FIMER

INVERTER FOR LIFE

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MEGASTATION

INSTALLATION, OPERATION AND MAINTENANCE MANUAL

FIMER

INVERTER FOR LIFE

20871 VIMERCATE (MB) Italy

Via J.F. Kennedy

Tel. +39 039 98981 - Fax. +39 039 6079334

www.fimer.com - solar@fimer.com

Istruzioni Originali

Original instructions

Übersetzung der Originalbetriebsanleitung

Notice originale

Manual original

CONTENTS

1. GENERAL

Document title: MEGASTATION

Document classification: Installation, operation and maintenance manual
ORIGINAL INSTRUCTIONS

1.1 Address of the manufacturer

FIMER S.p.A
Via J.F. Kennedy - 20871 Vimercate – (MB) - Italy
Tel. +39 039 98981 r.a. - Fax +39 039 6079334 - www.fimer.com - solar@fimer.com

1.2 Warning on electromagnetic compatibility.

Caution:
The sale of this product can only be handled by competent installers. To prevent inconveniences and malfunctions, installation restrictions or additional measures may apply.

1.3 Warning on the manual

1.4 Environmental Impact Statement

The solar inverters for networked systems produced by Fimer offer lower consumption of raw materials and smaller amounts of scrap throughout their working lifetime. In typical applications, these positive environmental effects far outweigh the negative impacts of product manufacture and final disposal.
Product packaging is of good quality and can be reused. All products come in strong cardboard and wood packages, which themselves have a high percentage of fibre and recycled materials. If not reused, these containers can be recycled. The polyethylene used for the production of protective film and bags for wrapping products can be recycled with the same purpose. The packaging strategy adopted by Fimer is oriented towards easily recyclable materials of low environmental impact and, thanks to regular checks and analysis, aims to identify new opportunities for improvement in this area.

At the end of their lives and of their operation, the inverters can be dismantled very easily by separating the main component parts for efficient recycling. Some parts of these devices are snap fitted together and can be separated without the use of tools, while many other components are fastened with conventional screws and can be disassembled with common screwdrivers. Virtually all parts of the product are suitable for recycling anyway. Do not dispose of the equipment or its parts as household waste. In accordance with the European Directive 2002/96/EC on waste electrical and electronic equipment and its implementation as national law, waste electronic equipment must be collected separately and returned to an environmentally compatible recycling facility. You must dispose of the equipment used in accordance with the system of collection and disposal that is adopted and authorized in your area. Failure to comply with this EU Directive may have adverse effects on the environment and health!

2. FOREWORD

Dear Customer,

We congratulate you on your choice of our MEGASTATION for solar PV systems, whose characteristics of high technology and reliability due to its design and system of quality control make it highly innovative and sturdy.

This manual contains all the information required for the installation, safe operation and maintenance of this product and you are advised to carefully read its contents before you connect and operate the machine. The instruction manual is intended for staff in charge of installation and maintenance as well as all operators involved during operation of the unit. Any installation, commissioning, operation and maintenance operations should always be carried out by qualified personnel.

Proper use and maintenance of the product ensure long-term reliability and quality of the system, an essential prerequisite for maximum performance and excellent yields.

The contents of this manual will help you to solve most doubts and problems. Do not hesitate to contact your installer, distributor or local representative if problems occur during use and installation which are not clearly described and documented in this manual. To get the latest product information and the latest version of the manual, please visit our website.

Store this manual in a safe, dry place away from direct sunlight, and in the immediate vicinity of the equipment to allow a quick reference to it in case of future consultations. In the event of damage to the manual, the user should request a copy from the manufacturer.

The manual reflects the state of the art at the time of marketing the product. The manufacturer reserves the right to make changes to the product, and consequently to the manual without obligation to update the previous editions. However, you can ask for information and updates that, when released, become an integral part of the manual.
This manual is an integral part of the machine; in case of resale of the MEGASTATION the manual must be delivered to the purchaser, and the first user is therefore invited to inform the manufacturer of the address of the new user.

The manual is an integral part of the unit, must accompany the MEGASTATION in its every move and should be retained until dismantling of the equipment.

Thank you again for choosing our MEGASTATION.

3. GENERAL INFORMATION

This manual refers to the essential aspects of the directives, rules and regulations pertaining to the use of the unit by summarizing the significant points. Non-observance of the warnings given in this manual, use of the unit by personnel not specifically trained and educated and use in a manner incompatible with the intended use may cause people serious injuries and even death. Operating instructions must be observed as well as laws and rules in force in the field of accident prevention and environmental protection in the countries where the MEGASTATION is installed. Before starting the operating cycle, the staff responsible for use and maintenance must have read the instructions below.

The internal devices are constituted by a set of standardized components that allow to create any system configuration.

Therefore, especially when factory configuration changes are required, we recommend that you refer, in addition to this manual, also to ancillary product documentation (functional and wiring diagrams, assembly and foundation drawing, protective device selectivity and coordination studies, etc.) that constitutes an external appendix to this manual, but that is an integral part for the whole equipment.

3.1 General product description

Fimer MEGASTATIONS are stations for the conversion of PV energy from large solar plants into electricity delivered to the distributor's MV grid. They are made as freestanding monoblock containers, are particularly suitable for use in construction sites of major civil engineering works and in solar parks. Thanks to the flexibility of different power sizes and ease of connection and commissioning they provide extremely quick and fast installation times.
Completely autonomous and with a very sturdy mechanical structure, they are suitable for mobile and semi-fixed installations outdoors and can withstand harsh environmental conditions.

Their main features are:

- Configuration flexibility and scalability.
- Wide and complete power range.
- Designed and tested at the factory to reduce installation time and avoid on-site assembly.
- Maximum efficiency and energy production due to built-in Multi Power System inverters.
- Differentiated management of the photovoltaic generator and optimized subdivision into several subarrays.
- Designed to be easily serviced periodically due to the easy accessibility of all installed devices.

3.2 Structural characteristics

Electrical substations can take a variety of system configurations that, in general, are the result of the assembly of transformers and high and low voltage components such as no load and on-load disconnecting switches, circuit breakers, photovoltaic converters, and equipment for protection, control and energy distribution. The unit is supplied complete with internal connections on both the medium voltage and low voltage side, with the transformer connected and installed in its compartment and all moving metal parts properly connected to the earthing system.

They are made in compliance with international standards of safety, accident prevention and environmental protection and are built using a container designed and constructed to maintain its structural integrity and withstand weather in a temperature range from -30ºC to 60ºC both during transport and after its installation and wiring within the PV system.

The container structure has standard size (20 feet / 6 meters measuring [WxHxD] 6055x 2896 x 2438 mm, or 40 feet / 12 meters measuring [WxHxD] 12110x 2896 x 2438 mm) for easy transport and handling both at our factory and at the PV system. It is mostly built with painted steel frames, corrugated panels welded by CO2 gas shielded arc welding, all external welds including the base frames are continuous with full penetration and all openings are sealed with flexible sealant. The basic structure is composed of two side bottom rails, a series of cross members and a series of gooseneck tunnels and stabilizers, which are welded together as a single subassembly. The original floor of the container is made of marine plywood parquet with a thickness of 28mm, is fixed to the cross beams by self-tapping screws and on top of it a non-slip metal sheet flooring is placed; panels are resting on the cross beam longitudinally with sanded coating.
The substation features 2 doors with frame and subframe along the long side of the container: the first for access to the inverter and switchgear room, while the second to the MV / LV transformer room according to Enel DS919 standard and equipped with a safety lock. Inside, the substation is divided into two rooms completely segregated, containing the power transformer and MV / LV electrical switchgears and inverters respectively. The size of the transformer compartment, and the medium and low voltage room vary in consideration of the installed power, the value of the mains operating voltage and the number of slave units. The MEGASTATION is insulated by affixed panels in a thermally insulating material and ventilation and temperature control are implemented by means of a fan system designed to ensure the maintenance of an ambient temperature inside the rooms within the limits required by the various equipment therein installed. Air entrance and exit takes place through suitable rainproof and anti-mouse mesh distributed peripherally so as to cool the equipment in an appropriate and uniform way. Access to the rooms is through doors properly sized to allow passage of the equipment installed within the rooms and are equipped, where necessary, with panic exit devices and security locks. On the equipment installed inside the substation appropriate mechanical safety interlocks are arranged to allow a control logic that avoids dangers to personnel in the execution of the manoeuvres. All electrical cables - both power and auxiliary cables - are housed in special segregated tunnels at the base of the LV modules so as to facilitate the connections between the switchgears. The lighting system is realized with the use of fluorescent lamps one of which is fitted with an automatic emergency device with 1h autonomy. For the earthing system an equipotential bonding terminal is provided inside, a copper earth busbar, which is to be field connected, by the client's installer, to the substation earth directly to the earth of the system.

3.3 Components installed

FIMER MEGASTATIONS are designed to produce energy complete with all accessories; the following major components are generally installed in the standard configuration:

- **pre-parallel inverter switchgears**, equal in number to the inverters installed, fitted with removable fuses type gPV, dimensioned according to the maximum current of the single PV subarray.

- **FIMER transformerless central inverters,** with modular MPS logic, to convert PV energy efficiently with maximum yield. The AC switches embedded within the inverters act as a generator device.

- the **MV/LV dry-type reduced-loss transformer** insulated with epoxy resin (rated operating voltages of 17.5 kV or 24 kV standard) is equipped with special PT100 probes controlled by a thermometric unit to maintain the operating temperature within optimal parameters by means of tangential fans.

- the **MV switchgear or cell,** in standard version protects, through special MV fuses, the section of the system underlying it and creates star configurations for the MV distribution grid. It has appropriate capacitive voltage indicators, a switch disconnector with closed / open / earth position and release coil 230VAC. It features a lever and key interlocks to ensure safety. (Different and optional configurations depending on the type of system should be evaluated with FIMER technical and commercial departments).

- the **LV switchgear for auxiliary services** is powered by an external source (on request only, an internal power line shunted from one of the LV secondary windings of the MV transformer through an auxiliary LV transformer 260/400Vca can be provided). The electric switchgear supplies output power to normal services (power supply for transformer room ventilation, interior lighting and sockets, power supply to inverter auxiliary services and SBC, UPS power supply, No. 1 IEC 309 three-phase socket, No. 1 single-phase socket, No. 2 spares [16A / 2 P]) and preferential services (MV switchgear auxiliary circuits supply, inverter auxiliary services supply, switchgear and/or monitoring devices supply - SPV, No. 2 spares [10A / 2 P]).

- double-conversion standard **UPS**, with single power factor, 1500 VA power and 30 minute maximum autonomy.

