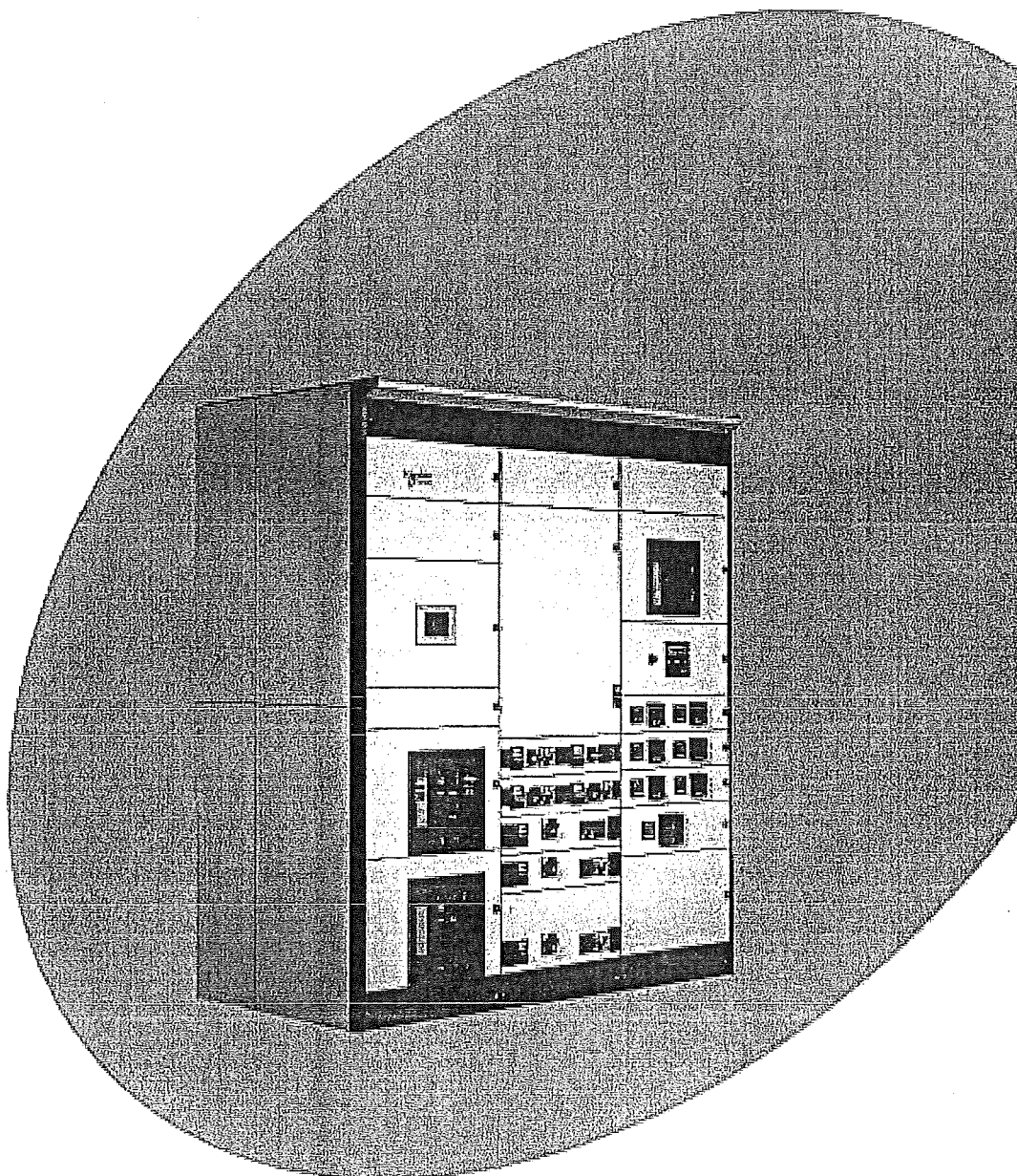


Okken

high dependability switchboard
for power distribution up to 6300A
and motor control

Instruction manual




Merlin Gerin

Modicon

Square D

Telemecanique

Schneider
 **Electric**

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Introduction

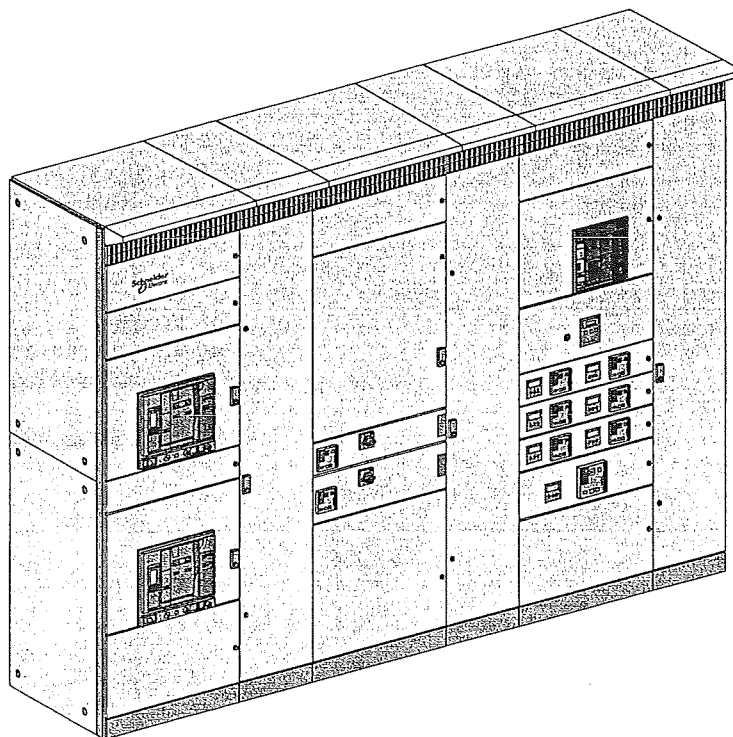
Okken is a switchboard made up of a number of modular sections. Such a design facilitates transportation and installation. The horizontal busbars are connected between sections by splicing. Prior to shipping, every Okken switchboard has been submitted to the 3 routine tests, as per IEC 60439-1 (wiring and electrical working, protective measures and insulation) and inspected visually, mechanically and electrically by a trained technician of the Quality Inspection department.

Safety recommendations

Correct operation of Okken switchboards requires that handling, installation, operation and maintenance be carried out exclusively by qualified personnel:

- ☐ qualified to work near live equipment
- ☐ trained to all applicable safety practices.

During the installation and maintenance operations, the switchboard must be de-energised so as not to expose personnel to electric shock hazards. Failure to comply with these instructions and with those recalled in this guide may result in very serious or even fatal accidents of operators or in damage to the switchboard.



General

Some precautions must be taken when receiving the switchboard:

- ☐ on receipt of the equipment and before handling it, check that the cases and packing materials used for transportation have not been damaged and that all items on the packing list have been effectively delivered

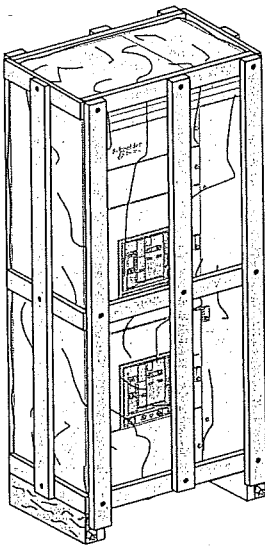
- ☐ even if the packing appears to be in good condition, do not hesitate to unpack the equipment in the presence of an authorised transport agent

- ☐ check consignment contents and weight. Thoroughly check the equipment to make sure that no damage or shocks have occurred which may impair insulation or operation

- ☐ if necessary, check that the information given on the switchboard nameplate, located on the incoming section, conforms to that given on the delivery slip

- ☐ in case of damage or missing parts, inform the transport agent by registered mail.

Packing



Standard packing

The Okken switchboards are normally dispatched column by column, or in sections of 2 juxtaposed columns.

Exceptionally, they may be made of sections of 3 columns, in the case of coupling with 2 incomer columns for example.

Each parcel is identified by marking giving:

- ☐ the project number
- ☐ the weight
- ☐ the packing (parcel number and number of parcels)
- ☐ the position of the centre of gravity
- ☐ the storage and handling instructions.

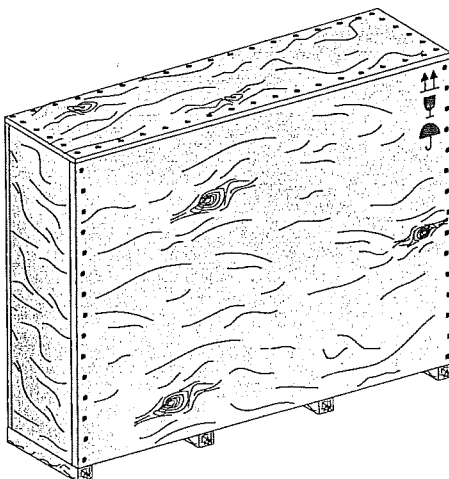
Standard packing

The column(s) are protected by a plastic cover in a crate. The lower ventilation grids are delivered separately. They are not mounted so as to allow handling of the column by the bottom.

Sea packing

The column(s) are protected by a heat-welded cover containing desiccant bags and are installed in a ventilated wooden or plywood crate.

As a rule the sea crates do not weigh more than 5 tonnes.



Sea packing

General

Final unpacking of the equipment will preferably take place just before the switchboard is installed, as close as possible to its final installation site.

The dimensions, weight and handling instructions for the columns are marked on the packing.

As a guideline, the average weight of a column is 650 kg.

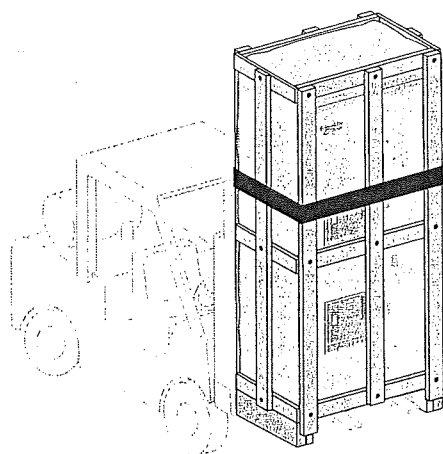
Sections should always be handled in the upright position with care. There is a risk of toppling of the column due to the high position of the centre of gravity.

Avoid any column movement by making them swivel jerkily.

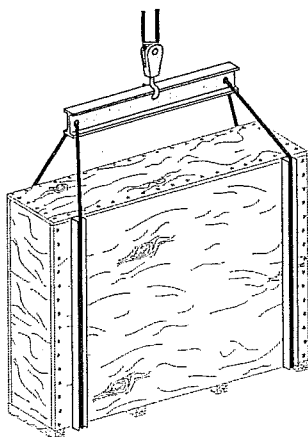
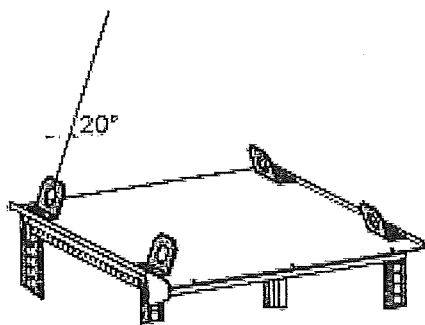
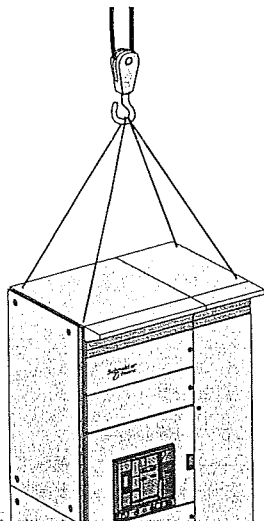
Handling by the bottom

The columns are designed with a built-in plinth and can be moved by the front or the rear using a pallet truck or a fork-lift truck.

In this case, the columns must be **lifted with care and held in place during transport**, either manually or by strapping them onto the handling machine, if movement is over large distances or bumpy.



Handling by the top



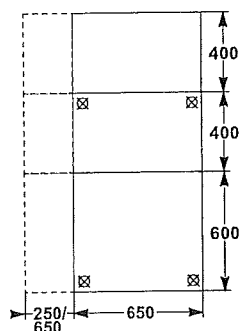
- ☐ if cranes or travelling cranes are used, you must use slings that are sufficiently resistant and in good condition
- ☐ latching must be on the 4 column lifting lugs
- ☐ adjust sling length according to switchboard dimensions so that their orientation is in the prolongation of that of the lifting rings, the angle compared to the vertical is of $20^\circ \pm 5^\circ$ (see sketch)
- ☐ take care to equally distribute the load on the 4 rings.

Implementations of the lifting lugs and slings length L (mm)

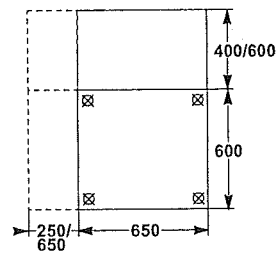
◀ 650 ▶ 650 ▶

slings: $1500 \leq L \leq 2300$

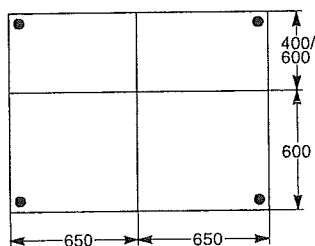
or lifting beam: $L=650$ with slings $700 \leq L \leq 1000$



slings: $800 \leq L \leq 1100$



slings: $700 \leq L \leq 1000$



slings: $1500 \leq L \leq 2300$

or lifting beam: $L=650 \times 400$ ou 600 with slings $700 \leq L \leq 1000$

In the special case of an assembly with more than 2 columns, you must:

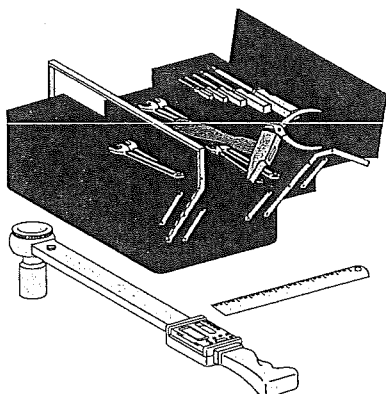
- ☐ bring the switchboard as close as possible to its installation site in its original packing
- ☐ use a lifting beam with direct gripping on the switchboard support plate.

Precautions

Precautions to be taken for Okken storage:

- ☐ Okken is intended for use indoors. The equipment must therefore be stored upright in a dry and ventilated location, protected from rain, extreme temperatures, streaming, dust and chemical agents
- ☐ never store Okken outside, even under a tarpaulin
- ☐ the columns must preferably remain packed until they are installed. Should work be in progress nearby or on the premises, cover the columns with a cover protecting them efficiently against dust, gravel, paint and cement
- ☐ acceptable storage temperature is -10°C to $+40^{\circ}\text{C}$
- ☐ to ensure easy, risk-free handling, the columns, in view of their great weight, must be stored on a stable, rigid floor.

