MESSINA
ENERGIA S.r.l.
unipersonale

MANUAL FOR INSTALLATION, USE AND MAINTENANCE FOR M.V. BOARDS

Series MG

This document contains the necessary instructions for installation, commissioning, operation and maintenance of the medium voltage boards of the **M6** series.

It's important that you read this manual before installing the boards.

Compliance with the information contained in this publication ensures the safety of operators and the smooth operation of the equipment.

MESSINA Energia S.r.l. declines any responsibility for any inconvenience related to the failure to comply with these instructions or the execution of operations not provided for in this manual.

MESSINA Energia S.r.l. declines all responsibility for any type of tampering made against the carpentry and the equipment contained therein.

We do not recommend, therefore, a use of compartments different from those indicated in the types of schemes included in our documents (see catalog and manual of use and maintenance).

In case of further clarification, please contact MESSINA Energia S.r.l. Barletta (BT)

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General description

Electrics characteristics

Standards and requirements

The equipment complies with the standards:
- International EN-62271
- Safety measures in force

Main electrical characteristics

- Rated voltage	**kV**	12	17,5	24
- Test voltage to f.i. 50Hz 1”	**kV**	28	38	50
- Pulse isolation voltage	**kV**	75	95	125
- Rated current busbars	**A**	630-800		
- Simmetrical short circuit current busbars for 1”	**kA eff**	12,5-16		
- Dynamics limit current (crest value) for busbars	**kA cr.**	31,5-40		
Internal arc withstand current - Type accessibility A/FLR – Criteria of 1 to 6	**kA**	16kA per 1 sec,		
- Outside protection degree	IP 3X			
- Internal protection degree	IP 2X			

The mechanical working and the abovementioned electric characteristics are warranted for normal service conditions and for inside (CEI EN 60694);

Environment temperature :	-5÷40°C Max
Altitude :	1000m Max
Humidity :	95% Max
Environment :	Free from contaminations like dust, smoke, salts, gas, corrosive or flammable steams.

Packaging and transport - Handling

Shipment

Depending on the means of transport and the destination the shipment can be made with different packaging.
For shipments in the national territory (by truck) the packaging is carried out in almost all cases for individual compartments and only in rare cases for groups of two.
The packaging consists of a wooden platform on which the compartment is fixed, and a polyethylene bag that covers the same and protects it from dust and weather.
Each package is numbered with the same confirmation number on the transport document.
Accessories and documents included such as coupling bolts, coupling bars, operating levers, fuses, electrical diagrams and installation, etc. are placed inside the compartment.
In the "I" compartments the circuit breaker is inserted inside the compartment.
In the case of supply of several compartments that make up a framework will be provided n°2 levers for switchgear and wiring diagrams and installation related to the entire board.
For shipments to foreign countries or by rail/ ships the above applies except for packaging that is carried out according to the instructions of the forwarder.

Material receipt

Upon receipt of the material:
- ensure that no handling has taken place during transport
- check that all materials have arrived by reference to the order confirmation issued by us, and accepted
- check that the packaging and its contents show no signs of damage.

Otherwise promptly inform the nearest office of MESSINA Energia S.r.l. and, if deemed appropriate, lodge a complaint at the same time with the company which carried out the transport.

Weigth and dimension

See the technical sheets of compartment,

Note: The weigjts must be approximate and refer to the compartiments complete with equipment,

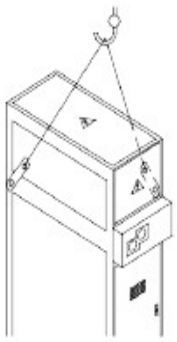
Handling in general

Donot make the board wave

Do not move the board by actinh on The command cells

Handling with crane or overhead crane

Each unit must be raised individually, using mobile cranes or overhead cranes of adequate capacity, using the appropriate lifting eyebolts provided for each unit. Avoid dangerous manoeuvres and/or oscillations while lifting.



Handling with a forklift truck

To avoid sharp fluctuations, balance the compartment on the base of the carrier.

Storage

In the case of longterm storage, keep in a covered, dry and ventilated area.
Restore the original packaging if it has been opened.
If work is in progress near or in the room itself, cover the units with a sheet that protects them effectively against powders, debris, paints, etc

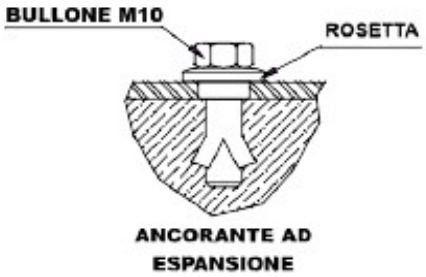
Installation

Local environmental characteristics

Rooms in which compartments are to be installed shall be so constructed as to ensure the normal ambient conditions defined above.

