• 15P0177B100 •

SUNWAY M XS

2200TL – 3000TL – 3800TL

SINGLE-PHASE SOLAR INVERTER

USER MANUAL

-Installation and Programming Instructions-

Issued 10/04/2012

R.00.1

Inverter Software Version: 1.055
Display Software Version: 1.3.3

- This manual is integrant and essential to the product. Carefully read the instructions contained herein as they provide important hints for use and maintenance safety.
- This device is to be used only for the purposes it has been designed to. Other uses should be considered improper and dangerous. The manufacturer is not responsible for possible damages caused by improper, erroneous and irrational uses.
- Elettronica Santerno is responsible for the device in its original setting.
- Any changes to the structure or operating cycle of the device must be performed or authorized by the Engineering Department of Elettronica Santerno.
- Elettronica Santerno assumes no responsibility for the consequences resulting by the use of non-original spare-parts.
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SUNWAY M XS

2200 TL
3000 TL
3800 TL

S000298

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1. SCOPE OF THIS MANUAL

Elettronica Santerno is committed to update its User Manuals available for download from santerno.com with the latest software version officially released. Please contact Elettronica Santerno if you require technical documents related to previous software versions.

2. GENERAL INFORMATION

2.1. Description of the Product

The inverters of the SUNWAY M XS series are full-digital devices that convert DC energy produced by photovoltaic (PV) panels – when radiated by sunlight – into AC energy, which is delivered to the grid.

A solar system for the self-generation of electric power is composed of two elements:

- The PV generator, consisting of a set of PV panels.
- The SUNWAY M XS inverter, delivering power supply from the PV generator to the grid.

Operation in parallel to the grid allows consumers to exploit the power supply produced directly by the system when radiated by sunlight, and to deliver power which is not locally consumed to the grid, by conferring it to the Grid Administrator. Therefore, residual power can be used by other consumers connected to the grid, thus allowing the exploitation of the green energy produced by the PV generator, as well as the constant operation of the same PV generator at its max ratings for optimum performance.

At night-time or when sunlight is weak, consumers can exploit the grid to power their loads.
All the parameter values related to the operation of the equipment may be easily programmed through the touchscreen display and the parameter menus and submenus.

The inverters of the SUNWAY M XS series have been designed and manufactured in compliance with the requirements of the “Low Voltage Directive” and the “Electromagnetic Compatibility Directive” and comply with the prescriptions for grid connection applying to self-generation electric plants.

2.2. Benefits

- Wide range of supply voltages: 125 to 580 Vdc;
- Full-digital DC/AC conversion through 32-bit microprocessor obtained with PWM technique and IGBT bridge ensuring high efficiency, high reliability and low distortion of the grid current;
- Transformerless topology;
- Die cast aluminium enclosure for maximum robustness, thermal performance and weight optimization, suitable for outdoor installation (IP65-rated);
- DC disconnect switch ensuring maximum safety when maintaining the inverter (optional);
- Input filters and output filters for the suppression of conducted disturbance and radiated disturbance;
- Testing circuit to check the isolation resistance between the input and the earth;
- Operation in parallel to the grid, power factor = 1;
- Fast connection through quick-coupling MC4 connectors for the connection of up to 4 strings;
- User interface based on graphic touchscreen display, 240x320 pixels, 262,000 colours for user-friendly control of the inverter functionality;
- RS485 serial link with Modbus protocol for remote monitoring and programming (optional);
- Wi-Fi connectivity for the access to LANs and interaction via smartphones;
- Remote Technical Support if the inverter is connected to the Internet;
- Power supply from the grid in order to maintain operation even in the event of weak solar radiation from the PV field.

2.3. Operating Principle

The power conversion system (inverter) is connected directly to the PV field. By using an IGBT bridge associated with a high-frequency voltage booster, the DC current coming from the PV field is converted into AC at the grid frequency. The transformerless architecture ensures maximum efficiency without affecting safety: the residual current device (RCD) is integrated into the inverter and the redundant grid connecting devices ensure proper safety even in the event of single fault.

The EMC filters for the suppression of electromagnetic disturbance, the isolation sensor monitoring the isolation to earth of the PV panels as well as the device controlling the operation in parallel to the grid are integrated into the inverter. Therefore, no additional device external to the inverter is required.

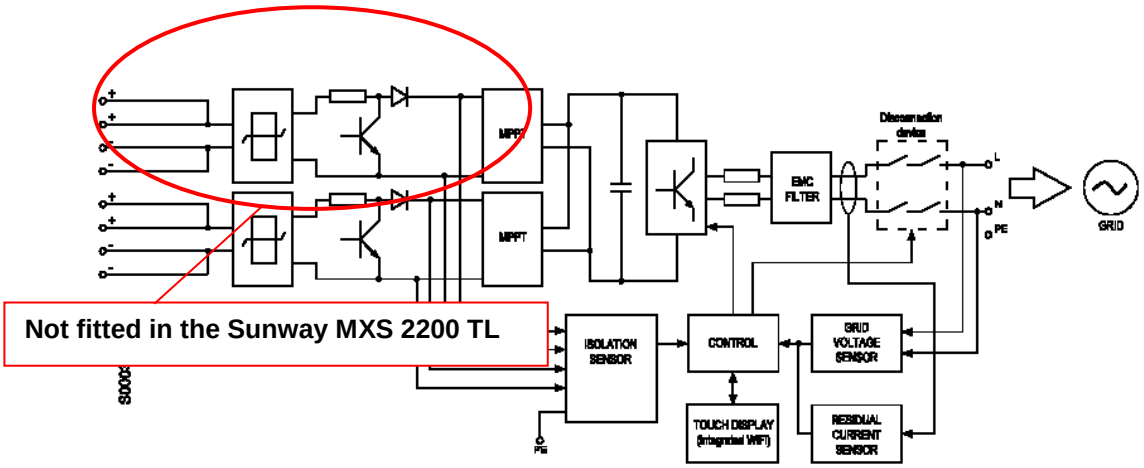


Figure 1: Block diagram of the SUNWAY M XS

2.4. Main Standard Integrated Functions

This section contains a brief description of the equipment functions, to allow users who are not familiar with the operation of PV fields to better understand this manual.

Device for constant isolation control: this is a device which checks the isolation between the earth and the polarities of the PV field and the earth before the inverter is connected in parallel to the grid. This function is obtained by measuring the isolation resistance: the equipment is factory-set to detect isolation loss when the isolation resistance between polarity + or polarity – and the earth drops below 850 kΩ.

MPPT (Maximum Power Point Tracking): A sophisticated computing performed by the microprocessor allows the inverter to detect the optimum operation point of the PV field, corresponding to the maximum power that can be produced by the PV field depending on current solar radiation conditions.

Automatic Disconnecting Means: This device automatically disconnects the self-generation plant from the grid when parallel operation is no longer possible. This typically occurs when the grid "opens" due to maintenance needs or to safety circuit tripping. This function allows the inverter to instantly disconnect from the grid, thus avoiding unwanted stand-alone operation of the plant and electric shock hazards for the operators working on the grid. Trip times and levels are factory-set according to the applicable safety standards. To modify the factory settings, please refer to the sections relating to the inverter programming. The ratings of this safety function have been certified as prescribed by the Grid Administrator.

When required by the Grid Administrator, a simple self-test procedure performed via the touchscreen display allows checking the efficiency of the grid disconnection device.

2.5. Attached Documentation

The SUNWAY M XS inverter is supplied complete with the following documents:

- Multilingual "Quick Start Guide", included as a hard copy and available for download from santerno.com;
- "Wi-Fi Connection – Quick Start Guide", included as a hard copy and available for download from santerno.com;
- Multilingual "Certification and Grid Interface File", available for download from santerno.com;
- "User Manual" (this document) available for download from santerno.com.

3. BASIC INSTALLATION

The basic installation consists in connecting the basic elements for the system operation (grid and PV generator).

Advanced configurations of the SUNWAY M XS inverter are covered in section 4. Fully read the basic installation instructions before carrying out the advanced configurations.

3.1. Caution Statements

This section covers safety statements. The non-observance of the safety instructions below may cause serious injury or death and equipment failure. Carefully read the instructions below before installing, starting and operating the inverter.

Only competent personnel must carry out the equipment installation.

KEY TO SYMBOLS:

DANGER — Indicates operating procedures that, if not correctly performed, may cause serious injury or death due to electric shock.

CAUTION — Indicates operating procedures that, if not respected, may cause serious equipment failure.

NOTE — Indicates important information concerning the operation of the equipment.

SAFETY STATEMENTS TO FOLLOW WHEN INSTALLING AND OPERATING THE EQUIPMENT:

NOTE — Always read this instruction manual thoroughly before starting the equipment.

DANGER — **Always earth the equipment.**

CAUTION — The SUNWAY M XS must be powered by a photovoltaic field only, and must be used exclusively for operation in parallel with the grid. Any other use is to be considered as improper.

CONNECTION TO THE PV FIELD – When exposed to solar radiation, the photovoltaic panels produce DC voltage that is applied to the inverter.

DANGER

ELECTRIC SHOCK HAZARD – Do not touch the electric parts of the inverter and do not operate on the inverter when it is powered. Always wait at least 15 minutes from the instant when the DC and AC supply is removed from the inverter before carrying out any operation, because electric energy is accumulated inside the inverter.

Do not operate on the equipment when it is powered.

Before operating on the electric connections, remove both DC and AC voltage from the equipment and wait at least 15 minutes.

EXPLOSION AND FIRE – The risk of explosion and fire may exist if the equipment is installed in presence of flammable fumes. Do not install the equipment where there is a risk of explosion and fire.

Do not connect supply voltages which exceed the rated voltage. If voltage exceeding the rated value is applied, the internal circuits may be damaged.

In the event of installation in presence of flammable and/or explosive substances, please consult the relevant applicable standards.

In the event of an alarm, consult section 4.3.6 Alarms Menu. Only restart the equipment after the problem has been rectified.

CAUTION

Do not carry out isolation tests between the power terminals or between the control terminals.

Make sure that the screws on the connection terminal boards have been properly tightened.

Observe the environmental requirements for installation.

Do not open the inverter to avoid affecting the IP rating and/or damaging the internal circuits.

CAUTION

Certain parts of the product (side walls, heatsink and reactors) may reach temperatures as high as 100 °C. Take all the necessary precautions to avoid burns.

3.2. Checking the Product on Delivery

On receiving delivery of the equipment, make sure that the packaging shows no signs of damage. Check that it complies with your order by referring to the dataplates described below. In the event of any damage, please contact the relative insurance company or the supplier. If the delivery does not match your order, contact the supplier immediately.

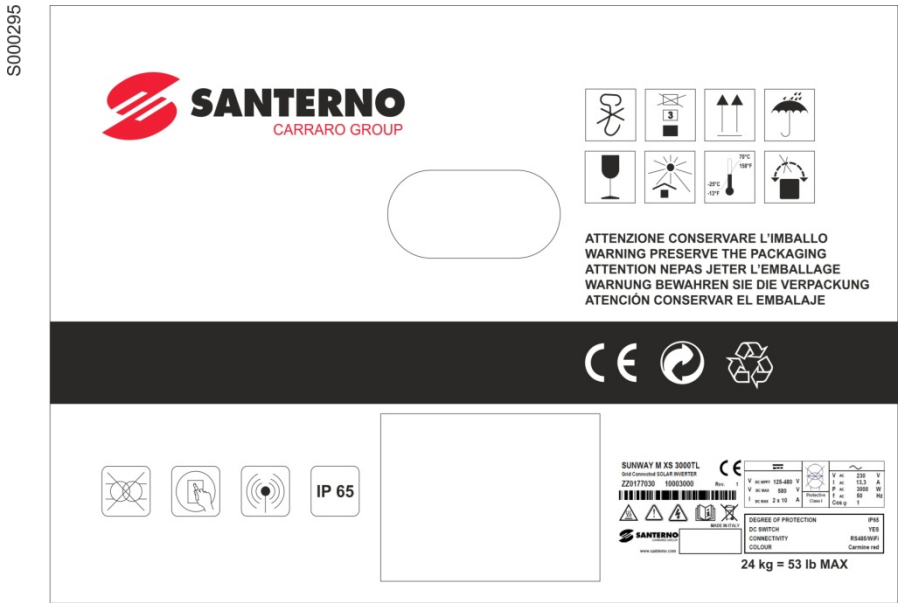


Figure 2: Packaging of the SUNWAY M XS

If the equipment is to be stored before installation, make sure that the ambient conditions in the warehouse meet the necessary specifications (see section 3.4.1). The warranty covers manufacturing defects. The manufacturer shall not be held liable for any damage which may have occurred during transport and unpacking. Under no circumstances shall the manufacturer be held liable for damage or faults cause by incorrect use, misuse, incorrect installation or inadequate temperature or humidity conditions or exposure to corrosives, nor for faults caused by operation outside the rated values. Nor shall the manufacturer be held liable for consequential or accidental damage.

NOTE

For the terms of warranty, please refer to the warranty certificate supplied with the product.

3.2.1. Dataplate

The product is described and identified by two dataplates placed on its side, as shown in Figure 3.

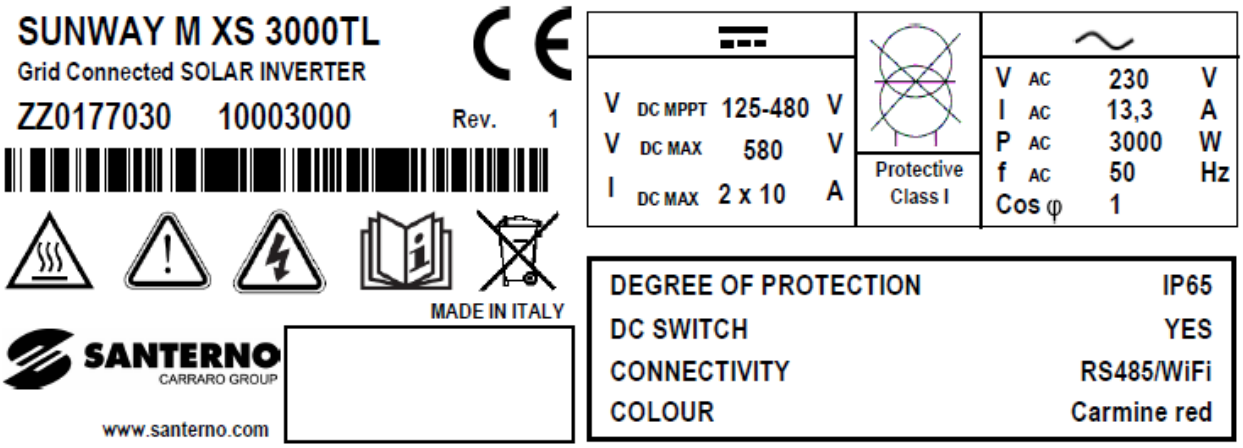


Figure 3: Dataplates of the SUNWAY M XS

The dataplate measures 60mm x 30mm.

The product code is made up of the following elements:

SUNWAY	M	XS	3000	TL
1	2	3	4	5

1	Product line: SUNWAY inverter for the conversion of photovoltaic energy
2	Type of connection to the grid: M = single-phase
3	Product family: XS = new generation of Santerno inverters
4	Model (identifies the rated power injected into the grid)
5	Grid connection technology: TL = transformerless

Purchase code of the product:

ZZ01770	PP		D	A	C	U	W	X	Y	Z
1	2	3	4	5	6	7	8	9	10	11

1	Fixed figures of the purchase code: ZZ01770 for the SUNWAY M XS series
2	Size (two figures): 22 = 2200 (2200 W rated power for 230 V grid) 30 = 3000 (3000 W rated power for 230 V grid) 38 = 3800 (3800 W rated power for 230 V grid)

3	Blank field
4	DC disconnect switch (optional): 0 = Not fitted 1 = Fitted
5	Unused field: 0 = Default
6	Colour: 0 = Carmine Red (RAL 3002) 1 = Night Blue (RAL 5022) 2 = Traffic Black (RAL 9017) 3 = Traffic White (RAL 9016)
7	UL certification: 0 = Non UL-certified version 1 = UL-certified version (unavailable at the moment)
8	RS485 Option 2 = Not fitted 3 = Fitted
9	Unused field: 0 = Default
10	Unused field: 0 = Default
11	Unused field: 0 = Default

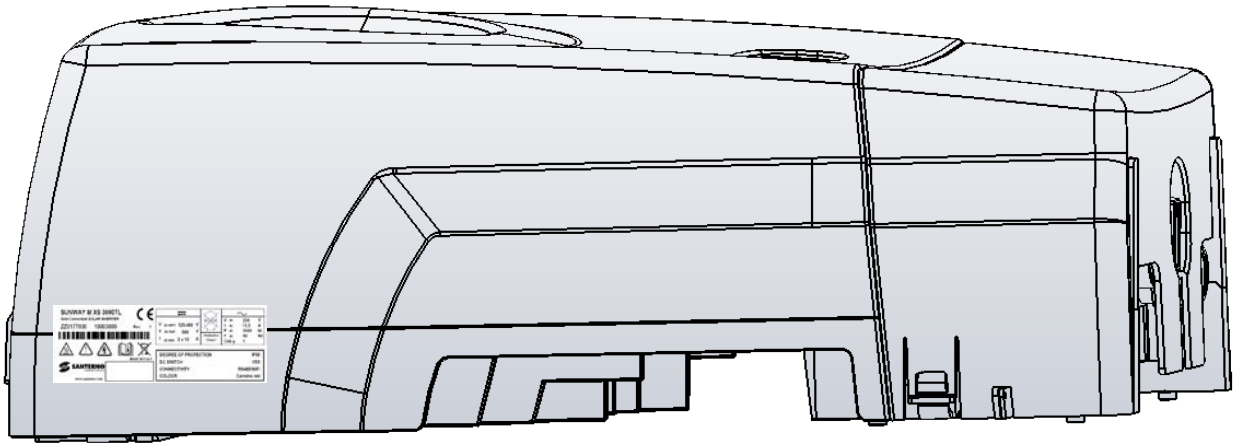


Figure 4: Label placed on the metal enclosure of the product

The basic configuration of the SUNWAY M XS inverter comprises the following:

- N. 1 SUNWAY M XS inverter
- N. 1 Wall-mounting bracket
- N.1 PV field connectors kit
- N.1 Grid connector
- N.1 Wi-Fi connector with adapter
- N. 1 Quick start Guide
- N. 1 Authentication form
- N. 1 Warranty certificate

The following options are available for the SUNWAY M XS:

Available options	Component	Configuration
RS485 Port	RS485 connector mounted on the upper cover of the inverter	Integrated into the product
DC Disconnect switch	Integrated disconnect switch for the disconnection of the photovoltaic field from the inverter	Integrated into the product

NOTE

Before commissioning the SUNWAY M XS, make sure that all the options required are fitted. Contact the Customer Service of Elettronica Santerno SpA for any clarifications.

3.3. Transport and Handling

State-of-the-art packing is provided when shipping the SUNWAY M XS. Handling should be done using a transpallet or a lift truck with a carrying capacity of at least 50 kg, in order not to damage the product.

Get near the installation place, then unpack following the instructions provided below.

CAUTION

The whole original packing is to be kept for the full duration of the warranty period.

CAUTION

Based on the configuration of the product, the content of the packing may have a maximum weight of 21.6 kg. The centre of gravity of the SUNWAY M PLUS does not match with the geometrical centre of the packing. It is therefore recommended that the packing be handled with extreme care by at least two persons. Always use proper handling equipment.

1. Unpacking the product:

- Cut with pincers the plastic straps that fix the package of the SUNWAY M XS to the pallet;
- Cut with a cutter the adhesive tape closing the box.

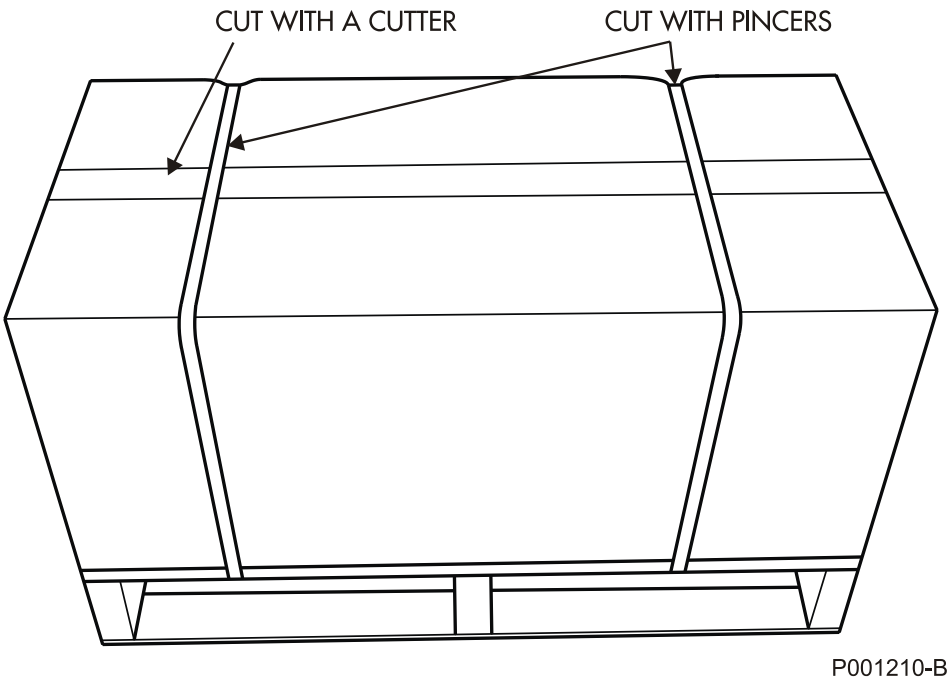


Figure 5: Procedure for opening the package

2. Remove the SUNWAY M XS from its packing by lifting it from its sides. To avoid damaging the packing, lift the product keeping it horizontal to the floor (see Figure 6).

Figure 6: Procedure for removing the SUNWAY M XS from its packing

3. Put all the packing elements in the box and store it in a dry place (see Figure 7).

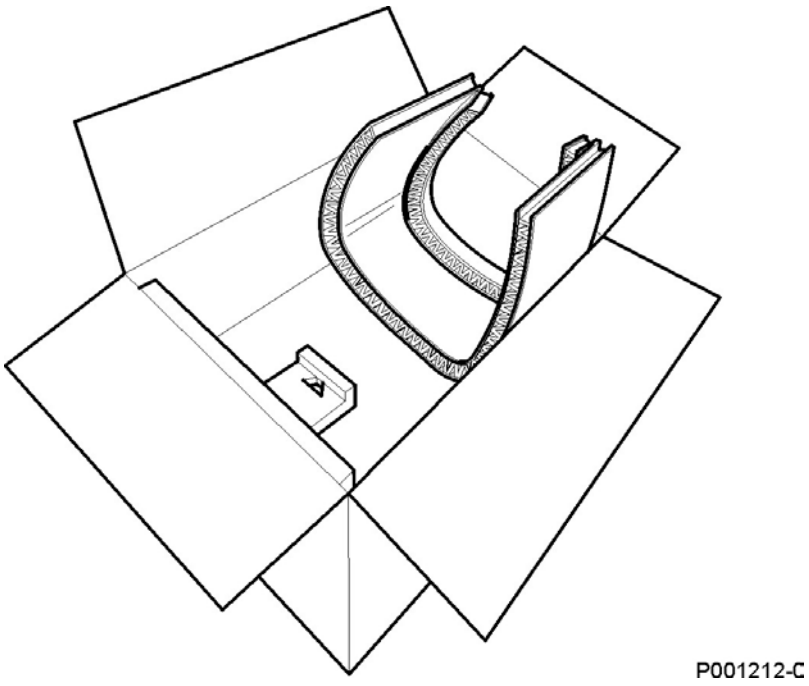


Figure 7: SUNWAY M XS box with packing elements

3.4. Installation

NOTE

Do not remove the inverter lid during installation. Removing the lid may affect the IP rating of the inverter and may damage the internal parts. **Removing the lid voids the inverter warranty.**

3.4.1. Environmental Requirements for the Equipment Storage, Installation and Operation

SUNWAY M XS Model	**2200TL**	**3000TL**	**3800TL**
IP Rating (*)	IP65	IP65	IP65 (*)
Mechanical dimensions (mm)	380 x 570 x 218		
Weight (kg)	17.5	20.8	21.6
Operating ambient temperature	-25 °C ÷ +60 °C		
Rated operating temperature (**)	-25 °C ÷ +45 °C		
Ambient temperature for storage and transport	-25 °C ÷ +70 °C		
Maximum number of packed SUNWAY M XS that can be stacked up	3		
Installation site	Outdoor installation, degree of pollution 3 or better. Do not install the equipment where it is exposed to direct sunlight or where it is exposed to conductive dust, corrosive gases, vibrations. Do not install in salty environments.		
Altitude	Up to 2000m a.s.l. For altitudes ranging from 2000m to 3000m a.s.l., derate the output current by 1% every 100m. For higher altitudes, please contact Elettronica Santerno.		
Operating ambient humidity	0 % to 100 %, 1 g/m^3 to 25 g/m^3, non-condensing and non-freezing (class 3k3 according to EN 50178).		
Storage ambient humidity	0 % to 100 %, 1 g/m^3 to 25 g/m^3, non-condensing and non-freezing (class 1k3 according to EN 50178).		
Ambient humidity during transport	Max. 100%. Up to 60g/m^3, condensation may appear when the equipment is not running (class 2k3 according to EN 50178).		
Operating and storage atmospheric pressure	86 kPa to 106 kPa (class 3k3 and 1k4 according to EN 50178).		
Atmospheric pressure during transport	70 kPa to 106 kPa (class 2k3 according to EN 50178).		

Table 1: Environmental requirements

* The external fans are IP54 rated.

** Beyond 45 °C, the SUNWAY M XS automatically decreases the output power in order to avoid overheating. See the product specifications.

CAUTION

Environmental conditions significantly affect the life-expectancy of the product. Consequently, DO NOT install the product in a location which does not meet the required specifications.

3.4.2. Wall Mounting

The SUNWAY M XS is provided with a bracket that can be used for wall mounting. The inverter is to be installed in upright position. Make sure that the wall can withstand the weight of the product.

CAUTION

Do not install the SUNWAY M XS in direct sunlight or above heat sources.

NOTE

The installation place for the SUNWAY M XS is to be chosen on the basis of its degree of protection. It is recommended that the SUNWAY M XS be not installed in environments directly exposed to water jets.