Tools required

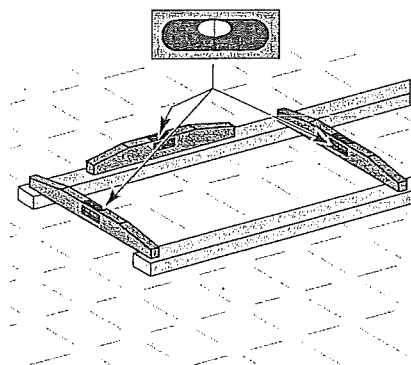


- ☐ torque wrench
- ☐ bush ratchet
- ☐ bush of 10
- ☐ bush of 13
- ☐ bush of 16
- ☐ bush of 17
- ☐ bush of 18
- ☐ bush of 19
- ☐ Torx 8 bit
- ☐ Torx 10 bit
- ☐ Torx (8 and 10) and recess screwdriver or screwing/unscrewing machine, with appropriate bits
- ☐ clamps for column alignment
- ☐ rubber mallet
- ☐ hydraulic jacks that can operate in horizontal position and are used to lift the columns and, if necessary, move them sideways.

Assembly types

- splicing: busbars
 - ☐ bush of 16 and 17 for M10 screw
- assembling: columns
 - ☐ bush of 10 for M6 screw
 - ☐ bush of 16 and 17 for M10 screw
- floor fixing:
 - ☐ bush of 16 and 17 for M10 screw
- fitting the roofs and lifting lugs:
 - ☐ bush of 19 for M12 screw.

General



The place of installation of the switchboard must be clean.
We recommend that the floor is even: $\pm 2 \text{ mm/m}$ (in this case the columns can be fixed using studs).

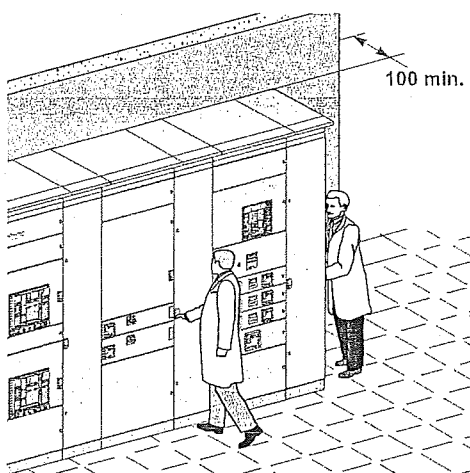
For floors with evenness $> 2 \text{ mm/m}$, you must provide U, T, I sectioned supports, whose straightness and level must be checked in both directions.

Systematic use of sectioned supports is recommended to simplify mechanical assembly between columns and fishplating of busbars.

If possible, apply a dust-proof paint on the floor to limit pollution inside the switchboard.

Also provide the necessary space if future extensions are foreseen.

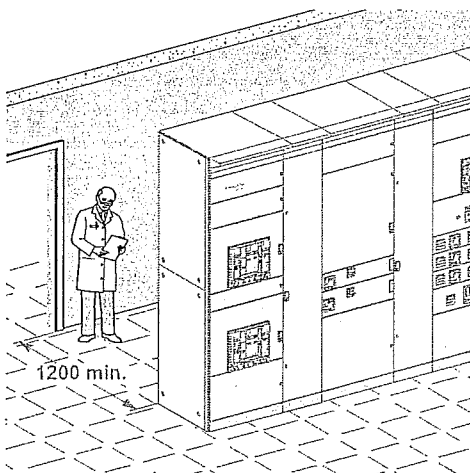
Front connection



Provide a minimum space of 100 mm behind the switchboard to allow proper ventilation.

A minimum space of 1200 mm (1500 mm for 4 pole NW 40b/50/63 devices) must be arranged at the front of the switchboard to allow complete opening of doors and handling of a device using a fork-lift truck.

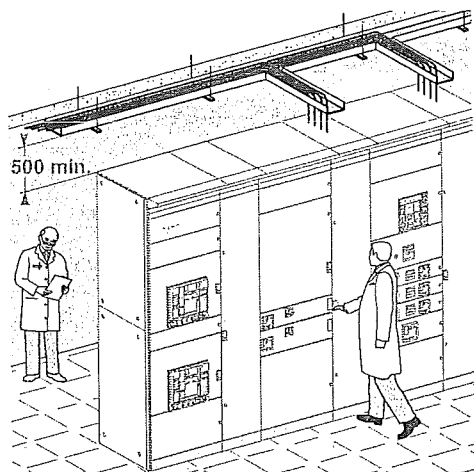
Rear connection



Provide a minimum space of 1200 mm behind the switchboard to allow complete opening of the rear doors and the intervention of an operator.

A minimum space of 1200 mm (1500 mm for 4 pole NW 40b/50/63 devices) must be arranged at the front of the switchboard to allow complete opening of doors and handling of a device using a fork-lift truck.

Top connection



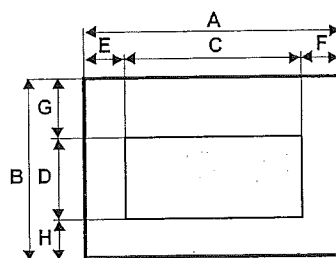
Provide a minimum space of 500 mm above the switchboard for connection by cables or busbar trunking and fishplating of the busbar.

Cable entry from the top without busbar

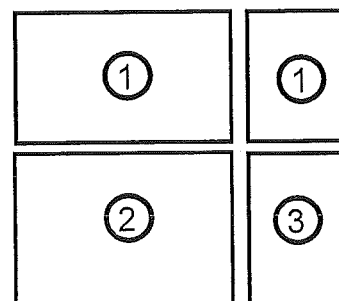
A	B	C	D	E	F	G	H
compartment: zone (1)							
650	600	570	560	40	40	20	20
650	400	570	360	40	40	20	20
450	600	370	560	40	40	20	20
450	400	370	360	40	40	20	20
350	600	270	560	40	40	20	20
350	400	270	360	40	40	20	20
250	600	170	560	40	40	20	20
250	400	170	360	40	40	20	20

Cable entry from the top with busbar

A	B	C	D	E	F	G	H
cubicle 115*: zone (2)							
650	600	460	210	120	70	335	55
cubicle 70*: zone (2)							
650	600	290	200	110	250	360	40
compartment: zone (3)							
650	600	570	260	40	40	320	20
450	600	370	260	40	40	320	20
350	600	270	260	40	40	320	20
250	600	170	260	40	40	320	20



cable entry

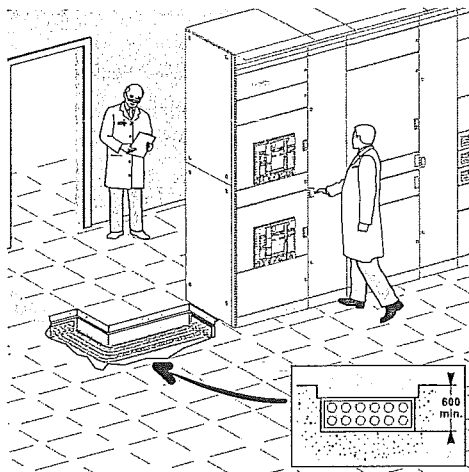


various zones inside the switchboard

*cubicle 115: distance between axes of busbar 115 mm. Equipped with Masterpact NW/NT and Compact NS 630b/1600

*cubicle 70: distance between axes of busbar 70 mm. Equipped with functional units ≤ 630A and, in some cases, with Masterpact NT/Compact NS 630b/1600

Bottom connection



The connection cables will be routed:

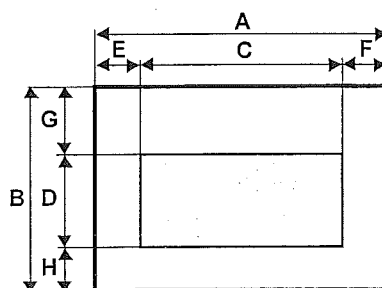
- ☐ either in a duct fitted under the columns
- ☐ or under a false floor.

In the latter case, the switchboard must be installed on a metal chassis designed to support column weight (approx. 650 kg per column). The slabs of the false floor will be adjusted so as to respect the degree of protection of the switchboard.

In both cases, provide a minimum depth of 500 mm (600 mm recommended) to respect the bending radius of the cables.

Cable entry from the bottom

A	B	C	D	E	F	G	H
cubicle 115*							
650	600	450	170	140	60	355	75
cubicle 70*							
650	600	530	240	60	60	340	20
compartment							
650	600	530	560	60	60	20	20
650	400	530	360	60	60	20	20
450	600	330	560	60	60	20	20
450	400	330	360	60	60	20	20
350	600	230	560	60	60	20	20
350	400	230	360	60	60	20	20
250	600	130	560	60	60	20	20
250	400	130	360	60	60	20	20

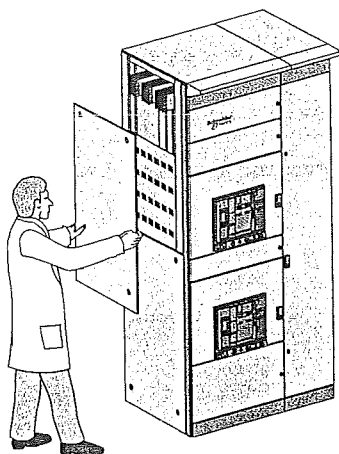


cable entry

*cubicle 115: distance between axes of busbar 115 mm. Equipped with Masterpact NW/NT and Compact NS 630b/1600

*cubicle 70: distance between axes of busbar 70 mm. Equipped with functional units ≤ 630A and, in some cases, with Masterpact NT/Compact NS 630b/1600

Side panels



■ disassembly

- ☐ disassemble the upper 1/2 panel by unscrewing the 4 screws
- ☐ disassemble the lower 1/2 panel by unscrewing the 4 screws
- ☐ store the 1/2 panels to protect them from impacts.

■ assembly

- ☐ store the lower 1/2 panel
- ☐ screw but do not tighten 4 screws beginning with the top screws
- ☐ permanently tighten when all the screws have been fitted
- ☐ store the upper 1/2 panel
- ☐ screw but do not tighten 4 screws beginning with the top screws
- ☐ permanently tighten when all the screws have been fitted

rear panels

■ disassembly

- ☐ unscrew the 6 screws starting with the bottom screws
- ☐ remove the panel and store it so it is protected from impacts

■ assembly

- ☐ store the panel
- ☐ screw but do not tighten the 6 screws beginning with the top screws
- ☐ permanently tighten when all the screws have been fitted

doors

■ disassembly

- ☐ remove the earth braid if the doors are fitted with one
- ☐ disassemble the door pins beginning with the bottom one, then, if applicable, the middle one
- ☐ disassemble the top door pin. In the case of a partial door, the top pin is fitted upside down (head downwards). It is held in place by a clip
- ☐ remove the door and install it so that it is protected from impacts.

■ assembly

- ☐ position the door on the hinge pins
- ☐ fit the door pins, beginning with the top one. In the case of a partial door, the top pin is fitted upside down (head downwards). It is held in place by a clip
- ☐ fit the other door pins
- ☐ if necessary, put back the earth braid
- ☐ check proper operation of the handle and its locking system.

Identifying columns

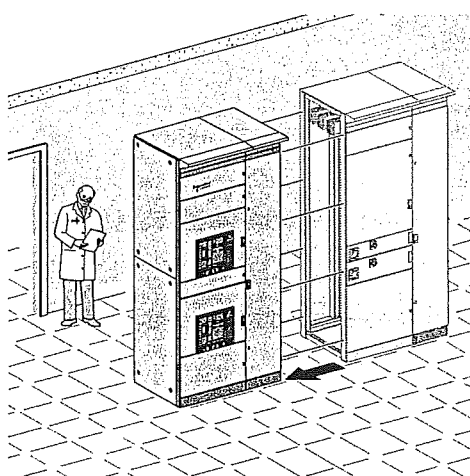
Each column is identified by a digit or a letter at the top of the column.

It corresponds to the serial number assigned to each column switchboard drawing.

Some devices are too heavy to be dispatched in their column. They will be sent separately and are identified by:

- ☐ the number of the column in which they will be installed
- ☐ the reference of their position in this column.

Fitting the columns

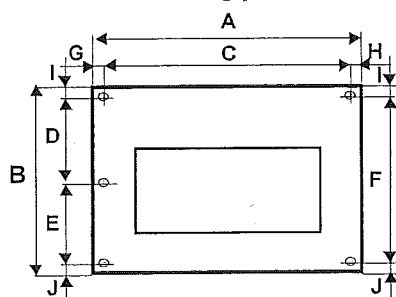


There are no precise rules for the order in which columns must be fitted. The layout consists of juxtaposing the columns in a logic order. The first column positioned may be the right or left one or even the middle one of the switchboard.

The choice is made according to:

- arrangement of the premises
- access possibilities
- installation requirements for the equipment as a whole on the premises (positioning with respect to a partition or a transformer, etc...)
- connection requirements (position of cabletrays, incoming cables by busbar trunking system (BTS), etc...)
- ☐ bring up the columns to the site in the chosen assembly order
- ☐ remove the containers and the protection boards if necessary
- ☐ remove the panels to allow access to the cubicle assembly points and to the connection points
- ☐ disassemble the roof
- ☐ disassemble the top ventilation grids (the bottom grids are delivered unmounted to allow handling of columns using a pallet truck).

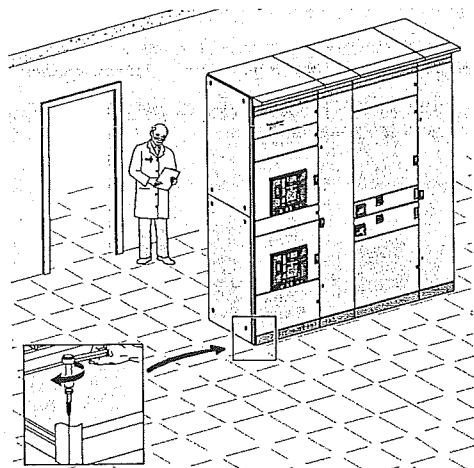
Column floor fixing points



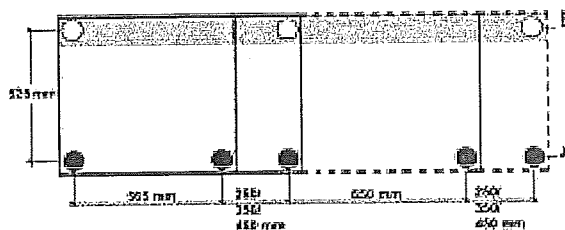
A	B	C	D	E	F	G	H	I	J
650	600	565	262.5	262.5		42.5	42.5	37.5	37.5
650	400	565			325	42.5	42.5	37.5	37.5
450	600	365	262.5	262.5		42.5	42.5	37.5	37.5
450	400	365			325	42.5	42.5	37.5	37.5
350	600	265	262.5	262.5		42.5	42.5	37.5	37.5
350	400	265			325	42.5	42.5	37.5	37.5
250	600	165	262.5	262.5		42.5	42.5	37.5	37.5
250	400	165			325	42.5	42.5	37.5	37.5

Note : Sections should always be handled in the upright position with care. There is a risk of toppling due to the high position of the centre of gravity.

