Medium Voltage Distribution

F400

Air insulated switchboard
Withdrawable circuit breaker 1 to 40.5 kV

Instruction for use
September 2009

Schneider Electric

Content

Note: the subject of this new version of this user guide is about the annexe “Adaptation/instructions - Replacement of the voltage presence type VPIS 1 by type VPIS 2 and VPIS 2 by VPIS 2”, updated on july 2009.

General description

Glossary

Abbreviations

Warning: *all dimensions are in cm.*

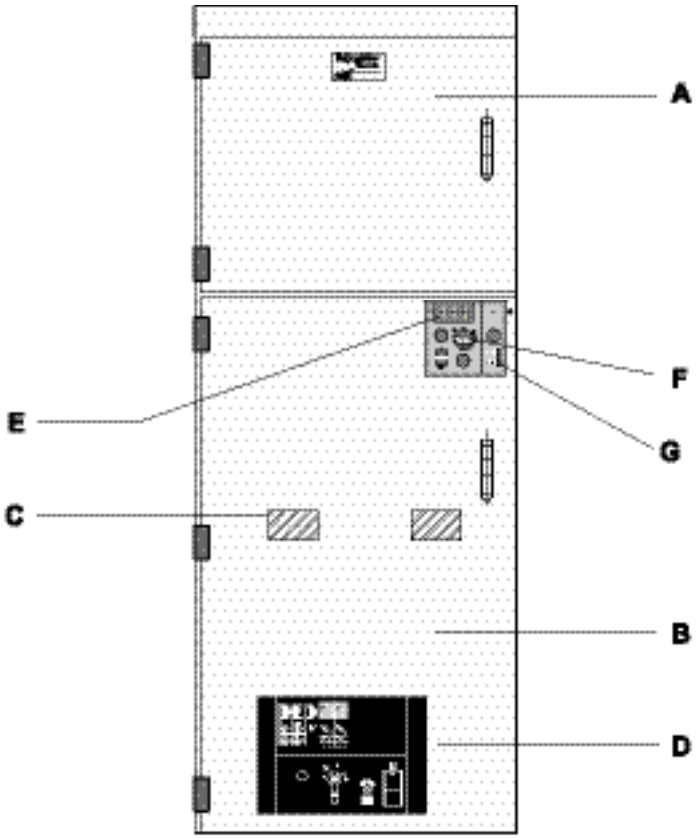
LV: low Voltage
MV: 36 kV voltage class
EI: earthing isolator
SF: range of SF6 circuit-breakers used in the F400

VT: Voltage Transformer
NVC: no-voltage check
CT: Current Transformer or current sensor
CT Add: second row of current transformer.

Cable incoming or outgoing cubicles

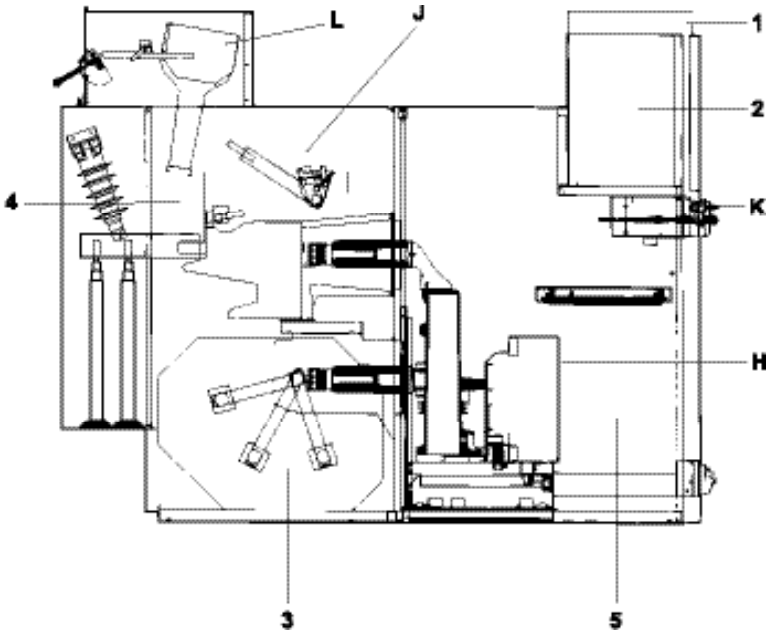
Front side

A: LV compartment access door
B: removable part compartment access door
C: removable part position check view ports
D: removable part interlocking and operating plate
E: voltage indicators
F: earthing isolator interlocking and operating plate
G: removable part blocking.



Left-hand view

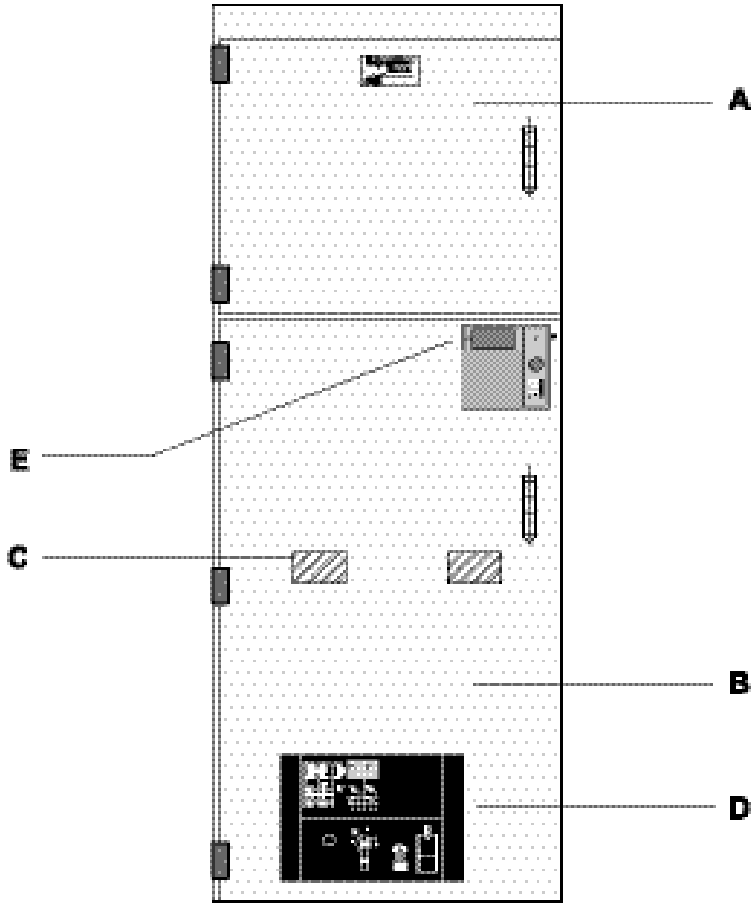
1: LV cable routing and connection compartment
2: low voltage compartment
3: busbar compartment
4: MT and VT cable compartment
5: removable part compartment
H: removable part
J: earthing isolator
K: earthing isolator operating mechanism
L: voltage transformer.



Bus coupler cubicles

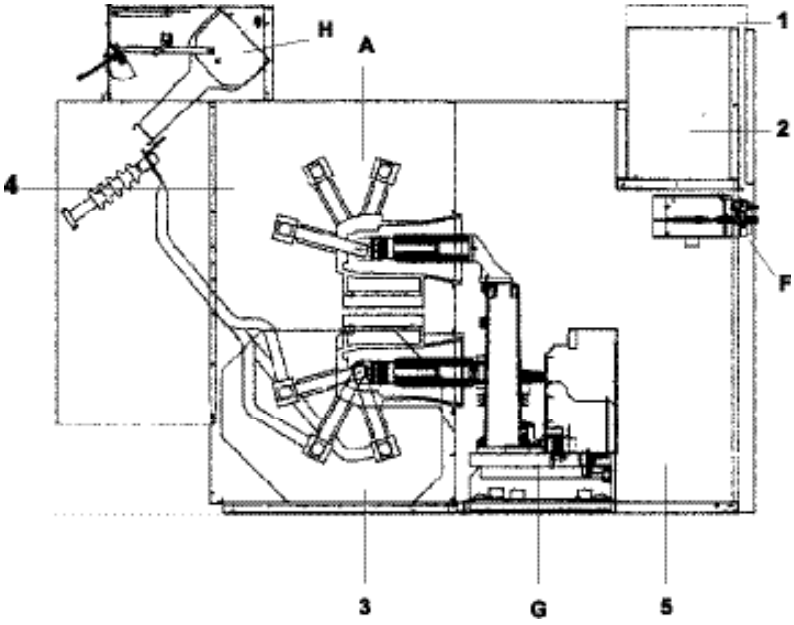
Front side

A: LV compartment access door
B: removable part compartment access door
C: view ports
D: removable part interlocking and operating plate
E: removable part interlocking plate.



Left-hand view

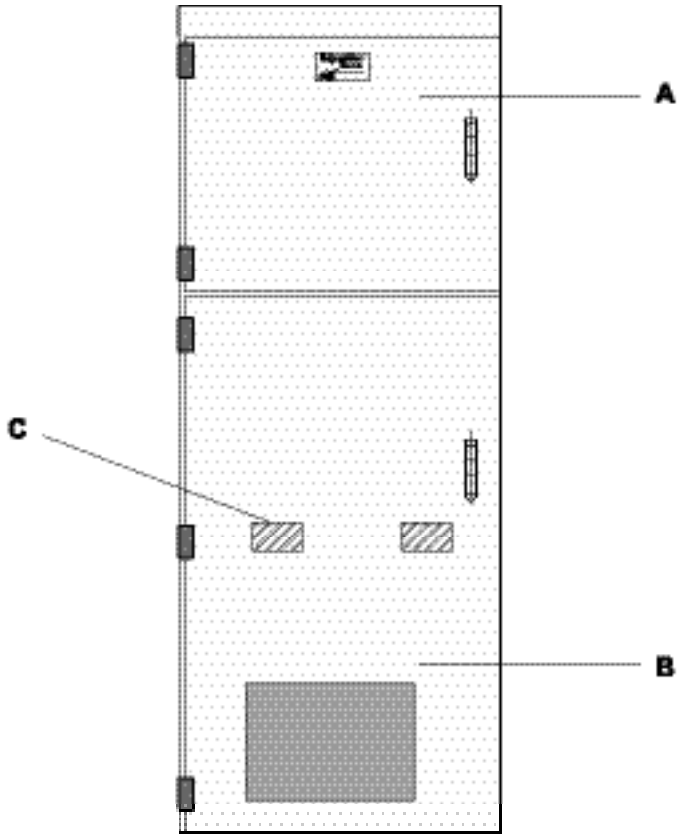
1: LV cable routing compartment
2: low voltage compartment
3: bottom busbar compartment
4: top busbar compartment
5: removable part compartment
F: removable part interlocking mechanism
G: removable part
H: voltage transformer.



Bus riser cubicles

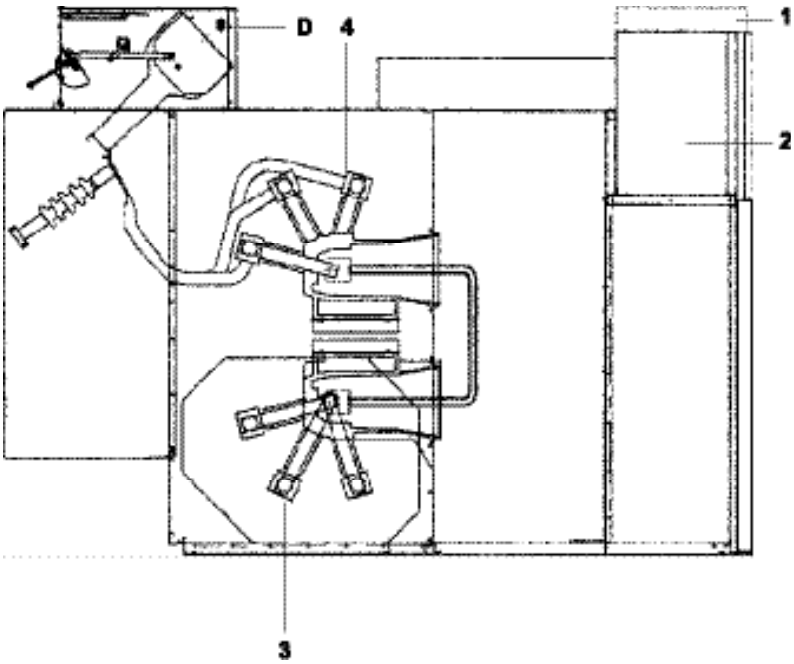
Front side

A: LV compartment access door
B: fixed bar bridge compartment access door
C: view ports.



Left-hand view

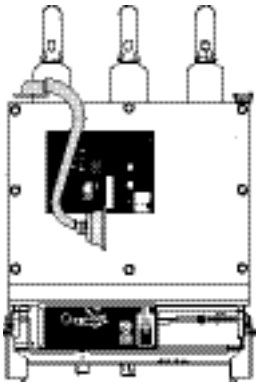
1: LV cable routing compartment
2: low voltage compartment
3: bottom busbar compartment
4: top busbar compartment
D: voltage transformer.

