

Low Voltage

Okken

High Dependability

Installation guide 2023



Life Is On

Schneider
Electric

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Note

You have just received your new Okken switchboard. Please read this manual carefully. It provides all the necessary information concerning installation, operation and maintenance of your switchboard.

Please keep this manual on hand for easy reference.

The messages opposite are used in this manual to:

- ☐ warn of potential hazards,
- ☐ draw attention to additional information intended to clarify or simplify a procedure.

DANGER

Used where there is a hazard of severe injury or death.
Failure to follow a "DANGER" instruction will result in electric shock, severe injury or death.

WARNING

Used where there is a hazard of injury or death.
Failure to follow a "WARNING" instruction may result injury or death.

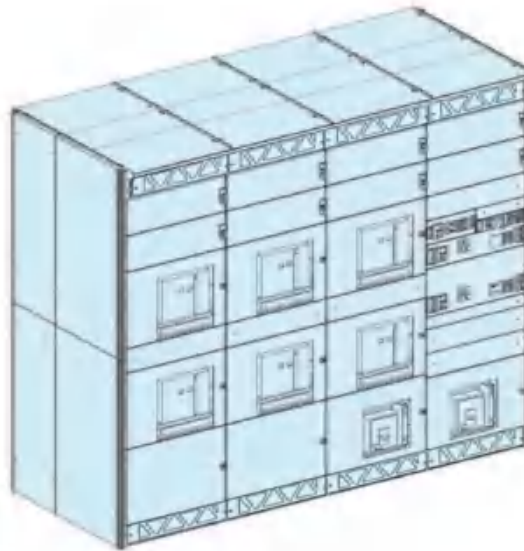
CAUTION

Used where there is a hazard of damage to equipment.
Failure to follow a "CAUTION" instruction may result in damage to equipment.

NOTE

Provides additional information intended to clarify or simplify a procedure.

Okken is a switchboard made up of a number of modular sections. Such a design facilitates transportation, installation and maintenance.
The horizontal busbars are connected between sections by joining.
Prior to shipping, every Okken switchboard has been submitted to the tests, as per IEC 60439-1 and IEC 61439-2 and inspected visually, mechanically and electrically by a trained technician of the Quality Inspection department.

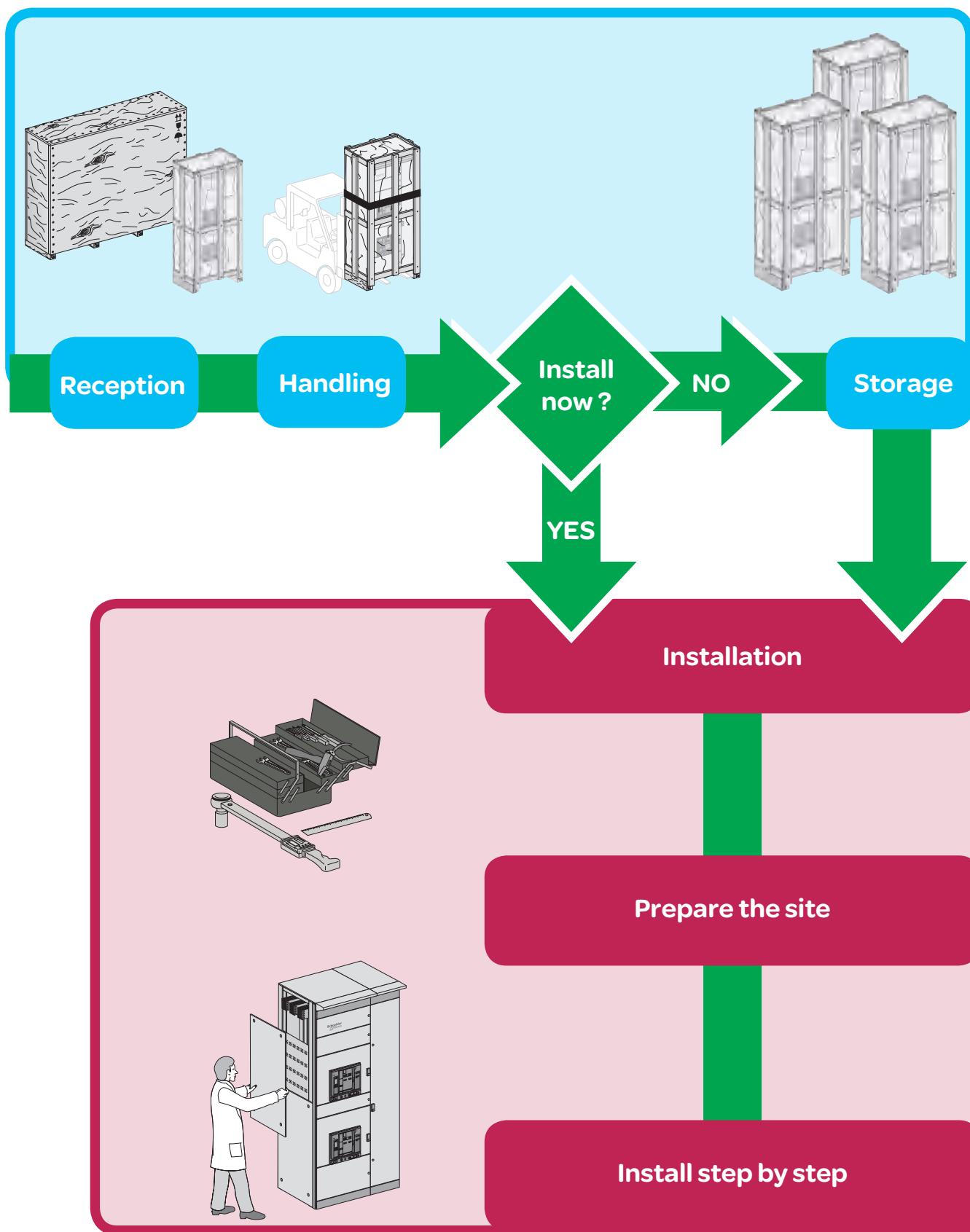


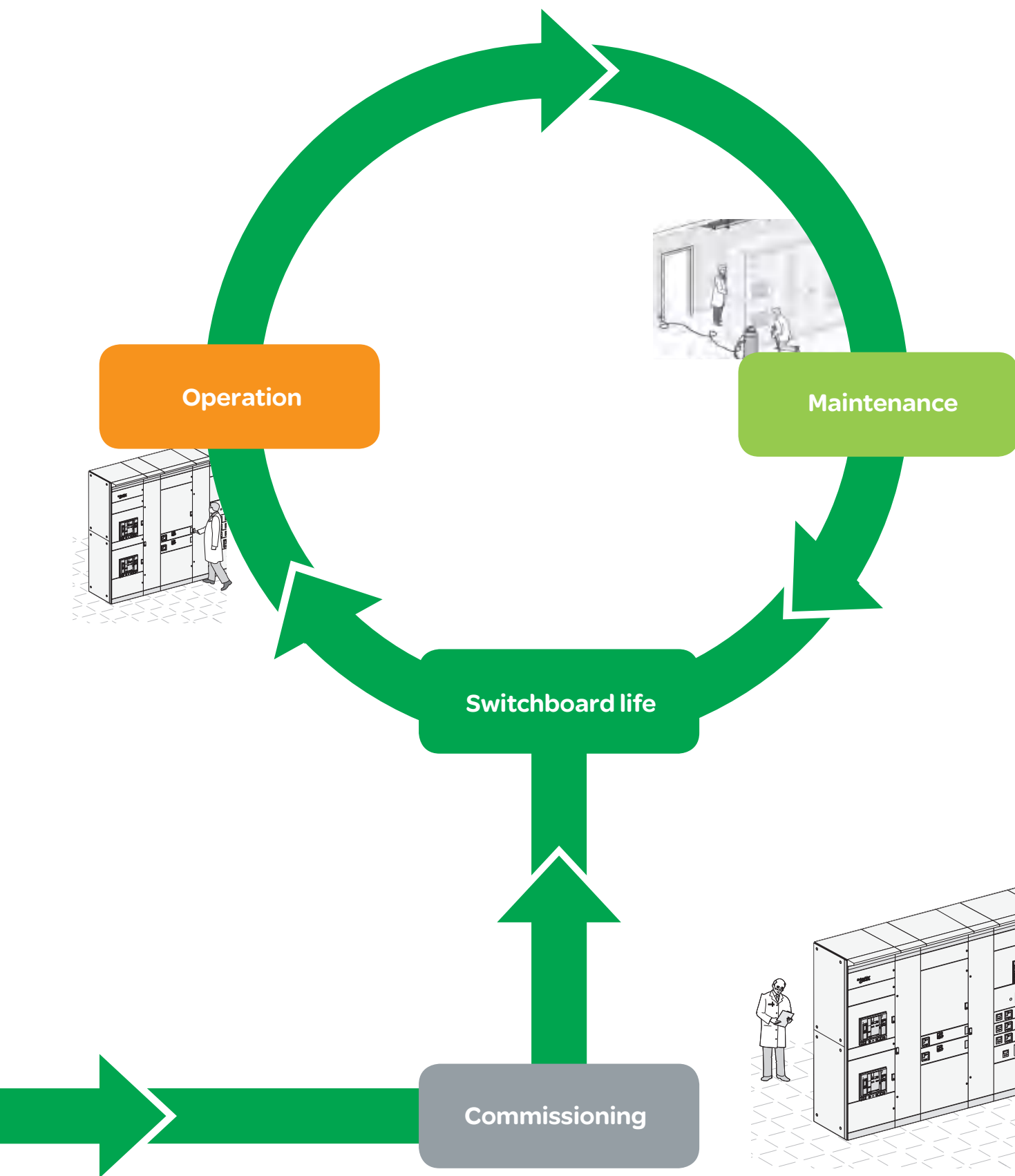
DANGER

- Correct operation of the Okken switchboard requires that handling, installation, operation and maintenance be carried exclusively by qualified personnel
- The system must be de-energised prior to installation and maintenance operations to avoid exposing personnel to the risk of electrical shock.
- The purpose of this instruction manual is to familiarise qualified persons with Okken construction, installation and maintenance as well as the risks encountered. Personnel must be:
 - ☐ qualified to work near live equipment
 - ☐ trained with respect to all applicable safety practices.

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

Check the switchboard nameplate located on the incoming section for conformity with the delivery note.





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All switchboard components including separate devices, are delivered on pallets, enabling the bottom handling.
The cubicles or section of cubicles, have also their lifting lugs mounted, ready to be used in a handling by the top.

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.
- After this inspection, put back the plastic protection cover.

NOTE

We decline any responsibility for losses or damage during transportation and any financial liability for the said losses and damage.



The identification is generally done by a digit at the top of each cubicle. It corresponds to the serial number assigned to each column on the switchboard's front face drawing.

When sent separately, the devices are identified by

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

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 (fit the adhesive handling instruction label on all 4 sides of the parcel).

When ?

The cubicles and the heavy functional units have to be handled:

- when manufacturing, to be moved between two work stations,
- after manufacturing:
 - at the panelbuilder to prepare shipping,
 - at the customer to prepare installation.

The solutions

Depending on the size, the weight and what to move, appropriate solution can be adopted.

Functional units



Lifting tables

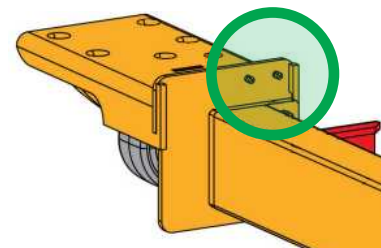
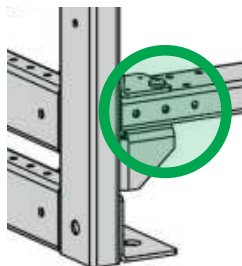


Manual stacker

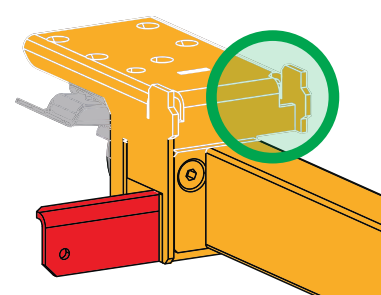
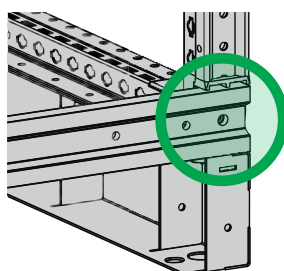
Skates

Whatever during manufacture or installation, the skate is a good handling solution. There is 2 types of skate, according to the type of frame:

■ frame 70-M



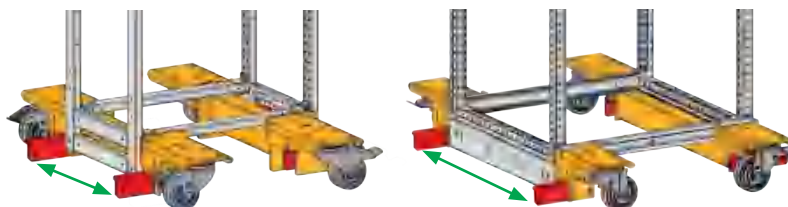
■ other frame



The solutions (contd.)

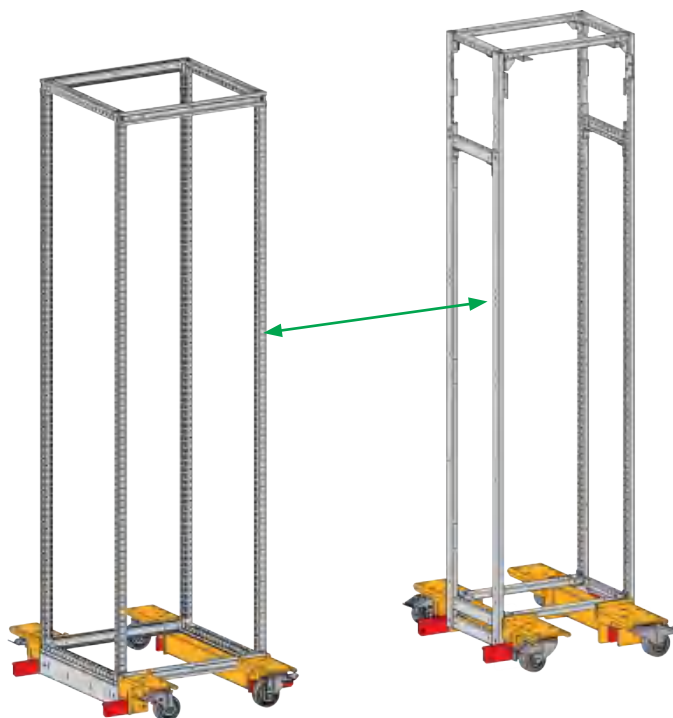
The length of the skate is adapted to the cubicle depth by the part in the middle of the skate.

From 400 mm to 1400 mm



2

The skates allow to move a multiple cubicle assembling (even different type).



File number to manufacture these solutions

Type of skate	File number
70-M	NHA46215
Other Okken cubicles	NHA46216

The solutions (contd.)



Single 70-M cubicle handling solution

WARNING

- The pallet truck must be used on a flat and clear floor.
- The pallet truck must be manipulated carefully, without jolt. Sudden changes of direction can be dangerous.

CAUTION

- The maximum weight of the cubicle to handle is 600kg.
- Do not manipulate the pallet truck while the cubicle is not strapped to the poles.
- Cubicle must be handled by at least two persons.

NOTE

- Pallet truck must be maintained in accordance with builder instructions.
 - Attention has to be brought on wheels and their fixing systems
 - Attention has also to be paid on fastening bolts of the anti-lurching structure.

Documentation

Documentations	File number
Manufacturing Purchasing Using	NHA57131

Heavy single cubicle or multiple cubicles section

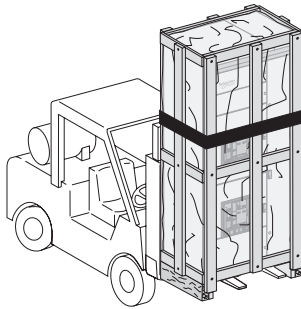


Forklift



Lifting equipment + slings

The solutions (contd.)



Recommendations

Sections should always be handled in the upright position with care.

- Avoid any column movement by making them swivel jerkily.
- The equipment may be handled:
 - from the bottom:

WARNING

- When handled from the bottom, use extreme caution. There is a tendency for the equipment to tilt due to its high centre of gravity.
- Failure to observe these instructions may result in injury or damage to the equipment.

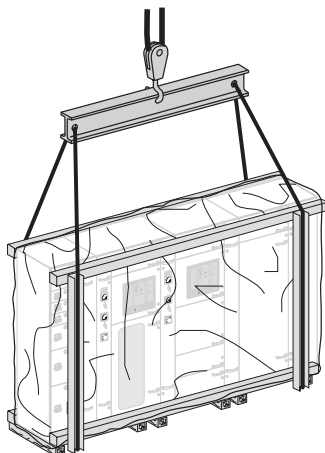
- the columns are designed with a built-in plinth and can be moved by the side or the rear using a pallet truck or a adapted fork-lift truck,
- in this case, the columns must be lifted with care and held in place during transport, either manually or by strapping them onto the handling machine, if movement is over large distances or bumpy,

Useful space for forks

Cubicle	Space (mm)
Mono NT	335
70 M	450
115, 70-2, 115-70, 70-F, VSD, CEF	535
230	1035



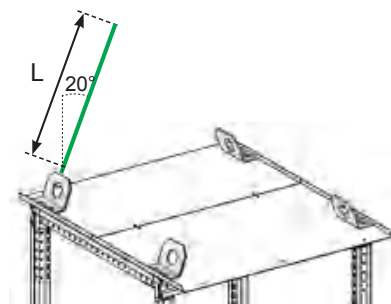
- the top:
 - if cranes or overhead cranes are used, you must use slings that are sufficiently resistant and in good condition,
 - latching must be on the 4 column lifting lugs,
 - adjust sling length according to switchboard dimensions so that their orientation is in the prolongation of that of the lifting rings,
 - do not tilt the column during transportation,
 - take care to equally distribute the load on the 4 rings.



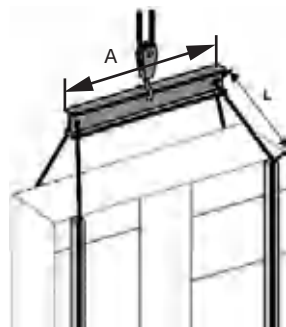
- In special cases where the transport unit includes more than two interconnected sections, it is necessary to:

- bring the switchboard as close as possible to its installation site in its original packing,
- reinforce the mechanical connections between sections,
- use a lifting beam with direct connections to the switchboard support items.

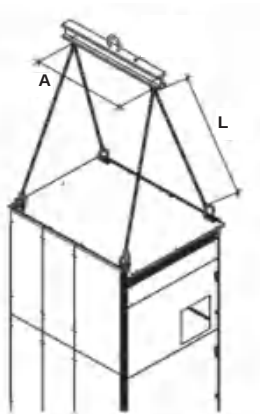
Implementations of the lifting lugs and slings - length L (mm)



Okken lifting lugs



Lifting beam + slings



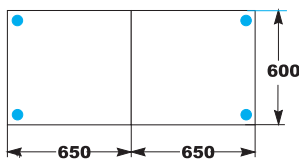
Column 1150

NOTE

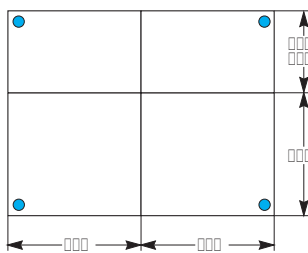
- The 4 slings must have an equal length.
- The angle of the slings must be $20^\circ \pm 2^\circ$ compared to the vertical.