Ground fastening points layout

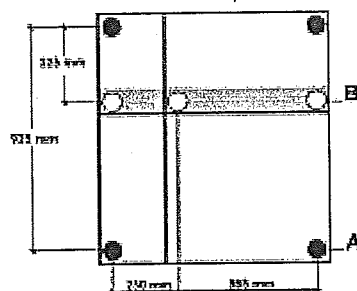


■ front connection



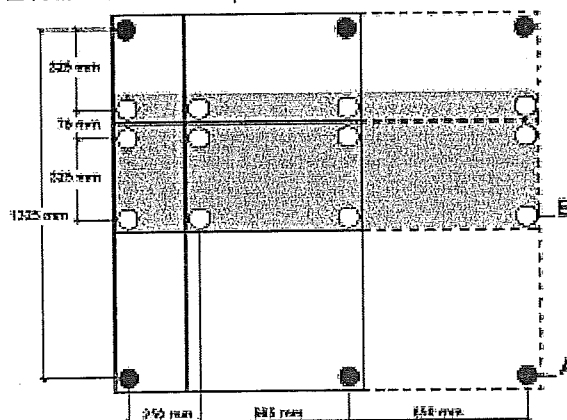
Example: switchgear cubicle + compartment D600

■ rear connection depth 1000/1200



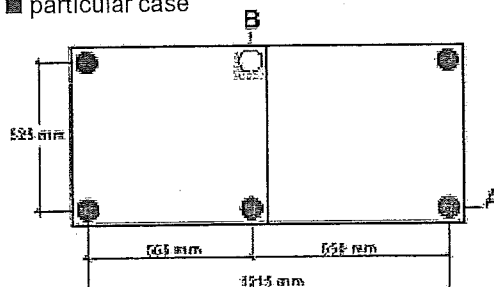
Example: switchgear cubicle + compartment

■ rear connection depth 1400



Example: switchgear cubicle L650 D600 + 2 rear compartments L650 D400

■ particular case



Example: 3200A incoming cubicle + coupling

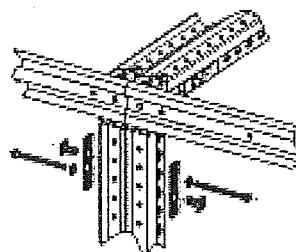
Legend:

● : compulsory fixing point

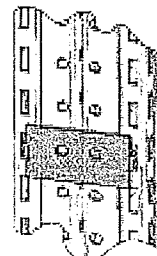
○ : fixing point recommended if possible

Fixing and assembling

- fit the first column
- fix it to the floor using three M10 bolts having first checked its vertical position and support
- bring the second column up beside the first one
- adjust the position of the associated column (wedging at the right height, alignment of front panels)
- assemble the columns with one another:
 - 4 coupling kits, ref. 87171 on the top of frameworks
 - 2 M10 bolts on the plinths
 - 2 holding plates, ref. 87170 on the frameworks in the middle part.
 These plates are clipped on forcibly and are held in place by diameter 6 plastic rivets.
- Position of rivets with respect to the bottom of the top cross-member:
 - for a column H = 2350mm: 1294 mm
 - for a column H = 2200mm: 1219 mm
 If plate installation causes problems, they can be replaced by coupling kits, ref. 87171.
- identify the routing of strands or auxiliary wiring between columns. Take all necessary measures to avoid jamming or deterioration of wires when installing the columns
- protect the auxiliary wiring when it is routed near sharp edges by means of sheaths or grommets.

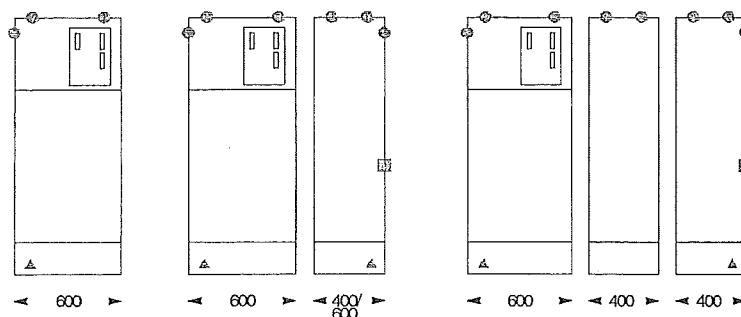


coupling kit ref. 87171



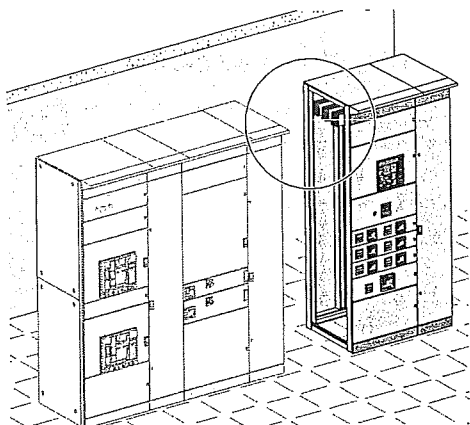
holding plate ref. 87170

- install all associated columns in the same way



- compulsory binding by coupling kit ref. 87171
- compulsory binding by holding plate ref. 87170
- ▲ M10 bolt

Fishplating the main busbar



Once the roof is disassembled, connect the bars to each other as described below:

□ disassemble the top cross-pieces at each column juxtaposition so as to simplify access to the horizontal busbar

□ loosen the fishplates positioned on the first column (assembled in workshop) and make them slide between the bars to be assembled. For better access to the tightening points, we recommend that you begin by fishplating the bottom bars (Neutral, Phase 1), followed by the top bars (Phase 3 and finally Phase 2).

For busbars with 4 or 6 bars per phase, use a 5 mm max. thick bar or a screwdriver to slide the middle plate of the fishplate

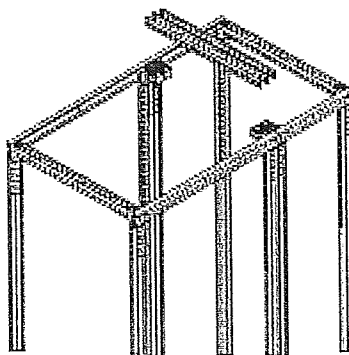
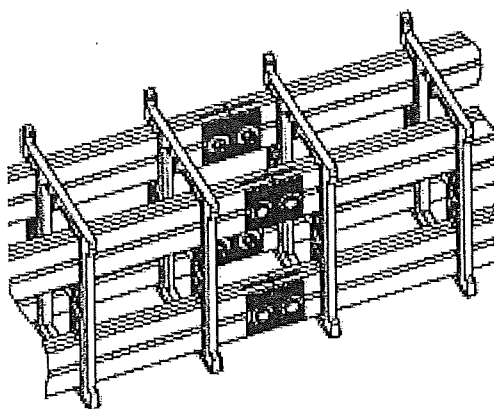
□ a visual reference (notch) lets you check that the fishplate is properly centred with respect to the bars to be assembled

□ tighten the nuts using a torque wrench to the recommended tightening torque (50 N.m), **ensuring that the base of the screw head is properly positioned in the square recess of the washer**

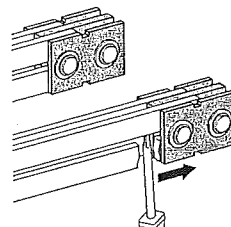
□ mark all nuts with a dot of varnish.

note:

If the fishplate has to be completely removed, ensure, when putting it back, that the tightening nuts are towards the inside of the busbar in order to guarantee clearances.



disassembling cross-pieces

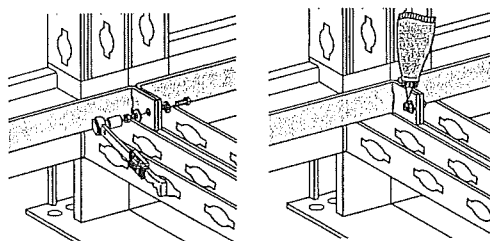


sliding the fishplate

Linking the protective conductors

The earthing bars of the various sections are connected together using M10 class 8.8 nuts and bolts equipped with contact washers

- ☐ set the bolts
- ☐ tighten the nuts at the required torque (50 N.m) using a torque wrench
- ☐ mark each nut with a drop of varnish

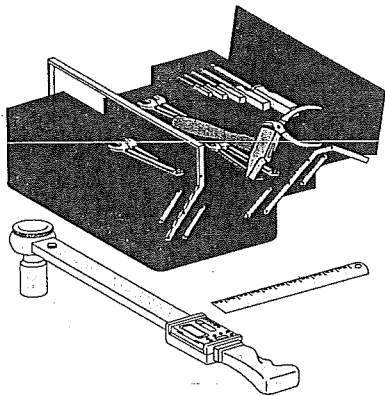


Equipment protection

Should the connection not be performed immediately after installation, the following precautions will prevent any dust or foreign material penetration:

- ☐ close all the doors
- ☐ reassemble the side and rear panels
- ☐ reassemble the roofs and top and bottom ventilation grids
- ☐ plug in the circuit-breakers and drawers
- ☐ seal temporary openings (cable entries)
- ☐ in case of works involving water drops or splashing (cement, welding...), it is necessary to put a cover on the switchboards.

Tools required



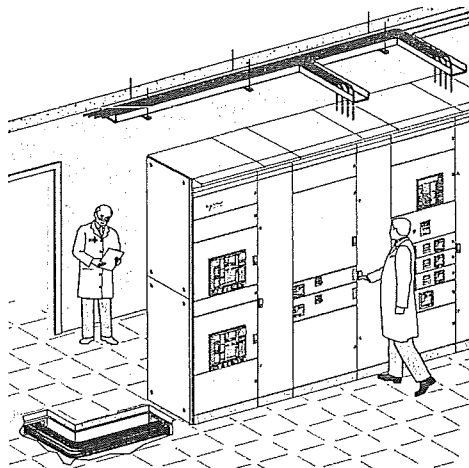
- ☐ torque wrench
- ☐ bush ratchet
- ☐ bush of 10
- ☐ bush of 13
- ☐ bush of 16
- ☐ bush of 17
- ☐ bush of 18
- ☐ bush of 19
- ☐ crimping pliers
- ☐ clamps pliers
- ☐ screwdrivers.

note: for the other operations, use the contractor's standard tools.

Assembly types

- power connections:
 - ☐ connection of cables equipped with lugs on bar tails
 - ☐ direct connection on devices.
- auxiliary connection:
 - ☐ inter-column wiring
 - ☐ terminal blocks.

General



☐ for protection of persons, first connect the switchboard's protective conductor to the earth connection

☐ flange cables as close as possible to the connections so as not to create excessive mechanical stresses on the device connection pads.

If cable glands are not used, also flange the cables as close as possible to the column entry point

☐ cables must never be routed in contact with or between live conductors (copper bars, etc.)

☐ the sharp edges of the framework placed on the cable route must be protected so as not to damage conductors

☐ comply with a minimum bending radius of 6 to 8 times cable outer diameter

☐ all the power connections must be made using class 8.8 bolts and nuts and tightened to the recommended torque

☐ in the event of connection of aluminium cables on copper pads, use bimetal lugs or interfaces

☐ make strands circuit by circuit. The number of cables per strand depends on cable cross-section.

Cable cross-section (mm ²)	Number of cable per strand
< or = 10	8
from 16 to 50	4
> 50	tie individually

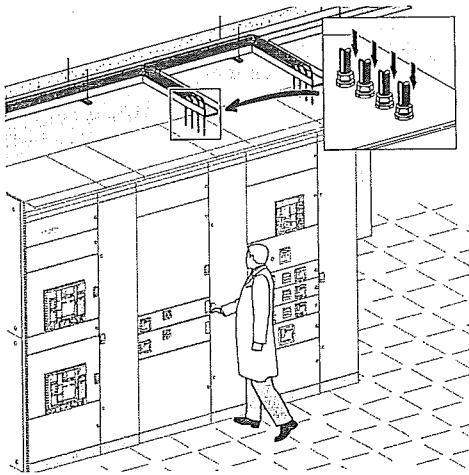
☐ the strands are made using cable ties. The distance between them depends on electrodynamic stresses and on the type of tie used.

Type of tie	Maximum I _{cw} (kA /rms 1s)	Distance between ties (mm)
width: 4,5 mm	10	200
load: 22 kg	15	100
	20	50
width: 9 mm	20	350
load: 80 kg	25	200
	35	100
	45	70

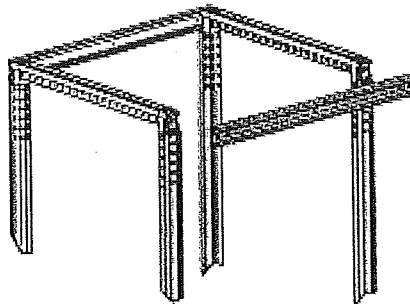
☐ recommended tightening torque for mechanical and electrical connections with 8.8 class screws.

Diameter of screw	Tightening torque (N.m) (with nut + contact washer)
M3	1.5
M4	3.5
M5	7
M6	13
M8	28
M10	50
M12	75
M14	120
M16	185
M18	260
M20	370

connection through the top

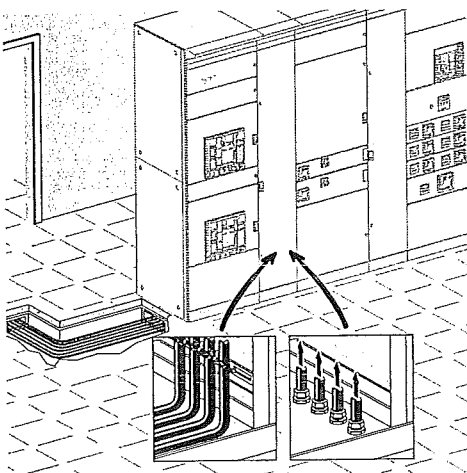


- ☐ remove the roof
- ☐ drill the holes required to install cable glands or grommets
- ☐ install the cable glands or grommets. They must comply with the required protection degree (IP)
- ☐ install the roof back
- ☐ run the cables through the glands or grommets
- ☐ run the cables in the intended compartments and secured them to cable tie-bars every 400 mm
- ☐ crimp the lugs and connect
- ☐ when tightness does not call for cable glands or when it is achieved by means of foam, cables can be routed in a rectangular cut-out in the roof. The removable beam then simplifies insertion of cables in the connection compartment.