- the **creation of internal connections and wiring of the electrical system** in the substation are factory made. In the field, the installer must make the connections of the switchgears (pre-parallel, MV cell, LV aux services switchgear for both power and auxiliary / monitoring) to the outside and connect the substation to the external earthing system.

- standard **substation accessories** are the following**:** 2-tube lamps, one fitted with an emergency tube with integrated batteries for 1 hour duration; no. 1 emergency button to disconnect MV; platform and insulated gloves (class 3) to operate safely on the MV cell, no. 1 6kg powder fire extinguisher; AREL

safety lock for access to the transformer room, no. 1 portable emergency lamp with rechargeable batteries, posters and safety signs.

The main protection devices installed in Fimer MEGASTATIONS are the following:

- ✓ Input:
  - DC input fuses within the QPPI and Inverter
  - DC surge arresters within the Inverter
  - Insulation control
  - Protection against reverse polarity
  - Input short circuit and overload protection

- ✓ Output:
  - AC circuit breaker
  - Output short circuit and overload protection.

- ✓ In the substation:
  - External emergency button to disconnect the MV line
  - Overheating control for the MV transformer with MV line disconnection system

The main optional equipment available on request for the substations are:

- Shunt trip coil within the inverter (to manage redundancy)
- Fiscal meter (integrated, one per each inverter)

- SPD surge arresters on LV auxiliary switchgear input
- LV transformer to supply LV auxiliary services (protected by a specific circuit breaker)

- Non standard nominal operating voltage for system MV line
- SPD surge arresters on MV cell line input
- MV switchgear with ring or enter/exit configuration
- MV switchgear with integrated interface device and/or general device
- Fiscal metering of energy delivered to the MV grid
- Input room/substation
- Technical services room

- Switch and Router (Adsl/Wan/3G)
- Fimerguard monitoring system for system remote supervision
- UPS for auxiliary services for monitoring and protection purposes

- Sprinkler system
- Substation in vibrated reinforced concrete
- Concrete foundation
- Substation custom colour

- Plant start-up on site

With regard to the product technical data please refer to the external appendixes to this manual, which list in detail all the devices installed in the MEGASTATION within the scope of supply.

3.4 Personnel involved with installation / operation / maintenance

Operators allowed to handle a MEGASTATION can be classified according to their different tasks and skills as:

- operator;
- maintenance mechanic;
- electrical maintenance technician.

Operator

Operator means a qualified person authorized by the buyer who is entrusted with the operation of the Megastation with the protections enabled.

In particular, the operator is autonomous and trained to perform operation activities.

The operator must have a thorough knowledge of safety rules and operating instructions detailed in this manual.

This task is assigned by the employer and / or plant supervisor.

Maintenance mechanic

Maintenance mechanic means a qualified technician authorized by the buyer, who is able to install, repair, or perform routine and extraordinary maintenance and any set-up operations of a purely mechanical nature on the Megastation.

The person designated to carry out the maintenance activities of a mechanical nature must have the technical knowledge to vary the parameters of the control system of the module (Supervisor access level) and must have, in addition, a thorough knowledge of safety rules and instructions detailed in this manual.

This task is assigned by the employer and / or the plant supervisor.

Electrical maintenance technician

Electrical maintenance technician means a qualified technician authorized by the buyer, who is able to install, repair, or perform routine and extraordinary maintenance and any set-up operations of a purely electrical nature on the Megastation.

The person designated to carry out the maintenance activities of an electrical nature must have the technical knowledge to vary the parameters of the control system of the module (Supervisor access level) and must have, in addition, a thorough knowledge of safety rules and instructions detailed in this manual.

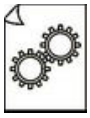
This task is assigned by the employer and / or the plant supervisor.

3.5 Limited warranty

FIMER spa disclaims all responsibility for damage to persons or property resulting from:

- use contrary to the specific national legislation;
- improper use or use by personnel untrained to professional use;
- incorrect installation;
- incorrect power supply;
- removal and / or reduced visibility of signs and warnings;
- avoidance and / or removal of security guards;
- serious deficiencies in scheduled maintenance;
- use of non-genuine parts or non-specific for the model;
- unauthorized modifications or operations;
- total or partial non-observance of the instructions contained in this manual;
- exceptional events.

3.6 Symbols used in this manual

	INFORMATION: the user is required to give due consideration to what is described and to pay attention to the directions in the manual.
	CAUTION or WARNING: pay maximum attention to what is described in order to prevent the occurrence of situations that give rise to serious damage or malfunction to the equipment as well as accidents, personal injury, or death.
	DANGER OF SHOCK: the instructions must be followed to avoid the risk of lightning and electrical shock.
	PACKAGING INSTRUCTIONS
	INSTALLATION INSTRUCTIONS: a description is provided of the procedure for installing the Megastation.
	INSTRUCTIONS FOR USE: a description is provided for using the substation.
	DISPOSAL: contains useful information for the disposal of the Megastation.

4. SAFETY INSTRUCTIONS AND OTHER NOTES

Failure to follow these instructions can have serious consequences, such as the destruction of the equipment, personal injury and death due to electric shock. Therefore, reading and understanding the following safety instructions must precede the commissioning of MEGASTATIONS. For any clarification or additional information please contact Fimer technical support.

4.1 General provisions

Upon receipt of the substation:

- Upon receipt of the MEGASTATION visually check it for integrity and in case you notice any abnormality or damage, due to shipping, proceed to a conditional acceptance of the substation, and contact your dealer or the manufacturer.
- The reporting of irregularities, even following the receipt must be accompanied by the date of construction of the container, the serial number and the corresponding number of the order confirmation, which can be found on the nameplate.

Hazardous voltage:

- Inside the substation high operating voltages may cause damage, even serious ones, to people.
- The conductors and components with hazardous voltages are segregated in special areas only accessible using tools not supplied with the container.
- All devices installed in it must always be used with all the panels properly secured and locked doors or guards enabled.
- All maintenance or repair works that require access to the interior of the equipment can be carried out only by Fimer technical personnel or properly trained staff.
- Before working on devices inside the MEGASTATION (operation reserved only to personnel trained by Fimer), it is absolutely necessary to open the switches on both the DC (solar array) and AC (LV and MV mains) side and wait at least 10 minutes in order to allow all the internal units to discharge completely.
- Always use a multimeter or other suitable measuring instrument to ensure that there are no hazardous voltages.

Earthing:

- Firstly, always connect the earth wire coming from the earthing system of the plant to the appropriate copper busbar (earth busbar) provided for this purpose, located in the LV / MV switchgear room and identified by the symbol  .
- In case of disconnection of the substation, lastly disconnect the earth wire from the busbar.

Plant:

- Always connect the Megastation to the electricity distribution network according to MV and LV devices provided and avoid connecting the latter to any other type of voltage or current generator other than the solar panels in order to avoid the occurrence of damage and breakage.
- Follow the instructions and guidelines given by the manufacturers of the panels, which make up the photovoltaic generator, and the electric power distribution and management company.
- Power up the substation according to the values indicated in the technical specifications of the product and on the data plate of the equipment.

Safety standards:

- In addition to the installation and use instructions it is mandatory to comply with the local rules of safety and security for the prevention of accidents and the protection of the environment.
- The personnel accessing the premises in which solar inverters or electro-mechanical equipment are installed must always wear earmuffs and appropriate personal protection equipment.

Safety and danger symbols:

All safety and danger symbols on the equipment

- must be kept legible
- must not be damaged
- must not be removed
- must not be covered with stickers or markings

Object insertion:

- Do not insert objects into the slots and ventilation grilles and avoid blockage of air entrance and exit in/from the substation and any devices installed in it; avoid contact with any type of liquid; cleaning must be carried out only with a dry cloth. These precautions should be observed even with the machine off.

Treading-on:

- LV, MV switchgears and PV inverters are not designed to withstand heavy weights. Never climb on the equipment, do not place scaffolding and do not use them as support for additional devices (bridges, pipes, air ducts, etc.....).

Cable cross-section:

- Check that MEGASTATION input and output cables are of a suitable section. Perform the same check also for the cables of the system.
- The connections, the section of the cables used and the installation must comply with the regulations in force.

First start-up:

- Avoid to power the equipment before competent personnel expressly authorized by Fimer has carried out checks.

Subsequent start-ups:

- Proceed with the start-up with all switches open.

Repairs:

- **The unit must be immediately taken out of service in case of anomaly.**
- The work must be performed only by electricians in compliance with the rules of electrical engineering. All the measures and warnings about the safety of operation, general safety and accident prevention must be compulsorily taken and observed.
- All operations and interventions on live electrical parts that may also affect the unit indirectly must be carried out after opening the medium voltage switch / disconnector and after closing the MV transformer side earthing switch.

- Never attempt to repair the Megastation or any equipment mounted in it, but always contact the manufacturer or its authorized service centre.
- **Any attempt to repair not authorized in writing and not directly managed by Fimer, as well as being objectively dangerous, results in the immediate expiration of the warranty and the cessation of any liability for any malfunctions and for the consequences that may result from them.**
- In case of repair, contact the manufacturer or its authorized service centre; only use original spare parts; in case any non-original parts are used no warranty is made as to their ability to withstand the stresses to which they are subjected during normal operation.
- Do not make changes within the Megastation nor install devices that are not envisaged or non-compliant and not approved for any reason.
- Never bypass safety devices and have them reset by specialized personnel for the necessary repairs before restarting the unit.

Support:

- Support must be required any time the equipment has been damaged in any way such as by liquid penetration, objects fallen on top of it or within it, when it has been exposed to rain or moisture (outside of the specified values), when it does not operate normally, when it exhibits changes in performance or when it suffered severe and obvious impact.
- The faults that can jeopardise the safety of the Megastation and of the whole system must be repaired before restarting the system again.

Duration of Megastations and equipment installed within them:

- Fimer Megastations are designed and produced to ensure a high MTBF. Note, however, that MTBF is a statistical parameter entailing conceptual and practical limitations.
- Remember that the MTBF is related to equipment properly ventilated, installed and maintained; in other words, it cannot take account of conceptual or practical errors in the construction of the plant, nor of neglect or wilful misconduct.
- It should be noted that a continuous operation of the equipment at elevated temperatures or always approaching the admissible limit, determines the shortening of life expectancy.
- In consideration of their own function, the Megastations and associated equipment covered by this manual are suitable for professional use only and cannot be used by inexperienced personnel.

