
Cable routing

Cable straps

- Cables passing through straps must comply with the following rules:
 - the cables must not be tied in the straps
 - a sufficient number of straps must be used (generally 1 strap every 100 mm).

Cable duct

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

Connection

Connection to terminals:

- Terminals are either installed on the device mounting plate or on modular rails.
- All conductor strands must be placed in the terminal hole.
- Tighten properly making sure the strands are not cut.
- Fit ferrules on the cables for pointed screw terminals.
- Certain Merlin Gerin connection systems use screwless spring-terminals. This type of terminal is very reliable since it is insensitive to vibrations and thermal variations. Do not fit ferrules on the cables with this type of spring-terminal and only insert one cable per terminal.
- Identify cables using markers that are consistent with those in the switchboard to make future work easier.

Routing auxiliary cabling between cubicles

- Connect the auxiliaries on the terminal blocks for auxiliary wiring.

Routing towards auxiliary door-mounted switchgear

- Route the cables through self-adhesive door trunking and/or flexible trunking to the door.

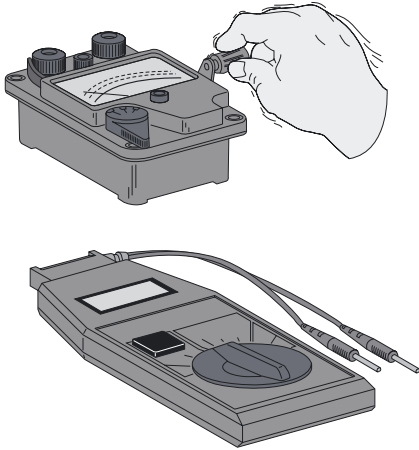
General

Any work on the cubicles allowing or facilitating cable routing, must not compromise the original degree of protection.

Note: if a panel has been cut to pass cables for example, the edge should be repainted to avoid oxidation and fitted with a protective device (gasket, grommet) to avoid damaging conductors.

Panelling

- Reassemble the shields and partitions protecting the connections and busbars.
- Reassemble the roof (check the presence of the self-adhesive gasket on the roof for IP31 degree of protection).
- Reassemble the rear panels.
- Reassemble the side panels.
- Reassemble the door. Do not forget to connect the braid when devices are installed on the door.
- Reassemble gland plates.
- Touch up paint as necessary.



Required measuring and checking instruments

The following measuring and testing items are required for energising the switchboards:

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

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

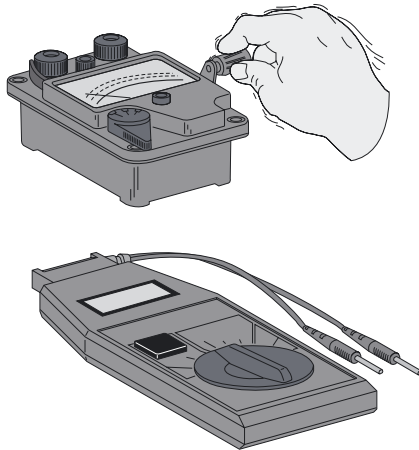
General

Positioning of high power devices

- Unpack the devices, if they are packed separately.
- Check that they have suffered no damage that might inhibit correct operation.
- Before racking in the device, check that the chassis corresponds.
- Press the release tabs and pull the rails out.
- Position device on the rails.
- Make sure it rests on all four supports.
- Push the device into the chassis.

Installing and operating

- Refer to device leaflet.



Precautions before tests

Measures and precautions to be taken before energizing auxiliaries and power circuits.

- Respect the security rules.
 - Draw the dust up of all switchboards.
 - Remove all the foreign substances hurtful to good switchboard working order (cables, strands, screws, miscellaneous pieces and tools falls).
 - 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.
 - 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.

Checking mechanical junctions

- Check the fixing of switchboards to the floor.
- Check mechanical inter-cubicle connections.

Checking electrical junctions

- Busbars (joints): checking the clearances and creepage distances between conductive parts.