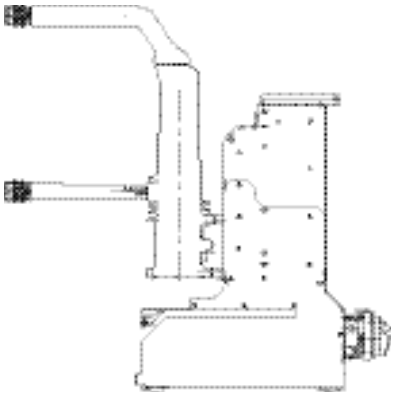


Draw-out SF circuit-breakers

SF1

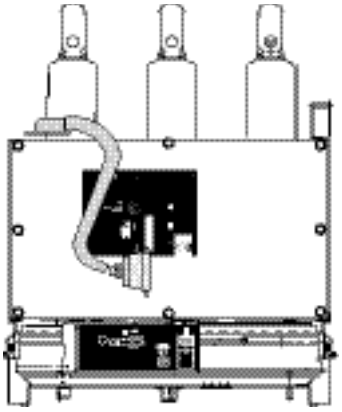
CEI 1250 A standard

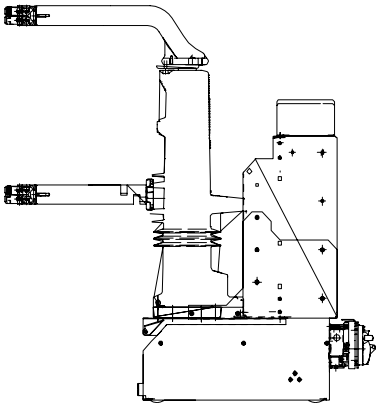




SF2

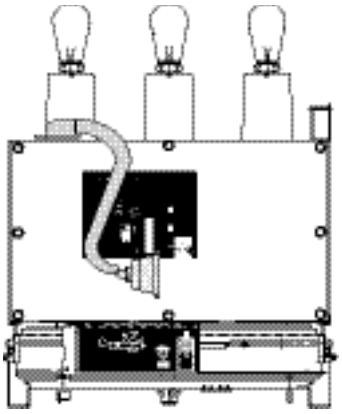
CEI 1250 A standard

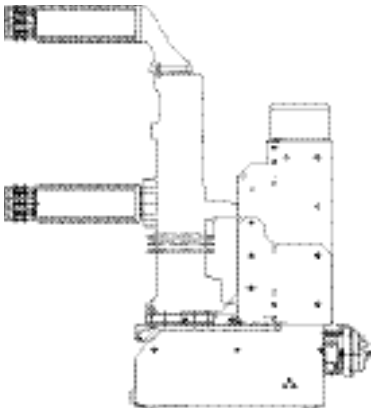




SF2

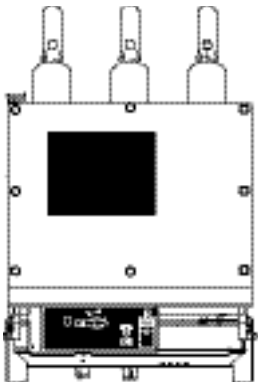
CEI 2500 A standard

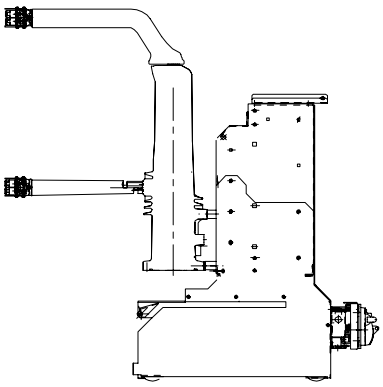




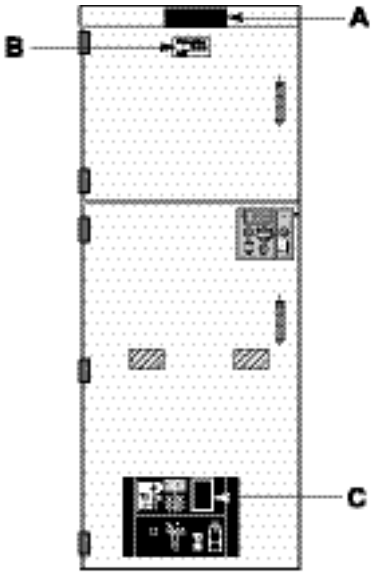
Draw-out bar bridge

1250 A and 2500 A

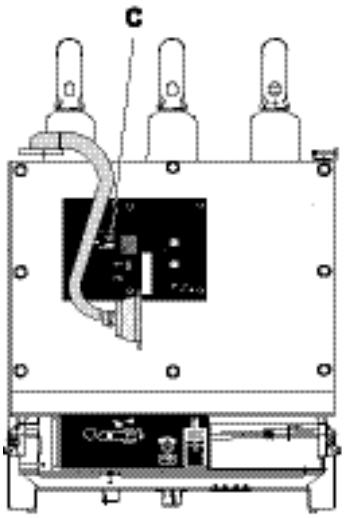




Identification



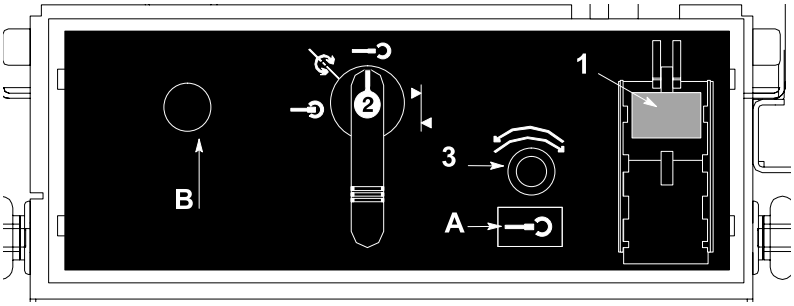
Functional unit
A: cubicle name
B: firm plate
C: features, descriptions and serial number.



SF draw-out removable part
C: features, descriptions and serial number.

How to read the information on the front side

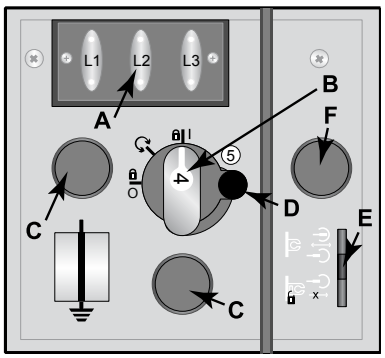
Removable part



1: mechanical opening push-button
2: removable part position selector
3: removable part operating crank insertion aperture.

A: removable part mechanical position indicator
B: **slot for the disconnecting truck lock (optional).**

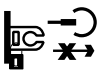
Earthing isolator, power on and plug-in disabling



A: power-on indicator block
B: earthing isolator position selector
C: slot for the earthing isolator lock
D: earthing isolator operating crank insertion opening
E: locking pull for plug-in disabling (plug-in disabling selector)
F: slot for the plug-in disabling lock.

Symbols

Cubicle



"Plug-in disabling" position

"Operating" position

Earthing isolator open position

Earthing isolator open mechanical indicator

Earthing isolator closed position

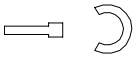
Earthing isolator closed mechanical indicator

Padlockable position.

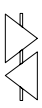
Removable part

"Operating" position

"Plugged-in" position



"Drawn-out" position

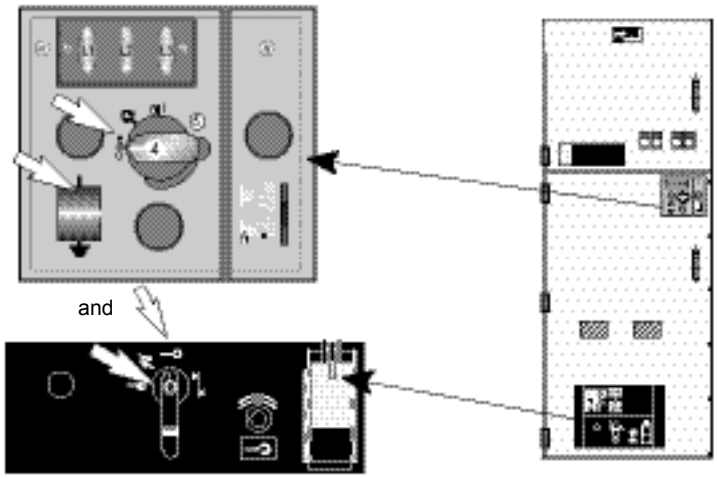


"Insertion / extraction" position

List of optional accessories available with the switchboard

- 1 busbar earthing truck (optional), see "**Busbar earthing truck**".
- 1 phase coincidence checking device (optional), see "**Checking phase coincidence between two cubicles**".

How to extract the removable part

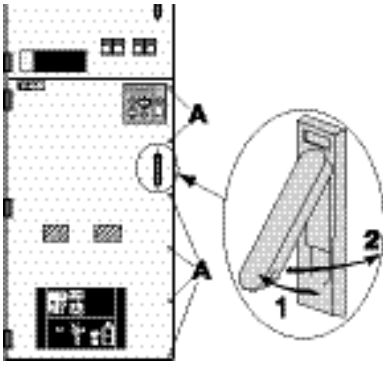


Earthing isolator
■ Selector **4** to ○ (earthing isolator open).

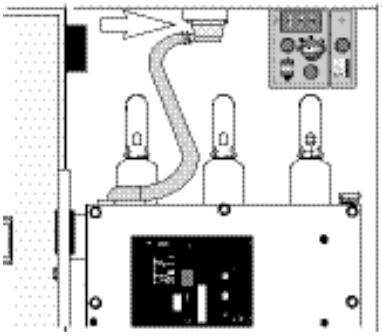
Initial status:
Removable part
The removable part is drawn out.
■ The cubicle is in disconnected position.

Operation

Warning: *for cubicles with internal arc withstand option, loosen the 6 screws* **A** *before operating the handle.*

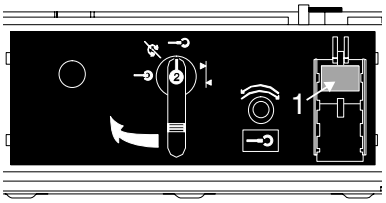


Open the access door to the removable part by pulling and then rotating the handle rightwards.



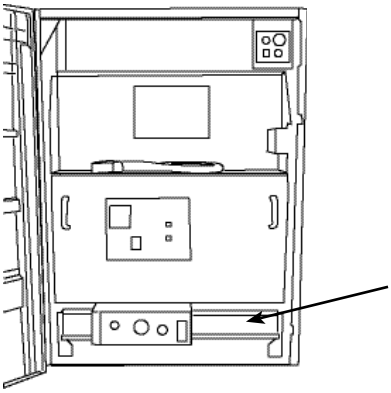
Unplug the LV auxiliary connection cord.
Clip the cable on the circuit-breaker.

Warning: *the threshold bar must be removed before extracting the removable part.*



Press push-button **1**.
Hold it down to move selector **2** to position .

Then extract the removable part by pulling the handles

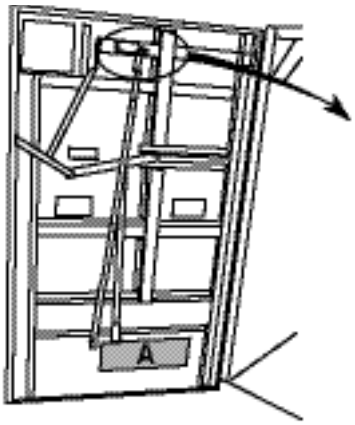


Pull out the removable part.

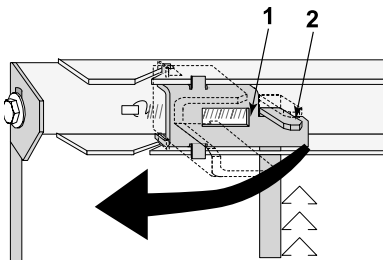
Closing the door after extracting the removable part

Warning: *the following steps MUST be followed to allow the door to be closed.*

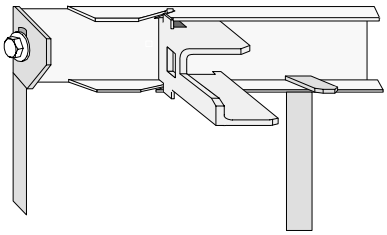
Warning: *put back the threshold bar.*



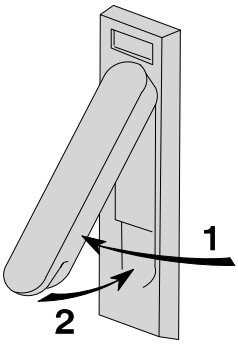
Before closing the access door to the removable part, bottom the panel **A**.



Inside the door, pull locking part **1**. Rod **2** goes down.

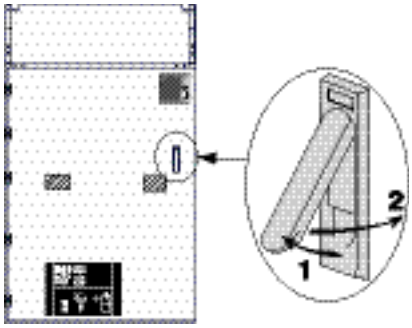


The door closes but does not lock.



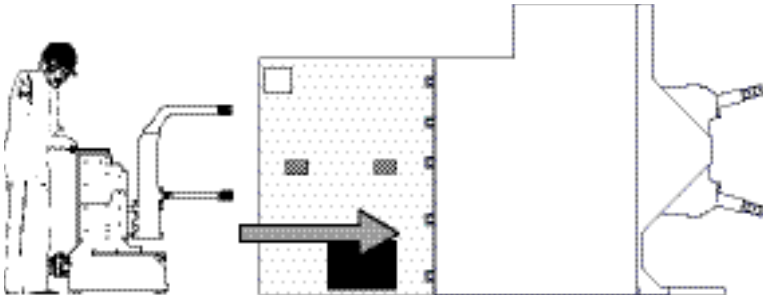
Close the door.

How to insert the removable part

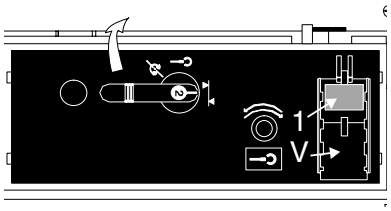


Open the access door to the removable part by pulling and then rotating the handle rightwards.