NOTE

It is recommended that the SUNWAY M XS be installed in a place sheltered from rain and snow.

CAUTION

Based on the configuration of the product, the content of the packing may weigh up to 21.6 kg (see the product specifications). Make sure that adequate handling measures are taken.

CAUTION

The protective cover of the connector unit is made of plastic and cannot withstand mechanical stress. Avoid using it as a grip point during installation.

CAUTION

Make sure that the surface where the inverter is to be installed on is perfectly flat and is not tilted.

Do the following to mount the inverter:

1. Find an installation site suitable for the inverter, allowing adequate clearance as mentioned in Figure 8. The clearance below allow easy mounting and proper ventilation.

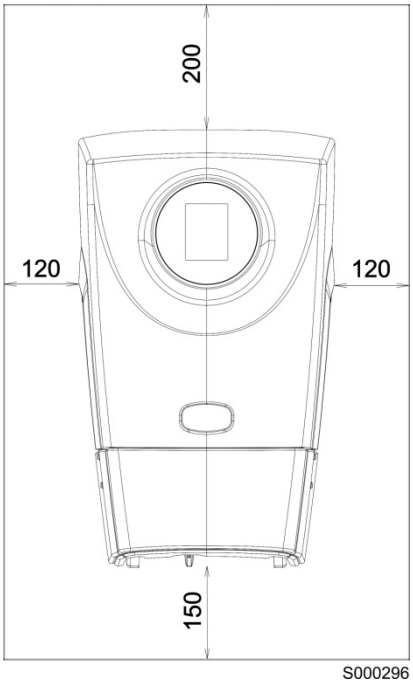


Figure 8: Minimum clearance (in mm) to respect for proper ventilation of the SUNWAY M XS

2. N. 3 wall plugs, 6 mm flared head are required to fasten the wall-mounting bracket (plugs are not supplied with the product because different wall materials require different types of fixing devices).

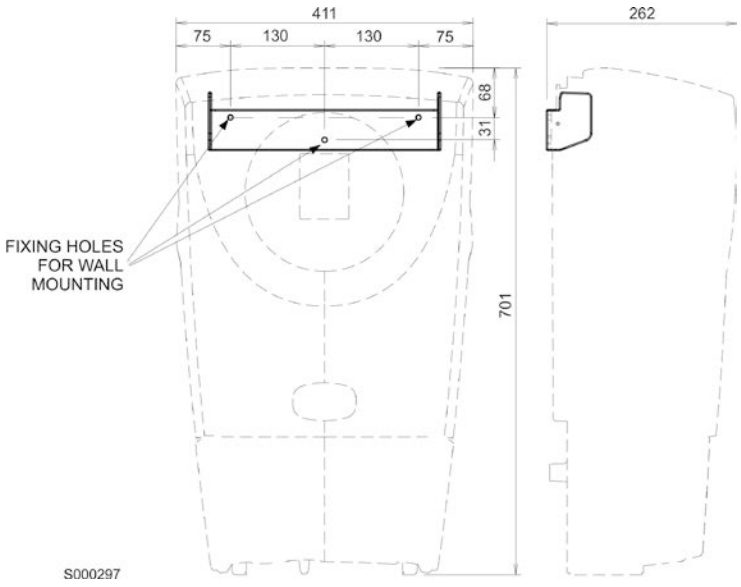


Figure 9: Detail of the SUNWAY M XS bracket with the fixing screws

3. Place the inverter upright in contact with the wall in the proximity of the fixing point. The inverter is equipped with feet for upright installation.

Figure 10: The SUNWAY M XS in upright position

4. Fasten the SUNWAY M XS to the bracket by lifting it from the two side handles.

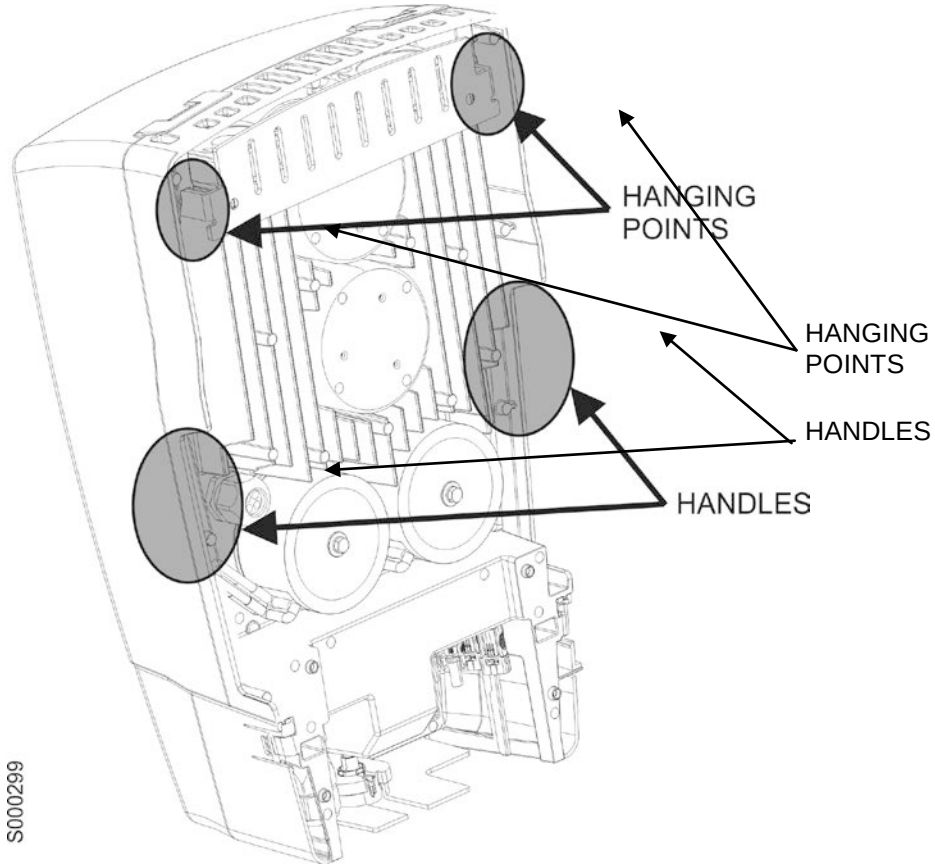


Figure 11: Detail of the SUNWAY M XS with the side handles

DANGER **Make sure that the product is properly fastened to the wall bracket before loosening your grip on the product.**

5. Make sure that the SUNWAY M XS is firmly fixed to the wall. Make sure that no tilting occurs.

3.4.3. Electrical Connection

Remove the cable cover at the bottom of the inverter in order to gain access to the connectors.

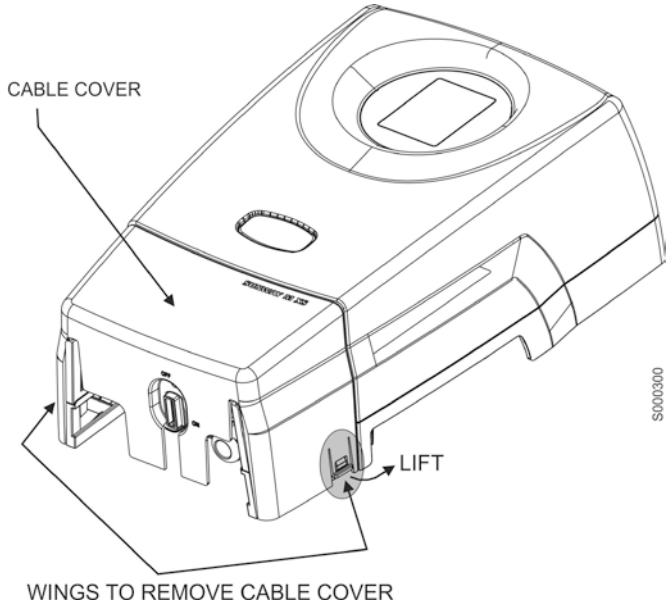


Figure 12: Removing the cable cover

CAUTION When removing the cable cover, make sure that the DC disconnect switch is set to OFF.

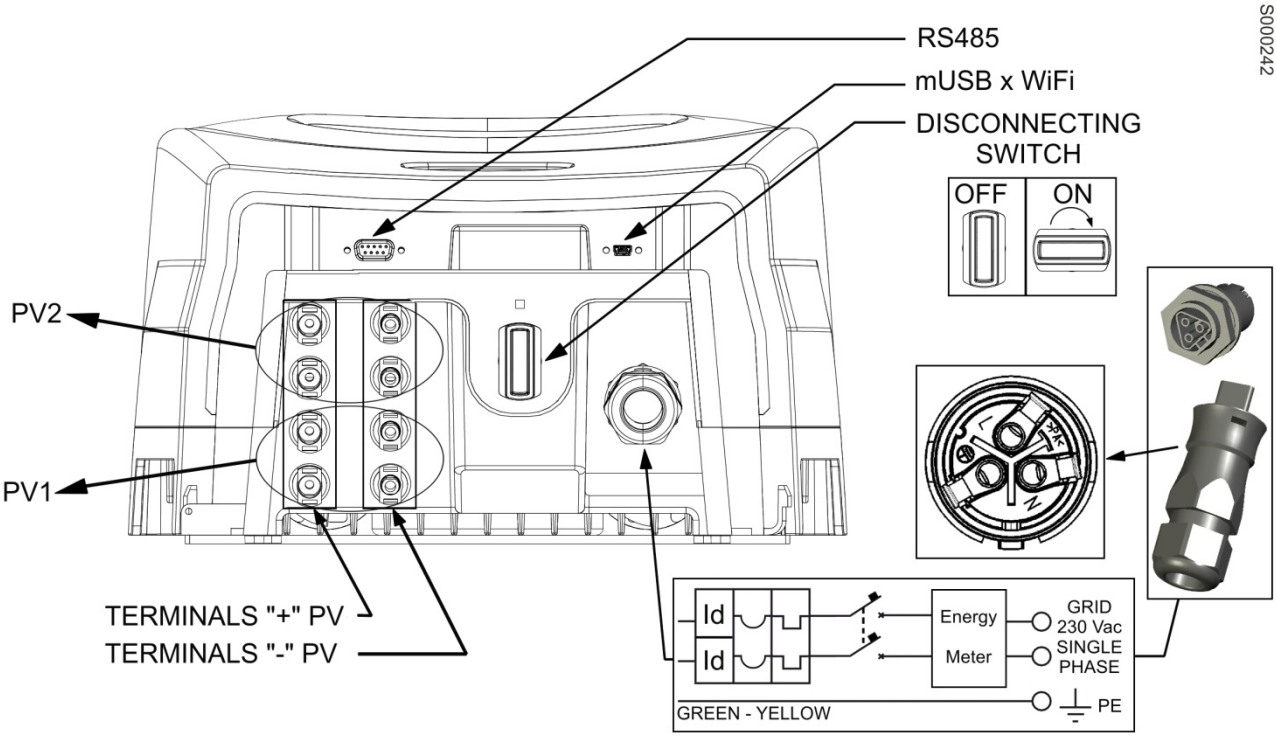


Figure 13: SUNWAY M XS connectors

DANGER **Always connect the protective earthing (PE).**

CAUTION

Follow the sequence below to carry out the electrical connection of the SUNWAY M XS.

1. Carry out the earth connection of the inverter.
2. Carry out the electrical connection of the inverter to the photovoltaic field.

3.4.3.1. Connection to the Grid

CAUTION

The electrical connection of the SUNWAY M XS must follow the steps given in section 3.4.3.

DANGER

Always remove voltage before operating on the grid. The earth conductor must be connected first.

Do not connect supply voltages exceeding the equipment rated voltage, single-phase, 230 V ±20 % to avoid damaging the internal circuits.

Always install a moulded case circuit breaker (MCCB) to protect the electric circuit.

CAUTION

RESIDUAL CURRENT DEVICE – A residual current device is integrated into the SUNWAY M XS inverters. The RCD provides protection against residual DC and AC currents and is compliant with the safety regulations in force. The efficiency of the RCD is checked when testing the inverter and whenever the inverter is connected to the grid. The integrated RCD provides protection against DC-side faults only. As per AC-side protection, an external RCD is to be provided to protect the line between the inverter and the delivery point.

Always install a MCCB and a RCD to protect the inverter line.

NOTE

It is recommended that a RCD with a minimum trip threshold of 100 mA be installed for each individual inverter.

The dimensioning of the MCCB and the specifications of the pre-wired cable are given in the table below.

SUNWAY M XS Model	**2200TL**	**3000TL**	**3800TL**
Rated output voltage (A)	9.6	13.3	16.5
Rated current of MCCB (A)	16	16	25
Cable cross-section (mm^2)	2.5	4	4
Type of cable	Three-pole, double insulation (phase+neutral+earth)		
Outer diameter of wiring cable (mm)	13-18mm		
Cable stripping (mm)	10		
Tightening torque (Nm)	1.2		

Table 2: Dimensioning of the MCCB and cable specifications

The inverter is provided with a quick-coupling connector for the connection to the grid. The installer shall connect the floating socket to the AC-connection cable.

The cable to be used must meet the requirements in Table 2.

The connector is composed of a fixed element (see figure below):

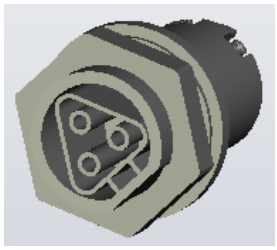


Figure 14: Fixed element of the grid connector

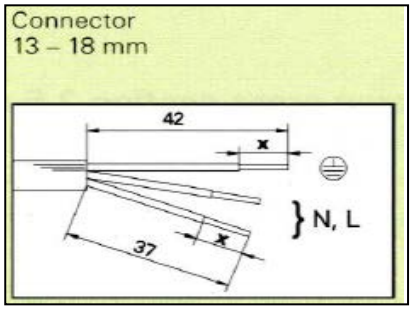
and of a floating element supplied with the product.

The installer shall connect the AC cable to this section according to the instructions given on the connector itself.

Earth	AC grid earth (yellow/green)
N	Neutral of the AC grid (black)
L	Phase of the AC grid (blue)

Figure 15: Flying connector for the connection to the grid

Preparing the AC connection cable to be used for the connector supplied.



Insulation Strip Length X = 8		
Conductor cross-section	2.5 mm^2 – 4 mm^2	AWG 12-18
Cable outer diameter	13 - 18 mm	

Inserting the cable into the connector.

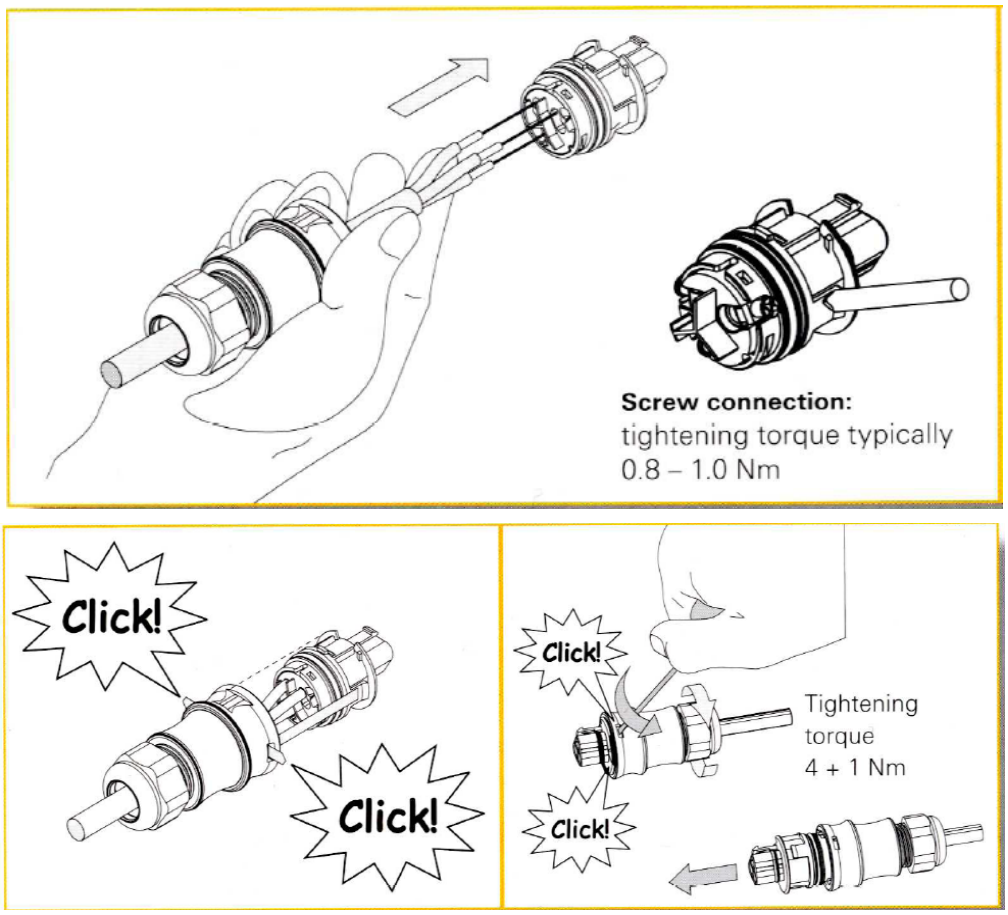


Figure 16: Mounting the floating connector for the connection to the grid

Proceed as follows:

1. Install the RCD making sure that no electric load is interposed between the circuit breaker and the SUNWAY M XS. Make sure that the current capacity of the electrical installation in that point is appropriate for the connection.

NOTE

It is recommended that a RCD with a minimum trip threshold of 100 mA be installed for each individual inverter. A total rating of at least 300 mA is therefore recommended.

2. Connect the SUNWAY M XS to the RCD.
3. Once the electrical connection to the grid has been carried out, keep the circuit breaker open.

3.4.3.2. Connection to the Photovoltaic Field

Each string is composed of a given number of series-connected PV modules. The PV generator may consist of a single or multiple parallel-connected strings for each input section. Two independent input sections are available for size 3000 and 3800 for the connection of two independent PV fields. The configuration of the main PV Field should be defined depending on the voltage range allowed by the SUNWAY M XS and on the power that is to be installed.

Up to two strings may be connected in parallel to the SUNWAY M XS (size 2200 and 3800), with no need to install any additional component**.** The strings forming the PV field and that are connected to the same SUNWAY M XS must be dimensioned in order to get the same working voltage per string. It is recommended that the same type of solar panels be used for the whole PV field and that all the strings be exposed to exactly the same solar radiation.

The SUNWAY M XS is not compatible with strings comprising PV modules that require earthing of one pole.

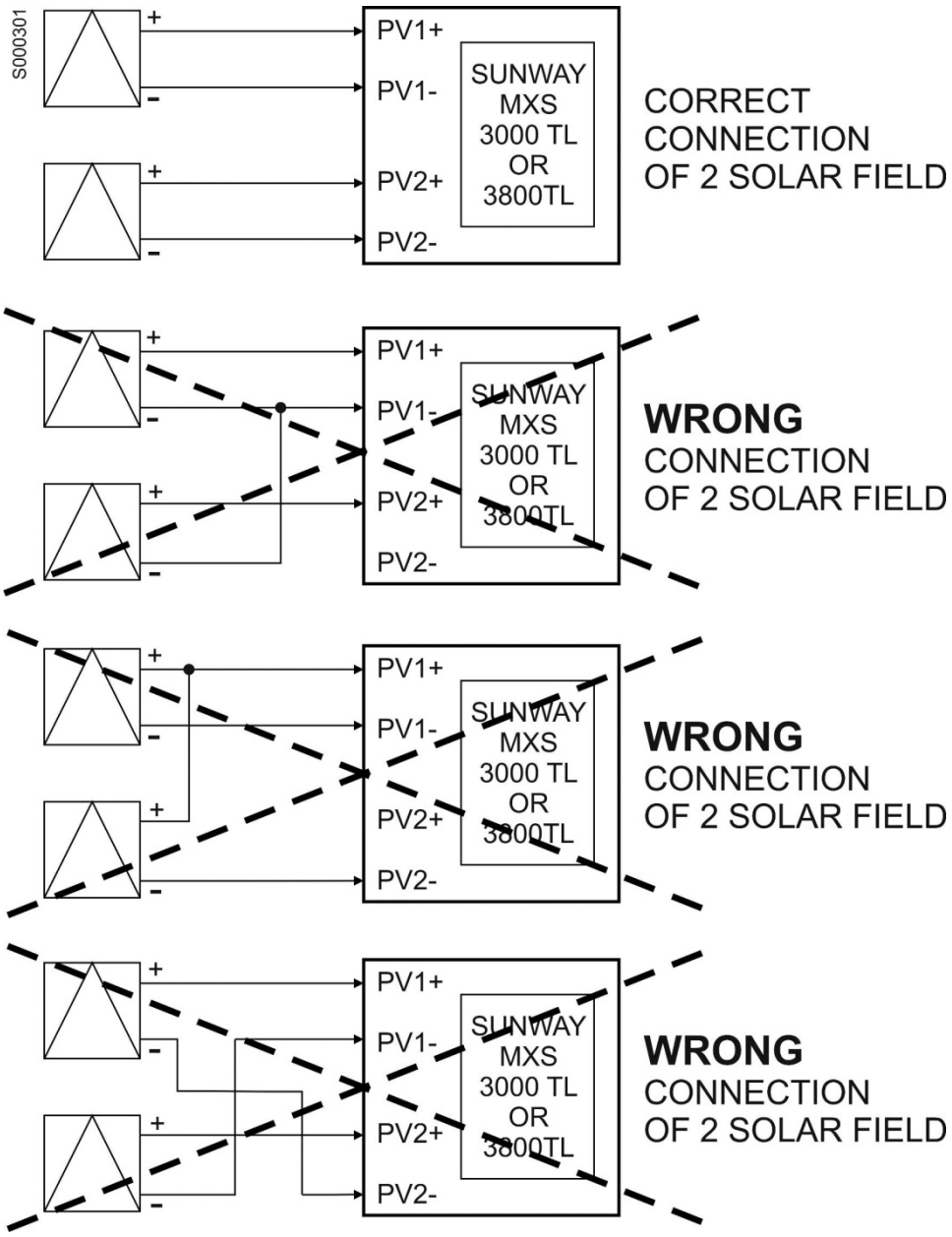
SUNWAY M XS Model	2200TL	3000TL	3800TL
Number of PV fields that can be connected	1	2	2
Number of strings per PV field that can be connected	2	1	2

DANGER

Make sure that the safety circuit breaker is open and the earth connector (PE) is properly earthed.

Do not connect any photovoltaic generator capable of producing field voltage exceeding the maximum allowable rating (580V). If voltage exceeding the maximum allowable rating is applied to the inverter, failures may occur on the internal circuits.

When two independent PV fields are used, each pole must be connected separately. Do not connect the negative poles of the two fields together to avoid malfunction and loss of generated energy and to avoid damaging the internal circuits.



CAUTION

DANGER

The voltage produced by the photovoltaic generator radiated by sunlight (even weak sunlight) can reach dangerous voltage.
Cable stripping and wiring must be carried out with extreme care using proper tools. It is advisable to cover the photovoltaic panels with a sun shade.
Always take **EXTREME CARE** to avoid any unintentional contacts with the floating pole of the PV generator. Contact with both polarities leads to severe injury or death due to electric shock.

The specifications of the PV field and the wiring cable dimensioning are given in the table below.

SUNWAY M XS Model	**2200TL**	**3000TL**	**3800TL**
Overall peak power (Wp) of the photovoltaic generators	2440	3600	4500
Number of PV generators that can be coupled	1	2	2
Number of strings per generator	2	1	2
MPPT voltage (Vdc) of the inverter	125-480	125-480	125-480
Maximum voltage (V) of the PV field	580	580	580
Maximum input current (A) of the photovoltaic generator	12.5	2x10	2x12.5
Cable cross-section (1 string, mm^2)	4	4	4
Type of cable	Unipolar		

Table 3: Specifications of the PV field

NOTE

The maximum peak power of the PV generator should not exceed the value given in the table. Exceeding values do not entail malfunctions to the inverter, as the equipment automatically limits the power fed into the grid. However, in this way the PV generator is not exploited at its best.

The voltage at the maximum power point of the PV generator, under the intended conditions of operation (min/max radiation, min/max temperature of the modules) must be within the MPPT voltage of the inverter (125-480V).

The maximum rated voltage of the PV field must never be exceeded. A higher voltage will damage the equipment in an irreversible manner.

DANGER

When testing the photovoltaic field, do not exceed 500 V for the isolation test in order not to damage the integrated varistors protecting the DC input of the inverter.

Do the following:

1) Make sure that the inverter is uncoupled from the AC grid.
2) If the DC disconnect switch (optional) is fitted, set it to **OFF** (see Figure 17).
3) Check polarity and voltage of each string.
4) Connect the strings of the PV field to the quick-coupling connectors, making sure that polarities are respected. The left-most (female) connectors are for the positive pole, whilst the right-most (male) connectors are for the negative pole.

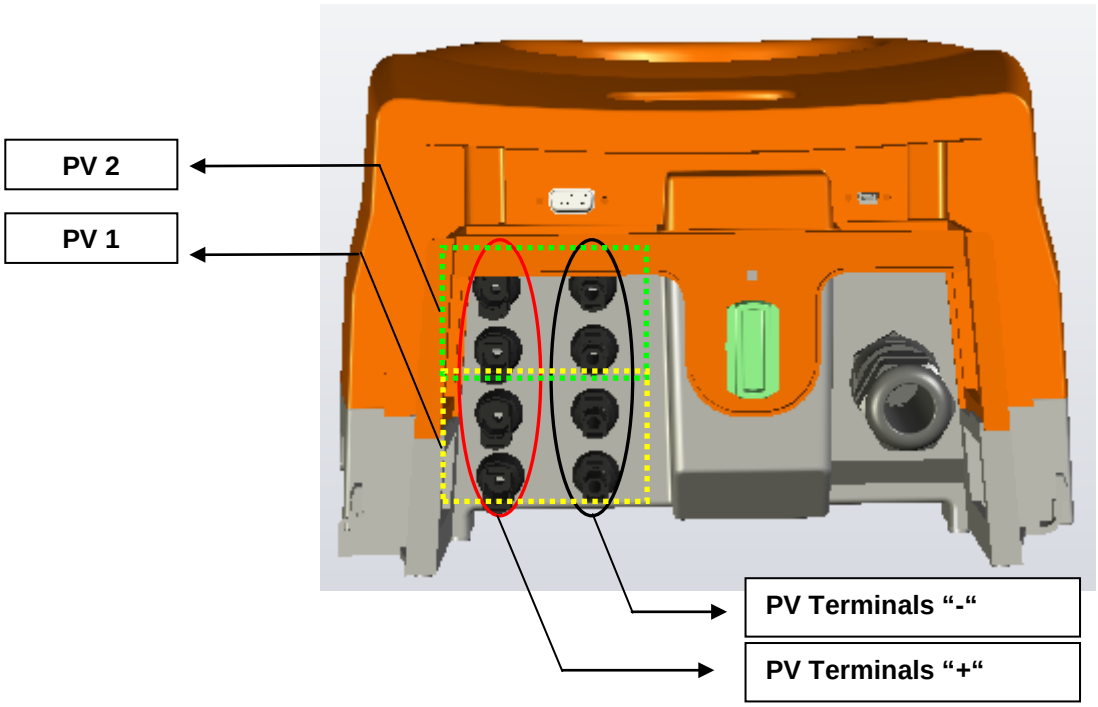


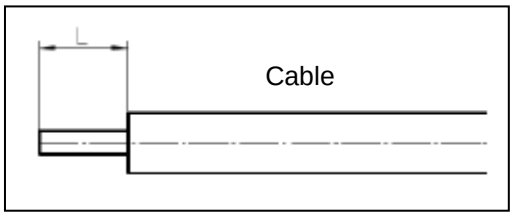
Figure 17: Polarity for string connection to the main PV field and DC-side disconnect switch

CAUTION

Plug any unused cable glands and quick-coupling connectors of the inverter to maintain the IP rating of the equipment.