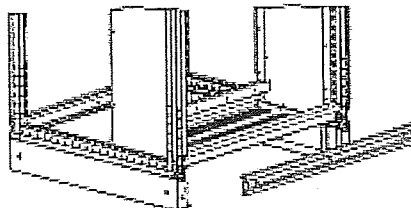


removable cross-member to simplify connection

Connection through the bottom

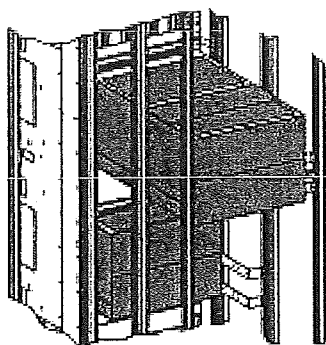


- ☐ remove the bottom plate
- ☐ drill the holes required to install cable glands or grommets
- ☐ install the cable glands or grommets. They must comply with the required protection degree (IP)
- ☐ fit the bottom plate back
- ☐ run the cables through the glands or grommets
- ☐ run the cables in the intended compartments and secured them to cable tie-bars every 400 mm
- ☐ if cable glands are not used, it may be easier to prepare the cable heads outside the switchboard (e.g. lug crimping) and then to topple them inside the column having first disassembled the bottom removable beam, as well as the ventilation grid or the strip.

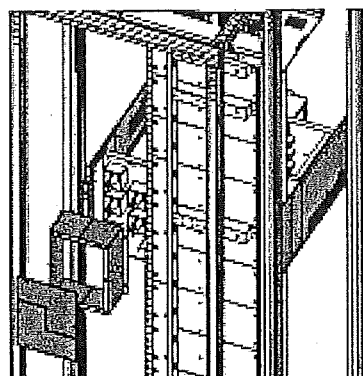


removable cross-member to simplify connection

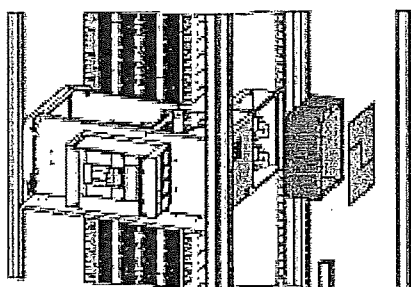
Form 4 box



Form 4 partitioning, Masterpact rear connection

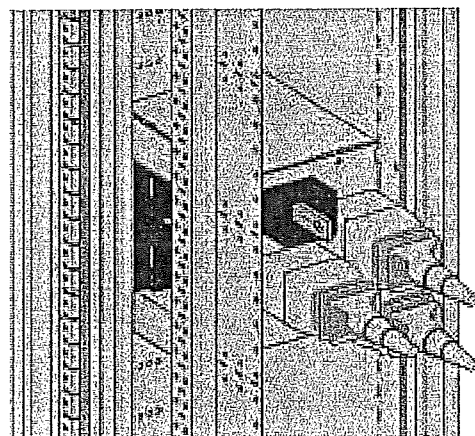


Form 4 partitioning, FU ≤ 630A rear connection



Form 4 partitioning, FU ≤ 630A front connection

Form 4 by sleeve



Form 4 sleeves, FU ≤ 630A front connection

■ for Masterpact NW/NT/NS 630b-1600

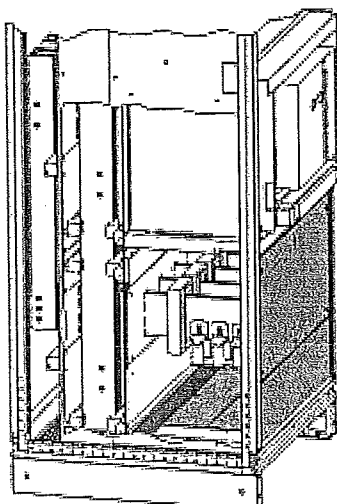
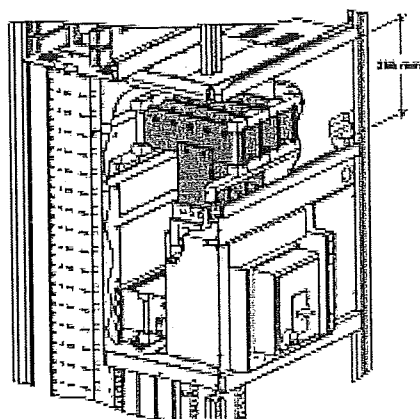
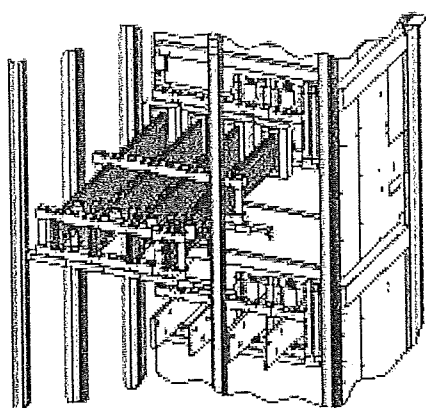
- ☐ disassemble the cover plate allowing access to the device connection bars
- ☐ connect, conforming with the insulation distances
- ☐ cut out the part of the cover disassembled in order to let cables pass through, while preserving the necessary degree of protection
- ☐ reassemble all the covering

■ for FU ≤ 630A

- ☐ disassemble the Form 4 box to access the device connection bars
- ☐ connect, conforming with the insulation distances
- ☐ reassemble the Form 4 box without the insulating removable and cuttable plate
- ☐ cut out the insulating plate in order to let cables pass through, while preserving the necessary degree of protection
- ☐ put back the insulating plate.

- ☐ position the sleeve on the cable before crimping the lug
- ☐ crimp the lug
- ☐ connect the cable
- ☐ slide the sleeve on the cable so that all the live parts are protected.

Connection to connection bars in Form 4 box



Use lugs to connect to copper connection bars

- ☐ check the consistence between circuit and switchgear identifications
- ☐ when connections are made to several bars for each phase, position the lugs opposite one another and insert copper spacers
- ☐ comply with the insulation distances between phases of 14 mm min.
- ☐ mark all nuts with a dot of varnish after tightening to the recommended torque.

Rear connection

Maximum number of cables according to the length of the connection bars.

connection bar length to column depth	Cu cables	Al cables
cubicle 115*		
250mm bar: P1000/1200/1400	4x300mm ²	4x300mm ²
400mm bar: P1000/1400	10x300mm ²	5x300mm ² 10x300mm ² (1)
600mm bar: P1200	12x300mm ²	6x300mm ² 12x300mm ² (1)
800mm bar: P1400	20x300mm ²	10x300mm ² 20x300mm ² (1)
cubicle 70*		
250mm bar: P1000/1200/1400	2x300mm ²	2x300mm ²
400mm bar: P1000/1400	4x300mm ²	4x300mm ²
600mm bar: P1200	7x300mm ²	7x300mm ²
800mm bar: P1400	10x300mm ²	10x300mm ²

Top direct connection

Maximum number of cables according to cubicle dimensions and apparatus rating.

cubicle dimensions WxD (mm)	max. apparatus rating (A)	number of poles	Cu cables	Al cables
cubicle 115*				
650x600	≤2000	3/4	6x300mm ²	3x300mm ² 6x300mm ² (1)
cubicle 70*				
650x600	≤1600	3/4	5x300mm ²	5x300mm ²

Bottom direct connection

Maximum number of cables according to cubicle dimensions and apparatus rating.

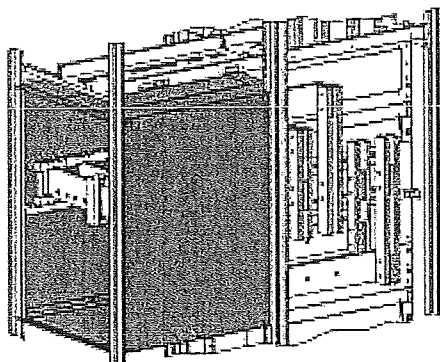
cubicle dimensions WxD (mm)	max. apparatus rating (A)	number of poles	Cu cables	Al cables
cubicle 115*				
650x600	3200	3/4	8x300mm ²	
650x600	≤2500	3/4	8x300mm ²	4x300mm ² 8x300mm ² (1)
cubicle 70*				
650x600	≤1600	3/4	5x300mm ²	5x300mm ²

*cubicle 115: distance between axes of busbar 115 mm. Equipped with Masterpact NW/NT and Compact NS 630b/1600

*cubicle 70: distance between axes of busbar 70 mm. Equipped with functional units ≤ 630A and, in some cases, with Masterpact NT/Compact NS 630b/1600

(1): with lugs insulated by sleeves or screens

Connection to connection bars in Form 4 box



Side connection

Maximum number of cables according to column dimensions and apparatus rating

column dimensions WxD (mm)	max. apparatus rating (A)	number of poles	Cu cables	Al cables
cubicle 115*				
650+350 x600	≤1600	3	4x300mm ²	4x300mm ²
650+450 x600	3200	3	10x300mm ²	5x300mm ²
	2000/2500	3	10x300mm ²	10x300mm ² (1) 4x300mm ²
650+650 x600	≤1600	4	4x300mm ²	4x300mm ²
	3200	4	10x300mm ²	5x300mm ²
	2000/2500	4	10x300mm ²	10x300mm ² (1)
cubicle 70*				
650+450 x600	≤1000	3/4	3x240mm ²	3x240mm ²
650+650 x600	≤1000	3/4	3x300mm ²	3x300mm ²

Connection directly to device terminals



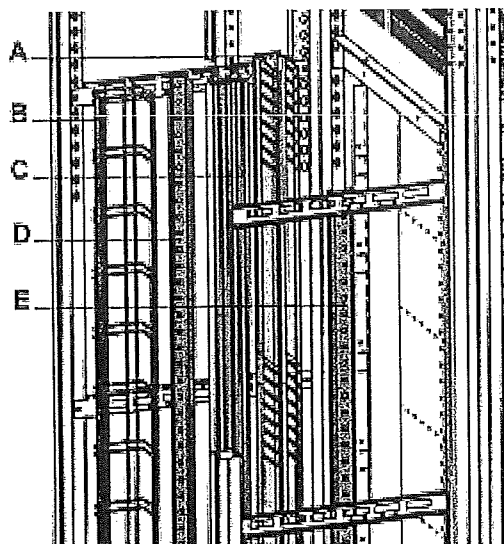
- ☐ when connections are made directly to the terminals of devices (disconnectable Polyfast), comply with the tightening torque recommended by the device manufacturer
- ☐ check that the length of the screws delivered with the apparatus is compatible with the lugs thickness
- ☐ comply with the safety perimeter around the apparatuses, defined by the manufacturer to guarantee their correct operation
- ☐ if necessary, position back after connection the phases separators and the terminal covers
- ☐ in the particular case of connection with armoured wires, please consult us.

*cubicle 115: distance between axes of busbar 115 mm. Equipped with Masterpact NW/NT and Compact NS 630b/1600

*cubicle 70: distance between axes of busbar 70 mm. Equipped with functional units ≤ 630A and, in some cases, with Masterpact NT/ Compact NS 630b/1600

(1): with lugs insulated by sleeves or screens

Cable routing



- A: trunking panelbuilder side
- B: trunking contractor side
- C: auxiliary busducts
- D: rail for auxiliary terminal blocks
- E: 1 or 2 rails for power terminal blocks

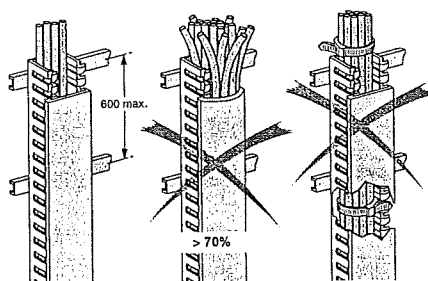
■ cabletrays

The auxiliary cables are routed on metal cabletrays. They must be flanged according to proper procedures.

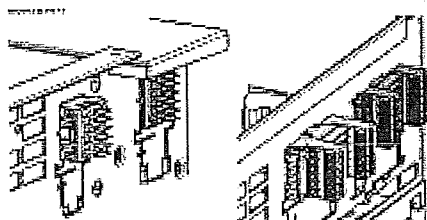
■ trunkings

The following rules must be complied with in traditional trunkings:

- ☐ trunking must be secured at least every 600 mm
- ☐ trunking must not be filled to more than 70% of capacity
- ☐ cables must not be tied inside trunking
- ☐ trunking must be secured using plastic screws to avoid any risk of damaging cables
- ☐ avoid routing auxiliary cables directly in contact with power cables.



Connection



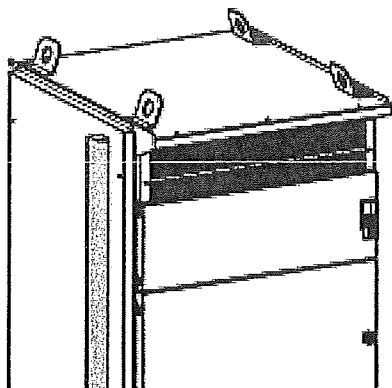
■ general

- ☐ all strands of a conductor must be inserted in the hole of the terminal
- ☐ tighten securely, taking care not to cut strands
- ☐ identify cables using references consistent with switchboard references in order to simplify future intervention.

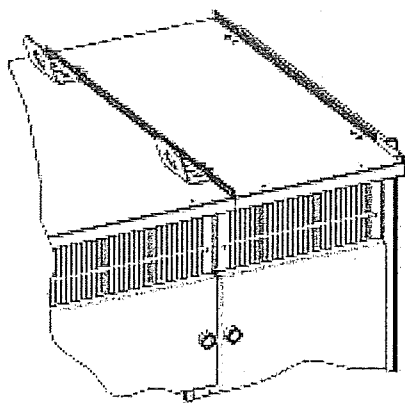
■ connection of the auxiliary blocks of the Polyfast functional units

- ☐ front connection: direct connection on the fixed part of the block
- ☐ in rear connection: connection on a terminal block placed in the rear compartment.

Finishing



edging sections position



roof gasket mounting

■ reassemble:

- ☐ the roofs, without forgetting the seal and the cornice end covers
- ☐ the ventilation grids
- ☐ the rear panels
- ☐ the side panels
- ☐ the edging sections (ref. 87141 for columns H=2200 mm and ref. 87140 for columns H=2350 mm) delivered separately.

They are stuck on side panels bend, situated on the front side of the switchboard

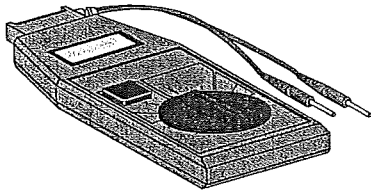
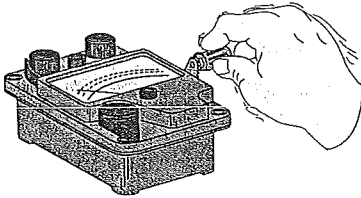
- ☐ the doors

■ do not forget, if necessary, to create the equipotential bonding of the doors by means of an earth braid.

detail of the roof gasket mounting:

- ☐ check the installation of the roofs and the side panels
- ☐ cut out lengths of gasket corresponding to the depth of the column
- ☐ install the gasket «in rider» on the jointed sheet sections
- ☐ check its good installation by a pressure of the hand over all its length.

