/21
7896682EN revision : 03

T200S for LV connection

A : **T200S** "relay"
B : radio location"in the case of remote control"
C : LV cabinet (W : 375mm)
D : battery for independent supply
E : fuse switch for connecting the 230 V AC battery charger supply
F ; malle/femelle connector info SW1, SW2, i.SW1 and i.SW2



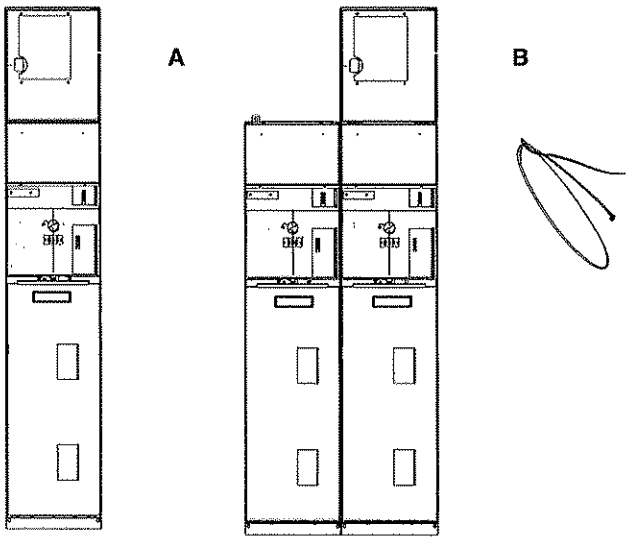
1 : connect the 230 V AC supply to the fuse switch **(E)** and shut off the switch
2 : connect the battery
3 : the automated controller will be fully operationnal after one hour.

commissioning the automated controller

- check the position of the buttoms on the operating mechanism : buttom K in operation position button **D** set to **ON.**
- to configure the automated controller, refer to the **T200S** user manuals **nos. NT00044** and **N° T00045** in English.

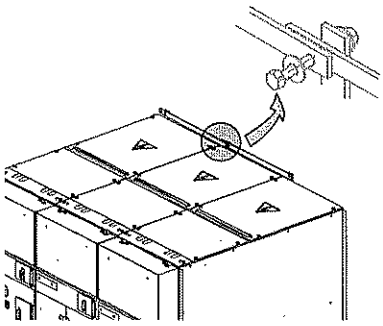
remote control for 1 cubicle switch (A)

remote control for 2 cubicle switch (B)

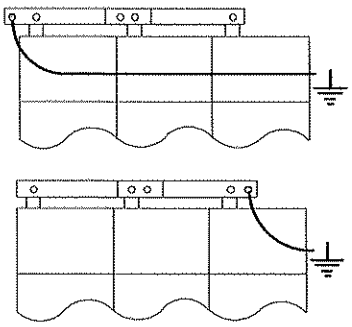


assembly the earthing bars

nuts and bolts in bag S1 : 3729745

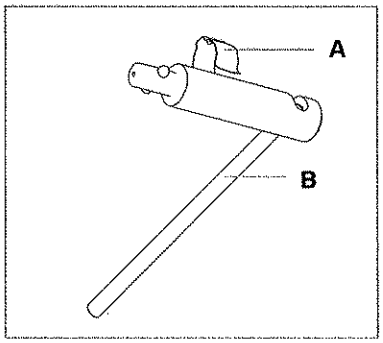


Connect the earthing bars together. (HM8 x 30 bolts)



Earth the substation frames in either of these two ways.

storing the operating lever

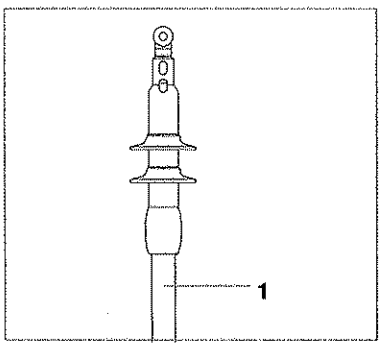


Fix the hook **(A)** and the wall. (screws not supplied)
The operating lever has to be hooked **(B).**

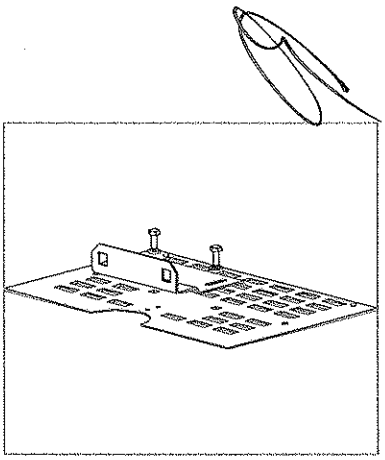
HV cable connection for an IM cubicle

To limit the effort on the cable connection you have to ajust the lenght at the bending radius of the cable.