3.4.3.3. Specifications of the Quick-coupling Connectors Supplied with the Product

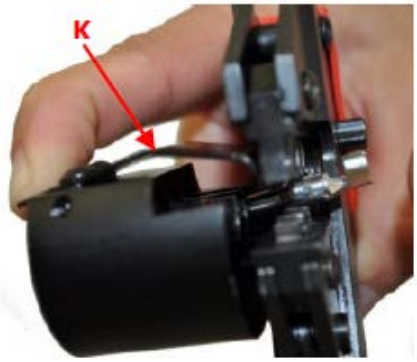
The product houses unipolar conductors with cross-section 4 to 6 mm^2 and outer diameter from 6.3 to 7.8 mm. Follow the instructions below to assemble the flying connectors.



Type of connector	Cable cross-section	Cable outer diameter	Length L
LC4-CP3x…4/6	4/6 mm^2 (AWG12/10)	6.3-7.8mm	6mm^{+1}

Crimp the cable in the connector insert module using the Lumberg crimp tool (LC4-CX CZK48) (the crimp tool is supplied separately).

- Open the crimp tool (insert K)
- Fit the insert module into the correct diameter (4.0 to 6.0) of the crimp tool and lock it with insert K
- Close the crimp tool without tightening the insert module, then release insert K
- Fit the stripped cable section into the insert module
- Tighten the crimp tool completely



Fit the insert module into the connector.

Do the following once the electrical connection is completed:

- Insert the Wi-Fi transmitter supplied into the USB connector using the special adapter
- If the RS485 option is fitted, establish a connection with the remote monitoring device (if required)
- Reassemble the cable cover

3.4.3.4. Removing the Protective Film from the Display

The SUNWAY M XS inverter is supplied with a film protecting the touchscreen display. See Figure 18.

Once the inverter installation is complete, remove the protective film from the touchscreen display to start using it.

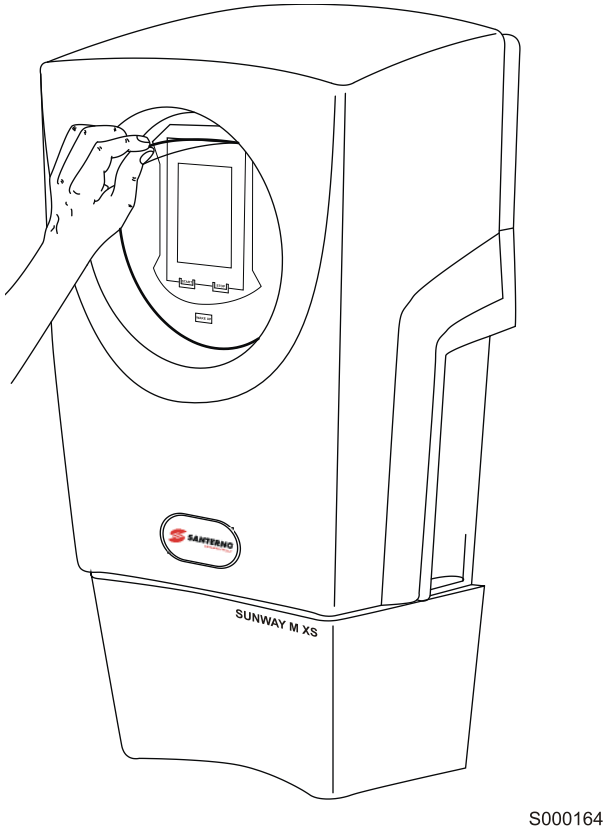


Figure 18: Removing the protective film from the touchscreen display

3.4.3.5. Fiscal Seal

A fiscal seal may be applied to the inverter, where required. The seal may be applied through the special slots on both sides of the product cover and enclosure. Remove the connector protective cover to gain access to the slots.

Figure 19 shows the location of the slots.

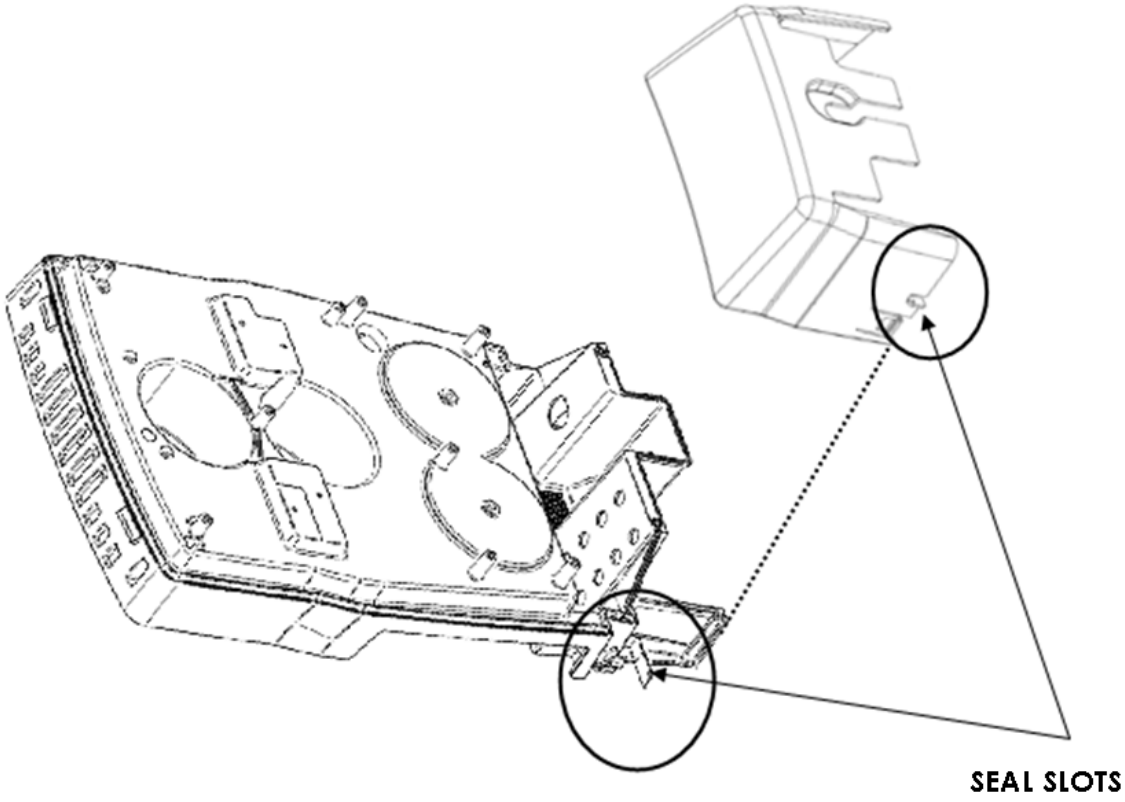


Figure 19: Slots for the application of the fiscal seal

3.5. Commissioning

NOTE

The SUNWAY M XS inverter is factory-set with a set of parameters fitting most applications; therefore, no parameter modification is generally required.

Always carry out the Quick Configuration procedure of the touchscreen display (see section 3.6).

- Make sure that the inverter connections to the PV field and the grid are correct.
- Connect the inverter to the grid by closing the grid-side switch.
- When the loading stage is complete (approx. 2'), the display shows a screen similar to the screen below:

Figure 20: Example of the start menu

- If the DC disconnect switch (optional) is fitted, set it to **ON**
- Carry out the Quick Configuration procedure from the Tools menu by pressing the icon here below.

The Quick Configuration procedure makes it possible to change the grid interface settings as well. Note that the grid interface configuration may be changed only within the first 12 hours after the commissioning of the inverter.

- Press the **START** button from the graphic interface module.

If the voltage of the PV generator exceeds 150V for the timeout set in **P021** (5 minutes as a factory setting) the inverter synchronises with the national grid, closes the integrated coupling device and forces a perfectly sinusoidal current in phase with the grid voltage. The current amplitude depends on the power made available from the PV generator.

The inverter operating conditions are displayed via the status icon and the status page. More details are given in section 4.1.3.

NOTE

The action of pressing the **START** button is permanently stored; therefore, if voltage is removed from the SUNWAY M XS, its Run status will still be active at next power on. The inverter must be restarted only after resetting an alarm or after pressing the **STOP** button.

NOTE

According to factory setting, the inverter startup conditions are as follows:

1. Grid voltage: 230 Vac +/-15 %.
2. Grid frequency: 50 Hz +/-0.3 Hz.
3. PV field voltage ranging from 150 V to 540 V.

CAUTION

GRID INTERFACE CONFIGURATION – The grid interface configuration based on the Country where the inverter is installed may be changed only **within the first 12 hours after the commissioning of the inverter**.

Once started, the SUNWAY M XS operates in full automatic mode. The inverter operating conditions may be constantly monitored via the touchscreen display (see section 4). If not used for 5 minutes, the touchscreen display automatically turns off to minimize self-consumption. Press anywhere on the display to turn it on again.

If solar radiation is absent, the equipment turns off after the time set in parameter **P041** (factory setting: 15 minutes). When solar radiation is present, the SUNWAY M XS automatically restarts and resumes the production of electric power. The inverter may be restarted at any time by pressing the **WAKE UP** button from the graphic interface module. When the inverter is on, you can edit the operating parameters and display production data and fault list, even if no PV field voltage is supplied.

3.5.1. Stopping the Inverter

Press **STOP** from the touchscreen display to stop delivering energy to the grid and to stop the inverter.

DANGER

The STOP button does not power off the inverter; consequently, live parts are dangerous even if the inverter has been stopped.

DANGER

Any operations on the inverter must be performed under safety conditions, after cutting off both the DC power supply and the AC power supply.

DANGER

After turning off the inverter, wait at least 15 minutes before operating on the connections to give the DC-link capacitors time to discharge.

3.6. Quick Configuration

The Quick Configuration in the Tools menu guides the user through preset operations for a quick configuration of the product. The Quick Configuration comprises:

1. **Setting the language.** See section 3.6.1
2. **Setting the Country.** See section 3.6.2
3. **Setting the time zone.** See section 3.6.3
4. **Setting the date and time.** See section 3.6.4
5. **Setting the currency.** See section 3.6.5
6. **Setting the feed-in tariff.** See section 3.6.6
7. **Resetting the history data.** See section 3.6.7
8. **Resetting the display.** See section 3.6.8.

3.6.1. Setting the Language

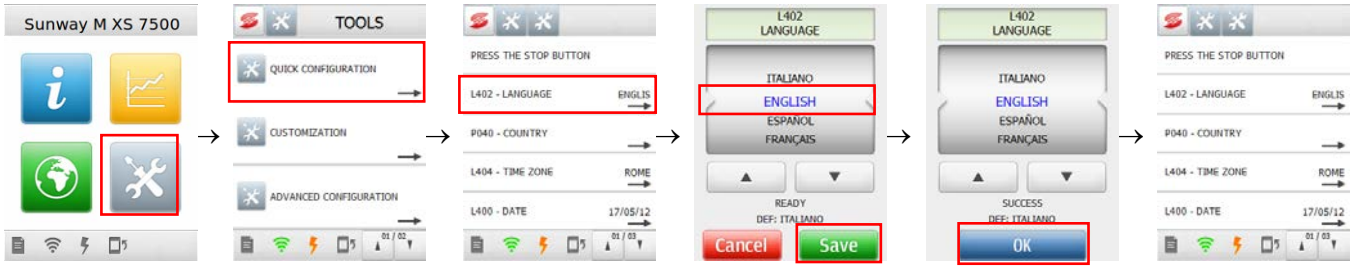
This section describes how to change the dialogue language from the touchscreen display. Do the following:

- From the start menu, select the **Tools** icon ( );
- Select the **Quick Configuration** (QUICK CONFIGURATION) menu. Use the arrows (01 / 02) on the Status Bar to go to the first page of each submenu;
- Select **L402 - Language**; the screen below appears:

Figure 21: Language setting page

- Scroll the list of the available languages using the arrow keys (▲ ▼) and select the desired language;
- Activate your choice by pressing the **Save** (Save) button and confirm with OK. The system automatically quits the current page. If you press **Cancel** (Cancel), the previous settings are maintained.

In summary:



*Select the **Tools** icon* → *Select the **Quick Configuration** submenu* → *Select **L402 - Language*** → *Select a language and press **Save*** → *Confirm with **OK***

Figure 22: Setting the dialogue language

3.6.2. Setting the Country

NOTE

Changing the Country affects the configuration of the grid interface of the inverter.

NOTE

The grid interface configuration based on the Country where the inverter is installed may be changed only **within the first 12 hours after the commissioning of the inverter**. After this time interval, the Country setting may be changed only by the Customer Service of Elettronica Santerno SpA.

This section describes how to change the Country where the inverter is to be installed. Do the following:

- Stop the inverter by pressing the STOP button
- From the start menu, select the **Tools** ( ) icon;
- Select the **Quick Configuration** (QUICK CONFIGURATION) menu. Use the arrows (01 / 02) on the Status Bar to go to the first page of each submenu;
- Select **P040 - Country**; the screen below appears:

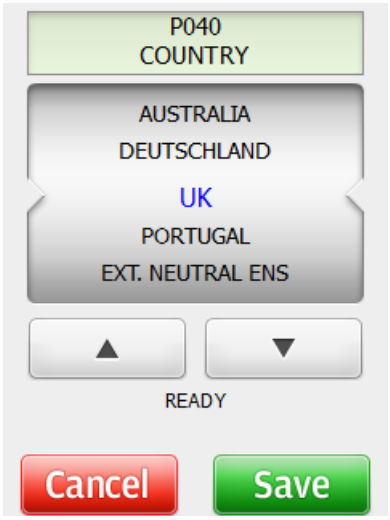
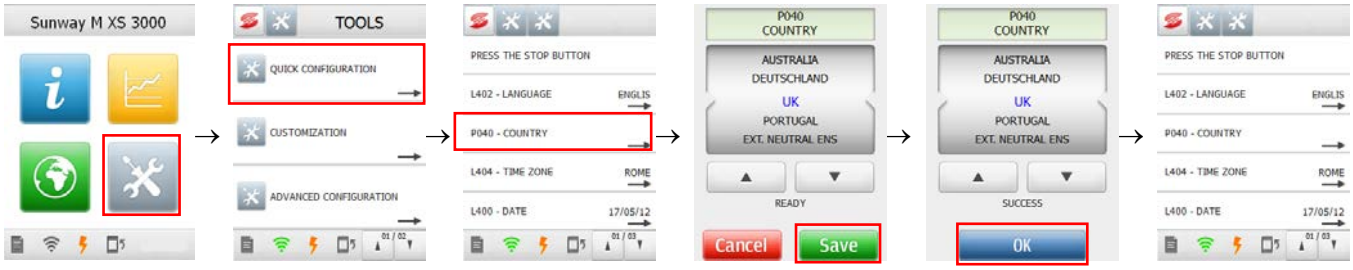


Figure 23: Country setting page

- Select the desired Country;
- Activate your choice by pressing the **Save** (Save) button and confirm with OK. The system automatically quits the current page. If you press **Cancel** (Cancel), the previous settings are maintained.

In summary:



*Select the **Tools** icon* | *Select the **Quick Configuration** submenu* | *Select **P040 - Country*** | *Select a value and press **Save*** | *Confirm with **OK***

Figure 24: Setting the Country

During the time interval when the Country may be changed (12h), the start menu shows the name of the Country which is currently selected. After that time interval, the Country is no longer displayed.

Figure 25: Name of the Country displayed in the start menu

3.6.3. Setting the Time Zone

This section describes how to change the time zone. Do the following:

From the start menu, select the **Tools** ( ) icon;

- Select the **Quick Configuration** (QUICK CONFIGURATION) menu. Use the arrows (01 / 02) on the Status Bar to go to the first page of each submenu;
- Select **L404 – Time zone**; the screen below appears:

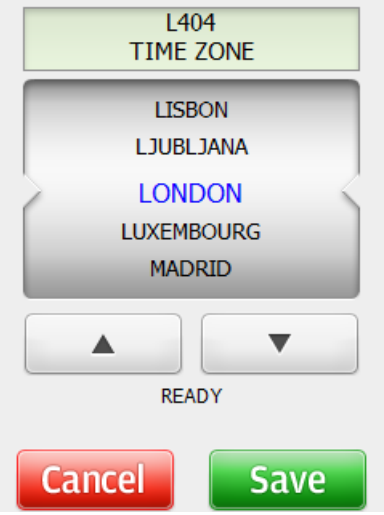


Figure 26: Time zone setting page

- Select the desired time zone;
- Activate your choice by pressing the **Save** (Save) button and confirm with OK. The system automatically quits the current page. If you press **Cancel** (Cancel), the previous settings are maintained.

In summary:

*Select the **Tools** icon* → *Select the **Quick Configuration** submenu* → *Select **L404 – Time zone*** → *Select a value and press **Save*** → *Confirm with **OK***

Figure 27: Setting the time zone

3.6.4. Setting the Date and Time

This section describes how to change the date and time of the inverter. Do the following:

- From the start menu, select the **Settings** ( ) icon;
- Select the **Quick Configuration** (QUICK CONFIGURATION) menu. Use the arrows (01 / 02) on the Status Bar to go to the first page of each submenu;
- Select **L400 - Date**; the screen below appears:

–

Figure 28: Setting the date

– Enter the date by pressing the buttons;
– Activate your choice by pressing the **Save** (Save) button and confirm with OK. The system automatically quits the current page. If you press **Cancel** (Cancel), the previous settings are maintained;
– Repeat the steps above for **L401 – Time**.

In summary:

*Select the **Tools** icon* → *Select the **Quick Configuration** submenu* → *Select **L400 - Date*** → *Enter the value and press **Save*** → *Confirm with **OK***

Figure 29: Setting the date

NOTE Setting the date and time of the inverter is required to properly view the graphs.

3.6.5. Setting the Currency

This section describes how to change the currency. Do the following:

- From the start menu, select the **Tools** ( ) icon;
- Select the **Quick Configuration** (QUICK CONFIGURATION) menu. Use the arrows (01 / 02) on the Status Bar to go to the second page of the submenus;
- Select **L403 - Currency**; the screen below appears:

Figure 30: Setting the currency

- Scroll the list of the available currencies using the arrow keys (▲ ▼) and select the desired currency;
- Activate your choice by pressing the **Save** (Save) button and confirm with OK. The system automatically quits the current page. If you press **Cancel** (Cancel), the previous settings are maintained.

In summary:

*Select the **Tools** icon* → *Select the **Quick Configuration** submenu* → *Select **L403 - Currency*** → *Select the currency and press **Save*** → *Confirm with **OK***

Figure 31: Setting the currency

3.6.6. Setting the Feed-in Tariff

This section describes how to change the parameters of the inverter net metering. The net-metering function constantly informs the consumers about the economic return of their PV plant. You have to set up the remuneration of the generated energy acknowledged by your Grid Administrator. On the basis of the remuneration and the generated energy, the inverter displays the overall gain. See measures **M200** (Total Pay-off) and **M201** (Partial Pay-off) in section 4.3.2.3.

Do the following:

- From the start menu, select the **Tools** ( ) icon;
- Select the **Quick Configuration** (QUICK CONFIGURATION) menu. Use the arrows (01 / 02) on the Status Bar to go to the second page of the submenus;
- Select **P130 – Incentive**; the screen below appears:

Figure 32: Net metering setting page

- Enter the desired value by pressing the buttons;
- Activate your choice by pressing the **Save** (Save) button and confirm with OK. The system automatically quits the current page. If you press **Cancel** (Cancel), the previous settings are maintained.

In summary:

*Select the **Tools** icon* → *Select the **Quick Configuration** submenu* → *Select **P130 - Incentive*** → *Enter the value and press **Save*** → *Confirm with **OK***

Figure 33: Setting the feed-in tariff

3.6.7. Resetting the History Data

The Reset command resets the logs of the display history data and restarts the datalogging function for the integrity of the history data after the date and time have been changed.

Do the following:

- From the start menu, select the **Tools** ( ) icon;
- Select the **Quick Configuration** (QUICK CONFIGURATION) submenu;
- Select **L500 – Reset History**. Use the arrows (01 / 02) on the Status Bar to go to the second page of the submenus. The screen below appears:

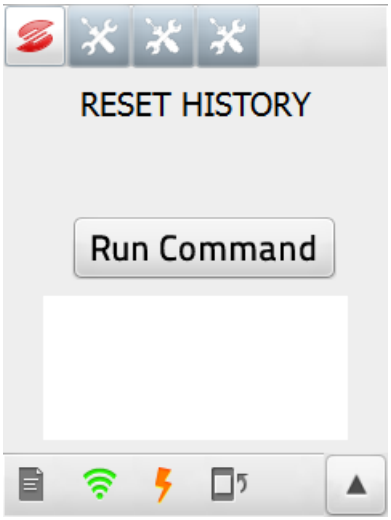
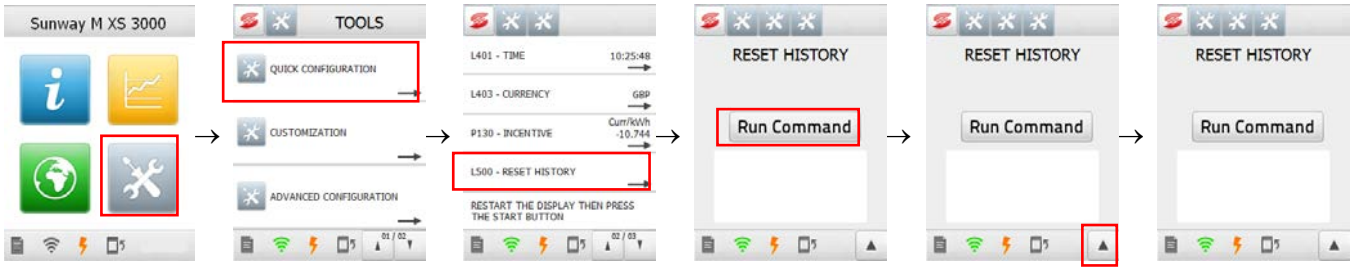


Figure 34: History data resetting page

- Run the command by pressing the Run Command button;
- Wait until the system notifies that the command has been run successfully;
- Quit the active window by pressing the return button ( ) in the bottom-right corner.

In summary:



*Select the **Tools** icon*

*Select the **Quick Configuration** submenu*

*Select **L500 – RESET HISTORY***

*Run the command by pressing the **Run Command** button*

Wait for the success message and quit by pressing the return button

Figure 35: History data resetting page

3.6.8. Resetting the Display

Resetting the display is required to ensure its correct operation after changing the display settings during the Quick Configuration procedure.

Do the following:

- From the start menu, select the **Tools** ( ) icon;
- Select the **Quick Configuration** (QUICK CONFIGURATION) submenu.
- Select **L011 – RESET DISPLAY**. Use the arrows (01 / 02) on the Status Bar to go to the second page of the submenus; the screen below appears:

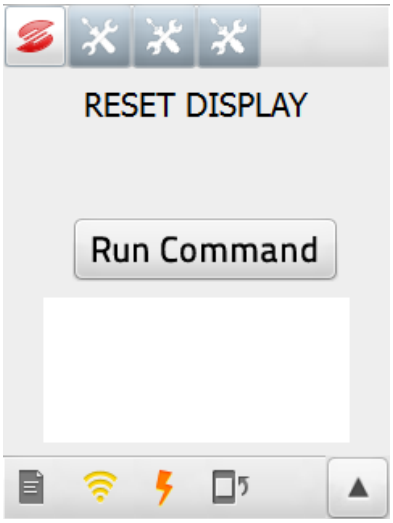
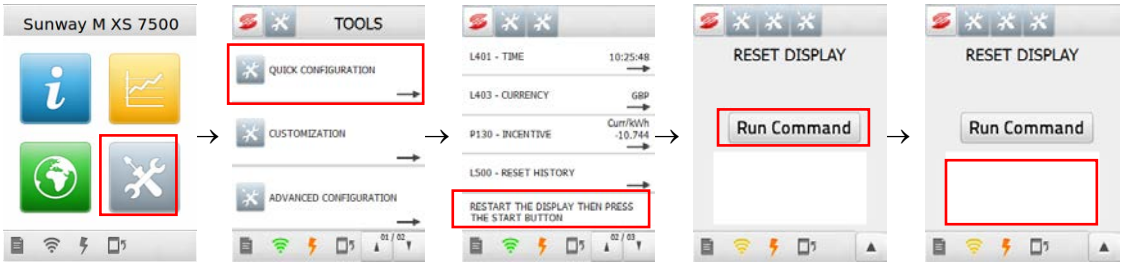


Figure 36: Display resetting page

- Run the command by pressing the Run Command button;
- Wait until the system notifies that the command has been run successfully and wait for the display reset.

In summary:



*Select the **Tools** icon* → *Select the **Quick Configuration** submenu* → *Select **RESTART THE DISPLAY THEN PRESS THE START BUTTON*** → *Run the command by pressing the Run Command button* → *Wait for the success message and the display reset*

Figure 37: Resetting the display

3.7. Connectivity

The Wi-Fi transmitter is to be inserted into the USB connector using the special adapter.