Maintenance:

- In order to ensure the effective expected life for which the equipment has been developed it is necessary to perform maintenance as described in this manual.
- Routine maintenance of the equipment must be periodically performed by qualified service personnel (such as the PV system installer) by visually verifying the status of the machine and its internal components by performing the operations described and set forth in the Appendix of this manual.
- The extraordinary maintenance of the equipment must always be carried out by Fimer personnel or authorized personnel such as one of its service centres, and this is the only way to ensure new and original spare parts are used, and that the device is (according to the applicable maintenance contract) constantly updated with any improvements made in the meantime (in accordance with the state of the art).
- In particular, any equipment fitted with non-original or non-new parts or parts not compliant with the state of the art, will be considered "modified" with the legal and practical consequences resulting therefrom.
- Adjustment, maintenance, inspection and repair operations prescribed in the operating instructions must be carried out at the deadlines specified also in compliance with the information on the replacement of parts or sub-components. These operations must be carried out by qualified personnel only.

Product data plate:

- The product data plate bearing the code of the equipment, the serial number and technical data is fitted within the LV / MV switchgear room of the substation.
- For any communication on the equipment, always quote the serial number marked on the data plate above.

Changes of the equipment:

- Any alterations and modifications to the equipment not expressly and formally authorized by Fimer are prohibited and will result in the immediate termination of the guarantee and the cessation of any liability for any malfunctions and for the consequences that may result from them.
- This prohibition does not apply to minor changes that do not involve consequences for the static and dynamic operational safety, nor to measures that increase safety. The user must, however, take responsibility, unless in case of written consent of the manufacturer.
- The unit can be used only if all safety devices are enabled.

Limitation of Liability:

- Fimer in no event shall be liable for any direct or indirect damages resulting from the failure of the equipment (including damages for loss of profits or loss of revenues), even assuming that Fimer had been notified of the possibility of such damages.
- The manufacturer assumes no responsibility for improper use of the equipment or use other than that for which it is intended, including failure to follow and comply with periodical maintenance, and which could cause damage or malfunction.
- Failure to comply with environmental conditions for operation and installation of the Megastation described in this manual may result in equipment or system damage, and are considered equal to the inadequate use of the equipment for which Fimer disclaims any liability.


Disposal:

- WEEE means Waste Electrical and Electronic Equipment including all components, subassemblies and any consumables that are an integral part of the product when the decision to discard it is made. The legislation provides for two main categories called professional WEEE and household WEEE.
- Professional WEEE means all waste electrical and electronic equipment intended for a purely industrial use.
- The equipment described in this manual are professional products and therefore, at the time of disposal, are professional WEEE.
- As the directive has not yet been enforced at the date of preparation of this instruction manual, please contact the distributor and / or the manufacturer for more information about the disposal or, alternatively, bring the equipment to a collection point for the recycling of electrical or electronic equipment.

Lightning and surge:

- The inverters installed within Megastations are fitted as standard with a class 2 arrester on the DC line (input).
- This arrester protects the inverter, but it is not able to protect the panels, especially in the case of long connections to the solar array.
- It is therefore recommended to install field boxes fitted with their own arresters suitable for photovoltaic application.

4.2 Requirements for safety

Like all electrical substations, Fimer MEGASTATIONS pose a risk to safety; according to the Consolidated text on Security, in order to eliminate or reduce these risks the following prohibitions, obligations and requirements must be complied with:

ENTRY FORBIDDEN
TO UNAUTHORISED PERSONS

DO NOT EXTINGUISH
FIRE WITH WATER

DANGEROUS VOLTAGE
DO NOT PERFORM ANY WORK UNDER VOLTAGE
DO NOT REMOVE PROTECTIONS AND / OR
ELECTRO-MECHANICAL SAFETY LOCKS

DANGER OF FALLING FROM HEIGHTS
DO NOT WALK ON THE ROOF

BEFORE LIFTING THE SUBSTATION
CHECK FOR SUITABLE EQUIPMENT

DO NOT STACK THE SUBSTATIONS OR PLACE MATERIALS ON THE ROOF
CHECK THE FITNESS OF THE SURFACE BEFORE POSITIONING
DO NOT STORE FOREIGN MATERIAL IN THE ELECTRIC SUBSTATION

REMOTE-CONTROLLED MECHANICAL PARTS
HIGH-ENERGY PARTS WITH PRELOADED SPRINGS

INSTALL THE SUBSTATION IN CONFORMITY TO THE PROJECT

BEFORE ANY OPERATION READ THE INSTRUCTIONS

INSTALLATION, COMMISSIONING AND MAINTENANCE
MUST BE PERFORMED BY AUTHORIZED PERSONNEL ONLY

4.3 RISK ASSESSMENT

Risk nature	Cause	Effect	Solution
Substation handling	Release/breakage of lifting chains	Crushing, bruise, impact, drop, injury	Use only approved hooks fitted with mechanical lock against release. The hooks must be secured to the eyelets or upper lifting cubes. The chains must have all the same length.
Substation handling	Forklift usage	Crushing, bruise, impact, drop, injury	Do not use forklifts if the substation is not equipped with fork pockets as it could slide on the forks themselves.
Substation handling	Positioning, obstacles, loosening of fasteners	Impact, drop, slipping, crushing, bruise, injury	Hooking and unhooking lifting chains must be carried out by operating from a ladder. Before any handling and / or lifting verify that there are no objects of any kind that are not fastened to the substation and to the roof. The doors must be closed.
Electrical	Direct or indirect contact with live parts	Electrocution, burns, injury	Do not remove the mechanical locks. Do not release the interlock keys. Do not remove bolted plates, panels, seals and any other item which ensures the degree of protection required. Do not work on auxiliary circuits under voltage. Do not use water to fight fires.

5. STORAGE

If the Megastation is not installed immediately, it should be stored in a dry place free from dust and corrosive pollutants. The storage site must be adequately ventilated, and heated if necessary without any extreme variations in temperature and condensation formation, and finally protected from moisture and weather. When the above requirements are not met, the user must take alternative measures preparing roofing, waterproof barriers and whatever else is necessary for the protection of the equipment.

The following specifications shall be complied with:

Ambient temperature:	-25°C ÷ +60°C
Relative humidity:	90% max

The recommended storage temperature is between +5°C and +40°C

If the substations are not put into service immediately, or if they must be transported to another destination, you may want to:

- disconnect the batteries or any installed UPS, both for safety reasons and to prevent discharge
- in the case of batteries, disconnect the wires connecting the two end poles (+) and (-)
- in the case of UPS, set the switch to zero (OFF).

6. INSTALLATION ENVIRONMENT

The Megastations are, by their nature, suitable to be installed in an industrial environment. The installer must take care to place the container far from the places where people stay for prolonged time.
Allowing free access to untrained personnel is absolutely forbidden. If appropriate make-up air is not complied with as required for the substation entrance and exit, the temperature of the room where electronic and electro-mechanical devices are installed will rise with consequent shortening of the life of the same, impact on production and, in case the stated maximum temperature is exceeded, stoppage of Megastation operation. Keep clearances around the machine as described in section 7.3, otherwise you will not be guaranteed a sufficient cooling of the equipment.
To ensure the proper functioning of the substation, make sure that cooling air inputs and outputs are not clogged; in case of obstruction solar inverters cannot provide all the power available from the solar array and will be affected by a shorter service life. The Megastation is not designed to be installed in locations subject to shocks or vibration, for example, means of transport by road, rail, rope, aircraft, ships and similar means (such as cranes, bridge cranes, machine tool parts subject to movement or vibration...). Do not install the Megastation in environments with dusty, explosive, corrosive, abrasive or saline atmosphere without taking precautions and without the manufacturer's permission.
Any installation carried out in contrast with the present notes determines the immediate withdrawal of the warranty and the cessation of any liability for any malfunctions and for the consequences that may result from them.

Verify that the ambient temperature with operating inverter complies with the following:

- Operating temperature: -10°C ÷ 50°C
- Maximum temperature for 8 hours per day: 45°C
- Average temperature for 24 hours: 35°C

Note: the average temperature recommended for the life of the equipment installed within the Megastation is between 10° C and 35° C.

7. PRELIMINARY OPERATIONS

All operations described in this chapter are the responsibility of the owner of the system and must be carried out by suitably qualified personnel trained as indicated in paragraph *3.4 Personnel involved with installation / operation / maintenance.*

- Before lifting the substation, check the suitability of the lifting equipment.
- Prior to positioning, verify the suitability of the surface.
- Before the installation, check the quality and condition of the equipment and accessories, checking for damage.
- Prior to installation and commissioning, perform preliminary verification activities referred to in this chapter.

7.1 Checking the packaging

When you receive the Megastation make sure that it has not been damaged externally and internally during transport. The integrity of the equipment and any packaging is checked up to loading on the transport mean when shipped from the Fimer factory.

The substation must be handled with care, as bumps and falls can damage it.

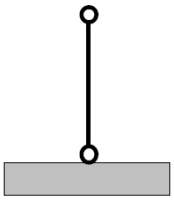
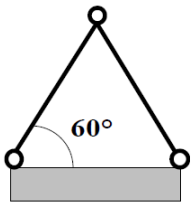
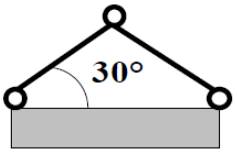
Also make sure that all ventilation slots are not deformed so as to ensure the smooth passage of air and the degree of protection stated.

If the unit is damaged DO NOT CONNECT IT and contact the supplier immediately.

7.2 Handling and lifting

Megastations are very heavy units; have handling operations carried out by qualified personnel. Check in advance the suitability and stability of the stands on which the unit will be placed. Do not store or transport the unit in a tilted position or placed on one side.
The container must be raised as described below by the use of appropriate harness or a crane beam and using the points provided for this purpose. Before performing these operations consult the technical documentation supplied with the equipment to identify both the lifting points and information relating to size and weight.
Before lifting the equipment, verify the suitability of the device, also checking the capacity and length of the cables, which must guarantee a sling angle not exceeding 60° (if you use two sling legs) to avoid overstressing the ropes and structure.

Sling leg load capacity:

	1 LEG	2 LEGS AT 60°	2 LEGS AT 30°
TYPE			
CHAIN ∅ 10 mm	2.500	4.330	2.500
CHAIN ∅ 8 mm	1.500	2.600	1.500
ROPE ∅ 18 mm	3.000	5.200	3.000
ROPE ∅ 14 mm	2.000	3.500	2.000
STRIP 100 mm	4.000 - double	6.400 – two, double	NO
STRIP 140 mm	6.000 - double	9.600 – two, double	NO

7.3 Positioning

The positioning must be made respecting the following requirements:

- Suitable surface properly stabilized and adjusted to the total weight of the substation, consisting of a stable flat surface that extends beyond the base of the product in all directions.
- The load value of the site (on which the electrical substations will be placed) must be greater than (0.06-0.08 kg/cm2).
- Perfectly horizontal plane in order to ensure the proper functioning of mechanical locks and doors, both internal and external; necessary levelling of the electric substation.
- Minimum distance from the plane of site of at least 200 mm.
- Compliance with the setup project, and with the local, national and international technical provisions.
- Place the substation away from sources of heat.
- Install the container in a sufficiently large place so as to allow maintenance, door opening, removal of any external panels and grids in order to allow the operations of periodic maintenance and repairs in the event of failures.