Measuring and of monitoring switchgear required



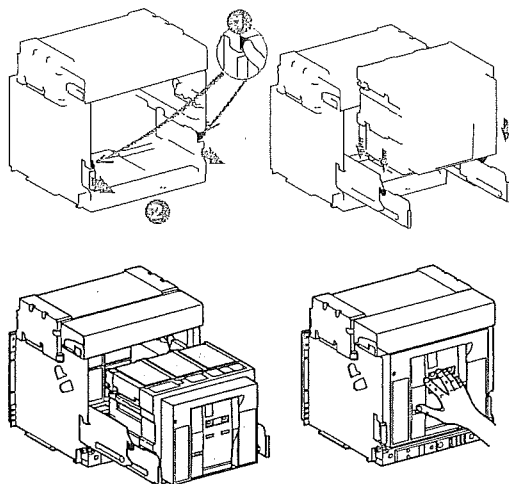
The following items are required for energising the switchboards:

- ☐ a magneto-electric generator
- ☐ a dielectric measuring unit (optional)
- ☐ a phase tester
- ☐ a phase sequence tester: rotophase
- ☐ a multimeter
- ☐ a vibrotest for locating poor auxiliary circuit connections
- ☐ a variable current source (AC, DC, recommended power 20A)
- ☐ a simulator (optional) with push-buttons, lights, measuring instruments.

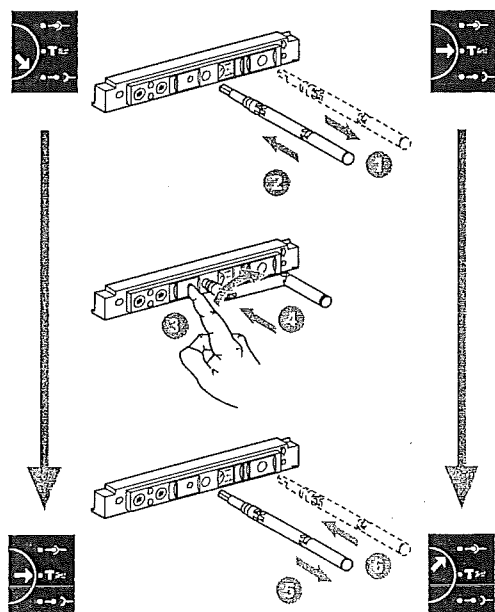
Okken switchboards commissioning must be carried out by qualified personnel, entitled to work in the proximity of the voltage and trained with the safety instructions.

Mounting

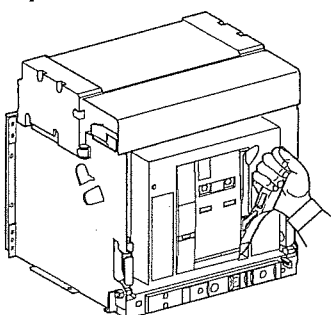
(refer to device leaflet)

**Putting into position**

- ☐ unpack the devices, if they are packed separately
- ☐ check that they have suffered no damage that might inhibit correct operation
- ☐ before racking in the Masterpact, check that the chassis corresponds to the device
- ☐ press the release tabs and pull the rails out
- ☐ position Masterpact on the rails
- ☐ make sure the device rests on all four supports
- ☐ push the circuit-breaker into the chassis, taking care not to push on the control unit.

**Racking**

- ☐ insert the crank
- ☐ unlock the racking mechanism, using the unlocking button
- ☐ turn the crank to the test position, then to the connected position. At the end of operation the stress can be important, due to the racking of the pads into the clamps (torque can reach 25 N.m)
- ☐ fit the crank back in its location.

Operation**■ to close Masterpact:**

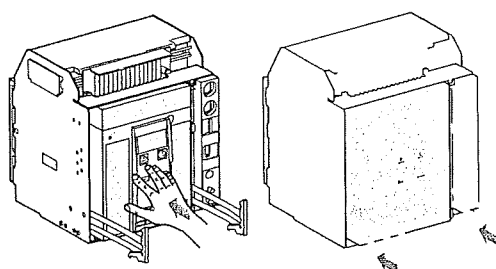
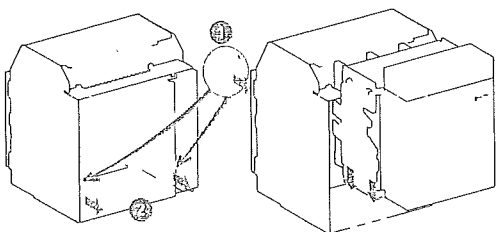
- ☐ charge Masterpact by pulling the handle down six times until you hear a «clack». The «charged» indication appears
- ☐ press the mechanical «ON» push-button. The «ON» indication appears.

■ to open Masterpact:

- ☐ press the mechanical «OFF» push-button. The «OFF» indication appears.

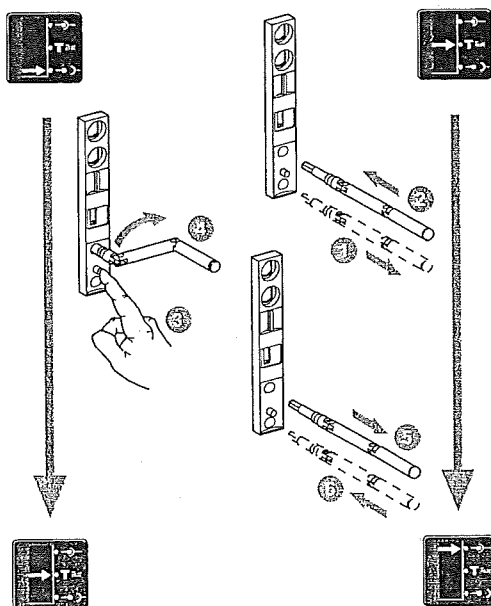
Mounting

(refer to device leaflet)



Putting into position

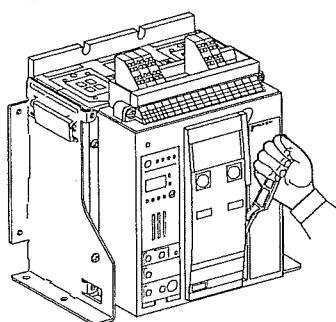
- ☐ unpack the devices, if they are packed separately
- ☐ check that they have suffered no damage that might inhibit correct operation
- ☐ before racking in the Masterpact, check that the chassis corresponds to the device
- ☐ press the release tabs and pull the rails out
- ☐ position Masterpact on the rails
- ☐ make sure the device rests on all four supports
- ☐ push the circuit breaker into the chassis, taking care not to push on the control unit
- ☐ press the release tabs to push the rails in.



Racking

- ☐ insert the crank
- ☐ unlock the racking mechanism, using the unlocking button
- ☐ turn the crank to the test position, then to the connected position. At the end of operation the stress can be important, due to the racking of the pads into the clamps (torque can reach 25 N.m)
- ☐ fit the crank back in its location.

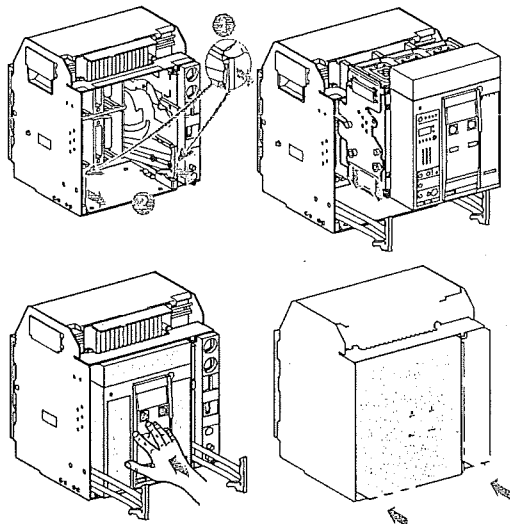
Operation



- ☒ to close Masterpact
- ☐ charge Masterpact by pulling the handle down six times until you hear a «clack». The «charged» indication appears
- ☐ press the mechanical «ON» push-button. The «ON» indication appears.
- ☒ to open Masterpact
- ☐ press the mechanical «OFF» push-button. The «OFF» indication appears.

Mounting

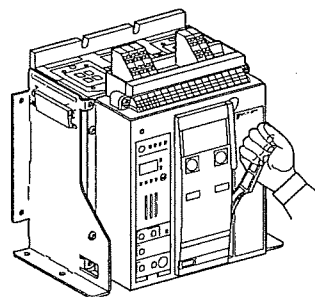
(refer to device leaflet)

**Putting into position**

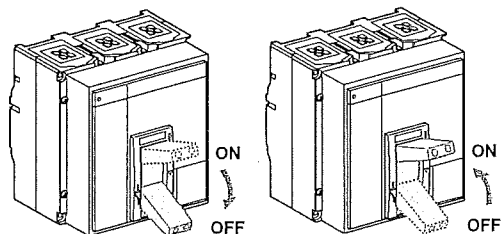
- ☐ unpack the devices, if they are packed separately
- ☐ check that they have suffered no damage that might inhibit correct operation
- ☐ before racking in the Compact NS, check that the chassis corresponds to the device
- ☐ press the release tabs and pull the rails out
- ☐ position Compact NS on the rails
- ☐ make sure the device rests on all four supports
- ☐ push the circuit breaker into the chassis, taking care not to push on the control unit
- ☐ press the release tabs to push the rails in.

Racking

- ☐ insert the crank
- ☐ unlock the racking mechanism, using the unlocking button
- ☐ turn the crank to the test position, then to the connected position. At the end of operation the stress can be important, due to the racking of the pads into the clamps (torque can reach 25 N.m)
- ☐ fit the crank back in its location.

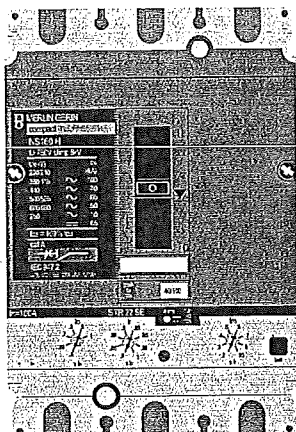
Operation**remote controlled breaker**

- to close the breaker:
 - ☐ charge Compact NS by pulling the handle down six times until you hear a «clack». The «charged» indication appears
 - ☐ press the «ON» push-button. The «ON» indication appears.
- to open the breaker:
 - ☐ press the «OFF» push-button. The «OFF» indication appears.

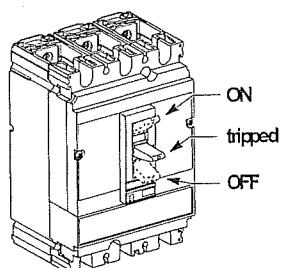
**toggle type manually operated breaker**

- to close the breaker:
 - ☐ lift the toggle up. the «ON» indication appears.
- to open the breaker:
 - ☐ pull the toggle down. The «OFF» indication appears.

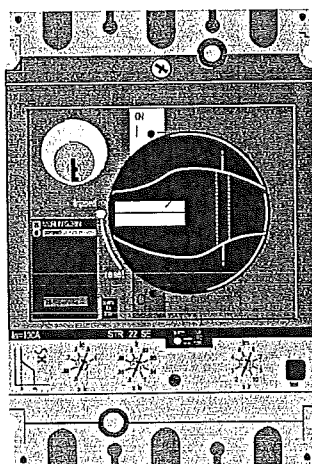
Toggle



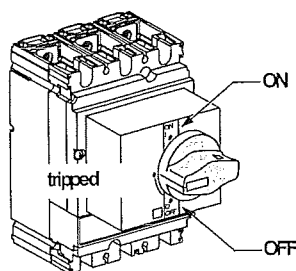
- if necessary, open the door to access the handle
 - the device is controlled by pushing the toggle right or left, according to the «ON» and «OFF» markings engraved on the apparatus.
- ON = Closing
OFF = Opening



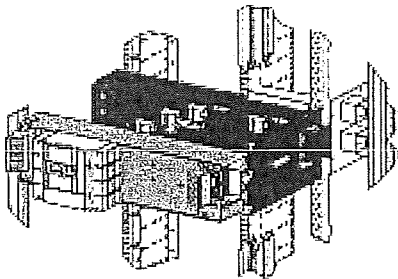
Direct or extended rotary handle



- to close the device:
turn the handle toward «ON» (clockwise).
- to open the device:
turn the handle toward «OFF» (counter-clockwise). Marks placed on the rotary handle indicate the position:
white / ON: closed
green / OFF: open
tripped: fault.

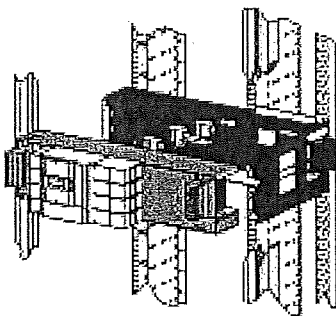


Plug-in Polyfast



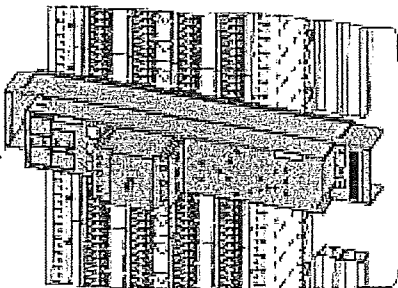
- ☐ check the correct fixing of Polyfast on its base plate (4 screws)
- ☐ check the presence of the terminal covers on the apparatus
- ☐ if necessary proceed with adjustment of the control unit
- ☐ close the apparatus: «ON» position.

Disconnectable Polyfast



- ☐ check the correct fixing of Polyfast on its base plate (4 screws)
- ☐ check the presence of the terminal covers on the apparatus
- ☐ if necessary proceed with adjustment of the control unit
- ☐ close the apparatus: «ON» position.

Disconnectable mounting plate



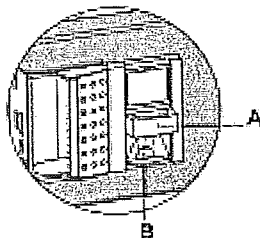
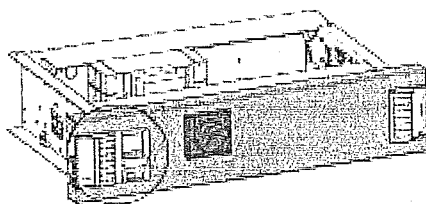
- ☐ check the correct fixing of the moving part on its base plate (2 screws)
- ☐ if necessary proceed with adjustment of the control unit
- ☐ close the apparatus: «ON» position.

Fixed and plug-in on mounting plate



- ☐ if necessary open the door to proceed with adjustment of the control unit
- ☐ close the apparatus: «ON» position.