■ Cubicles: 115, 70-2, 115-70, 70-F, VSD, CEF, Mono NT/NW

Side connection

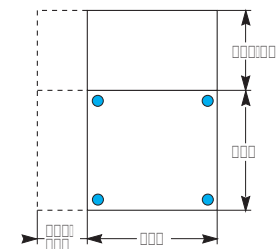


Lifting beam (A)	+	Slings (L)
-		1700 to 2100mm
650mm		1000 to 1200mm

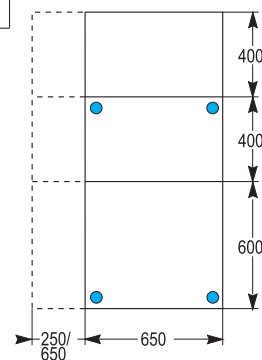


Lifting beam (A)	+	Slings (L)
-		2000 to 2650mm
650mm		1400 to 2000mm

Rear connection

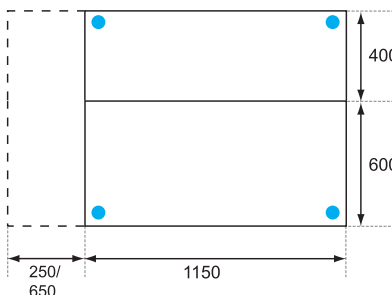


Slings (L)
1000 to 1200mm

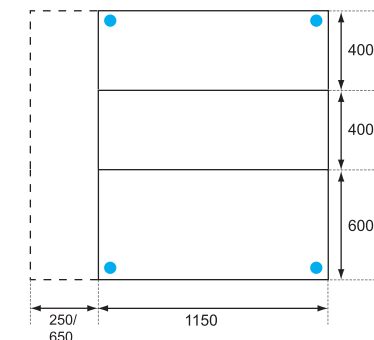


Slings (L)
1400 to 1700mm

■ Cubicle : 230



Lifting beam (A)	+	Slings (L)
600 to 1000mm		1400 to 1700mm



Lifting beam (A)	+	Slings (L)
1000 to 1500mm		1300 to 1700mm

WARNING

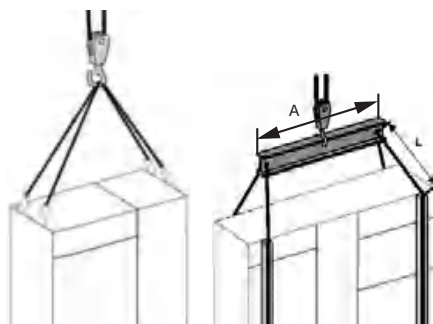
For D1150mm cubicle:

- slings must be double strand (minimum 1200kg per sling),
- the lifting beam is compulsory. It must be installed across the column depth.

It must be able to lift 1500 to 3000kg.

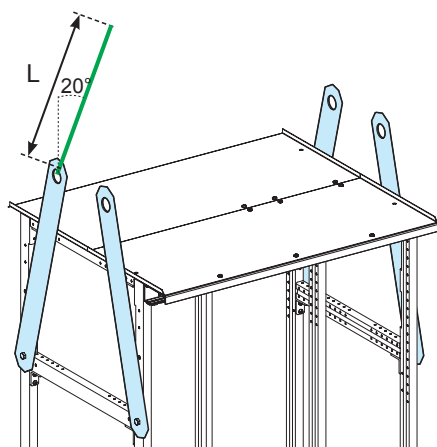
■ Cubicle : 70-M

Side connection

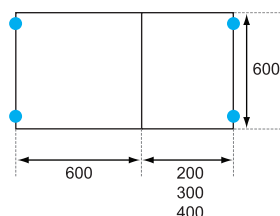


Slings

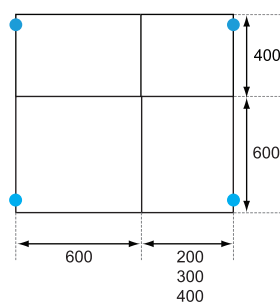
Lifting beam + slings



Slings

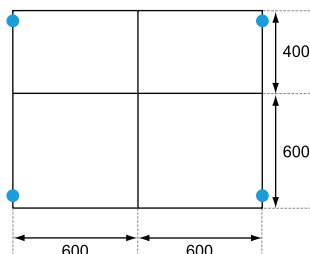


Lifting beam (A)	+	Slings (L)
-		1500 to 2300mm
650mm		700 to 1000mm

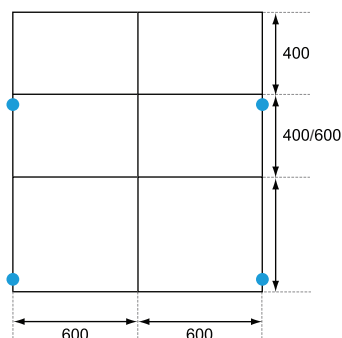


Lifting beam (A)	+	Slings (L)
-		1500 to 2300mm
650mm		700 to 1000mm

Rear connection

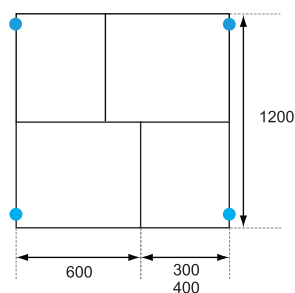


Lifting beam (A)	+	Slings (L)
-		1500 to 2300mm
650mm		700 to 1000mm

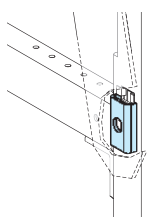


Lifting beam (A)	+	Slings (L)
-		1500 to 2300mm
650mm		700 to 1000mm

Back to back connection



Lifting beam (A)	+	Slings (L)
-		1500 to 2300mm
650mm		700 to 1000mm



Lifting gasket protection

70-M cubicle lifting lugs are delivered separately.

For handling operation follow the steps hereunder:

- remove the side panels,
- install the 4 captive nuts and the lugs:
 - IP31 directly on the frame
 - IP ≤ 54 on the gasket protection part
- position the columns,
- remove the lugs (and the possible gasket protection part).

-
- 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 -25°C to +70°C.
 - To ensure easy, risk-free handling, the columns, in view of their great weight, must be stored on a stable, rigid floor .

CAUTION

Never store Okken equipment outdoors, even if covered by a tarp. Failure to follow this precaution can result in damage to the equipment.

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Identifying the cubicles

Each column is identified by a digit or a letter at the top of the column. It corresponds to the serial number of each cubicle available in the front face drawing of the switchboard.

Fitting the switchboard

The juxtaposition of the cubicles can be done from the right, the left and even the center.

Assembly sequence depends on the room constraints:

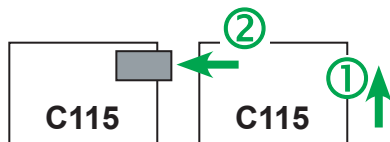
- the access possibilities,
- the requirements of the equipment setting up in the room (positionning regarding a partition, a transformer, ...),
- the connections constraints (cable duct position, busbar trunking incoming, ...).

Manipulations for cubicles installation

CAUTION

For 70-M, the lifting lugs and their captive nuts must be removed.

- Bring up the cubicles to the site in the chosen assembly order.
- Remove the containers and the protection boards.
- Remove the panels to allow access to the cubicle assembly points and to the connection points.
- Disassemble the roof.
- If necessary, disassemble the ventilation grids or bands (generally, the bottom grids are delivered unmounted to allow cubicle handling with a pallet truck).
- Fit the cubicle.²



CAUTION

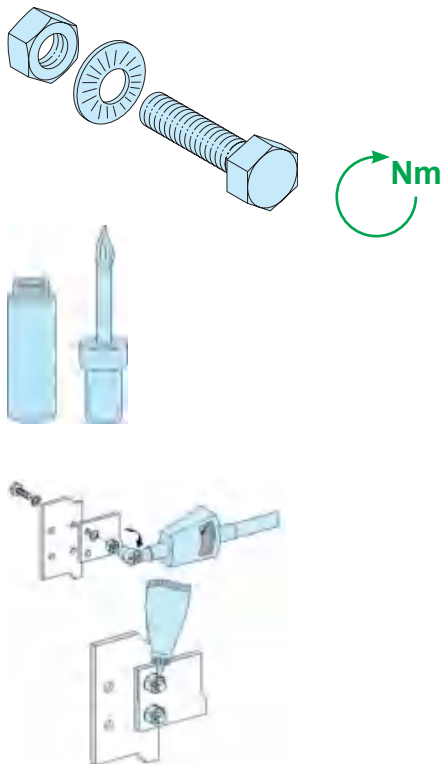
115 cubicle particular case : as the fishplates stick out at the right of the cubicle, install the columns beginning from the left.

- Check the vertical position and support and adjust the position of the associated cubicle.
- Fix it to the floor using M10 bolts
- Assemble the cubicle with the adjacent one using the perspective kits.

CAUTION

Identify the routing of strands or auxiliary wiring between cubicles. Protect the auxiliary wiring when it is routed near sharp edges using sheaths or grommets.

Material



- T8-8 quality steel. according to ISO 898-1 standard

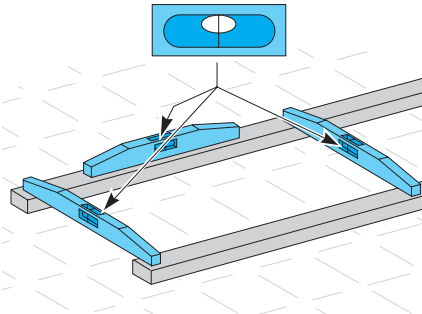
Diameter of screw	Tightening torque (N.m) (with nut + contact washer)
M4	3.5
M5	7
M6	13
M8	28
M10	50
M12	75

- **Tightening torque for electrical links on the devices and for their fixing**
 - Refer to the device's handbook.

- **Marking varnish**
 - After tightening each electrical connection to the appropriate torque, apply some varnish between the nut and the screw (or else, between the screw's head and the copper bar or the device for tightening on a threaded part).
 - The varnish isn't supposed to block the screw:
 - it allows operator inspection, to check that the nut has been tightened,
 - it facilitates the identification of any loose nuts during the switchboard's lifetime.

- **Varnish features**
 - Coloured acrylic varnish, indelible and able to resist a 150°C temperature.
 - Schneider Electric recommends a red varnish as a standard to identify the panelbuilder's work.
 - Other colours can be used by the contractor or any operators entitled to work on the switchboard after its commissioning.

Floor quality



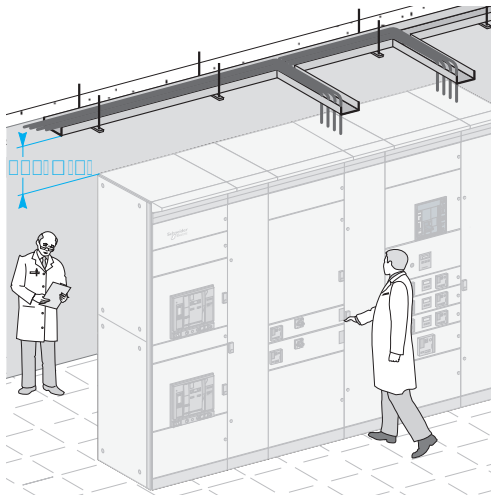
- The place of installation of the switchboard must be clean.
- We recommend that the floor is even: $\pm 2 \text{ mm/m}$ (in this case the columns can be fixed using studs)
- For floors with evenness $> 2 \text{ mm/m}$, you must provide U, T, I sectioned supports, whose straightness and level must be 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.

Space around the switchboard

Civil works in an electrical room is based on the place of the switchboard. This place is given by the required space around the switchboard to access different areas of the cubicles (busbar, connections, functional units) according to the type of connection.

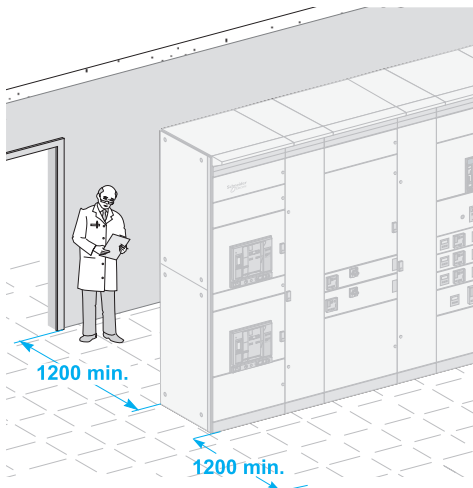
For top connection cubicle

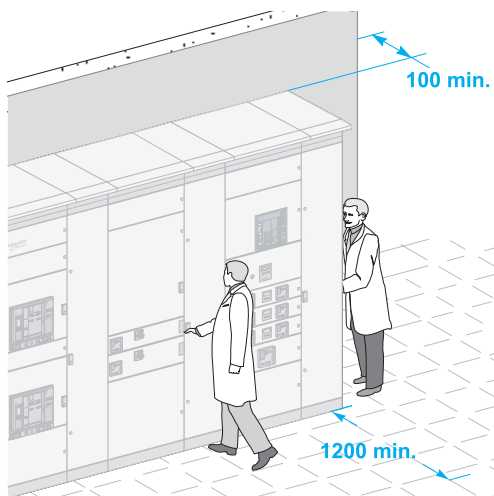
- Provide a minimum space of 500 mm above the switchboard for connection by cables or busbar trunking and fishplating of the busbar.



For rear connection and 70-M back to back connection cubicles

- 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.



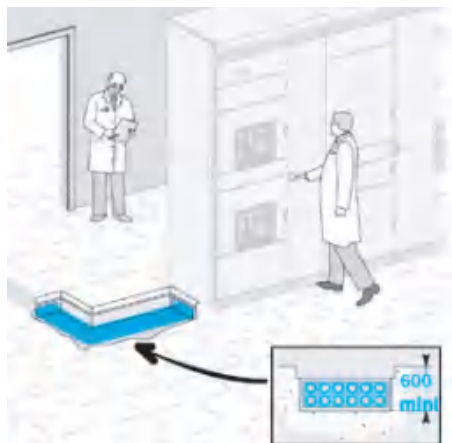


For side connection cubicle

- Provide a minimum space of 100 mm behind the switchboard to allow proper ventilation. In the case of compensation of energy cubicle, ventilated, this minimal space will be 200 mm.
- 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.

3

Cable routing



Once the switchboard is in place, it is possible to forecast the cables routing.

■ Connecting the cubicles from the top

Installation rules:

- The only precaution is to leave a space of 500mm above the switchboard.

■ Connecting the cubicles from the bottom

The connection cables can be routed:

- in a duct fitted under the column

Installation rules:

- the duct will have a width inferior to the column's depth,
- if not possible or for rear connection the duct will be fitted with rails or transvers sections,
- Provide a minimum space of 500mm (600 mm recommended) to respect the bending radius of the cables.

- under a false floor

Installation rules:

- the switchboard must be installed on a metal chassis designed to support column weight (650 kg on average for a column < 4000 A),
- the slabs of the false floor will be adjusted so as to respect the degree of protection of the switchboard,
- provide a minimum space of 500mm (600 mm recommended) to respect the bending radius of the cables.

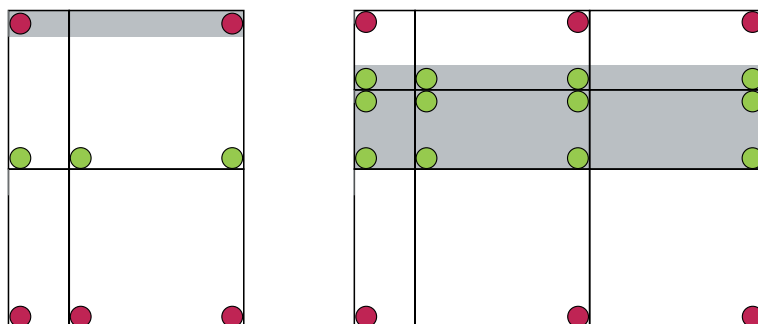
Cubicles fixing point

To prepare the ground fastening of the switchboard, it is important to know the compulsory and optional fixing points of each cubicle and their precise position

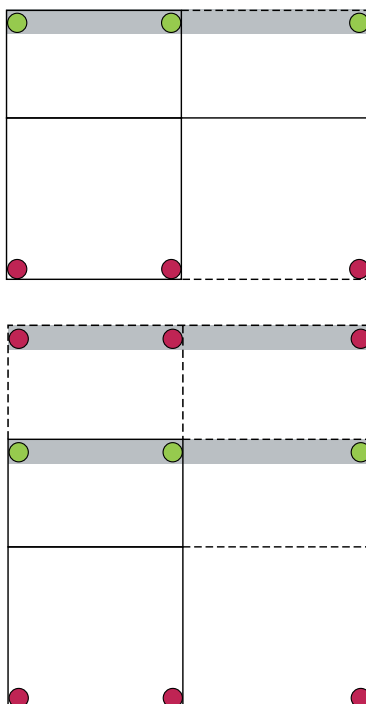
Cubicles fixing points definition - Rear connection

■ Cubicles: 115, 70-2, 115-70, 70-F, VSD, CEF, Mono NT/NW, 230.

● : recommended fixing point
● : compulsory fixing point



■ Cubicles: 70-M

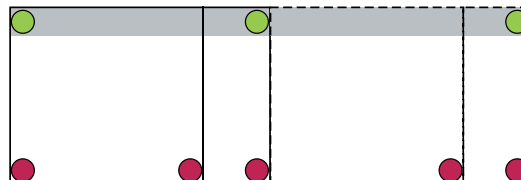


Cubicles fixing points definition - Side connection

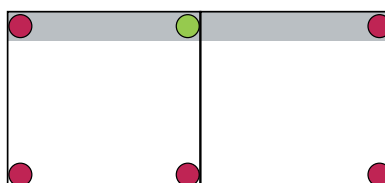
■ Cubicles: 115, 70-2, 115-70, 70-F, VSD, CEF, Mono NT/NW

● : recommended fixing point

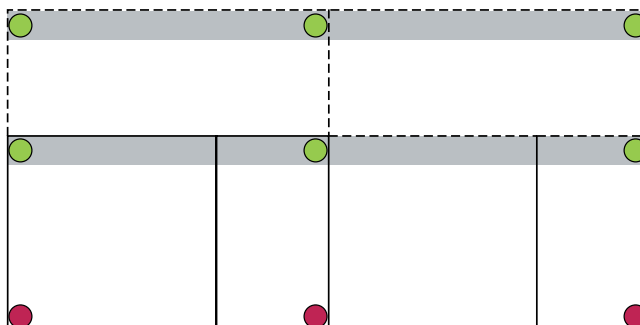
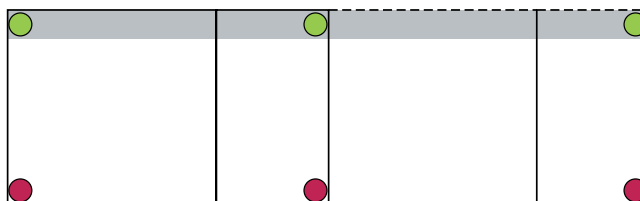
● : compulsory fixing point



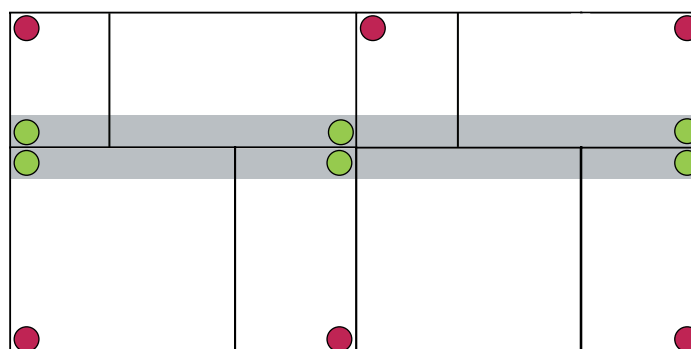
■ particular case : 3200A incoming cubicle + coupling 2 x W650 x D600



■ Cubicles: 115, 70-2, 115-70, 70-F, VSD, CEF, Mono NT/NW, 230.



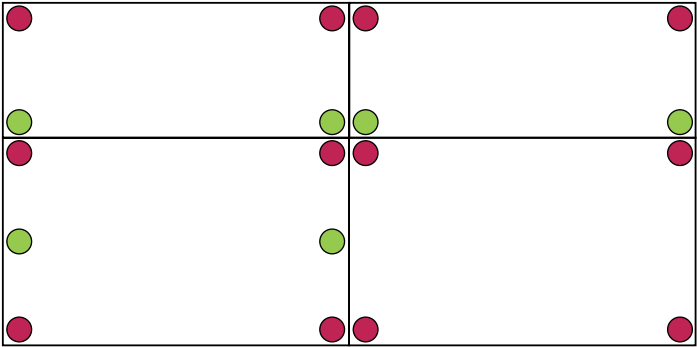
Cubicle 70-M back to back connection



Seismic specific fixation points

- fixing identical in 2G and 5G seismic ,
- fixing points: see tables below ,
- fixing on rail ,
- tightening torque: 50 N.m.