For proper positioning of the FIMER MEGASTATION a special base shall be prepared on which to rest the substation.

Any installation carried out in contrast with the present notes determines the immediate withdrawal of the warranty and the cessation of any liability for any malfunctions and for the consequences and damages to people or property which may result from them.

7.4 Electrical connections

The connections to be carried out by the installer of the final customer, are the following:

- connection to the earth equipotential bonding of the substation to the earth of the system on the points provided for this purpose and clearly identified (see earth busbar in the LV / MV switchgear room);
- connection of all cables - power, auxiliary, signal and communication network cables – at the substation input and output. The cables must be connected according to system diagrams, making sure that the contact surfaces are clean and of suitable section;
- restoration of connections that may have been removed for transport or for lengthy storage, in compliance with the numbering of the diagrams provided
- removal of any fasteners on moving elements placed for transport (see removal of the straps fixing the MV transformer placed within the substation to prevent the transformer from moving during transport).

The connections must be performed in a workmanlike manner so as to prevent abnormal mechanical stress on the terminals of the equipment and to avoid altering the adequate electrical clearances for the relevant insulation class.

The user should only entrust these tasks to qualified staff who is in possession of at least the minimum level of training required by IEC 11-27/1 "Execution of electrical works - Part

1: Minimum level of training to work on systems of class 0, I, II, III not under voltage, and to work on systems of class 0 and I under voltage".

7.5 Checks before commissioning

After making connections and prior to commissioning, accurate checks must be carried out in order to ascertain the suitability of the entire installation.
The verification includes both preliminary inspections and dimensional controls, and the execution of measurements and formal acts in compliance with the regulations.
The measurements and checks to be performed are as follows:

- Measurement of fault loop impedance.
- Measurement of the continuity of the protective conductor.
- Measurement of the total earth resistance.
- Checking the coordination of protections and levels of selectivity for failures both upstream and downstream of the substation.
- Checking the suitability of the earthing system and its connections, including equipotential bonding of exposed and extraneous conductive parts (outside the substation).

Checking MV transformer

- Open the access door to the transformer compartment and check for any damage caused during transportation.
- Check medium and low voltage cable connection.
- Remove any swarf and dust.

Checking moisture

- If the substation has undergone a prolonged storage, heat the medium and low voltage section for at least 24 hours with electric heaters in order to remove moisture.

Carry out the following checks:

1. Presence and legibility of warning signs of danger, requirements and notices.
2. Presence of all accident-prevention guards: barriers and auxiliary equipment.
3. Correct operation of all mechanical interlocks, pivoted arms and control rods of the MV and LV switchgears.
4. Proper functioning of safety systems and efficiency of auxiliary power supplies, including emergency lighting.
5. Functionality of all access doors to both the substation and the internal equipment, and related opposite areas which need to be clear and free from obstructions.
6. Slits and air vents clear of obstructions or clogging that prevent the free circulation of air.
7. Proper tightening of all electrical connections.
8. Checking the cleanliness of insulating surfaces.
9. Absence of leaks and proper level of any insulating or operating fluids.
10. Proper operation of fans and / or air conditioning devices (if any).
11. Tripped residual current circuit breakers and / or protections to earth.

12. Measurement of insulation resistance: MV to earth, MV to BV and BV to earth (measured values must be greater than 200 Mohm using a suitable ohmmeter for insulation measures of 5,000 V_{DC} on the MV side and 500 V_{DC} on the LV side).
13. Proper preparation of the transformer adjustment taps, especially when equipped with switchable voltages, in accordance with the conditions and characteristics of the electricity distribution network.

The appendix to this manual shows in greater detail the check points for the various devices installed within the MEGASTATIONS.

7.6 Commissioning the MEGASTATION

All activities relating to the installation and commissioning of the units must be carried out by qualified personnel.

The presence and perfect functionality of protections and security systems does not replace the expertise of persons who perform the manoeuvres and work, and only after you have completed the preliminary operations described in the previous paragraph, you can proceed to the first start-up and commissioning of the substation. Such operation shall be attended by the plant manager for the control and coordination of the operations which are described below:

- Checking the earthing of the substation by connecting the earth busbar, busbar within the MV / LV electrical switchgear room to the earthing of the system, with a yellow-green cable with a section at least equal to 95 sq mm.
- Controlling and monitoring the distribution system - in the event that the substation hosts FIMER TL series inverters, the distribution system is of IT type i.e., without the need to connect the neutral conductor of the MV transformer to earth.
- Commissioning the medium-voltage side, up to the primary side of the transformer according to the switching sequences shown on the plates located on the front of each cell and / or the procedure for placing the plant in and out of service indicated in the procedure for storing key.
- Checking voltage present indicators, instrument readings and absence of vibration or abnormal noise coming from MV devices.
- Closing the low voltage switch.
- Checking voltage present indicators, instrument readings and absence of vibration or abnormal noise coming from MV devices.
- Controlling instrument readings on the low voltage section.
- Closing the switches at low voltage shunted outgoing feeders.
- Verification of conformity of all sizes (thermal, electrical, etc..) with the ranges of the expected values.
- Checking the correct operation of the charging devices present within the substation and that the extra batteries, if present, are connected correctly to the UPS, which shall be "ON" and without faults / failures / alarms.
- Monitoring the absence of vibration or abnormal noise from the BV devices.
- Proceed to the first start-up and commissioning of the inverter as described in the use and maintenance manual of the solar inverters installed.

The medium-voltage transformer temperature is controlled by a special unit and the fans for exhausting air from the MV transformer room are thermostated.
The setting ranges of alarms and thresholds to start / stop the fan must be adjusted according to what is written in the project documentation for the system, since they depend on the rated power of the transformer, on construction, and on environmental conditions in which the MEGASTATION is operating.

8. OPERATING AND RUNNING THE MEGASTATION

In order to be guaranteed the correct operation of the substation during its normal running, it is necessary to ensure compliance with the following provisions:

- access to the substation must not be allowed to unauthorized persons;
- any operations must always be carried out in accordance with the instructions;
- unauthorized manoeuvres must not be carried out;
- safety interlocks must not be removed or forced;
- manoeuvres must not be carried out with the spare keys, delivered together with MV switchgears, improperly bypassing all mechanical safety devices.

Any abnormal situations, such as:

- excessive ambient temperature;
- abnormal noise level;
- presence of water infiltration and / or signs of insulating fluid leakage;
- excessive dust build-up and / or environmental pollution;
- tripped residual current circuit breakers;

should be reported immediately to the electric manager to identify the cause and remedies necessary.

In case of tripped electrical or thermal protections during normal operation, restore them only after verifying the causes in order to exclude or remove defects.

In case of failure to fuses, both medium and low voltage, it is also recommended to replace all fuses affected by the fault even when only one is burnt out (see IEC 282.1 § 23.2).

The manufacturer disclaims all liability for damage resulting from tampering or misuse of interlocks and / or safety equipment, or caused by mishandling made by inexperienced and / or unauthorized personnel.

9. PREVENTIVE AND PERIODIC MAINTENANCE FOR MEGASTATIONS

Fimer recommends its customers to implement proper and continuous preventive maintenance on MEGASTATIONS and equipment contained in it so as to maximize the reliability of service and minimize the costs of unscheduled repairs.

Proper preventive maintenance ensures a longer life cycle of the plant.

If not entrusted to the manufacturer or an authorized service centre by means of an appropriate maintenance contract, preventive maintenance is generally the responsibility of the client, to whom all the operations of periodic verification are entrusted. Qualified technical personnel must be appointed to carry out periodic operations to assess the state of the equipment, with a frequency of intervention which varies according to the environmental conditions typical of the installation or the types of equipment and switchgears on which action should be taken. Typically two preventive maintenance operations are suggested on average per year, including checking all the parts that make up the system plus any substitutions of consumables.

Before entering the substation, all operators authorized to carry out maintenance must be aware of safety rules contained in this manual and wear all of the personal protective equipment required.

	***Wear the helmet in case of installation or maintenance of the Megastation or equipment within it which require the handling of suspended materials.***
	***Wear appropriate protective gloves before working on the inverter.***
	***Wear appropriate safety shoes to protect against falling heavy objects.***
	***In case of prolonged exposure to noise wear hearing protection devices.***
	***Pay attention! Before performing any maintenance disconnect the substation from the mains and from the line of the PV array/s.***
	***Pay attention! Wear eye protection before performing any type of maintenance.***

9.1 Routine maintenance

Routine maintenance must be carried out in order to keep the unit in safe conditions. For the verification of the functionality of the equipment, please refer to the Appendix to this manual and to use and maintenance manuals of the individual components.
All maintenance operations must be performed by trained and experienced staff only, using original spare parts, if necessary.

The electrical manager should take care to verify that the personnel in charge of maintenance is familiar with specific and updated instructions.
He/she also needs to define operational responsibilities and procedures for de-energizing and earthing the parts of the system concerned and the subsequent re-commissioning.
Maintenance work must be carried out only after the following operations:

de-energizing:

- open all low voltage switches and fuse outgoing feeders to the field units
- open the low voltage switch
- open line switch disconnectors and circuit breakers or switches present in the medium voltage section (in case the substation is fitted with several switch disconnectors for input and output lines, open all switch disconnectors)

earthing:

If the MV switch is earthed then:

- go to the transformer / distribution substation that powers the Megastation
- open the MV circuit breaker / line switch disconnector that powers the Megastation
- close the MV earthing switch for the earthing of the cable that powers the Megastation

Close the earthing switches present in the medium voltage section of the Megastation referring to the specific procedures of the plant in question.
In the case where the substation is fitted with several earthing switches for input and output lines, close all switch disconnectors.

Disabling energy-storage devices:

- preloaded springs
- devices for operating fluid accumulation
- electrical accumulator batteries, and / or UPS
- wait for the power factor correction capacitors to discharge power

All maintenance work must be registered.

9.2 Controls and schedule for routine maintenance

The frequency of inspections and maintenance operations must be determined according to the conditions of operation and environmental pollution of the substation, however, in general, for each component it is necessary to comply with intervals and to carry out the checks indicated in the tables shown in the Appendix to this manual.

In any case it is necessary to perform routine or extraordinary maintenance whenever abnormal operating situations are notified by operators.

FIMER disclaims any liability for substations that are kept in operation without regular inspection and maintenance operations.