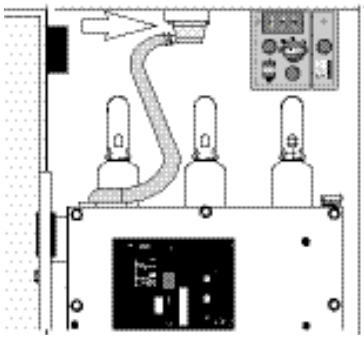
Warning: *put back the threshold bar.*



Insert the removable part in the cubicle.



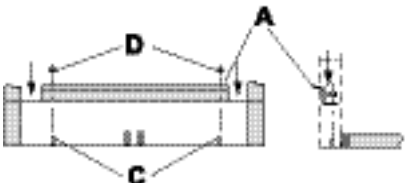
To move selector **2** to position , press push-button **1**.
Hold it down to move selector **2** to position .
Push the removable part into the cubicle until its is in abutment.
Then press push-button **1**.
Hold it down to move selector **2** back to position .



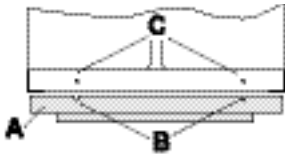
Connect the LV auxiliary connection cord.

Warning: *lift protection flap **V** of pushbutton **1**.*

Putting back the threshold bar

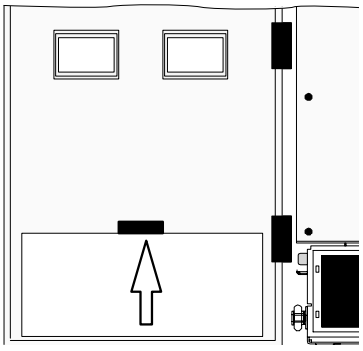


Insert the threshold bar **A** tilting it slightly, align slots **B** with threaded rods **C**, then fit the threshold bar.



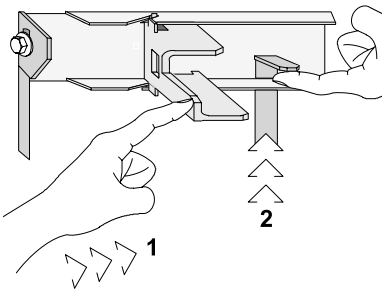
Loosen nuts **D**.

Closing the door with the removable part in place

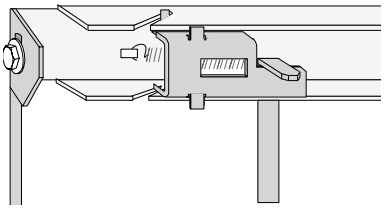


Warning: *if closing is impossible, check the following points given in **E** and **F**.*

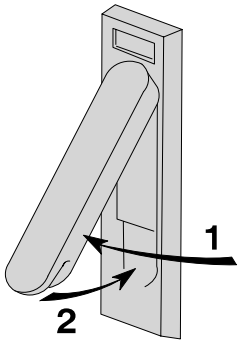
E: before closing the access door to the removable part, lift the panel and check that it is properly latched at the top.



F: Lift rod **2**, topple locking part **1** over and release rod **2**.



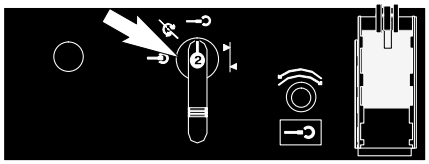
The door closes but does not lock.



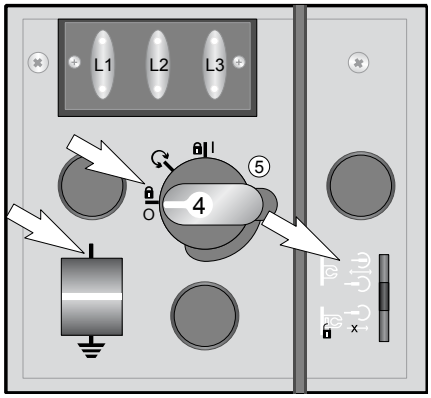
Close the door.

How to plug in the removable part (bottom front plate)

Initial status



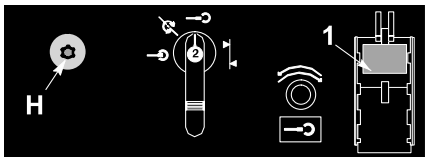
and



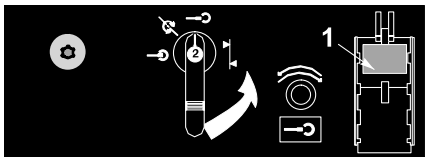
Removable part
■ The removable part is drawn out. Operation should be allowed by means of the locks, if fitted. The circuit-breaker LV auxiliaries are connected and the circuit-breaker compartment door is closed.

Sectionneur de terre
■ Selector **4** to O (earthing isolator open)
■ Locking pull to disable plug-in in unlocked position.

Operation



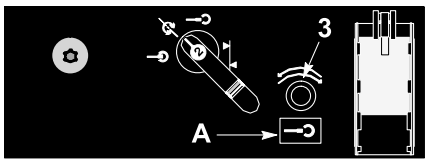
If it is key-locked: insert the key in **H**.
Bottom the protection flap of push-button **1**.



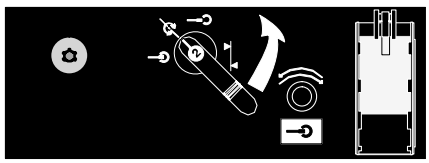
Press push-button **1**. Hold it down to move selector **2**

to position  .

Lift the protection flap of push-button **1**.

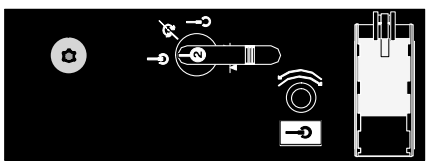


Insert the crank in aperture **3**.
Plug in the removable part by rotating the crank clockwise until status change of position indicator **A** and locking of crank in rotation.



Move selector **2** to position

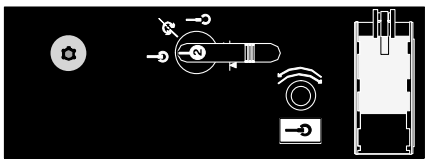
 .



The removable part is plugged-in.
If a circuit-breaker is used, the electrical operation for switching on the downstream part of the equipment is now possible.

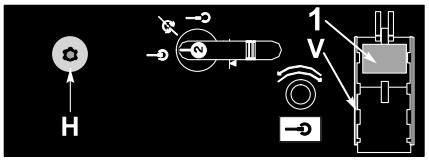
How to draw-out the removable part (bottom front plate)

Initial status

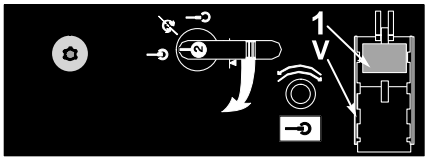


Removable part
■ Removable part in plugged-in position.

Operation



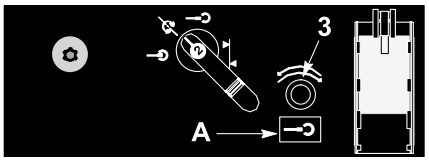
If it is key-locked (optional): insert the key in **H**.
Bottom the protection flap **V** of push-button **1**.



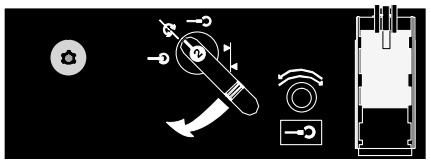
Press push-button **1** (which triggers a circuitbreaker mechanical opening order).
Hold it down to move selector **2**

to position  .

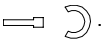
Lift protection flap **V** of push-button **1**.

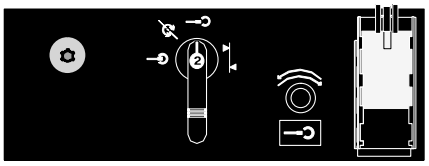


Insert the crank in aperture **3**.
Draw out the removable part by rotating the crank counter-clockwise until status change of position indicator **A**.



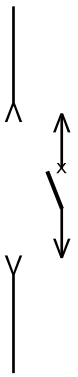
Move selector **2** to position

 .

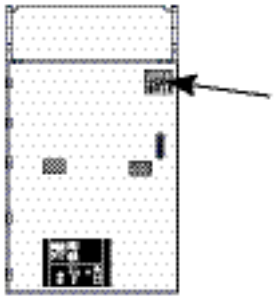


The removable part is drawn out.
The cubicle is in disconnected position.

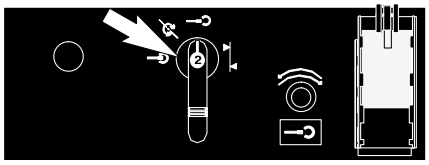
Final status



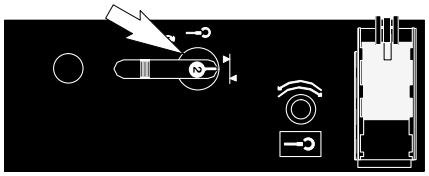
How to close the MV cable earthing isolator (top front plate)



Its function:
- In closed position, it short-circuits and earths MV cables, making it possible to work on cables in safe conditions..
- it can be closed only if the circuit-breaker is in drawn-out position or extracted from the cubicle.

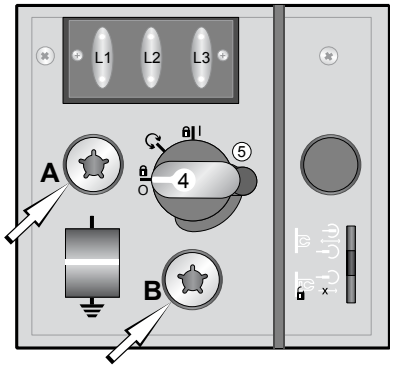


or



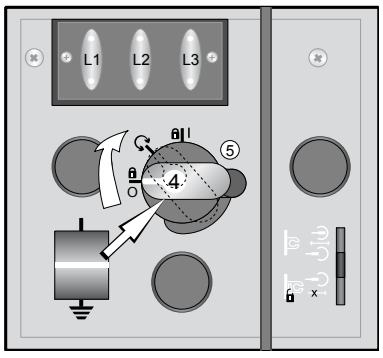
Initial status:
- The removable part has been drawn out or extracted from the cubicle.

and



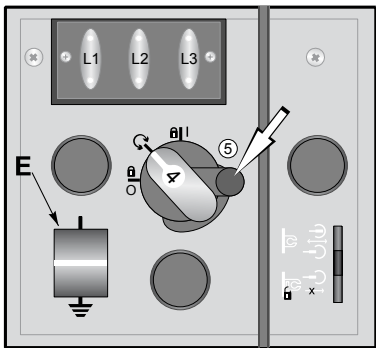
Earthing isolator.
Check that the Leds (L1, L2, L3) are off (no voltage).
The earthing isolator is open(**4**).
The locks **is fitted (A** and **B)** should allow operation.

Operation

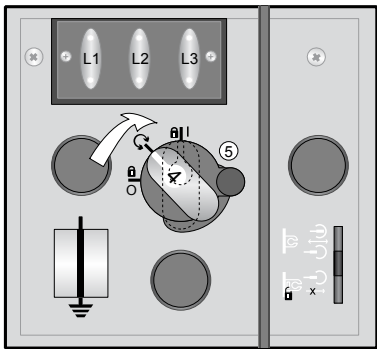


Move selector **4** to  , pulling

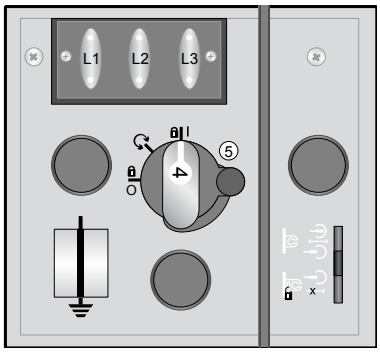
then rotating it clockwise.



Insert the crank in the operating shaft **5**, rotate it clockwise until status change of position indicator **E**.

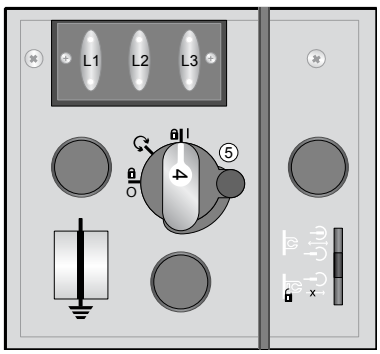


Move selector **4** to |, to do so, pull then rotate it clockwise.



The earthing isolator is in closed position.
MV cables are short-circuited and earthed.

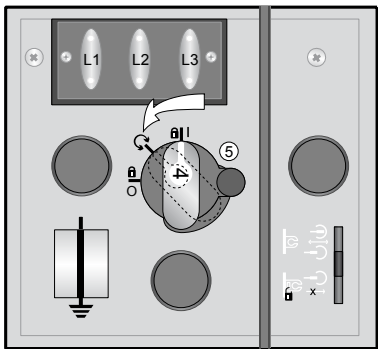
How to open the MV cable earthing isolator (top front plate)



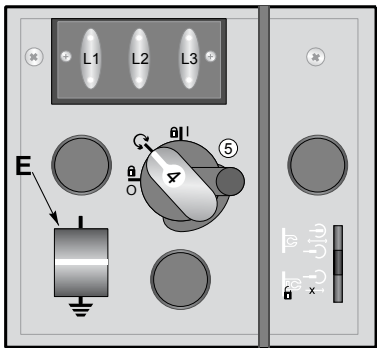
Initial status:
■ Earthing isolator closed.
If fitted, lock should allow operation.

