



OXYGEN_{ZERO}

MICRO-INTERRUPTION COMPENSATOR

USER'S MANUAL
MAT304 September 2025

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CONFORMITY DECLARATION

The Manufacturer,

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under its own responsibility

DECLARES

that the products:

3-PHASE VOLTAGE MICRO-INTERRUPTION COMPENSATOR

identified with the name:

OXYGEN_{ZERO} (part number SCZxxxxxxxCZxxx)

provided that they are installed, maintained and used for the purpose for which they have been designed and built according to good professional practice and in conformity with the Manufacturer's instructions,

COMPLYwith the requirements contained in the **CE** EUROPEAN DIRECTIVES:

- **2014/30/EU (EMC Directive)**
- **2014/35/EU (Low Voltage Directive)**
- **2011/65/EU (RoHS recast)**

as complying with the relevant parts of the Harmonised Standards:

- **EN 61439-1 (Low-voltage switchgear and controlgear assemblies. part 1: general rules)**
- **EN 61439-2 (Low-voltage switchgear and controlgear assemblies. Part 2: Power switchgear and controlgear assemblies)**
- **EN 55011 (Industrial, scientific and medical equipment. Radio-frequency disturbance characteristics. Limits and methods of measurement)**
- **EN 61000-6-2 (Electromagnetic compatibility (EMC) Generic standards)**

The Manufacturer also

DECLARES

that the units are built with suitable quality components and that the manufacturing process is constantly verified in accordance with the Quality Control Plans which the Company applies in compliance with the **ISO9001:2015** Standard.

The Company's commitment towards environmental issues and safety at work matters is guaranteed by the certification of the Management System according to the **ISO14001:2015** and **ISO45001:2018** Standards.

The General Sales Conditions, which include the warranty terms, can be downloaded either via the QR code or from the website www.orteanext.com



1 INTRODUCTION

This Manual contains the information necessary to ensure correct operation of the unit, efficient maintenance program, avoidance of incorrect use and safety for the personnel involved with the unit performance. The sag compensator described in this manual must be used exclusively for the purpose for which they have been designed and manufactured. Installation must be done according to the instructions provided with this handbook. Any other use has to be considered as inappropriate and therefore dangerous. The Manufacturer shall not be held liable for any damage to people and belongings due to incorrect use or installation. In case of doubt and for any other necessity, please contact the nearest authorised Service Centre. This Manual is as an integral part to the unit and the instructions therein must be carefully followed. File this manual and all the attached documentation for further consultation in a place available and known to the user and the maintenance personnel and keep it for the entire life of the unit.

1.1 Definitions

 **WARNING** Message relevant to potentially hazardous situations which might induce minor injuries if ignored or neglected. The same signal can be used to highlight hazards which might cause damage to the unit or to point out important information.

 **DANGER** Message relevant to possible or probable hazardous situations which might induce serious or even fatal harm if ignored or neglected

Note Additional information to better understand the unit operation.

1.2 Information property

This Manual (including any attached document) is covered by copyright and the Manufacturer maintains all the reserved rights. It is compulsory to inform the Manufacturer's Head Office and ask for authorisation before proceeding with any release or reproduction. The Manufacturer shall not be held liable or responsible in any way for unauthorised copies, alterations or additions to the text or to the illustrated parts of this document. Any modification involving company logo, certification symbols, names and official data is strictly forbidden. **In order to obtain better performance, the product described in this handbook can be altered at any date and without prior notice.**

 **WARNING** Information and instructions provided by this Manual add to and neither replace nor amend any Standards, Regulations, Decrees, Directives or Laws concerning environmental and safety at work awareness enforced both internationally and in the Country of installation.

1.3 Reference Normative

The units described in this Manual are designed and built in compliance with:

- 2014/35/EU (Low Voltage European Directive)
- 2014/30/EU (Electromagnetic Compatibility European Directive)
- applicable parts of the EN61439-1/-2 (Low-voltage switchgear and controlgear assemblies) Harmonised Standard
- EN 55011 (Industrial, scientific and medical equipment. Radio-frequency disturbance characteristics. Limits and methods of measurement)
- EN 61000-6-2 (Electromagnetic compatibility (EMC) Generic standards)

 **WARNING** Information and instructions provided by this Manual add to and neither replace nor amend any Standards, Regulations, Decrees, Directives or Laws concerning environmental and safety at work awareness enforced both internationally and in the Country of installation.

2 ENVIRONMENTAL NOTE

Note Units weighing more than 2000kg do not enter the scope of the 2012/19/EU WEEE Directive (Waste of Electric and Electronic Equipment) as they can be identified as large fixed industrial equipment. Nevertheless, although they do not bear the relevant symbol on their nameplates, it is recommendable to follow the Directive's guidelines concerning a responsible disposal at the end of their working life.



With reference to the 2012/19/EU WEEE Directive (Waste of electric and electronic equipment), please be aware that the products described in this manual have been produced after August 13th, 2015. When applicable, the WEEE symbol (beside) on the product label and / or accompanying documents means that used electrical and electronic equipment must not be mixed with general household or municipal waste. At the end of their useful life, these products must be disposed of via suitable channels. Please refer to the current legislation in force in the Country of installation. Professional users in the European Union must contact their dealer or supplier for further information. The symbol is only valid in the European Union (EU). For disposal in countries outside of the European

Union please contact the local authorities or dealers and ask for the correct method of disposal. Disposing of this product correctly will help saving valuable resources and preventing any potential negative effects on human health and the environment, which could otherwise arise from inappropriate waste handling. In this respect, the following tables list the type of materials found in the equipment described in this manual.

Packaging

TYPE	MATERIAL	EWG CODE	CODE EX 97/129/EC
Pallet, crate, cage	Wood	15 01 03	FOR 50
Box	Cardboard	15 01 01	PAP 20
Plastic protective film	Polyethylene	15 01 02	LDPE 4
Bubble wrap	Polyethylene	15 01 02	LDPE 4
Plastic strap	Polyethylene	15 01 02	PET 1
Polystyrene	Polystyrene	15 01 02	PS 6

Unit

PART/COMPONENT	MATERIAL	EWG CODE
External panels, frame, supports, plates	Steel	17 04 05
Power & auxiliary transformers, voltage regulators, reactors	Magnetic parts	16 02 14
Electronic PCBs	Boards	16 02 16
Instruments, breakers, contactors, thermostats, relays, fuses	Non-dangerous removable components	16 02 16
Wire ducts, fans, protective screens	Plastic	15 01 02
Busbars	Aluminium	17 04 02
Power & auxiliary cables	Sleeved copper wires	17 04 11
Documentation	Paper	15 01 01

* = European Waste Code

The product does not contain CFCs, HCFCs, asbestos, fuel, PCB, PCT, liquids or gaseous substances. At the end of the service, before disposing of the unit, remove the nameplate and make the appliance unusable by cutting the internal connections.

3 HEALTH & SAFETY

3.1 Notes for the operator

 **DANGER** *The voltage inside the equipment is dangerous. Access to the components for installation, setting, inspection and maintenance must be granted only to qualified personnel in charge of it and informed of the relevant risks. Before starting any operation, disconnect the unit from the mains.*

The following safety general instructions are based on experience and common sense but cannot describe or foresee all the possible situations. Basic safety procedures must be continuously applied and known by whoever operates on the unit. In order to ensure full knowledge of properties and characteristics of the unit, this Manual must be read and comprehended by those who supervise, maintain and run the unit.