10. TROUBLESHOOTING

For the analysis and resolution of faults and malfunctions occurring in MEGASTATIONS refer to the table below:

FAILURE MALFUNCTION	POSSIBLE CAUSE	SUGGESTED REMEDIES
Medium voltage present indicators off	No medium voltage power	Ensure that the medium voltage cable is properly connected to the medium voltage line switch disconnector. Check the upstream transformation substation for the operation of the corresponding cell.
The medium voltage line switch disconnector / circuit breaker does not stay closed	An electrical inconvenience prevents the line switch disconnector / circuit breaker from closing	Check the emergency button under the glass: it must be pressed so that its contact is normally open. Make sure the temperature control unit of the transformer is properly configured with the values shown in the wiring diagram and the plant project. Check that there are no other devices controlling the opening circuit (e.g., antifire)
	A mechanical inconvenience prevents the line switch disconnector / circuit breaker from closing	Verify that the substation is installed on a flat surface in order to avoid the malfunction of the mechanical locking and interlocking devices. Check that the front closing doors and protections of the individual compartments are closed properly. Verify proper installation of medium voltage fuses.
	Tripped MV protection relay	Verify that the medium voltage cable is not damaged or that the MV cable shielding passes through the core balance CT.
The medium voltage earthing switch does not close	A mechanical inconvenience prevents the earthing switch from closing	Verify that the substation is installed on a flat surface in order to avoid the malfunction of the mechanical locking and interlocking devices.
External overheating of medium voltage fuses	Operating voltage greater than that specified	Adjust the switch +/- 2x2.5% of the medium voltage transformer.

FAILURE MALFUNCTION	POSSIBLE CAUSE	SUGGESTED REMEDIES
The medium voltage line switch disconnector / circuit breaker opens (when the substation is operating)	Tripped emergency button	Restore the emergency button under the glass: it must be pressed so that its contact is normally open.
	Tripped temperature control unit of the medium voltage transformer	Make sure the temperature control unit of the transformer is properly configured with the values shown in the wiring diagram and the plant project. In this case the unit has tripped due to high temperature of the windings of the transformer. Check the correct operation of ventilation fans and the air inlet/outlet grilles of the room for cleanliness.
Network analyser (if any) off	No auxiliary power	Tripped protection fuses, replace them.
	Electrical fault	Use a tester to check that the value of the auxiliary voltage is within the rated data
The network analyser (if any) displays wrong measurements	Electrical fault	Use a multimeter to check the correctness of the input signals to the analyzer in question and the correct wiring of the electrical connections.
MV transformer ventilation tangential fans disabled	Electrical fault	Replace the fans
	No auxiliary power	Tripped protection fuses / circuit breaker, replace / restore them.
	Temperature control unit of the medium voltage transformer not configured	Make sure the temperature control unit of the transformer is properly configured with the values shown in the wiring diagram and the plant project. Configure the instrument by following the instructions on the manual supplied.
Fans for exhausting air from the MV transformer room disabled	Electrical fault	Replace the fans.
	No auxiliary power	Tripped protection fuses / circuit breaker, replace / restore them.
	Wrong setting of the thermostat	Check that the thermostat controlling the ambient temperature of the transformer room is set correctly.
The low voltage switch for external units does not close	Pilot wire wired incorrectly or not wired	Ensure that the pilot wire of the field cable is wired correctly inside the sockets / plugs as shown in the wiring diagram.

FAILURE MALFUNCTION	POSSIBLE CAUSE	SUGGESTED REMEDIES
	Tripped differential relay	An earth fault has occurred in the line towards the unit. Check the condition of the cable and proper connection at both ends.
The low voltage switch opens (when the substation is operating)	Tripped thermal protection	An overload has occurred on the line to the unit. Check the correct operation of the equipment for this slave unit. Verify that the slave equipment absorption is suitable for the size of the switch.
	Tripped magnetic protection	A short circuit has occurred in the line towards the unit. Check the condition of the cable and proper connection at both ends.
	Tripped differential relay	An earth fault has occurred in the line towards the unit. Check the condition of the cable (both line and neutral conductor) and proper connection at both ends.

Contact FIMER technical support or its authorized Service centre in case you cannot solve the problems as shown or in the case of the occurrence of an event other than those indicated.

11. PARTS AND SPARE PARTS

Recommended spare parts

The recommended spare parts for the continued operation of the substation are all those components that can be damaged as a result of malfunctions or that may terminate their normal mechanical / electrical life and for which replacement is necessary.

This category includes, among others:

- Medium Voltage fuses
- Signal lamps (capacitive MV indicators)
- Low Voltage Fuses
- Fans
- Circuit Breakers / residual current circuit breakers
- etc.

The following are however excluded:

- MV Switchgear
- Medium voltage transformer
- Purely mechanical materials

For all the material a quantity equal to 20% of the total supplied with the substation is recommended.

ALWAYS USE ORIGINAL PARTS AND ASK THE MANUFACTURER FOR THE LIST OF SPARE PARTS FOR THE MEGASTATION SUPPLIED AND INSTALLED IN THE SYSTEM.

APPENDIX

INTRODUCTION

The operation and maintenance of MEGASTATIONS have the aim to ensure high reliability (i.e., prompt identification of anomalies, failure prevention and functional monitoring) and safety.

Maintenance means the set of interventions aimed to reduce degradation, to cope with accidental events and to renovate and / or replace parts inside the substation and the equipment mounted within that do not modify its performance substantially.

The following are not considered as maintenance operations for a substation:

- The construction of new parts
- The transformation and expansion of substation systems
- The operating manoeuvres and safety measures

The operation and maintenance of the substations are shown clearly and comprehensively in standard IEC 0-15 (Maintenance of MV / LV substations for end customers).

This Appendix aims to provide general technical information and the minimum information necessary to allow qualified electrical personnel to operate safely on the equipment.

IDENTIFICATION OF PERSONNEL

Maintenance work on "live parts" must be performed in accordance with the procedures provided for "electrical work" (which are indicated by standard IEC 11-27 (Work on electrical equipment).

The staff involved in the management and maintenance of photovoltaic systems must be trained and qualified to work on electrical systems and it is given responsibility for the proper conduct of periodic inspections.

Below is a detailed description of the profile and responsibilities of a technician who performs running and maintenance operations on the MEGASTATIONS:

Maintenance technician:

- Person who has overall responsibility for maintenance, in particular safety, technical and managerial / administrative aspects
- The maintenance technician must have the requirements listed in IEC 11-27 for the Nominated person in control of a work activity (Skilled person PES)

Maintenance workers:

- People supervised by (or subordinate to) the maintenance technician who perform maintenance, manual and / or instrumental operations
- Must meet the PES or PAV requirements if they perform electrical work, or PEC requirements if they do not perform electrical work

The characteristics of the personnel executing electrical works not under voltage and in the vicinity just mentioned are as follows:

SKILLED PERSON (PES):

Trained person with relevant education and experience to enable him or her to avoid hazards which electricity could create.
He/she has:

- general and specific knowledge of safety
- organizational and supervision skills
- ability to assess risks and to resolve unforeseen situations
- ability to instruct the subordinate staff

INSTRUCTED PERSON (PAV):

Trained person, properly instructed in relation to the surrounding circumstances, by skilled people to enable him or her to avoid hazards which electricity could create.
He/she has:

- specific knowledge of safety
- ability to understand the instructions of a PES
- ability to manage anticipated risks arising for the specific work assigned

ORDINARY PERSON:

Person who is neither a skilled person nor an instructed person in the field of electrical activity.
He/she:

- is not able to independently manage electrical risks
- must operate in the absence of electrical hazard or be monitored

Before working on the system, the maintenance technician must carefully analyse the executive project and all documentation and technical manuals, which should be delivered to him/her by the plant manager, relating to important system parts and their warranty.

In the following description we describe the basic operations for the routine maintenance of the MEGASTATIONS whose verifications include visual inspections, manual and instrumentation controls and manoeuvres, aimed to ensure correct functionality of the components and systems of the substation. Bearing in mind that the MV / LV substations are very heterogeneous in their composition, the procedure should be applied from time to time according to existing equipment and in case of equipment not mentioned in the technical manuals available, the datasheets of the same will have to be integrated or updated.

Finally, the staff shall be provided with any keys for accessing any rooms where maintenance works are necessary.

SAFETY PRECAUTIONS

Potential hazards: electrocution, falling from a height.

Comments: In the case of works under voltage, the Nominated person in control of a work activity shall identify and mark off the work area, place a warning sign, disconnect the live

parts and secure any areas that may interfere with the working area (making disconnecting devices inaccessible, verifying the absence of voltage, shorting and earthing the disconnected part).
He/she should inform workers about the safety measures and precautions to be taken.
Even the execution of works under voltage must be under his/her control.
Before starting work, check:

- The efficiency of the equipment and means of protection;
- The absence of live parts with a danger of accidental contact, out of the area of intervention;
- The correct position of intervention of the worker.

When "working in contact" (work under voltage during which the operator, properly protected, can enter the guard zone with parts of his/her body), it is necessary to limit and contain the area of intervention, protect or isolate parts with different potentials to avoid the formation of short circuit arcing; fix moving parts of live elements that have become detached; implement procedures for plant safety and affix warning signs.

DETAIL AND FREQUENCY OF INTERVENTIONS

The maintenance schedule presented later in this appendix, is the main instrument for the management of schedulable maintenance activities, through which interventions are programmed over time, resources needed are identified, and transversal objectives are pursued, aimed at optimizing management and organization efficiencies, and raising the performance level of the plant.

In general the frequency of maintenance interventions must be established from time to time taking into account:

- service methods and duty and age of system and components;
- environmental conditions (e.g., penetration of water or solids, exposure to abnormal environmental temperatures (too high or low), exposure to direct sunlight in the presence of ultraviolet rays);
- exposure to high industrial pollution.

What follows provides technical operators with the information necessary for proper maintenance in order to then proceed with appropriate action.

Listed below are the major components of the PV system, the steps to take to monitor and ensure the proper functioning of the same and the frequency of controls.