Drawers



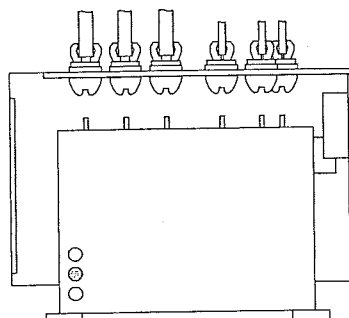
If the drawer is in the «disconnected» position

- ☐ the device is in the «OFF» position
- ☐ press and hold the red release button
- ☐ using the two handles, push the drawer fully home to the «connected» position
- ☐ check the correct position of the drawer on the indicator B placed under the release button A
 - draw-out: green
 - test: yellow
 - plug-in: red
- ☐ in the «connected» position, close the device: «ON» position.

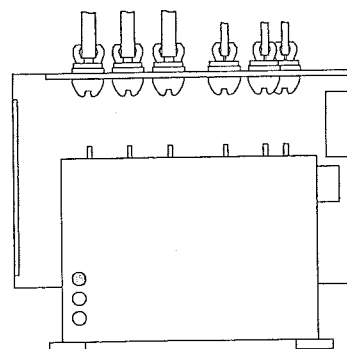
Drawers position

- ☐ connected:
 - power and auxiliary circuits are connected
- ☐ test :
 - power circuits are disconnected (upstream and downstream),
 - auxiliary circuits remain connected
- ☐ disconnected:
 - all circuits are disconnected
- ☐ removed.

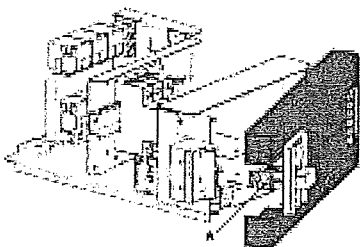
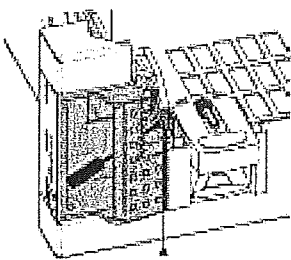
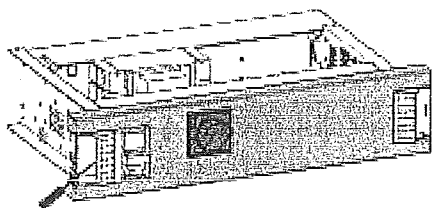
connected position



test position



disconnected position

Drawers**Adjustments**

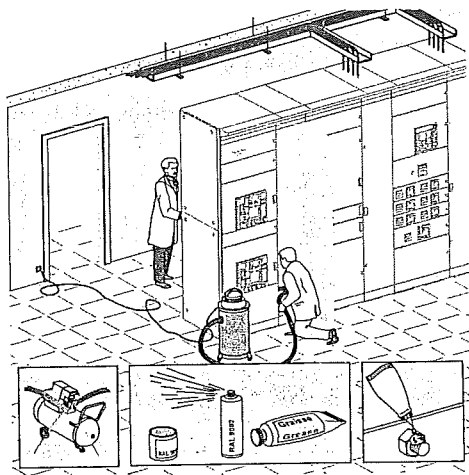
The front face of the drawer is swivelling and gives access to the devices adjustments.

- ☐ introduce a tool inside the left handle, press moderately in order to compress the leaf spring A and open the front panel using the red release button
- ☐ in the case of a drawer higher than 6 modules, remove the screw on the front panel
- ☐ open the door
- ☐ carry out the adjustments
- ☐ close again the gate. The spring goes back automatically in position.

note:

When the apparatus is closed, the voluntary opening of the door is possible if the «door closed locking» mechanism of rotary handle has been inhibited or removed.

Preliminary checks



- remove all foreign objects that may disturb switchboard operation (cable scraps, wires, nuts and bolts, tools...)
- vacuum the entire switchboard to remove dust. It may need to remove functional units like drawers, Polyfast
- check the insulation of auxiliary circuits using an electromagnetic generator

- check operation of the auxiliary in the switchboards: energise and carry out operating tests for the various sequences
- carry out overall insulation measurements.

If a TNC earthing arrangement is used, disconnect the earth electrodes before carrying out the insulation measurements. Measurements should be carried out using an insulation tester and with the system supplied by a voltage of at least 500V DC. The insulation-resistance value must be equal to at least 1000 ohm/V.

If the overall insulation value is low, preheat the switchboard using a source of heat (resistor, light bulb) for at least 24 hours to remove humidity, then carry out the overall insulation measurements again.

■ dielectric tests have already been carried out in the factory (see the factory test report). Knowing that such tests subject the equipment to certain stresses (ageing, etc...) it is advisable not to repeat them

- final connections and checks:

- ☐ reconnect the earth electrodes disconnected for the insulation and dielectric measurements

- ☐ check the electrical continuity of the protective conductors of the assembly (presence of contact washers, presence of equipotential connectors for doors, etc...)

- ☐ check the tightness of:

- all electrical connections, using a torque wrench, except if already marked with varnish

- mechanical connections

- anchor bolts.

- ☐ miscellaneous checks:

- mechanical locking of switchgear

- markings on the switchboard, on power and control conductors

- visual inspection of outside surfaces and paint. Touch up any scratches or other defects.

- check that original greasing of functional units clamps is effective. If necessary, lightly grease their electrical contacts (grease ref. 87635).

Energising equipment for the first time

- rack in the Masterpact devices (see Masterpact handbook)
- plug-in removable circuit-breakers (see relevant leaflet)
- insert Polyfast functional units
- plug-in drawers, if any
- check that all protective circuit-breakers are in the open (OFF) position
- set the Masterpact control units (see Masterpact handbook) to protect the network and, if applicable, the low-voltage distribution outgoers
- set the thermal-magnetic or electronic trip units of the protective circuit-breakers according to the rating of each outgoer
- set the motor-protection circuit breakers magnetic releases and the thermal relays according to the motors characteristics
- check that the phase rotation or index is consistent with the supplies one
- one after the other, energise the power circuits in the switchboard, checking each time that the loads are supplied and operate correctly
- carry out the operating tests:
 - ☐ operating sequence
 - ☐ controls, indications, measurements, protection
 - ☐ remote-control mechanism
 - ☐ electrical interlocks.

note: the first energising of the switchboard is potentially dangerous, due to the faults undetected during the preliminary checks. It must be carried out by a qualified technician. Before any intervention switch-off the equipment. A hazard of electric shock, burns or explosion are inherent in use of electrical equipment.

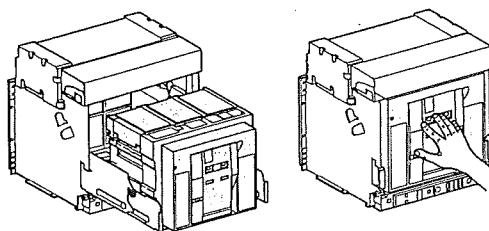
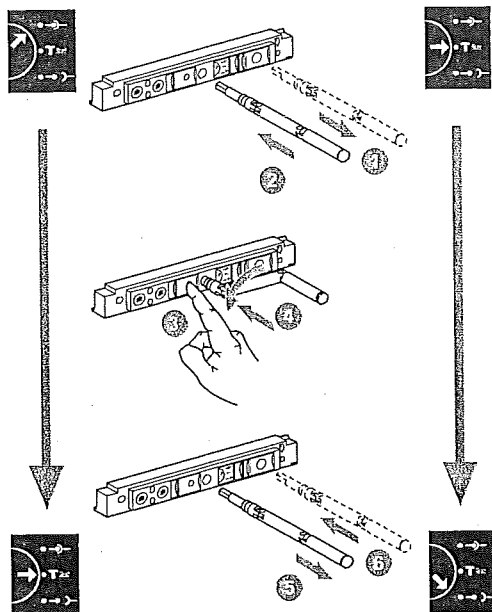
Failure to observe these instructions may result in severe bodily injury, death or damage to the switchboard.

Precautions to be taken when switchboard has been switched off for a long period

- ☐ check that nothing has been left inside the board (especially if modifications have been carried out)
- ☐ clean all components
- ☐ check the insulation (if the value is below 4 megaohms, preheat the board to get rid of humidity and condensation)
- ☐ before applying voltage make sure that all outgoing circuits are in «open» position to avoid a too high current surge when closing the main circuit-breaker
- ☐ progressively close the breakers.

Withdrawing and mounting

(refer to device leaflet)



Withdrawing

- ☐ insert the crank
- ☐ unlock the racking mechanism, using the unlocking button
- ☐ turn the crank to the disconnected position
- ☐ fit the crank back in its location.

Removal

- ☐ press the release tabs and pull the rails out
- ☐ remove the Masterpact. Because of the weight of the apparatus, the intervention of 2 operators is recommended. A lifting truck can also be used.

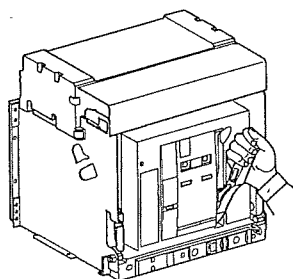
Putting in position

- ☐ before racking in the Masterpact, check that the chassis corresponds to the device
- ☐ press the release tabs and pull the rails out
- ☐ position Masterpact on the rails
- ☐ make sure the device rests on all four supports
- ☐ push the circuit-breaker into the chassis, taking care not to push on the control unit.

Racking

- ☐ inset the crank
 - ☐ unlock the racking mechanism, using the unlocking button
 - ☐ turn the crank to the test position, then to the connected position
- At the end of operation the stress can be important, due to the racking of the pads into the clamps (torque can reach 25 N.m)
- ☐ fit the crank back in its location.

Operation



■ to close Masterpact:

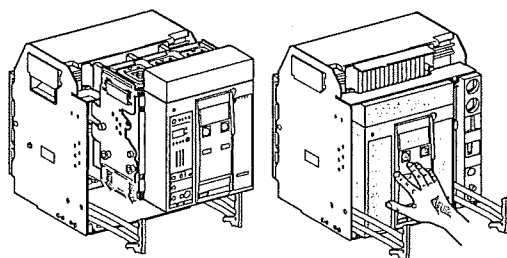
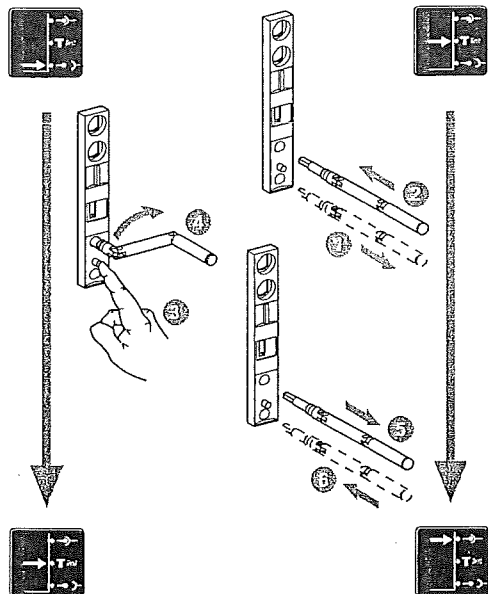
- ☐ charge Masterpact by pulling the handle down six times until you hear a «clack». The «charged» indication appears
- ☐ in case of opening on electrical fault, first press the trip indication button
- ☐ press the mechanical «ON» push-button. The «ON» indication appears.

■ to open Masterpact:

- ☐ press the mechanical «OFF» push-button. The «OFF» indication appears.

Withdrawing and mounting

(refer to device leaflet)



Withdrawing

- ☐ insert the crank
- ☐ unlock the racking mechanism, using the unlocking button
- ☐ turn the crank to the disconnected position
- ☐ fit the crank back in its location.

Removal

- ☐ press the release tabs and pull the rails out
- ☐ remove the Masterpact. Because of the weight of the apparatus, the intervention of 2 operators is recommended. A lifting truck can also be used.

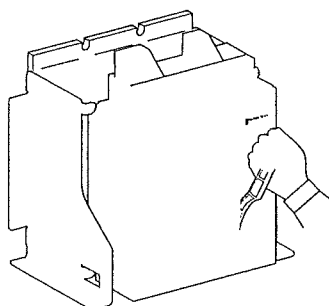
Putting into position

- ☐ before racking in the Masterpact, check that the chassis corresponds to the device
- ☐ press the release tabs and pull the rails out
- ☐ position Masterpact on the rails
- ☐ make sure the device rests on all four supports
- ☐ push the circuit-breaker into the chassis, taking care not to push on the control unit
- ☐ press the release tabs to push the rails in.

Racking

- ☐ insert the crank
 - ☐ unlock the racking mechanism, using the unlocking button
 - ☐ turn the crank to the test position, then to the connected position.
- At the end of operation the stress can be important, due to the racking of the pads into the clamps (torque can reach 25 N.m)
- ☐ fit the crank back in its location.

Operation



■ to close Masterpact:

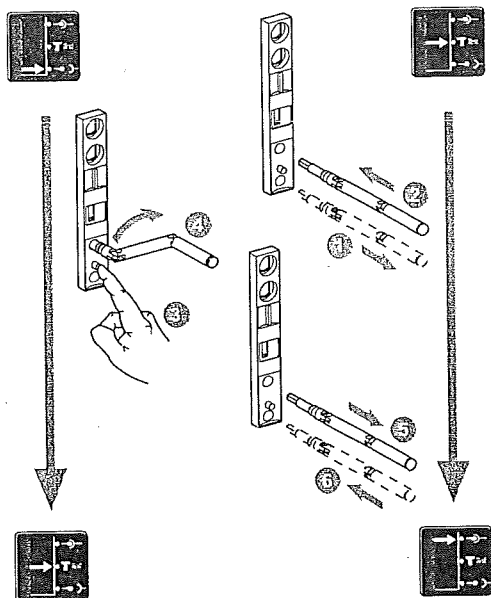
- ☐ charge Masterpact by pulling the handle down six times until you hear a «clack». The «charged» indication appears
- ☐ in case of opening on electrical fault, first press the trip indication button
- ☐ press the mechanical «ON» push-button. The «ON» indication appears.

■ to open Masterpact:

- ☐ press the mechanical «OFF» push-button. The «OFF» indication appears.

Withdrawing and mounting

(refer to device leaflet)



Withdrawing

- ☐ insert the crank
- ☐ unlock the racking mechanism, using the unlocking button
- ☐ turn the crank to the disconnected position
- ☐ fit the crank back in its location.

Removal

- ☐ press the release tabs and pull the rails out
- ☐ remove the breaker. Because of the weight of the apparatus, the intervention of 2 operators is recommended. A lifting truck can also be used.

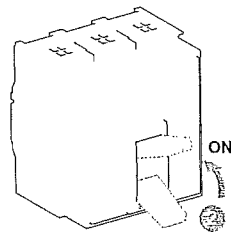
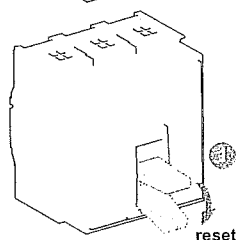
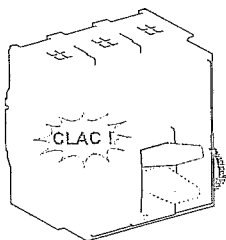
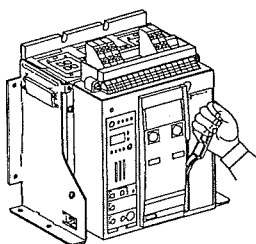
Putting into position

- ☐ before racking in the Compact NS, check that the chassis corresponds to the device
- ☐ press the release tabs and pull the rails out
- ☐ position Compact NS on the rails
- ☐ make sure the device rests on all four supports
- ☐ push the circuit-breaker into the chassis, taking care not to push on the control unit
- ☐ press the release tabs to push the rails in.