Selector **4** to |.

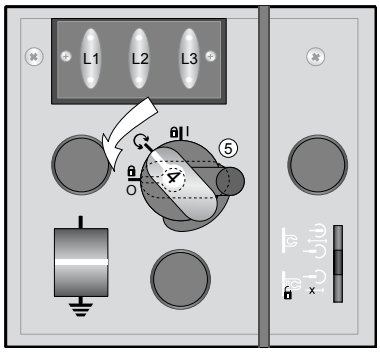
Operation



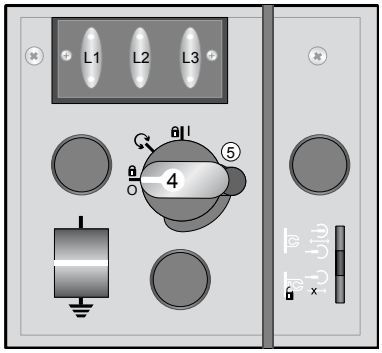
Move selector **4** to  , pulling then rotating it counter-clockwise.



Insert the crank in the operating shaft **5**, rotate it clockwise until status change of position indicator **E**.

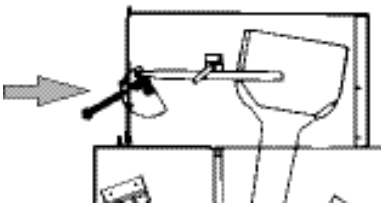


Move selector **4** to O by pulling and then rotating it counter-clockwise.



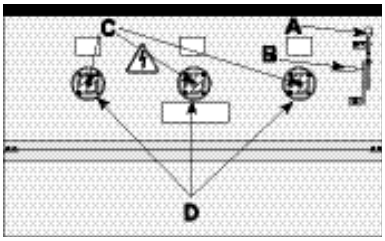
The earthing isolator is in open position.

How to operate the adjustable voltage transformers

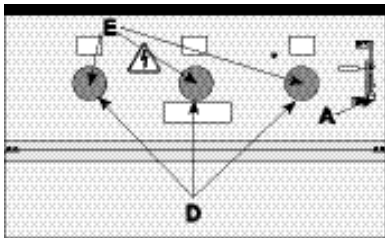


Voltage transformers are operated from the rear of the cubicle.
They can be in the position "**in operation**" (primary fuses and transformers connected to MV cables or switchboard busbars) or "**out of operation**" (primary fuses and voltage transformers disconnected).

Warning: *for cubicles with internal arc withstand option, first remove the panel located at the rear of the cubicle.*

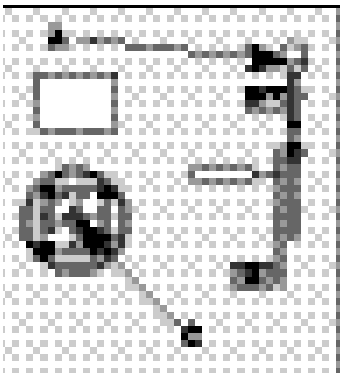


"Out of operation" position
A: operating handle in the top position
B: lock
C: fuse ends visible
D: fuse extraction slot.



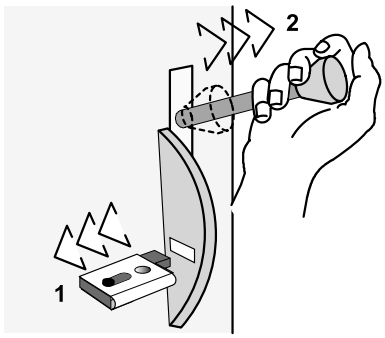
"In operation" position
A: operating handle in the bottom position
B: padlock
C: fuse slot retractable closing flap in closed position
D: fuse extraction slot.

How to put the VTs in operation

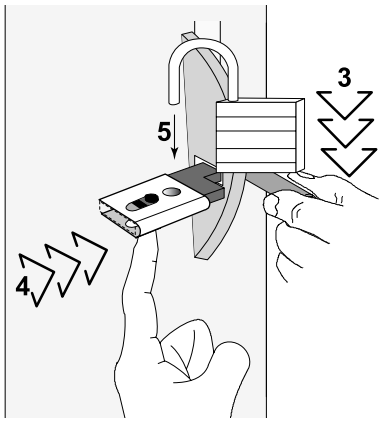


Initial status

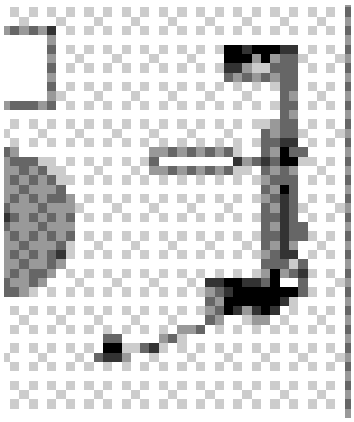
Handle **A** in top position, flap open and fuse ends **C** apparent, indicate that the transformers are out of operation.



1: push the latch to the left
2: pull the handle.

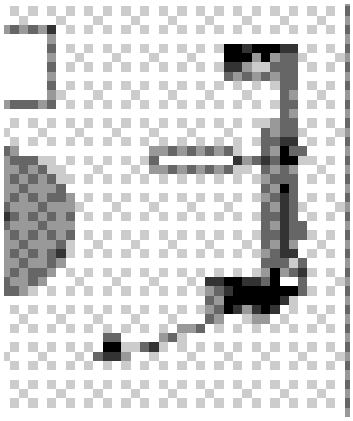


3: bottom the handle.
4: block the assembly in position by pushing the latch to the right
5: lock with a padlock.



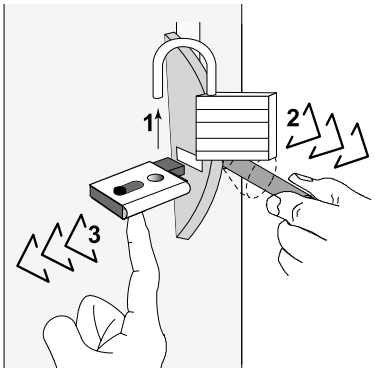
Handle **A** in bottom position and flap closed, indicate that the transformers are in operation.

How to put the VTs out of operation

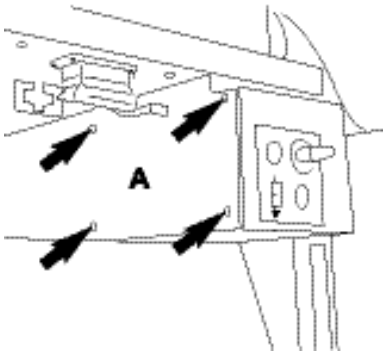


Initial status

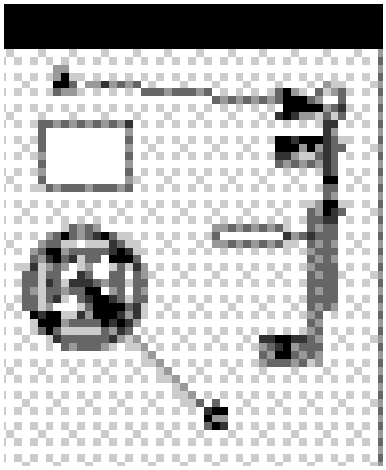
Handle **A** in bottom position and flap closed, indicate that the transformers are in operation.



1: remove the padlock
2: pull the handle
3: push the latch to the left.



4: lift the handle.
5: block the assembly in position by pushing the latch to the right.

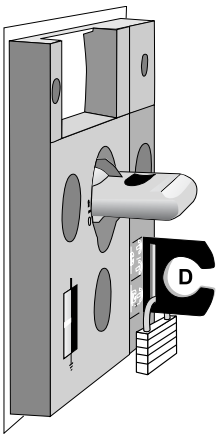


Handle **A** in top position, flap open and fuse ends **C** apparent, indicate that the transformers are out of operation.

Padlocking

Padlock with ø 6 to 8 mm can be used
- On the plug-in disabling selector
- On the protection flap of the removable part mechanical opening push-button
- On the earthing isolator selector in open or closed position
- On the flap opening mechanisms inside the removable part compartment
- on the adjustable voltage transformer operating mechanism.

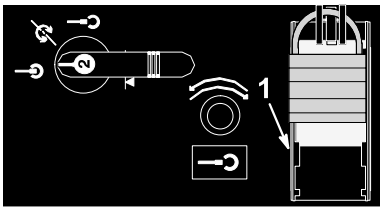
Disabling the removable part plug-in



Fit 1 to 3 padlocks on plug-in disabling selector **D** in the following position.

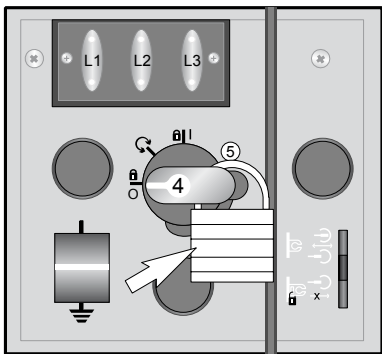
Disabling the mechanical opening order of a circuit-breaker in operation position

This device can also be used as an additional plug-in and draw-out disabling system.

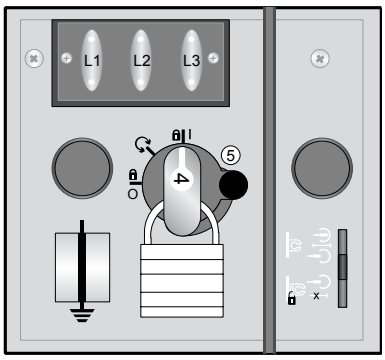


Fit a padlock on the protection flap of mechanical opening push-button **1**.

Disabling the opening or closing of the MV cable earthing isolator

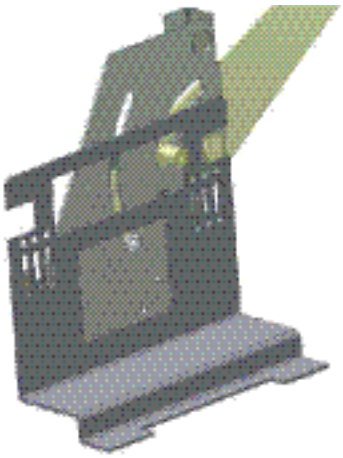


Earthing isolator open:
fit 1 to 3 padlocks on selector **4** in position O **to disable closing.**



Earthing isolator closed:
fit 1 to 3 padlocks on selector **4** in position | **to disable opening.**
This also disables the plug-in of a removable part.

Disabling the opening of a flap of the removable part compartment

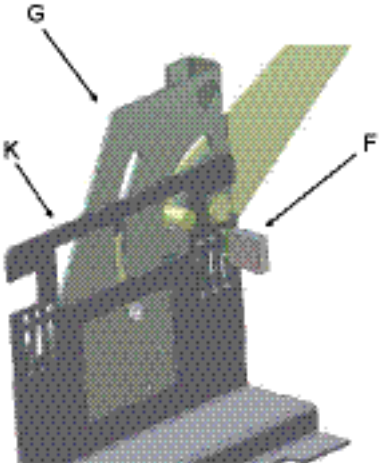


Left-hand side
The plug-in blocks are accessed by manual opening of the bottom flap:
- On the busbar side, in an incoming/ outcoming cubicle
- On the left-hand busbar side, in a circuit-breaker coupling cubicle.

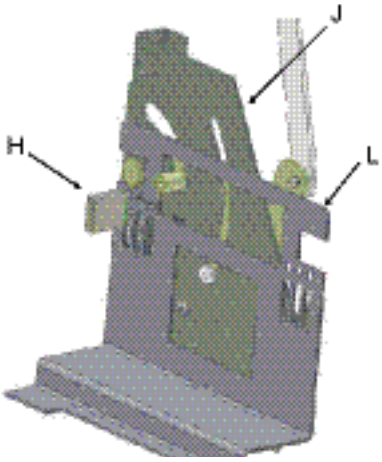
Right-hand side
The plug-in blocks are accessed by manual opening of the top flap:
- On the MV cable side, in an incoming/ outgoing cubicle
- On the right-hand busbar side, in a circuit-breaker coupling cubicle.

After the removable part has been extracted from the cubicle, the top or bottom flap can be locked by means of 1-2 or 3 padlocks.
1: position the part (**K** and **L**)
2: padlock.

Note: *the 2 operating mechanisms are separate.*

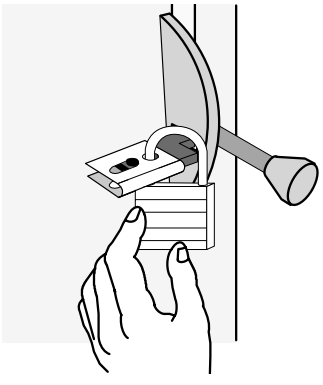


Left-hand side
F: padlocking
G: bottom flap operating mechanism.

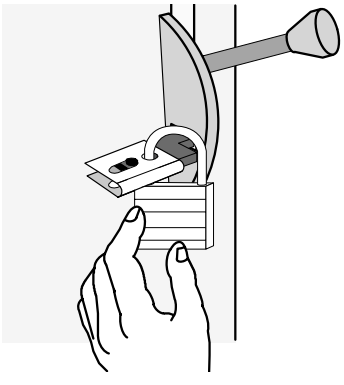


Right-hand side
H: padlocking
J: top flap operating mechanism.

Disabling the putting in or out of operation of the voltage transformers



Fitting a padlock allows you to lock the handle in bottom position (transformers in operation).



Fitting a padlock allows you to lock the handle in top position (transformers out of operation).