DATASHEET: Building analysis

Building Analysis Datasheet Year_____ SN MEGASTATION _____ datasheet consecutive no. _____ SUBSTATION AND ROOM STRUCTURE (Routine maintenance performed on the structures does not require to put the system out of service)					
N.B. Operations are performed after visual and / or instrumental inspection		**Maximum frequency**	**Performed on**	**Signature**	**Measures taken or suggested**
1	**Walls and roof on the substation - Checks / interventions: integrity of structures (walls, roof, and insulation), water infiltration, moisture**	**Six-monthly**			
2	**Identification of corrosion and oxidation due to weather and other agents, differences of geometry, loosening of bolted mechanical connections**	**Six-monthly**			
3	**Exterior painting of the substation and remaking of the waterproofing of the walls and roof if present**	**Three-yearly**			
4	**Inside the substation - Checks / interventions: integrity, cleanliness, overall dimensions, removal of any materials not related to the plants.**	**Six-monthly**			
5	**Doors, windows, hatches, tunnels - Checks / interventions: functionality**	**Six-monthly**			
6	**Checking the condition of protective structures against direct contact: grids, gates, Plexiglas, etc..**	**Six-monthly**			
7	**Checking integrity and cleanliness of ventilation grilles**	**Six-monthly**			
8	**Environmental / climatic conditions in the substation - Checks / interventions: temperature, humidity**	**Six-monthly**			
9	**Warning and danger signs - Checks / interventions: fixing, intelligibility, completeness of signs**	**Six-monthly**			
10	**First aid indications and wiring diagrams - Checks / interventions: intelligibility**	**Six-monthly**			
11	**Verification of the presence of protective devices and personal protective equipment (e.g., platform and gloves Class III to work with MV devices) and fire extinguishers (verify charge and revision on a yearly basis)**	**Six-monthly**			
12	**Indications of any emergency exits - Checks / interventions: intelligibility**	**Six-monthly**			
13	**Conductors and protection connections - Checks / interventions: integrity, oxidation, checking bolt tightening**	**Six-monthly**			
14	**Prevention and emergency systems - Checks / interventions: check, if any**	**Six-monthly**			
15	**Fire barriers - Checks / interventions: check existence and / or integrity**	**Six-monthly**			
16					
NOTES:					**Maintenance technician signature**

DATASHEET: Disconnecting switches, MV on-load disconnecting switches and fuses

MV on-load disconnecting switches and fuses Datasheet Year_____ SN MEGASTATION _____ datasheet consecutive no. _____ **DISCONNECTING SWITCHES, MV ON-LOAD DISCONNECTING SWITCHES AND FUSES: (Routine maintenance requires to put the system out of service and will only concern the parts of the plant directly served by them)**					
N.B. Refer to the manufacturers' datasheets, if existing or available. Operations are performed after visual and / or instrumental inspection.		**Maximum frequency**	**Performed on**	**Signature**	**Measures taken or suggested**
1	**MV fuses** – Checks / interventions: fixing and fuse removal device and size as per last project	**Yearly**			
2	**Disc. switches – On-load disc. switches –** Checks / interventions: visual inspection of live parts and cleaning	**Yearly**			
3	**Disc. switches – On-load disc. switches – MV fuses –** Checks / interventions: checking the integrity of the insulating parts and cleanliness	**Yearly**			
4	**Disc. switches – On-load disc. switches – MV fuses** – Checks / interventions: general checking and installation conditions	**Yearly**			
5	**Disc. switches – On-load disc. switches – MV fuses** – Checks / interventions: checking and adjustment of transmission lines	**Yearly**			
6	**Disc. switches – On-load disc. switches – MV fuses –** Checks / interventions: checking tightness of electrical wiring connected to the insulators	**Yearly**			
7	**Disc. switches – On-load disc. switches -** Checks / interventions: cleaning and lubrication of all mechanisms	**Yearly**			
8	**Disc. switches – On-load disc. switches** – Checks / interventions: checking contact pitch	**Yearly**			
9	**Disc. switches – On-load disc. switches** – Checks / interventions: checking contact wear	**Yearly**			
10	**Disc. switches – On-load disc. switches** – Checks / interventions: functionality of electrical and mechanical locks and interlocks and relevant manoeuvres	**Yearly**			
11	**Disc. switches – On-load disc. switches –** Checks / interventions: greasing fixed and moving contacts excluding arcing contacts	**Yearly**			
12	**Disc. switches – On-load disc. switches** – Checks / interventions: insertion of contact blades IMS and ST	**Yearly**			
13					
NOTES:					**Maintenance technician signature**

DATASHEET: SF6 Switches

SF6 switches datasheet Year_____ SN MEGASTATION _____ datasheet consecutive no. _____ **SF6 SWITCHES: (Routine maintenance requires to put the system out of service and will only concern the parts of the plant directly served by them)**					
N.B. Refer to the manufacturers' datasheets, if existing or available. Operations are performed after visual and / or instrumental inspection.		**Maximum frequency**	**Performed on**	**Signature**	**Measures taken or suggested**
1	**SF6 switches** – Visual inspection for equipment integrity and cleanliness	**Yearly**			
2	**SF6 switches** – Check the pressure on the pressure switch (if any) for any gas leaks	**Yearly**			
3	**SF6 switches** – Perform five mechanical opening and closing operations	**Yearly**			
4	**SF6 switches** – Visual inspection of poles (resin parts)	**Yearly**			
5	**SF6 switches** – Visual inspection of controls and transmission lines	**Yearly**			
6	**SF6 switches** – Checking contact pitch	**Yearly**			
7	**SF6 switches** – Checking tightness of earthing connections	**Yearly**			
8	**SF6 switches** – Checking tightness, disconnected contacts (for disconnectable switch only)	**Yearly**			
9	**SF6 switches** – Checking supply voltage of electric accessories of the control	**Six-monthly**			
10	**SF6 switches** – Measure the insulation resistance	**Five-yearly**			
11	**SF6 switches** – For auxiliary circuits check the operation of warnings and motor control (if fitted)	**Yearly**			
12	**SF6 switches** – Checking the functionality of the interlocks	**Yearly**			
13	**SF6 switches** – Checking springs and replace them, if damaged	**Yearly**			
14	**SF6 switches** – Lubricate the load points of the control springs with a suitable product, the opening spring load points and the closing and opening latches	**Yearly**			
15					
NOTES:					**Maintenance technician signature**

DATASHEET: MV Switchgear

MV switchgear datasheet Year_____ SN MEGASTATION _____ datasheet consecutive no. _____ **MV switchgear: (Routine maintenance requires to put the system out of service and will only concern the parts of the plant directly served by them)**					
N.B. Refer to the manufacturers' datasheets, if existing or available. Operations are performed after visual and / or instrumental inspection.		**Maximum frequency**	**Performed on**	**Signature**	**Measures taken or suggested**
1	**QMT** – Checks / interventions: visual inspection of the state of the entire metal structure and the equipment installed	**Yearly**			
2	**QMT –** Checks / interventions: presence of foreign bodies within the switchgear and any damage caused by rodents	**Yearly**			
3	**QMT** – Checks / interventions: cleaning insulating parts and live parts	**Yearly**			
4	**QMT** – Checks / interventions: checking tightness of the bolts	**Yearly**			
5	**QMT** – Checks / interventions: checking openings for cables and plugging	**Yearly**			
6	**QMT** – Checks / interventions: cleaning moving parts, lubrication	**Yearly**			
7	**QMT** – Checks / interventions: checking electrical and mechanical key locks, and interlocks preventing access to live parts	**Yearly**			
8	**QMT** – Checks / interventions: cleaning and tightening terminal blocks	**Yearly**			
9	**QMT** – Checks / interventions: checking auxiliary connections	**Yearly**			
10	**QMT** – Checks / interventions: checking internal lighting (if any), anti-condensation heater (if any), voltage presence / absence indicators, any measuring instruments on the front of the switchgear	**Yearly**			
11	**QMT** – Checks / interventions: intelligibility and completeness of plates for sequence of manoeuvres	**Yearly**			
12	**QMT** – Checks / interventions: functionality of the removable parts	**Yearly**			
13	**QMT** – Checks / interventions: functionality of shutters	**Yearly**			
14	**QMT** – Checks / interventions: functionality and efficiency of mechanical position indicators	**Yearly**			
15	**QMT** – Checks / interventions: functionality and efficiency of the earthing switch	**Yearly**			
16	**QMT** – Checks / interventions: continuity of earthing conductors of metal structures and equipment installed	**Yearly**			
17					
NOTES:					**Maintenance technician signature**

DATASHEET: MV Transformer

MV Transformer datasheet Year_____ SN MEGASTATION _____ datasheet consecutive no. _____ **CAST-RESIN DRY-TYPE MV TRANSFORMER: (Routine maintenance requires to put the system out of service and will only concern the parts of the plant directly served by them)**					
N.B. Refer to the manufacturers' datasheets, if existing or available. Operations are performed after visual and / or instrumental inspection. THE MV TRANSFORMER GENERALLY INSTALLED IN FIMER MEGASTATIONS IS OF DRY-TYPE (IN CASE OF AN OIL TRANSFORMER, REFER TO FURTHER SPECIFICATIONS AND TESTS LISTED IN THE MANUAL OF THE DEVICE INSTALLED)		**Maximum frequency**	**Performed on**	**Signature**	**Measures taken or suggested**
1	**TRAFO MT – S** – Checks / interventions: checking plate data	**Yearly**			
2	**TRAFO MT – S** – Checks / interventions: general cleaning to remove dust and dirt and foreign bodies on the windings	**Six-monthly**			
3	**TRAFO MT – S** – Checking centring of MV/LV windings on magnetic core with a meter	**Yearly**			
4	**TRAFO MT – S** – Checks / interventions: checking for any blockages in the cooling channels	**Yearly**			
5	**TRAFO MT – S** – Checks / interventions: checking tightening of floor anchors	**Yearly**			
6	**TRAFO MT – S** – Checks / interventions: checking tightening of bolts for star / delta connections and MV / LV terminals	**Yearly**			
7	**TRAFO MT – S** – Checks / interventions: checking operation of any fans and thermostatic unit controls	**Six-monthly**			
8	**TRAFO MT – S –** Checks / interventions: checking connections and proper operation of temperature probes	**Six-monthly**			
9	**TRAFO MT – S** – Checks / interventions: checking the status of mechanical devices for transformer handling	**Yearly**			
10	**TRAFO MT – S –** Checking insulation between windings and to earth	**Yearly**			
11	**TRAFO MT – S –** Checking plates for adjusting spacer blocks with torque wrench	**Yearly**			
12	**TRAFO MT – S –** Checking correct operation of emergency releases: buttons, dual threshold thermostatic unit	**Yearly**			
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NOTES:					**Maintenance technician signature**

DATASHEET: Protection relay (if any)

Protection relay and Interface control datasheet Year_____ SN MEGASTATION _____ datasheet consecutive no. _____ **PROTECTION RELAY AND INTERFACE CONTROL DATASHEET: (Routine maintenance requires to put the system out of service and will only concern the parts of the plant directly served by them)**					
N.B. Refer to the manufacturers' datasheets, if existing or available. Operations are performed after visual and / or instrumental inspection.		**Maximum frequency**	**Performed on**	**Signature**	**Measures taken or suggested**
1	**PROTECTION RELAY** – Checks / interventions: visual inspection and checking equipment integrity	**Six-monthly**			
2	**PROTECTION RELAY** – Checks / interventions: checking plate data and device SN checking compliance of equipment with the project	**Six-monthly**			
3	**PROTECTION RELAY** – Checks / interventions: general cleaning to remove dust and dirt	**Six-monthly**			
4	**PROTECTION RELAY** – Checks / interventions: Visual inspection of electrical parameters calibration values in compliance with project values	**Six-monthly**			
5	**PROTECTION RELAY** – Checks / interventions: simulation of proper operation of PI and PG by mechanical action on the switch release device	**Six-monthly**			
6	**PROTECTION RELAY** – Checks / interventions: checking the correct operation and tripping of any redundancy and interconnections with multiple devices	**Six-monthly**			
7	**PROTECTION RELAY** – Checks / interventions: Use a suitable instrument to check protection tripping, following a preliminary verification, before power-up, to ensure current circuits have not been left open	**Five-yearly**			
8					
NOTES:					**Maintenance technician signature**