1 : copper cable or aluminium cable

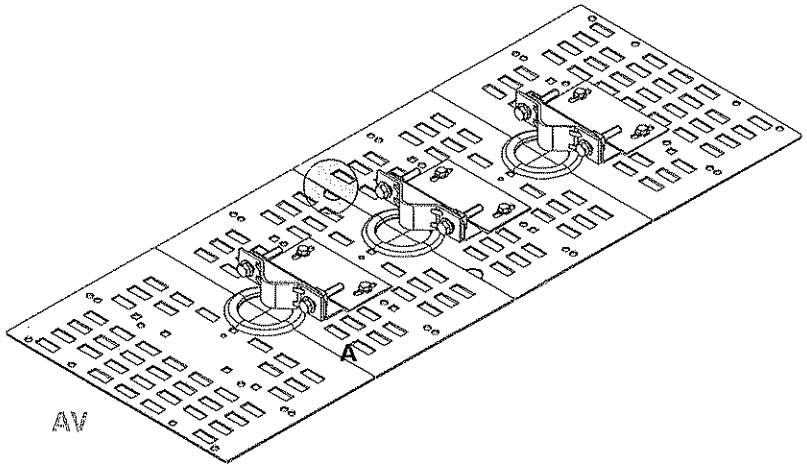


EUIC (short inner end, cold fitted).
They must be manufactured according to the standard :
IEC.60.502



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.

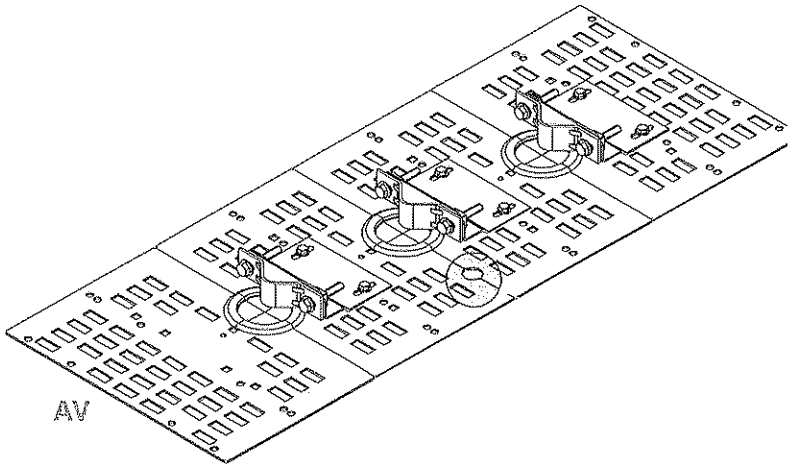
2 mounting possibilities :
A without toroids

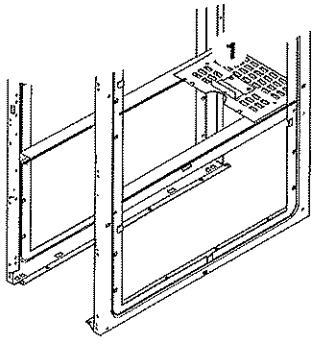


B with toroids

Nota : if the assembly **B** isn't equiped with toroids, the degree of protection **IP2X isn't observed.**

Remind : **IP2X** : degree of protection following protection suivant **IEC60529.**



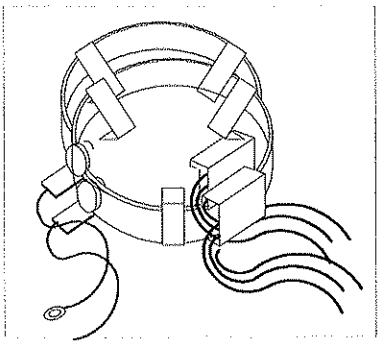


Mount the first bottom plate.