Preparation of the support plan

Stated beforehand that the plan of support of the switchboard must be positioned in respect to the perimetral walls as described in the Installation board chapter, it must be perfectly levelled, in longitudinal and transverse sense, with maximum levelness tolerance of 2/1000 on all the surface of support of the board.
In the support plan must be provided the passage's drillings of the M.V. and some l.v. cables. The dimensions of the holes and the positioning are noticeable from the technical cards of the cubicles. The position of the four holes is noticeable from the technical cards furthermore to be practised on the plan to fix the boxes by of anchoring to expansion as taken back in the particular



Board installation

- Clean the support surface arranged for the installation of the board.
- Verify, keeping present dimensions of the board and the typology of the cubicles, that the minimum distances taken back in the drawing below are respected.
- Prepare the cubicles for the installation.
- Fix, combine the cubicles and verify the board assembly.
- Mount the principal bars.
- Earth circuit assembly.
- M.V. cable terminal connection.
- Connection cables l.v. (auxiliaries)
- Choice and fuses installation...

Preparation of compartments for installation

- Remove the polyethylene packaging.
- Remove the wooden footboard.
- Check the condition of the equipment; the compartments are shipped with:
  Switches and disconnectors in the open position
  Earthing switch in closed position
  (with this configuration you can access the doors protected by interlocking doors by opening the same acting on the handle)
- Remove the sheet metal from the roof.
- Remove the front panel of the busbar compartment (when fitted).

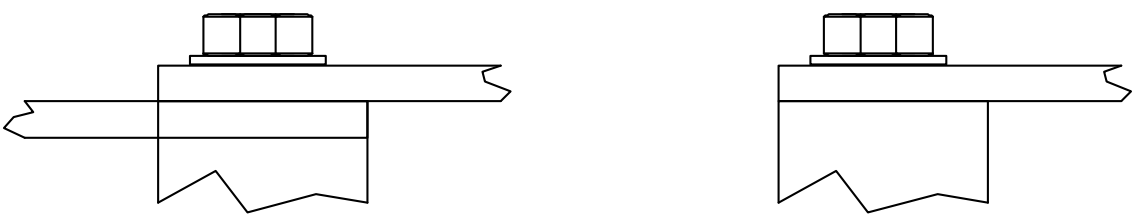
Fastening and matching of the compartments and verification of the panel assembly

- Fasten the compartments to the floor using the holes provided in the base panel and by expansion anchors. At this stage the anchors must not be tightened and you must check the correct levelling of the compartments (otherwise operate with thicknesses).
- Temporarily fit the compartments using the holes provided on the walls side and bolts. (At this stage it is necessary to mount any internal segregation panels for special segregations: a typical case is that in the framework of a conjunctor with relative and consequently the two systems of bars must be segregated).
- when the installation has been completed, having verified that the provision obtained is that indicated on the drawing of square assembly, clamp the various compartments to the floor and between them making sure that no deformation of the structures occurs during this operation.
- When the assembly is complete, attach the side closure panels of the bar.
  When the end compartments are AC6 or I6 in addition to the above panel must also be mounted the side closure panel of the cable compartment.

Main busbars assembly

Check the condition of the contact surfaces of the bars if they are oxidized (typical case that occurs when the compartments remain for a long period of storage) revive them with emery paper with fine grain and clean with a cloth soaked in alcohol.
Fit the supplied copper bars so as to join the connection points arranged in the various compartments.
Access to the compartments for this operation is allowed from the top and the front of the compartments.

N.B. The roof of the compartment has only infill function so it is not pedestrian, avoid in the most absolute way to climb and walk or put weights on the roof.
The bars to be used can be of three different lengths between the center of the holes (Type A Li=500mm - Type B Li=600mm - Type C Li=700mm) ,
Type A should be used to couple two compartments, one of which is 500mm wide and positioned on the left, facing the board.
Type B must be used to couple two compartments, one of which is 600mm wide and positioned on the left, looking at the front of the board.
Type C must be used to couple two compartments, one of which is 700mm wide and positioned on the left, looking at the picture from the front. For coupling M12 bolts are used mounted as in the drawings below,



La coppia di serraggio raccomandata è di 60Nm

Assembly of ground circuit

The assembly of the ground circuit is intended to achieve the continuity of the ground bar along the entire board. This continuity is achieved by coupling with bridge connections and bolts supplied with the ground bars provided in the compartments.