- Check that the unit is always properly earthed.
- Warn anybody who might be in the vicinity before energizing the unit.
- Always operate in good lighting.
- Do not allow unauthorized personnel to operate on the unit for no reason whatsoever.
- Always use suitable safety means such as isolating tools and footboards, isolating gloves, etc.
- NEVER operate the unit without the provided protections against accidental contact, unless specifically indicated in the maintenance instructions in this Manual. However, controls and maintenance routines that require the protections to be removed shall be under the User's full responsibility.
- Do not climb on top of the enclosure.
- Do not accumulate goods around or above the enclosure.

The unit is housed in an enclosure with screwed-in panels. In normal working conditions, the unit operates with the enclosure completely closed and cannot be accessed without opening the cubicle with specific means. The protection against direct contact is therefore inherently obtained. Any anomaly or alarm indication must be promptly signalled.

3.2 Notes for maintenance

 **DANGER** *Before any maintenance or repairing routine, disconnect the unit by opening the upstream general breaker and lock it with a padlock, the keys of which must be kept by the maintenance supervisor until the end of the procedure.*

- Do not perform maintenance while the unit is working. Only setting or checking operations through the provided instrumentation are allowed.
- Whenever possible, do not use hands instead of suitable tools to work on the unit.
- Do not use bars, cables, plates or internal components as support or handhold.
- Check that mechanical and electrical connections are properly tightened at the end of the maintenance routine.
- Do not remove, alter or damage nameplates, warnings of any identification tags or labels.
- Before re-energising, always restore the protection that might have been removed for maintenance.

In case of doubts on the operational features or on the necessary maintenance procedures, please contact the Manufacturer or an authorised Service Centre.

Tampering on the unit relieves the Manufacturer from any responsibilities and makes the User solely responsible towards the competent bodies concerning accident prevention. The Manufacturer disclaims all responsibility for:

- failure to follow the specified instructions
- modification (even slight) performed on the unit resulting in altering its operational features
- failure to comply with the health and safety at work measures
- use of not original spare parts (unless specifically authorized by the Manufacturer)

During maintenance and repairing procedures, the enclosure is likely to be open. Consequently, some residual dangers persist, due to the impossibility of eliminating the sources as implicit in the working procedures.

DANGER	INDICATIONS
Crushing	Handling the unit must be done exclusively by means of the tools described in the relevant chapter. Handling and lifting operations must be carried out by skilled and trained personnel only.
Electrocution	During normal working operation, the danger does not exist. Carry out maintenance routines only after having disconnected the unit. Should it be necessary to test an energized unit, segregate the area so that only skilled personnel can operate, still in compliance with all the health and safety requirements set forth by the Rules and Regulations enforced in the Country of installation.
Fire	Open the upstream interrupting device and use CO ₂ fire extinguishers. Do not use water to extinguish fire.
Human error	Installation, start-up, setting, inspection, maintenance and repairing operations must be carried out by skilled, qualified and authorized personnel only, informed of the relevant risks. Read this Manual carefully and thoroughly before operating on the unit. Altering its configuration or replacing one or more of its parts without the Manufacturer's authorization is strictly forbidden.
Failure to carry out maintenance	Carry out the maintenance routine as prescribed in this Manual. The Manufacturer shall not be held liable in any way for damage to people and belongings caused by failure in performing maintenance on the unit.
Lack of communication	While carrying out the maintenance routine, ensure that the unit cannot be energised without the maintainer's awareness. To this purpose, padlock the upstream interrupting device and affix warning signs.

3.3 Behaviour

The personnel dealing with the unit shall operate strictly in conformity with the requirements set forth by the health and safety at work Rules and Regulations enforced in the Country of installation. Provided that everything is carried out according to the instructions in this Manual, the unit is designed in order to work and be maintained without risks for people or the environment. The sag compensator is an automatic equipment that does not require manoeuvring or command drives. However, personnel dealing with it must be aware of its characteristics, functioning features, signals and alarm indications, maintenance routines and troubleshooting procedures. The full comprehension of this Manual is therefore critical.

 **DANGER** *Tampering and/or unauthorised replacement of one or more components, using accessories, tools or material not recommended and/or not approved by the Manufacturer might be dangerous and cause accidents. Said actions relieve the Manufacturer from any civil and/or penal responsibilities.*

3.3.1 Correct behaviour

The User is protected against the risks related to the unit operation. The correct use allows for fully and safely exploiting its performance and can be obtained by:

- following the instructions provided by this use and maintenance Manual

- paying attention to the provided warnings and danger indications
- respecting the recommended maintenance frequency and keeping a record of the performed interventions
- disconnecting the unit in case of inspection, maintenance or repairing routines
- using suitable PPEs (Personal Protective Equipment) when dealing with the unit
- promptly informing the supervisor about operating anomalies (suspected malfunctioning, incorrect operation or failure; excessive noise; etc.) and if necessary putting the unit out of order.

3.3.2 Incorrect behaviour

Any use that contrasts with what stated above and any of the operations listed below can be defined as 'incorrect':

- arbitrary alteration of the working parameters. Should changes be required, please contact the Manufacturer or an authorized Service Centre
- use of improper or unsuitable energy sources
- unit operated by insufficiently trained personnel
- failure to comply with the maintenance instructions or incorrect maintenance
- use of unsuitable or unauthorized not original spare parts
- alteration of the safety devices and/or unit tampering
- performance of inspection, maintenance or repairing routines without disconnecting the unit

 **WARNING** The Manufacturer shall not be held liable due to any damage to people and belongings arising from incorrect use as above defined.

The microprocessor-based control system detects data and anomalies, generating several alarms displayed by means of the external control panel. The alarms are generally accompanied by an acoustic signal.

 **WARNING** Excluding or bypassing in any way the alarms is strictly forbidden. The Manufacturer disclaims all responsibility on the unit safety in case of failure to respect said ban.

3.4 Personal Protective Equipment (PPE)

While dealing with the unit, the user must have and use suitable PPEs, in conformity with the safety requirements enforced in the Country of installation and with the relevant European Directives (89/656/EEC and 89/686/EEC). The Manufacturer strongly recommends dressing suitably, avoiding clothes that might be caught up, wide sleeves, synthetic material, scarves and ties. Necklaces, bracelets, metallic wristwatches and similar object should also be avoided. In the table below, the recommended PPEs are listed:

		USER	MAINTAINER	ANGER	CONSEQUENCE
	Safety shoes	✱	✱	Bumping, tripping, slipping, crushing limbs	Bruises, abrasions, cuts, sprains, dislocations, fractures
	Safety gloves	✱	✱	Contact with sharp surfaces or edges	Bruises, abrasions, cuts
	Safety dielectric gloves		✱	Contact with live parts when testing an energized unit	Electrocution
	Helmet		✱	Bumps to the head in case of suspended loads or work inside the enclosure	Bruises, abrasions, cuts, concussion, fractures
	Visor/glasses		✱	Contact with liquids and projectile	Eye injury, eyesight loss or limitation
	Anti-arc visor		✱	Contact with projectile and radiation from electric arc	Eye injury, eyesight loss or limitation
	Generic anti-dust mask		✱	Particulate and/or dust inhalation	Respiratory disorders

 **WARNING** A visitor can approach a working unit ONLY if the latter is completely closed. Should the internal components be shown, regardless of the protection against accidental contact, the unit will have to be switched off. Otherwise, the visitor shall be maintained at a safety distance by means of physical barriers.