● : recommended fixing point
● : compulsory fixing point



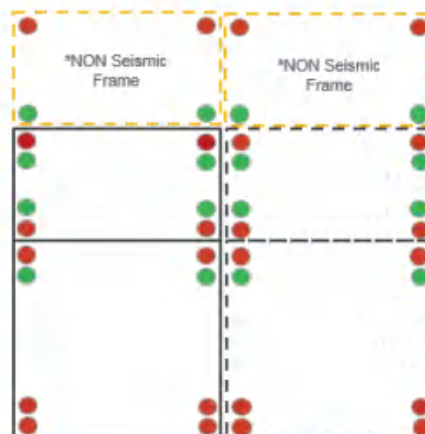
Seismic specific fixation points for 70M

- : recommended fixing point
- : compulsory fixing point

- Fixing identical in 2.7G seismic,
- Fixing points: see tables below,
- Fixing on rail,
- Tightening torque: 50 N.m.

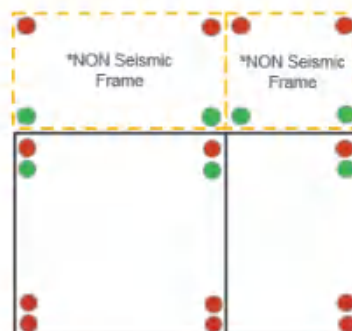
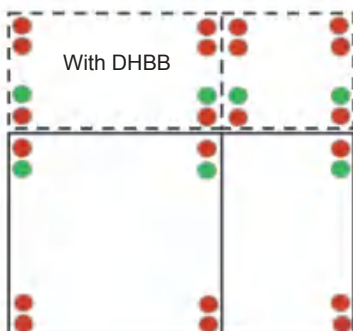
■ Cubicle and compartments: 70-M

□ Rear connection



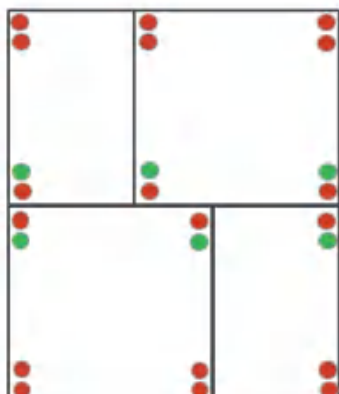
*Additional Empty Cubicles
*In case of No DEPTH variation

□ Side connection



*Additional Empty Cubicles
*In case of No DEPTH variation

□ Back to back connection



Seismic specific fixation points for 70M

- Fixing identical in 2.7G,
- Fixing points: see tables below,
- Fixing on rail,
- Tightening torque: 50 N.m.

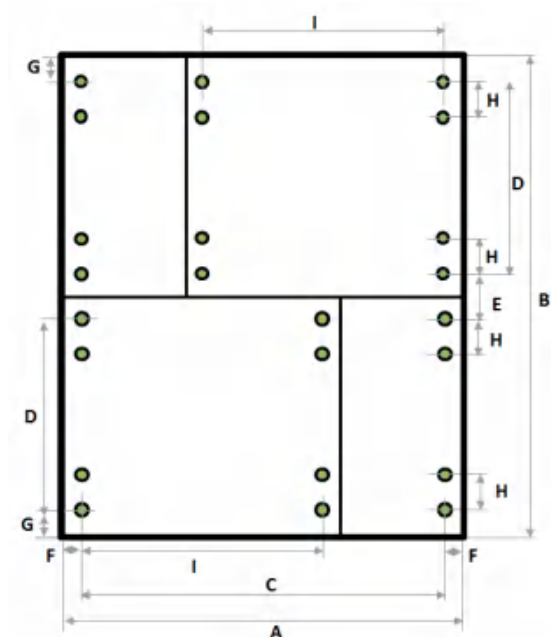
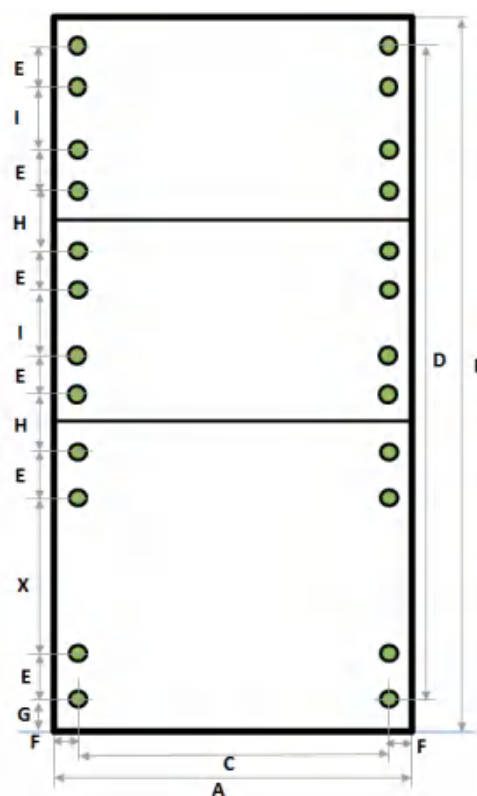
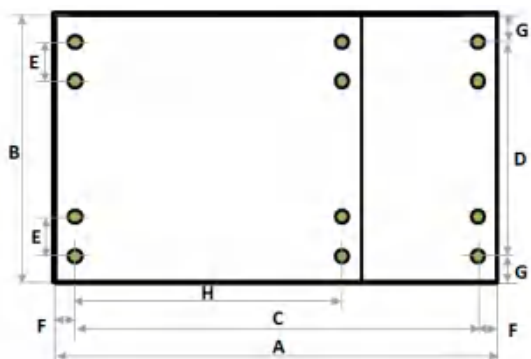
■ Cubicle and compartments: 70-M

□ Side connection

A	B	C	D	E	F	G	H
800	600	700	444.5	30	50	77.75	550
900	600	800	444.5	30	50	77.75	550
1000	600	900	444.5	30	50	77.75	550
800	400	700	444.5	30	50	77.75	550
900	400	800	444.5	30	50	77.75	550
1000	400	900	444.5	30	50	77.75	550

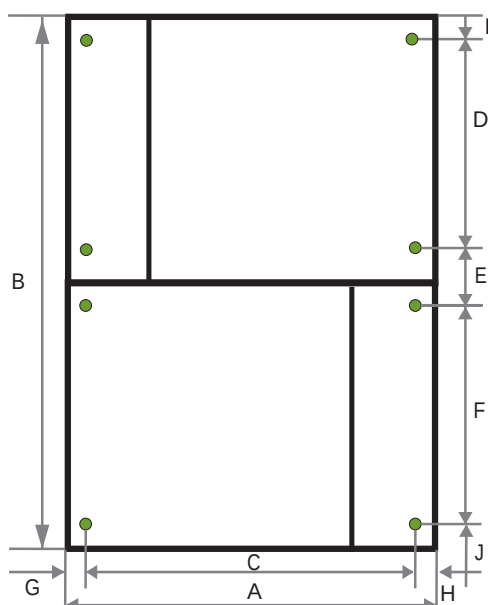
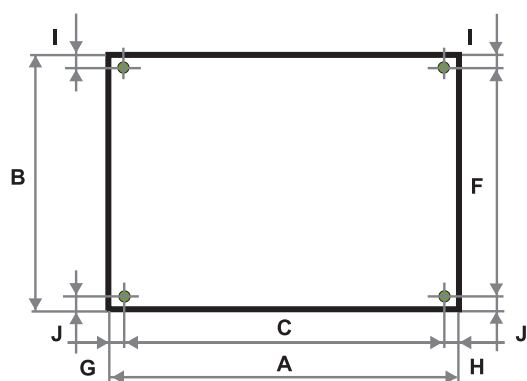
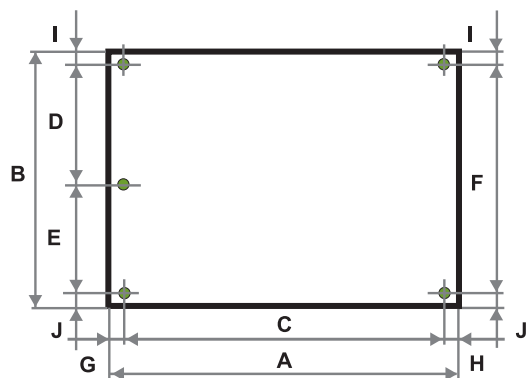
□ Rear connection

A	B	C	D	E	F	G	H	I	X
600	1000	500	844.5	30	50	77.75	155.5	244.5	444.5
600	1200	500	1044.5	30	50	77.75	155.5	444.5	444.5
600	1400	500	1244.5	30	50	77.75	155.5	244.5	444.5



□ Back to Back

A	B	C	D	E	F	G	H	I
900	1200	800	444.5	155.5	50	77.75	30	550
1000	1200	900	444.5	155.5	50	77.75	30	550



Cubicles fixing points position

■ Cubicles and compartments: 115, 70-2, 115-70, 70-F, VSD, CEF, Mono NT/NW

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	265.5	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

■ Cubicles and compartment 230

A	B	C	D	E	F	G	H	I	J
1150	600	1065	300	300		42.5	42.5	37.5	37.5
1150	400	1065			300	42.5	42.5	37.5	37.5

■ Cubicle and compartments: 70-M

□ Rear connection

A	B	C	F	G	H	I	J
600	1000	490	925	55	55	37.5	37.5
600	1200	490	1125	55	55	37.5	37.5
600	1400	490	1325	55	55	37.5	37.5

□ Side connection

A	B	C	F	G	H	I	J
800	600	690	575	55	55	37.5	37.5
900	600	790	575	55	55	37.5	37.5
1000	600	890	575	55	55	37.5	37.5
800	400	690	325	55	55	37.5	37.5
900	400	790	325	55	55	37.5	37.5
1000	400	890	325	55	55	37.5	37.5

The fixing points to be used are specified depending on the connection direction (side or rear).

□ Back to back connection

A	B	C	D	E	F	G	H	I	J
900	1200	790	525	75	525	55	55	37.5	37.5
1000	1200	890	525	75	525	55	55	37.5	37.5

Identifying the cubicles

Each column is identified by a digit or a letter at the top of the column. It corresponds to the serial number of each cubicle available in the front face drawing of the switchboard.

Fitting the switchboard

The juxtaposition of the cubicles can be done from the right, the left and even the center.

Assembly sequence depends on the room constraints:

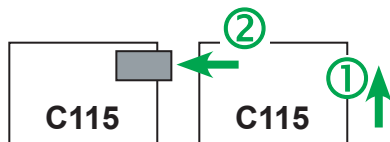
- the access possibilities,
- the requirements of the equipment setting up in the room (positionning regarding a partition, a transformer, ...),
- the connections constraints (cable duct position, busbar trunking incoming, ...).

Manipulations for cubicles installation

CAUTION

For 70-M, the lifting lugs and their captive nuts must be removed.

- Bring up the cubicles to the site in the chosen assembly order.
- Remove the containers and the protection boards.
- Remove the panels to allow access to the cubicle assembly points and to the connection points.
- Disassemble the roof.
- If necessary, disassemble the ventilation grids or bands (generally, the bottom grids are delivered unmounted to allow cubicle handling with a pallet truck).
- Fit the cubicle.²



CAUTION

115 cubicle particular case : as the fishplates stick out at the right of the cubicle, install the columns beginning from the left.

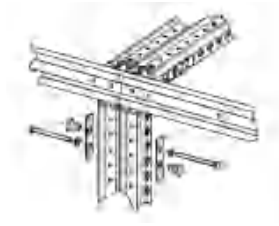
- Check the vertical position and support and adjust the position of the associated cubicle.
- Fix it to the floor using M10 bolts
- Assemble the cubicle with the adjacent one using the perspective kits.

CAUTION

Identify the routing of strands or auxiliary wiring between cubicles. Protect the auxiliary wiring when it is routed near sharp edges using sheaths or grommets.

Assembling 230, 115, 115/70-2, 70-2, 70-F, PFC and VSD cubicles

■ Assembling kits.



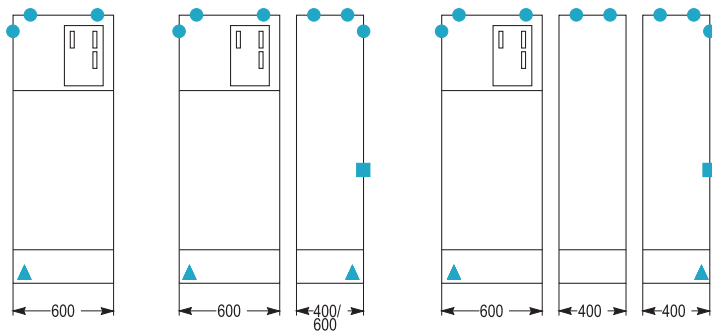
coupling kit cat. no. 87171



holding plate cat. no. 87170

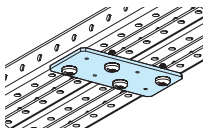
■ Assembling points.

- coupling kit
- assembling plate (If possible only for side connection)
- ▲ M10 bolt

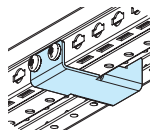


Assembling 70-M cubicles

■ Assembling kits.



70-M / 70-M association
cat. no. 88693



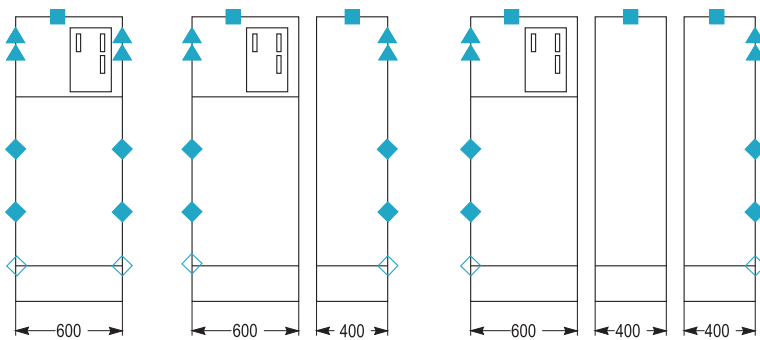
70-M / Other cubicles
association
cat. no. LVM00098

- assembling plate
- ▲ top fixation (M6x16)
- ◆ *medium fixation (M5x16)
- ◇ bottom fixation (M6x70)

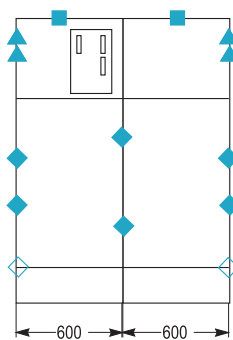
* Mandatory for seismic only & if possible for standard

■ Assembling points

Side and rear connection cubicles

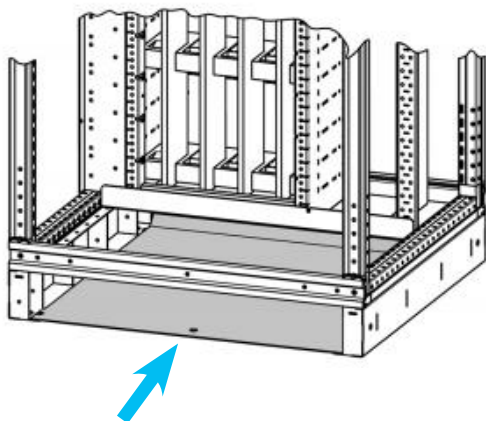


Back to back connection cubicle



	Association standard		Association Seismic	
	70-M / 70-M association	70-M / other cubicles association	70-M / 70-M association	70-M / other cubicles association
Top fixation	4x (M6 X 16)	4x (M6 X 50)	4x (M6 X 16)	4x (M6 X 50)
Medium fixation	4x (M5 X 16)		6x (M5 X 16)	4x (M5 X 50)
Bottom fixation	2x (M6 X 70)	2x (M6 X 40)	2x (M10 X 80)	2x (M10 X 50)

Internal arc withstand complements

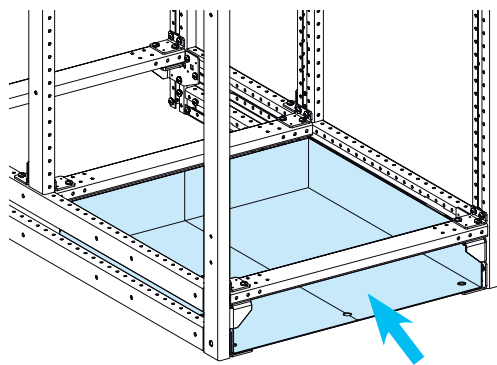


■ This item is compulsory for the arcing withstanding inside the column. It comes in addition with the parts installed by the panelbuilder.

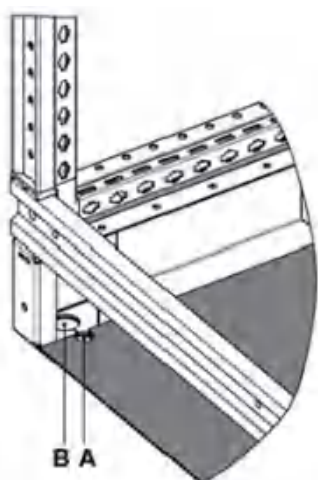
■ The bottom plate delivered with the switchboard (part of the reference 87723) should be installed only at the bottom of the switchgear cubicles type 115, 70, 185 (W650 mm).

It is needless for cubicle 230 (W1150 mm).

■ Slide the plate on the 2 plinths bends up to stop against the rear cross-member of the switchgear cubicle.

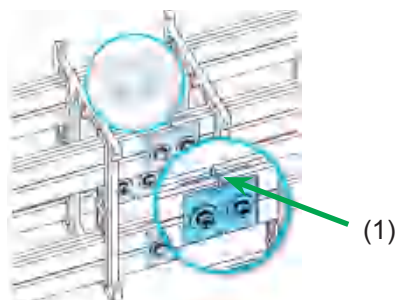
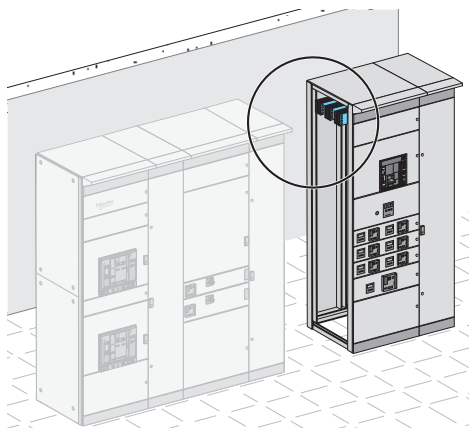
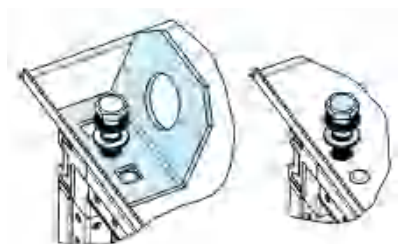


70-M

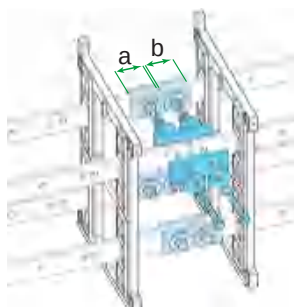


■ Screw the plate to the ground, using the 2 holes A on the cubicle's front side. The B holes are used for the column ground fastening.

Equipment protection



Fishplate for busbars with 2, 3, 4, or 6 bars



Fishplate for busbars with 1 bar

CAUTION

Before energizing the switchboard, 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.
- Please ensure no foreign bodies are present in the switchboard prior to charging.

■ Disassemble the roof (the roof should be removed only for the duration of the assembly of the fish plates)

- unscrew the screws and remove the lifting lugs,
- remove the roof and store it sheltered from impacts.

■ Connect the bars

- disassemble the top cross-pieces at each column juxtaposition so as to simplify access to the horizontal busbars,
- For busbars with 2, 3, 4 or 6 bars, loosen the fishplates positioned on the first column (assembled in workshop) and make them slide between the bars to be assembled.
- For busbars with 1 bar, loosen the fishplates positioned on the first column (assembled in workshop) and remove the fastener at other side. Then rotate the fishplate until it can be connected to the other HBB, the fastener can be installed again at this time.

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, use a 5 mm max. thick bar or a screwdriver to slide the middle plate of the fishplate

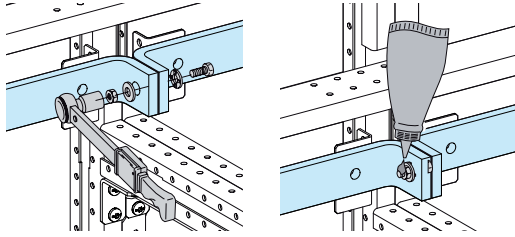
WARNING

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.