■ Cables:

- number and cross-sectional area
- correspondence between cable passage holes made in metal panels and the diameter of grommets and cable glands (compliance with degree of protection), so that cables do not risk being damaged
- compatibility of cross-sectional area of cable terminations or lugs with the device terminals or connectors
- quality of cable supports: these must support the weight of the cables and withstand any electrodynamic forces caused by short circuits.

■ Tightening: check the screw diameter and quality of tightening of all electrical connections made on site:

- either visually, if the mounting hardware has been marked
- or using a calibrated torque wrench for the last connections made on site.

Insulating testing

Before energizing the equipment, carry out a global insulation measurement.

- For a TNC-type earthing arrangement, disconnect the earthing connections and carry out insulation measurements only on the phases.
- The test must be made using an insulation measurement device working at a voltage of at least 500 V DC.
- The minimum insulation resistance value must be equal to 1000 ohms/V. If the global insulation value is low, preheat the switchboard (using an electrical element, bulb, heat source) to eliminate dampness for at least 24 hrs. Repeat the global insulation measurement.
- Dielectric testing has already been carried out in the factory (see workshop inspection certificate). This subjects the equipment to certain tests (aging, etc.). It is preferable not to repeat these tests. If the customer expressly requests a new test, apply a coefficient of 0.8 to the factory test value.

Protection of persons

■ Electrical continuity:

- the use of spiked washers to guarantee the electrical continuity of the assembled components (inter-cubicle, cover panels, partitions)
- junction between the protection conductor and the inter-cubicle connection
- presence of earthing braids on doors fitted with switchgear
- correct earthing of the switchboard.

■ Protection against direct contact:

- presence of the covers requested by the customer and in conformity with standard IEC 63439-14, § 7.7
- presence of barriers to keep people from approaching live equipment.

■ **Protection against indirect contact:** check automatic breaking of the installation on first or second fault according to the earthing arrangement.

Switchboard degree of protection

Check the use of protection corresponding to the requested degree of protection against external influences:

- for IP31: check the use of a self-adhesive gasket on the roof and deflectors on ventilation openings
- for IP55: check the use of inter-cubicle gaskets for side-on-side and back-to-back combinations.

Check that the openings for conductors (inter-cubicle copper busbars, incomer and feeder cables) do not change the switchboard degree of protection.

Miscellaneous tests

■ Mechanical locking of switchgear :

- correct operation
- conformity with needs.

■ Markings :

- of the switchboard
- of power and control conductors
- of incoming and outgoing cables if applicable.

■ Appearance :

- visual inspection of the external appearance (paint, scratches, etc)
- carry out touch-up work if necessary.

Cleaning

■ Clean the switchboard:

- remove dust from inside the switchboard using a vacuum cleaner: using an air jet could cause swarf or other debris to accumulate on live parts
- remove dust on the outside of the switchboard
- if necessary, use a neutral solvent remover that will not deteriorate the paintwork
- touch-up the paintwork if necessary
- check there are no foreign bodies inside the switchboard (tools, screws) which could interfere with correct switchboard operation.

Energising equipment for first time

- Rack in the Masterpact and Compact NS devices (see mounting instructions).
- Plug-in the possible removable circuit-breakers (see Compact mounting instructions).
- Check that all protective circuit-breakers are in the open (OFF) position.
- Set the Masterpact and Compact NS control units (see mounting instructions).
- Set the thermal-magnetic or electronic trip units of the protective circuit-breakers.
- Set the motor-protection circuit breakers magnetic releases and the thermal relays, or the "motor" circuit-breaker and motor protection relays according to the motors characteristics.
- Check that the phase rotation or index is consistent with the supplies one.
- One after the other, energise the power circuits in the switchboard, checking each time that the loads are supplied and operate correctly.
- Carry out the operating tests:
 - operating sequence
 - controls, indications, measurements, protection
 - remote-control mechanism
 - electrical interlocks.

***Note:** the first energising of the switchboard is potentially dangerous, due to the faults undetected during the preliminary checks.*

It must be carried out by a qualified technician.

Before any intervention switch-off the equipment.

A hazard of electric shock, burns or explosion are inherent in use of electrical equipment.