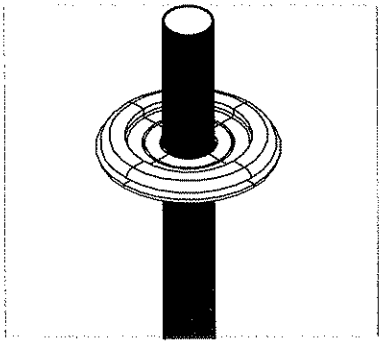
installing the fault detection toroids

(instructions suggested by

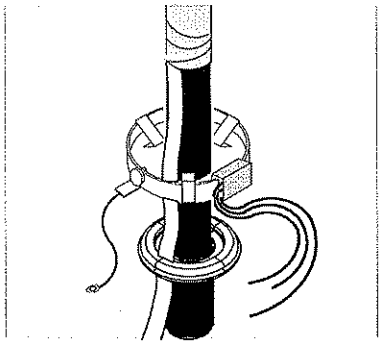
For IM cubicles only.
Follow the instructions of the toroid manufacturer.



Prepare the toroids outside the cubicle.

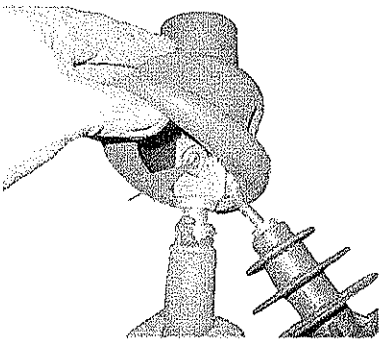


Fit the cable bushing.

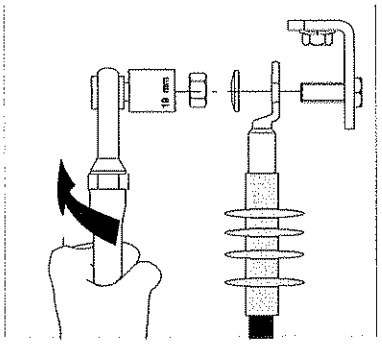


Position and fix the toroid on the cable.

The earthing bread of the cables has (isolated) must go trough the toroids.

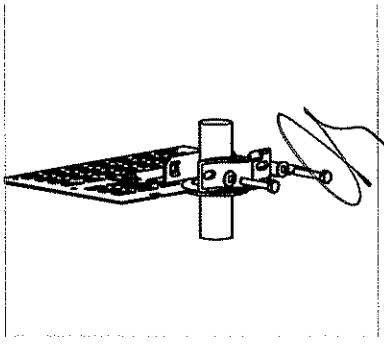


Connect the cable to the bolt provided on the phase **L1** connector.

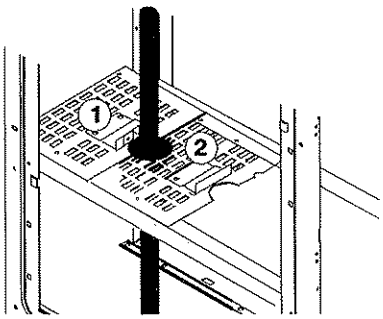


Use a torque wrench and a 19 mm socket to tighten the cable to this bolt.

Tightening torque : 50 Nm.

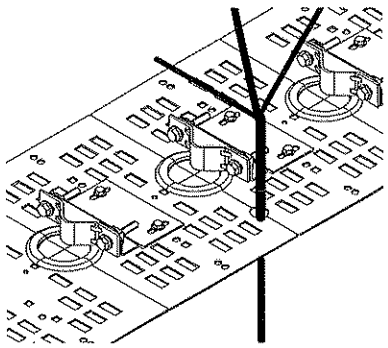


Clamp the cable to the clamp support on the bottom plate. (HM8 x 50 bolts)

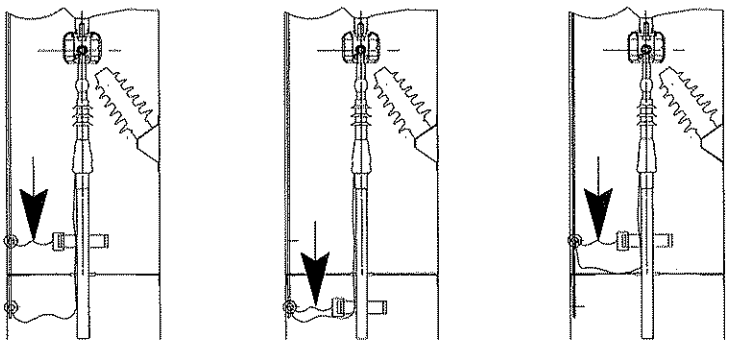


Mount the **second** bottom plate.