- For busbars with 2, 3, 4 or 6 bars, a visual reference (notch (1)) lets you check that the fishplate is properly centred with respect to the bars to be assembled,
- For busbars with 1 bar, attempt to ensure that the distance between the fishplate and the HBBs of the two column is equal ($a=b$),
- tighten the nuts using a torque wrench to the recommended tightening torque (50N.m), ensuring that the base of the screw head is properly positioned in the square recess of the washer,
- mark all nuts with dot of varnish,
- reassemble the top cross-pieces at each column juxtaposition.

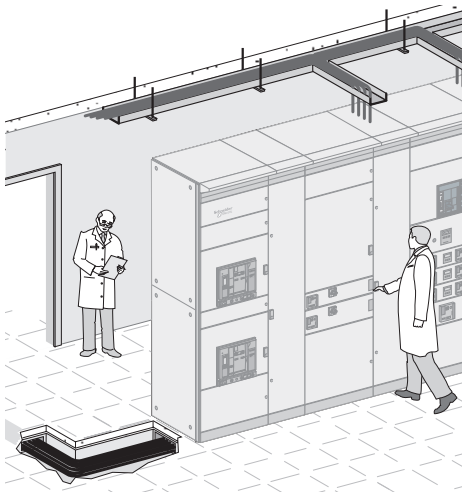
■ Reassemble the roof

Linking earth bars



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.



DANGER

Turn off the power supplying the equipment before working on it. A hazard of electric shock, burns or explosion exists whenever working in or around the equipment.

Failure to observe these instructions will result in severe injury or death.

WARNING

For protection of persons, first connect the switchboard's protective conductor to the earth connection.

NOTE

Cables must never touch or run between live conductors (copper bars, etc.).
When bending cables, observe the minimum bending radius (six to eight times the cable diameter).

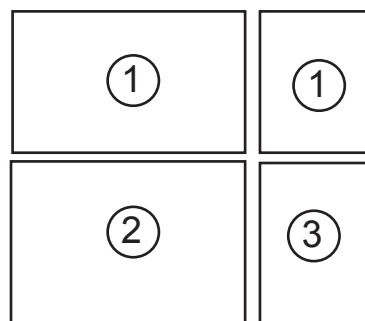
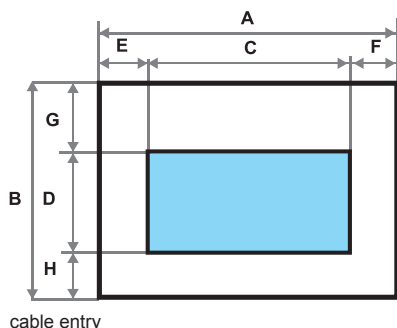
- Flange cables as close as possible to the connections so as not to create excessive mechanical stresses on the device connection pads.
- If cable glands are not used, also flange the cables as close as possible to the column entry point.
- The sharp edges of the framework placed on the cable route must be protected so as not to damage conductors.
- All the power connections must be made using class 8.8 bolts and nuts and tightened to the recommended torque (see chapter Installation).
- In the event of connection of aluminium cables on copper pads, use bimetal lugs or interfaces.
- Make strands circuit by circuit and fasten them on provided cable tie bars . The number of cables per strand depends on cable cross-section.

Cable cross-section (mm ²)	Number of cables per strand
≤10	8
16 < S ≤ 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 (mm)	Maximum I _{cw} (kA _{peak})	Distance between ties (mm)
width: 4,5 mm load: 80 kg	14	200
	21	100
	28	50
width: 9 mm load: 80 kg	28	350
	35	200
	49	100
	63	70

Connection through the top



various zones inside the cubicle

Roofs must be drilled for cable passage through glands or grommets.

■ Drilling areas

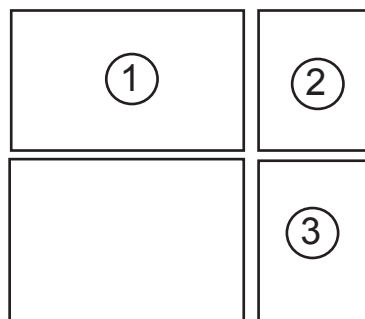
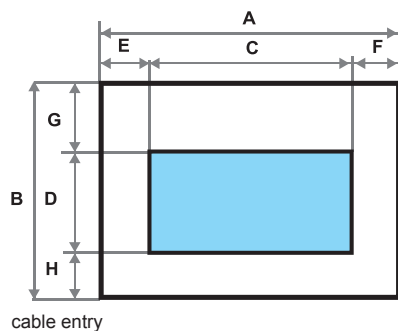
□ Cubicles: 115, 70-2, 115-70, 70-F, VSD, CEF, Mono NT/NW

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

with busbar

A	B	C	D	E	F	G	H
cubicle 230							
zone (2)							
1150	1000	1070	280	40	40	680	40
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



various zones inside the 70-M cubicle

□ Cubicle : 70-M

Side connection

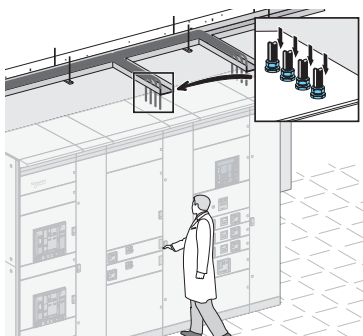
A	B	C	D	E	F	G	H
Cubicle depth 600							
zone (3)							
200	600	150	190	0	50	360	50
300	600	250	190	0	50	360	50
400	600	350	190	0	50	360	50
Cubicle depth 1000							
zone (1)							
600	400	500	300	50	50	50	50
zone (2)							
200	400	150	300	0	50	50	50
300	400	250	300	0	50	50	50
400	400	350	300	0	50	50	50
zone (3)							
200	400	150	190	0	50	360	50
300	400	250	190	0	50	360	50
400	400	350	190	0	50	360	50

Rear connection

A	B	C	D	E	F	G	H
Cubicle depth 1000							
zone (1)							
600	400	500	200	50	50	60	140
Cubicle depth 1200							
zone (1)							
600	600	500	200	50	50	60	340
Cubicle depth 1400							
zone (1)							
600	400	500	200	50	50	60	140

Connection

Bars linking and cables passing



- Cable path:
 - 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,
 - The removable cross member simplifies insertion of cables in the connection compartment (except on 70-M).

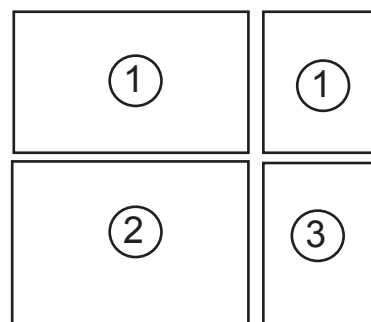
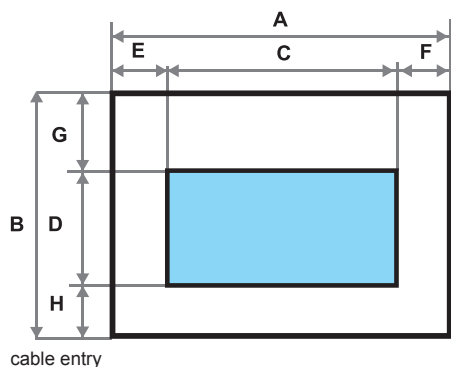


upper removable cross-member to simplify connection

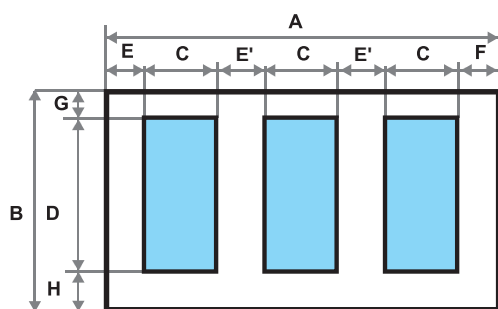
NOTE

The removable cross member simplifies insertion of cables in the connection compartment (except on 70-M).

Connection through the bottom



various zones inside the cubicle



Bottom plates must be drilled for cable passage through glands or grommets.

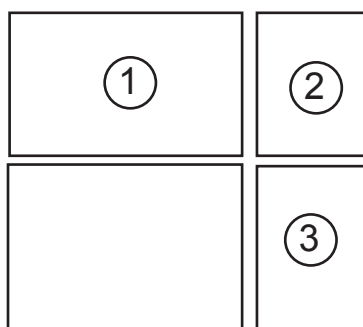
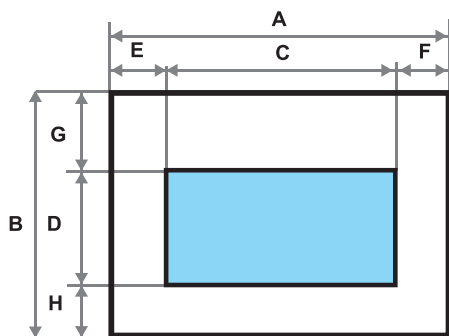
■ Drilling areas

□ Cubicles: 115, 70-2, 115-70, 70-F, VSD, CEF, Mono NT/NW, 230

A	B	C	D	E	F	G	H
cubicle 115*							
zone (2)							
650	600	450	170	140	60	355	75
cubicle 70*							
zone (2)							
650	600	530	240	60	60	340	20
compartment							
zone (1)							
650	400	530	360	60	60	20	20
450	400	330	360	60	60	20	20
350	400	230	360	60	60	20	20
250	400	130	360	60	60	20	20
zone (3)							
650	600	530	560	60	60	20	20
450	600	330	560	60	60	20	20
350	600	230	560	60	60	20	20
250	600	130	560	60	60	20	20

□ Cubicle 230

A	B	C	D	E	E'	F	G	H
cubicle 230								
zone (1)								
1150	1000	300	370	65	60	65	15	15
cubicle 230								
zone (2)								
1150	1000	520	280	65	60	65	15	65



various zones inside the 70-M switchboard

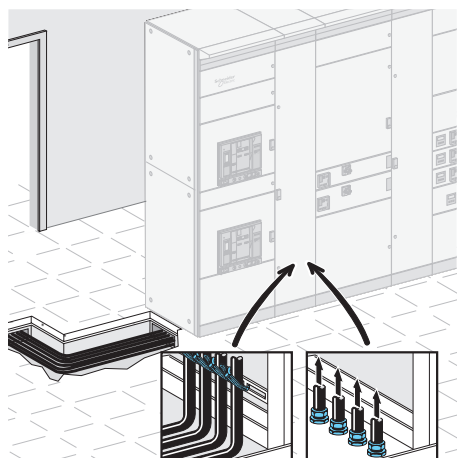
□ Cubicle 70-M

Side connection

A	B	C	D	E	F	G	H
Cubicle depth 600							
zone (3)							
200	600	150	280	25	25	160	160
300	600	250	280	25	25	160	160
400	600	350	280	25	25	160	160
Cubicle depth 1000							
zone (1)							
600	400	500	200	50	50	60	140
zone (2)							
200	400	150	160	25	25	120	120
300	400	250	160	25	25	120	120
400	400	350	160	25	25	120	120
zone (3)							
200	400	-	-	-	-	-	-
300	400	-	-	-	-	-	-
400	400	-	-	-	-	-	-

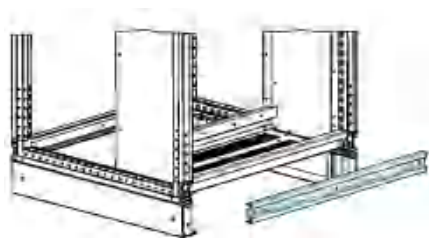
Rear connection

A	B	C	D	E	F	G	H
Cubicle depth 1000							
zone (1)							
600	400	500	200	50	50	60	140
Cubicle depth 1200							
zone (1)							
600	600	500	200	50	50	60	340
Cubicle depth 1400							
zone (1)							
600	400	500	200	50	50	60	140



■ Cable path:

- 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 overbalance them inside the column having first disassembled the bottom removable cross member, as well as the ventilation grid or the strip (except on 70-M).

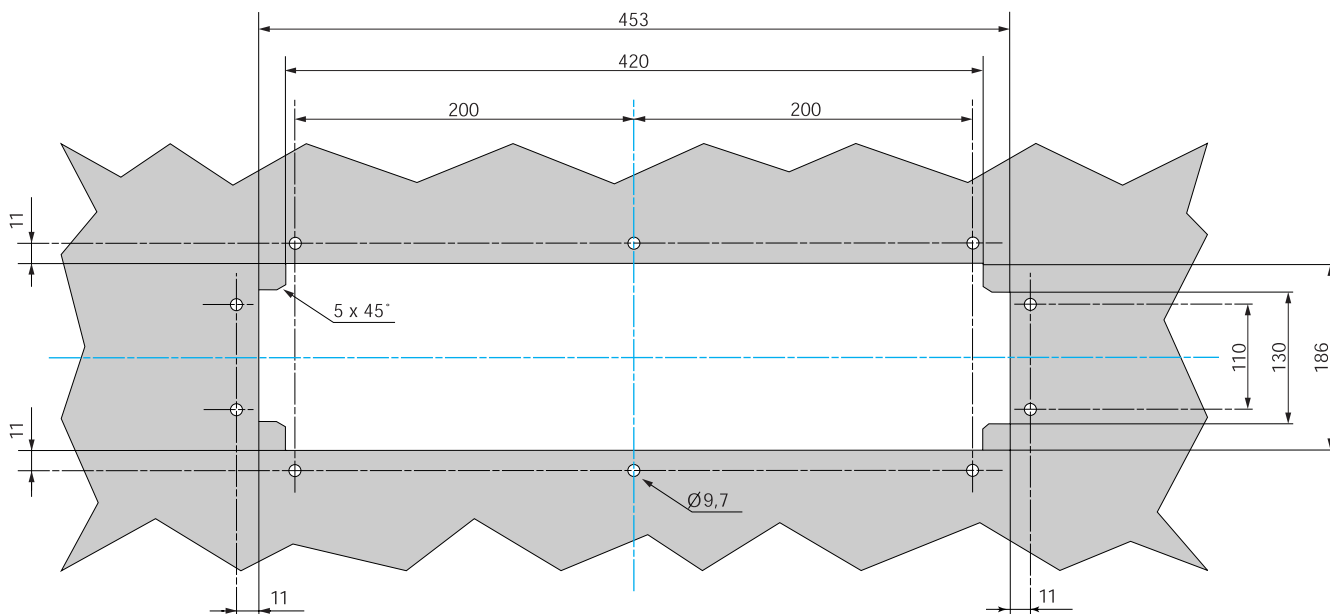


lower removable cross-member to simplify connection

Connection by busbar trunking

■ Drilling areas

The roof cut-out for busbar trunking interface is unique whatever the nominal current.

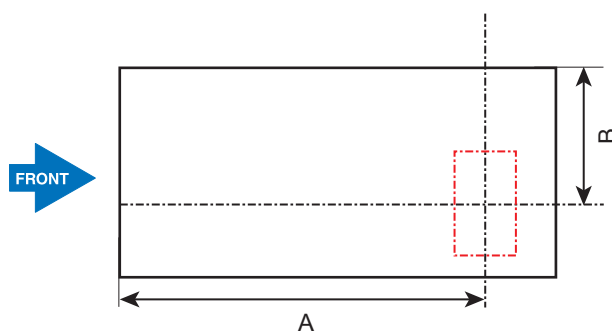


■ Cut-out position

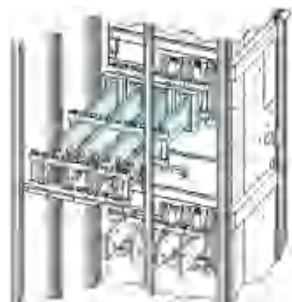
The cut-out position on the roof is defined by

- the type of connection,
- the cubicle depth.

Type of connection	Cubicle depth	Junction axis position (top view)	
		from the front A	from the left B
Top direct connection	D600	275	325
	D1000	925	363
Rear connection	D1200	1053	363
	D1400	1325	363



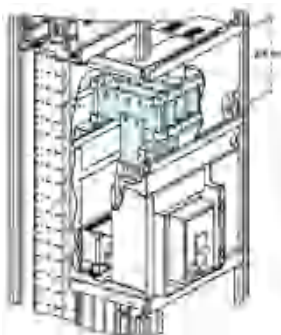
Connecting to the connection bars



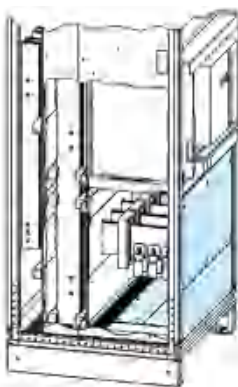
Rear connection

Use lugs to connect to copper connection bars.

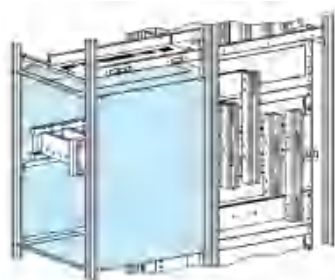
- Check the consistence between circuit and switchgear identifications
- When connections are made to several bars for each phase, position the lugs opposite one another and insert copper spacers.
- Comply with the insulation distances between phases of 14 mm min.
- Mark all nuts with a dot of varnish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



Top direct connection

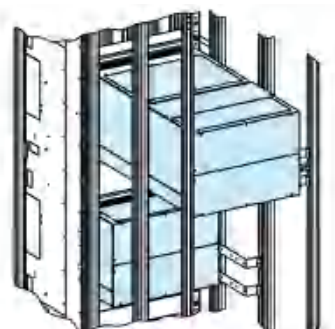


Bottom direct connection



Side connection

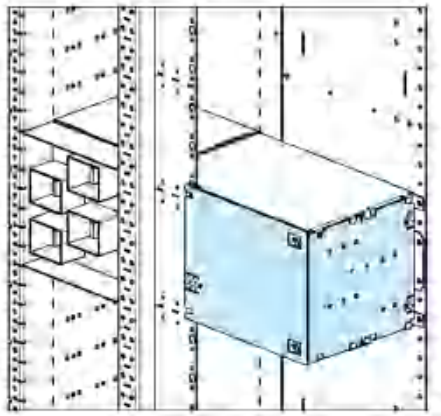
Form 4 adaptation



Form 4 partitioning, FU rear connection

- For functional units > 630A:
 - 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 IP2X mini,
 - reassemble all the covering.

Connecting to the connection bars



Plug-in FU ≤ 630A in Polyfast drawer (70-2)

Connection principles :

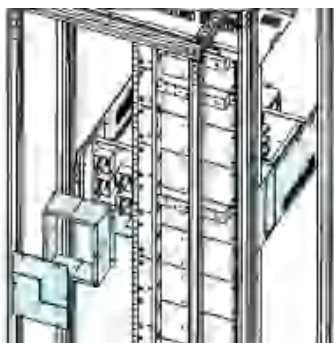
- Use anti-rotation plates (87188 : 100 plates) to ease accessing to and tightening the lugs on the connection pads. They allow the use of a single tool.
- Comply with insulation distances near metallic parts: 14mm for $U_e \leq 690V$.
- Place the bolt's head on the plate's side every time there is a risk of not respecting the insulation distance.

Drilling the cable plate :

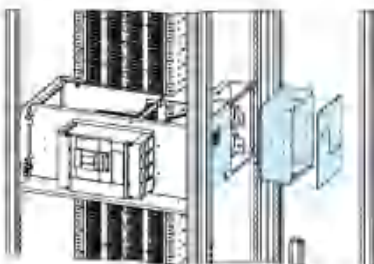
- Remove the F4 boxes 2 insulating plates.
- Drill the cable plate on the marked location as shown in the drawings on the next pages, following the indications given in the facing tables, which indicate :
 - the drilling diameter, depending on the cable section ± 1 mm. The holes leave sufficient clearance for an easy operating and ensures an IP2 after the cable connection,
 - the drillings' position, from case to case.

Drilling diameter	
Cable (mm ²)	Drilling ± 1 mm
95	27
120	29
150	31
185	32
240	34
300	37

Form 4 adaptation



Form 4 partitioning, rear connection

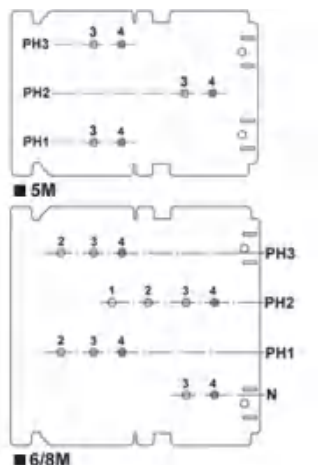


Form 4 partitioning, side connection

- For functional units ≤ 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.