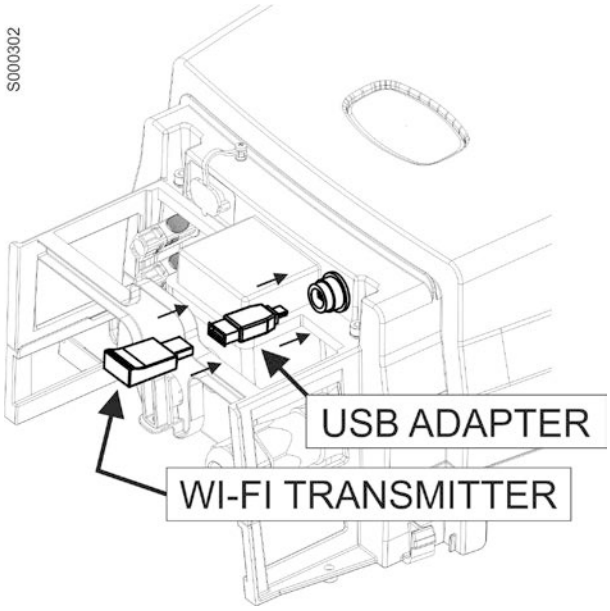


Figure 38: Inserting the Wi-Fi transmitter

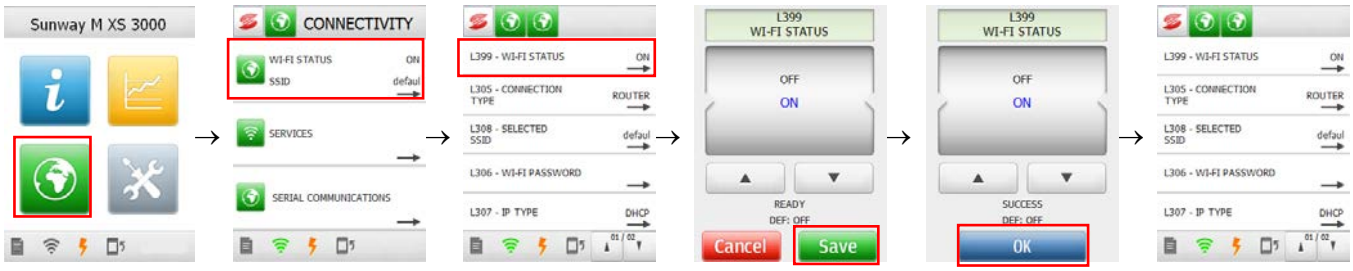
3.7.1. Wi-Fi Connectivity

The SUNWAY M XS features Wi-Fi 802.11 b/g connectivity for *ad hoc* (point-to-point) connection or for the connection of the inverter to a *WLAN* (wireless area network).

NOTE The Wi-Fi connection is to be disabled before changing the Wi-Fi settings.

3.7.1.1. Wi-Fi Activation and Deactivation

The Wi-Fi status may be set up by the user from the Wi-Fi > Wi-Fi Status in the Connectivity menu.



*Select the **Connectivity** icon* → *Select the **Wi-Fi Status SSID** submenu* → *Select **Wi-Fi Status*** → *Select the desired status and press **Save*** → *Confirm with **OK***

Figure 39: Activating the Wi-Fi connection

3.7.1.2. AD HOC Connection

The *AD HOC* connection enables connecting a PC to a different device allowing using one of the consulting methods in section 4 for one or more inverters, with no need to exploit an existing wireless network.

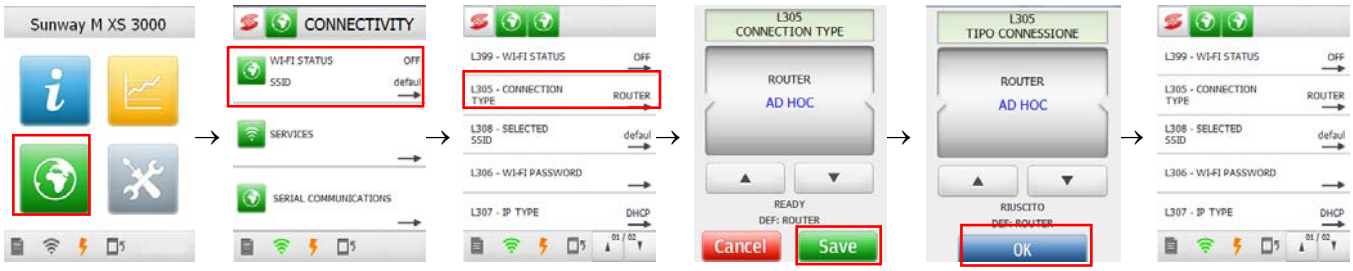
NOTE

When using the *AD HOC* connection, unencrypted data is transmitted from/to the inverter.

When an *AD HOC* connection is established, the Wi-Fi status icon is green or yellow during data transmit/receive. The red Wi-Fi icon may therefore indicate that a connection is correctly established but no data exchange is occurring.

Do the following in order to establish an *AD HOC* connection with the inverter:

- Set “AD HOC” as the type of connection (L305);
- By activating the “AD HOC” connection, the inverter will create a network supporting the connection of an external device (e.g. iPhone), identified with the “Santerno_MXS” SSID. In multi-inverter plants, the inverters will automatically assign themselves unique IP addresses within the same “Santerno_MXS” network.



*Select the **Connectivity** icon* → *Select the **Wi-Fi Status SSID** submenu* → *Select **L305 – Connection Type*** → *Select “Ad Hoc” and press **Save*** → *Confirm with **OK***

Figure 40: Setting the *AD HOC* connectivity

- Activate the Wi-Fi connection (see Figure 39)
- Connect the second device to the AD HOC network made available by the inverter.

For the connection to the AD HOC network of devices featuring Wi-Fi connectivity, please refer to the relevant User Manuals.

On completion of this procedure, access the Wi-Fi status window (see Figure 59) to check the connection status. If a screen similar to the one in the figure is displayed, this means that the connection is completed successfully. Some check values for AD HOC connection are given below:

- ESSID: Sunway_MXS
- the IP address shall by of type 169.254.xxx.xxx
- Subnet: 255.255.000.000

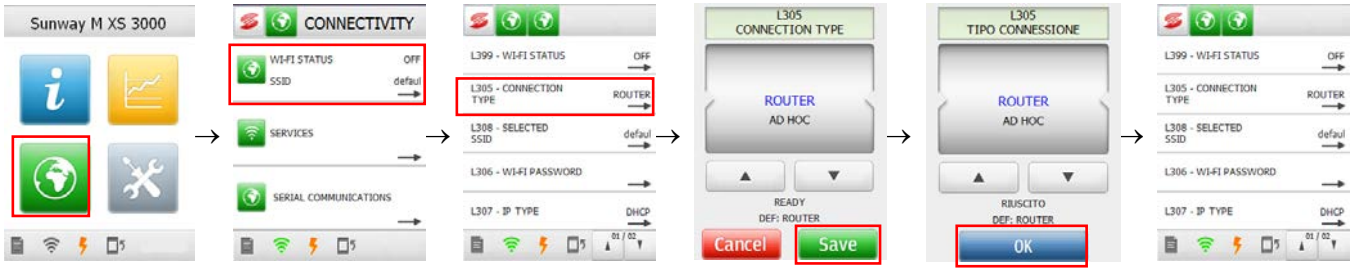
3.7.1.3. Router Connection

CAUTION The SUNWAY M XS inverter may be connected only to WPA encrypted networks by entering an alphanumeric password from 8 to 63 characters.

The ROUTER connection allows connecting the inverter to an existing wireless infrastructure, thus allowing the other devices connected to the same network to use the consult methods in section 4 and allowing the inverter itself to gain access to the Internet in the event of an infrastructure connected to the network.

Do the following to connect the inverter to an existing network:

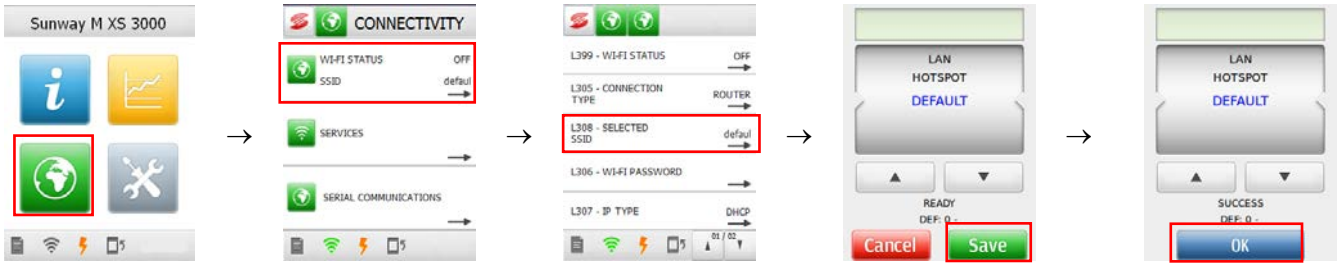
– Set "**L305 – Connection Type"** to "ROUTER";



*Select the **Connectivity** icon* → *Select the **Wi-Fi Status SSID** submenu* → *Select **Connection Type*** → *Select "ROUTER" and press **Save*** → *Confirm with **OK***

Figure 41: Setting the ROUTER connectivity

– Select the network where the inverter is to be connected to. Select "**L308 – SELECTED SSID**" to view the networks detected by the inverter and to select the desired network;



*Select the **Connectivity** icon* → *Select the **Wi-Fi Status SSID** submenu* → *Select **L308 – SELECTED SSID*** → *Select the desired network and press **Save*** → *Confirm with **OK***

Figure 42: Selecting the desired network

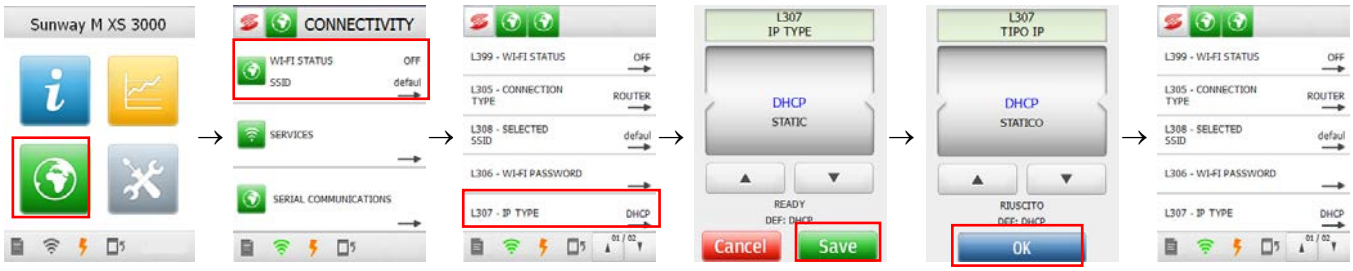
– Set the network access password:

*Select the **Connectivity** icon* → *Select the **Wi-Fi Status SSID** submenu* → *Select **L306 –Wi-Fi Password*** → *Enter the value and press **Save*** → *Confirm with **OK***

Figure 43: Setting the network access password

– Set the IP address assignment mode. Select:

  - "DHCP" if you desire that the IP address is assigned by the router or access point (factory setting). By selecting the "DHCP" mode, the additional connection parameters will be set up directly by the router or access point. The IP address, however, may be changed by the router or access point over time;
  - "STATIC" if you desire to manually enter the IP address to be assigned to the inverter. By selecting the "STATIC" mode, the IP address will remain unchanged over time. The user is required to know all the specifications of the connection network to avoid conflicts in assigning static IP addresses of other devices. Also, the user is required to set any other connection parameter after selecting the "STATIC" mode.



*Select the **Connectivity** icon* | *Select the **Wi-Fi Status SSID** submenu* | *Select **L307 – IP Type*** | *Select the desired mode and press **Save*** | *Confirm with **OK***

Figure 44: IP address assignment mode

– Set the IP address (only if you chose the "STATIC" method for the IP address assignment). The set up of this parameter requires knowing the network the inverter is to be connected to. The IP address is to be composed of 12 digits, including any zeros.

*Select the **Connectivity** icon* | *Select the **Wi-Fi Status SSID** submenu* | *Select **L301 –IP address (page 2)*** | *Enter the value and press **Save*** | *Confirm with **OK***

Figure 45: Setting the IP address

– Set the subnet mask (only if you chose the "STATIC" method for the IP address assignment). Setting this parameter requires knowing the network the inverter is to be connected to. A typical value for domestic environments is 255.255.255.000.

*Select the **Connectivity** icon* | *Select the **Wi-Fi Status SSID** submenu* | *Select **L302 - Subnet mask (page 2)*** | *Enter the desired value and press **Save*** | *Confirm with **OK***

Figure 46: Setting the subnet mask

- Set the gateway (only if you chose the “STATIC” method for the IP address assignment). Setting this parameter requires knowing the network the inverter is to be connected to. A typical value for domestic environments is the IP address of the router or the access point.

*Select the **Connectivity** icon* → *Select the **Wi-Fi Status SSID** submenu* → *Select **L303 – Gateway (page 2)*** → *Enter the desired value and press **Save*** → *Confirm with **OK***

Figure 47: Setting the gateway

– Set the DNS (only if you chose the “STATIC” method for the IP address assignment). Setting this parameter requires knowing the network the inverter is to be connected to.

*Select the **Connectivity** icon* → *Select the **Wi-Fi Status SSID*** → *Select **L311 – DNS (page 2)*** → *Enter the desired value and press **Save*** → *Confirm with **OK***

Figure 48: Setting the DNS

– Activate the Wi-Fi connection (3.7.1). If the Wi-Fi status icon is green and the screen is similar to the one in Figure 59, this means that the connection is completed successfully.

NOTE

In the event of failures connecting the inverter to an existing network, contact your local Network Administrator.

3.7.2. Accessing the Inverter Data

The SUNWAY M XS may be monitored in wireless mode directly by the user, who can check status information, such as operating measures, alarms tripped and events fired, with no need to implement demanding wiring solutions.

Data exchange with the inverter is made possible via a Wi-Fi connection operating as described above.

NOTE

Data access is protected by a password associated with the serial number of the product. The password is given in a form contained in the box of the product.

The consulting modes below are available only when the inverter is powered on. If the PV field voltage is too weak (higher than the value set in **P020 – FIELD REFERENCE**), the inverter stops after the time set in **P041 – POWER OFF TIMEOUT**. Parameter **P041** may be changed by the user to keep the inverter on for the desired time even when the PV field reference is too weak, in order to exploit the functionality described above. Setting parameter **P041** to 0 fully inhibits the inverter shut down.

3.7.2.1. Web Browser

The Web Browser application is compatible with the most popular web browsers, such as Chrome, Firefox, Internet Explorer (version 8 or greater) and Safari. Do the following to consult the information made available by the inverter:

- Open the web browser from the device connected to the same “ROUTER” or “AD HOC” network as the inverter;
- In the address bar of the browser, enter the IP address of the target inverter (e.g. http://192.168.0.3);
- When you are required for authentication, enter the serial number of the product as the username and enter the password received when purchasing the product;
- Navigate through the contents made available from the application. The values on the right of the web page are updated every minute.

If multiple inverters are connected to the same wireless network, the web-like page will display the data relating to all the connected inverters, both as discrete data and as aggregate data, after entering the authentication parameters for all the inverters.

NOTE

The authentication parameters may be stored by the browser to avoid entering them each time a connection is established. The user is responsible for any implications in terms of information protection.

The web-like page displayed by the inverter features on-line Help functionality that can be activated by pressing the  icon in the top-right corner.

3.7.2.2. iPhone application

NOTE

The iPhone application is available for iPhone 3 and more recent models.

The iPhone Application developed by Elettronica Santerno for the connection to the SUNWAY M XS inverters may be downloaded from Apple iTunes.

The iPhone Application allows displaying the status info of the inverter as well as the main operating measures, both in local mode and in remote mode—after the first connection in local mode has been established. The inverter is to be enabled for accessing the Internet via the Wi-Fi connection and the Sunwayportal.it service is to be activated (parameter **L505**).

NOTE

The iPhone Application generates data traffic. Costs may vary based on the user’s tariff plan. Costs are charged to the user.

Do the following to consult the inverter data from your iPhone:

- Launch the SUNWAY M XS application;
-

Figure 49: Icon of the SUNWAY M XS application on the iPhone

- Complete the startup wizard;
- When you are required for authentication, enter the serial number of the product as the username and enter the password received when purchasing the product;
- Navigate through the contents made available from the application.

3.7.3. Sunwayportal.it

The SUNWAY M XS inverters, if connected to the Internet via Wi-Fi, may send the main info about the inverter status and measures to the Sunwaportal.it service of Elettronica Santerno SpA. Information may be accessed in remote mode as well.
Sending data to the Sunwayportal.it is a functionality that can be enabled from the Services submenu in the Connectivity menu. Do the following to access the Sunwayportal.it service:

- Activate the Sunwayportal.it functionality:

*Select the **Connectivity** icon* → *Select the **Services** submenu* → *Select **L505 – SUNWAYPORTAL .IT*** → *Select **ENABLE** and press **Save*** → *Confirm with **OK***

Figure 50: Activating the Sunwayportal.it service

Once the Sunwayportal.it functionality is activated, proceed with authentication entering the serial number of the inverter as the username and the password given in the form contained in the box of the product.

3.7.4. Technical Support

The SUNWAY M XS inverters, if connected to the Internet via Wi-Fi, may be remotely accessed by the Customer Service of Elettronica Santerno SpA. Assistance is given via an encrypted communication channel between the inverter and Elettronica Santerno SpA Customer Service, whose staff is allowed to access the measures and programming parameters of the inverter. This functionality allows the Customer Service to promptly operate on the inverter.

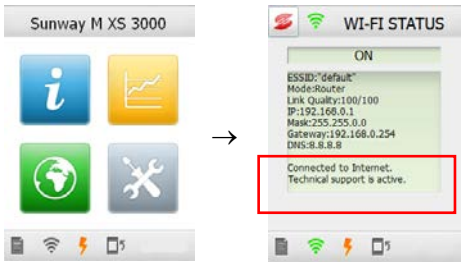
Before activating the Technical Support, contact the Customer Service of Elettronica Santerno SpA with the serial number of the inverter. The Technical Support functionality may be activated from the Services submenu in the Connectivity menu. Do the following:

– Activate the Technical Support functionality:

*Select the **Connectivity** icon* | *Select the **Services** menu* | *Select **L502 – Technical Support*** | *Select **ENABLE** and press **Save*** | *Confirm with **OK***

Figure 51: Activating the Technical Support Service

– Check if the Technical Support functionality is activated:



*Select the **Wi-Fi Status** icon* | *Wait until the "**Technical support is active**" message appears*

Figure 52: Checking the Technical Support Service

NOTE

The activation of the Technical Support is persistent. The Technical Support functionality is to be deactivated when assistance is finished.

The date and time of the inverter must be correctly set up for the activation of the Technical Support functionality.

3.7.5. Connectivity Troubleshooting

- The desired network is not listed among the available networks
  Possible cause:
  - The router cannot be detected by the inverter because it is too far
  - The router has a hidden wireless network

- No connection is established between the inverter and the selected router
  Possible cause:
  - The router is too far from the inverter and no stable connection may be established
  - Wrong password entered (the password is case-sensitive)
  - The router does not implement WPA cryptography for the network security
  - The inverter is assigning a DHCP IP address and the router DHCP is disabled
  - The inverter is assigning a STATIC IP address and the address being set up is in conflict with the address of a different device connected to the same network

- No connection to the Internet is established from the inverter
  Possible cause:
  - The router is not connected to the Internet
  - The Gateway is set to a wrong value. The typical Gateway IP address displayed on the Wi-Fi status window must be the same IP address of the router. Contact your network administrator for complex networks
  - The DNS is set to a wrong value. The factory setting (8.8.8.8) is to be left unchanged.

- The Technical Support service is not correctly activated
  Possible cause:
  - The inverter fails connecting to the Internet. See the case in point
  - Date and time are not set correctly

- The inverter is connected to the selected network but the web page cannot be accessed
  Possible cause:
  - The device from which you are trying to consult the web page is not connected to the same network as the inverter

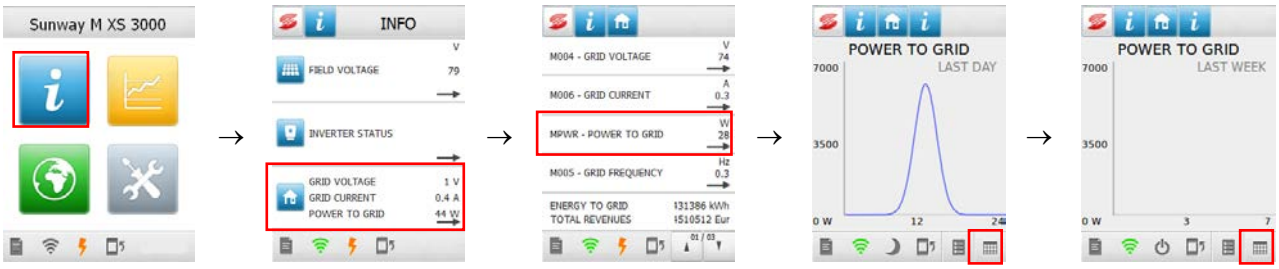
3.8. Datalogging

The SUNWAY M XS inverters may store the measures listed in Table 4.

The user may display the history measures over 4 time intervals:

- the latest day, considered as the latest 24 hours, with a resolution of 1 data item/minute;
- the latest week, considered as the latest 7 days, with a resolution of 1 data item/day;
- the latest month, considered as the latest 30 days, with a resolution of 1 data item/day;
- the latest year, considered as the latest 52 weeks, with a resolution of 1 data item/week.

The stored data may be displayed by selecting the measure inside the desired menu and by accessing the relevant graph. Figure 53 is an example of how to display a measure graph.



*Select the **Info** icon*

*Select the **Grid** submenu*

*Select **MPWR – Power to Grid***

Select the icon to change the time interval

Select the icon again to switch to a different time interval

Figure 53: Displaying a measure graph

The user may also choose 3 measures from Table 4 to customize the Main Graph (4.3.3).

ID	Function	Type	Can be graphically represented
	Empty		
M058	(Temperature) Boost	Measure	Yes
M006	Grid Current	Measure	Yes
M002	Field 1 Current	Measure	Yes
M059	(Temperature) Heatsink	Measure	Yes
MPWR	Power to Grid	Measure	Yes
M004	Grid Voltage	Measure	Yes
M000	Field 1 Voltage	Measure	Yes
M021	Field 2 Voltage	Measure	Yes
M057	Internal Temperature	Measure	Yes
M005	Grid Frequency	Measure	Yes
M024	Field 2 Current	Measure	Yes

Table 4: Logged variables

4. GRAPHIC INTERFACE MODULE

The full-colour, graphic touchscreen display is located on the inverter front. The touchscreen display is the HMI of the inverter. When the inverter is powered on, the appearance of the graphic interface module is as in Figure 54.

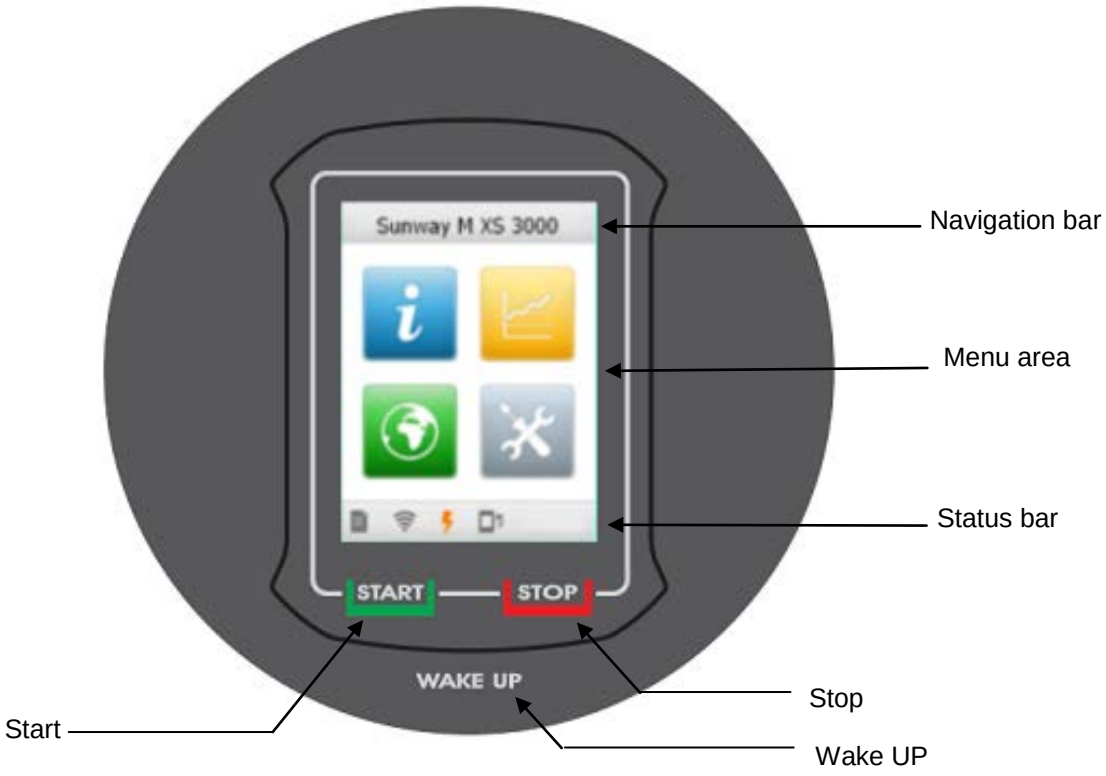


Figure 54: Graphic interface module/Touchscreen display – Start menu

The **START** button for the inverter startup and the **STOP** button for the inverter stoppage, due to maintenance reasons, are located in the bottom part of the graphic interface module.

Pressing the **START** button is required only for the inverter commissioning. Once commissioned, the inverter will automatically start up every morning when the required operating conditions are achieved.