The outer earthing system of the switchboard shall be connected with a conductor of equivalent cross-section to the outer underside of the enclosure.

M.V. Cable connection.

Before connecting the M.V. cables, make sure that any earthing switch is closed. The cables that can be fastened must be single-pole extruded insulating type, with a maximum section of 240mm² and equipped with indoor terminals of the taped type with rubber sleeve or heat shrink sleeve (to make the terminals follow the instructions of the manufacturer). After having made the terminals and having made them pass through a possible toroid, connect them to the attachment points provided in the compartments starting from the rear phase (bolt only approached). Fasten the cable to the cable shelf with cable ties, collars or clamps that can be supplied on request, taking care that the weight of the cable is borne by the cable holder and not by the terminal attachment. Tighten the bolts left together previously: the bolt provided for the attachment of the terminals has dimensions M12 therefore it is recommended to tighten it with a torque of 60Nm. Connect the cable screens and any toroids to the compartment ground circuit. Mount the bottom plate, available on request, when you want to avoid access from the tunnel inside the compartment to people or animals such as cats, rats, etc....

L.V. and auxiliary cable connection.

The auxiliary circuits of all equipment mounted in the compartments: switches, LBS anti-condensation resistors, internal lighting kits, amperometric and voltmeter transformers, are connected to a terminal block, the location of which is indicated in the data sheets of the individual compartments.

The box b.t. mounted at the top, on the front of the compartments, contains the terminal blocks intended for the realization of the interpannellary connections between the compartments component the panel and the connection for the connections from the field.

At this terminal block, accessible also with voltage compartments, must be attested all the cables coming from the field whose section must be suitably sized with particular attention to the amperometric and voltmetric circuits. The auxiliary cable entry is provided by holes drilled in the bins b.t..

Important:

- The cables must be connected to the terminal block by reference to the electrical diagrams supplied with the compartment and/or switchboard.

Choice of assembly and disassembly M.V, fuses.

- The fuses to be used must be of the type constructed in accordance with IEC 32-3, IEC 282-1 and DIN 43625. Fuses are characterized by a rated voltage, rated current, switching curve. The choice of fuses must be made by consulting the catalog of the manufacturer depending on the loads to be protected.

Assembly and disassembly is carried out by inserting / extracting the lower fuse contact into the lower fuse holder caliper and then inserting / extracting the other contact into the fuse holder caliper.

To ensure the release of the IMS must be used fuses with striker that must be able to exert a force of 80N.

Important:

- Be careful during the installation of fuses with striker that the same is mounted with the striker facing the special vane that drives the opening system of the LBS when the fuse intervenes.

Instructions of putting in serrvices

Checks before putting in services

Visual checks

- dimensions: checking both the total dimensions of the picture and the individual compartments and their sequence as indicated in the assembly drawing;
- bars: check that the main bars are properly fitted and tightened with a torque of 60Nm;
- earthing: verification of the connection of the switchboard ground rod to the ground network of the installation;
- insulators: external integrity check of insulators (clean all parts thoroughly with dry rags insulators);
- foreign objects: make sure, by checking each individual unit, that there are no foreign objects, such as tools, insects or excessive accumulation of dust inside the various compartments;
- Device plates: Verification that the plate data of all devices are consistent with the information on drawings of the picture;
- terminations: verify that the terminals are correctly installed and fixed with a torque of 60Nm;
- fuses: verify that the fuses are correctly positioned (striker facing the release blade) and are suitable for the intended use.

Please note:

Before carrying out further tests make sure that there is no tension on the cables and bars

Mechanical tests

- **key and mechanical locks**: verification of the functionality of all key and mechanical locks;
- **manual commands on LBS**: each switch in a series of switches opening and closing commands by acting on the controls;
- **manual commands circuit breakers**: the switch can only be operated with the switch switched on in the compartment. Since the switch is equipped with an interlocking key lock with the line disconnector, for operate the switch you have to close the line disconnector pull out the key, insert it into the lock of the switch, unlock it and then perform a series of opening and closing commands by acting on the commands mechanics after loading the closing springs by hand;
- **normal vacuum disconnector controls**: certain opening and closing operations of disconnectors acting on the commands;

Functional tests

- verify that the calibration of any installed relays has been carried out according to the data communicated by the customer;
- operation of opening and closing manoeuvres for local and remote control devices;
- control of alarm, signalling and electrical locking circuits;
- simulation of switch intervention;
- checking the correct position of the auxiliary contacts of the devices in all positions;
- verify that the secondary circuits of AT and VT (if any) are in series (cto cto) or in derivation (open) especially if there are measurement or protection connections outside the board;

Insulation check

- measure the insulation resistance between the phases and between them and the mass of the primary circuit With closed position. Minimum permissible value: R = V+10 (V = nominal square voltage in kV) MΩ.