Drilling the Form 4 cable plates

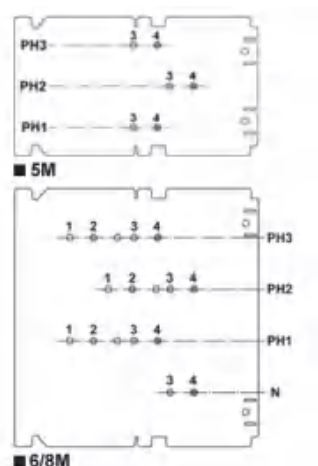
■ 3P cable plate



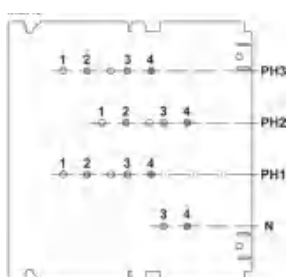
■ 4P cable plate



■ 3P cable plate



■ 4P cable plate



Side connection

No. of poles	Modularity	CT	Hole number to drill	
			1 cable	2 cables
3P	5M	-	3	3-4 ⁽¹⁾
		-	1	
	6M	1 CT RS 2G	2	
		1 CT RS 2P	3	3-4 ⁽¹⁾
	8M	-	1	
		1 CT RS 2G	2	
4P	7M	1 CT RS 2P	3	3-4 ⁽¹⁾
		-	1	
	9M	1 CT RS 2G	2	
		1 CT RS 2P	3	3-4 ⁽¹⁾
		-	1	
		1 CT RS 2G	2	

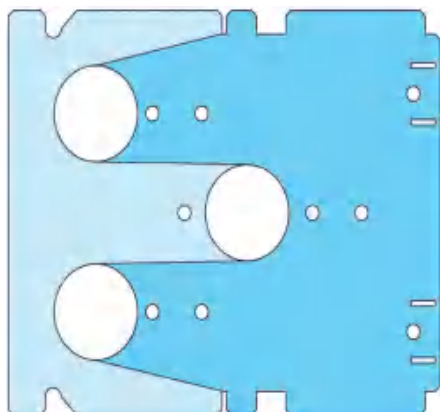
(1) 95 mm² max, copper lugs
300 mm² cable are connected only with copper lugs

Rear connection

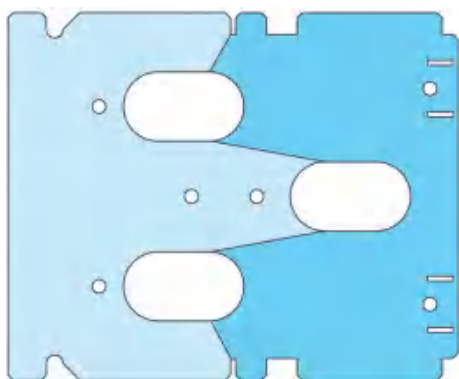
No. of poles	Modularity	CT	Hole number to drill	
			1 cable	2 cables
3P	5M	-	3	3-4 ⁽²⁾
		-	1	1-2 ⁽²⁾
	6M	1 CT RS 2G	2	
		1 CT RS 2P	3	3-4 ⁽²⁾
	8M	-	1	1-2 ⁽²⁾
		1 CT RS 2G	2	
4P	7M	1 CT RS 2P	3	3-4 ⁽³⁾
		-	1	1-2 ⁽²⁾
	9M	1 CT RS 2G	2	
		1 CT RS 2P	3	3-4 ⁽³⁾
		-	1	1-2 ⁽²⁾
		1 CT RS 2G	2	

(2) 150 mm² max
(3) 240 mm² max
300 mm² cable are connected only with copper lugs

Mounting the Form 4 cable plates



drawing for 1 cable per phase



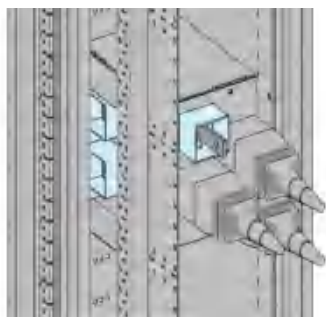
drawing for 2 cables per phase

Cutout after drilling :

- after drillings, cutout each plate following the explanatory drawings,
- each plate is cut in 2 parts which are mounted on the F4 boxes after the cables connection,
- put back the cut off plates after drilling :
 - slide the first part at the back of connected cables
 - slide and screw the second part at the front of cables,
 - put back the other insulating plate.

3

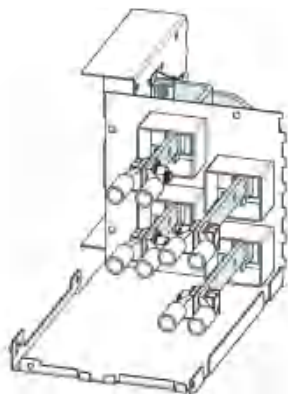
Form 4 by sleeve



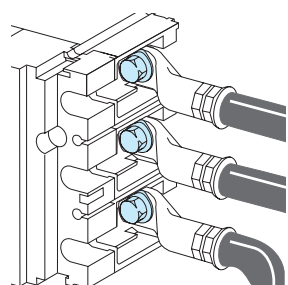
Form 4 sleeves, side connection

- 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.

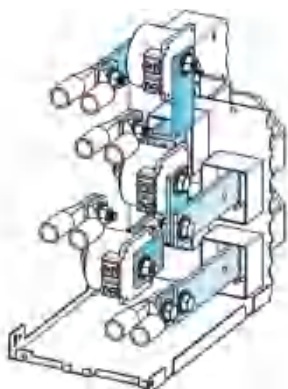
Connecting the cables: examples and recommendations



- Connection without CT $\leq 9M$

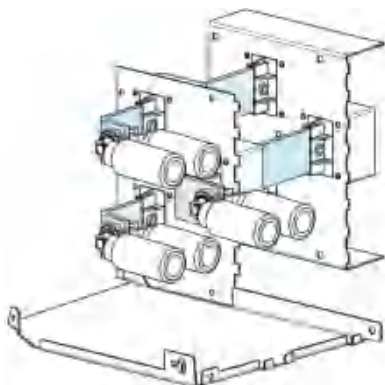


- Direct connection to the device terminals
 - When connections are made directly to the terminals of devices (disconnectable Polyfast), comply with the tightening torque recommended by the device manufacturer.
 - Check that the length of the screws delivered with the device is compatible with the lugs 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.

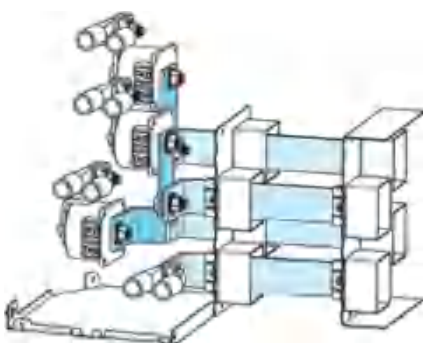


- Connection with CT 12/14M.
- The copper pads, except from those held by the insulating bushings, must be studied and manufactured by the panelbuilder.

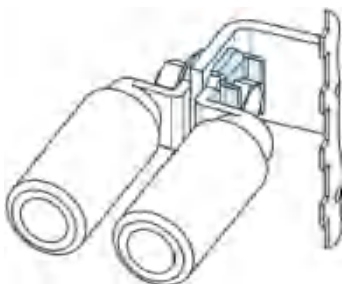
Connecting the cables: examples and recommendations (continued)



- Connection without CT $\leq 9M$.



- Connection with 12/14M.
- The copper pads, except from those held by the insulating bushings, must be studied and manufactured by the panelbuilder.

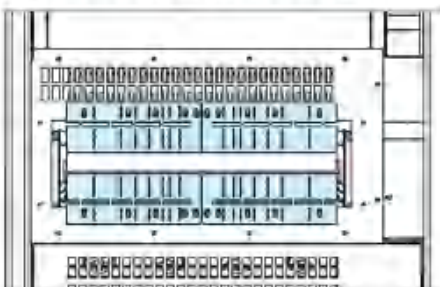
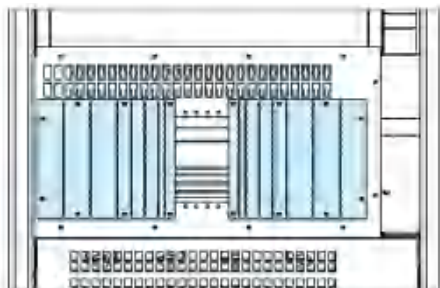
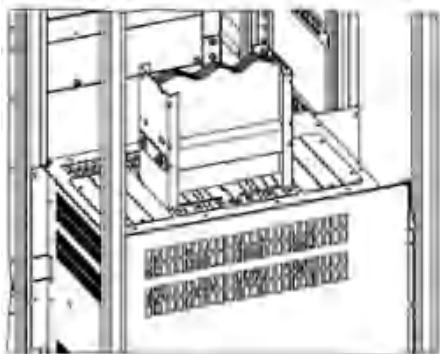


- The anti-rotation plates are indispensable for the contractor: they allow the cable tightening with only on tool.
Quantity : 1 plate per bolt at the connection point, to be delivered with the switchboard.
87188 : 100 anti-rotation plates.

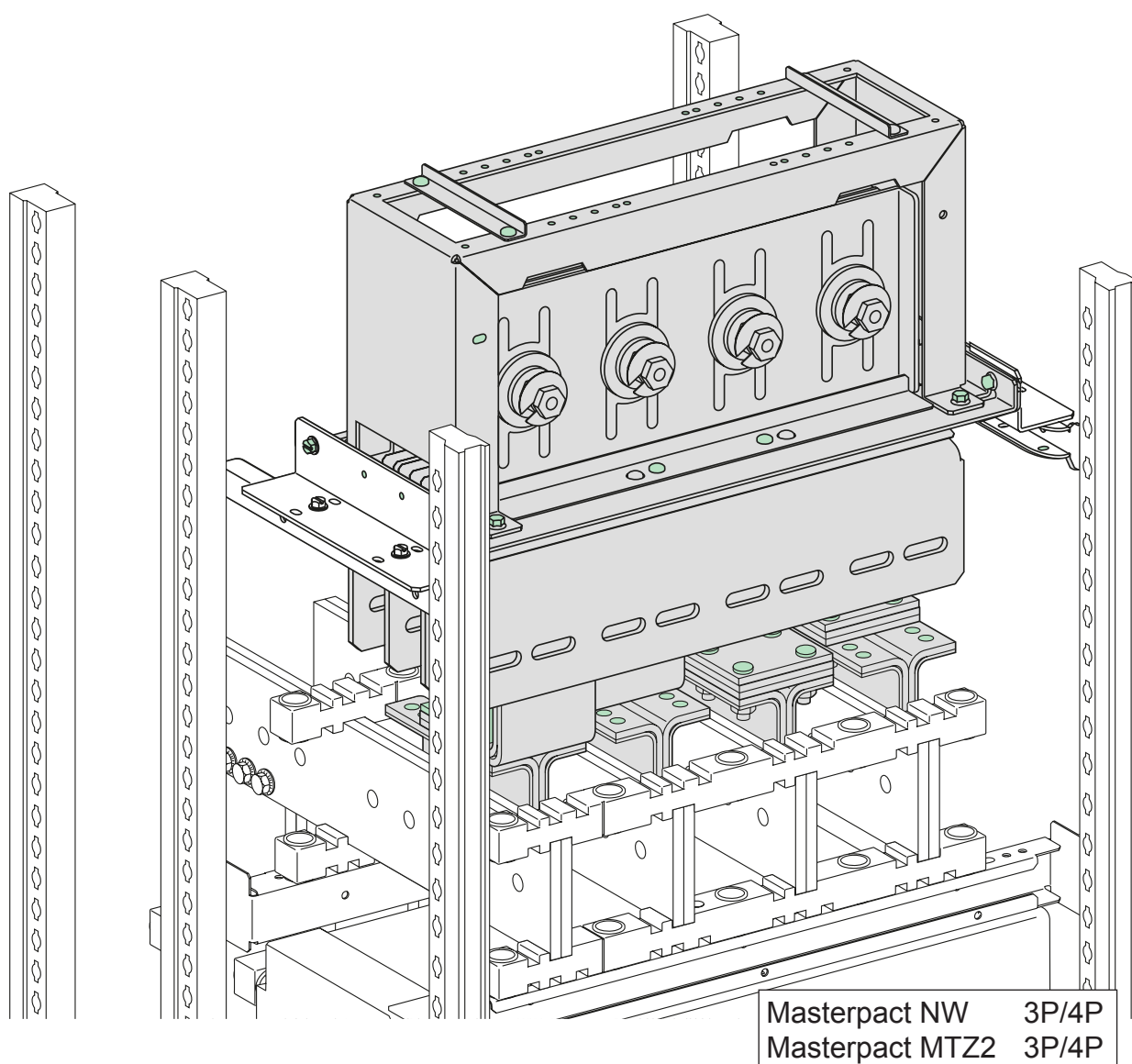
Connection to busbar trunking

- Connection of the busbar trunking KT is made through the junction block, installed in the switchboard.
- In 115-1/115-2 RC (junction block $\leq 3200A$), mount the blanking plates supplied by the panelbuilder (they are provided with the junction block's installation).

- Connect the busbar trunking KT on the junction block's installed in the switchboard.
Drawing : mounted set.



- Mount the 2 lateral blanking plates, cutting out the central parts according the busbar trunking's width.
- Mount the 4 side and rear blanking plates, cutting out the right and left part as per general drawing.
- The oblong holes allows to fit as well to 3 busbar trunking as to 4P busbar trunking.
- After mounting the blanking plates, the IP2x must be ensured.



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PELIGRO DE DESCARGA ELÉCTRICA, EXPLOSIÓN O ARCO ELECTRICO Desconecte todas las alimentaciones antes de manipular el producto. Per verificare che l'alimentazione sia isolata usare sempre un rivelatore di tensione correttamente tarato. Si no se siguen estas instrucciones provocará lesiones graves o incluso la muerte.	GEFAHR VON ELEKTRISCHEM SCHLAG, EXPLOSION ODER LICHTBOGEN Vor dem Arbeiten am Gerät alle Spannungsversorgungen abschalten. Verwenden Sie stets ein Spannungsprüfgerät mit der korrekten Bemessungsspannung, um festzustellen, ob die Spannungsversorgung wirklich abgeschaltet ist. Die Nichtbeachtung dieser Anweisungen führt zu Tod oder schwerer Körperverletzung.
RISCHIO DI SCARICA ELETTRICA, ESPLOSIONE O ARCO ELETTRICO Scollegare l'apparecchio da tutti i circuiti di alimentazione prima di qualsiasi intervento. Per verificare che l'alimentazione sia isolata usare sempre un rivelatore di tensione correttamente tarato. Il mancato rispetto di queste istruzioni provocherà morte o gravi infortuni.	RISCO DE ELECTROCUSSÃO, DE EXPLOÇÃO, OU DE ARCO ELÉCTRICO Desconecte todas as alimentações antes de manipular o produto. Utilize sempre um dispositivo de detecção da tensão nominal adequada para confirmar se a alimentação está desligada. A não observância destas instruções resultará em morte, ou ferimentos graves.
可能有触电、爆炸或者电弧灼伤的危险 在此电力设备上工作时,请先切断所有电源。确保使用合适的额定电压传感器 确认电源已关闭。若违背这些说明,则可能会导致严重的人身伤害甚至死亡	Опасность поражения электрическим током, опасность взрыва или вспышки дуги. Передобслуживанием или ремонтом убедитесь, что питание отключено. Чтобы убедиться в отключении питания, обязательно используйте тестер надлежащего номинала. Несоблюдение этих инструкций приведет к смерти или серьезной травме.

NOTICE / AVIS / AVISO / AVISO / AVVISO / HINWEIS / 注意 / ПРЕДУПРЕЖДЕНИЕ

EQUIPMENT DAMAGE IN THE EVENT OF PHASE-TO-EARTH SHORT-CIRCUIT

- Connect the casing of the prefabricated interface to the distribution board earth bar when it is used as input (case I2).
 - Connect the casing of the prefabricated interface to the distribution board earth bar when it is used to supply receivers (case I3).
 - The type and cross-section of the cable must be defined according to the short-circuit current.
- Failure to follow these instructions can result in equipment damage.**

DETERIORATION MATERIELLE EN CAS DE COURT-CIRCUIT PHASE-TERRE

- Raccordez l'enveloppe de l'interface préfabriquée à la barre de terre du tableau lorsqu'elle est utilisée comme arrivée (cas I2).
 - Raccordez l'enveloppe de l'interface préfabriquée à la barre de terre du tableau lorsqu'elle est utilisée pour alimenter des récepteurs (cas I3).
 - La nature et la section du câble doivent être définies en fonction du courant de court-circuit.
- Le non-respect de ces instructions peut provoquer des dommages matériels.**

DEGRADACIÓN MATERIAL EN CASO DE CORTO CIRCUITO FASE-TIERRA

- Conecte la carcasa de la interfaz prefabricada a la barra de tierra del tablero de distribución cuando se utilice como entrada (caso I2).
 - Conecte la carcasa de la interfaz prefabricada a la barra de tierra del tablero de distribución cuando se utilice para proporcionar energía a los receptores (caso I3).
 - El tipo y la sección transversal del cable deben definirse en función de la corriente de cortocircuito.
- Si no se siguen estas instrucciones pueden producirse daños en el equipo.**

DETERIORAÇÃO MATERIAL EM CASO DE CURTO-CIRCUITO FASE-TERRA

- Conecte o invólucro da interface pré-fabricada à barra de aterramento da placa de distribuição quando for utilizada como entrada (caso I2).
 - Conecte o invólucro da interface pré-fabricada à barra de aterramento da placa de distribuição quando for utilizada para alimentar receptores (caso I3).
 - O tipo e a seção transversal do cabo devem ser definidos de acordo com a corrente de curto-circuito.
- A não observância destas instruções pode provocar danos no equipamento.**

如果出现相对地短路，可能会损坏设备

- 当预制接口套管用作输入（壳体 I2）时，将其连接到配电板接地棒。
 - 当预制接口套管用于为接收器（壳体 I3）供电时，将其连接到配电板接地棒。
 - 必须根据短路电流定义电缆的类型与截面。
- 如果不遵守这些说明，则会导致设备损坏。**

ПОВРЕЖДЕНИЕ ОБОРУДОВАНИЯ ПРИ ЗАМЫКАНИИ ФАЗЫ НА ЗЕМЛЮ

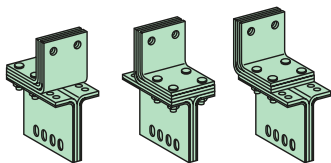
- Соедините корпус изготовленного заводским способом сопряжения с шиной заземления распределительного щита, когда он используется как вход (вариант I2).
 - Соедините корпус изготовленного заводским способом сопряжения с шиной заземления распределительного щита, когда он используется для питания приемников (вариант I3).
 - Тип и размер поперечного сечения кабеля нужно выбирать в соответствии с величиной тока короткого замыкания.
- Несоблюдение этих инструкций может привести к повреждению оборудования.**

DETERIORAMENTO MATERIALE IN CASO DI CORTOCIRCUITO FASE-TERRA

- Collegare il carter dell'interfaccia prefabbricata alla barra di terra della scheda di distribuzione quando viene utilizzata come ingresso (caso I2).
 - Collegare il carter dell'interfaccia prefabbricata alla barra di terra della scheda di distribuzione quando viene utilizzata per alimentare i ricevitori (caso I3).
 - Il tipo e la sezione del cavo devono essere definiti in funzione della corrente di cortocircuito.
- Il mancato rispetto di queste istruzioni può provocare danni alle apparecchiature.**

MATERIALBESCHÄDIGUNG BEI PHASE/ERDE-KURZSCHLUSS

- Verbinden Sie das Gehäuse der Fertigbau-Schnittstelle mit der Erdungsleiste des Verteilerkastens, wenn die Schnittstelle als Eingang verwendet wird (Fall I2).
 - Verbinden Sie das Gehäuse der Fertigbau-Schnittstelle mit der Erdungsleiste des Verteilerkastens, wenn die Schnittstelle zur Versorgung der Empfänger verwendet wird (Fall I3).
 - Typ und Durchmesser des Kabels sind je nach Kurzschlussstrom zu bestimmen.
- Die Nichtbeachtung dieser Anweisungen kann Sachschäden zur Folge haben.**