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

When switchboard switched off for a long period

- Check that nothing has been left inside the board (especially if modifications have been carried out).
- Clean all components (see chapter "Connection/Finishing/Cleaning").
- Check the insulation : if the value is below 1000 ohms/V, preheat the board (by resistor, light, 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.
- Supply the switchboard and progressively close the breakers.

General

- Masterpact NW, Masterpact NT, Compact NS 630b-1600, Compact NS 1600b-3200: removal and reinsertion of the device: see device mounting instruction.
- Compact NS 100/630, other devices: settings, switching operations, operating mechanism recharging, removal of plug-in devices: see mounting instructions.

Frequency

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

Recommended calendar

Type	Action	Frequency
General inspection	Visual checks and general cleaning. Visual check of busbars. Running tests	Once a year
Maintenance on functional units	Inspection of the connections	Every 5 years
Maintenance of ventilation system	Cleaning of filters	Every 6 months
Maintenance of devices	According to the respective handbooks	

General recommendations

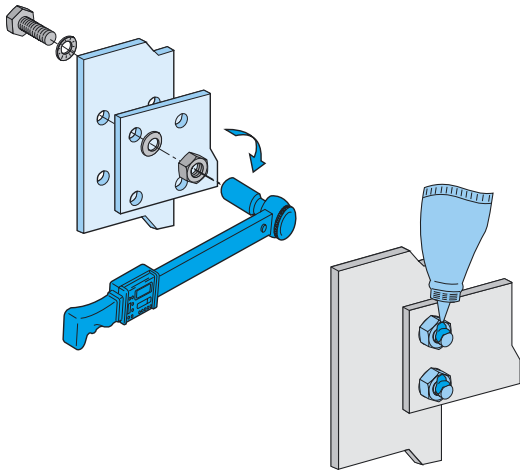
Before any intervention on the connections, switch off the functional unit, remove the protective screens and the partitioning sheets and boxes.

- For interventions on the connections, refer to chapter "Connections", profession Install.
- When reassembling the connections:
 - use new screws, washers, nuts of the same type (class 8.8)
 - tighten to the defined torque (refer to the tightening torques table in the chapter "Connection/Tools required")
 - apply varnish.

Method of inspection of the electrical connections

- Connections by lugs or screwed bars: presence of varnish, colour changes of a copper bar.
- Connections by cage type terminals: if necessary, re-screw to the torque defined by the manufacturer to compensate for a possible creep.

Please ensure that you consult the "General" chapter section dealing with safety instructions.



General inspection

Visual checks and general cleaning of the cubicles

- Check the lack of humidity and foreign bodies inside and outside the switchboard.
- Examine the outer finish. If necessary, touch up any paint scratches and replace any damaged or rusted parts.
- Clean the switchboard, preferably with a vacuum cleaner.
- If necessary, clean the ventilation system and change the filters.

Visual check of busbars

- Connections do not need to be tightened as they were already tightened to the tightening torque in workshop and the use of a contact washer compensates for possible creeps due to overheating. The presence of vernish guaranteeing correct tightening torque, is intact.
- The control of busbars connections and outgoing cables connections can be carried when disassembling the protection (out of supply) or if a hot point is detected (infrared control or thermal sensors). A hot point materialises by a change in the copper colour.
- In case of hot point see "Corrective maintenance".
- Check the condition of insulating busbars supports.

Cleaning of panel ventilation filters

Standard or fine filters

- Wash with water (preferably using a high-quality detergent).
- It is also possible to remove the dust by tapping, vacuuming or blowing with compressed air.
- If there is any oil or grease, change the filter.

General

General recommendations

Before any intervention on the connections, switch off the cubicle, remove the protective screens and the partitioning sheets and boxes.

When reassembling the connections:

- use new screws, washers, nuts of the same type (class 8.8)
- tighten to the defined torque (refer to the tightening torque table in chapter "Connection/Connection of power cables")
- apply varnish.

Hot point

Screwed connection

- Identify the cause: generally a loosening connection.
- Dismantle the assembly.
- Clean and rub down surfaces in contact (e.g. sandpaper N° 400).
- Set the connection up.

Maintenance after a fault has occurred

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

Following a fault, contact your local Schneider Electric office.

Troubleshooting and interventions

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

