

INSTALLATION AND MAINTENANCE INSTRUCTIONS

LOW VOLTAGE SWITCHGEAR

DISCLAIMER

The following instructions are provided to inform persons undertaking installation, maintenance or remedial work on IC Switchgear manufactured equipment of the common requirements and considerations while carrying out that work. The instructions have been written to cover a wide range of switchboard types and are therefore generic. Should any doubt exist about the relevance of any particular instruction or if further information is required, clarification should be sought from IC Switchgear.

These instructions do not cover safe work practices as they may apply to any particular site of installation and should therefore be read in conjunction with the specific requirements for carrying out work at the site of installation.

RECEIVING THE GOODS AT SITE

As per IC Switchgear standard Conditions of Sale, demarcation of transfer of risk to the receiver of the goods occurs upon safe arrival of the goods at site on truck. Lifting, placing, manoeuvring and positioning works at site are the responsibility of the receiver of the goods, and all steps shall be taken to ensure a safety plan is developed taking the following essential points into account:

1. All lifting is from the bottom of the switchgear assembly only.
2. Ensure the centres of gravity are found. If this is not already marked on the packaging, it should be established by careful test lifts. It is often the case that one end of a switchboard is heavier than the other.
3. It is possible that a switchboard may be top-heavy. Once again ensure that such details are established prior to manoeuvring the equipment.
4. Ensure that lifting gear is well rated for the weight of the switchboard and that crane lifting is rated for the reach required.

Options for special top-lifts and other specific installation needs can be met by arrangement at the time of order.

Damaged goods - In the event that goods arrive at site in a damaged or potentially damaged condition, do not accept the goods and contact IC Switchgear immediately while the driver is at site. Instructions will be provided on the best way to proceed once the situation is assessed.

SIEMIC RESTRAINT

Wall mounting - cabinets are provided with a minimum of four mounting holes located at the corners. Use a minimum of four anchors of suitable size and strength to fix the cabinet to the wall. Hole locations should be marked through the back of the board or measured where practical. Mounting holes in the wall should be formed without the cabinet in place so as to avoid wood, masonry or other debris entering the cabinet.

External mounting lugs can be fitted if requested at the procurement stage.

Floor standing, front access - cabinets require fixing at the top to the wall, and at the bottom to the floor as a minimum.

Anchoring at the top to the wall can be achieved with either the proprietary fixing lugs provided on the cabinet or by means of special brackets provided by the installer. In the case of special brackets, check inside the relevant compartment to ensure that where fixing is to be made to the top of the cabinet, no damage will occur to components or conductors within that compartment. Also ensure that any swarf produced as a result of drillings etc does not enter the cabinet by means of a temporary shield. Remove any residual swarf by means of vacuum cleaning. Do not use compressed air or similar means to clear away swarf.

Holes in the base plinth can be formed on site or pre-ordered to specification to suit the site specific needs. The base plinth can also have fixing lugs fitted during fabrication or hold-down clamps can be fitted on site by the installer.

Anchors should be sized to suit the seismic loading and floor material. Seek structural engineering advice where these requirements are not known.

Floor standing, front and back access - cabinets require fixing at the bottom to the floor on both sides as a minimum.

Holes in the base plinth can be formed on site or pre-ordered to specification to suit the site specific needs. The base plinth can also have fixing lugs fitted during fabrication or hold-down clamps can be fitted on site by the installer.

Anchors should be sized to suit the seismic loading and floor material. Seek structural engineering advice where these requirements are not known.

GLAND PLATES

Gland plates should be specified at the procurement stage to suit the cable types and quantities and site conditions. Gland plates can be made from the following materials: powder coated steel, aluminium, brass, stainless steel, PVC and Formica in thicknesses to suit.

The following information about cables should be provided: quantities, type, size, multiple conductors per phase and neutral, copper or aluminium conductor, screening or armouring and exact physical location where existing cables are fixed in situ. (Such as retained cables with potheads)

Gland plates can be factory slit into multiple pieces to enable removable sections where required for larger cables.

Where possible, always remove gland plates from the cabinet before forming holes. If it becomes necessary to form holes while the gland plate is in place, ensure that swarf does not enter the cabinet by means of a temporary shield. Remove any residual swarf by means of vacuum cleaning. Do not use compressed air or similar means to clear away swarf. Gland plates must be re-fitted to the cabinet to minimise the ingress of pests, dust and moisture.

CABLE TERMINATIONS

The following information about cables should be provided at the procurement stage: type, size, multiple conductors per phase and neutral, copper or aluminium conductor, screening or armouring and exact physical location where existing cables are fixed in situ. (Such as retained cables with potheads)

As a guide only, if the cables to be terminated at any device are larger than the ones given in the table below, please provide this information at the procurement stage.

CURRENT RATING OF DEVICE	COPPER CABLES	ALUMINIUM CABLES
UP TO 63 AMPS	1 x 25 mm ² per phase	Please specify
UP TO 125 AMPS	1 x 35 mm ² per phase	Please specify
UP TO 160 AMPS	1 x 50 mm ² per phase	Please specify
UP TO 250 AMPS	1 x 70 mm ² per phase	Please specify
UP TO 400 AMPS	1 x 120 mm ² per phase	Please specify
UP TO 630 AMPS	Please specify	Please specify
LARGER THAN 630 AMPS	Please specify	Please specify

Crimp lugs with reduced palm width are also available in some instances and tails can also be provided to joint to installed cables with the use of shear-bolt in-line connectors.