M10

x6

x6

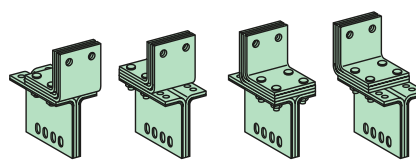
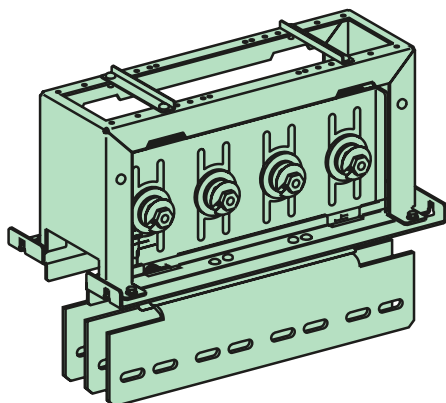
M12

x6

x6

x6

x12



M10

x8

x8

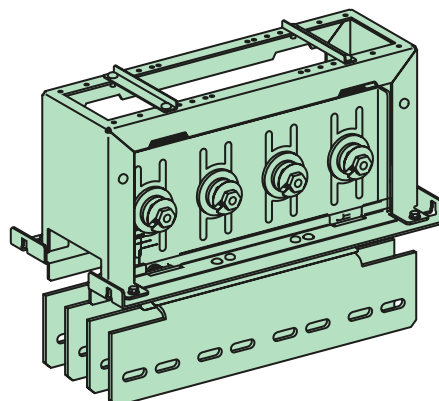
M12

x8

x8

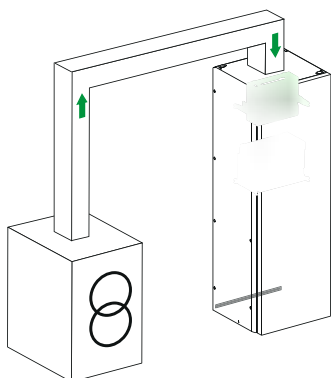
x8

x16

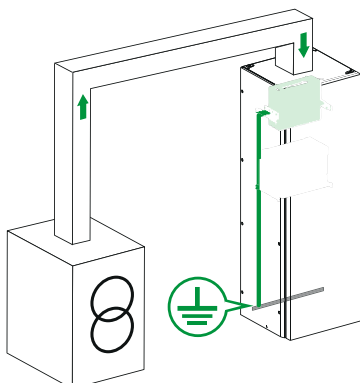




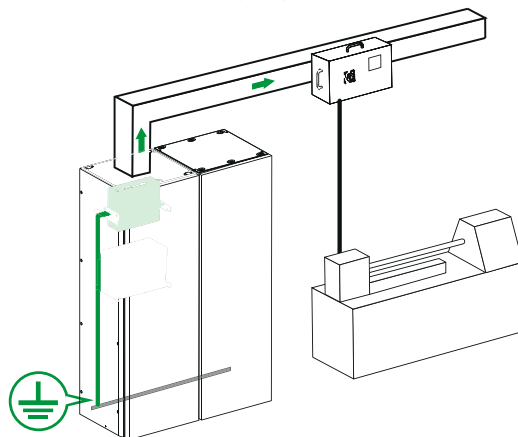
TN-S , IT or TT earthing system



TN-C earthing system

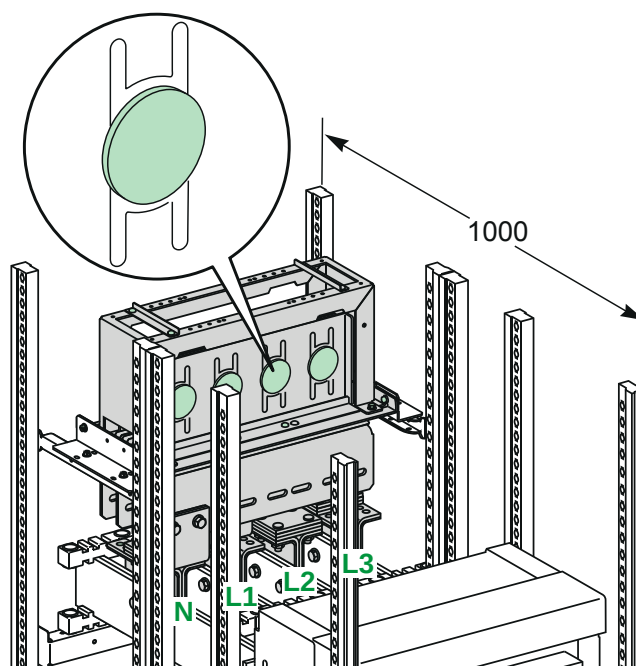
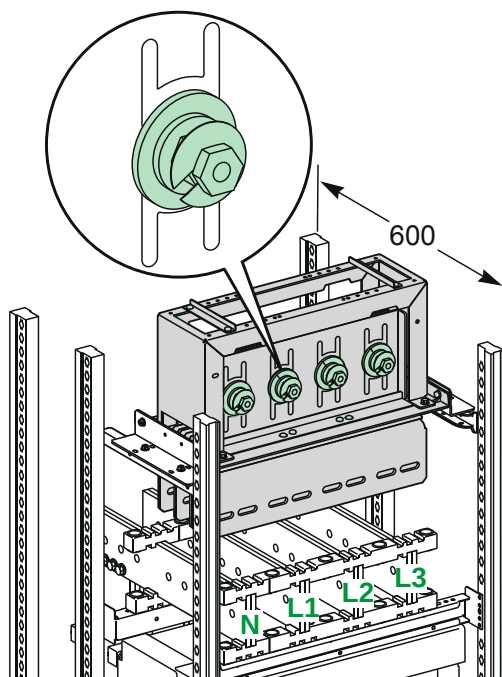
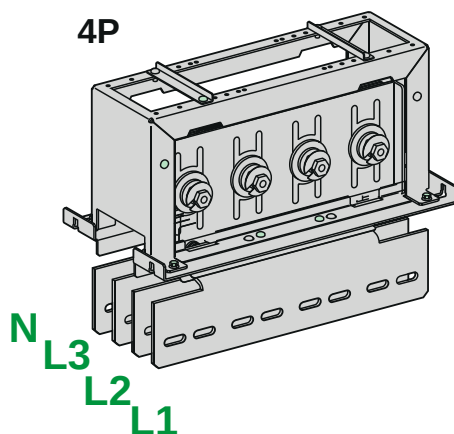


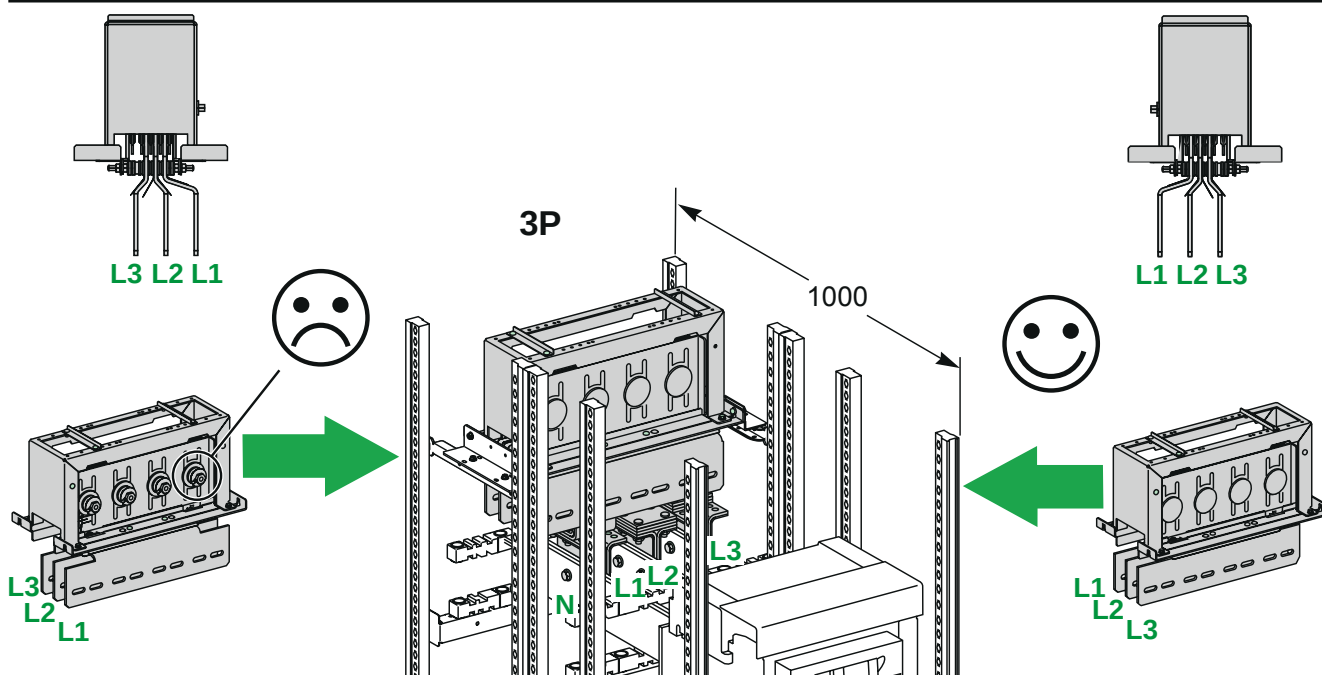
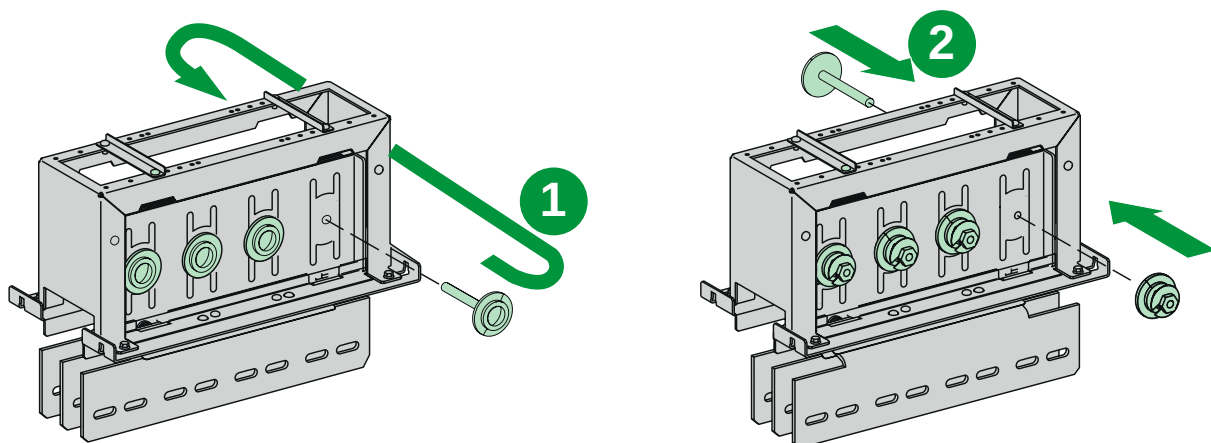
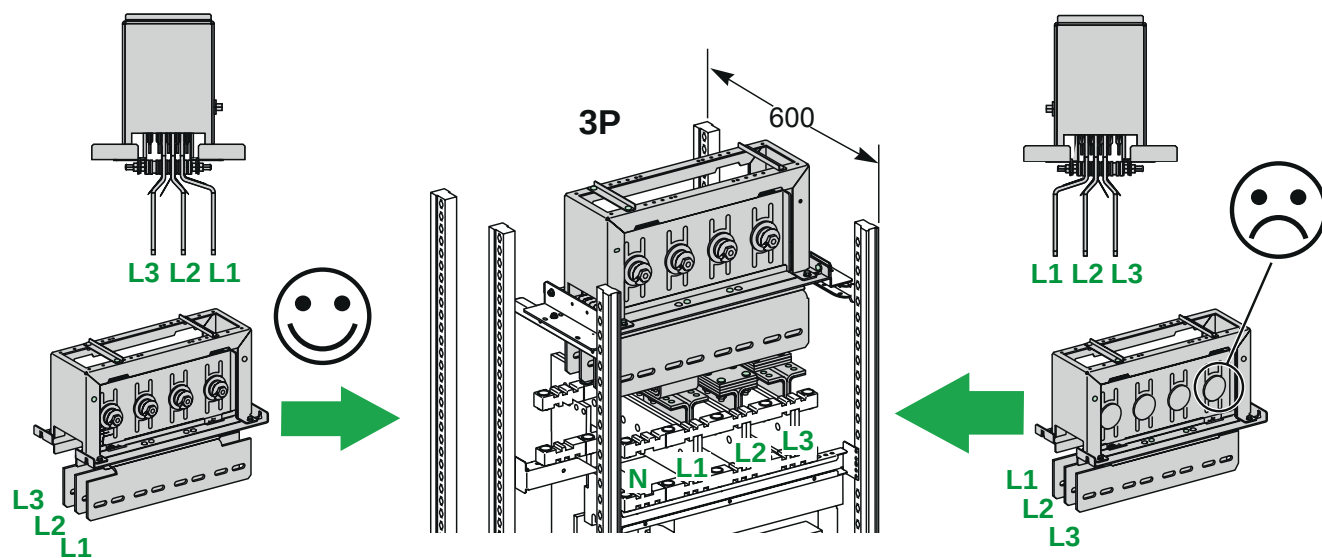
TN-S, TN-C, IT or TT earthing system

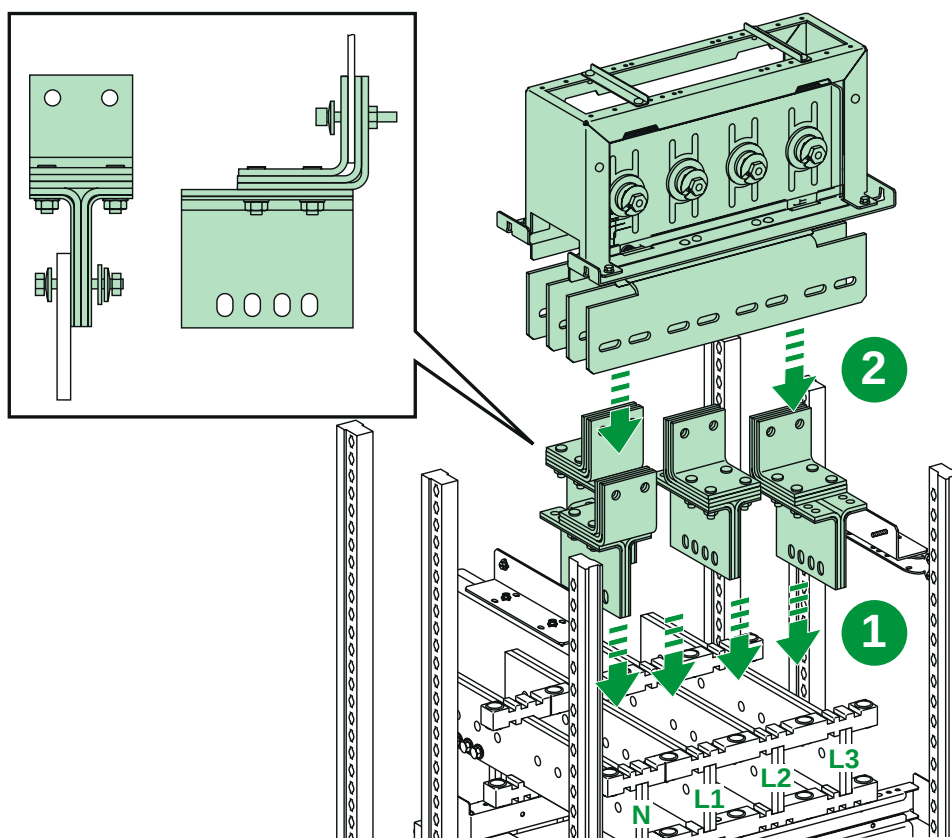
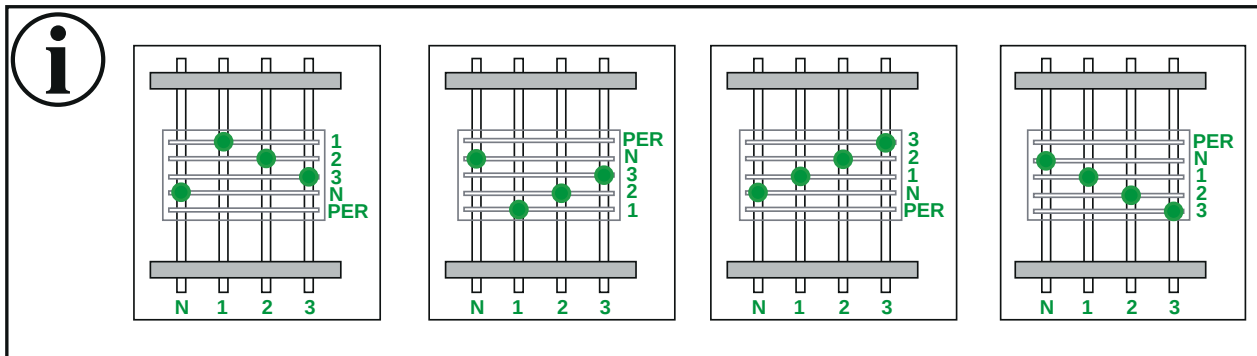


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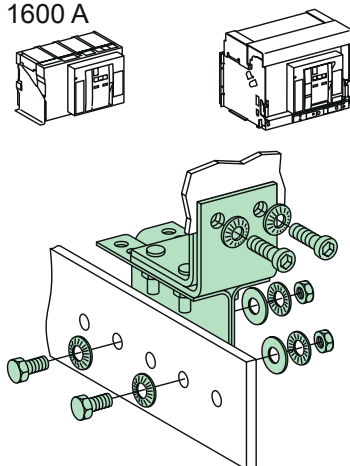
4P