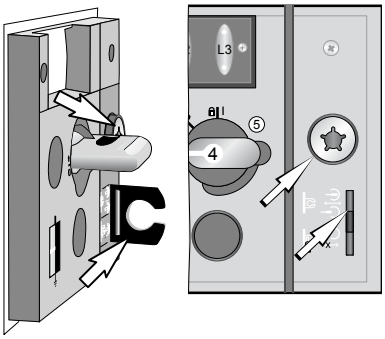
Key-locking

Possible number of locks
This locking is optional.
- removable part in drawn-out position: 1 lock on the cubicle
- (2 NO) or (2 NC) or (1 NO and 1 NC) or (1 NO) or (1 NC) : on the earthing isolator

NO: normally open
NC: normally closed

- Disconnecting truck: 1 lock in “plugged-in” position on the removable part.

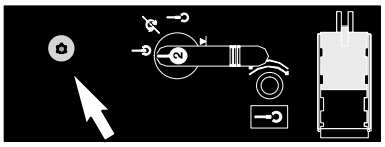
Disabling the plug-in of a removable part



Removable part in drawn-out position. Remove the key when the plug-in disabling selector is in the following position:

Draw-out is then impossible.

Disabling the draw-out of a removable part or of a disconnecting truck



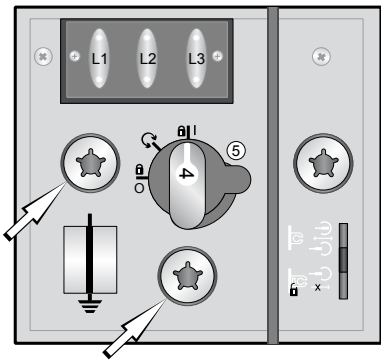
Remove the key when selector **2**

is in position  .

Draw-out is then impossible.

Disabling the opening or closing of the earthing isolator

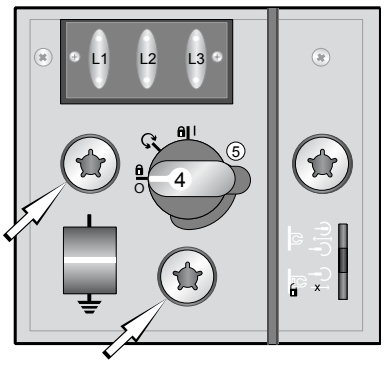
Earthing isolator closed



Remove the key(s) when selector **4**

is in position | , opening is then impossible.

Earthing isolator open

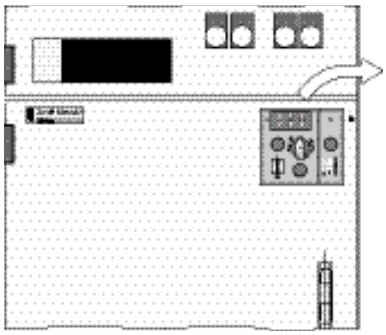


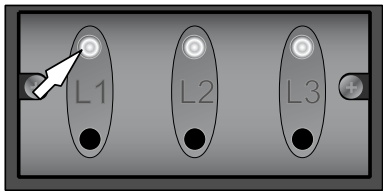
Remove the key(s) when selector **4**

is in position O , closing is then impossible.

Testing

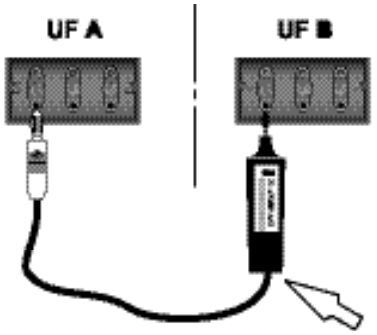
“Power on” on the MV cables





As soon as the cables have been energized, the “power on” indicator Leds L1, L2 and L3 must come on.

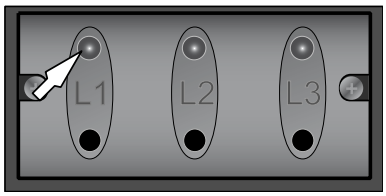
Checking phase coincidence between two cubicles



Phase coincidence:
the tester lamp does not come on.
Phase unbalance:
the tester lamp comes on.

Testing MV cables

Voltage injection to MV cables



Check that power is off.
The “power on” indicator Leds are off.
Close the earthing isolator (see “**How to close the MV cable earthing isolator**”).
It is recommended to lock the tester in this position.

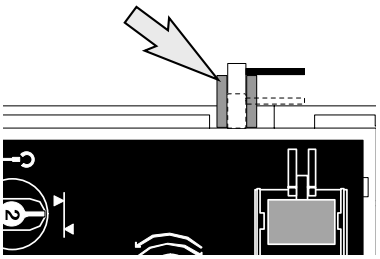
■ Remove the closing plate from the cable compartment.
Open the earthing isolator (see “**How to close the MV cable earthing isolator**”) then perform the tests.

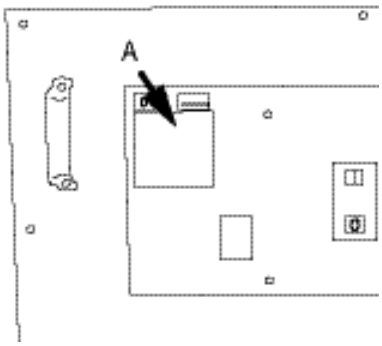
At the end of the tests:
■ Close the earthing isolator
■ Remove accessories
■ Close cable compartment
■ Fasten the injection vises to the MV cable fastening terminal pads or to the lugs.

Switchboard dielectric test

This test can be performed in a single operation.
All circuit-breakers must be plugged-in and closed, with the cubicle doors open.
Furthermore, one of the outgoing cubicles must have its MV cable compartment open for the connection of the test cable.

55 mm wedge

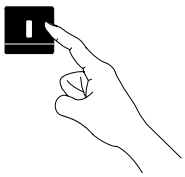




This preparation requires the manual disabling of interlocking to plug in the circuitbreakers, with the door open.

The sequence below must absolutely be followed.

Position the circuit-breaker in drawn-out position, with the door open.
Lift and lock the door locking rod by means of a 55 mm high U-shaped wedge.
Plug in the circuit-breaker.
Remove the wedge.



The manual closing of the circuit-breaker by pressing button "**I**" is then possible by means of its mechanical control.
Indicator **A** indicates the status of the circuitbreaker ("**O**" or "**I**").
The test can be performed.

Testing the current transformers

Note: *to perform this operation, refer to the various relevant chapters in this document.*

Injection at primaries
An injection at the current transformer primaries is possible by access to the fixed plug-in blocks located in the circuit-breaker compartment.

Injection at secondaries
The tests and settings will be preferably performed by injection at secondaries, using the test and injection boxes provided in the LV compartment.

1: extract the removable part
2: close the earthing isolator
3: padlock the opening of the bottom flap providing access to the fixed blocks on the busbar side
4: access the fixed blocks on the current transformer side through the top flap aperture
5: Fit the injection device between the fixed block (primary terminal P1) and the cubicle earth bar which is accessible in the circuit-breaker compartment. Terminal P2 of the transformer is connected to the cubicle earth bars by means of the earthing isolator in closed position.

Warning: *the connection accessory must not damage the fixed block coating.*

Changing the winding ratios at the secondary.
Any change in the winding ratio is performed by access to a specific terminal board inside the low voltage compartment (see LV developed diagrams).

This operation is performed with the transformer primary de-energized and earthed by closing of the earthing isolator.

After testing
1: remove the injection device
2: close the top flap
3: remove the padlock locking the opening of the bottom flap
4: open the earthing isolator
5: insert the removable part.

Busbar earthing truck

The earthing of the busbars of Fluair 400 switchboards in version 2000 is provided by means of a circuit-breaker type truck positioned in one of the outgoing cubicles after draw-out.
All circuit-breakers in the switchboard can be extracted if necessary.
Busbar earthing truck F400 complies with the requirements of CEI129.

Technical features

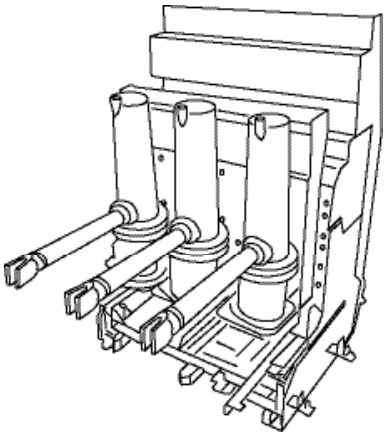
Rated voltage = 36 kV	
Ith = i.e.	25 kA - 3s
Ith = i.e.	31,5 kA - 3s
“Power on” device: no	

The MALT trucks are planned to be inserted in one of the switchboard cubicles 1250 A for the main earthing of the busbars.
A double lock can be provided with separate operating mechanisms releasing cams that abut the polarization block located on the cubicle floor.
Each double lock is then allocated to one ofthe ½ sets of cubicles (L-H or R-H) by means of a central key box.

Recommendations for operating MALT trucks
The plug-in of a MALT truck is performed by means of the propulsion mechanism used for circuit-breakers (crank).
The closing-opening operations of the main contacts are performed manually by the operator, with the cubicle MV door open.

The MALT truck is used in the following conditions:
- possibility of plugging in the MALT truck with the cubicle MV door open or closed
- the MALT truck only operates the bottom flap of the plug-in bells
- the truck operates the plug-in/draw-out contacts of the cubicle
- the positioning of closing springs is performed manually by means of the lever
- opening-closing operations are controlled by means of the buttons located on the front panel of the truck
- the « O-C « buttons are padlockable separately
- the truck can be inserted with the earthing isolator (SMALT) closed or open
- the SMALT remains operable with the MALT truck plugged-in
- the MALT truck is equipped with a separation prohibiting access to energized parts when the truck is plugged-in.

Polarization of MALT trucks
The purpose of this optional device is to impose the draw-out of all circuit-breakers in a ½ set of cubicles and of the coupling before plugging in a busbar earthing truck.



Once plugged in, the MALT truck is considered as potentially closed.
As a result, it does not have the following auxiliaries:
- auxiliary contacts indicating the status of the Mean Voltage main contacts
- electric control systems to ensure the remote opening-closing controls
- low voltage cord connecting the MALT truck to the cubicle LV compartment.

The “O - C“ position mechanical indicator of HV contacts is:
- black for OPEN
- white for CLOSED.

Ordering parts

When preparing the order, refer to this manual supplied with the system to define the equipment desired very precisely.

To order any equipment, you must indicate:
- Type of cubicle
- Manufacturing number (engraved on the identification plate located on the left-hand panel of the removable part compartment)
- If possible, attach a diagram of this manual on which the part is conspicuous.

Preventive maintenance

Before performing any task, make sure of the strict compliance with operating and safety instructions.

Our equipment is designed to guarantee optimum operation provided that the maintenance instructions described in this manual are strictly adhered to.

Start each maintenance task with the thorough cleaning of the cubicle.

The use of pressurized solvent projection as a cleaning process is prohibited.

The main risks related to this process are as follows:
- De-lubrication of sliding rails and joints (life lubricated)
- Corrosion of unprotected parts
- Damage and deformation due to high pressure
- Overheating due to solvent on contact areas
- Elimination of special protections.

Schneider Electric cannot guarantee the durability and reliability of the equipment subjected to this type of cleaning process, even if followed with lubrication.

Maintenance points

Removable part

Extract the removable part (see “How to extract the removable part”).
Referring to its user’s manual, perform an overall check of the system.
- Clean insulating parts
- Apply a thin film of grease, « Kluber Amblygon TA 15/2 » type or equivalent, to the plug-in clamps.

Warning: *should clamps be damaged, the corresponding MV fixed block in the cubicle shall be inspected.*

Warning: *prior to any application, remove the old grease.*

Removable part compartment

Extract the removable part.

Check and lubricate:
- Pins and joints, mechanisms and sliding rails of flaps (“Kluber Isoflex Topas L152” or equivalent”)
- The earthing plate (“Kluber Amblygon TA 15/2” or equivalent”)
- The Smalt driving mechanism (“Kluber Isoflex Topas L152”) or equivalent
- Behaviour at the LV wiring connection points.

Warning: *for electric contacts, do not use grease of “Kluber Isoflex Topas L152” type or equivalent.*

Warning: *prior to any application, remove the old grease. Remove dust and clean the inside of the compartment.*

MV cable compartment

- Check behaviour, condition and tightening of the connections of the main earth bar, earthing isolator braid and MV cables
- Check the condition of the earthing isolator contacts and that it is operating correctly
- Remove dust and clean the inside of the compartment, the cable ends and the insulating shields
- Slightly lubricate the earthing isolator blades and blocks («Kluber Amblygon TA 15/2») or equivalent.

Warning: *prior to any application, remove the old grease.*

Busbar compartment

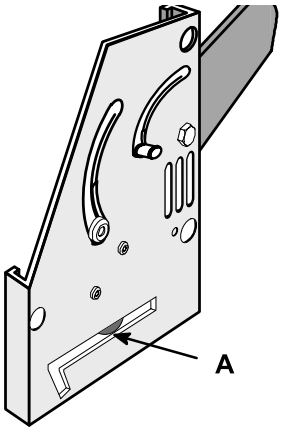
■ Remove dust and clean the inside of the compartment and the insulators
■ Check the behaviour, condition and tightening of the busbars.