4 HANDLING

4.1 Packaging

The units can be packaged either in cardboard boxes strapped to a pallet and wound in plastic film or in a wooden crate with seaworthy vacuum bag. Each unit is provided with a label indicating nominal data, consignee data and purchasing order details. The package bears the usual pictograms (☱; ☼; ☼) and, in case of wooden crate, the indication of the lifting points for chains or fork-lift trucks. With cardboard box packaging, anti-shock and anti-tilting indicators are also affixed.

4.2 Reception

At reception, check the integrity of the packaging and the absence of evident damage occurred during transport.

- If the unit does not require immediate installation, store it with its original packaging without breaching it.
- If the unit requires immediate installation, once the good condition of the delivery has been established, unpack the unit and check it. In the unlikely event of damage, **do not connect** the unit and notify the Manufacturer in writing immediately.

4.3 Documentation

The unit is accompanied by a set of documents positioned in a pocket inside one of the front doors (usually the one bearing the display). The set includes User's manual and relevant annexes, schematics and test report.

4.4 Storage

Should the unit be stored:

- Keep it in its original packaging
- Provide shelter from rain or snow, excessive humidity, adverse climatic conditions (atmospheric pollution, saline atmosphere, etc.), parasites and other lifeforms in a closed warehouse.
- Ensure that the ambient temperature is between -25°C and +40°C
- Ensure that the relative humidity is lower than 95% (not condensing).



WARNING *The unit can be kept idle in a warehouse for maximum four (4) months. If stored for a longer period, contact the manufacturer before start-up.*

4.5 Moving the unit



WARNING *The unit must be kept in vertical position, as indicated on the packaging. Laying it down into horizontal position might seriously damage the internal components, alter the mechanical stability and compromise the functionality.*

Unloading and moving operations are under the User's responsibility. Take the utmost care in order to avoid damage to:

- whoever might be around the unit
- the unit itself
- belongings and/or other equipment on the installation site.

Unloading and moving operations can be performed via cranes fitted with chains or lifting brackets or fork-lift trucks. The lifting devices must be suitable to the unit weight, in good conditions and regularly checked and maintained. If required by the weight distribution inside the cabinet (which might not be balanced), the lifting points are highlighted by means of stickers (black arrow on yellow field).



DANGER *Handling operations must be carried out only by authorised, suitably trained personnel provided with the necessary Personal Protective Equipment (PPE). Always operate in conformity with the safety at work rules and regulations enforced in the Country of installation and with the instruction manuals of the tools used. The Manufacturer shall not be held liable for any damage that might occur to people or belongings due to failure in complying with what stated above during unloading and moving operations.*



WARNING *Should any of the above prescription not be respected, the warranty terms and conditions available in the General Sales Conditions (chapter 11) shall cease to be valid.*

5 DESCRIPTION

The present handbook deals only with the standard units. If optional devices such as by-pass switch, circuit breakers, etc. are provided, please refer to the attached technical documentation.

OXYGEN zero is an electronic device capable of compensating for micro grid interruptions of up to 1s (expandable with derating) at full load using energy accumulators based on supercapacitor technology, which present the following advantages:

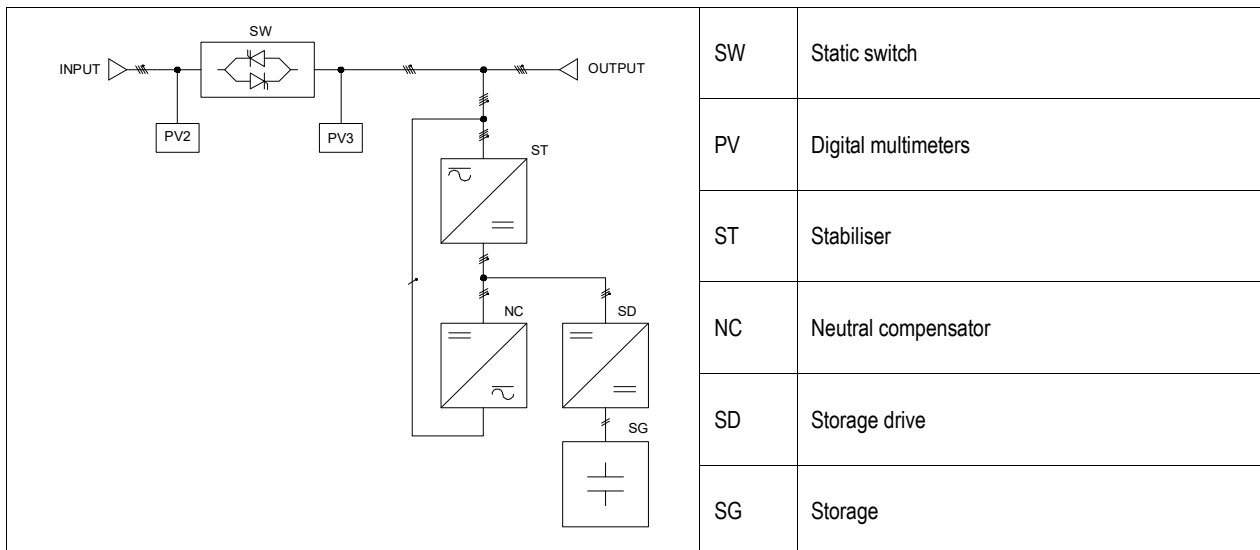
- Long service life: 10 times longer than standard lead-acid batteries.
- High number of cycles: one million compared to around 300 for lead-acid batteries.
- Low maintenance costs.
- High temperature resistance.
- Reduced dimensions and weight.
- Modularity: possibility of expansion to increase autonomy

The device main characteristics are.

- Technology based on IGBT static switches and supercapacitors
- Energy storage via supercapacitors
- Correction time: < 5ms
- Correction duration: 1s (up to 10s with derating)
- Fast disconnecter (static thyristor switch)
- Possibility of choosing the input voltage variation thresholds at which the device intervenes. The thresholds can be asymmetrical (for example, +10% and - 30%)
- Admitted load range: 0 – 100%
- No output voltage harmonic distortion introduced
- Harmonics tolerance according to IEC 61000-2-4 Class 2 (THDV < 8%). With THDV > 8%, please contact the Manufacturer, as the components lifetime may be significantly affected

5.1 Main components and working principle

A representation of the system is shown in the picture below.



The remote communication can be obtained via a TCP MODBUS® protocol or a Client application that enables the remote reproduction of the control panel on a PC connected to it by means of an Ethernet network.

6 INSTALLATION & COMMISSIONING

⚠ DANGER *DO NOT connect in parallel to each other two or more sag compensators output lines.*

6.1 Site choice

The installation site must comply with the basic requirements listed below:

- unless otherwise agreed upon, the ambient temperature must fall in the -20/+40°C range
- unless otherwise agreed upon, the maximum installation altitude is 1000mt a.s.l.
- the floor or surface must be flat and able to withstand the unit's weight;
- the installation room dimensions and the airing system must ensure that the generated heat can be disposed of, otherwise, a cooling system must be arranged (see also the chapter on ventilation);
- the lighting system must be suitable for normal operating and maintenance routines;
- the ground circuit must comply with the relevant applicable rules and regulations;

If not previously arranged during the contracting phases, the unit must not be commissioned in case of:

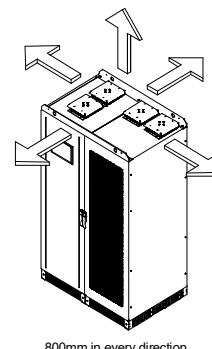
- corrosive, explosive or flammable atmosphere;
- presence of conductive dust in the environment;
- proximity to radiation sources;
- possibility of floods.