- 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.
(the bolts are already installed)

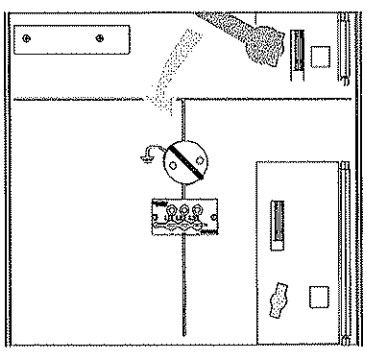
MV cable connection for PM and QM cubicles

Do not use the cable clamp supports.

Nuts and bolts in bag S5 : 3729743.

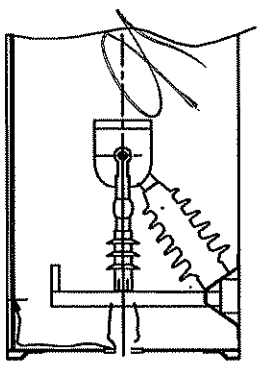
ATTENTION

Make sure to fully complete the operating cycle you before removing the lever.



Open the earthing switch using the operating lever.

To see manual operations section.

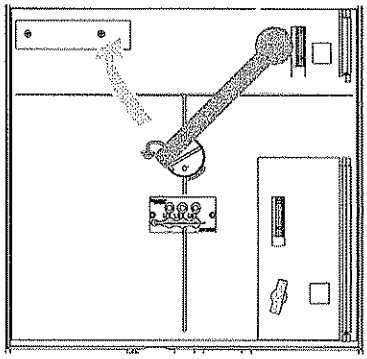


Fit the cables in the same order as for the **IM cubicle**.
Use a torque wrench and a 16 mm socket to tighten the bolts.
Tightening torque : 50 Nm.

ATTENTION

Make sure to fully complete the operating cycle you before removing the lever.

Close the earthing switch

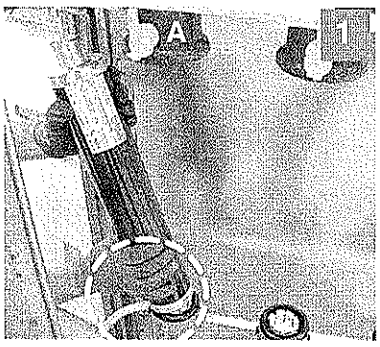


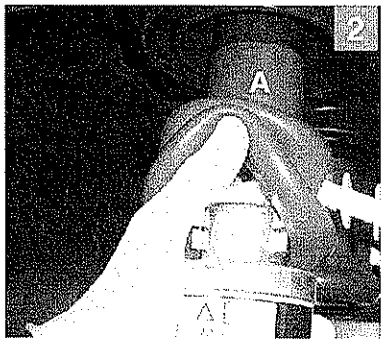
assembly fuses in PM and QM cubicles

Reminder :
Check the condition of the fuses before assembling them .

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

2 : Fit the upper part of the fuse, do not forget to draw by hand the upper field repartitor (**A**).



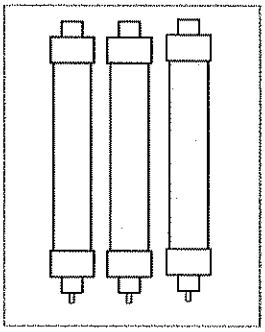


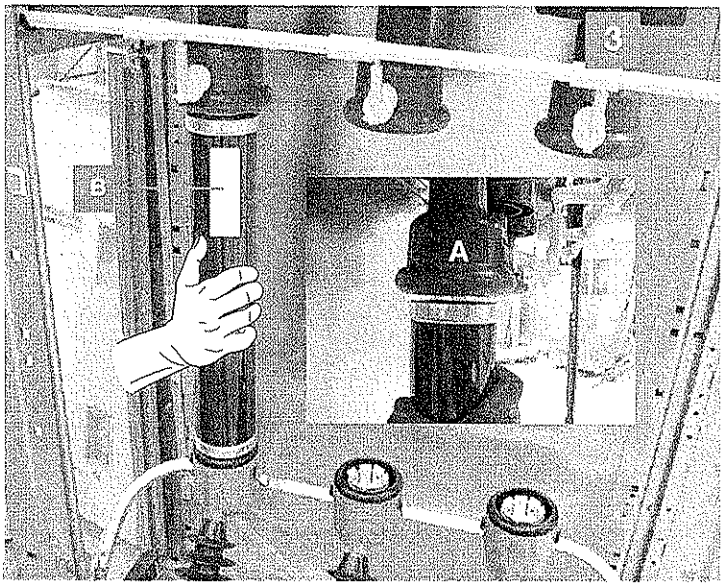
3 : correct mounting

Reminder:
check the correct position of the upper field repartitor (**A**)