Placing in voltage of the arrival cables

- Restore any interlocks removed during testing (removal of interlocks is not permitted except under the direct supervision and responsibility of the cabin crew member).
- Remove any panels.
- Close the door to the arrival compartment.
- Open any earthing switch.
- With the possible open line disconnector, tension the cables (feeding from the cab upstream).

Voltage presence control (if applicable)

When the cables are wired, the lamps of the voltage indicators shall be illuminated.

Compartment with circuit breaker

Operating instructions

Putting on services

- close the compartment door;
- Open the earthing switch (Fig. 1-2);
- Close the switch disconnector (Fig. 3-4);
- Rotate and extract the key from the lock on the switch disconnector (Fig. 5);
- Insert and rotate the circuit breker key in the key lock (Fig. 6),
- Load circuit breaker's springs and close.

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Compartment with circuit breaker

Operating instructions

Putting out of services

- Open the circuit breaker by pressing the "O" button and remove the key (Fig. 1);
- Insert the key into the key block of the switch disconnector (Fig. 2);
- Open the switch disconnector (Fig. 3-4);
- Close the earthing switch (Fig. 5-6);
- Open the compartment door.

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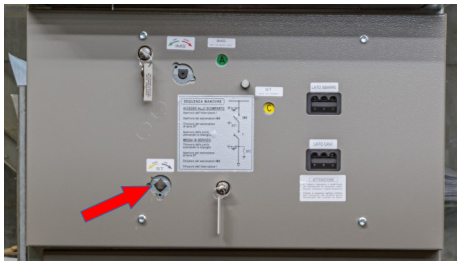

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Compartment with disconnector and fuses

Operating instructions

Putting in services

- close the compartment door;
- Open the earthing switch (Fig. 1-2);
- Close the line disconnector using the switch lever (Fig. 3-4).

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Putting out of services

- Open the disconnector using the switch lever (Fig. 1);
- Close the earthing switch (Fig. 2);
- Open the compartment door.

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Troubleshooting

Tasble of anomalies and remedies

Cubicle	Anomalies	Remedies
All the cubicles	Voltage presence indicator does not light	- Check that the arrival cables are in tension; - Check the status of the lamps; - For the T6 compartment check the good condition of M.V. fuses
L6 T6 I6	The door does not open or cannot be closed;	- Check that the earthing switch is closed;
	Impossibility to introduce the operating lever in the control seats of the earthing switch	- Check that the door is closed properly;
	Impossibility to introduce the operating lever in the control seats	- verify that the introduction of the lever is not prevented by a lock key;
	The operating lever can be introduced into the control seat but the earthing switch cannot be operated	- Verify that the LBS or switch disconnector is open;
	The operating lever may be introduced into the control seat but the LBS or switch disconnector cannot be operated	- Verify that the earthing switch is open;
I6	With earthing switch closed the door cannot be closed	- Check that the movable part of connector of circuit breaker is correctly inserted in the fixed part,

Contact our Technical office for other anomalies:

Tel. +39 0883 331446

Important:

Before contacting us to collect the registration number of the compartment under report

Maintenance

General and maintenance program

Important

any maintenance intervention must:

- Be made by staff specialized and opportunely taught
- Be made with the board out of voltage and the grounding interested part.
- Be made respecting all the prescriptions and security directives.
- Be made adopting opportune precautions what padlocks mounted the manoeuvres you interest of the equipment and positioning opportune posters you monitor.

The frequency and the types of maintenance interventions depend on the severity of service of the cubicle/board or from the frequency of the manoeuvres and the environmental conditions.

It’s recommended for a condition of normal service to make the following maintenance operations every year:

- Remove dust and dirt from the insulating parts with clean and dry rags.
- Inspect on sight the insulators and possibles TA and TV.
- Remove dust from possible ventilation splits with a dry brush.
- Verify the clamping of the bolts.
- Verify the correct working of the leverages and if necessary fatten the parts in movement.
- Make a few manoeuvres on the electric equipments.
- Verify the functionality of interlock.
- Verify the working of possible anticondensate resistors and internal ligthing.
- Verify the working of possible members of the auxiliary circuits: signaling lamps, relè, etc..

After the maintenance, remove the possible posters monitor and padlocks mounted on the manoeuvres, remount the possible removed panels and make all the necessary operations for the putting on servic.