Avoid direct heat and contact with liquid, flammable or corrosive materials.

Do not clog the cabinet air outlets.

For a correct ventilation of the unit, please leave at least 800mm clearance on each side, including the roof.

Check that anti fire devices are available in the area



800mm in every direction

6.2 Harmonics

The unit is designed to tolerate disturbances such as voltage and current harmonics in the load or supply. However, excessive distortion can lead to the stressing of components and therefore to rectifier and inverter modules lifetime shortening.

For a correct operation, the overall harmonic contents on the input and the output of the system must determine a THD_v lower than 8% (IEC 61000-2-4 Class 2).

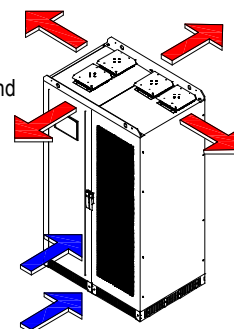
6.3 Downstream Capacitor Banks

Care must be taken when installing the unit with a power correction system (which shall be of the detuned type) downstream of the unit. The recommended installation would be with the power correction system connected upstream of the unit.

6.4 Cooling airflow and circulation

The cooling air enters the unit through the base air inlets and the grills located on the front door and exits from the top through the hooded fans mounted on the cabinet roof.

Being the ambient colder than the cabinet inner environment, the air is sucked in through the base and the grids and conveyed inside. Only by ensuring this operating mode and an airflow rate adequate to the sag compensator in hands, the correct separation between cold and hot areas can be maintained and the proper operation of the unit guaranteed.



6.5 Electrical connection

⚠ DANGER *The sag compensator is not and must not be used as a protecting device for neither the plant nor the loads. The electrical connection must be carried out by trained and qualified personnel, aware of the involved risks. Always use suitable tools and Personal Protective Equipment (PPE). The operations must be carried out in conformity with the rules and regulations enforced in the Country of installation.*

Please refer to the annexed schematics for details on the connections.

6.5.1 Supply

The supplying line must comply with the technical data specified in the nameplate. The unit is not protected against short-circuit or overload. In compliance with the safety regulations in force, the installation should take place in a system fitted with:

- an interrupting device with capacity referred to the maximum input current upstream the unit
- an interrupting device with capacity referred to the output current downstream the unit

The above-mentioned protections are not included with the standard unit and must be part of the supplying line.

⚠ WARNING *For a correct operation, the supply phase sequence must be positive (direct).*

6.5.2 Connections

Note *The cross-section value of the cables/bars for the connection to mains and load falls entirely under the installer's responsibility. The Manufacturer shall not be held liable for any damage that might occur to people or belongings due to an incorrect choice.*

Open the cubicle and locate main parts and connection points. Remove the accidental contact protections. Prepare the connection cables/bars with regard to the nominal current and make them go through the openings prepared on purpose.

The very first operation is to connect the earth wire to the terminal identified by PE, GRD or ⊕.

⚠ DANGER *The earth conductor must never be electrically interrupted neither inside nor outside the unit.*

The earth wire cross-section must be chosen in conformity to the regulations in force. Therefore, depending on the phase cable cross-section, the earth wire cross-section should respect the values in the table below:

PHASE CABLE CROSS-SECTION S [mm ²]	EARTH WIRE MIN CROSS-SECTION [mm ²]
$S \leq 16$	S
$16 < S \leq 35$	16
$35 < S \leq 400$	$S/2$
$400 < S \leq 800$	200
$S > 800$	$S/4$

Note If the application of this data determines a not standardised cross-section, the nearest larger one should be chosen.

 **WARNING** For the correct operation of the- sag compensator, the neutral wire must be available and connected to the relevant terminals. Connect the unit to mains and load, trying to avoid kinks and accidental contact between the cables and the electric components. Make the connections respecting the indications written on the terminations.

 **WARNING** Be sure that phase and neutral wires are connected to the relevant terminals. Swapping the input connection with the output one could cause serious damage.

Check the tightness of the connections and carefully close the cabinet.

7 USER INTERFACE ('UI')

This chapter provides with an overview of the user interface organisation and with instructions on how to interact/setup the unit. The user interface allows for:

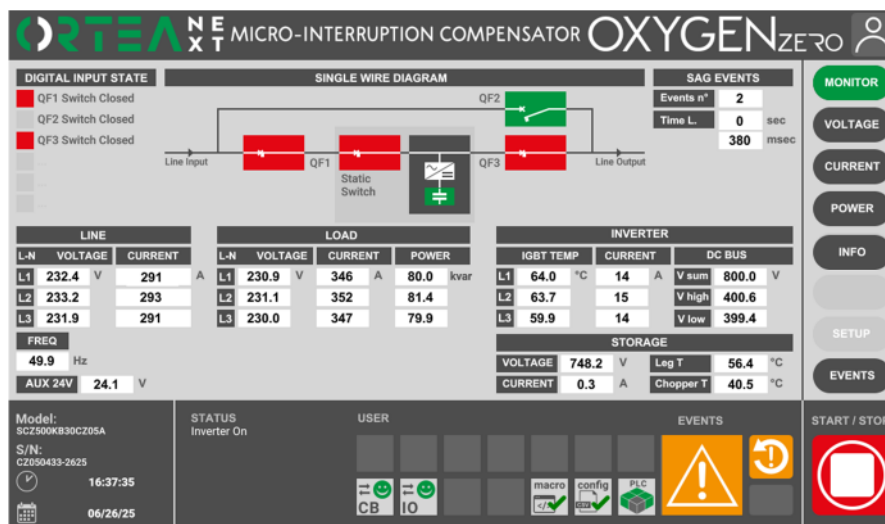
- easy setup of the sag compensator;
- monitoring of measured current and voltage values;
- logging the events during the sag compensator operation
- switching on/off the sag compensator

Note UI and electronic boards inside the unit are not measurement instruments. Therefore, reported values are to be intended as indicative and not as absolute, even if they tend to be close to reality. If the user needs to perform precision measurements, the unit must be fitted with a suitable measuring device.

7.1 UI panel Elements and Structure

WARNING The screenshots shown in this manual are intended only to make it easier to understand the topics on the UI and to operate the unit. Therefore, they may not correspond in whole or in part to any real screen that will appear on the machine's user interface and/or may report information that may not actually be available on the user's machine, for instance because not provided for the specific machine model or because available only as options.

The UI panel schematic representation and the element identification are reported in the following figure.



The main areas of the interface are:

- a header showing manufacturer and unit family name;
- a body showing the information related to the electrical quantities of interest or to the unit overview;
- a footer showing the information related to the unit status, date and time, and the ON/OFF button;
- a right-hand navigation bar with the list of pages that can be accessed by touching the relevant key.