Nota :
- **when changing a fuse, change all 3 fuses .**

▪ **B** :Turn the fuse so that the label appears in front.



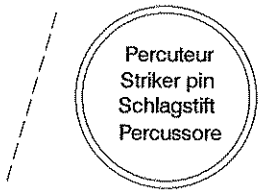


CAUTION

– Do not re–used fuses that have already been used.

in a QM cubicle

Fit striker type fuses that actuate the opening of the switch when they blow.



The striker end of the fuse is marked.

The fuse characteristics and direction of mounting are printed on the fuse.
Turn the fuse so that the label is in front.
(striker at the top)

transformer protection

Fuse ratings for **SM6** protection units such as the **PM** and **QM** depend, among other things, on the following criteria :

- Service voltage
- Transformer rating.
- Fuse technology (manufacturer).

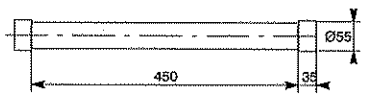
- Different types of fuses with medium loaded striker may be installed:
  −Solefuse fuses as per standard **UTE NFC 64.210.**
  −CF Fusarc fuses as per **IEC** recommendation **282.1 and DIN** dimensions **43.625.**

dimensions of fuses

Example: for the protection of a 400 kVA transformer at 10 kV, select either Solefuse fuses rated 43A or CF Fusarc fuses rated 50A.

Please consult us on installation

soléfuse (UTE standard)



rated voltage (kV)	rating (A)	weight (Kg)
7,2	6,3 à 125	2
12	100	2
17,5	80	2
24	6,3 à 63	2

CF Fusarc (DIN standard)

rated voltage (kV)	rating (A)	L (mm)	Ø (mm)	weight (Kg)
7,2	125	292	88	3,3
12	6,3 à 63	292	55	1,4
	80 à 100	292	88	3,3
24	6,3 à 40	442	55	1,4
	50 à 80	442	88	5

selection table

(rating in (A), no overload, $-5^{\circ}C < \theta < 40^{\circ}C$)

Please consult us for overloads and operation over 40°C.

type of fuse	service voltage (kV)	transformer rating (KVA) 25	50	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	rated voltage (kV)
UTE NFC standards: 13.100, 64.210																			
Solefuse																			
	5.5	6.3	16	31.5	31.5	63	63	63	63	63									7.2
	10	6.3	6.3	16	16	31.5	31.5	31.5	63	63	63	63							24
	15	6.3	6.3	16	16	16	16	16	43	43	43	43	43	63					
	20	6.3	6.3	6.3	6.3	16	16	16	16	43	43	43	43	43	63				
General case, UTE NFC standard 13.200																			
Solefuse																			
	3.3	16	16	31.5	31.5	31.5	63	63	100	100									7.2
	5.5	6.3	16	16	31.5	31.5	63	63	63	80	80	100	125						
	6.6	6.3	16	16	16	31.5	31.5	43	43	63	80	100	125	125					7.2
	10	6.3	6.3	16	16	16	31.5	31.5	31.5	43	43	63	80	80	100				12
	13.8	6.3	6.3	6.3	16	16	16	16	31.5	31.5	31.5	43	63	63	80				17.5
	15	6.3	6.3	6.3	16	16	16	16	31.5	31.5	31.5	43	43	63	80				
	20	6.3	6.3	6.3	6.3	16	16	16	16	31.5	31.5	31.5	43	43	63				24
	22	6.3	6.3	6.3	6.3	16	16	16	16	16	31.5	31.5	31.5	43	63	63			
General case, IEC 62271-105 standard																			
CF Fusarc and SIBA*																			
	3,3	16	25	40	50	50	80	80	100	125	125	160*	200*						7,2
	5	10	16	31,5	40	40	50	63	80	80	125	125	160*						
	5,5	10	16	31,5	31,5	40	50	50	63	80	100	125	125	160*	160*				
	6	10	16	25	31,5	40	50	50	63	80	80	125	125	160*	160*				
	6,6	10	16	25	31,5	40	50	50	63	80	80	100	125	125	160*				
	10	6,3	10	16	20	25	31,5	40	50	50	63	80	80	100	100	125*	200*		12
	11	6.3	10	16	20	25	25	31.5	40	50	50	63	80	100	100	125*	160*		
	13,8	6,3	10	16	16	20	25	31,5	31,5	40	50	50	63	80	80	100*	125*	125*	17,5
	15	6,3	10	10	16	16	20	25	31,5	40	50	50	63	80	80	100	125*	125*	
	20	6,3	6,3	10	10	16	16	25	25	31,5	40	40	50	50	63	80	100*	125*	24
	22	6,3	6,3	10	10	10	16	20	25	25	31,5	40	40	50	50	80	80	100*	