Tightening torque
The connections must be tightened by means of a torque wrench, complying with the following torques:

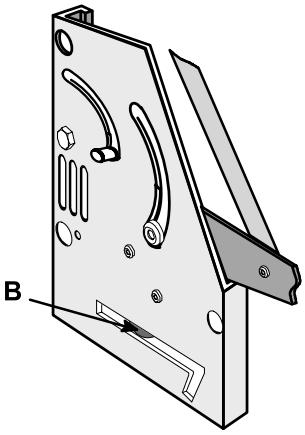
Screw	Torque in Nm
Ø 6	13
Ø 8	28
Ø 10	50
Ø 12	75
Ø 14	120

Access to top and bottom plug-in blocks

Opening the flaps



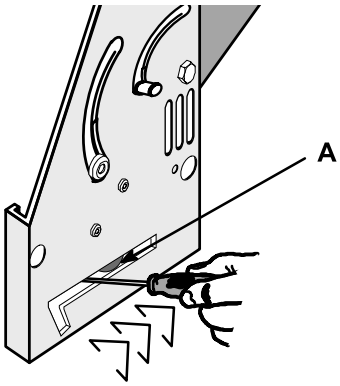
Left-hand side
A: bottom flap latch finger.
The plug-in blocks are accessed by manual opening of the bottom flap:
■ On the busbar side, in an incoming/outcoming cubicle
■ On the left-hand busbar side, in a circuit-breaker coupling cubicle.



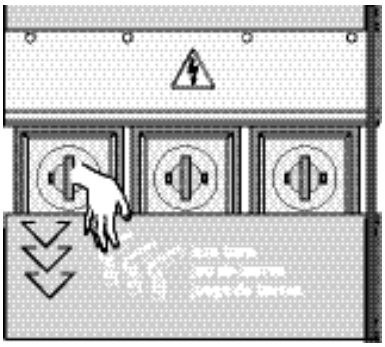
Right-hand side
B: top flap latch finger.
The plug-in blocks are accessed by manual opening of the bottom flap:
■ On the MV cable side, in an incoming/outgoing cubicle
■ On the right-hand busbar side, in a circuit-breaker coupling cubicle.

Operating the bottom flap

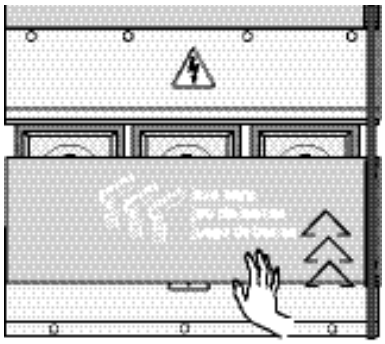
Right-hand side
Padlock the opening of the top flap (see "**Disabling the opening of a flap of the removable part compartment**").



Left-hand side
Using a screwdriver, release latch finger **A**.



Push to open the flap.

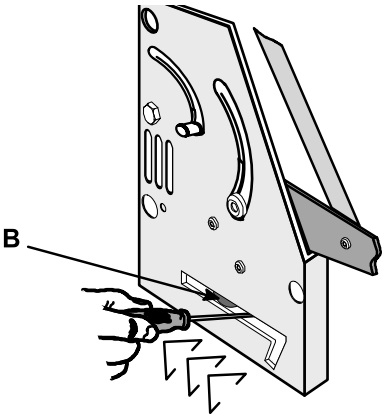


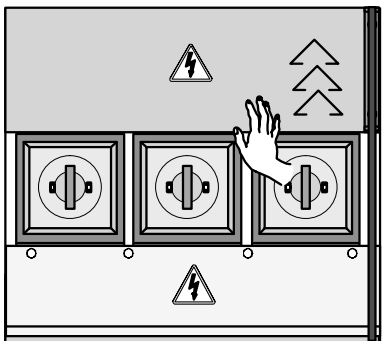
After maintenance, close the flap by lifting it manually until it locks, then remove the padlock locking the top flap.

Operating the top flap

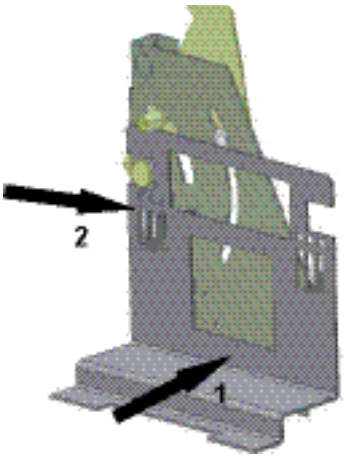
Left-hand side:
Padlock the opening of the bottom flap (see paragraph titled "**Disabling the opening of a flap of the removable part compartment**").

Right-hand side:
Using a screwdriver, release latch finger **B**.





Holding latch finger **B**, in position, push the flap upwards.



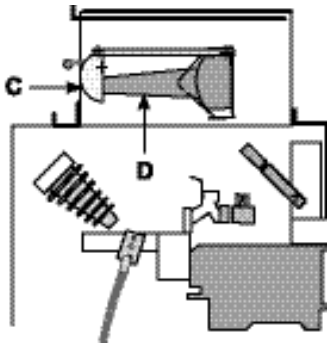
Locking the top flap:
1: when the top flap is open (flap upwards), position the part.
2: padlock (see paragraph titled "**Disabling the opening of a flap of the removable part compartment**").

After maintenance, remove the padlock and remove the part holding manually the flap.
Then, lower the flap manually until it locks.

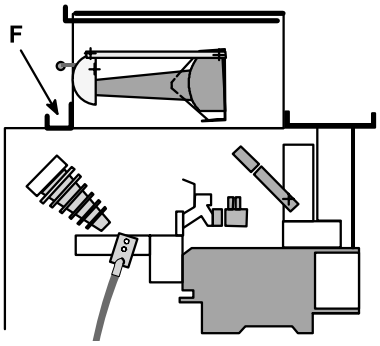
Access to the voltage transformers

Warning: *this operation should preferably be performed with the cable head or busbars deenergized, according to the type of cubicle.*

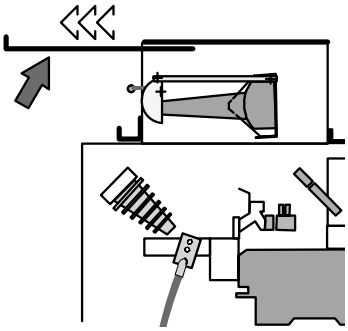
For cubicles with internal arc withstand option, earth the system then remove the shield.



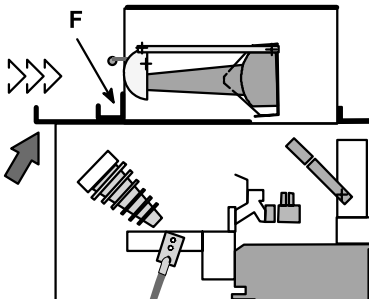
Put the transformers out of operation (see "**How to put the VTs out of operation**")
C: fuses
D: adjustable voltage transformers.



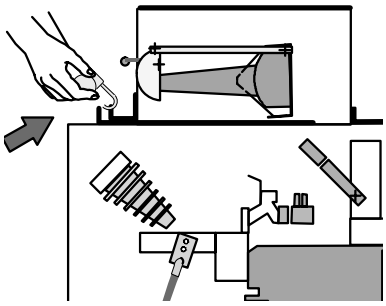
Once the transformers are out of operation, release, without removing them, the 2 screws that secure cover **F** in order to lift it.



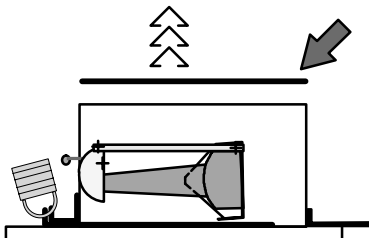
Remove the red flap located at the top of the compartment.



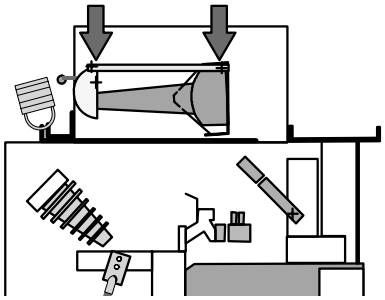
Slide it under cover **F**.



Padlock the red flap.



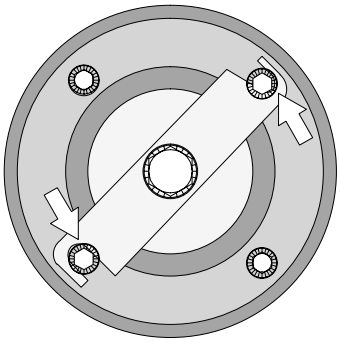
Remove the top of the compartment.



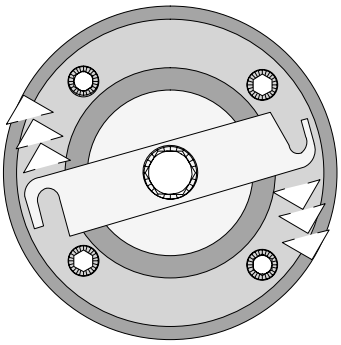
Access to voltage transformers and VT position auxiliary contacts is then possible.
To put back into operation, proceed in the reverse order.

Replacing the fuses of the adjustable voltage transformers

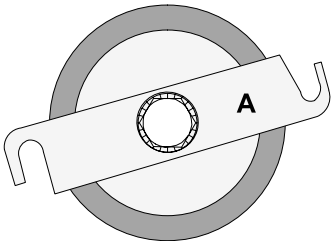
Put the VTs out of operation (see “**How to put the VTs out of operation**”).



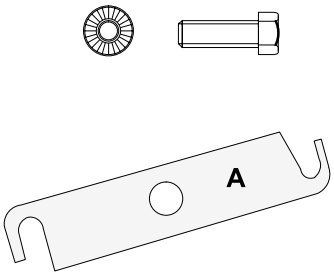
Release the two screws.



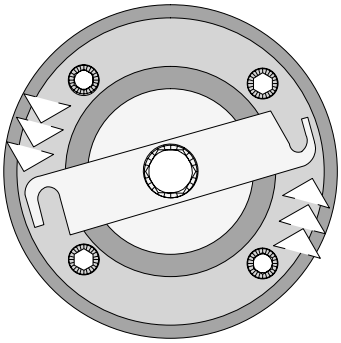
Rotate and remove the fuse.



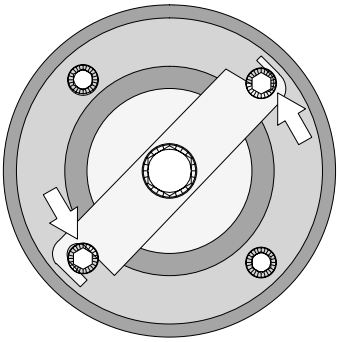
Remove the fasteners and bayonet **A** from the fuse...



... and fit it on the new fuse.



Fully insert the fuse and rotate.

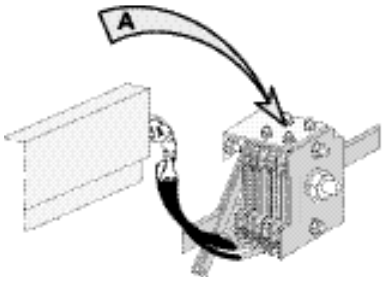


Lock the two screws to the recommended torque.
Put the VTs into operation (see “**How to put the VTs out of operation**”)

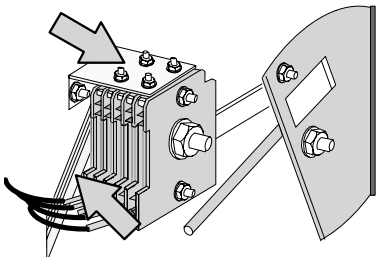
Replacing the VT position auxiliary contacts

Removal

Note : *to access the auxiliary contact block, see "***Access to voltage transformers***".*



A: auxiliary contacts.



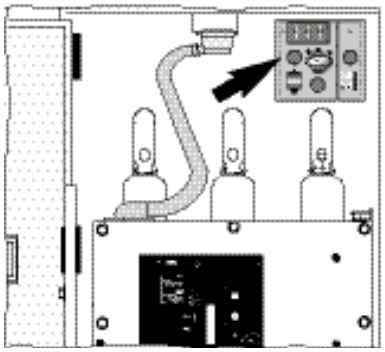
For the auxiliary contacts, separate the crank on the compartment side and remove the 4 mounting screws.

Fitting

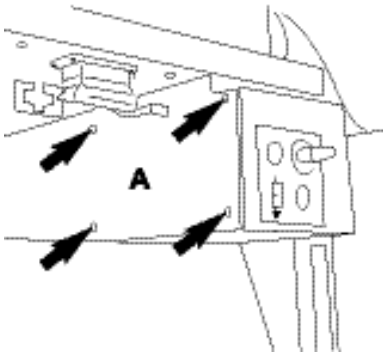
Proceed in the reverse order.

Replacing the "power on" Led block

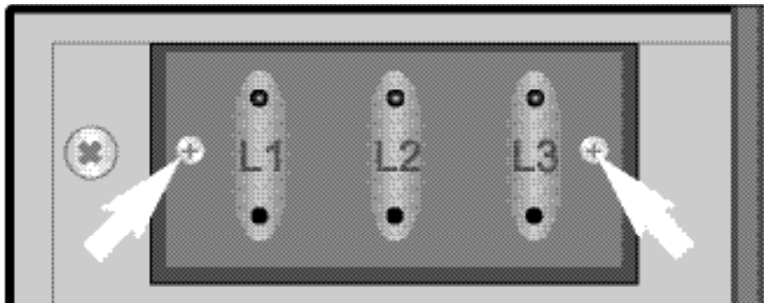
Removal



Extract the removable part from the cubicle. On the right-hand side of the circuit-breaker compartment, locate the earthing isolator control box.



Remove the 4 M6 screws on the earthing isolator control box side, to access auxiliary contacts. Remove protecting cover **A**.



Mark and disconnect the wiring connector.