Except for the information shown in the body changing according to the user's selection, all the other elements are always visible in every page. The table below lists the elements contained in the footer:

ELEMENT	DESCRIPTION
INFO Model: SCZ500KB30CZ05A S/N: CZ050433-2625 16:37:35 06/26/25	Section showing: ▪ model (part number) ▪ serial number of the unit ▪ time ▪ date
STATUS STATUS Inverter On	Section showing the actual status. The available information is: ▪ INIT: the unit has just started up; initial checks are performed. ▪ ResettingOffsetAD: inputs auto-tuning ▪ Precharge: the unit received all needed consensus, then it started DC bus charge operation; this operation can last from seconds to minutes, depending on the power of line regulators installed in the unit. ▪ Standby: the unit has successfully completed the DC bus charging operation. ▪ InverterPreOn: the unit is stabilising the output voltage and is running all the runtime checks on voltage and current. ▪ InverterOn: the unit is in internal bypass mode ▪ InverterOnBuco: the unit detected an overload condition and is waiting for the transient to stop
START/STOP 	This control allows the user to switch the unit on or off. When the unit is off, the button looks like this: ; if the user pushes the button, a start command is issued to the unit. When the unit is on, or the unit is still off (charging the DC bus), but a start command has been issued, the button changes to: ; if the user pushes the button, a stop command is issued to the unit and all the running operations (DC bus charging, stabilisation, etc.) are terminated. Please refer to the relevant chapter for more details about start-up and shutdown procedure.

ELEMENT	DESCRIPTION
	Dangerous voltage indicator Warning concerning the presence of voltage higher than 50V _{dc} /30V _{AC} inside the unit.  : dangerous voltage detected; DO NOT OPERATE INSIDE THE UNIT
 	Control card communication indicator If green, the supervision card communicates correctly with the UI pane If red, the card is not communicating
 	I/O module communication indicator If green, the module managing inputs and outputs communicates correctly with the UI pane If red, the module is not communicating
 	Macro indicator If green, the UI is carrying out a macro correctly
 	Configuration indicator If green, the UI has read correctly the .csv file containing the unit parameters
 	PLC indicator During normal operation, the indicator should be blinking, showing that the UI is communicating with the integrated PLC
EVENTS 	This indicator shows, at any time, the maximum severity of currently active events. Icons that can be shown are:  Normal Operation: no active events (or normal operation events)  Warning: event that might degrade the unit performance or that represents a potential source of problems (doors open, SAG or OVV in progress, internal bypass active, etc.). Typically, no user intervention is required; the unit will go back to normal operation when the triggering event ends.  Critical: event that caused termination of unit operation (inverter trip due to IGBT's overcurrent or current unbalance, DC bus overvoltage, etc.). When a critical event occurs, the unit stops the inverters and activates internal bypass. The user can try to reset the unit by means of the UI and to restore normal operation. This operation is detailed later in this chapter. By pressing the indicator, the user can view the active alarm page to check which event, or events, caused the change in the indicator.
RESET 	This key allows the user to reset from an error condition that drove the unit into ERROR status. The unit is reset and returns back to IDLE status. If the AutoStart function is enabled, the unit will start up automatically without any further intervention.
	User selection By pressing this key, a user can be selected

7.2 UI Pages

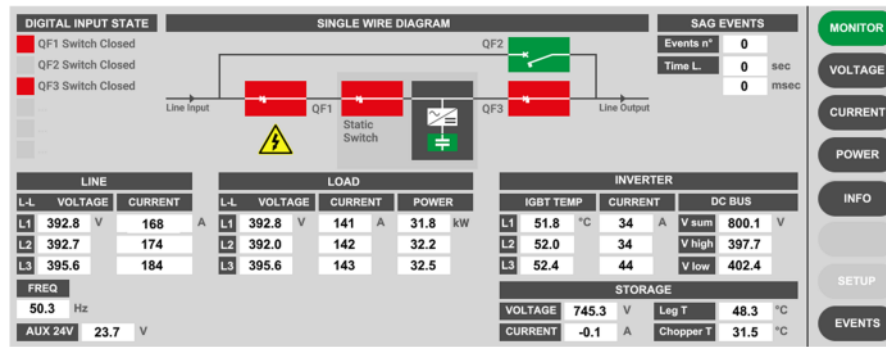
When the UI panel is powered, the UI software is executed. The default page that appears is the **Monitor page**. Then user can select a different page by pushing the related button in the **Navigation Bar**. A brief overview of all available pages is reported in the following.

In the pages **Voltage**, **Current** and **Power**, the key Trend shows the relevant rms value over time.

7.2.1 Monitor page

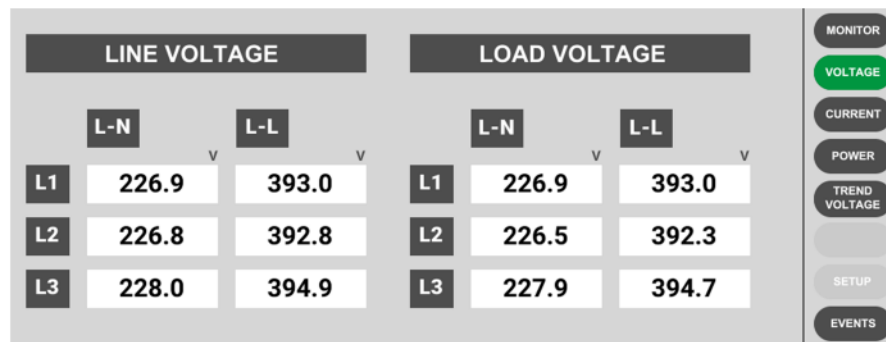
This page shows:

- unit's single wire diagram, with actual status of **QF_x** switches
- synoptic of main digital I/Os status available in the unit
- input/output voltage (line-to-line and line-to neutral shown alternatively every 5 secs) and current
- input/output power (active, reactive and apparent power shown alternatively every 5 secs)
- IGBT heatsink temperature
- Inverter current
- DC bus voltage
- Frequency
- Voltage in the auxiliary circuits
- DC voltage storage
- Current storage
- Compensator branch IGBT temperature
- Chopper IGBT temperature



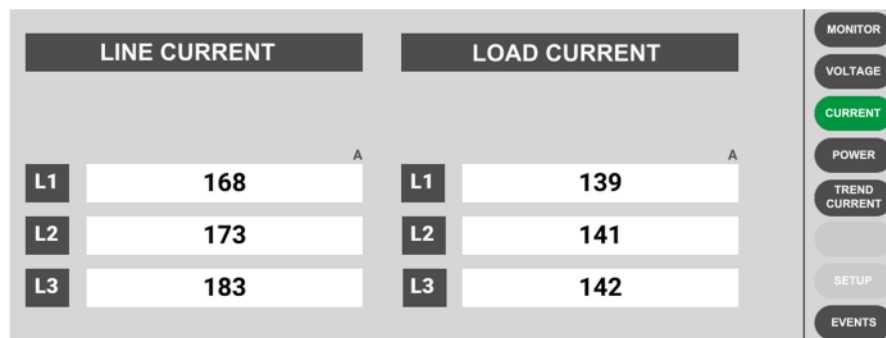
7.2.2 Voltage page

For each phase, both input and output voltage are displayed as *line-to-neutral* and *line-to-line* voltage.



7.2.3 Current page

For each phase, the page shows input and output current.