reference list

Reference list of fuse inside **QM cubicle** according to **IEC 62271-105** standard.

Please consult us for all other type of fuses.

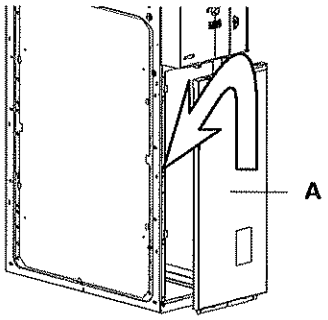
Fusarc CF						SIBA							
Ur.7,2 Kv		**Ur.12 Kv**		**Ur.24 Kv**		**Ur.7,2 Kv**		**Ur.12Kv**		**Ur.17,5Kv**		**Ur.24 Kv**	
Ir(A)	ref	Ir(A)	ref	Ir(A)	ref	Ir(A)	ref	Ir(A)	ref	Ir(A)	ref	Ir(A)	ref
125	757352BN	6,3	51006511M0	6,3	51006538M0	160	3736720	125	3736722	125	3736725	100	3736726
		10	51006512M0	10	51006539M0	200	3736721	160	3736723			125	3736727
		16	51006513M0	16	51006540M0			200	3637724				
		20	51006514M0	20	51006541M0								
		25	51006515M0	25	51006542M0								
		31,5	51006516M0	31,5	51006543M0								
		40	51006517M0	40	51006544M0								
		50	51006518M0	50	51006545M0								
		63	51006519M0	63	51006546M0								
		80	51006520M0	80	51006547M0								
		100	51006521M0										

checks before energizing

Check that nothing has been left in the connection cabinet.

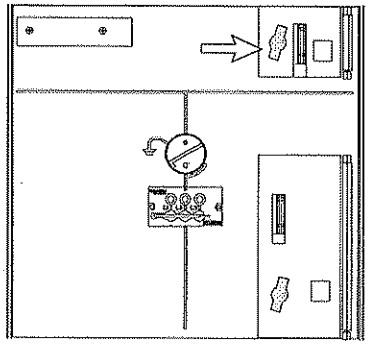
For all phases:

- check that the fuse has been properly fitted.
- check that the field distributor covers have been properly closed on all phases.
- check that the fault detector has been properly connected.

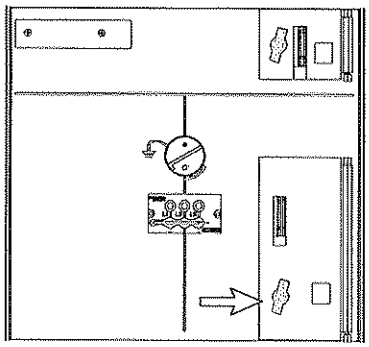


Refit the front panel **A**.

operating test before energizing

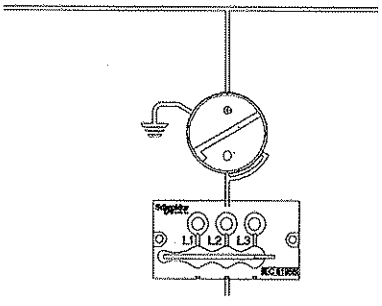


Operate the switch several times.



Operate the earthing switch several times.

energizing the incoming MV cables



The switchgear must be in open position.
(see : **operating instructions**)