DATASHEET: LV switchgears

LV switchgear datasheet Year_____ SN MEGASTATION _____ datasheet consecutive no. _____

LV Switchgear datasheet: (Routine maintenance requires to put the system out of service and will only concern the parts of the plant directly served by them)

	N.B. Refer to the manufacturers' datasheets, if existing or available. Operations are performed after visual and / or instrumental inspection.	**Maximum frequency**	**Performed on**	**Signature**	**Measures taken or suggested**
1	**QBT** – Checks / interventions: external visual inspection to verify the integrity of the cabinet(s), identification of damage to the cabinet and the components contained (localized heating, damage caused by rodents, etc.) and correct identification of the measuring instruments possibly installed on the front of the switchgear. Where possible, perform a visual check of the electrical supply lines	**Six-monthly**			
2	**QBT –** Checks / interventions: Perform internal and external cleaning of switchgears by compressed air and vacuum cleaners	**Six-monthly**			
3	**QBT** – Checks / interventions: Check the status of structures for protection against direct contact (metal screen, etc.)	**Six-monthly**			
4	**QBT** – Checks / interventions: Check the tightness of bolts, cleanliness of connections and continuity of the earthing conductor and replace any damaged terminals and conductors	**Six-monthly**			
5	**QBT** – Checks / interventions: Check the efficiency of locking devices preventing access to live parts	**Six-monthly**			
6	**QBT** – Checks / interventions: Check the efficiency of internal lighting of the switchgear (if any)	**Six-monthly**			
7	**QBT** – Checks / interventions: Check the efficiency of anti-condensation heaters and thermostats (if any)	**Six-monthly**			
8	**QBT** – Checks / interventions: Check the tightness of power connections	**Six-monthly**			
9	**QBT** – Checks / interventions: Check and replace, if necessary, door seals (if any)	**Six-monthly**			
10	**QBT** – Checks / interventions: Visually inspect the good state of protections (fuses, relays, circuit breakers)	**Six-monthly**			
11	**QBT** – Checks / interventions: As for fuses, check compliance with the electrical specifications of the project	**Six-monthly**			
12	**QBT** – Checks / interventions: As for relays, check the overload calibration values of the project. As for circuit breakers, check calibration values and electric specifications of the project	**Six-monthly**			
13	**QBT** – Checks / interventions: As for indirect protections (if any) check for proper operation of overcurrent and earth protections by using the proper tool	**Six-monthly**			
14	**QBT** – Checks / interventions: As for relays and residual current circuit breakers check for proper operation by using the proper tool	**Six-monthly**			
15	**QBT** – Checks / interventions: Visual inspection of the information shown on the min. voltage relay switch (if any)	**Six-monthly**			
16	**QBT** – Checks / interventions: Check integrity and efficiency of surge arresters (if any)	**Six-monthly**			
17	**QBT** – Checks / interventions: Check integrity of equipment earthing	**Six-monthly**			
18	**QBT** – Checks / interventions: Tightening of electric terminals and barriers	**Six-monthly**			
19	**QBT** – Checks / interventions: Check calibration of overcurrent relays (if any)	**Yearly**			
20	**QBT** – Checks / interventions: As for auxiliary circuits: 1. Check the tightness of the electrical connections of auxiliary circuits. 2. Check the integrity of the switches and use the tester to verify the actual opening and closing. 3. Check the integrity, functionality and efficiency of switches, buttons, lamps, etc. to verify that the circuits are enabled as provided for in the project. 4. Check the integrity and function of the measuring instruments by acting on voltage switches for voltmeters and on load variation for ammeters. 5. Check the efficiency of auxiliary equipment by energizing and de-energizing them, where possible, or use the tester	**Yearly**			
21					
NOTES:					**Maintenance technician signature**

DATASHEET: UPS

UPS Datasheet Year_____ SN MEGASTATION _____ datasheet consecutive no. _____ **UPS: (Routine maintenance requires to put the system out of service and will only concern the parts of the plant directly served by them)**					
N.B. Refer to the manufacturers' datasheets, if existing or available. Operations are performed after visual and / or instrumental inspection.		**Maximum frequency**	**Performed on**	**Signature**	**Measures taken or suggested**
1	**UPS** – Checks / interventions: check plate data	**Six-monthly**			
2	**UPS** – Checks / interventions: visual inspection, cleaning and replacement of batteries nearing end of life	**Six-monthly**			
3	**UPS** – Checks / interventions: check UPS autonomy for the minimum amount of time provided for by the project	**Six-monthly**			
4	**UPS** – Checks / interventions: fully charge batteries and UPS for the minimum amount of time provided for by the project	**Six-monthly**			
5	**UPS** – Checks / interventions: check that the ventilation grilles are not blocked	**Six-monthly**			
6	**UPS** – Checks / interventions: check the good condition of the electrical connections	**Six-monthly**			
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NOTES:					**Maintenance technician signature**

DATASHEET: PV Inverter

PV Inverter datasheet Year_____ SN MEGASTATION _____ datasheet consecutive no. _____ **PV inverter: (Routine maintenance requires to put the system out of service and will only concern the parts of the plant directly served by them)**					
N.B. Refer to the manufacturers' datasheets, if existing or available. Operations are performed after visual and / or instrumental inspection.		**Maximum frequency**	**Performed on**	**Signature**	**Measures taken or suggested**
1	**INVERTER** – Checks / interventions: Check the external part of the inverter: cleanliness, any damage to the case, and good conditions of maintenance	**Yearly**			
2	**INVERTER** – Checks / interventions: Check plate data	**Yearly**			
3	**INVERTER** – Checks / interventions: Check the operation and efficiency of the ventilation device by performing functional tests and reading temperature on the display. Check that the fresh air inlet and hot air exhaust are not blocked	**Yearly**			
4	**INVERTER** – Checks / interventions: Check for signs of infiltration of liquids or condensation in or around the inverter and restore room insulation as necessary as soon as possible; prevent pollen or rodent infiltration	**Yearly**			
5	**INVERTER** – Checks / interventions: Verify that there are no signs of tampering or damage on the inverter, which may have altered the technical specifications	**Yearly**			
6	**INVERTER** – Checks / interventions: Clean the inside of the inverter to remove traces of dust, pollen and all kinds of dirt introduced in the equipment and that may damage electronic boards or disrupt the operation of the fans	**Yearly**			
7	**INVERTER** – Checks / interventions: Check the inverter safety devices	**Yearly**			
8	**INVERTER** – Checks / interventions: Check the tightness of power connections and the isolation of individual connections	**Yearly**			
9	**INVERTER** – Checks / interventions: Check the integrity of the existing arresters by visually checking the appropriate indicator	**Yearly**			
10	**INVERTER** – Checks / interventions: Check the integrity and perfect condition of fuses	**Yearly**			
11	**INVERTER** – Checks / interventions: Check the operation of the display: state of pixels, colour and operation of inverter management software	**Yearly**			
12	**INVERTER** – Checks / interventions: Check the connections of circuit breakers and contactors of individual modules and the perfect isolation of each connection	**Yearly**			
13	**INVERTER** – Checks / interventions: Check the connection status of each board by checking the correct fastening of the cable connectors and Flat cables	**Yearly**			
14	**INVERTER** – Checks / interventions: Visual inspection of the inverters and their ventilation: if possible GENTLY blow with compressed air to remove dust from heat sinks, fans, and power modules (before blowing make sure that there is no condensation in the air line of the compressor)	**Yearly**			
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NOTES:					**Maintenance technician signature**

DATASHEET: Power installation, standard and emergency lighting, security and air extraction

Power installation, standard and emergency lighting, security and air extraction Datasheet **Year_____ SN MEGASTATION _____ datasheet consecutive no. _____** **POWER INSTALLATION, STANDARD AND EMERGENCY LIGHTING, SECURITY AND AIR EXTRACTION: (Routine maintenance requires to put the system out of service and will only concern the parts of the plant directly served by them)**					
N.B. Refer to the manufacturers' datasheets, if existing or available. Operations are performed after visual and / or instrumental inspection.		**Maximum frequency**	**Performed on**	**Signature**	**Measures taken or suggested**
1	**Power installation - Lighting – Air extraction** – Visual inspection for equipment integrity and cleanliness	**Six-monthly**			
2	**Power installation - Lighting – Air extraction** – Check the status of the lamps both inside and outside the substation with replacement of parts that show obvious signs of overheating and / or corrosion and replace defective or obsolete lamps	**Six-monthly**			
3	**Power installation - Lighting – Air extraction** – Check the operation of emergency lighting by causing lack of voltage in standard power supply	**Six-monthly**			
4	**Power installation - Lighting – Air extraction** – Perform a discharge of emergency lights for a few minutes and check the operation of the portable torch	**Six-monthly**			
5	**Power installation - Lighting – Air extraction** – For the power installation verify integrity and the presence of voltage with an appropriate tool. (CEE-type and / or Shuko 400 V-230 V sockets IEC309)	**Six-monthly**			
6	**Power installation - Lighting – Air extraction** – For the power installation check the tightness of the electrical and earthing connections	**Six-monthly**			
7	**Power installation - Lighting – Air extraction** – Check the air extraction system and the thermostat for proper operation; clean the fans of the transformer room	**Six-monthly**			
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NOTES:					**Maintenance technician signature**

DATASHEET: Earthing system

Earthing system Year_____ SN MEGASTATION _____ datasheet consecutive no. _____ **EARTHING SYSTEM: (Routine maintenance requires to put the system out of service and will only concern the parts of the plant directly served by them)**					
N.B. Refer to the manufacturers' datasheets, if existing or available. Operations are performed after visual and / or instrumental inspection.		**Maximum frequency**	**Performed on**	**Signature**	**Measures taken or suggested**
1	**GND** – Checks / interventions: Survey the earthing system every two years	**Bi-Yearly**			
2	**GND** – Checks / interventions: Check connection to earth electrodes	**Yearly**			
2	**GND** – Checks / interventions: Check connections for tightness at accessible points	**Yearly**			
3	**GND** – Checks / interventions: Replace components showing evident signs of oxidation and corrosion	**Yearly**			
4		**Yearly**			
NOTES:					**Maintenance technician signature**