Larger cables and multiple cables per phase and neutral may require braced terminations to prevent undue force being applied to the terminals of the device.

Please consult us at the procurement stage to ensure that adequate provision is made for cable terminations and routing within the switchboard.

FITTING MINIATURE CIRCUIT BREAKERS

Choose the correct MCB type when adding MCBs to a busbar assembly provided. Refer to the switchboard name plate to determine which MCB chassis type has been installed.

Do not attempt to fit MCBs of incorrect manufacture. MCBs of correct manufacture may be purchased directly from IC Switchgear.

Do not attempt to fit MCBs to a busbar assembly while it is alive.

SETTINGS OF PROTECTIVE DEVICES

Unless detailed instructions have been received by IC Switchgear, the settings of protective devices such as air circuit breakers, moulded case circuit breakers and protective relays will be left at the product manufacturer's factory settings.

It is the responsibility of the installing contractor to determine the appropriate setting for every protective device based upon his assessment of the cable type, cable size and cable length.

Whilst discrimination studies may be carried out to determine the co-ordination of protective devices, such a study by itself does not satisfy the wiring rules for cable protection against over-current, short-circuit or other fault conditions.

Seek professional engineering advice where the requirement for correct protective device settings is not known.

EARTH-LEAKAGE CIRCUIT BREAKERS

Earth leakage protective devices such as RCBOs and RCCDs are tested in our factory by pressing of the trip button on the face of the device to ensure that they will trip. This test proves only that the device will function and that we can reasonably rely on the device manufacturer's own tests.

This does not satisfy the testing requirements for an installation under the Electrical (Safety) Regulations however, and therefore full and final tests on the earth-leakage protective devices should be carried out by the installing contractor at site once the installation is complete.

LIVE WORK

Work should not be carried out on a particular section of a switchboard while that particular section is alive. Always isolate and test any section of a switchboard to ensure it is safe before commencing work. Wear personal protective equipment (PPE) appropriate to the risk assessment for the work being done.

Screens and barriers providing protection against inadvertent contact with live conductors may be safely removed for the purposes of thermographic inspections. Such screens or barriers should always be re-fitted once the inspection work is complete.

TIGHTNESS CHECKS

All connections within the switchboard are factory checked prior to dispatch of the switchboard. Generally all bolted connections and device power connections will be set to recommended torque settings and it is important to note that subsequent re-torquing of connections must be done to the correct torque setting.

Consult IC Switchgear for advice on torque settings.

Screw terminations can work loose in transit and should be checked prior to livening of the switchboard.

We recommend that all connections be checked within one year of commissioning as part of ongoing maintenance of the switchboard.

PRE-LIVENING TESTING

Before livening the switchboard the following checks should be carried out:

- Visual inspection for general soundness of installation work, connections and insulation
- Earthing of switchboard and appropriate earth continuity to the installation works in general
- Polarity of supply cables and submains, especially parallel cable runs
- Appropriateness of switchboard IP rating for the environment in which it is situated
- Nameplate ratings are appropriate for the as-installed conditions
- Insulation resistance testing as described below

PRE-LIVENING TESTING - CONTINUED

Insulation resistance tests should be carried out up to the terminations of the switchboard devices. Ensure that the devices are switched off and that any potential fuses are removed prior to testing to avoid damage to metering and control equipment.

Once all installation testing has been carried out, close the main switch and prove that a high resistance (with Ohm-meter) exists between all phase combinations and phase to neutral and earth. A low reading will require further investigation until the cause of such low reading is found. If required, consult IC switchgear to assist with this **before** energising the equipment.

SCREENS, MASKS, BARRIERS AND SHROUDS

Screens, masks, barriers and shrouds are factory fitted to meet the device manufacturer's recommendations, to meet a specified standard of IP rating and/or to provide adequate insulation, and are therefore essential to the safe operation of the switchboard.

All screens, masks, barriers and shrouds provided for the purposes of insulation and protection against inadvertent contact with live conductors must be re-fitted following completion of the installation work.

SWITCHBOARD MODIFICATIONS AND ADDITIONS

Where field modifications or additions are to be made to a switchboard, please consult IC Switchgear for advice about the best method to achieve the desired outcome.

IC Switchgear can update existing drawings on file and have qualified staff to carry out the work at site.

We recommend that our switchboards are not modified by others so as to retain the warranty on that switchboard as well as ensuring that the correct construction techniques are applied for the sake of on-going safety and reliability.

ROUTINE MAINTANANCE INSPECTIONS

IC Switchgear recommend that routine maintenance inspections be carried out on switchboards following commissioning. The frequency of such inspections may depend on a number of factors such as the type of equipment, the operating environment, the duty of equipment operation and the owner's insurance Ts & Cs. These factors should be assessed by the owner of the equipment and his electrical advisor and a maintenance plan be established to suit the specific circumstances.

Certain equipment such as power factor correction equipment may require more regular inspections throughout a year to determine the equipment is functioning safely and correctly.

In general, switchboard inspections may include:

- Visual checks
- Cleaning of filters for ventilation
- Measurement of currents drawn by PFC capacitors
- Temperature rise is within acceptable limits
- Proving of anti-condensation heaters
- Cleaning of any foreign matter within the enclosure
- Testing of safety circuits
- Thermographic surveys of components and connections
- Tightness checks on connections (ensure correct torque settings are applied)

Consult IC Switchgear for further advice specific to the equipment concerned.