Racking

- ☐ insert the crank
 - ☐ unlock the racking mechanism, using the unlocking button
 - ☐ turn the crank to the test position, then to the connected position.
- At the end of operation the stress can be important, due to the racking of the pads into the clamps (torque can reach 25 N.m)
- ☐ fit the crank back in its location

Operation



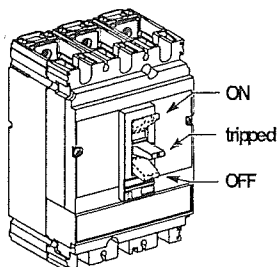
remote controlled breaker

- to close the breaker:
 - ☐ charge Compact NS by pulling the handle down six times until you hear a «clack». The «charged» indication appears.
 - ☐ in case of opening on electrical fault, first press the trip indication button
 - ☐ press the «ON» push-button. The «ON» indication appears.
- to open the breaker:
 - ☐ press the «OFF» push-button. The «OFF» indication appears.

toggle type manually operated breaker

- to close the breaker:
 - ☐ in case of opening on electrical fault, first pull the toggle down to the bottom stop
 - ☐ lift the toggle up. The «ON» indication appears.
- to open the breaker:
 - ☐ pull the toggle down. The «OFF» indication appears.

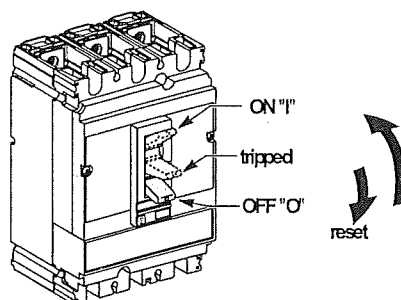
Toggle



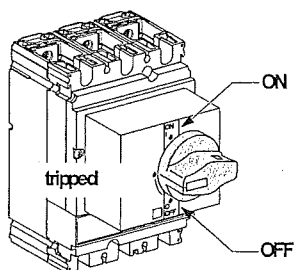
- if necessary, open the door to access the handle
 - the device is controlled by pushing the toggle right or left, according to the «ON» and «OFF» markings engraved on the apparatus.
- ON = Closing
OFF = Opening.

Reset

In case of tripping on electrical fault (indicated by the toggle position), first pull the toggle down to the bottom stop. The device is then ready to be closed.



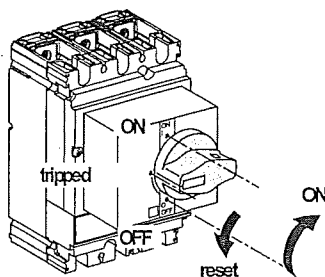
Direct or extended rotary handle



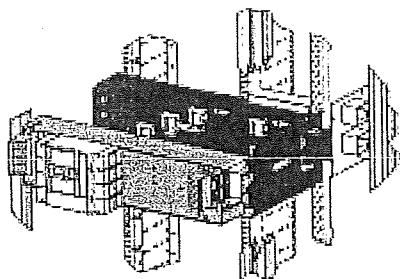
- to close the device:
turn the handle toward «ON» (clockwise)
 - to open the device:
turn the handle toward «OFF» (counter-clockwise). Marks placed on the rotary handle indicate the position:
- white / ON: closed
green / OFF: open
tripped: fault.

Reset

In case of tripping on electrical fault (indicated by the handle position), first turn the handle thoroughly to the open position. The device is then ready to be closed.



Plug-in Polyfast



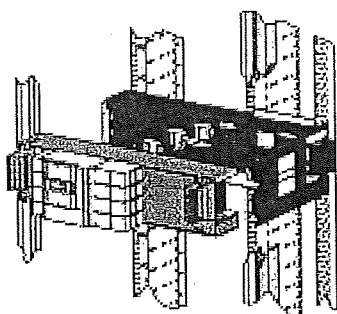
■ removal

- ☐ open the apparatus: «OFF» position
- ☐ unscrew the 4 fastening screws of Polyfast on its base
- ☐ extract Polyfast by means of the 2 handles, holding it horizontal in order to maintain the fastening screws in position.

■ putting into position

- ☐ plug Polyfast on its base
- ☐ secure Polyfast on its base plate (4 screws)
- ☐ check the presence of the terminal covers on the apparatus
- ☐ if necessary proceed with adjustment of the control unit
- ☐ close the apparatus: «ON» position.

Disconnectable Polyfast



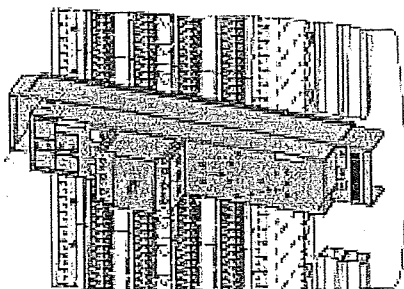
■ removal

- ☐ open the apparatus: «OFF» position
- ☐ remove the downstream terminal cover
- ☐ disconnect power cables
- ☐ unscrew the 4 fastening screws of Polyfast on its base
- ☐ extract Polyfast by means of the 2 handles, holding it horizontal in order to maintain the fastening screws in position.

■ putting into position

- ☐ plug Polyfast on its base
- ☐ secure Polyfast on its base plate (4 screws)
- ☐ connect the downstream power cables, conforming with the recommended tightening torques
- ☐ fit the terminal covers on the apparatus
- ☐ if necessary proceed with adjustment of the control unit
- ☐ close the apparatus: «ON» position.

Disconnectable mounting plate



■ removal

- ☐ open the apparatus: «OFF» position
- ☐ disconnect the power terminal block
- ☐ disconnect the auxiliary terminal block
- ☐ unscrew the 2 fastening screws of the mounting plate on its base
- ☐ extract the mounting plate, holding it horizontal in order to maintain the fastening screws in position.

■ putting into position

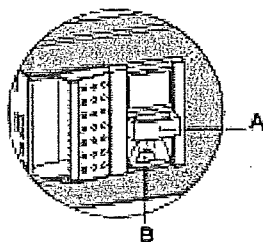
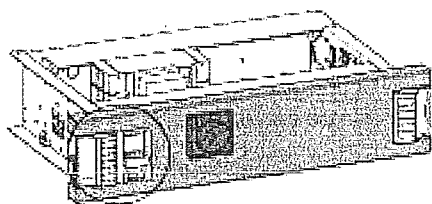
- ☐ plug the mounting plate on its base
- ☐ secure the mounting plate on its base plate (2 screws)
- ☐ connect the power and auxiliary terminal blocks
- ☐ if necessary proceed with adjustment of the control unit
- ☐ close the apparatus: «ON» position.

Fixed and plug-in on mounting plate



- removal of a Compact MCCB from its base (refer to the Compact leaflet).

Drawers



■ general: passing from one position to another

□ operation of the drawer impossible apparatus closed: open the apparatus

□ seize the drawer by the handles and press and hold the red release button.

The positions are visible on the indicator B located under the release button A

- plug-in: red
- test: yellow
- draw-out: green.

■ withdrawing

□ pass from the «connected» to the «test» position, then to the «disconnected» position

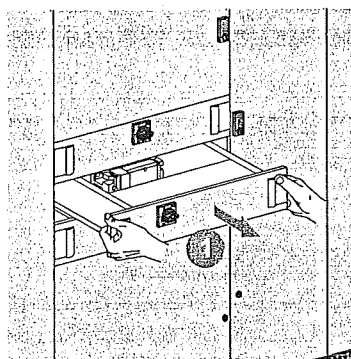
□ the positioning mechanism locks the drawer in the selected position.

■ removal

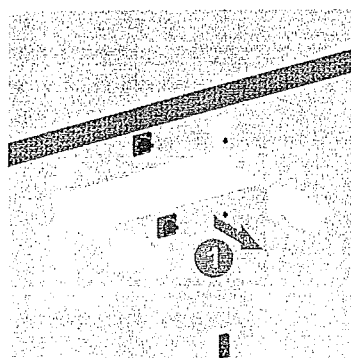
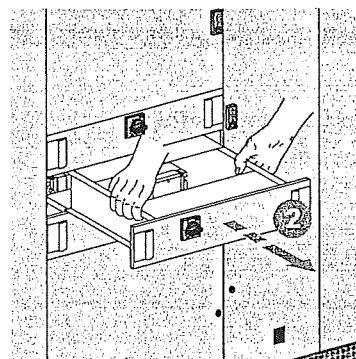
□ pull the drawer with the handles to the pre-extraction hard point

□ position the hands as indicated on the diagrams and extract the drawer

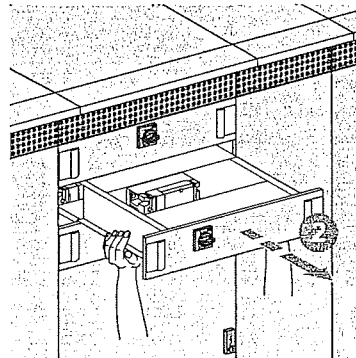
□ be careful with grease present on the mechanisms.



drawer implemented in the lower side of the column



drawer implemented in the upper side of the column



■ putting into position

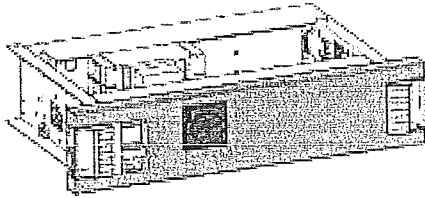
□ engage the drawer in its cell, positioning the hands as indicated on the diagrams

□ check that the apparatus is in open position

□ using the two handles, push the drawer to the «disconnected» position

note: if the drawer are equipped with mismatching device, check the consistence of drawer and cell.

Drawers



■ racking

- ☐ seize the drawer by the handles
- ☐ press and hold the red release button
- ☐ push the drawer fully home to the «connected» position
- ☐ the racking is correct if the positioning mechanism is locked
- ☐ check the correct position of the drawer on the indicator B placed under the release button A
 - plug-in: red
 - test: yellow
 - draw-out: green

notes:

- 1 it is possible to go directly to the «connected» position when putting the drawer into position
- 2 the drawers equal or more than 12 modules need a more important stress on racking. Curtly impart a firm motion of wrists at full stroke.

disconnected position

connected position

■ operation

- ☐ when the drawer is in the «test» or «connected» position, actuate the apparatus rotary handles or the control devices (push-buttons, selector switches) according to the electrical diagram
- ☐ rotary handle on Compact or GV:
 - turn clockwise toward «ON» to close
 - turn counter-clockwise toward «OFF» to open
 - marks placed on the rotary handle indicate the position:
 - white / ON: closed
 - green / OFF: open
 - tripped: fault.

Reset

In case of tripping on electrical fault (indicated by the handle position), first turn the handle thoroughly to the open position. The device is then ready to be closed.

General**Frequency**

The frequency of preventive maintenance depends primarily on the operating conditions of the electrical switchboard. For operating conditions found in normal environments, the frequency should be as indicated in the table below. It may be extended if the switchboard is used in a particularly clean environment and not in an intensive manner. It must be reduced if the switchboard is used in a particularly aggressive environment (dust, humidity, corrosive vapours, heat) or is used intensively.

Recommended diary

Type	Action	Frequency
General inspection	Visual checks and general cleaning Visual check of busbars Running tests	Once a year
Maintenance on functional units on plate	Inspection of the connections	Every five years
Maintenance on plug-in and disconnectable functional units	Inspection of the connections and clamps Cleaning and greasing of clamps	Every two years
Maintenance on drawers	Check of mechanical working Inspection of the connections and clamps Cleaning and greasing of clamps Cleaning and greasing of mechanical parts	Every year or during a production break Every two years
Maintenance of switchgear	according to the respective handbooks	

General recommendations

- ☐ before any intervention on the connections, switch off the functional unit, remove the protective screens and the partitioning sheets and boxes
- ☐ if the column is not form 4, its feeding it must be totally de-energised in order to prevent any contact with the close functional units or their connections
- ☐ it is compulsory to switch off the column for any intervention on functional units on plate
- ☐ when reassembling the connections:
 - use new screws, washers, nuts of the same type (class 8.8)
 - tighten to the recommended torque (see table page 21)
 - apply varnish.

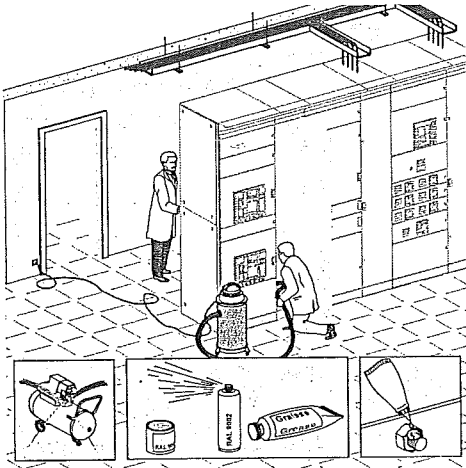
Method of inspection of the electrical connections

- ☐ connections by lugs or screwed bars: presence of varnish
- ☐ connections by cage type terminals: screw moderately to compensate for a possible creep.

Grease to be used

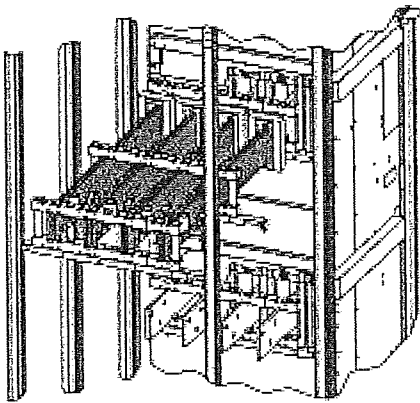
- ☐ electrical contacts: ref. 87635
- ☐ mechanical parts: ref. 87636

General inspection



Visual checks and general cleaning of the columns

- ☐ check for humidity and foreign bodies inside and outside the switchboard
- ☐ examine the outer finish. If necessary, touch up any paint scratches and replace any damaged or rusted parts
- ☐ remove the possible foreign bodies and clean the switchboard, preferably with a vacuum cleaner
- ☐ if necessary, clean the ventilation system and change the filters.