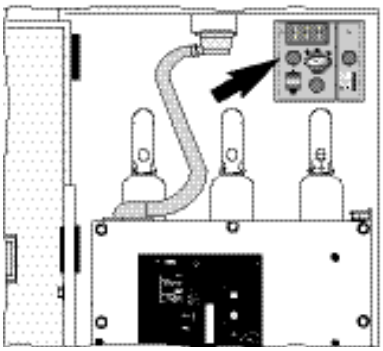
Remove the fasteners and free the "power on" Led block.

Fitting

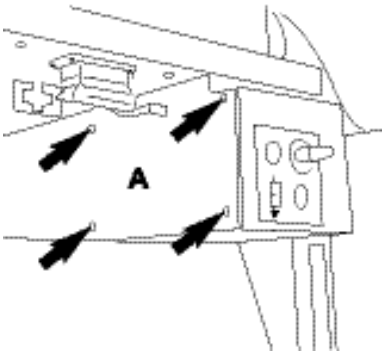
Proceed in the reverse order.

Replacing the earthing isolator position auxiliary contacts

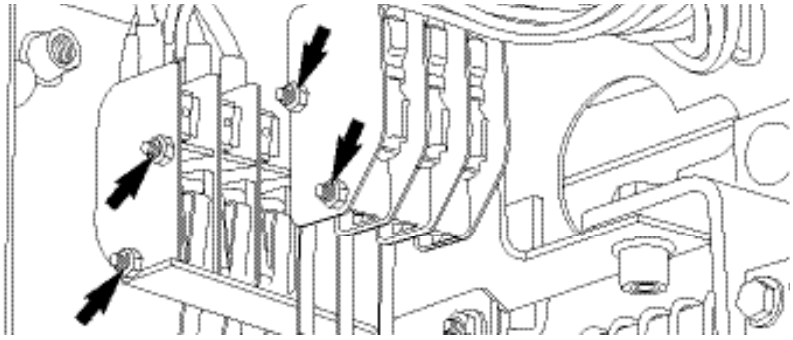
Removal



Extract the removable part from the cubicle. On the right-hand side of the circuit-breaker compartment, locate the earthing isolator control box.



Remove the 4 M6 screws on the earthing isolator control box side, to access auxiliary contacts. Remove protecting cover **A**.



Mark and disconnect the auxiliary contact wiring.

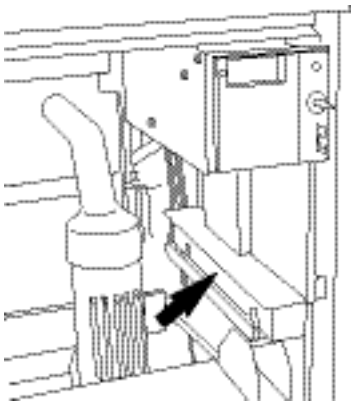
Remove the 2 screws that secure the auxiliary contact support. Remove the assembly.

Fitting

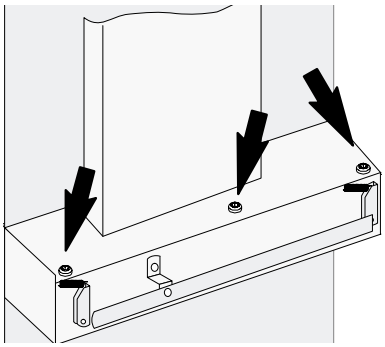
Proceed in the reverse order.

Replacing the removable part position auxiliary contacts

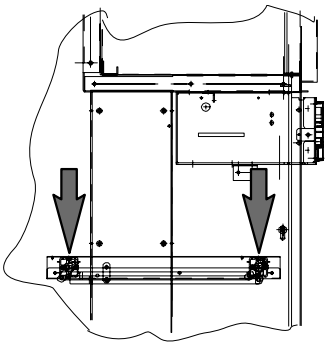
Removal



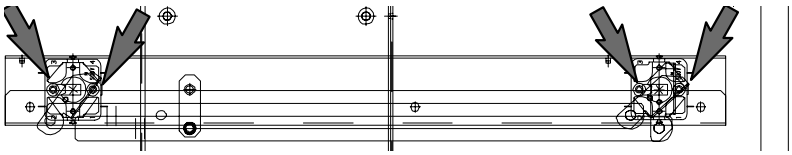
Extract the removable part from the cubicle.
Locate the assembly on the internal righthand side of the circuit-breaker compartment.



Remove the three screws from the cover and the cover itself.



Mark and disconnect the wiring.



Remove the mounting screws and the contact unit assembly.

Fitting

Proceed in the reverse order.

Trouble-shooting

Symptoms	Faulty devices	Possible causes and solutions
Abnormal noise with power on (crackling, vibrations)	■ insulators	Damp or dirty ■ clean or dry them
	■ metal components	Incorrectly fastened ■ check fasteners
	■ upstream or downstream connection	Incorrect cubicle connection ■ check the connections
Excessive overheating at connection points	■ connection	Connections incorrectly tightened ■ retighten them, see tightening torque, contact surfaces ill adapted or damaged ■ change or clean them
Operation requiring abnormal effort		Anomaly resulting from deformation ■ adjust
One of the “power on” Leds does not come on	■ led	Abrupt handling, MV network overvoltage ■ change the “power on” block
	■ wiring	Faulty ■ check it (see wiring diagram)
	■ “power on” Led functional unit	Capacitor damaged ■ change the unit
	■ capacitor insulator	Insulator capacitor damaged ■ change insulator
Circuit-breaker does not close		Operation incomplete ■ refer to the removable part extraction chapter
	■ protection relay	Action of a protection ■ check the relay settings and remove the fault
	■ wiring	Faulty ■ check it by successive eliminations
	■ LV circuit-breaker	Faults on LV circuit ■ trouble-shooting by successive eliminations
	■ section switch	In “Out of operation” position ■ close it

Adaptation/instructions

Replacement of the voltage presence type VPIS 1 by type VPIS 2 and VPIS 2 by VPIS 2

Note: *the subject of this new version of this user guide is about the annexe “Adaptation/instructions - Replacement of the voltage presence type VPIS 1 by type VPIS 2 and VPIS 2 by VPIS 2”, updated on july 2009.*

Adaptation/instructions

Replacement of the voltage presence type VPIS 1 by type VPIS 2 and VPIS 2 by VPIS 2

Symbols and conventions

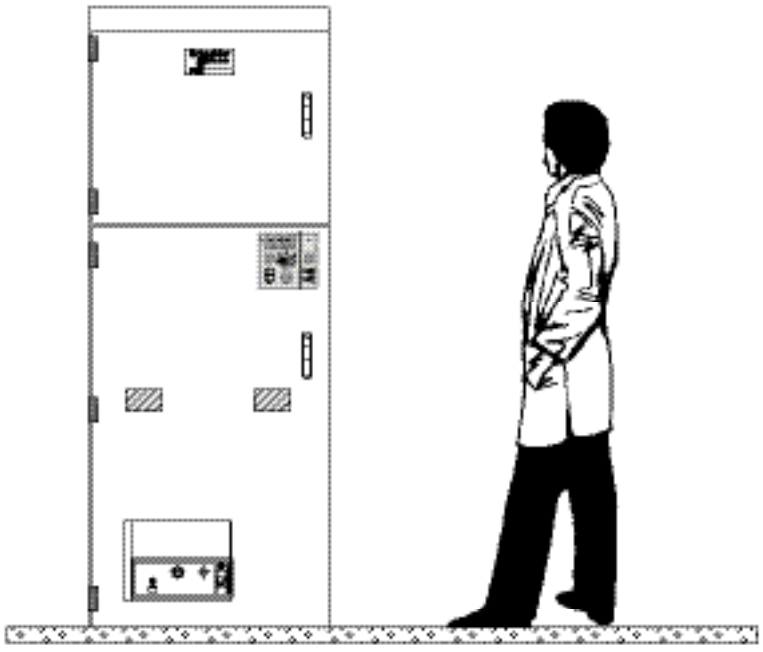
Caution :
you will find all the symbols below throughout the document, indicating the hazard levels depending on the different types of situation.

DANGER	**As per iso 3864-2** **DANGER:** failure to follow this instruction **will result in death** or serious injury.
WARNING	**As per iso 3864-2** **WARNING:** failure to follow this instruction **may result 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 RM6 unit.
	INFORMATION - ADVICE: we draw your attention to this specific point.

Contact the Schneider Electric service unit for diagnosis and advice

Call your sales representative who will put you in contact with the closest SCHNEIDER ELECTRIC group service centre.

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



Adaptation/instructions

Replacement of the voltage presence type VPIS 1 by type VPIS 2 and VPIS 2 by VPIS 2

Distribution rules

CAUTION

The aim of this publication is to enable the RM6 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.**

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.**

WARNING

The contractor must be certified and authorised to manipulate and perform work on the RM6 unit.

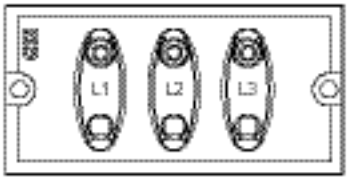
Information

THE INFORMATION WHICH FOLLOWS CONCERNS THE INSTALLATION INSTRUCTION (VOLTAGE PRESENCE INDICATING SYSTEM)

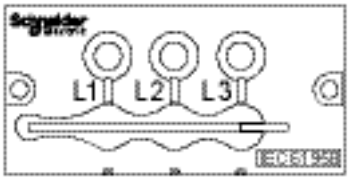
VPIS

Présentation of VPIS-V1 and VPIS-V2

VPIS : **V**oltage **P**resence **I**ndicating **S**ystem, a case with 3 built-in lights.



VPIS-V1:
production until February 2009.



VPIS-V2:
production starting from March 2009.

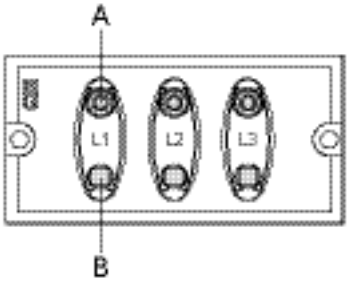
Characteristics

Conforming to **IEC 61958**, relative to voltage presence.

Operating instructions

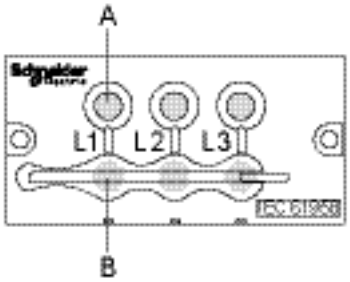
WARNING

The indication provided by a **VPIS-V1** or **V2**, alone is not sufficient to ensure that the system is de-energised.



A: voltage presence indicator light (one for each phase)

B: connection point designed for the connection of a phase concordance unit (one for each phase)



A: voltage presence indicator light (one for each phase)

B: connection point designed for the connection of a phase concordance unit (one for each phase)

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

Adaptation/instructions

Replacement of the voltage presence type VPIS 1 by type VPIS 2 and VPIS 2 by VPIS 2

Phase concordance unit

Phase concordance testing for VPIS-V1 and VPIS-V2 must be carried out each time a cable is connected to a functional unit.

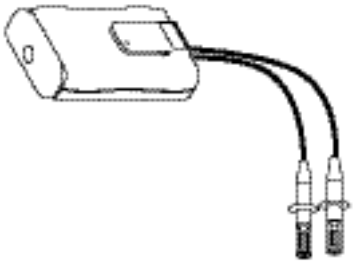
It is a way of making sure that all three cables are each connected to the corresponding phase of the substation.

Principle

The principle of the phase concordance unit is that it allows a check of the phase concordance between 2 energised functional input units on the same panel.

Reminder of accessories that can be used for phase concordance testing

Phase concordance unit V1-51191954FA



Phase concordance unit V2-VPI62421

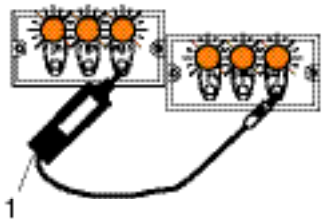
Rules for the use of phase concordance unit

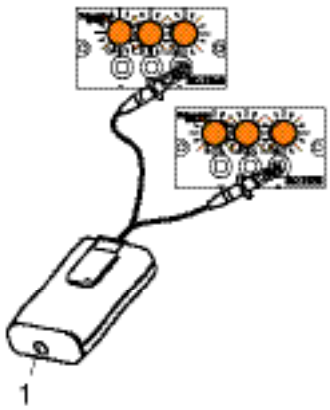
WARNING

It is impossible to carry out a phase concordance of test with 2 VPIS of different types.

Balanced phase:
■ The phase concordance unit light (1) is unlit.

Unbalanced phase:
■ The phase concordance unit light (1) is lit.