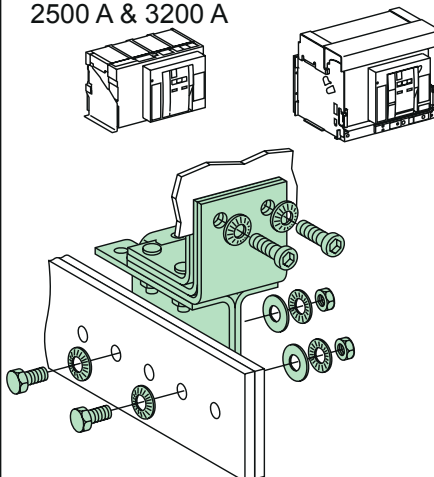




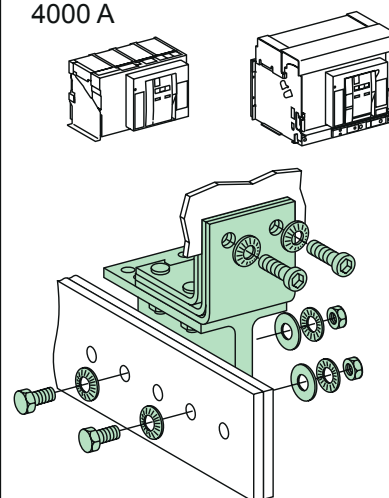
NW/MTZ2
1600 A

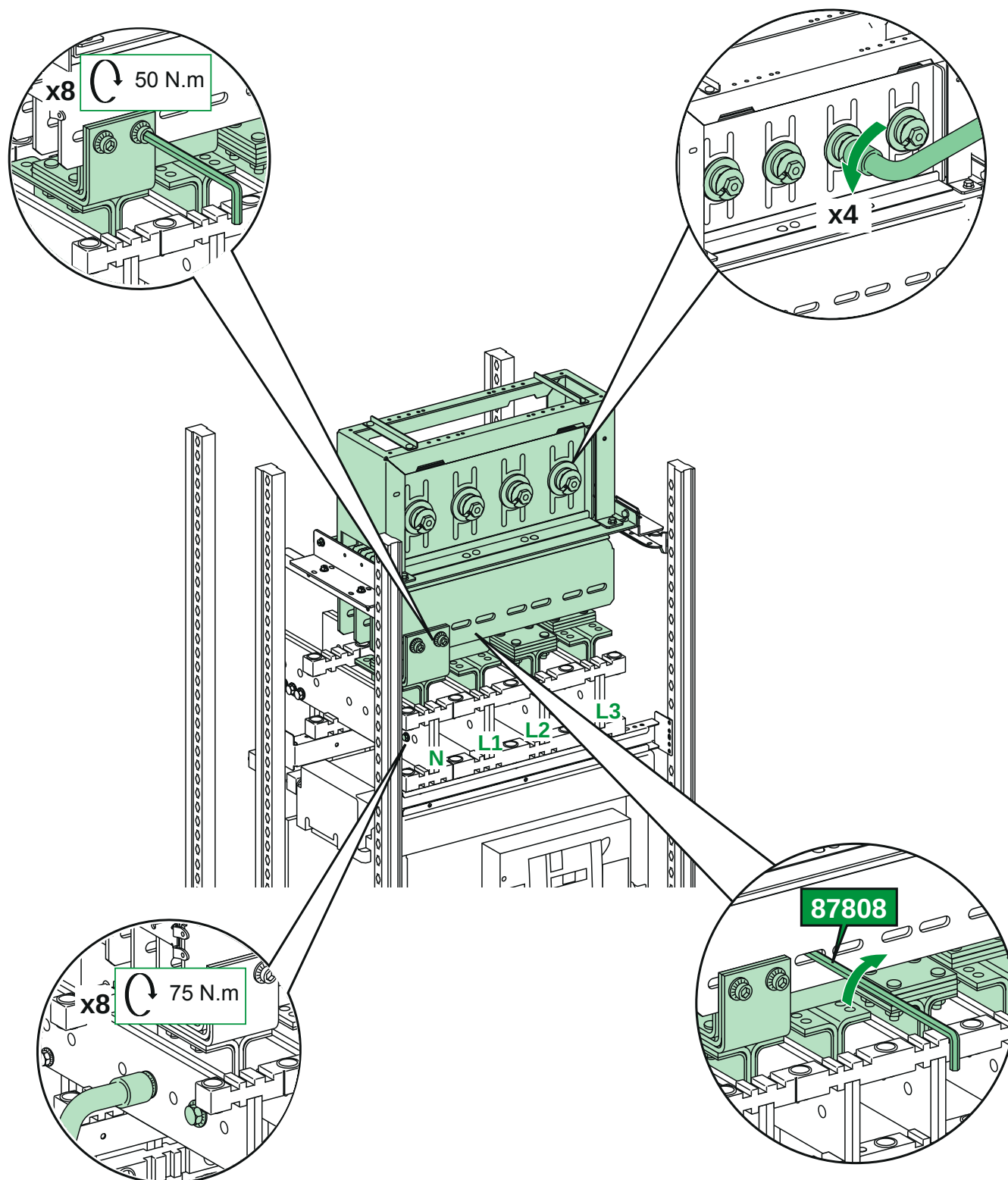


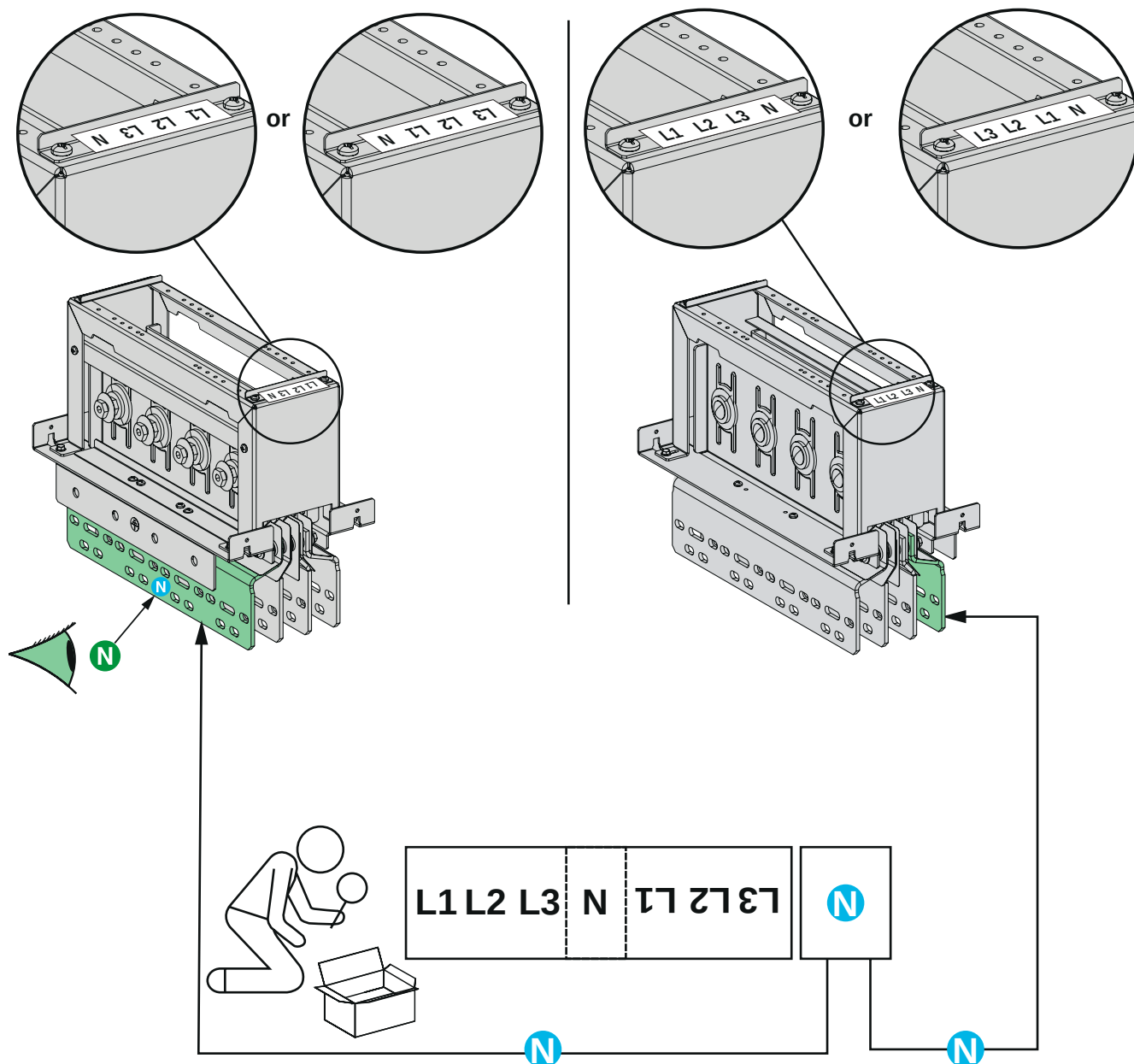
NW/MTZ2
2500 A & 3200 A



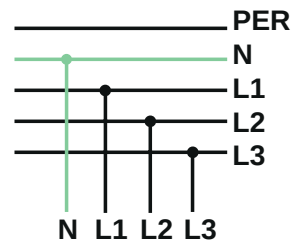
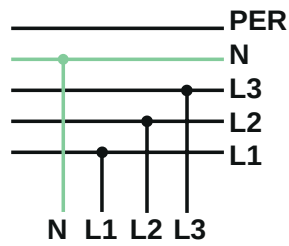
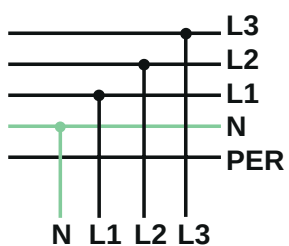
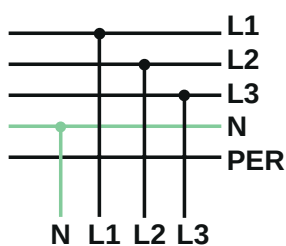
NW/MTZ2
4000 A



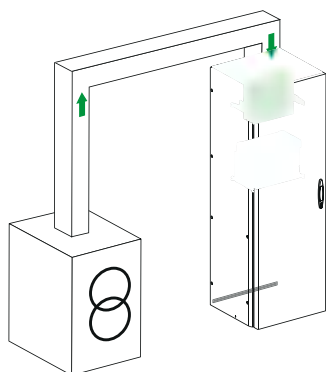




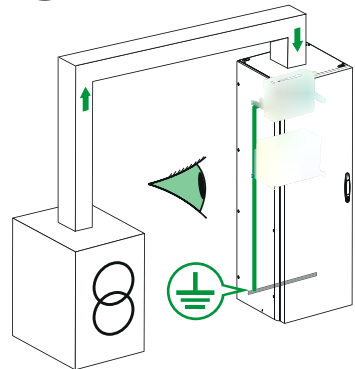
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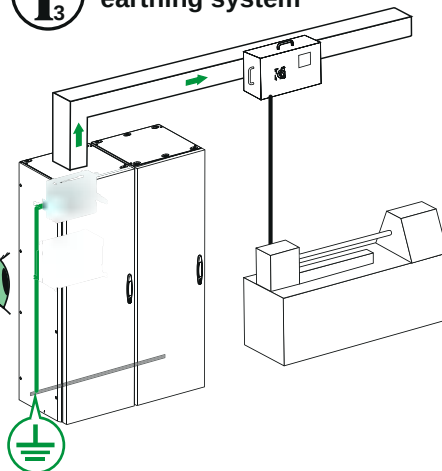
i₁ TN-S , IT or TT earthing system



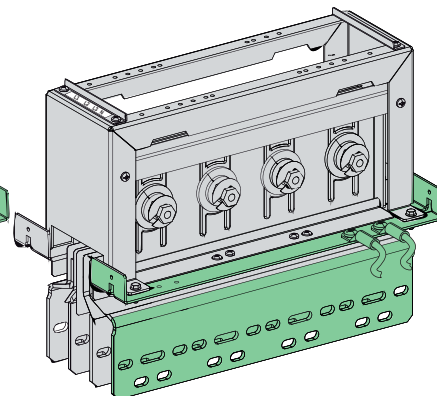
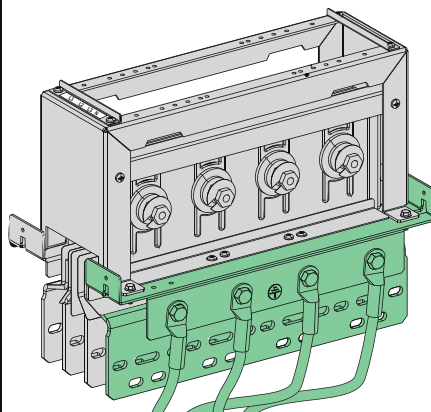
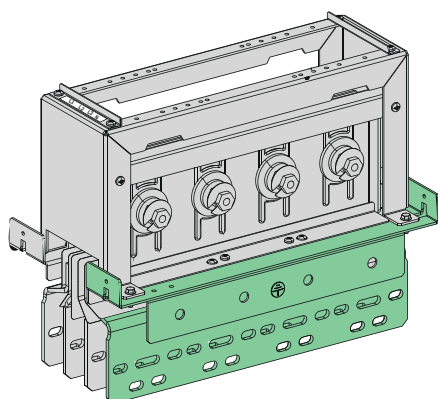
i₂ TN-C earthing system



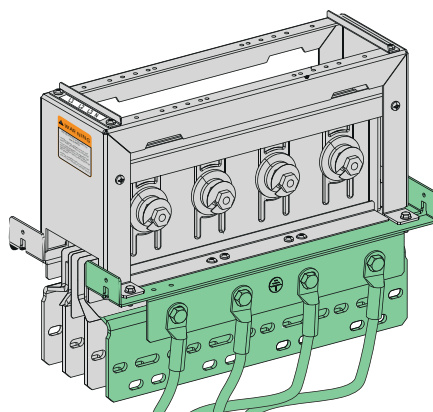
i₃ TN-S, TN-C, IT or TT earthing system



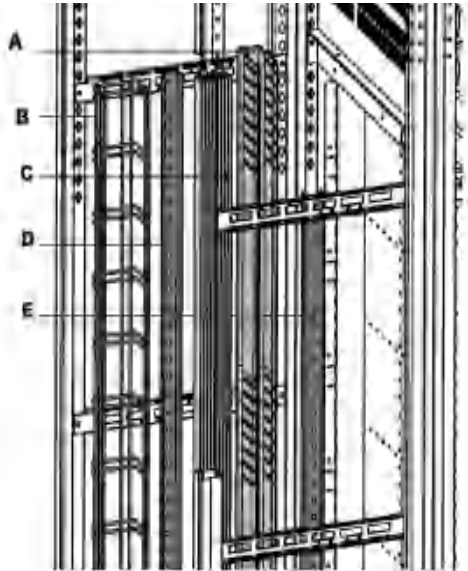
3



Note: Please use correct earth cable size



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

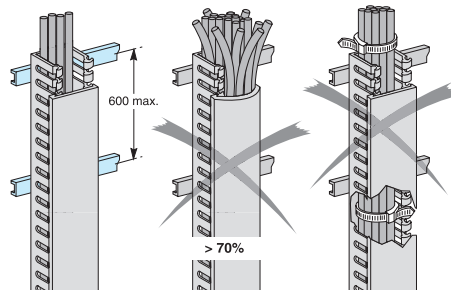
■ Cabletrays

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

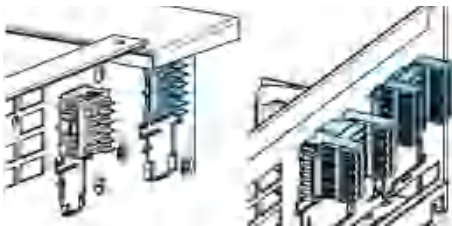
■ Trunkings

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.



Auxiliary contacts



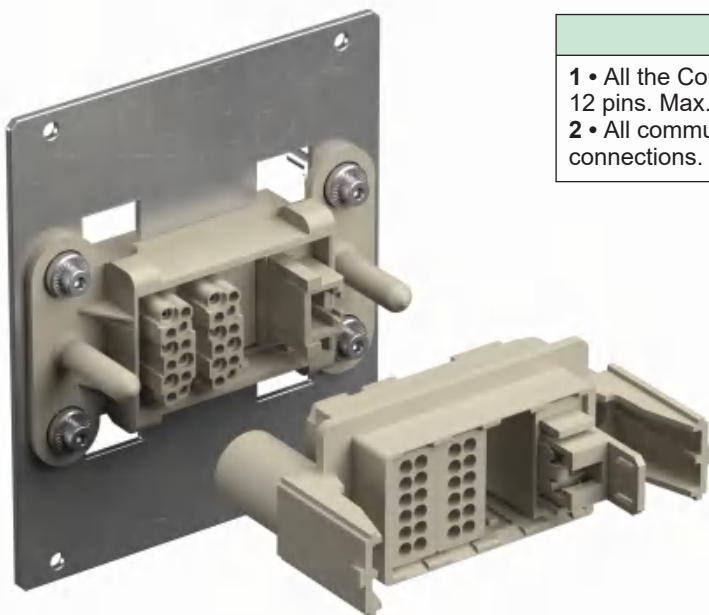
■ General:

- 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:

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

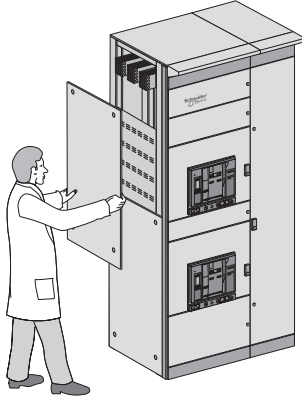
70-M Network wiring



NOTE

- 1 • All the Control connection to be wired to Pin Module in multiples of 12 pins. Max. 48 pin connection are possible in 1 drawer.
- 2 • All communication connections to be routed through RJ45 connections. Refer wiring guide for more details.

Panelling



Side panels

■ Assembly

- install the lower ½ panel,
- screw but do not tighten screws beginning with the top screws,
- permanently tighten when all the screws have been fitted
- store the upper ½ panel,
- screw but do not tighten screws beginning with the top screws,
- permanently tighten when all the screws have been fitted

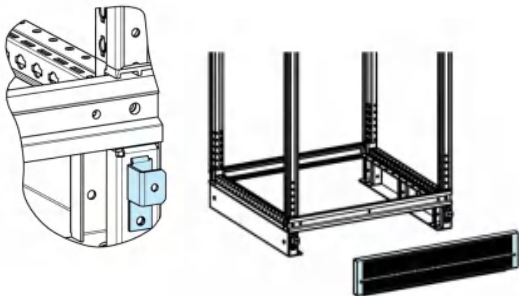
■ The edging sections should be stuck on the cubicle after the panel assembly on the site.

All contact areas must be perfectly clean.

Rear panels

■ Assembly

- install the panel,
- screw but do not tighten the screws beginning with the top screws,
- permanently tighten when all the screws have been fitted



Doors

■ 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.

Plates and grids

■ Securing the bottom supports and the grids or cover plates
M6x13 TF screw (87182 : 1000 screws).

■ In order to ease handling the columns by the bottom, and avoid damage during transportation, the fixing supports and grids (or IP42 strips) at the bottom of the columns have to be mounted on the site after the switchboard's installation. They aren't mounted on the switchboard at the delivery (supplied separately).



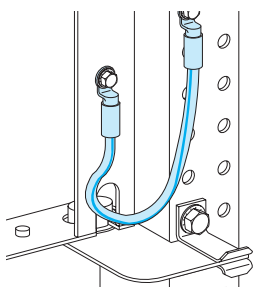
Edging sections

Stick the edging sections on side panels bend situated on the front side of the switchboard.



Roof gaskets

- 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 lengths.



Equipotential connection

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

Installing Masterpact

Masterpact is often delivered separately because of its weight.

In this case, the device is identified by

- the number of the column in which it will be installed,
- the reference of its position in this column.

Here are all the manipulations to do to install it in the cubicle:

- unpack the devices,
- check that they have suffered no damage that might inhibit correct operation,
- remove the two securing brackets (see Fig. 1),
- before racking in the Masterpact, check that the chassis corresponds to the device,
- pull on the rail extraction handles (see Fig. 2),
- position Masterpact on the rails (see Fig. 3),
- make sure the device rests on all four supports,
- push on the extraction handles to insert Masterpact in the chassis (see Fig. 4).

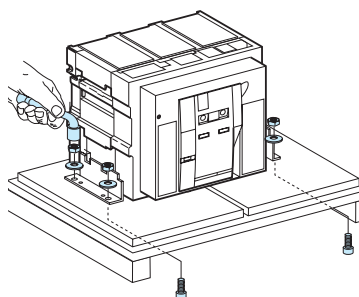


Fig. 1

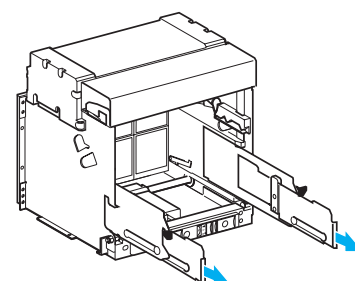


Fig. 2

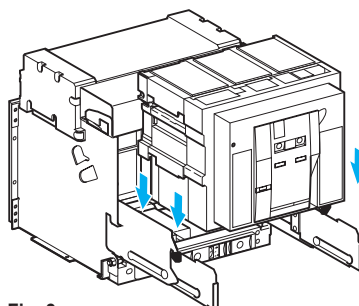


Fig. 3

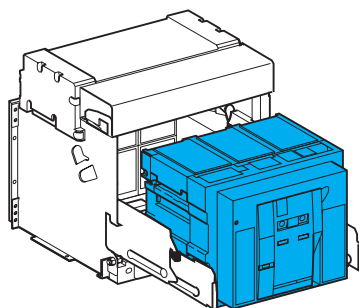
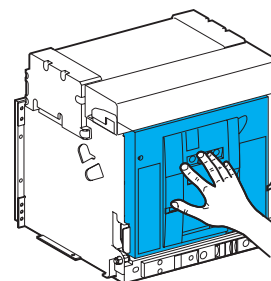


Fig. 4



Cleaning

Practical rules

Cleaning the switchboard before the preliminary checks:

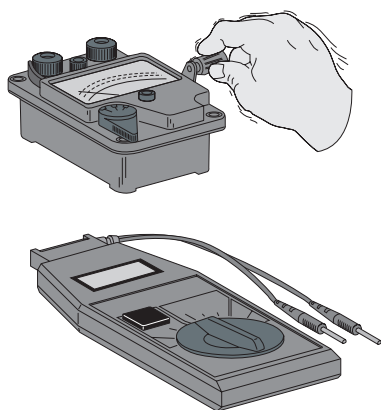
- ☐ remove dust from the inside using a vacuum cleaner : do not use blow cleaning as this may cause shavings and detritus to accumulate in a live area,
- ☐ dust the outside,
- ☐ if necessary, use a neutral dissolvent that will not damage the paint,
- ☐ touch up paintwork if necessary,
- ☐ check absence of foreign matter inside the switchboard (tools, screws and bolts) that could prevent it from operating properly.

Checking and testing	70
Masterpact NW and NT	71

CAUTION

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.