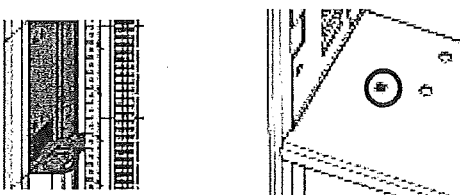
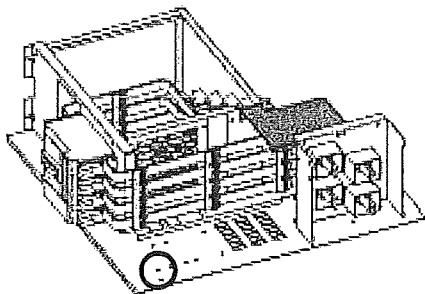
Visual check of busbars

- ☐ assembly screws for busbars do not need to be tightened as long as the red paint, guaranteeing correct tightening torque, is intact. The use of a contact washer compensates for possible creeps due to overheating
- ☐ the vertical busbars receiving the functional units $\leq 630A$ need no control. The system of double clamp prevents busbars from any constraint on racking/withdrawing
- ☐ the control of busbars connections and outgoing cables connections is therefore strictly visual to detect any hot point. It can be carried when disassembling the protections (**out of supply**). A hot point materialises by a change in colour
- ☐ in case of hot point see «corrective maintenance»
- ☐ check the condition of insulating busbars supports.

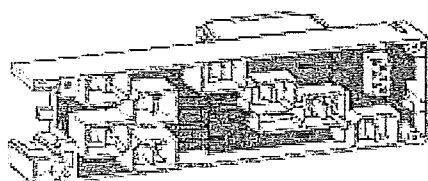
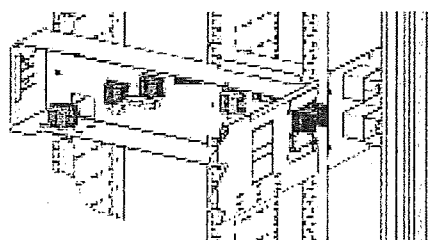
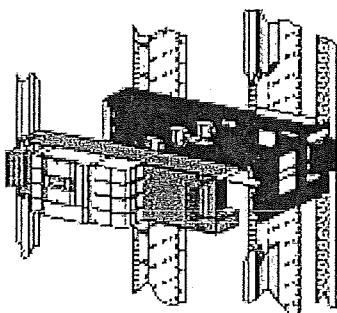
Runnign tests

- ☐ check the insulation monitors
- ☐ carry out signalling units tests
- ☐ carry out working tests with the drawers drawout circuit-breakers in test position
- ☐ checking of devices: refer to the corresponding handbooks.

Maintenance of functional units on mounting plate (column out of supply)



Maintenance of plug-in and disconnectable functional units (FU out of supply)



Inspection of the connections

- ☐ remove the mounting plate, after having disconnected the downstream cables and auxiliary connectors, if any:
 - remove the door of the concerned FU and that of the lower FU
 - remove the front plate of the fixed circuit-breakers
 - dismantle the side fastening screws
 - insert a screwdriver between the mounting plate and the support in order to release the mechanical stop unit (embossing)
 - draw the mounting plate out
- ☐ remove the terminal covers of the fixed devices
- ☐ check electric connections
- ☐ check the absence of hot point on the points of connection. A hot point materialises by a change in colour
- ☐ in case of hot point see «corrective maintenance»
- ☐ fit the terminal covers
- ☐ lightly grease the contacts of the clamps
- ☐ put the mounting plate into position:
 - present the mounting plate and to make it slide up to the mechanical stop unit: the square holes of the plate are aligned with those of the supports
 - fit the side fastening screws
 - fit the front plate if any, as well as the doors
- connect the downstream cables and auxiliary connectors, if any.

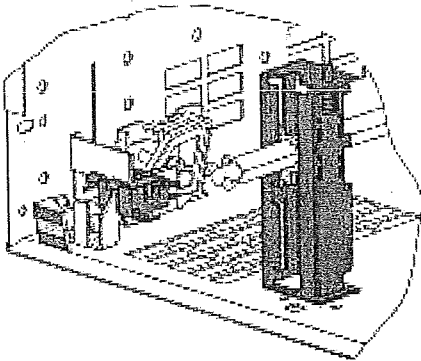
Inspection of the connections and clamps

- downstream connections
 - ☐ inspect the electrical connections.
- functional unit
 - ☐ open the apparatus: «OFF» position
 - ☐ remove the moving part:
 - unscrew the 4 fastening screws of Polyfast on its base, after having disconnected the downstream cables in the case of disconnectable functional units
 - extract Polyfast by means of the 2 handles, holding it horizontal in order to maintain the fastening screws in position.
 - ☐ remove the terminal covers of the apparatus
 - ☐ check the absence of hot point on the clamps and the interface/circuit-breaker connections. A hot point materialises by a change in colour
 - ☐ in case of hot point see «corrective maintenance»
 - ☐ fit the terminal covers
 - ☐ plug and secure Polyfast on its base (4 screws)
 - ☐ connect the downstream cables if need be.

Cleaning and greasing of clamps

- ☐ remove the moving part
- ☐ extract the clamps:
 - the clamps get out from the front of the fixed part
 - press the sides of the insulating part to release the clip-mounting from the fixed part
 - pull the clamp to withdraw it from the busbars or the outgoing bushing.
- remove dust and excess of grease with a brush: **do not use solvent or hydrocarbon**
- ☐ lightly grease the **contact pins**, busbars and outgoing bushing side
- ☐ lightly grease the **silver plated bars** of the moving part, UF side
- ☐ set the clamps up:
 - present the clamp in the fixed part's opening, release push rods ahead
 - rack the clamp in and clip-mount it to the fixed part by pushing the two sides at the same time. Check that the clip-mounting is correct.
- ☐ put the moving part into position.

Maintenance of drawers (FU out of supply)

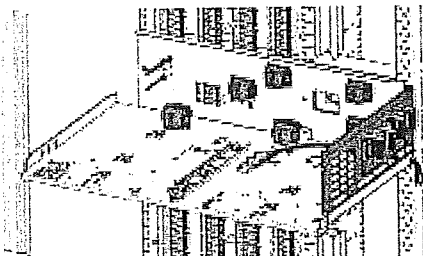


Check of mechanical working

- ☐ carry out an operation of withdrawing/racking: see chapter «operation»
- ☐ check the operation of the release button and the positioning mechanism
- ☐ check the good position of the auxiliary contacts and their condition, fixed and moving parts
- ☐ check the microswitches condition
- ☐ check the locking mechanisms.

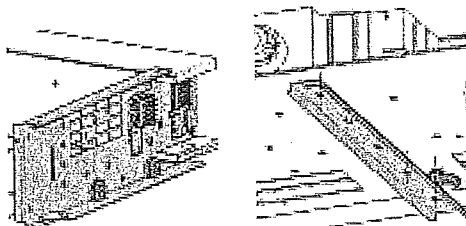
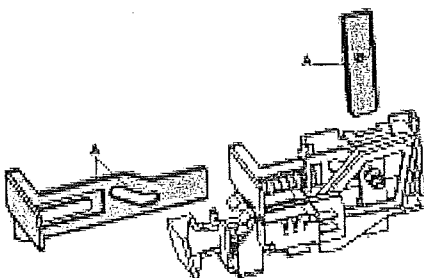
Inspection of the connections and clamps

- downstream connections
 - ☐ inspect the electrical connections.
- functional unit
 - ☐ open the main apparatus of the FU
 - ☐ remove the drawer: see chapter «operation»
 - ☐ remove the terminal covers of the apparatuses if necessary
 - ☐ inspect internal connections
 - ☐ check the absence of hot point on the clamps, the internal connections and the interface/circuit-breaker connections if any. A hot point materialises by a change in colour
 - ☐ in case of hot point see «corrective maintenance»
 - ☐ fit the terminal covers
 - ☐ put back the drawer in place: see chapter «operation».



Cleaning and greasing of clamps

- ☐ remove the drawer: see chapter «operation»
 - ☐ extract the clamp:
 - the clamps get out from the front of the fixed part
 - press the sides of the insulating part to release the clip-mounting from the fixed part
 - pull the clamp to withdraw it from the busbars or the outgoing bushing.
 - ☐ remove dust and excess of grease with a brush: **do not use solvent or hydrocarbon**
 - ☐ lightly grease the **contact pins**, busbars and outgoing bushing side
 - ☐ lightly grease the **incoming bushings** of the drawer
 - ☐ set the clamps up:
 - present the clamp in the fixed part's opening, release push rods ahead
 - rack the clamp in and clip-mount it to the fixed part by pushing the two sides at the same time. Check that the clip-mounting is correct.
 - ☐ put back the drawer in place: see chapter «operation».
- Drawers ½ width:** lightly grease the contact points of the connectors.



Cleaning and greasing of mechanical parts

- ☐ remove the drawer: see chapter «operation»
 - ☐ remove dust and excess of grease with a brush or a duster: **do not use solvent or hydrocarbon**
 - ☐ proceed with a moderate greasing.
- Parts to lubricate:
- positioning mechanism: lightly grease zones A
 - bearings
 - slides.

General**General recommendations**

- ☐ before any intervention on the connections, switch off the functional unit, remove the protective screens and the partitioning sheets and boxes
- ☐ if the column is not form 4, its feeding it must be totally de-energised in order to prevent any contact with the close functional units or their connections
- ☐ it is compulsory to switch off the column for any intervention on functional units on plate
- ☐ when reassembling the connections:
 - use new screws, washers, nuts of the same type (class 8.8)
 - tighten to the recommended torque (see table page 21)
 - apply varnish.

Grease to be used

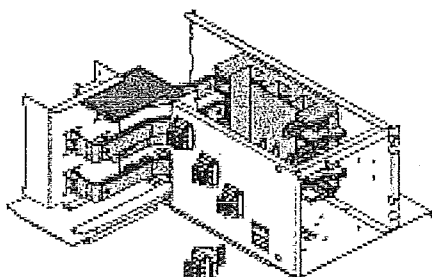
- ☐ electrical contacts: ref. 87635
- ☐ mechanical parts: ref. 87636

Hot point**Screwed connection**

- ☐ identify the cause: generally a loosening connection
- ☐ dismantle the assembly
- ☐ clean and rub down surfaces in contact (e.g. sandpaper N°400)
- ☐ set the connection up.

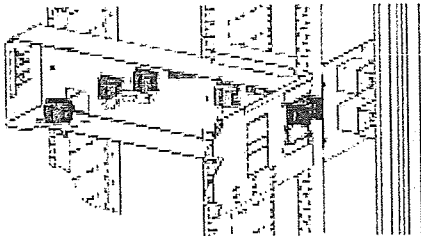
Clamp connection

- ☐ identify the cause: generally a loosening connection on a junction related to the clamp
- ☐ repair the involved connection: see screwed connection
- ☐ carry out the replacement of clamp: see procedure of replacement of the clamp.

Maintenance of functional units on mounting plate (column out of supply)**Replacement of the clamps (column out of supply)**

- ☐ remove the mounting plate
- ☐ dismantle upstream connections
- ☐ extract the clamps:
 - using a screwdriver, break the securing clips of the clamp interior side of the mounting plate
 - push the clamp and take it out by the back the mounting plate.
- ☐ **the clamp is from now on unusable**
- ☐ check that the new clamp is identical (number of pins) to the replaced one
- ☐ mount the new clamp:
 - present the clamp in the opening of the mounting plate by the back
 - clip-mount the clamp on the mounting plate by pushing the two sides at the same time. Check that the clip-mounting is correct.
- ☐ set the upstream connections up
- ☐ lightly grease the contacts of the clamps
- ☐ put the mounting plate into position.

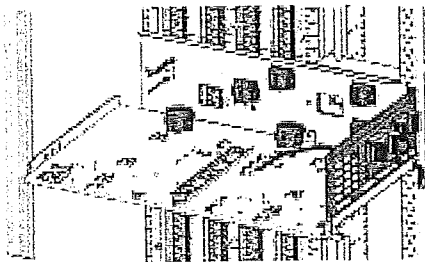
Maintenance of plug-in and disconnectable functional units (FU out of supply)



Replacement of the double-clamps (FU out of supply)

- ☐ remove the moving part
- ☐ extract the clamps:
 - the clamps get out from the front of the fixed part
 - press the sides of the insulating part to release the clip-mounting from the fixed part
 - pull the clamp to withdraw it from the busbars or the outgoing bushing.
- ☐ check that the new clamp is identical (colour and number of pins) to the replaced one
- ☐ proceed with greasing:
 - lightly grease the **contact pins**, busbars and outgoing bushing side
 - lightly grease the **silver plated bars** of the moving part, UF side.
- ☐ set the clamps up:
 - present the clamp in the fixed part's opening, release push rods ahead
 - rack the clamp in and clip-mount it to the fixed part by pushing the two sides at the same time. Check that the clip-mounting is correct.
- ☐ put the moving part into position.

Maintenance of drawers (FU out of supply)



Replacement of the double-clamps (FU out of supply)

- ☐ remove the drawer: see chapter «operation»
- ☐ extract the clamps:
 - the clamps get out from the front of the fixed part
 - press the sides of the insulating part to release the clip-mounting from the fixed part
 - pull the clamp to withdraw it from the busbars or the outgoing bushing.
- ☐ check that the new clamp is identical (colour and number of pins) to the replaced one
- ☐ proceed with greasing:
 - lightly grease the **contact pins**, busbars and outgoing bushing side
 - lightly grease the **incoming bushings** of the drawer.
- ☐ set the clamps up:
 - present the clamp in the fixed part's opening, release push rods ahead
 - rack the clamp in and clip-mount it to the fixed part by pushing the two sides at the same time. Check that the clip-mounting is correct.
- ☐ put back the drawer in place: see chapter «operation».

Maintenance after a fault has occurred

The high currents resulting from a fault cause damage to structures, components, busbars and cables.

Following a fault, contact your local Schneider Electric office.

Troubleshooting and interventions

For any interventions other than those described in this manual, contact your local Schneider Electric agency.

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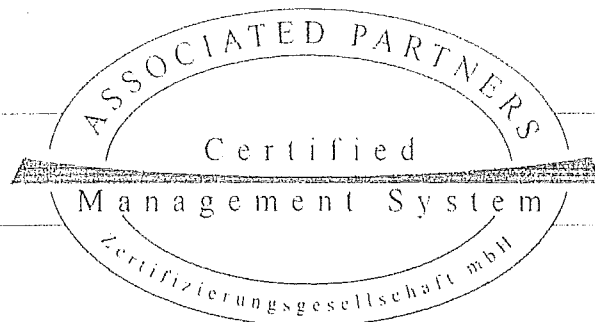
As standards, specifications and designs change from time to time, please ask for confirmation of the information given in this publication.

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CERTIFICATE



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Zur Eisenhütte 11

46047 Oberhausen

has introduced and applies a quality management system conforming to

DIN EN ISO 9001/December 2000

and

an environmental management system conforming to

DIN EN ISO 14001/October 1996

Scope of work and service

Industrial Plants

Consulting, planning, development, production and assembly of industrial automation, low-voltage switchgear and cable technology

Power Supplies

Development, production and logistic of modular power supply systems, distribution of industrial batteries

Telecommunication

Planning, installation, commissioning, integration and service of telecommunication plants, turnkey as well as training and licensing of human resources

Further details are contained in the report:

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