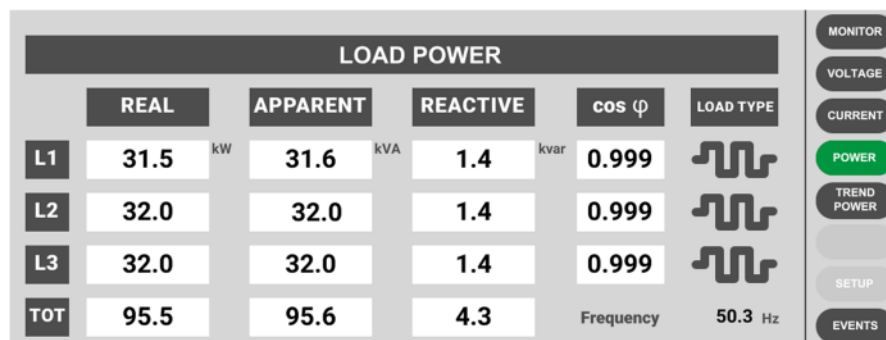
7.2.4 Power page

The information provided in this page is related to the load power. It is possible to select the view related to *active (kW)*, *reactive (kvar)*, or *apparent (kVA)* power by pushing the relevant key.

For each output line, the $\cos(\varphi)$ – or *power factor PF* – indication and the type of connected load are available.

A different symbol indicates if the load is purely resistive, mainly inductive or mainly capacitive.

The frequency of the system is also shown here.



7.2.5 Info page

All the general information on the unit can be found in this page.

- Temperature of all IGBTs (5, 10 or 15 values depending on the unit rating)
- System auxiliary voltage
- Unit model (part number)
- Unit serial number
- Manufacturing date
- .csv file version
- UI name
- UI app name
- PLC app version
- Date of the latest UI app amendment
- PLC info
- Firmware version
- Hardware version

Tag	Value	units	Tag	Value
IGBT R Temperature	64.0	°C	Machine Model	SCZ500K830C205A
IGBT S Temperature	63.8	°C	Serial Number	CZ050433-2625
IGBT T Temperature	59.9	°C	Make Date	25/06/2025
IGBT Leg Temperature	39.8	°C	cfg_01.csv file version	v1r00
IGBT Chopper Temperature	56.3	°C	HMI Name ID	Ortea_09
Aux voltage 24V DC	24.1	V	HMI App Name	Ortea_HMI_OxygenZero_v1_04.c
			Ortea_OxygenZero_v1_04_Cde3_S_sp16	
			PLC App Version	Cde 3.5 SP17
			PLC App last change	DT#2025-06-25-12:40:05
			PLC Info	PLC for PCB Oxygen Zero MPPC-3M
PCB Fw Version	1.08			
PCB Hw Version	3			

Model: SCZ500K830C205A

S/N: CZ050433-2625

16:40:22

06/26/25

STATUS: Inverter On

USER: CB IO

EVENTS: macro config PLC

START / STOP

7.2.6 Setup/Info page

This page can be accessed by means of the Ortea user password: *CSE830*.

Here the unit intervention voltage value can be changed.

115	Swell Voltage Line Input Threshold (%)
85	Sag Voltage Line Input Threshold (%)

Model: SCZ500K830C205A

S/N: CZ050431-1725

10:45:20

06/25/25

STATUS: Inverter On

USER: Ortea

EVENTS: macro config PLC

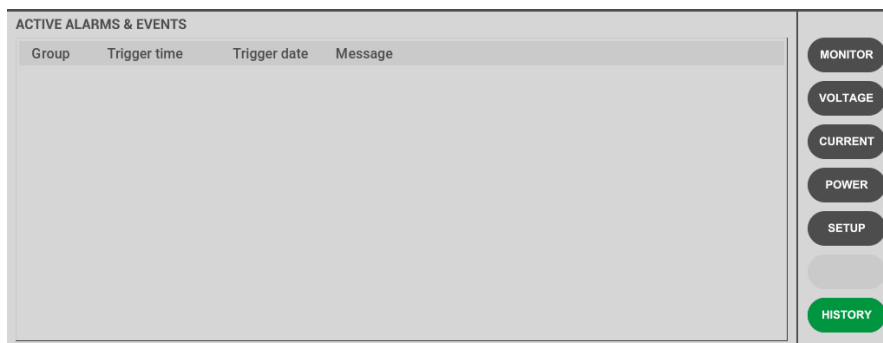
START / STOP

ELEMENT	DESCRIPTION
Line voltage thresholds 115 Swell Voltage Line Input Threshold (%) 85 Sag Voltage Line Input Threshold (%)	▪ Swell threshold (increase) input phase voltage ▪ Sag threshold (decrease) input phase voltage

7.2.7 Active Events page

It shows any event triggered by the unit. An event can be in one of the following conditions:

- **Triggered**: the event has been detected by the unit and is still active
- **Not Triggered**: the event has not been detected by the unit
- **Triggered Not Ack'ed**: the event has been detected by the unit but the user has not acknowledged it yet
- **Not Triggered Not Ack'ed**: the event previously triggered has ended and the user has not acknowledged it yet
- **Triggered Ack'ed**: the event has been detected by the unit and the user has acknowledged it



The table below lists all the events that can be triggered by the unit.

#	EVENTO
1	Storage Trip
2	Storage Current
3	Inverter Current
4	Inverter Voltage
5	Inverter Trip
6	Inverter Frequency Trip
7	Inverter Voltage Peak Trip
8	DC Bus Voltage Peak Trip
9	Inverter Current Peak Trip
10	Battery Current Peak Trip
11	DC Bus Voltage Trip
12	Storage Voltage Trip
13	High Temperature Trip
14	CAN bus Error
15	DC Bus Voltage Fast Trip
16	Aux 24Vdc fail
17	Timing Trip

Please note that, depending on the specific unit, not all events might be triggered. Each event is characterized by a **severity level** (from 0 to 2: low severity; from 2 to 4: medium severity; greater than 4: high severity), which identifies the impact on the unit performance; medium severity level denotes a degrading in unit performance, high severity level denotes a complete degradation or loss of unit performance.

If no event or a low severity level event is triggered, the indication is .

If a medium severity level event is triggered, the indication is .

If a high severity level event is triggered, the indication is .

The Indicator changes dynamically while the unit is operating, depending on what events are active at the moment. Events can be sorted by **Time**, **Name**, **Description**, etc., simply by pressing the relevant column header. The sorted column will show Δ or ∇ , indicating ascending or descending ordering criteria.

7.3 Start-Up & Shutdown

 **DANGER** *The start-up and shutdown routines must be carried out by trained and qualified personnel, aware of the involved risks. Always use suitable tools and Personal Protective Equipment (PPE). The operations must be carried out in conformity with the rules and regulations enforced in the Country of installation.*

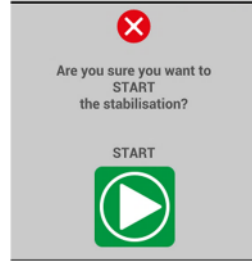
7.3.1 Turn ON

Before starting-up, it is recommendable to check whether haulage and long permanence in a warehouse might have affected the unit. If clear signs of dust, dirt or rust can be detected, follow the instruction given in the 'Maintenance' chapter concerning how to clean the components. Should the unit be fitted with a maintenance manual bypass line, please refer to the relevant technical note attached to this manual.