Checking and testing



- 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 system is used, carry out the insulation measurements on the phases only.
- 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.
- If another test is expressly required by the customer, apply a coefficient of 0,8 to the factory test value.
- 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 all the tightenings made on the site, except if already marked with varnish:
 - electrical connections, using a torque wrench
 - mechanical connections
 - ground fastening
 - ☐ 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 cat. no. 87635).

CAUTION

Dielectric tests subject equipment to certain stresses (ageing...) and should not be carried out overly frequently.

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

DANGER

Check that nothing has been left inside the board (especially if modifications have been carried out).

- Check the insulation: if the value is below 1000 ohms/V, preheat the switchboard (resistor, bulb, heating source) 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.
- After energising the switchboard, progressively close the breakers.

For the first time

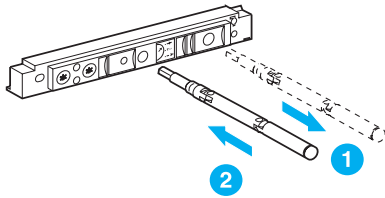


Fig. 1

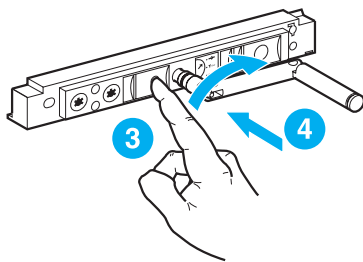


Fig. 2

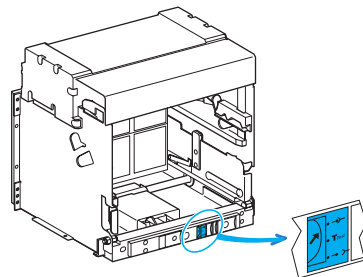


Fig. 3

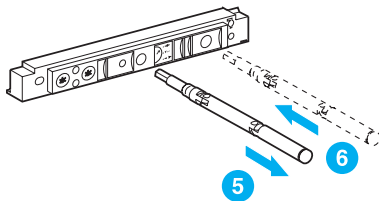


Fig. 4

- Rack in the Masterpact devices.
 - Fit the racking crank (see Fig. 1).
 - Turn the crank (see Fig. 2) until "connected" position be indicated (see Fig. 3).

CAUTION

At the end of insertion, considerable effort is required on the crank. This is because the device terminals must be pushed into the fixe contacts. The required torque may be as high as 25 Nm.

- Put the crank back into its lodging (see Fig. 4).
- Insert any disconnectable circuit breakers.
- Check that all protective circuit breakers are in the open (off) position.
- Set the control units of the Masterpact devices (see the Masterpact manual) to protect the network and, if applicable, the low-voltage distribution outgoers.
- Set the trip units on the protective circuit breakers, depending on the rating of each outgoer.
- Set the magnetic release on each of the motor-protection circuit breakers after examining the nameplate of the motor to be protected.
- Check that the phase rotation or index is in conformity with that of the circuits supplying Okken.
- One after the other, energise the power circuits in the switchboard, checking each time that the loads are supplied and operate correctly.
- Carry out operating tests:
 - Operating sequence;
 - Controls, indications, measurements, protection;
 - Remote-control mechanism;
 - Electrical interlocks.

DANGER**HAZARD OF ELECTRIC SHOCK, BURNS OR EXPLOSION**

Energising the switchboard for the first time is potentially dangerous. Therefore only qualified personnel may carry out the energising procedure because faults, caused by shocks or incorrect installation and not detected during the preliminary checks, may result injury and serious damage to the equipment when the power is turned on.

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

Masterpact circuit breakers	74
Functional units ≤ 630A	76
Plug-in and disconnectable Polyfast and mounting plates	76
Drawers	77

Consult the Masterpact documentation.

To close Masterpact (ON position):

■ Charge the Masterpact operating mechanism by pulling down on the lever seven times until a "Click" is heard. The "charged" indication is displayed (see Fig. 1).

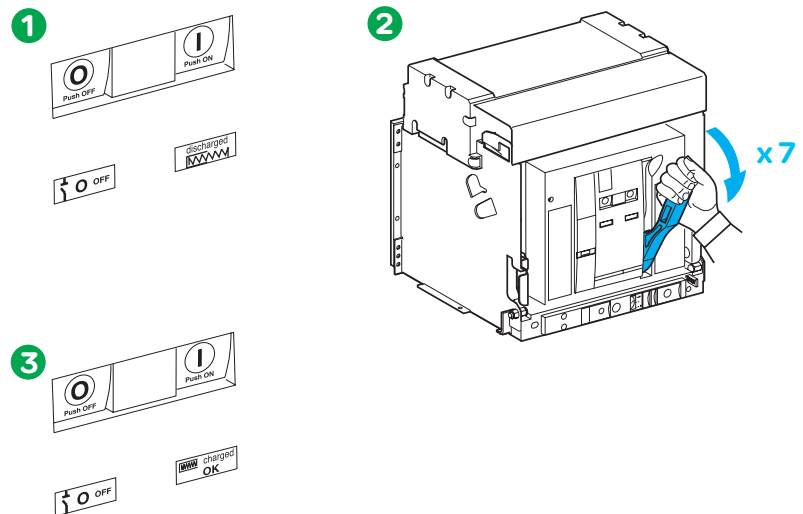


Fig. 1

■ If the device tripped due to an electrical fault, reset the indicator on the control unit by pushing it (see Fig. 2).

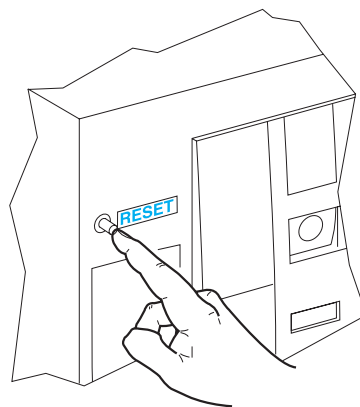


Fig. 2

■ Press the ON button. The ON indication is displayed (see Fig. 3).

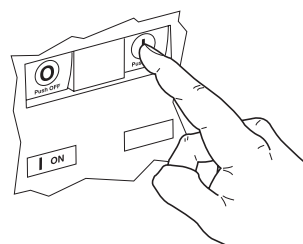


Fig. 3

To open Masterpact (OFF position):

- Press the OFF button. The OFF indication is displayed (see Fig. 1).

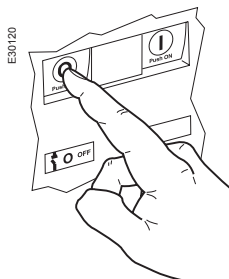


Fig. 1

DANGER

HAZARD OF ELECTRIC SHOCK, BURNS OR EXPLOSION

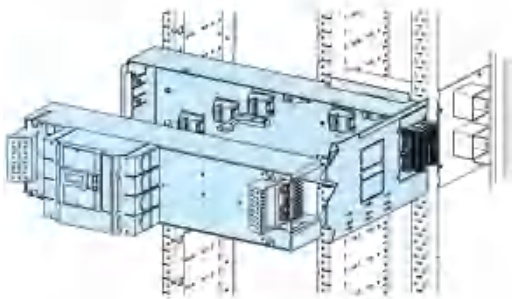
A hazard of electric shock, burns or explosion exists whenever working in or around the equipment. Okken must be operated only by qualified personnel, familiar with the installation

Failure to observe these instructions will result in severe injury and damage to the switchboard.

5

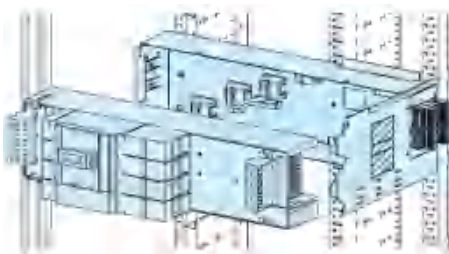
Functional units ≤ 630A Plug-in and disconnectable Polyfast and mounting plates

Plug-in Polyfast



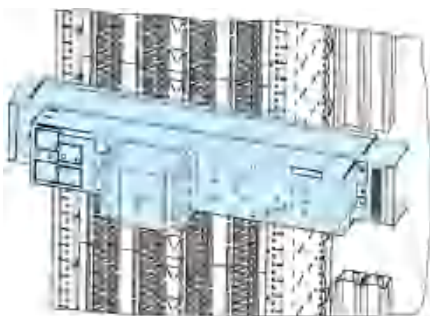
- Commissioning
 - check that greasing of functional units clamps is effective
 - check the correct fixing of Polyfast on its base plate (4 screws)
 - check the presence of the terminal covers on the device
 - if necessary proceed with adjustment of the control unit
 - close the device: "ON" position.
- Removal
 - open the device: "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.

Disconnectable Polyfast



- Commissioning
 - check that greasing of functional units clamps is effective
 - check the correct fixing of Polyfast on its base plate (4 screws)
 - check the presence of the terminal covers on the device
 - if necessary proceed with adjustment of the control unit
 - close the device: "ON" position.
- Removal
 - open the device: "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.

Disconnectable mounting plate



- Commissioning
 - check that greasing of functional units clamps is effective
 - 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 device: "ON" position.
- Removal
 - open the device: "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.

Fixed and plug-in on mounting plate

- Commissioning
 - check that greasing of functional units clamps is effective
 - if necessary open the door to proceed with adjustment of the control unit
 - close the device: "ON" position.
- Removal of an device from its base:
 - refer to the device leaflet

Drawer racking



70-2 drawer



70-M drawers

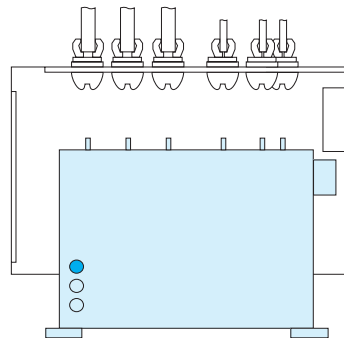
■ Racking

- press and hold the red release button while pushing the drawer fully home to the "connected" position
- the racking is correct if the positioning mechanism is locked

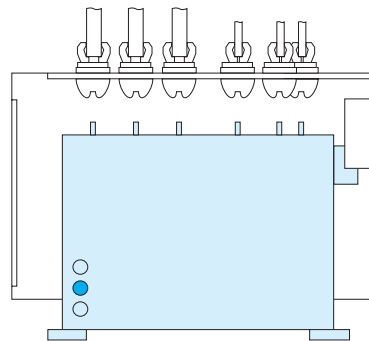
NOTE

It is possible to go directly to the "connected" position when maintaining the release button.

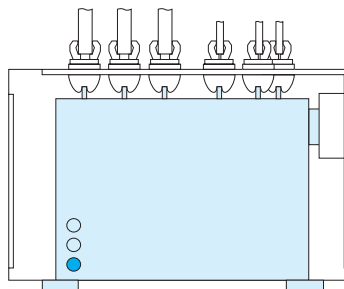
70-2



disconnected position

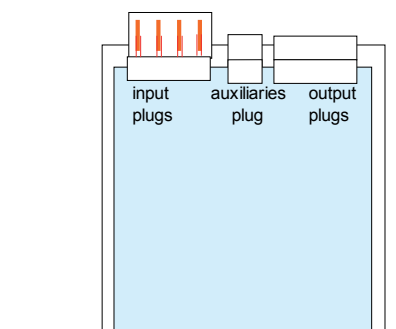
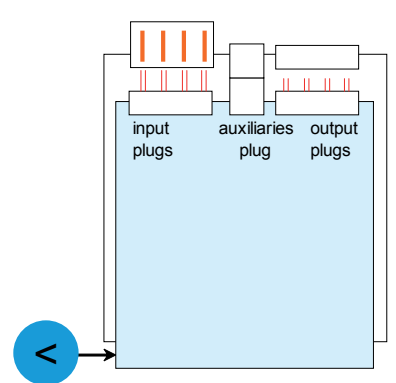
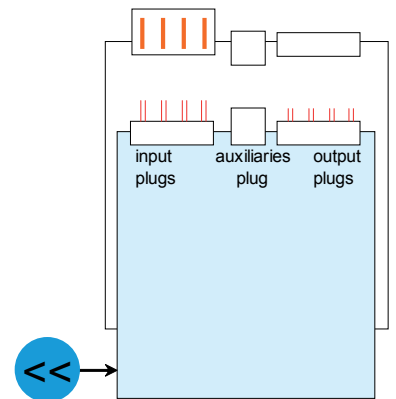


test position



connected position

70-M



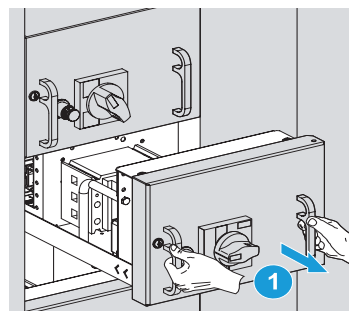
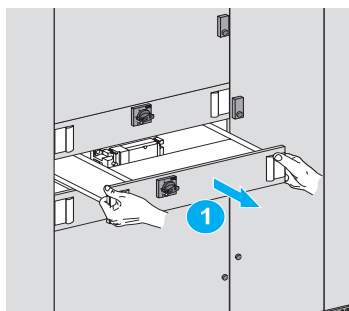
■ Check that greasing of functional units clamps is effective.

■ Operation

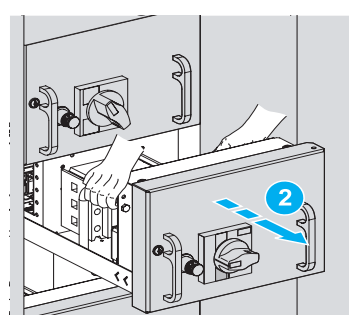
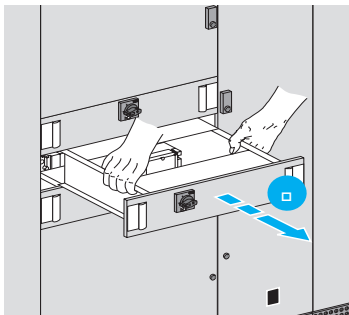
- when the drawer is in the "test" or "connected" position, you can turn the protection device on.

Drawer positions

- **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.
- **Withdrawing**
 - pass from the "connected" to the "test" position, then to the "disconnected" position
 - the positioning mechanism locks the drawer in the selected position.



drawer implemented in the lower side of the column

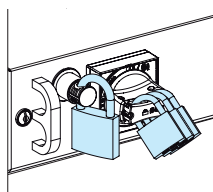


- **Removal**
 - pull the drawer with the handles to the pre-extraction hard point
 - position the hands as indicated on the diagrams and extract the drawer
 - be careful with grease present on the mechanisms.
- **Putting into position**
 - engage the drawer in its cell, positioning the hands as indicated on the diagrams
 - check that the apparatus is in open position
 - using the two handles, push the drawer to the "disconnected" position

NOTE

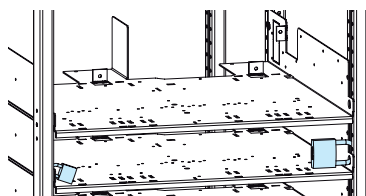
If the drawers are equipped with mismatching device, check the consistence of drawer and cell.

Secure a functional unit



- Each functional unit can be secured with:
 - 1 to 3 padlocks on the rotary handle
 - 1 padlock on the push-button
- Using the GV2V03, the push-button can be secured with up to 6 padlocks.

Secure a 70-M drawer place



- Drilling following the specification S1A9335002 (see fixed part drawin
- Available for diam 5 and 8mm padlocks and for GV2V03 multipadlocking device

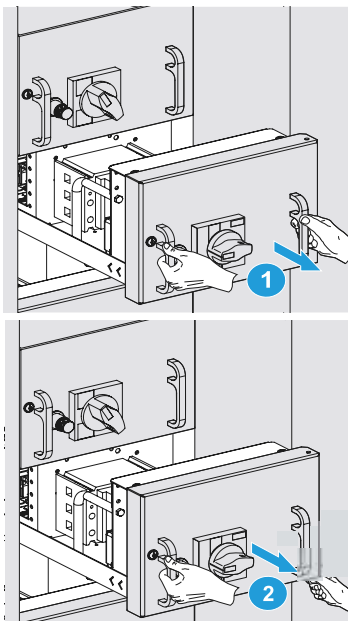
Manipulation of a 70M Drawer

■ General:

- Withdrawal of the drawer is not possible when the breaker is in ON/closed condition. To withdraw the drawer:
 - Turn the breaker to OFF/open position.
 - Hold the handle and press the indexing push button simultaneously.

Withdrawing

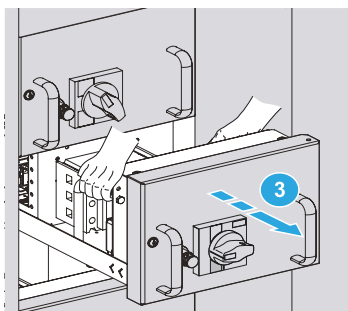
- Pass from the "connected" to the "test" position, then to the "disconnected" position.
- The Locking mechanism locks the drawer in the selected positions.
- The Drawer Stop mechanism locks the drawer in the pre-extraction hard point to avoid drawer extracting out completely.
- Release Drawer Stop by pushing the Drawer Stop Lever with a moment of Drawer as shown below.



drawer implemented in the lower side of the column

■ Removal

- Pull the drawer with the handles to the pre-extraction hard point.
- To extract the drawer, pull the drawer by pushing the drawer stop lever.



■ Putting into position

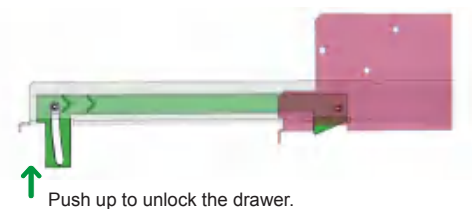
- Engage the drawer in its cell by pushing the drawer stopper lever up.
- Check that the breaker is in OFF/open position.
- By using the two handles, push the drawer to the disconnected position.

Drawer stopper positions

Drawer in connected position



Drawer in pre-extraction hard point position



Drawer in extracted position



Settings

It is possible to open the front face of the drawer, giving access to the device settings and to the live parts for thermal monitoring.

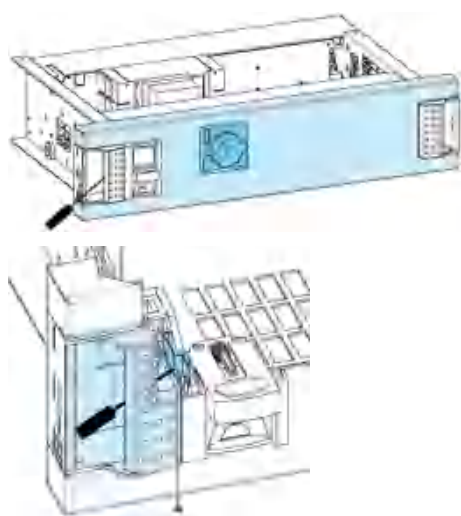
DANGER

HAZARD OF ELECTRIC SHOCK

Opening the door of the drawers in connected position, give access to live parts.

Only authorised person equipped with safety protection can carry out this operation according to all safety procedures.

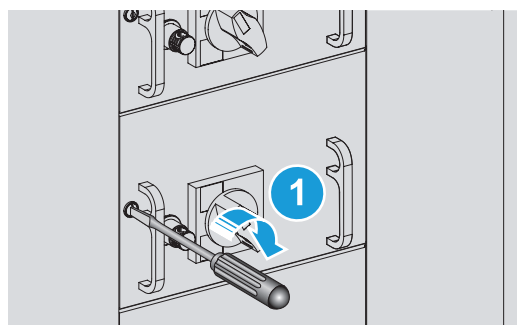
Failure to observe these instructions will result in severe injury or death.



70-2

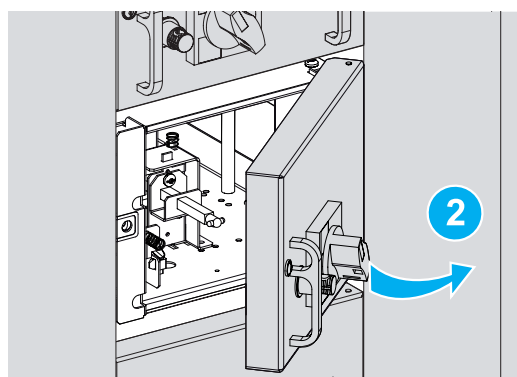
■ For 70-2

- 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 door. The spring goes back automatically in position.



■ For 70-M

- unscrew the 1/4 turn screw
- unlock the protection device rotary handle
- open the door
- carry out the adjustments or execute thermal monitoring
- close again the door.



70-M

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