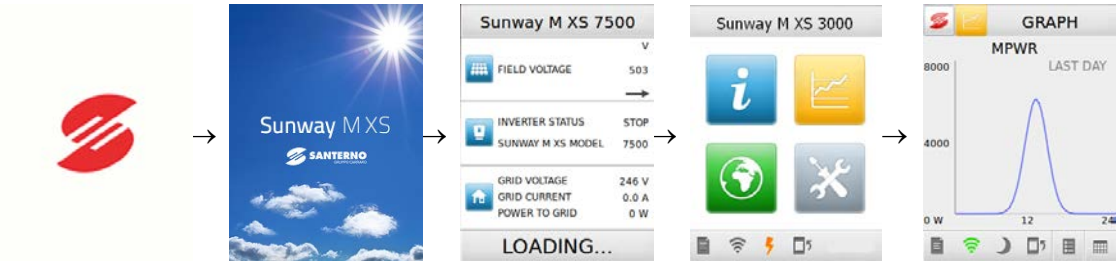
After pressing the **STOP** button, the inverter is kept stopped until the **START** button is pressed again, regardless of the operating conditions.

NOTE

Press **START** after commissioning or maintaining the inverter to restore the normal operation of the inverter. If this is not the case, the inverter will not automatically restart even though the correct operating conditions are restored.

In the absence of solar radiation, the inverter will automatically deactivate. When solar radiation is enough to start the inverter, the SUNWAY M XS will automatically restart and will resume energy generation. The inverter may be restarted at any time by pressing the **WAKE UP** button from the graphic interface module.
.

When the inverter is started, the touchscreen display shows the following screens in sequence:



Santerno Logo *Sunway M screen* *Loading… screen* *Start menu* *Default screen (Graph as a factory setting)*

Figure 55: Screens of the graphic interface module at power on

When no input has been received for 5 minutes, the touchscreen display automatically turns off to reduce self-consumption to a minimum. Press anywhere on the display to turn it on again.

4.1. Navigating in the Graphic Interface

The touchscreen display uses a menu and submenu tree to organize the information made available to the user. Menus and submenus are divided into four main areas in the **Menu Area** in the main window (Figure 56). Touch an icon to navigate to its contents.

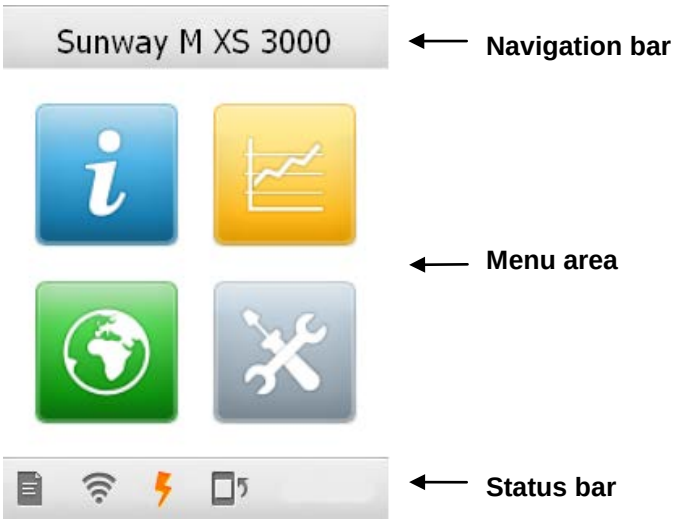


Figure 56: Start menu

The graphic layout of the application is divided into 3 main areas:

Area	Description
Navigation bar	The Navigation Bar is populated by different icons allowing the user to know the navigation position inside the menus. Icons are displayed based on the selected items in the menus.
Menu area	The Menu Area displays the information about the product as well as all the configuration parameters. These items are divided into some areas identified on the main page by the 4 main buttons below: • Info menu (blue button) • Graphic menu (yellow button) • Connectivity menu (green button) • Tools menu (grey button)
Status bar	The Status Bar comprises the icons relating to the most important information of the inverter for easy access from any part of the menus. The 4 icons on the left allow navigating to the following: • Alarm and event history data • Wi-Fi status • Inverter status • Default view (4.3.5.2) Additional buttons necessary to navigate inside the menus are viewed if required by the organisation of the active menu.

The areas above are populated by contents varying based on the current position in the menu tree.

Figure 57 shows an example of a screen. The main interactive items are described below.

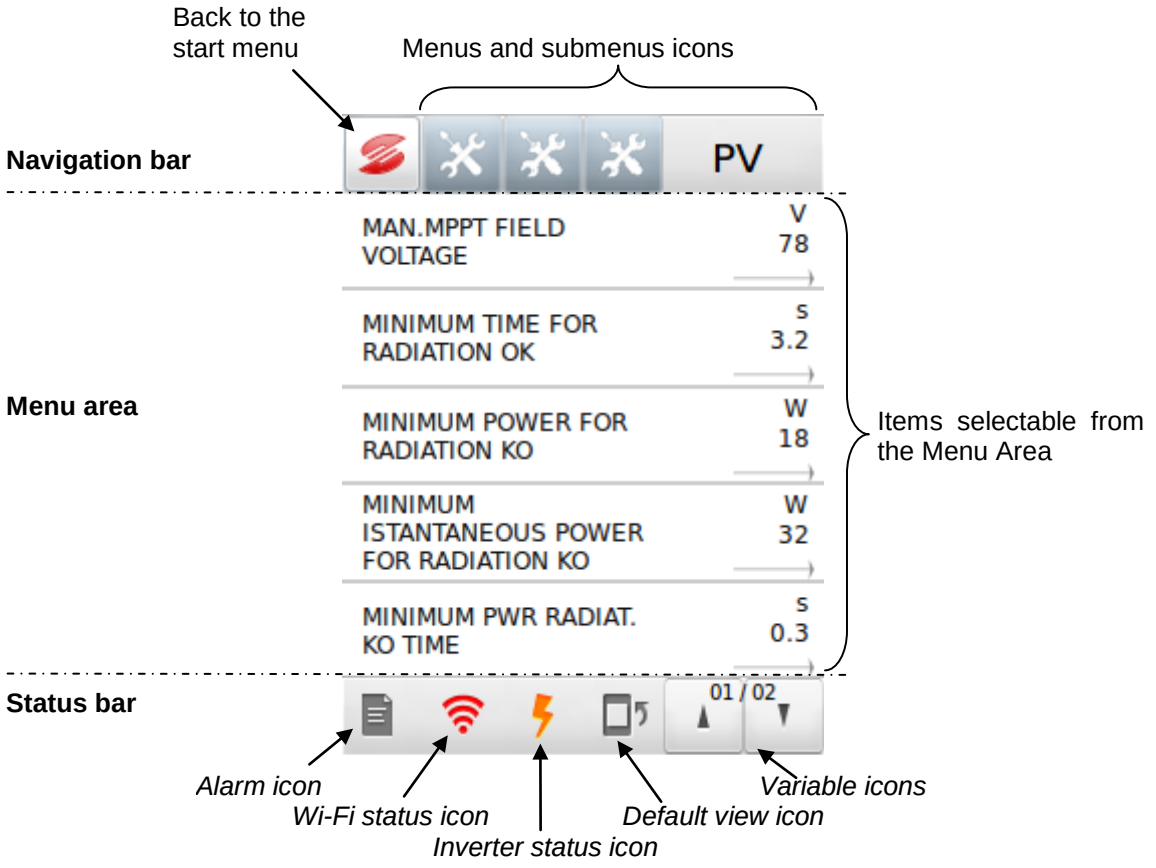


Figure 57: Example of a screen

4.1.1. Navigation Bar

The Navigation Bar displays the icons for easy navigation to the different menus and submenus:

- Back to the start menu icon: allows going back to the **start menu** from any position in the menus.
- Menu and submenu icons: graphically represent the current position in the menus. Select one of the icons preceding the last icon from the right to return to the upper level.

4.1.2. Menu Area

The Menu Area displays the items allowing interaction with the inverter. The items marked with an arrow may be displayed as a graph or may lead to a dialog window (see section 4.3).

4.1.3. Status Bar Area

The Status Bar Area includes four fixed icons and two variable icons depending on the page displayed. The fixed icons are detailed below:

- Alarms icon: allows accessing the Alarms menu from any page in the program (see section 4.3.6). The Alarms menu contains the lists of the alarms and events of the system.
  The icon can have two statuses:

  No alarms tripped.

  Alarm(s) tripped but the user has not yet viewed the relevant details (see section 4.3.6).

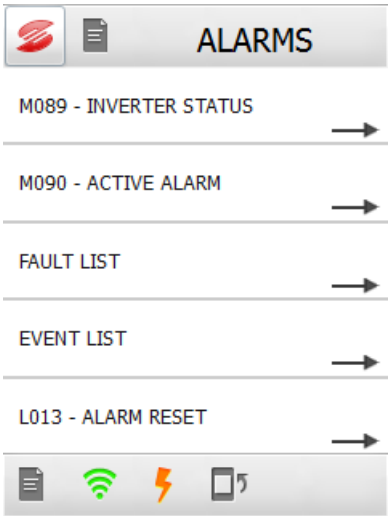


Figure 58: Screen of the Alarms menu

- Wi-Fi Status icon: allows accessing the Wi-Fi Status menu, including Wi-Fi connectivity info, such as the name of the network SSID, the IP address of the inverter and the quality of the Wi-Fi connection.

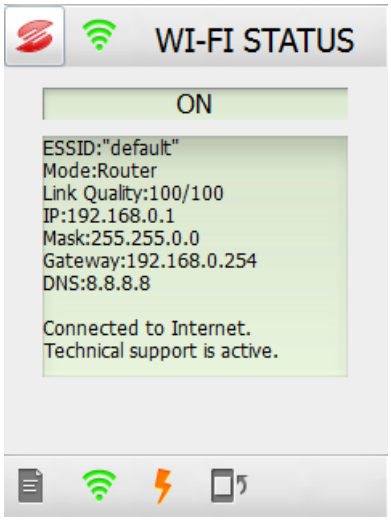


Figure 59: Screen of the Wi-Fi Status menu

The icon can have four statuses:

Hardware not fitted or hardware fault.
If your SUNWAY M XS is provided with an external Wi-Fi connector, make sure that it is correctly inserted into the USB port of the inverter.
If the Wi-Fi functionality is integrated into the product, the grey Wi-Fi icon may indicate that the Wi-Fi connection has been inactive for a while. If the icon is pressed, it will turn to red. This does not indicate any malfunction.
If the problem persists, please contact the Customer Service.

Wi-Fi connection failed.

Wi-Fi connection established, but the connection is poor quality.

Wi-Fi connection established, the connection is good quality.

The Wi-Fi Status menu is detailed in section 4.3.9.

- Inverter Status icon: allows accessing the inverter Status menu 4.3.9.

Figure 60: Screen of the inverter Status menu

The Status menu icon represents the operating conditions of the inverter. The icon can have three statuses:

Indicates that the inverter is powered, but the PV field voltage is lower than the value set in parameter **P020**.

This inverter status normally occurs:

- o in the early morning, when the PV field voltage is too weak for energy generation
- o in the daytime, when solar radiation is weak
- o in the evening, before the inverter shuts off

Indicates that the inverter is correctly operating and is feeding power to the grid.

Indicates that an alarm tripped.

The Status menu is detailed in section 4.3.7.

- Default View icon: allows accessing the default view, that can be set up via the Customization > Display submenu in the Tools menu (see sections 4.3.3.2 and 4.3.5). The default view is displayed by the inverter after no input has been received for a reasonably long time.

4.2. Display Windows and Data Enter Windows

The windows listed below make it possible to display the measures made available from the inverter and to change the system settings:

1. **Graph window**. See section 4.2.1.
2. **Alphanumeric keypad window**. See section 4.2.2.
3. **List window**. See section 4.2.3.
4. **Run Command window**. See section 4.2.4.

4.2.1. Graph Window

The graph window shows the pattern of the selected measure. This window may be accessed from the Menu Area by selecting one of the measures marked with an arrow.

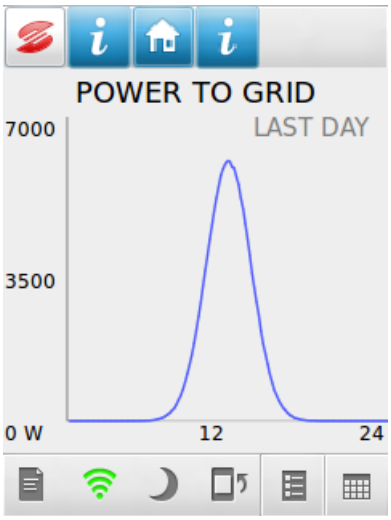


Figure 61: Example of a measure graph

The two right-most icons in the bottom-right corner of the Graph window may vary and allow doing the following:

Accesses the key of the graph. Select the icon to display a list of the measures that are graphically represented, their colour and instant value.
The graph may be customized from the Customization submenu in the Tools menu.

Selection of the time period. The icon allows changing the time period in the graph by selecting one of the 4 time periods: the latest day, the latest week, the latest month or the latest year. Press the icon repeatedly to switch from a time period to the other.

4.2.2. Alphanumeric Keypad Window

The alphanumeric keypad window enables entering alphanumeric values in the selected field, as detailed below:

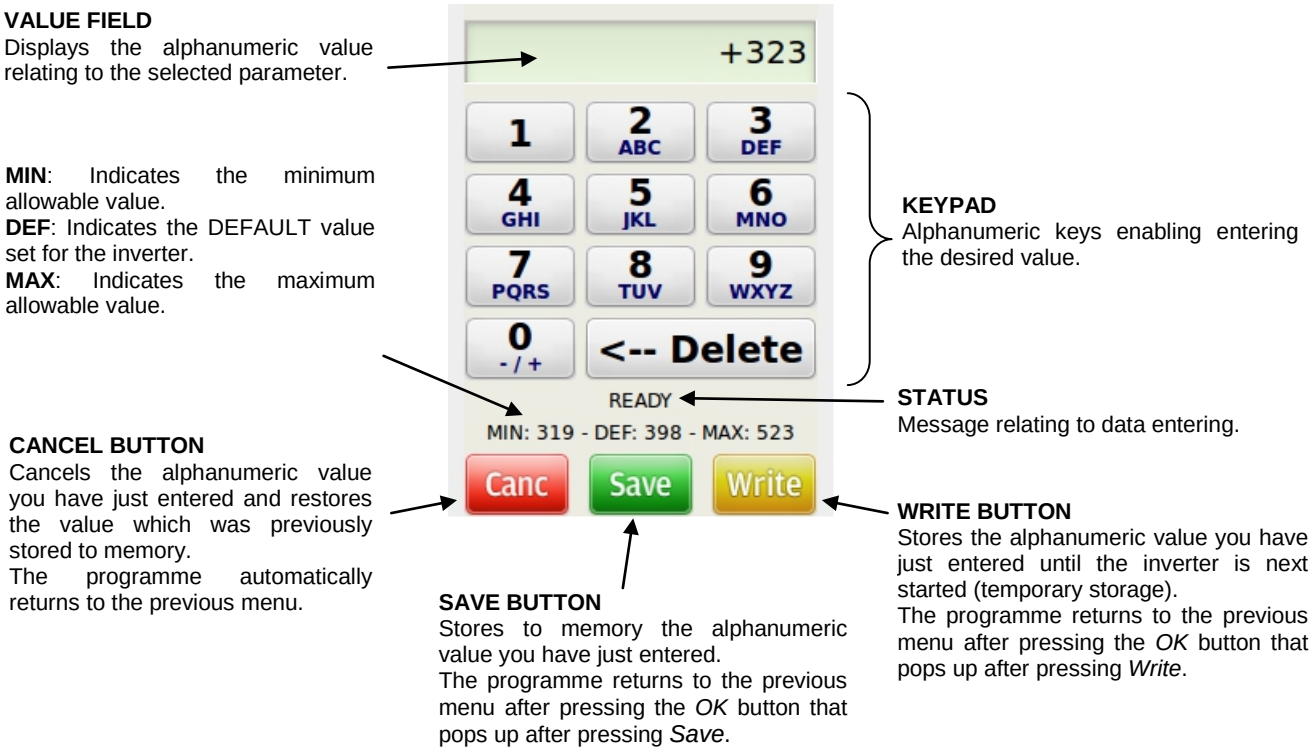


Figure 62: Example of an alphanumeric keypad window

By pressing an alphanumeric key from the keypad, the digit is displayed first, followed by the characters included in the same key.

Some function keys are available:

- Key “1”: if pressed twice, enters a space;
- key “0”:
  - enters 0, -, + when entering digits
  - enters 0 and toggles between CAPS and lower case when entering text messages. The activation of this functionality affects the latest character entered.
  - “Delete” key: deletes a character at a time from right to left.

NOTE

The BASIC access level features two confirmation buttons:

– **CANCEL** cancels the data entered;

– **SAVE** stores the data entered to permanent memory.

The ADVANCED access level features three confirmation buttons:

– **CANCEL** cancels the data entered;

– **SAVE** stores the data entered to permanent memory;

– **WRITE** stores the data entered until the inverter is next powered on (temporary storage). The previous value is restored at next power on.

4.2.3. List Window

The list window allows entering or changing a parameter chosen from a list, as detailed below:

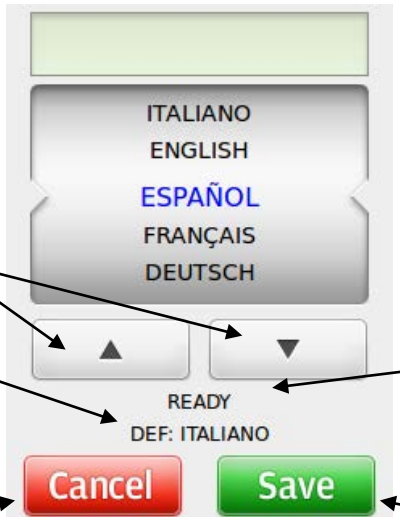


Figure 63: Example of a list window

NOTE

The BASIC access level features two confirmation buttons:

- **CANCEL** cancels the data entered;
- **SAVE** stores the data entered to permanent memory.

The ADVANCED access level features three confirmation buttons:

- **CANCEL** cancels the data entered;
- **SAVE** stores the data entered to permanent memory;
- **WRITE** stores the data entered until the inverter is next powered on (temporary storage). The previous value is restored at next power on.

4.2.4. Command Execution Window

This command execution window allows sending a command to the inverter, as detailed below:

Figure 64: Example of a Run Command window

4.3. Description of the Menus

The menus and submenus of the graphic interface module are divided into the four main areas represented by the four icons in the start menu.

Figure 65: Icons of the Menu Area in the start menu

1. Info Menu

Measures and programming parameters of the inverter. See section 4.3.2 for details.

2. Graph Menu

Graphic display of the measures that can be customized by the user. See section 4.3.3 for details.

3. Connectivity Menu

Provides information about connectivity and relevant setting parameters. See section 4.3.4 for details.

4. Tools Menu

Provides tools and configuration parameters of the inverter. See section 4.3.5 for details.

4.3.1. Organisation of Measures and Parameters

The parameter configuration involves two access levels:

- **BASIC** (factory setting): displays the main measures and parameters;
- **ADVANCED:** displays the advanced measures and enables accessing all the parameters.

The access level may be changed by the user from **Customization > Access Level > User Level** in the Tools menu (see section 4.3.5.2).

The BASIC access level features two confirmation buttons:

– **CANCEL** cancels the data entered;

– **SAVE** stores the data entered to permanent memory.

NOTE

The ADVANCED access level features three confirmation buttons:

– **CANCEL** cancels the data entered;

– **SAVE** stores the data entered to permanent memory;

– **WRITE** stores the data entered until the inverter is next powered on (temporary storage). The previous value is restored at next power on.

NOTE

NOTE Set the ADVANCED level to program the inverter parameters.

The information and configuration variables are grouped as follows:

- Measures. These values may only be displayed and cannot be changed by the user. Each measure is identified by letter **M** followed by 3 digits (e.g. **M001**). Measures are detailed as follows in the sections below:

Mxxx	**Range**	Internal representation	Value displayed on the touchscreen display (may be a decimal figure) plus unit of measure
Name of the measure	**Active**	If present, this field indicates if and when the measure is valid. When this field is not present, the measure concerned is considered as ALWAYS active.	
	Address	Modbus address from which the measure is read (integer).	
	Level	Access level (BASIC / ADVANCED).	
	Function	Description of the measure.	

Table 5: Template of the measure descriptive tables

- Parameters. These values may be changed by the user in order to configure the inverter operation. Each parameter is identified by one of the following letters: **P**, **I**, **C** or **R**. Each letter is followed by 3 digits (e.g. **P020**). Parameters are detailed as follows in the sections below:

Pxxx	**Range**	Internal representation of the device (integer)	Value displayed on the touchscreen display (may be a decimal figure) plus unit of measure
Name of the parameter	**Default**	Factory setting of the parameter (as represented internally).	Factory setting of the parameter (as displayed) plus unit of measure.
	Level	Access level (BASIC / ADVANCED).	
	Active	If present, this field indicates if and when the measure is valid. When this field is not present, the measure concerned is considered as ALWAYS active.	
	Id/Address	Device Address/Modbus address the parameter is read from or written to (integer).	
	Function	Description of the parameter.	

Table 6: Template of the parameter descriptive tables

- Display variables. These values relate to the display. Some of them may only be displayed, some other may be changed by the user. Each variable is identified by letter **L** followed by 3 digits (e.g. **L001**). Variables are detailed as follows in the sections below:

Lxxx	**Range**	Value displayed on the touchscreen display (may be a decimal figure) plus unit of measure
Name of the variable	**Default**	Factory setting of the parameter (as displayed) plus unit of measure.
	Function	Description of the parameter.

Table 7: Template of the variable descriptive tables

4.3.2. Info Menu

The icons of the menus and submenus in the Info area are blue in colour and allow monitoring the inverter measures. Each measure is identified by letter **M** followed by 3 digits.

Figure 66 shows the Info menu tree, while Table 8, Table 9 and Table 10 describe each submenu belonging to the Info menu.

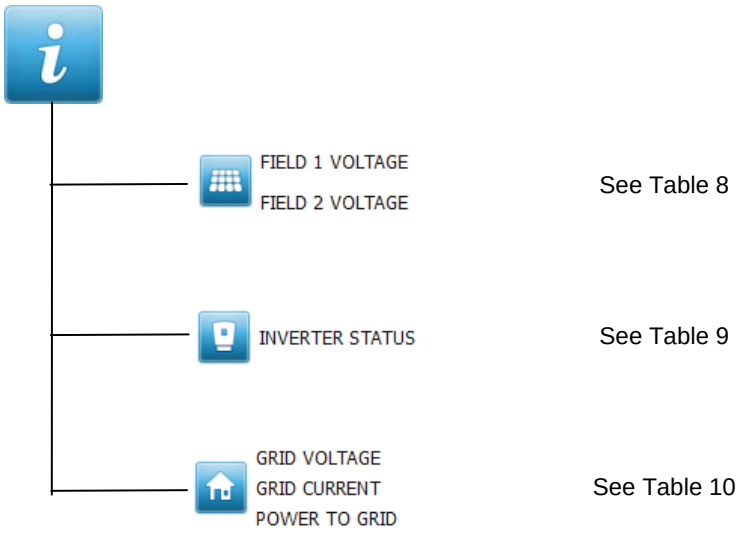


Figure 66: Info menu tree

4.3.2.1. Field Submenu

Menu	 FIELD 1 VOLTAGE FIELD 2 VOLTAGE	
Submenu	**Access Level**	**Action**
M000 – FIELD 1 VOLTAGE Displays the instant value of the PV field 1 voltage **NOTE:** This measure is valid only if the PV field is coupled to the inverter	BASIC	Displays the measure graph.
M002 – FIELD 1 CURRENT Displays the instant value of the PV field 1 current	BASIC	Displays the measure graph.
M001 – MPPT 1 REFERENCE Displays the instant value of the MPPT reference for PV field 1	ADVANCED	None. View-only item.
M011 – FIELD 2 VOLTAGE Displays the instant value of the PV field 2 voltage **NOTE:** This measure is valid only if the PV field is coupled to the inverter	BASIC	Displays the measure graph.
M012 – FIELD 2 CURRENT Displays the instant value of the PV field 2 current	BASIC	Displays the measure graph.
M024 – MPPT 2 REFERENCE Displays the instant value of the MPPT reference for PV field 2	ADVANCED	None. View-only item.
M017 – POSITIVE POLE INSULATION RESISTANCE, FIELD 1 Displays if the insulation resistance of the positive pole of PV field 1 is exceeding the value required by the standards in force	ADVANCED	None. View-only item.
M018 – POSITIVE POLE INSULATION RESISTANCE, FIELD 2 Displays if the insulation resistance of the positive pole of PV field 2 is exceeding the value required by the standards in force	ADVANCED	None. View-only item.
M019 – NEGATIVE POLE INSULATION RESISTANCE Displays if the insulation resistance of the positive pole of PV fields 1 and 2 is exceeding the value required by the standards in force	ADVANCED	None. View-only item.

Table 8: Info menu, Field submenu

M000	Range	0 ÷ 6200	0 ÷ 620.0 V
Field 1 Voltage	Id/Address	1/1653	
	Level	BASIC	
	Function	PV field 1 voltage that has been measured.	

M001	Range	0 ÷ 6200	0 ÷ 620.0 V
MPPT 1 Reference	Id/Address	1/1651	
	Level	ADVANCED	
	Function	When the inverter is running, this is the measure of the voltage reference generated by the MPPT of PV field 1; when the inverter is *not* running, this is the voltage value of the PV field 1 voltage.	

M002	Range	0 ÷ 1925	0 ÷ 19.25 A
Field 1 Current	Id/Address	1/1655	
	Level	BASIC	
	Function	PV field current that has been measured.	

M017	Range	0÷1	KO÷OK
Positive Pole Insulation Resistance, Field 1	Id/Address	1/1670	
	Level	ADVANCED	
	Function	Indicates if the insulation resistance to earth of the positive pole of PV field 1 is exceeding 700kOhm.	

M018	Range	0÷1	KO÷OK
Positive Pole Insulation Resistance, Field 2	Id/Address	1/1672	
	Level	ADVANCED	
	Function	Indicates if the insulation resistance to earth of the positive pole of PV field 2 is exceeding 700kOhm.	

M019	Range	0÷1	KO÷OK
Negative Pole Insulation Resistance	Id/Address	1/1670	
	Level	ADVANCED	
	Function	Indicates if the insulation resistance to earth of the positive pole of PV fields 1 and 2 is exceeding 700kOhm.	