Once the above electrical connections and the all check have been made, the internal safety screens have been repositioned, and the doors of the cabinet have been closed, the unit can be started. Follow these steps:

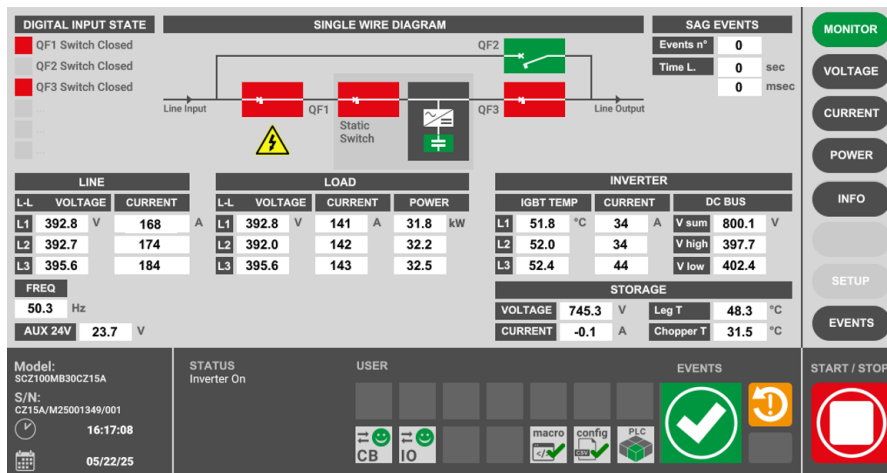
- Close the **QF1** input breaker, if present.
- Close the **QF11** and **QF12** breakers to switch on the control card.
- If possible, check that control board and UI panel are energised.
- Wait until the UI panel completes the start-up procedure.
- Close the **QF10** breaker and check on the UI that the DC bus is charging. With 400V input voltage the operation should terminate on a voltage between 560V and 610V is reached.
- If the Monitor page does not appear, call support and request assistance;

- Click on the ON/OFF button 
- Confirm the requested operation in the dialog window that will appear:



Once the operation has been confirmed the unit will start working in few seconds, and the **ON/OFF** button will change from  to . Please check that,

- DC Bus voltage reaches 800V.
- The Storage voltage increases up to the 750V_{DC} limit. The operation might last a few minutes, depending on the unit rating.
- Input and putput voltage are the same in order to for allow the static switch to close.



Check in the Voltage or in the Monitor page that input and output parameters comply with the rated ones and output voltage regulation is steady.

WARNING To avoid unit manual switch on, each time a black-out occurs, please go to the Setup page and turn on Autostart feature.

7.3.2 Turn OFF

To turn off the unit:

- Click on the ON/OFF button 
- Confirm the requested operation in the dialog window that will appear:



Once the operation has been confirmed the unit will stop working in a few seconds, and the ON/OFF button will change from  to . When the unit is off, the AC Switch is closed to guarantee that input and output voltages are equal.

To secure the unit, open any input breaker, if present, then wait at least **20** minutes to allow for all the internal capacitors to discharge; DC-Bus voltage can be checked in the Monitor page. Always make sure there is no dangerous voltage by measuring instrument.

7.4 Modbus TCP available tags

The unit exposes a few Modbus tags for remote monitoring purposes.

Such tags can be read through a Modbus TCP connection, by connecting a remote computer to the unit operator panel via an Ethernet cable. The exported tags are listed in the table below:

IND: REGISTRO	NOME VARIABILE	UNITA' DI MISURA
1	VoltageInput_LN_V	V x10
2	VoltageInput_LL_V	V x10
3	VoltageOutput_LN_V	V x10

IND: REGISTRO	NOME VARIABILE	UNITA' DI MISURA
4	VoltageOutput_LL_V	V x10
5	CurrentInput_A	A x1
6	CurrentOutput_A	A x1
7	PowerFactorOutput	x1000
8	ApparentPowerOutput_kVA	kVA x10
9	RealPowerOutput_kW	kW x10
10	ReactivePowerOutput_kVar	kvar x10
11	InverterCurrent_A	A x1
12	VoltageInput_LN_V	V x10
13	VoltageInput_LL_V	V x10
14	VoltageOutput_LN_V	V x10
15	VoltageOutput_LL_V	V x10
16	CurrentInput_A	A x1
17	CurrentOutput_A	A x1
18	PowerFactorOutput	x1000
19	ApparentPowerOutput_kVA	kVA x10
20	RealPowerOutput_kW	kW x10
21	ReactivePowerOutput_kVar	kvar x10
22	InverterCurrent_A	A x1
23	VoltageInput_LN_V	A x10
24	VoltageInput_LL_V	A x10
25	VoltageOutput_LN_V	A x10
26	VoltageOutput_LL_V	A x10
27	CurrentInput_A	A x1
28	CurrentOutput_A	A x1
29	PowerFactorOutput	x1000
30	ApparentPowerOutput_kVA	kVA x10
31	RealPowerOutput_kW	kW x10
32	ReactivePowerOutput_kVar	kvar x10
33	InverterCurrent_A	A x1
34	AuxVoltage_24Vdc_V	V x10
35	LineFrequency_Hz	Hz x10
36	DCbusVoltage_V	V x10
37	DCbusVoltage_H_V	V x10
38	DCbusVoltage_L_V	V x10
39	SuperCapStorageVoltage_V	V x10
40	SuperCapStorageCurrent_A	A x10
41	IGBT_TR1_Temperature_Celsius	°C x10
42	IGBT_TR2_Temperature_Celsius	°C x10
43	IGBT_TR3_Temperature_Celsius	°C x10
44	IGBT_TS1_Temperature_Celsius	°C x10
45	IGBT_TS2_Temperature_Celsius	°C x10
46	IGBT_TS3_Temperature_Celsius	°C x10
47	IGBT_TT1_Temperature_Celsius	°C x10
48	IGBT_TT2_Temperature_Celsius	°C x10
49	IGBT_TT3_Temperature_Celsius	°C x10
50	IGBT_TG1_Temperature_Celsius	°C x10
51	IGBT_TG2_Temperature_Celsius	°C x10
52	IGBT_TG3_Temperature_Celsius	°C x10
53	IGBT_TC1_Temperature_Celsius	°C x10
54	IGBT_TC2_Temperature_Celsius	°C x10
55	IGBT_TC3_Temperature_Celsius	°C x10
56	MachineOperatingStateMsg	see Tab
57	SAG_Events_n	n
58	SAG_Event_time_sec	sec
59	SAG_Event_time_msec	msec
60	StopReasonCode	See tab
61	StopReasonValue	Value caught on stop reason event
62	State_QF1	0 = none, 1 = none, 2 = Man Open, 3 = Man Close, 4 = Auto Open, 5 = Auto Close, 6 Mot Open, 7 = Mot Close
63	State_QF2	0 = none, 1 = none, 2 = Man Open, 3 = Man Close, 4 = Auto Open, 5 = Auto Close, 6 Mot Open, 7 = Mot Close

IND: REGISTRO	NOME VARIABILE	UNITA' DI MISURA
64	State_QF3	0 = none, 1 = none, 2 = Man Open, 3 = Man Close, 4 = Auto Open, 5 = Auto Close, 6 Mot Open, 7 = Mot Close
65	State_StaticSwitch	0 = none, 1 = Open, 2 = Close,
66	MBRTU_CB_CommOK	Inverter Control Board, 1 = Comm Up, 0 = Comm down
67	MBRTU_IO_CommOK	IO Module, 1 = Comm Up, 0 = Comm down
68	ActApparentEnergySumInput_kVAh	kVAh x1
69	ActRealEnergySumInput_kWh	kWh x1
70	ActReactiveEnergySumInput_kvarh	kvarh x1
71	ActApparentEnergySumOutput_kVAh	kVAh x1
72	ActRealEnergySumOutput_kWh	kWh x1
73	ActReactiveEnergySumOutput_kvarh	kvarh x1
74	LastApparentEnergySumInput_kVAh	kVAh x1
75	LastRealEnergySumInput_kWh	kWh x1
76	LastReactiveEnergySumInput_kvarh	kvarh x1
77	LastApparentEnergySumOutput_kVAh	kVAh x1
78	LastRealEnergySumOutput_kWh	kWh x1
79	LastReactiveEnergySumOutput_kvarh	kvarh x1

7.4.1 How to setup operator panel TCP/IP address, subnet mask and gateway

The operator panel default configuration is with DHCP feature enabled.