An-tifire system **Year**_____ **SN MEGASTATION** _____ **datasheet consecutive no.** _____

ANTI-FIRE SYSTEM: (Routine maintenance requires to put the system out of service and will only concern the parts of the plant directly served by them)

	N.B. Refer to the manufacturers' datasheets, if existing or available. Operations are performed after visual and / or instrumental inspection.	**Maximum frequency**	**Performed on**	**Signature**	**Measures taken or suggested**
1	Visual inspection, cleaning and verify the correct wiring of the system	**Yearly**			
2	Check the set-up of the electronic central and fire-sensors of anti-fire system	**Yearly**			
3	Check the correct functionality of the optical sensors and of the system	**Yearly**			
4	Check the correct functionality of the external red lamp and external siren	**Yearly**			
5	Check of the correct functionality of the relay for opening the MV Cell	**Yearly**			
6	Check the presence of the manuals and technical documentations	**Yearly**			
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NOTES: **Maintenance technician signature**

Anti-Rodent System **Year_____** **SN MEGASTATION _____** **datasheet consecutive no. _____**

ANTI-RODENT SYSTEM: (Routine maintenance requires to put the system out of service and will only concern the parts of the plant directly served by them)

	N.B. Refer to the manufacturers' datasheets, if existing or available. Operations are performed after visual and / or instrumental inspection.	**Maximum frequency**	**Performed on**	**Signature**	**Measures taken or suggested**
1	Visual inspection, cleaning and verify the correct wiring of the system	**Yearly**			
2	Check the set-up of the electronic central and ultra sound-sensors of anti-rodent system	**Yearly**			
3	Check the correct calibration functionality of the ultra sound-sensors of anti-rodent system	**Yearly**			
4	Check the presence of the manuals and technical documentations	**Yearly**			
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NOTES:					**Maintenance technician signature**

Scada System **Year**_____ **SN MEGASTATION** _____ **datasheet consecutive no.** _____

SCADA SYSTEM: (Routine maintenance requires to put the system out of service and will only concern the parts of the plant directly served by them)

N.B. Refer to the manufacturers' datasheets, if existing or available. Operations are performed after visual and / or instrumental inspection.		**Maximum frequency**	**Performed on**	**Signature**	**Measures taken or suggested**
1	Visual inspection of the correct state and connection of the devices	**Yearly**			
2	Check the correct functioning of the Meteo Station; check the solar, wind and temperature sensors	**Yearly**			
3	Check the correct display and storage of the measured values	**Yearly**			
4	Check the correct functioning of the digital input signal and commands	**Yearly**			
5	Check the different SCS cabinets	**Yearly**			
6	Check the correct communication realized by optical fiber (If present)	**Yearly**			
7	Check the correct remote connection (for example by mobile phone line o by satellite connection)	**Yearly**			
8	Check the presence of the manuals and technical documentations	**Yearly**			
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NOTES:					**Maintenance technician signature**

In addition, below is a list of tests and measurements that must be performed with respect to MEGASTATIONS which have not been listed above:

1. Every three years, measure continuity of all protective conductors and protective bonding conductors
2. Every three years, measure insulation resistance
3. Every three years, measure the Zg fault loop impedance at the bottom of the circuit, i.e., in the point farthest from its protective device

Finally as regards the electrical cables and cable ducts:

Routine maintenance carried out on cables and cable ducts does not require to put the system out of service; the operations to be carried out are described below.
Visual inspection, to be performed on a yearly basis, aimed to the identification of damage, burns, abrasions, insulation deterioration, fastening at the anchor points.

NOTE

NOTE

ITALIANO

Per RAEE s'intendono i rifiuti di Apparecchiature Elettriche ed Elettroniche (AEE) incluse di tutti i componenti,i sottoinsiemi ed i materiali di consumo che sono parte integrante del prodotto nel momento in cui si assume la decisione di disfarsene. La Legislazione prevede la suddivisione in 2 categorie principali chiamate RAEE PROFESSIONALI o RAEE DOMESTICI.

Per RAEE PROFESSIONALI s'intendono tutti i rifiuti di apparecchiature elettriche ed elettroniche destinate ad uso prettamente industriale.
Per RAEE DOMESTICO s'intendono tutti i generatori ad alimentazione monofase con corrente di uscita MAX <= 200A con i loro accessori.

Per lo smaltimento di un RAEE DOMESTICO si avranno 2 possibilita':
a)Nel caso si decidesse di comprare una nuova apparecchiatura equivalente l'utilizzatore potrà consegnarlo al distributore il quale dovrà ritirarlo gratuitamente.
b)Dovrà depositarlo nella piazzola Comunale, nel contenitore o apposita area identificata come "RAGGRUPPAMENTO 4".
Per lo smaltimento di un RAEE PROFESSIONALE alla data di redazione del Manuale di istruzioni non essendo ancora definitiva l'applicazione della Normativa si prega di contattare il distributore e/o Il costruttore per informazioni in merito allo smaltimento.
ALLA DATA DELLA REDAZIONE DEL PRESENTE MANUALE D'ISTRUZIONI QUESTE INFORMAZIONI SONO DA RITENERSI NON DEFINITIVE IN QUANTO SUSCETTIBILI DI POSSIBILI MODIFICHE SECONDO GLI OBBLIGHI LEGATI AL DECRETO LEGISLATIVO N° 151/2005 CHE OTTEMPERA LA DIRETTIVA 2002/96/CE.

ENGLISH

This product contains electrical or electronic materials.

The presence of these materials may, if not disposed of properly, have potential adverse affects on the environment. Presence of this label on the product means it must not be disposed of in normal household waste and must be disposed of separately.

As a consumer you are responsible for ensuring that this product is disposed of properly. If your supplier offers a disposal facility please use it or alternatively contact your local authority/council to find out how to properly dispose of this product.

DEUTSCH

Nur für EU-Länder

Werfen Sie Elektrogeräte nicht in den Hausmüll

Gemäß Europäischer Richtlinie 2002/96/EG über Elektro- und Elektronik-Altgeräte und Umsetzung in nationales Recht müssen verbrauchte Elektrowerkzeuge getrennt gesammelt und einer umweltgerechten Wiederverwertung zugeführt werden.

ESPAÑOL

No tirar nuncalos aparatos eléctricos junto con los residuos en general!

De conformidad a la Directiva Europea 2002/96/EC relativa a los Residuos de Equipos Eléctricos o Electrònicos (RAEE) y al acuerdo de la legislaciòn nacional, los equipos eléctricos deberàn ser recogidos y reciclados respetando el medioambiente.

Como propietario del equipo, deberà informar de los sistemas y lugares apropiados para la recogida de los mismos.

Aplicar esta Directiva Europea protegerà el medioambiente y su salud!

FRANÇAIS

Ne pas jeter les appareils électriques avec les déchets ordinaires!

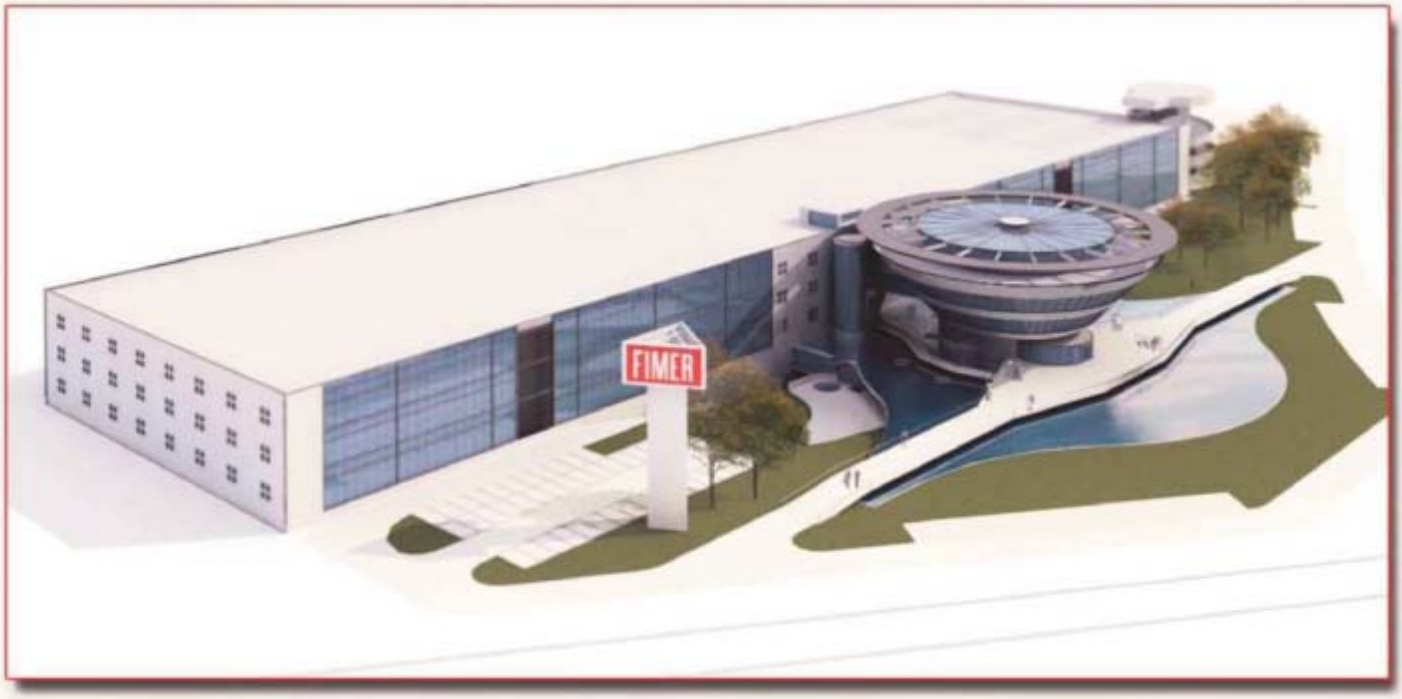
Conformément à la Directive Européenne 2002/96/EC relative aux Déchets d'Équipements Électriques ou Électroniques (DEEE), et à sa transposition dans la législation nationale, les appareils électriques doivent être collectés à part et être soumis à un recyclage respectuex de l'environnement.

En tant que propriétaire de l'équipement, vous devriez vous informer sur les systèmes de collecte approuvés auprès nos représentants locaux.

Appliquer cette Directive Européenne améliorera l'environnement et la santé!

FIMER

THE GROUP



Via J.F. Kennedy - 20871 Vimercate - MB - Italy
Tel. +39 039 98981r.a. - Fax +39 039 6079334
www.fimer.com - info@fimer.com

Gruppo Imprese Fotovoltaiche Italiane

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