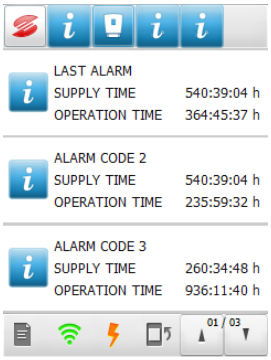
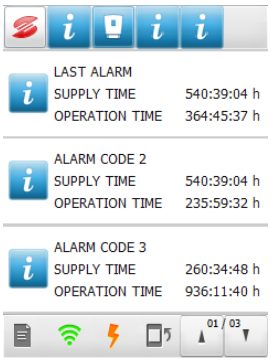
M021	Range	0 ÷ 6200	0 ÷ 620.0 V
Field 2 Voltage	Id/Address	1/1654	
	Level	BASIC	
	Function	Field 2 voltage that has been measured.	

M022	Range	0 ÷ 6200	0 ÷ 620.0 V
MPPT 2 Reference	Id/Address	1/1656	
	Level	ADVANCED	
	Function	When the inverter is running, this is the measure of the voltage reference generated by the MPPT of PV field 2; when the inverter is *not* running, this is the voltage value of the PV field 2 voltage.	

M024	Range	0 ÷1925	0 ÷ 19.25 A
Field 2 Current	Id/Address	1/674	
	Level	BASIC	
	Function	Field current that has been measured.	

4.3.2.2. Inverter Submenu

<table>
<tr><th>Menu</th><td colspan="2">INVERTER STATUS
ACTIVE ALARM</td></tr>
<tr><th>Submenu</th><th>Access Level</th><th>Action</th></tr>
<tr><td>INVERTER STATUS
ACTIVE ALARM

Displays the Event History and the Alarm History</td><td>BASIC</td><td>Select the icon to display the following items:
– M089 – INVERTER STATUS
– M090 – ACTIVE ALARM
– ALARM HISTORY
Displays the Alarm History. See section 4.3.6 for details.
 
• EVENT HISTORY
Displays the Event History. See section 4.3.6 for details.
  </td></tr>
<tr><td>PRODUCT INFO

Displays the information on the product specifications and programming modes</td><td>BASIC</td><td>Select the icon to display the following items:
• MLBL – SUNWAY M XS MODEL
• PRSN – SERIAL NUMBER
• L000 – DISPLAY SOFTWARE
• INVERTER SOFTWARE
• M040 – COUNTRY</td></tr>
<tr><td>DIAGNOSTICS

Displays diagnostic information</td><td>BASIC</td><td>Select the icon to display the following items:
• M098 – SUPPLY TIME
• M099 – OPERATION TIME
• M058 – BOOST TEMPERATURE
• M059 – HEATSINK TEMPERATURE
Displays the measure graph.
• M057 – INTERNAL TEMPERATURE
Displays the measure graph.</td></tr>
</table>

Table 9: Info menu, Inverter submenu

M089	Range	See Table 25	See Table 25
Inverter Status	Id/Address	1/1662	
	Level	BASIC	
	Function	Describes the operating conditions of the inverter.	

M090	Range	See section 4.3.6	See section 4.3.6
Active Alarm	Id/Address	1/7711	
	Level	BASIC	
	Function	Active alarm.	

MLBL	Range	2200, 3000, 3800	2200, 3000, 3800
Sunway M XS Model	Id/Address	1/1706	
	Level	BASIC	
	Function	Indicates the size of the product.	

PRSN	Range	0 ÷ 9999999	0 ÷ 9999999
Serial Number	Id/Address	1/517	
	Level	BASIC	
	Function	Indicates the serial number of the product.	

L000	Range	N/A	
Display Software	Level	BASIC	
	Function	Indicates the software version installed on the touchscreen display.	

SWVer	Range	0÷9999	0÷9999
Inverter Software	Id/Address	1/475	
	Level	BASIC	
	Function	Indicates the software version installed on the inverter microcontrollers.	

L004	Range	N/A	
Menu Version	Level	BASIC	
	Function	Indicates the version of the menu structure.	

M097	Range	$0 \div 2^{32}$	$0 \div 2^{32}$ in units of 200 ms displayed as hh:min:sec
Operation Time	Id/Address	1/1684	
	Level	ADVANCED	
	Function	Operation time of the inverter while delivering energy. This measure is expressed in 32bits divided into two 16-bit words: the low part and the high part.	

M098	Range	$0 \div 2^{32}$	$0 \div 2^{32}$ n units of 200 ms displayed as hh:min:sec
Supply Time	Address	1/1680	
	Level	ADVANCED	
	Function	Time when the inverter is power supplied. This measure is expressed in 32bits divided into two 16-bit words: the low part and the high part.	

M057	Range	-100 ÷ +120	-100,00 ÷ +150 °C
Internal Temperature	Address	1/1661	
	Level	ADVANCED	
	Function	Measure of the temperature internal to the inverter.	

M058	Range	-100 ÷ +120	-100.00 ÷ +150 °C
Boost Temperature	Address	1/1660	
	Level	ADVANCED	
	Function	Measure of the heatsink temperature in the boost converter area.	

M059	Range	-100 ÷ +120	-100.00 ÷ +120 °C
Heatsink temperature	Address	1/1669	
	Level	ADVANCED	
	Function	Measure of the heatsink temperature in the inverter area.	

4.3.2.3. Grid Submenu

Menu	 GRID VOLTAGE GRID CURRENT POWER TO GRID	
Submenu	**Access Level**	**Action**
M004 – GRID VOLTAGE Displays the instant value of the grid voltage	BASIC	Displays the measure graph.
M006 – GRID CURRENT Displays the instant value of the grid current	BASIC	Displays the measure graph.
MPWR – GRID POWER Displays the instant value of the power delivered to the grid	BASIC	Displays the measure graph.
M005 – GRID FREQUENCY Displays the instant value of the grid frequency	BASIC	Displays the measure graph.
M324 – AUTOTEST Displays the result of the autotest procedure	BASIC	Displays the results and the data when the autotest of the interface protections has been made.
M010 – TOTAL ENERGY Displays the total value of the energy delivered to the grid **M200 – TOTAL PAY-OFF** Displays the total pay-off resulting from the produced energy	BASIC	None. View-only item.
M011 – PARTIAL ENERGY Displays the partial energy delivered to the grid **M201 – PARTIAL PAY-OFF** Displays the total pay-off resulting from the produced energy	BASIC	None. View-only item.

Table 10: Info menu, Grid submenu

M004	Range	0 ÷ 4950	0 ÷ 495.0 V
Grid Voltage	Id/Address	1/1657	
	Level	BASIC	
	Function	Measured grid voltage.	

M005	Range	0÷32768	0÷327.7Hz
Grid Frequency	Id/Address	1/1658	
	Level	BASIC	
	Function	Measured grid frequency.	

M006	Range	2200TL: 0 ÷ 1800 3000TL: 0 ÷ 2400 3800TL: 0 ÷ 3000	2200TL: 0 ÷ 18.0 A 3000TL: 0 ÷ 24.0 A 3800TL: 0 ÷ 30.0 A
Grid Current	Id/Address	1/1667	
	Level	BASIC	
	Function	Current fed to the grid.	

MPWR	Range	2200TL: 0 ÷ 4000 3000TL: 0 ÷ 4000 3800TL: 0 ÷ 4000	2200TL: 0 ÷ 4000 W 3000TL: 0 ÷ 4000 W 3800TL: 0 ÷ 4000 W
Power to Grid	Id/Address	1/1686	
	Level	BASIC	
	Function	Active power delivered to the grid.	

M010	Range	$0 \div 2^{32}$	xxxxxkWh
Total Energy	Id/Address	1/1672	
	Level	BASIC	
	Function	Active energy delivered to the grid.	

M011	Range	$0 \div 2^{32}$	xxxxxkWh
Partial Energy	Id/Address	1/654	
	Level	BASIC	
	Function	Partial count of the active energy delivered to the grid.	

M200	Range	$0 \div 2^{32}$	xxxxCur
Total Pay-off	Id/Address	1/1676	
	Level	BASIC	
	Function	This measure represents the total pay-off resulting from the total count of the energy delivered to the grid, where Cur represents the currency set in **L403**. The pay-off is displayed by setting the feed-in tariff in **P130**.	

M201	Range	$0 \div 2^{32}$	xxxxCur
Partial Pay-off	Address	1/1678	
	Level	BASIC	
	Function	This measure represents the partial pay-off resulting from the total count of the energy delivered to the grid, where Cur represents the currency set in **L403**. The pay-off is displayed by setting the feed-in tariff in **P130**.	

NOTE The partial energy counter may be reset from the Settings → Commands → Partial Energy Reset submenu.

4.3.3. Graph Menu

The icon of the Graph menu is yellow in colour. The Graph menu displays a graph window (4.2.1) where up to three custom measures may be displayed. Measures may be selected from the **Customization > Display > Graph** submenu (see section 4.3.5.2) in the Tools menu. The **MPWR** (Power to Grid) measure is displayed as a factory setting.
The Graph menu may be set up as the Default View from **Customization > Display > L450 – Default View** (factory setting).

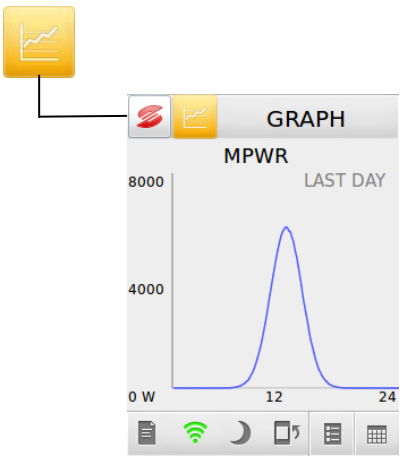


Figure 67: Graph menu

4.3.3.1. Customization of the Measures to be Graphically Displayed

The selection of the measures to be graphically displayed is made from the **Customization > Display** submenu in the Tools menu. Do the following:

- From the start menu, select the **Tools** ( ) icon;
- Select the **Customization** (CUSTOMIZATION) icon, then the **Display** (DISPLAY) submenu;
- Select **GRAPH**, then select the measure to be customized. The screen below appears:

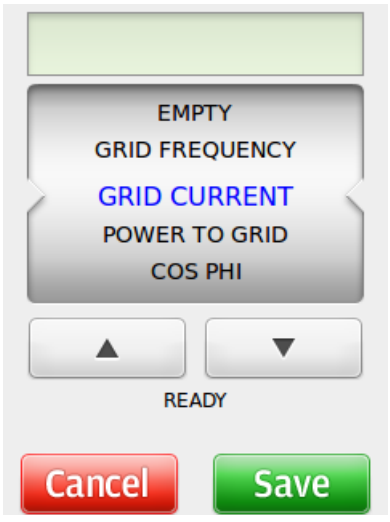
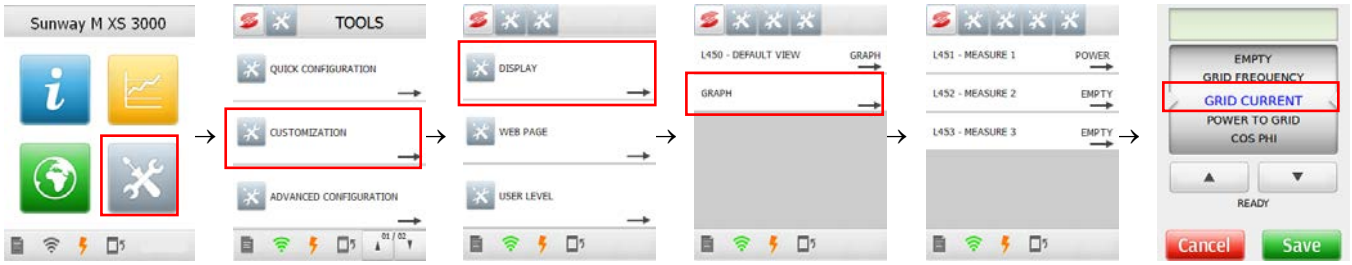


Figure 68: Selection page for the measure to be graphically displayed

- Scroll the list of the available measures with the arrow keys ( ) and activate the desired measure;

- Activate your choice by pressing the **Save** (Save) button and confirm with OK. The system automatically quits the current page. If you press **Cancel** (Cancel), the previous settings are maintained;
- Repeat the operation for the other measures (if any) to be graphically represented;
- Press to return to the start menu.

In summary:



*Select the **Tools** icon* | *Select the **Customization** submenu* | *Select the **Display** submenu* | *Select the **Graph** item* | *Select one of the three customizable measures* | *Select the variable to be graphically represented, , press **SAVE** and confirm with **OK***

Figure 69: Steps to take for the customization of the measures to be graphically displayed

4.3.3.2. Setting the Graph Menu as the Default View

Setting the Graph menu as the default view is possible from the **Customization > Display** submenu in the Tools menu. Do the following:

- From the start menu, select the **Tools** ( ) icon;
- Select the **Customization** (CUSTOMIZATION) icon, then select the **Display** (DISPLAY) submenu.
- Select **Default View**; the screen below appears:

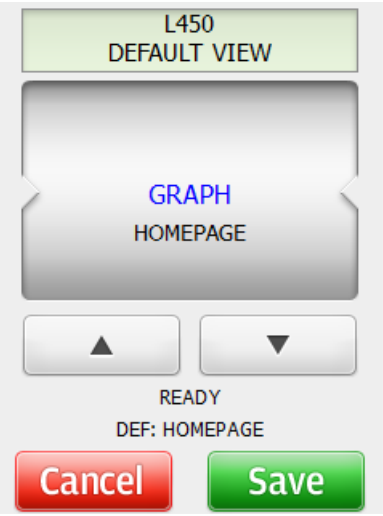


Figure 70: Setting page of the Default View

- Scroll the list of the available measures with the arrow keys (▲ ▼) and activate the desired measure;

- Activate your choice by pressing the Save (Save) button and confirm with OK. The system automatically quits the current page. If you press Cancel (Cancel), the previous settings are maintained;
- Press to return to the start menu.

In summary:

*Select the **Tools** icon* → *Select the **Customization** submenu* → *Select the **Display** submenu* → *Select **L450 – Default View*** → *Select **GRAPH** and press **SAVE*** → *Confirm with **OK***

Figure 71: Setting the Graph menu as the Default View

4.3.4. Connectivity Menu

The icons of the menus and submenu in the Connectivity area are green in colour and enable doing the following:

- display the information about the connectivity status;
- configure the Wi-Fi connection;
- access the software update and remote assistance functions;

The identifier parameter for each item is marked with **L** or **R** followed by three digits.

Figure 72 shows the Connectivity menu tree, while Table 11 and Table 12 describe each parameter relating to the inverter connectivity.

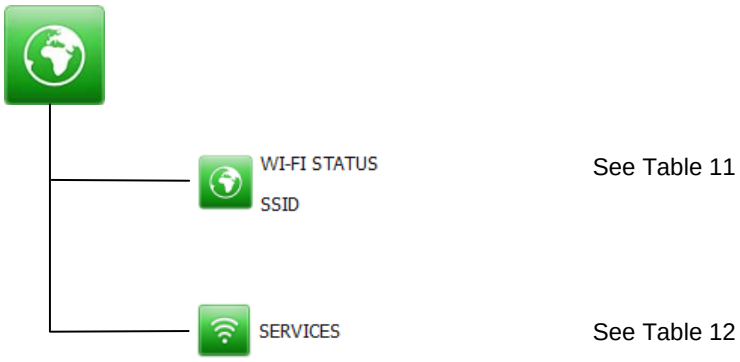


Figure 72: Connectivity menu tree

4.3.4.1. Wi-Fi Submenu

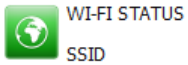
Menu		
Submenu	**Access Level**	**Action**
L399 – WI-FI STATUS Displays the current setting of the parameter	BASIC	Activates a list window. Select: – OFF – ON
L305 – CONNECTION TYPE Displays the current setting of the parameter	BASIC	Activates a list window. Select: – ROUTER: connection via Router or Access Point – AD HOC: direct connection between the inverter and the device (PC or Smartphone).
L308 – SELECTED NETWORK Displays the current setting of the parameter	BASIC	Activates a window containing a list of the available networks. Select the target network for the Wi-Fi connection.
L306 – WI-FI PASSWORD Sets the password for the Wi-Fi connection	BASIC	Activates an alphanumeric keypad window. Set the password of the target network for the Wi-Fi connection.
L307 – IP TYPE Displays the current setting of the parameter	BASIC	Activates a list window. Select: – DHCP – STATIC
L301 – IP ADDRESS Displays the current setting of the parameter	BASIC	Activates an alphanumeric keypad window. Write the desired IP address.
L302 – SUBNET MASK Displays the current setting of the parameter	BASIC	Activates an alphanumeric keypad window. Set the desired value.
L303 – GATEWAY Displays the current setting of the parameter	BASIC	Activates an alphanumeric keypad window. Set the desired value.
L311 – DNS Displays the current setting of the parameter	BASIC	Activates an alphanumeric keypad window. Set the desired value.

Table 11: Connectivity menu, Wi-Fi submenu

L399	Range	OFF, ON
Wi-Fi Status	Default	OFF
	Level	BASIC
	Function	This variable allows setting the activation status of the Wi-Fi connection.

L307	Range	ROUTER, AD HOC
Connection Type	Default	ROUTER
	Level	BASIC
	Function	This variable selects the type of connection to establish.

L308	Range	N/A
Select Grid	Default	default
	Level	BASIC
	Function	If a Wi-Fi ROUTER connection (section 3.7.1.3) is established, this variable contains the name of the target network for the Wi-Fi connection. The user may choose among a list populated based on the Wi-Fi networks detected by the inverter. If an AD HOC connection is established (see section 3.7.1.2), this variable assumes the “Sunway_MXS” value.

L306	Range	Alphanumeric value ranging from 8 to 63 characters
Wi-Fi Password	Default	Default
	Level	BASIC
	Function	This variable contains the password enabling accessing the target wireless network for the Wi-Fi connection.

L307	Range	DHCP, STATIC
IP Address Assign Mode	Default	DHCP
	Level	BASIC
	Function	This variable selects the assign mode of the IP address of the inverter when this is connected to an existing network. DHCP = the address is assigned to the inverter by an external agent, such as the reference access point. STATIC = the user sets the IP address of the inverter.

L301	Range	000.000.000.000 ÷ 255.255.255.255
IP Address	Default	N/A
	Level	BASIC
	Function	This variable represents the IP address of the inverter when connected to a communications network. This variable is read-only for the ROUTER connection, with active DHCP and for the AD HOC connection. This variable may be written by the user in ROUTER mode, with inactive DHCP (STATIC IP address assigned). See variable **L307**.

L302	Range	000.000.000.000 ÷ 255.255.255.255
Subnet Mask	Default	255.255.248.000
	Level	BASIC
	Function	This variable represents the subnet mask of the inverter when connected to a communications network. This variable is read-only for the ROUTER connection, with active DHCP and for the AD HOC connection. This variable may be written by the user in ROUTER mode, with inactive DHCP (STATIC IP address). See variable **L307**.

L303	Range	000.000.000.000 ÷ 255.255.255.255
Gateway	Default	000.000.000.000
	Level	BASIC
	Function	This variable represents the IP address of the network gateway. This variable is read-only for the ROUTER connection, with active DHCP and for the AD HOC connection. This variable may be written by the user in ROUTER mode, with inactive DHCP (STATIC IP address). Setting a wrong variable may compromise the right connection of the PC or the Smartphone to the inverter, thus compromising the inverter access to the Internet.

L311	Range	000.000.000.000 ÷ 255.255.255.255
DNS	Default	8.8.8.8
	Level	BASIC
	Function	This variable represents the IP address of the DNS. Setting a wrong variable compromises the inverter access to the Internet.

4.3.4.2. Services Submenu

Menu	SERVICES	
Submenu	**Access Level**	**Action**
L505 – SUNWAYPORTAL.IT Displays the current setting of the parameter	BASIC	Activates a list window. Select: – DISABLED – ENABLED
L502 – TECHNICAL SUPPORT Displays the current setting of the parameter	BASIC	Activates a list window. Select: – DISABLED – ENABLED
L010 – DISPLAY UPDATE Displays the current setting of the parameter	BASIC	Activates a list window. Select: – DISABLED – ENABLED
L501 – INVERTER UPDATE Enables updating the inverter firmware	BASIC	Activates a "Run command" window. Press the Run Command button. The messages relating to the execution of the command will be displayed.

Table 12: Connectivity menu, Services submenu

L505	Range	DISABLED, ENABLED
Sunwayportal.it	Default	ENABLED
	Level	BASIC
	Function	This variable enables the activation of the Sunwayportal.it service.

L502	Range	DISABLED, ENABLED
Technical Support	Default	DISABLED
	Level	BASIC
	Function	This variable enables the activation of the Technical Support. The Technical Support service enables remote access to the inverter measures and programming parameters by the Customer Service of Elettronica Santerno SpA. The inverter is to be connected to a Wi-Fi network and is to be connected to the Internet for the activation of the service.

L010	Range	DISABLED, ENABLED
Display Update	Default	DISABLED
	Level	BASIC
	Function	This variable enables the update procedure of the software implemented in the touchscreen display.

L501	Range	N/A
Inverter Update	Level	BASIC
	Function	This variable enables the update procedure of the firmware implemented in the inverter.

4.3.5. Tools Menu

The icons of the menus and submenus belonging to this macroarea are grey in colour and enable displaying the operating parameters that can be changed by the user. The identifier parameter for each item is marked with letter **P**, **C**, **I**, **L** and **R** followed by three digits.

The SUNWAY M XS inverter is factory-set with a set of parameters fitting most applications. Therefore, the Quick Configuration settings are normally sufficient for the correct operation of the inverter.

Figure 73 shows the Tools menu tree. The submenus in the Tools menu are detailed in the sections below.

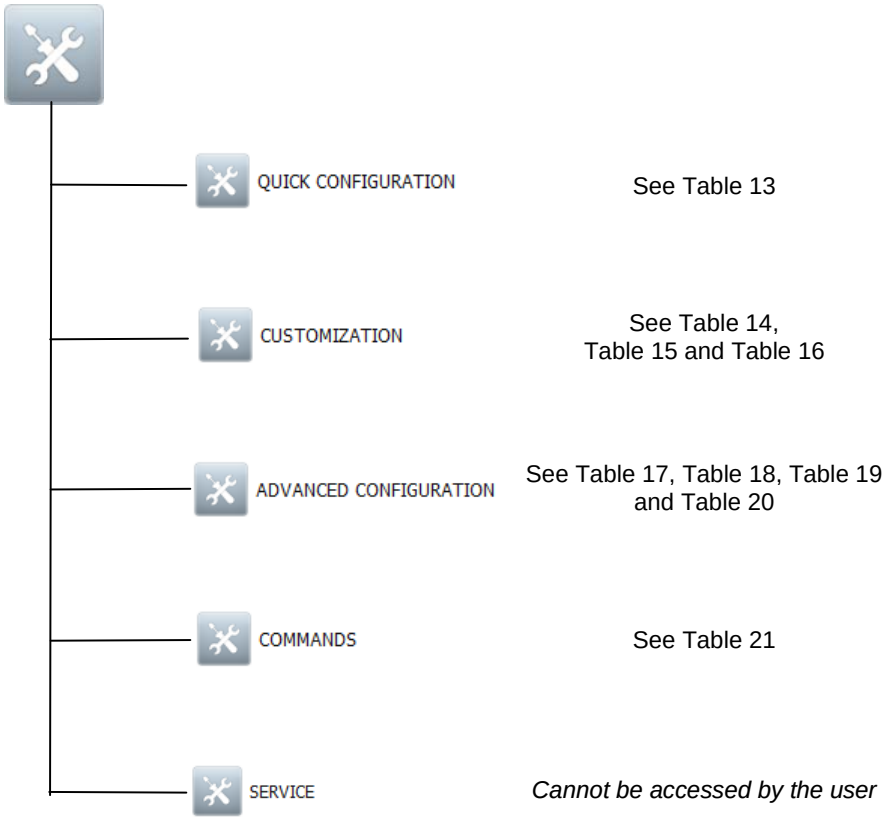


Figure 73: Tools menu tree

4.3.5.1. Quick Configuration Submenu

The Quick Configuration submenu groups the settings to be configured when commissioning the inverter for its correct operation. See section 3.6 for details.

Menu	QUICK CONFIGURATION	
Submenu	**Access Level**	**Action**
L402 – LANGUAGE Displays the current language of the touchscreen display	BASIC	Activates a list window. You can select one of the following: – ITALIANO – ENGLISH – ESPAÑOL – FRANÇAIS – DEUTSCH
P040 – COUNTRY Displays the Country for the grid interface configuration	BASIC	Activates a list window. You can select one of the following: – ITALIA – ESPAÑA – CONT. GREECE – GREEK ISLANDS – FRANCE – BELGIQUE – AUSTRALIA – DEUTSCHLAND – UK – PORTUGAL – EXT. NEUTRAL ENS
L404 – TIME ZONE Displays the time zone set for the inverter	BASIC	Activates a list window. Select the desired time zone.
L400 – DATE Displays the date set for the inverter	BASIC	Activates a list window. Select the desired date.
L401 – TIME Displays the time set for the inverter	BASIC	Activates a list window. Select the desired time.
L403 – CURRENCY Displays the currency set for the inverter	BASIC	Activates a list window. Select the desired currency.
P130 – INCENTIVE Displays the remuneration incentive for the produced energy	BASIC	Activates a list window. Select the desired value.
L500 – HISTORY RESET Resets the alarm history of the touchscreen display	BASIC	Activates a run command window. Press the Run Command button and wait for the success message.
L011 – DISPLAY RESET Resets the touchscreen display	BASIC	Activates a run command window. Press the Run Command button and wait for the success message. When the command is run, the touchscreen display will be shut off and restarted.

Table 13: Tools menu, Quick Configuration submenu

L011	Range	N/A
Display Reset	Default	N/A
	Level	BASIC
	Function	This is a command to reset the touchscreen display.

L400	Range	01/01/1970 ÷ 19/01/2038
Date	Default	01/01/1970
	Level	BASIC
	Function	Sets the date for the inverter. If the inverter is connected to the Internet, the date will be automatically updated.

L401	Range	00:00 ÷ 23:59
Time	Default	00:00
	Level	BASIC
	Function	Sets the time for the inverter. If the inverter is connected to the Internet, the date will be automatically updated based on the time zone set in **L404**.

L402	Range	ITALIANO, ENGLISH, ESPAÑOL, FRANÇAIS, DEUTSCH
Language	Default	ENGLISH
	Level	BASIC
	Function	Sets the language for the graphic interface programme.

L403	Range	AUD, BRL, CAD, CHF, DKK, EUR, GBP, INR, JPY, NOK, NZD, RMB, RUB, SEK, USD
Currency	Default	EUR
	Level	BASIC
	Function	Sets the currency. The currency is used for **M200 – Total Pay-off** and **M201 – Partial Pay-off**.