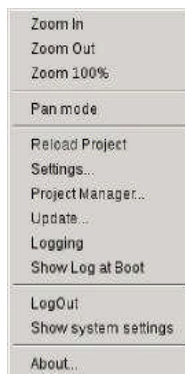
In such case, if a DHCP server is available on the network, the IP address will be assigned automatically by the server.

If no DHCP server is available on the network, the operator panel assigns itself an IP Address into range 169.254.x.x with subnet mask 255.255.0.0.

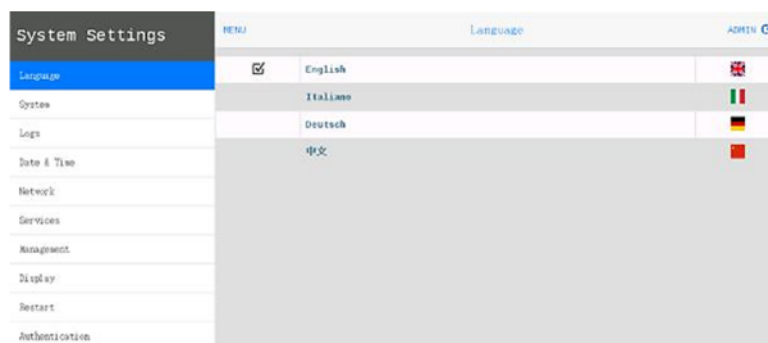
IP address can also be assigned manually by disabling the DHCP feature.

To perform this operation, please follow the steps detailed hereafter:

1. click and hold an empty area on the screen
2. release after 3 seconds and a popup menu will appear:



3. Click on the **Show system settings** menu item
4. After a few seconds, the screen will switch from application to system settings; the operator panel should look as follows:



5. Click **Network** in the left menu
6. Click the **Network Interface** header to show the current network setting
7. Click the **Edit** key in the upper right side of the screen to change the current setting
8. Turn off the DHCP feature and setup the desired Host name, IP address, Subnet mask and default Gateway
9. Click the **Save** key in the upper right side of the screen to save the new setting
10. If the left menu disappeared after having executed the operations listed at item no. 5, please click the **Menu** key in the upper part of the screen
11. Click the **Exit** in the left menu. Please scroll the page if this entry is not visible

8 MAINTENANCE

8.1 Foreword

⚠ DANGER Access to the internal components for installation, setting, inspection and maintenance must be granted only to qualified personnel in charge of it and informed of the relevant risks. Any intervention must be carried out in compliance with the habitual rules on personal safety and use of adequate protective tools.

In order to ensure the performance throughout its life, the unit must undergo a simple but regular maintenance scheduling. The recommended frequency is 12 months, but the maintenance routine ought to be more frequent should it be required by other factors such as polluted environment or heavy-duty cycle. Conforming to the maintenance program ensures correct functioning, thus preventing potentially dangerous failures.

⚠ DANGER Every maintenance operation must be done while the unit is disconnected from the mains.

⚠ DANGER Once the unit has been switched off, a residual dangerous voltage could still be present inside the converting modules and on the DC terminals. This is due to the electrolytic capacitors that stay charged for a limited amount of time. Before intervening on the unit, make sure that said voltage is decreased to a level < 60VDC.

⚠ WARNING If the THD_v on the installation site is higher than 8%, the components lifetime is likely to be significantly reduced. Maintenance schedule should be adjusted accordingly.

Before proceeding with the maintenance routine, check that the upstream interrupting device (disconnecting switch or circuit breaker) is open. Put on the unit a sign indicating the **out of order** condition. Be sure that only the personnel necessary to the maintenance operations is dealing with the unit. The tables below resume the maintenance program:

8.2 Maintenance activities

8.2.1 General operations

WHAT TO DO	HOW	WHY
Clean the components removing dust, dirt and rust	Vacuum cleaner	Dust accumulation may limit the cooling airflow and cause overheating. Rust may compromise the dielectric properties of materials and components.
Check that the electrical connections are tight	Tightening tools	Improper electrical connections may cause localised overheating and consequent major failure of the unit
Clean the air inlets at the base of the enclosure	Vacuum cleaner	Dust accumulation may limit the cooling airflow and cause overheating.

8.2.2 Roof fans

Please note that roof fans could or could not be present depending on unit configuration.

WHAT TO DO	HOW	WHY
Check that the airflow coming out from the fan hoods is regular. Keep the air outlets and the fans clean.	Vacuum cleaner	Dust accumulation may limit the cooling airflow and cause overheating.
If necessary, replace defective fans. Warning. The fans are controlled by the control card. Before proceeding with the replacement, check the temperature threshold that determines the activation.	- disconnect the fan plug; - unscrew and remove the hood from the roof; - replace the defective fan with an original spare one; - connect the fan plug; - re-position the turret on the roof	Failure of one or more fans may compromise the air circulation inside the enclosure.

8.2.3 Electronic boards

WHAT TO DO	HOW	WHY
Remove the suspended dust	Vacuum cleaner	Dust accumulation may cause damage.
Check power	See on board power on indicators, typically LEDs	Diagnostic problems

8.2.4 Conversion units

WHAT TO DO	HOW	WHY
Check that the fan airflow is regular. Clean units and fans from dust	Vacuum cleaner	Dust accumulation may limit the cooling airflow and cause overheating.
If necessary, replace defective fans. Warning. The fans are controlled by the control card. Before proceeding with the replacement, check the temperature threshold that determines the activation.	- unscrew the diagnostic and power cables; - remove the power module (if necessary); - unscrew and remove the fan module; - replace the defective fan with an original spare one; - re-position power module (if necessary); - screw the diagnostic and power cables	Failure of one or more fans may compromise the air circulation inside the enclosure.
Check that the electrical connections are tight	Tightening tools	Improper electrical connections may cause localised overheating and consequent major failure of the unit
Clean the air inlets at the front of the enclosure	Vacuum cleaner	Dust accumulation may limit the cooling airflow and cause overheating.

 DANGER Access to the internal components for installation, setting, inspection and maintenance must be granted only to qualified personnel in charge of it and informed of the relevant risks. Any intervention must be carried out in compliance with the habitual rules on personal safety and use of adequate protective tools.

In case of abnormal situations (such as polluting or aggressive environment, heavy duty cycle, etc.) the maintenance frequency ought to be increased accordingly.

NOMINAL DATA			
TYPE	CODE	SERIAL NUMBER	RATING

ORDINARY MAINTENANCE		
CLEANLINESS	1	GENERAL
	2	VENTILATION AIR INLET
CHECK	3	MECHANICAL FIXTURES
	4	ELECTRICAL CONNECTIONS
	5	FAN OPERATION

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