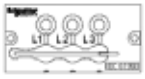
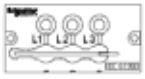
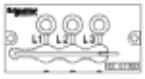
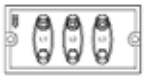
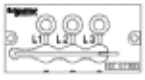
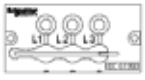
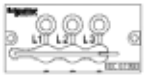




Adaptation/instructions

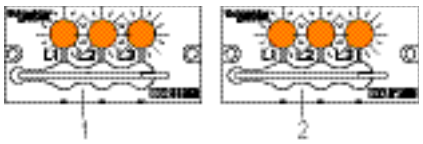
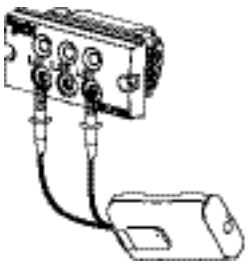
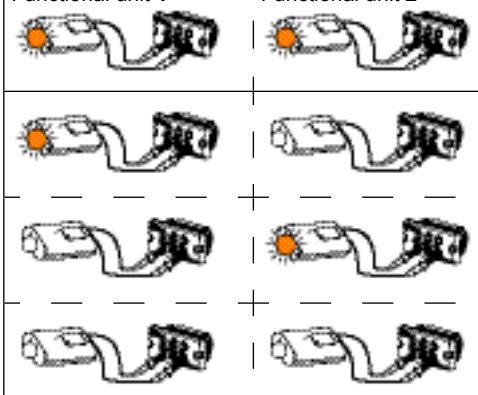
Replacement of the voltage presence type VPIS 1 by type VPIS 2 and VPIS 2 by VPIS 2

Rules for choosing phase concordance unit

Phase concordance unit	Functional unit 1	Functional unit 2	Compatibility result	Corrective actions
	V1 	V1 	**OK**	
	V1 	V2 	~~OK~~	Replace **VPIS-V1** by **VPIS-V2** Use a phase concordance unit **V2**
	V2 	V2 	~~OK~~	Use a phase concordance unit **V2**
	V1 	V1 	~~OK~~	Replace **VPIS-V1** units by **VPIS-V2** units OR test with a phase concordance unit **V1**
	V1 	V2 	~~OK~~	Replace **VPIS-V1** by **VPIS-V2**
	V2 	V2 	**OK**	

Check before phase concordance test

Please refer to the previous chapters in the event of test malfunctioning.

Test	Result	Action
 Visual checking of the indicator lights on the **VPIS** units of functional unit **1** and of functional unit **2**	The 3 indicator lights of each VPIS are on.	The 2 functional units are energised, the VPIS units are operating and the check can continue.
	The 3 indicator lights of the VPIS are off. The functional unit is not energised or the VPIS is defective.	Apply power to the functional unit. If VPIS-V1 remains unlit, replaced it by a VPIS-V2.
	1 or 2 indicator lights unlit.	The VPIS is probably defective. Replace by a VPIS-V2.
Phase concordance unit check choice  On each functional unit test phases **1** and **3**.	Functional unit **1** / Functional unit **2** 	You can test.
		You cannot test them. The choice of the phase concordance unit is wrong or it is not functionning correctly.

Adaptation/instructions

Replacement of the voltage presence type VPIS 1 by type VPIS 2 and VPIS 2 by VPIS 2

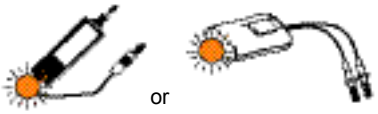
Phase concordance test

The 3 indicator lights of the 2 VPIS are lit and the phase concordance unit is correct meaning that phase concordance test can be performed.

Lexique

Phase concordance unit LED **lit**

LED un**lit**.



Functional unit 2					
Functional unit 1		L1	L2	L3	Conclusion regarding phase concordance
	L1	○	☀	☀	Connection is satisfactory.
	L2	☀	○	☀	
	L3	☀	☀	○	
	L1	☀	○	☀	Reverse the MV cables connected to L1 and L2 and one of the functional units.
	L2	○	☀	☀	
	L3	☀	☀	○	
	L1	○	☀	☀	Reverse the MV cables connected to L2 and L3 on one of the 2 functional units.
	L2	☀	☀	○	
	L3	☀	○	☀	
	L1	☀	☀	○	Reverse the MV cables connected to L1 and L3 on one of the 2 functional units.
	L2	☀	○	☀	
	L3	○	☀	☀	
	L1	☀	○	☀	Change the position of each MV cable on one of the 2 functional units.
	L2	☀	☀	○	
	L3	○	☀	☀	
	L1	☀	☀	○	Change the position of each MV cable on one of the 2 functional units.
	L2	○	☀	☀	
	L3	☀	○	☀	

Adaptation/instructions

Replacement of the voltage presence type VPIS 1 by type VPIS 2 and VPIS 2 by VPIS 2

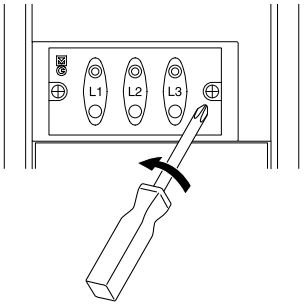
Information

THE INFORMATION WHICH FOLLOWS, CONCERNS "THE CORRECTIVE MAINTENANCE SECTIONS" (REPLACE OF THE VOLTAGE PRESENCE UNIT)

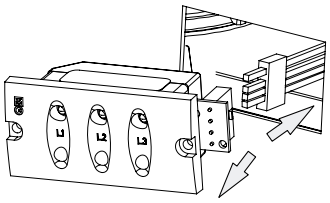
Removing the VPIS 1 voltage presence unit

CAUTION

The screws must be retained.



Unscrew the 2 self-tapping screws.



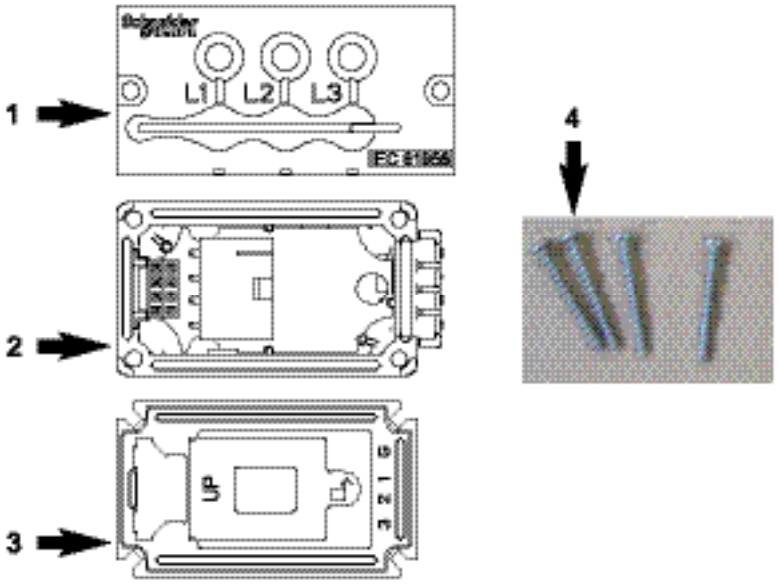
Remove the VPIS 1 type voltage presence unit Disconnect the VPIS 1 voltage presence unit.

Instructions to be respected

In case of replacement of a VPIS 1 by a VPIS 2, all the VPIS 1 installed on the unit need to be replaced in order to compare phases.

Contents of the kit VPIS 2

1: indicator unit
2: cable gland seals
3: VPIS-V2 safety
4: screws (x 4).



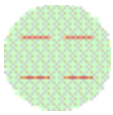
CAUTION

The screws removed earlier are reused (2 self-tapping screws).

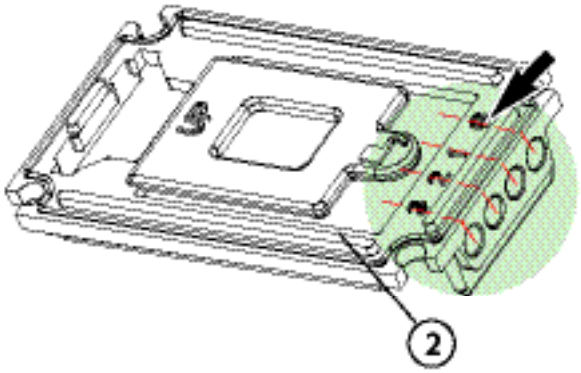
Adaptation/instructions

Replacement of the voltage presence type VPIS 1 by type VPIS 2 and VPIS 2 by VPIS 2

Preparation of the cable gland seal before mounting the voltage presence unit VPIS 2



Follow the dotted line to cut the cable gland.

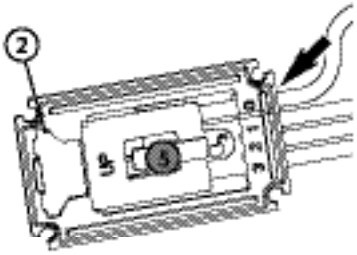


To integrate the cable gland seal (**2**) onto the wiring harness, the 4 holes must be cut open using a Stanley knife.

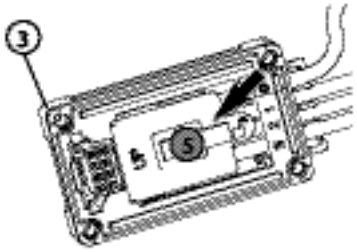
	CAUTION

Cut the cable glands in one place ONLY per hole to slide the wires inside.

Mounting the voltage presence unit VPIS 2



Position the cable gland seal (**2**) on the voltage presence connection (**5**).



Clip the cable harness connector (**5**) onto the VPIS V2 safety (**3**) and fit the seal.

Checks to be made before continuing with the operation

Check the condition of the wiring harness (**5**) and the VPIS 2 rating using the optional diagnostic tool (VPI62420) (not included in the kit) or see correspondence table below.

	VPI62406		**VPI62407**	
	Ranges		Ranges	
F400 **50-60 Hz**	21.5 kV	36.0 kV	36.1 kV	40.5 kV

Key

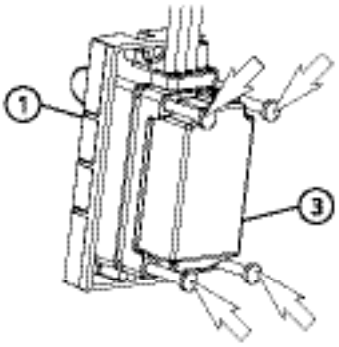
Minimum and maximum operating voltage for usage in 50 Hz and 60 Hz.

Values used in Elonet (ADD) for the choice of VPIS.

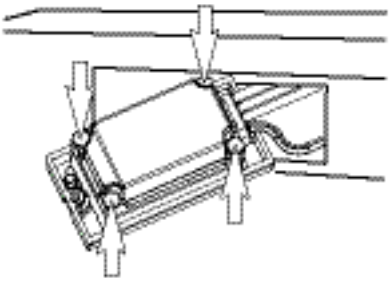
Adaptation/instructions

Replacement of the voltage presence type VPIS 1 by type VPIS 2 and VPIS 2 by VPIS 2

Please refer to the chapter entitled ”contents of the kit”



Screw the indicator unit (**1**) onto the VPIS V2 protection (**3**) using the 4 screws.

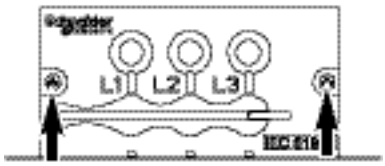


CAUTION

Tighten the screws to exert slight pressure on the cable gland seal without distorting it.

CAUTION

The screws removed earlier are reused.

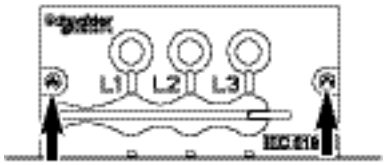


Install the voltage presence unit in the correct position using the 2 self-tapping screws removed earlier.

Removing the VPIS 2 voltage presence unit

CAUTION

The screws must be retained.



Remove the 2 screws from the front panel.

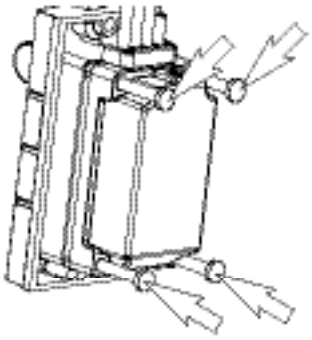
Adaptation/instructions

Replacement of the voltage presence type VPIS 1 by type VPIS 2 and VPIS 2 by VPIS 2

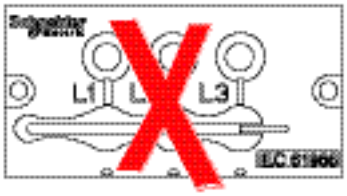
Mounting the new VPIS 2 voltage presence unit

CAUTION

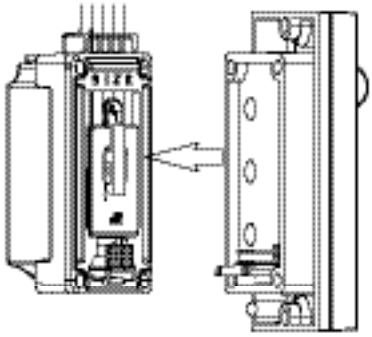
Only the indicator unit is to be changed.
Contact the **Schneider Electric** administration for recycling products at the end of their service life.



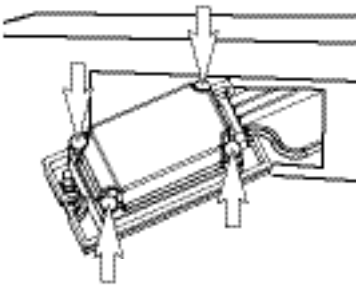
Remove the unit. Remove the 4 screws from the indicator unit.



Discard the faulty indicator unit. Leave the existing surge arrestor and seal.



Install the new voltage presence indicator unit.



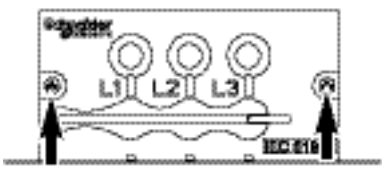
Screw up the 4 screws.

CAUTION

Tighten the screws to exert slight pressure on the cable gland seal without distorting it.

CAUTION

The screws removed earlier are reused.



Install the voltage presence unit in the correct position using the 2 self-tapping screws removed earlier.

Schneider Electric group service centers are there to provide:
- engineering and technical assistance,
- commissioning,
- training,
- preventive and corrective maintenance,
- adaptation work,
- spare parts.

Call your sales representative who will put you in touch with your nearest Schneider Electric group service center or directly call the following telephone number: +33 (0)4 76 57 60 60 Grenoble France.

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