L404	Range	Amsterdam, Andorra, Athens, Belgrade, Berlin, Bratislava, Brussels, Bucharest, Budapest, Chisinau, Copenhagen, Dublin, Gibraltar, Guernsey, Helsinki, Isle of man, Istanbul, Jersey, Kaliningrad, Kiev, Lisbon, Ljubjana, London, Luxembourg, Madrid, Malta, Mariehamn, Misnk, Monaco, Moscow, Oslo, Paris, Podgorica, Prague, Riga, Rome, Samara, San Marino, Sarajevo, Simferopol, Skopje, Sofia, Stockholm, Tallinn, Tirane, Uzhgorod, Vaduz, Vatican, Vienna, Vilnius, Volgograd, Warsaw, Zagreb , Zaporozhye, Zurich
Time Zone	Default	Rome
	Level	BASIC
	Function	Sets the time zone for the inverter. This setting takes effect if the inverter is connected to the Internet. In that case, the inverter will automatically update its time based on the set time zone.

L500	Range	N/A
History Reset	Default	N/A
	Level	BASIC
	Function	This command resets the history data from the display. This command permanently deletes the history data saved on the display.

P130	Range	0 ÷ 10000	0.0 ÷ 10.000 Unit / kWh
Incentive	Default	0	0 Unit / kWh
	Level	BASIC	
	Address	676	
	Function	This parameter sets the remuneration per kWh produced. The currency may be set via parameter **L403**.	

4.3.5.2. Customization Submenu

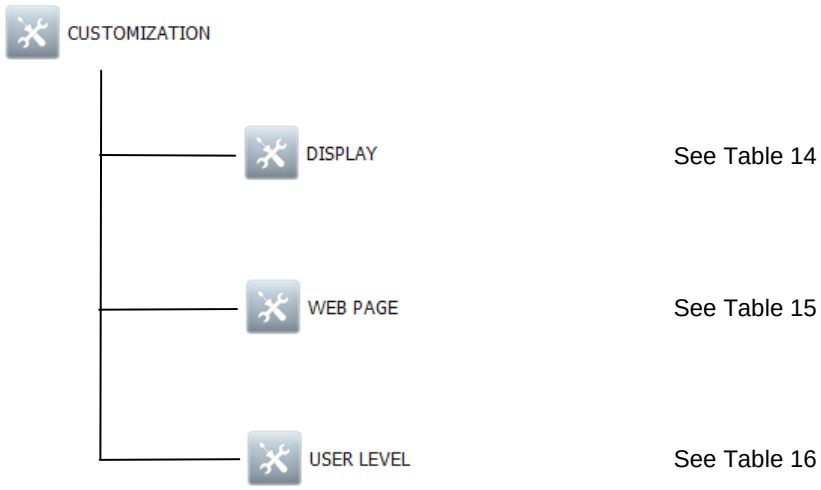


Figure 74: Tools menu, Customization submenu

Menu	DISPLAY	
Submenu	**Access Level**	**Action**
L450 – DEFAULT VIEW Displays the current setting for the Default View	BASIC	Activates a list window. Select one of the following: – GRAPH – HOMEPAGE
GRAPH	BASIC	Displays the following items: – L451 – MEASURE 1 – L452 – MEASURE 2 – L453 – MEASURE 3 Each item activates a list window. You can select one of the Measure values listed in Table 4.

Table 14: Tools menu, Customization > Display submenu

L450	Range	GRAPH, HOMEPAGE
Default	Default	GRAPH
	Level	BASIC
	Function	Enables the customization of the Default View of the product. The default screen is displayed by the inverter when no input has been received for a reasonably long time.

L451	Range	See Table 4
Measure 1	Default	MPWR
	Level	BASIC
	Function	Enables the customization of measure 1 in the main Graph.

L452	Range	See Table 4
Measure 2	Default	EMPTY
	Level	BASIC
	Function	Enables the customization of measure 2 in the main Graph.

L453	Range	See Table 4
Measure 3	Default	EMPTY
	Level	BASIC
	Function	Enables the customization of measure 3 in the main Graph.

Menu	 WEB PAGE	
Submenu	**Access Level**	**Action**
L503 – INVERTER COLOUR Displays the current setting for the inverter colour. This setting affects the colour of the icon displayed on the browser web page (3.7.2.1)	BASIC	Activates a list window. Select one of the following: – BLACK – WHITE – RED – BLUE
L504 – LABEL Displays the current setting for the inverter label. This setting affects the label of the icon displayed on the browser web page (3.7.2.1)	BASIC	Activates an alphanumeric keypad window. Set the inverter identifier on the web page.

Table 15: Tools menu, Customization > Web Page submenu

L503	Range	BLACK, WHITE, RED, BLUE
Inverter Colour	Default	N/A
	Level	BASIC
	Function	Selects the colour of the product icon displayed on the browser web page (3.7.2.1). This parameter is factory set to the colour of the product.

L504	Range	N/A
Label	Default	S/N
	Level	BASIC
	Function	Enables the customization of the product name displayed on the browser web page (3.7.2.1). This parameter is factory set to the serial number of the product.

Menu	USER LEVEL	
Submenu	**Access Level**	**Action**
P001 – USER LEVEL Displays the current level for the user level	BASIC	Activates a list window. Select one of the following: – BASIC – ADVANCED
SW0 – SERVICE PASSWORD	ADVANCED	Activates an alphanumeric keypad window. Enter the Service password. This functionality is reserved to the Customer Service of Elettronica Santerno SpA.

Table 16: Tools menu, Customization submenu > Access Level

P001	Range	0 ÷ 1	0: BASIC 1: ADVANCED
User Level	Default	0	0: BASIC
	Level	BASIC	
	Address	1/291	
	Function	The programming parameters of the inverter are divided into groups based on user access levels, depending on the complexity of their function. Therefore, based on the user level programmed in the touchscreen display, the user is allowed to view only some menus or certain parts of them. By setting the BASIC user level, once the inverter is properly parameterized, navigation is easier, since the user is shown a shorter set of parameters including only the most frequently used parameters. The preset user level is stated in the “Level” field.	

4.3.5.3. Advanced Configuration Submenu

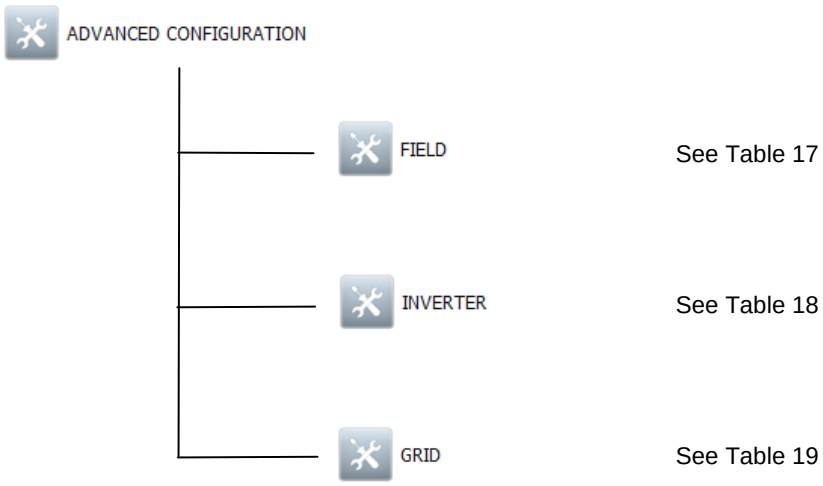


Figure 75: Tools menu, Advanced Configuration Submenu

Menu	FIELD	
Submenu	**Access Level**	**Action**
P026 – MPPT 1	ADVANCED	Activates a list window. Select one of the following: – INACTIVE – ACTIVE
P020 – FIELD 1 REFERENCE	ADVANCED	Activates an alphanumeric keypad window. Enter the desired value.
P021 – STARTUP DELAY	ADVANCED	Activates an alphanumeric keypad window. Enter the desired value.
P300 – MPPT2	ADVANCED	Activates a list window. Select one of the following: – INACTIVE – ACTIVE
P220 – FIELD 2 REFERENCE	ADVANCED	Activates an alphanumeric keypad window. Enter the desired value.

Table 17: Tools menu, Advanced Configuration > Field submenu

P020	**Range**	1100÷4000	110.V÷400V
Field 1 Reference	**Default**	2800	280V
	Level	ADVANCED	
	Id/Address	1/254	
	Function	If the MPPT algorithm is disabled (**P026**=Inactive), **P020** represents the working voltage reference of PV field 1: the inverter will try to make the PV field voltage match with the value set in **P020**.	

P021	**Range**	0÷32767	0÷327.67s
Startup Delay	**Default**	300	300.0 s
	Level	ADVANCED	
	Id/Address	1/294	
	Function	Minimum time when the open-circuit voltage of the PV field must be longer than the time set in **P020** to enable the inverter startup.	

P026	**Range**	0 ÷ 1	0: Inactive 1: Active
MPPT 1	**Default**	1	1: Active
	Level	ADVANCED	
	Id/Address	1/1374	
	Function	MPPT Enable: if **P026** = Active, the MPPT (Maximum Power Point Tracking) is enabled. If **P026** is set to Inactive, the MPPT is in manual mode and the field voltage reference is the one set in **P020**.	

P220	Range	1100÷4000	110.V÷400V
Field 2 Reference	Default	2800	280V
	Level	ADVANCED	
	Id/Address	1/255	
	Function	If the MPPT algorithm is disabled for PV Field 2 (**P226**=Inactive), **P220** represents the working voltage reference of PV Field 2: the inverter will try to make the PV field voltage match with the value set in **P220**.	

P226	Range	0 ÷ 1	0: Inactive 1: Active
MPPT 2	Default	1	1: Active
	Level	ADVANCED	
	Id/Address	1/1375	
	Function	MPPT Enable: if **P030** = Active, the MPPT (Maximum Power Point Tracking) is enabled. If **P030** is set to Inactive, the MPPT is in manual mode and the field 2 voltage reference is the one set in **P020**.	

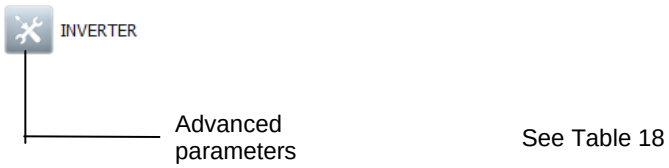


Figure 76: Tools menu, Advanced Configuration > Inverter submenu

Menu	ADVANCED PARAMETERS	
Submenu	**Access Level**	**Action**
P041 – POWER OFF DELAY Displays the value currently set for the power off delay	ADVANCED	Activates an alphanumeric keypad window. Enter the desired value.

Table 18: Tools menu, Advanced Configuration > Inverter > Advanced Parameters submenu

P041	Range	0 ÷ 32768	0 ÷ 546 min
Power Off Delay	Default	900	15 min
	Level	ADVANCED	
	Address	1/310	
	Function	Time when the inverter is waiting for a field voltage value exceeding 150V; when that time is over, the inverter is powered off.	

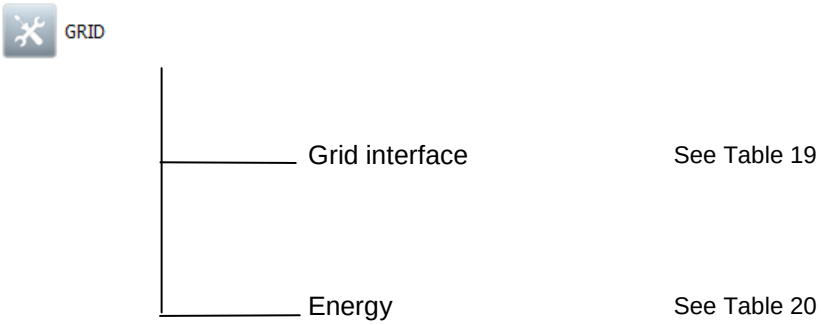


Figure 77: Tools menu, Advanced Settings > Grid submenu

Menu	GRID INTERFACE	
Submenu	**Access Level**	**Action**
C000 – RATED GRID VOLTAGE Displays the value currently set for the parameter	ADVANCED	Activates an alphanumeric keypad window. Enter the desired value.
C001 – RATED GRID FREQUENCY Displays the value currently set for the parameter	ADVANCED	Activates an alphanumeric keypad window. Enter the desired value.
P080 – INSTANT OVERVOLTAGE THRESHOLD Displays the value currently set for the parameter	ADVANCED	Activates an alphanumeric keypad window. Enter the desired value.
P081 – INSTANT OVERVOLTAGE RELEASE RATIO Displays the value currently set for the parameter	ADVANCED	Activates an alphanumeric keypad window. Enter the desired value.
P082 – INSTANT OVERVOLTAGE TRIP TIME Displays the value currently set for the parameter	ADVANCED	Activates an alphanumeric keypad window. Enter the desired value.
P083 – INSTANT OVERVOLTAGE RESET TIME Displays the value currently set for the parameter	ADVANCED	Activates an alphanumeric keypad window. Enter the desired value.
P084 – MAXIMUM VOLTAGE TRIP THRESHOLD Displays the value currently set for the parameter	ADVANCED	Activates an alphanumeric keypad window. Enter the desired value.
P085 – MAXIMUM VOLTAGE RELEASE RATIO Displays the value currently set for the parameter	ADVANCED	Activates an alphanumeric keypad window. Enter the desired value.
P086 – MAXIMUM VOLTAGE TRIP TIME Displays the value currently set for the parameter	ADVANCED	Activates an alphanumeric keypad window. Enter the desired value.
P087 – MAXIMUM VOLTAGE RESET TIME Displays the value currently set for the parameter	ADVANCED	Activates an alphanumeric keypad window. Enter the desired value.
P088 – MINIMUM VOLTAGE TRIP THRESHOLD Displays the value currently set for the parameter	ADVANCED	Activates an alphanumeric keypad window. Enter the desired value.
P089 – MINIMUM VOLTAGE RELEASE RATIO Displays the value currently set for the parameter	ADVANCED	Activates an alphanumeric keypad window. Enter the desired value.
P090 – MINIMUM VOLTAGE TRIP TIME Displays the value currently set for the parameter	ADVANCED	Activates an alphanumeric keypad window. Enter the desired value.
P091 – MINIMUM VOLTAGE RESET TIME Displays the value currently set for the parameter	ADVANCED	Activates an alphanumeric keypad window. Enter the desired value.

P092 – INSTANT GRID UNDERVOLTAGE THRESHOLD Displays the value currently set for the parameter	ADVANCED	Activates an alphanumeric keypad window. Enter the desired value.
P093 – INSTANT UNDERVOLTAGE RELEASE RATIO Displays the value currently set for the parameter	ADVANCED	Activates an alphanumeric keypad window. Enter the desired value.
P094 – INSTANT UNDERVOLTAGE TRIP TIME Displays the value currently set for the parameter	ADVANCED	Activates an alphanumeric keypad window. Enter the desired value.
P095 – INSTANT UNDERVOLTAGE RESET TIME Displays the value currently set for the parameter	ADVANCED	Activates an alphanumeric keypad window. Enter the desired value.
P096 – MAXIMUM FREQUENCY TRIP THRESHOLD Displays the value currently set for the parameter	ADVANCED	Activates an alphanumeric keypad window. Enter the desired value.
P097 – MAXIMUM FREQUENCY RELEASE RATIO Displays the value currently set for the parameter	ADVANCED	Activates an alphanumeric keypad window. Enter the desired value.
P098 – MAXIMUM FREQUENCY TRIP TIME Displays the value currently set for the parameter	ADVANCED	Activates an alphanumeric keypad window. Enter the desired value.
P099 – MAXIMUM FREQUENCY RESET TIME Displays the value currently set for the parameter	ADVANCED	Activates an alphanumeric keypad window. Enter the desired value.
P100 – MINIMUM FREQUENCY TRIP THRESHOLD Displays the value currently set for the parameter	ADVANCED	Activates an alphanumeric keypad window. Enter the desired value.
P101 – MINIMUM FREQUENCY RELEASE RATIO Displays the value currently set for the parameter	ADVANCED	Activates an alphanumeric keypad window. Enter the desired value.
P102 – MINIMUM FREQUENCY TRIP TIME Displays the value currently set for the parameter	ADVANCED	Activates an alphanumeric keypad window. Enter the desired value.
P103 – MINIMUM FREQUENCY RESET TIME Displays the value currently set for the parameter	ADVANCED	Activates an alphanumeric keypad window. Enter the desired value.

Table 19: Tools menu, Advanced Configuration > Grid > Grid Interface submenu

C000	**Range**	1000 ÷ 6900	100.0 ÷ 690.0 V
Rated Grid Voltage	**Default**	230	230.0 V
	Level	ADVANCED	
	Id/Address	1 and 2/1307	
	Function	This parameter sets the rated value of the grid voltage.	

C001	Range	470 ÷ 630	47.0 ÷ 63.0 Hz
Rated Grid Frequency	Default	50.0	50.0Hz
	Level	ADVANCED	
	Id/Address	1 e 2/1308	
	Function	This parameter sets the rated value of the grid frequency.	

P080	Range	120 ÷ 180	[120 ÷ 180] % of Vn
Instant Overvoltage Threshold	Default	140	140
	Level	ADVANCED	
	Id/Address	1/1311	
	Function	This parameter, expressed as a percentage of the rated grid voltage, sets the trip threshold of the grid overvoltage fault.	

P081	Range	0 ÷ 1000	0.00÷ 1
Instant Overvoltage Release Ratio	Default	950	0.95
	Level	ADVANCED	
	Id/Address	1/1312	
	Function	This parameter sets ratio between the trip threshold of the overvoltage fault and the value at which the overvoltage fault is reset.	

P082	Range	1 ÷ 10000	0.001 ÷ 10.000 s
Instant Overvoltage Trip Time	Default	3	0.003s
	Level	ADVANCED	
	Id/Address	1/1313	
	Function	This is the time during which the instantaneous overvoltage trip condition must be maintained to prompt the activation of the grid overvoltage fault.	

P083	Range	1 ÷ 10000	0.001 ÷ 10.000 s
Instant Overvoltage Reset Time	Default	20	0.02s
	Level	ADVANCED	
	Id/Address	1/1314	
	Function	This is the time during which the instantaneous overvoltage reset condition must be maintained to prompt the grid overvoltage fault reset.	

P084	Range	105 ÷ 130	[105 ÷ 130] % of Vn
Maximum Voltage Trip Threshold	Default	120 (Italy), 110 (Spain), 115 (Germany)	120 (Italy), 110 (Spain), 115 (Germany)
	Level	ADVANCED	
	Id/Address	1/1315	
	Function	This parameter is expressed as a percentage of the rated grid voltage; it sets the trip threshold for the grid maximum voltage fault.	

P085	Range	0 ÷ 1000	0 ÷ 1.000
Maximum Voltage Release Ratio	Default	950	0.95
	Level	ADVANCED	
	Id/Address	1/1316	
	Function	Sets the ratio between the trip voltage value for the maximum voltage fault and the value at which it is reset.	

P086	Range	1 ÷ 10000	0.001÷ 10.000s
Maximum Voltage Trip Time	Default	100 (Italy), 150 (Spain), 200 (Germany)	0.1s (Italy), 0.15s (Spain), 0.2s (Germany)
	Level	ADVANCED	
	Id/Address	1/1317	
	Function	This is the time during which the maximum voltage trip condition must be maintained to prompt the activation of the grid maximum voltage fault.	

P087	Range	1 ÷ 10000	1 ÷ 10.000 s
Maximum Voltage Reset Time	Default	100 (Italy), 200 (Spain), 10000 (Germany)	0.1s (Italy), 0.2s (Spain), 10.0s (Germany)
	Level	ADVANCED	
	Id/Address	1/1318	
	Function	This is the time during which the maximum voltage reset condition must be maintained to prompt the reset of the grid maximum voltage fault.	

P088	Range	10 ÷ 95	[10 ÷ 95] % of Vn
Minimum Voltage Trip Threshold	Default	80 (Italy), 85 (Spain), 80 (Germany)	80 (Italy), 85 (Spain), 80 (Germany)
	Level	ADVANCED	
	Id/Address	1/1319	
	Function	This parameter, expressed as a percentage of the rated grid voltage, sets the activation threshold of the grid minimum voltage fault.	

P089	Range	1000 ÷ 1499	1.000 ÷ 1.499
Minimum Voltage Release Ratio	Default	1050	1.050
	Level	ADVANCED	
	Id/Address	1/1320	
	Function	Sets the ratio between the trip threshold of the minimum voltage fault and the value at which the minimum voltage fault is reset.	

P090	Range	1 ÷ 10000	0.001 ÷ 10.000s
Minimum Voltage Trip Time	Default	200 (Italy), 150 (Spain), 200 (Germany)	0.2s (Italy), 0.15s (Spain), 0.2s (Germany)
	Level	ADVANCED	
	Id/Address	1/1321	
	Function	This is the time during which the minimum voltage trip condition must be maintained to prompt the activation of the minimum voltage fault.	

P091	Range	1 ÷ 10000	0.001 ÷ 10.000s
Minimum Voltage Reset Time	Default	100 (Italy), 100 (Spain), 10000 (Germany)	0.1s (Italy), 0.1s (Spain), 10s (Germany)
	Level	ADVANCED	
	Id/Address	1/1322	
	Function	This is the time during which the minimum voltage trip condition must be maintained to prompt the grid minimum voltage fault reset.	

P092	Range	30 ÷ 95	[35 ÷ 95] % of Vn
Instant Grid Undervoltage Threshold	Default	60	60
	Level	ADVANCED	
	Id/Address	1/1323	
	Function	This parameter, expressed as a percentage of the grid rated voltage, sets the activation threshold of the instant grid undervoltage fault.	

P093	Range	1000 ÷ 1499	1.0 ÷ 1.499
Instant Undervoltage Release Ratio	Default	1050	1.050
	Level	ADVANCED	
	Id/Address	1/1324	
	Function	Sets the ratio between the trip threshold of the instant undervoltage fault and the value at which the instant undervoltage fault is reset.	

P094	Range	1 ÷ 10000	0.001 ÷ 10.000s
Instant Undervoltage Trip Time	Default	3ms	0.003s
	Level	ADVANCED	
		1/1325	
	Function	Time during which the trip condition of the instant overvoltage must be maintained to prompt the activation of the grid instant undervoltage fault.	

P095	Range	1 ÷ 10000	0.001 ÷ 10.000s
Instant Undervoltage Reset Time	Default	10ms	0.010s
	Level	ADVANCED	
	Id/Address	1/1326	
	Function	Time during which the trip condition of the instant overvoltage must be maintained to prompt the reset of the grid instant undervoltage fault.	

P096	Range	10 ÷ 300	[0.1 ÷ 3.00] Hz
Maximum Frequency Trip Threshold	Default	30 (Italy), 100 (Spain), 20 (Germany)	0.30Hz (Italy), 1.00Hz (Spain), 0.20Hz (Germany)
	Level	ADVANCED	
	Id/Address	1/1327	
	Function	This parameter sets the maximum value of the frequency offset in respect to the nominal value at which the grid maximum frequency fault trips.	

NOTE

Value set on the inverters delivered in Italy starting from 1 April 2012 and identified by the relative label, compliant with CEI 0-21 according with deliberation 84/2012/R/EEL. For the inverters delivered before 1 April 2012, this parameter is set to 0.3Hz according to the previous standards in force, so it has to be set to 1Hz.

P097	Range	900 ÷ 1000	0.900 ÷ 1.000
Maximum Frequency Release Ratio	Default	998	0.998
	Level	ADVANCED	
	Id/Address	1/1328	
	Function	Sets the ratio between the trip frequency of the maximum frequency fault and the value at which the maximum frequency fault is reset.	

P098	Range	1 ÷ 10000	0.001 ÷ 10.000 s
Maximum Frequency Trip Time	Default	50 (Italy), 50 (Spain), 200 (Germany)	0.05s (Italy), 0.05s (Spain), 0.20s (Germany)
	Level	ADVANCED	
	Id/Address	1/1329	
	Function	Time during which the trip condition of the maximum frequency must be maintained to prompt the activation of the grid maximum frequency fault.	

P099	Range	1 ÷ 10000	0.001 ÷ 10.000 s
Maximum Frequency Reset Time	Default	10 (Italy), 100 (Spain), 10000 (Germany)	0.01s (Italy), 0.1s (Spain), 10s (Germany)
	Level	ADVANCED	
	Id/Address	1/1330	
	Function	Time during which the reset condition of the maximum frequency must be maintained to reset the grid maximum frequency fault.	

P100	Range	10÷300	[-3.0 ÷ -0.1] Hz
Minimum Frequency Trip Threshold	Default	30 (Italy) 200 (Spain) 250 (Germany)	-0.30Hz (Italy), -2.0Hz (Spain), -2.5Hz (Germany)
	Level	ADVANCED	
	Id/Address	1/1331	
	Function	This parameter defines the maximum value of the frequency offset in respect to the nominal value at which the grid minimum frequency fault trips.	

NOTE

Value set on the inverters delivered in Italy starting from 01/04/2012 and identified by the relative label, compliant with CEI 0-21 according with deliberation 84/2012/R/EEL. For the inverters delivered before 01/04/2012, this parameter is set to -0.3Hz according to the previous standards in force, so it has to be set to -1Hz.

P101	Range	1000 ÷ 1500	1.000 ÷ 1.500
Minimum Frequency Release Ratio	Default	1002	1.002
	Level	ADVANCED	
	Id/Address	1/1332	
	Function	Sets the ratio between the trip frequency of the minimum frequency fault and the value at which the minimum frequency fault is reset.	

P102	Range	0 ÷ 10000	0.001 ÷ 10.000 s
Minimum Frequency Trip Time	Default	50 (Italy), 3000 (Spain), 250 (Germany)	0.050s (Italy), 3.000s (Spain), 0.200s (Germany)
	Level	ADVANCED	
	Id/Address	1/1333	
	Function	Time during which the trip condition of the minimum frequency must be maintained to prompt the activation of the grid minimum frequency fault.	

P103	Range	40 ÷ 10000	0.04 ÷ 10.0 s
Minimum Frequency Reset Time	Default	100 (Italy), 100 (Spain), 10000 (Germany)	0.10s (Italy), 0.10s (Spain), 10.0s (Germany)
	Level	ADVANCED	
	Id/Address	1/1334	
	Function	Time during which the reset condition of the minimum frequency must be maintained to reset the minimum frequency fault.	

Menu	ENERGY	
Submenu	Access Level	Action
P135L – FISCAL METER L PRESET Displays the value currently set for the parameter	ADVANCED	Activates an alphanumeric keypad window. Enter the desired value.
P135H – FISCAL METER H PRESET Displays the value currently set for the parameter	ADVANCED	Activates an alphanumeric keypad window. Enter the desired value.

Table 20: Tools menu, Advanced Configuration > Grid > Energy submenu

P135L	Range	0 ÷ 9999	0 ÷ 9999 Wh
Fiscal Meter L Preset	Default	0	0
	Level	ADVANCED **Inactive function, do not use**	
	Id/Address	2/1364	
	Function	Start value for the computation of the energy produced by the inverter. This parameter must match with **P135H** to obtain the desired value based on P135H*10000 + P135L formula.	

P135H	Range	0 ÷ 10000	0 ÷ 10000 * 10 kWh
Fiscal Meter H Preset	Default	0	0
	Level	ADVANCED **Inactive function, do not use**	
	Id/Address	2/1365	
	Function	Start value for the computation of the energy produced by the inverter. This parameter must match with **P135L** to obtain the desired value based on P135H*10000 + P135L formula.	

4.3.5.4. Commands Submenu

Menu	COMMANDS	
Submenu	**Access Level**	**Action**
AUTOTEST	BASIC	Displays the following: – I030 – TEST VMIN – I031 – TEST VMAX – I032 – TEST FMIN – I033 – TEST FMAX Each item activates a run command window. For any details on the grid interface Autotest commands, see section 5.3.
L500 – HISTORY RESET	BASIC	Activates a run command window. Press the Run Command button and wait for the success message.
RST – INVERTER RESET	ADVANCED	Activates a list window. Select: • NO COMMAND • INVERTER RESET
L011 – DISPLAY RESET	BASIC	Activates a run command window. Press the Run Command button and wait for the success message.
I002 – PARTIAL ENERGY RESET	ADVANCED	Activates a list window. Select: • INACTIVE • ACTIVE
I008 – WARNING RESET	BASIC	Activates a run command window. Press the Run Command button and wait for the success message.

Table 21: Tools menu, Commands submenu

I002	Range	0 ÷ 1	0: Inactive 1: Active
Partial Energy Reset	Default	0	0: Inactive
	Level	ADVANCED	
	Id/Address	2/1389	
	Function	Resets the partial active energy meter (**M011**).	

L011	Range	N/A
Display Reset	Default	N/A
	Level	BASIC
	Function	This is a command. Enables restarting the touchscreen display.

I030	Range	0 ÷ 1	0: Inactive 1: Active
Test V Min	Default	0	0: Inactive
	Level	BASIC	
	Id/Address	1/1417	
	Function	This parameter enables testing the activation of the grid minimum voltage threshold as required by the Italian regulations in force governing Low Voltage grids.	

I031	Range	0 ÷ 1	0: Inactive 1: Active
Test V Max	Default	0	0: Inactive
	Level	BASIC	
	Address	1/1418	
	Function	This parameter enables testing the activation of the grid maximum voltage threshold as required by the Italian regulations in force governing Low Voltage grids.	

I032	Range	0 ÷ 1	0: Inactive 1: Active
Test f Min	Default	0	0: Inactive
	Level	BASIC	
	Id/Address	1/1419	
	Function	This parameter enables testing the activation of the grid minimum frequency threshold as required by the Italian regulations in force governing Low Voltage grids.	

I033	Range	0 ÷ 1	0: Inactive 1: Active
Test f Max	Default	0	0: Inactive
	Level	BASIC	
	Id/Address	1/1420	
	Function	This parameter enables testing the activation of the grid maximum frequency threshold as required by the Italian regulations in force governing Low Voltage grids.	

L500	Range	N/A
Alarm History	Default	N/A
	Level	BASIC
	Function	This command resets the display history data. This command permanently deletes the history data saved on the display.

RST	Range	0, 34	0: No command 34: Reset inverter
Reset inverter	Default	0	0
	Level	ADVANCED	
	Id/Address	1/50	
	Function	This is a command. It resets the control electronics of the inverter without affecting the touchscreen display functionality.	

I008	Range	0, 555	0: Inactive 555: Active
Reset warning	Default	0	0: Inactive
	Level	BASIC	
	Id/Address	1 and 2/1400	
	Function	**Inactive functionality**	

4.3.5.5. Service Submenu

The **Advanced Configuration > Service** submenu in the Tools menu comprises parameters reserved to the Customer Service of Elettronica Santerno SpA.

4.3.6. Alarms Menu

When a safety device or an alarm trips, the inverter STOPS; the connection to the electric grid of the output power and the current delivery are inhibited.

CAUTION

When an alarm message is displayed, find the cause responsible for the alarm before restarting the equipment.

When a protection or an alarm trips, the inverter operation is disabled.

NOTE

Carefully read the following sections before operating on the inverter.

The alarms that are automatically reset do not let the inverter quit the run mode. Consequently, once the cause responsible for the alarm is reset, alarms are automatically reset and the inverter will run without having to press the **START** button.

The alarm condition is displayed on the touchscreen display of the inverter through a pop up window similar to the screen shown in Figure 78.

Figure 78: Example of an alarm screen

When an alarm trips, the inverter stores to the “ALARM HISTORY” the instant when the alarm is triggered (supply time and operation time), the inverter status and the value of the most important measures (see Table 23) sampled when the alarm has tripped. Reading and storing those data items may help find the triggering cause and reset the alarm. The alarm history keeps track of the last 6 alarms tripped. The section below describes the alarm conditions that can occur.

The Alarms menu enables resetting the alarms tripped. Press the Alarms icon ( ) from the status bar to access the Alarms menu.

Menu		
Submenu	**Access Level**	**Action**
M089 – INVERTER STATUS Displays the current inverter status	BASIC	Displays detailed information.
M090 – ACTIVE ALARM Displays the active alarm (if tripped)	BASIC	Displays detailed information. See section Table 24 or information on the displayed values.
ALARM HISTORY Displays the alarm history	ADVANCED	Displays the following: • **LATEST ALARM** • **ALARM 2** • **ALARM 3** • **ALARM 4** • **ALARM 5** • **ALARM 6** • **ALARM 7** • **ALARM 8** Each item displays the measures given in Table 23 pertaining to the selected alarm.
EVENT HISTORY Displays the event history	ADVANCED	Displays the following: • **LATEST EVENT** • **EVENT 2** • **EVENT 3** • **EVENT 4** • **EVENT 5** • **EVENT 6** • **EVENT 7** • **EVENT 8** Each item displays the measures given in Table 23 pertaining to the selected event.
L013 – ALARM RESET Resets the alarm condition and restores the normal operation of the inverter	BASIC	Activates a run command window. Press the Run Command button. Messages relating to the execution of the command will be displayed.

Table 22: Alarms Menu

Alarm History Measure	Event History Measure	Description
FL0x	**EL0x**	Alarm Code
FL0xa	**EL0xa**	Inverter Status
FL0xb	**EL0xb**	Supply Time
FL0xc	**EL0xc**	Operation Time
FL0xd	**EL0xd**	Field 1 Voltage
FL0xe	**EL0xe**	Field 1 Current
FL0xf	**EL0xf**	MPPT 1 Reference
FL0xg	**EL0xg**	Field 2 Voltage
FL0xh	**EL0xh**	Field 2 Current
FL0xi	**EL0xi**	MPPT 2 Reference
FL0xl	**EL0xl**	DC-bus Voltage
FL0xm	**EL0xm**	Voltage between PE and PV-
FL0xn	**EL0xn**	Grid Voltage

Table 23: Measures in the Alarm History and Event History

4.3.6.1. List of the Alarms

NOTE

The Sunway MXS is controlled by two microcontrollers; each of them constantly checks the inverter status and stops power delivery when severe conditions occur that may damage the equipment. Alarms may be triggered by microcontroller 1 (identified as section A) and alarms triggered by microcontroller 2 (identified as section B). The alarms triggered by microcontroller 1 range from 001 to 099, while the alarms triggered by microcontroller 2 are over 100.

The SUNWAY M XS alarms are listed in Table 24. The alarm codes in the table are displayed by **M090** in the Alarms menu and may be stored to the first item in every record of the Alarm History.

Alarm	Description
A001-A101	Parameter memory read/write failure
A003-A103	Microprocessor clock fault
A004-A104	Watchdog protection tripped
A005-A105	Control software autodiagnostics failure
A006-A106	Control software autodiagnostics failure
A007-A107	Control software autodiagnostics failure
A008-A108	Control software autodiagnostics failure
A009-A109	Analog power supply hardware fault (control board failure)
A010-A110	ADC Tune failure (control board failure)
A112	Communications failure between section A and section B (control board failure)
A013-A113	Communications failure between section A and section B (control board failure)
A015	The uPA has detected a HW reset command (control board failure)
A016-A116	Communications failure between section A and section B (control board failure)
A122	Failure while testing the RCD internal to the inverter
A026	Relay test failure
A028	Grid voltage measure failure
A029	DC link voltage measure failure
A030-A130	The memory area containing the configuration parameters is corrupted
A031-A131	The memory area containing the working parameters is corrupted
A033	The program controlling the inverter is locked in “ready” status
A034	The program controlling the inverter is locked in “wait” status
A136	DC/AC converter temperature sensor fault
A037	Boost converter temperature sensor fault
A038	Fault of the inverter internal temperature sensor
A144	The inverter has measured an instant grid current value exceedingly high
A045	The inverter has measured a field 2 current value exceedingly high
A046	The inverter has measured a field 1 current value exceedingly high
A048-A148	The DC voltage detected by the inverter software is out of the allowable range
A049	DC-side HW current protection
A151	AC-side HW current protection
A065	AC section temperature out of allowable range
A066	DC section temperature out of allowable range
A067	Internal temperature out of allowable range
A068	PV Field insulation protective device
A081	Hardware failure in communications between display and control board
A090	PV Field insulation protective device
A091	Interface protection autotest timeout
A136	Protection against leakage current instant variations
A137	DC Current injected to the grid out of allowable range
A138	Maximum leakage current protection
A199	Alarm sent by a remote device

Table 24: List of the SUNWAY M XS alarms

A001÷A101	Description	Control board failure: E2P Timeout sect.A/sect.B
	Event	Multiple causes are possible: the autodiagnostics function of the control board constantly checks its correct operation.
	Possible Causes	Strong electromagnetic conducted disturbance or radiated disturbance. Possible failure of the microcontroller or other circuits in the control board.
	Solutions	Reset the alarm (see Figure 80). If the alarm persists, contact the Customer Service of Elettronica Santerno SpA.

A003÷A103	Description	Control board failure: Sect.A/Sect.B clock fault
	Event	The microprocessor clock is absent.
	Possible Causes	Control board failure. NOTE: This alarm is displayed on the alarm history only.
	Solutions	Contact the Customer Service of Elettronica Santerno SpA.

A004-A104	Description	Control board failure: Sect.A/Sect.B watchdog fault
	Event	The autodiagnostics function of the control board constantly checks the correct operation of the programme installed on the microprocessors: a programme failure has been detected.
	Possible Causes	Strong electromagnetic disturbance. Possible failure of the microcontroller or other circuits in the control board. NOTE: This alarm is displayed on the alarm history only.
	Solutions	Reset the alarm (see Figure 80). If the alarm persists, contact the Customer Service of Elettronica Santerno SpA.

A005-A105	Description	Control board failure: Sect.A/Sect.B fast cycle overtime
	Event	The autodiagnostics function of the control board constantly checks the correct operation of the programme installed on the microprocessors: a failure in the fast cycle programme has been detected.
	Possible Causes	Strong electromagnetic conducted disturbance or radiated disturbance. Possible failure of the microcontroller or other circuits in the control board.
	Solutions	Reset the alarm (see Figure 80). If the alarm persists, contact the Customer Service of Elettronica Santerno SpA.

A006-A106	Description	Control board failure: Sect.A/Sect.B 1ms cycle overtime
	Event	The autodiagnostics function of the control board constantly checks the correct operation of the programme installed on the microprocessors: a failure in the programme relating to the instructions run every ms has been detected.
	Possible Causes	Strong electromagnetic disturbance. Possible failure of the microcontroller or other circuits in the control board.
	Solutions	Reset the alarm (see Figure 80). If the alarm persists, contact the Customer Service of Elettronica Santerno SpA.

A007-A107	Description	Control board failure: Sect.A/Sect.B slow cycle overtime
	Event	The autodiagnostics function of the control board constantly checks the correct operation of the programme installed on the microprocessors: a failure in the slow cycle programme has been detected.
	Possible Causes	Strong electromagnetic disturbance. Possible failure of the microcontroller or other circuits in the control board.
	Solutions	Reset the alarm (see Figure 80). If the alarm persists, contact the Customer Service of Elettronica Santerno SpA.

A008-A108	Description	Control board failure: Sect.A/Sect.B very slow cycle overtime
	Event	The autodiagnostics function of the control board constantly checks the correct operation of the programme installed on the microprocessors: a failure in the very slow cycle programme has been detected.
	Possible Causes	Strong electromagnetic disturbance. Possible failure of the microcontroller or other circuits in the control board.
	Solutions	Reset the alarm (see Figure 80). If the alarm persists, contact the Customer Service of Elettronica Santerno SpA.

A009-A109	Description	Hardware failure in Sect.A/Sect.B analog power supply (control board failure)
	Event	Multiple causes are possible: the autodiagnostics function of the control board constantly checks its correct operation.
	Possible Causes	Strong electromagnetic disturbance. Possible failure of the microcontroller or other circuits in the control board.
	Solutions	Reset the alarm (see Figure 80). If the alarm persists, contact the Customer Service of Elettronica Santerno SpA.

A010-A110	Description	ADC calibration error (control board malfunction)
	Event	Multiple causes are possible: the autodiagnostics function of the control board constantly checks its correct operation.
	Possible Causes	Strong electromagnetic disturbance. Possible failure of the microcontroller or other circuits in the control board.
	Solutions	Reset the alarm (see Figure 80). If the alarm persists, contact the Customer Service of Elettronica Santerno SpA.

A112	Description	Control board failure: IPC driver fault
	Event	The autodiagnostics function of the control board constantly checks its correct operation: a failure in the communications circuits between section A and section B has been detected.
	Possible Causes	Strong electromagnetic disturbance. Possible failure of the control board.
	Solutions	Reset the alarm (see Figure 80). If the alarm persists, contact the Customer Service of Elettronica Santerno SpA.

A013-A113	Description	Control board failure: Sect.A/Sect.B communications failure
	Event	The autodiagnostics function of the control board constantly checks its correct operation: a failure in the communications circuits between section A and section B has been detected.
	Possible Causes	Strong electromagnetic disturbance. Possible failure of the control board.
	Solutions	Reset the alarm (see Figure 80). If the alarm persists, contact the Customer Service of Elettronica Santerno SpA.

A015	Description	Control board failure: reset Sect.A
	Event	The microprocessor of section A has detected a HW reset command.
	Possible Causes	Strong electromagnetic disturbance. Possible failure of the control board.
	Solutions	Reset the alarm (see Figure 80). If the alarm persists, contact the Customer Service of Elettronica Santerno SpA.

A016-A116	Description	Control board failure: synchronization failure between section A and B
	Event	The autodiagnostics function of the control board constantly checks its correct operation: a failure in the communications circuits between section A and section B has been detected.
	Possible Causes	Strong electromagnetic disturbance. Possible failure of the control board.
	Solutions	Reset the alarm (see Figure 80). If the alarm persists, contact the Customer Service of Elettronica Santerno SpA.

A122	Description	Failure while testing the RCD
	Event	A failure has been detected on the RCD (residual current device) integrated into the inverter during the RCD test.
	Possible Causes	The integrated RCD is faulty. Failure in the diagnostics circuit of the integrated RCD.
	Solutions	Reset the alarm (see Figure 80). If the alarm persists, contact the Customer Service of Elettronica Santerno SpA.

A026	Description	Control board failure: board relays faulty
	Event	Relay malfunction detected during the test performed before power delivery.
	Possible Causes	One or multiple relays are faulty. Failure in the relay diagnostics circuit.
	Solutions	Reset the alarm (see Figure 80). If the alarm persists, contact the Customer Service of Elettronica Santerno SpA.

A028	Description	Control board failure: grid measurement circuit failure
	Event	The autodiagnostics function of the control board constantly checks its correct operation: a failure in the communications circuits between section A and section B has been detected.
	Possible Causes	Very unstable grid. Failure in the measurement circuit.
	Solutions	Reset the alarm (see Figure 80). If the alarm persists, contact the Customer Service of Elettronica Santerno SpA.

A029	Description	Control board failure: DC-link measurement circuit failure
	Event	The autodiagnostics function of the control board constantly checks its correct operation: a failure in the communications circuits between section A and section B has been detected.
	Possible Causes	Strong electromagnetic disturbance. Failure in the measurement circuit.
	Solutions	Reset the alarm (see Figure 80). If the alarm persists, contact the Customer Service of Elettronica Santerno SpA.

A030÷A130	Description	Control board failure: Sect.A/Sect.B configuration parameters memory failure
	Event	The memory area containing the configuration parameters is corrupted
	Possible Causes	Strong electromagnetic conducted disturbance or radiated disturbance. Possible failure of the microcontroller or other circuits in the control board.
	Solutions	Reset the alarm (see Figure 80). If the alarm persists, contact the Customer Service of Elettronica Santerno SpA.

A031÷A131	Description	Control board failure: Sect.A/Sect.B working parameters memory failure
	Event	The memory area containing the working parameters is corrupted
	Possible Causes	Strong electromagnetic conducted disturbance or radiated disturbance. Possible failure of the microcontroller or other circuits in the control board.
	Solutions	Reset the alarm (see Figure 80). If the alarm persists, contact the Customer Service of Elettronica Santerno SpA.

A033	Description	Control board failure: programme locked in “ready” status
	Event	The programme controlling the inverter is locked in “ready” status.
	Possible Causes	Strong electromagnetic conducted disturbance or radiated disturbance.
	Solutions	Reset the alarm (see Figure 80). If the alarm persists, contact the Customer Service of Elettronica Santerno SpA.

A034	Description	Control board failure: programme locked in “wait” status
	Event	The programme controlling the inverter is locked in “wait” status.
	Possible Causes	Strong electromagnetic conducted disturbance or radiated disturbance.
	Solutions	Reset the alarm (see Figure 80). If the alarm persists, contact the Customer Service of Elettronica Santerno SpA.

A136	Description	Control board failure: fault of temperature sensor in AC section
	Event	The control board autodiagnostics circuits have detected a failure in the temperature sensor located in the DC/AC conversion section.
	Possible Causes	Strong electromagnetic conducted disturbance or radiated disturbance.
	Solutions	Reset the alarm (see Figure 80). If the alarm persists, contact the Customer Service of Elettronica Santerno SpA.

A037	Description	Control board failure: fault of temperature sensor in DC section
	Event	The control board autodiagnostics circuits have detected a failure in the temperature sensor located in the boost converter section.
	Possible Causes	Strong electromagnetic conducted disturbance or radiated disturbance.
	Solutions	Reset the alarm (see Figure 80). If the alarm persists, contact the Customer Service of Elettronica Santerno SpA.

A038	Description	Control board failure: internal temperature sensor fault
	Event	The control board autodiagnostics circuits have detected a failure in the temperature sensor measuring the internal temperature of the inverter.
	Possible Causes	Strong electromagnetic conducted disturbance or radiated disturbance.
	Solutions	Reset the alarm (see Figure 80). If the alarm persists, contact the Customer Service of Elettronica Santerno SpA.

A144	Description	Overcurrent detected by the system software
	Event	Tripping of instant current limiter.
	Possible Causes	Abrupt grid variations. Output short-circuit or earth short-circuit.
	Solutions	Reset the alarm (see Figure 80). If the alarm persists, contact the Customer Service of Elettronica Santerno SpA.

A045	Description	Overcurrent 2 detected by the system software
	Event	Tripping of instant current limiter 2.
	Possible Causes	Wrong wiring in the PV plant. The wiring circuits of field 1 and field 2 are not completely separate. Output short-circuit or earth short-circuit.
	Solutions	Check cable tightening and wiring. Reset the alarm (see Figure 80). If the alarm persists, contact the Customer Service of Elettronica Santerno SpA.

A046	Description	Overcurrent 1 detected by the system software
	Event	Tripping of instant current limiter 1.
	Possible Causes	Wrong wiring in the PV plant. The wiring circuits of field 1 and field 2 are not completely separate. Output short-circuit or earth short-circuit.
	Solutions	Check cable tightening and wiring. Reset the alarm (see Figure 80). If the alarm persists, contact the Customer Service of Elettronica Santerno SpA.

A048-A148	Description	DC Overvoltage detected by the system software
	Event	The field voltage has exceeded the maximum allowable threshold (580 V) for the safe operation of the inverter.
	Possible Causes	PV generator incompatible with the amplitude of the SUNWAY M XS input voltage. Failure of the DC-bus voltage measuring circuit. Inverter failure.
	Solutions	Check the value of the measured DC-bus voltage (**M000**). Reset the alarm (see Figure 80). If the alarm persists, contact the Customer Service of Elettronica Santerno SpA.

A049	Description	HW overcurrent
	Event	Hardware overcurrent detected by the measuring circuit of the inverter input current.
	Possible Causes	Wrong wiring in the PV plant. The wiring circuits of field 1 and field 2 are not completely separate. Strong electromagnetic conducted disturbance or radiated disturbance.
	Solutions	Check that the inverter is properly dimensioned in respect to the power ratings of the PV Field. Check wiring and cable tightening. Reset the alarm (see Figure 80). If the alarm persists, contact the Customer Service of Elettronica Santerno SpA.

A151	Description	Hardware overcurrent
	Event	The circuit measuring the inverter output current has detected a hardware overcurrent event.
	Possible Causes	Abrupt grid variations. Output short-circuit or earth short-circuit. Strong electromagnetic conducted disturbance or radiated disturbance.
	Solutions	Check that the inverter is properly dimensioned in respect to the power ratings of the PV Field. Make sure that there are no short-circuits between two phases or between one phase and the earth at the inverter output. Reset the alarm (see Figure 80). If the alarm persists, contact the Customer Service of Elettronica Santerno SpA.

A065	Description	AC section overtemperature
	Event	The temperature in the DC/AC conversion section is higher than the maximum allowable temperature.
	Possible Causes	The temperature in the place where the inverter is installed is too high. The inverter has been installed in direct sunlight. The cooling fans are faulty.
	Solutions	Check if warnings relating to fan faults are displayed (Status page, 4.3.7). Check the internal temperature pattern (**M057**). Reset the alarm (see Figure 80). If the alarm persists, contact the Customer Service of Elettronica Santerno SpA.

A066	Description	DC section overtemperature
	Event	The temperature in the DC/AC conversion section is higher than the maximum allowable temperature.
	Possible Causes	The temperature in the place where the inverter is installed is too high. The inverter has been installed in direct sunlight. The cooling fans are faulty.
	Solutions	Check if warnings relating to fan faults are displayed (Status page, 4.3.7). Check the internal temperature pattern (**M057**). Reset the alarm (see Figure 80). If the alarm persists, contact the Customer Service of Elettronica Santerno SpA.

A067	Description	Internal temperature out of the allowable range
	Event	The internal temperature is higher than the maximum allowable temperature.
	Possible Causes	The temperature in the place where the inverter is installed is too high. The inverter has been installed in direct sunlight. The cooling fans are faulty.
	Solutions	Check if warnings relating to fan faults are displayed (Status page, 4.3.7). Check the internal temperature pattern (**M057**). Reset the alarm (see Figure 80). If the alarm persists, contact the Customer Service of Elettronica Santerno SpA.

A068	Description	Insulation fault of the PV field
	Event	The circuit measuring the insulation between the PV field and the earth has detected an impedance value lower than the allowable value.
	Possible Causes	Insulation loss between the PV field and the earth.
	Solutions	Check if warnings relating to PV insulation are displayed (Status page, 4.3.7). Decouple the PV field from the inverter and check if short-circuits or low-impedance paths occur between the PV field and the earth. Reset the alarm (see Figure 80). If the alarm persists, contact the Customer Service of Elettronica Santerno SpA.

A081	Description	Control board failure: display communication failure
	Event	No communication with the touchscreen display.
	Possible Causes	The touchscreen display cable internal to the product has disconnected. One of the two connectors in the touchscreen display cable internal to the product is faulty. The touchscreen display is faulty.
	Solutions	Reset the alarm (see Figure 80). If the alarm persists, contact the Customer Service of Elettronica Santerno SpA.

A090	Description	Control board autotest failure
	Event	The autotest procedure of the interface protection has failed.
	Possible Causes	Grid disturbance occurred during the autotest procedure. Failure in the grid frequency and voltage measuring circuits.
	Solutions	Reset the alarm (see Figure 80). If the alarm persists, contact the Customer Service of Elettronica Santerno SpA.

A091	Description	Interface protection autotest timeout
	Event	The interface protection autotest procedure has not been completed.
	Possible Causes	Grid disturbance during autotest procedure. Failure in the grid frequency and voltage measuring circuits.
	Solutions	Reset the alarm (see Figure 80). If the alarm persists, contact the Customer Service of Elettronica Santerno SpA.

A136	Description	Protection against leakage current instant variations
	Event	Instant variations of the leakage current exceeding the maximum allowable variations. The leakage current variation has been at the maximum value of 30 mA for 300 ms. The leakage current variation has been at the maximum value of 60 mA for 150 ms. The leakage current variation has been at the maximum value of 150 mA for 40 ms.
	Possible Causes	Abrupt variations of the grid. Output short-circuit or earth short-circuit. Accidental contact of foreign matters with the power cables.
	Solutions	Check wiring. Check if warnings relating to PV insulation are displayed (Status page, 4.3.7). Decouple the PV field from the inverter and check if short-circuits or low-impedance paths occur between the PV field and the earth. Reset the alarm (see Figure 80). If the alarm persists, contact the Customer Service of Elettronica Santerno SpA.

A137	Description	DC Current injected into the grid out of allowable range
	Event	The DC current to grid detected by the inverter is too high.
	Possible Causes	Abrupt variations of the grid. Output short-circuit or earth short-circuit.
	Solutions	Reset the alarm (see Figure 80). If the alarm persists, contact the Customer Service of Elettronica Santerno SpA.

A138	Description	Leakage current protection
	Event	The leakage current to earth has exceeded the maximum allowable current. The current to earth has exceeded 300 mA (RMS).
	Possible Causes	PV field insulation loss to earth. Increase of the parasitic capacitance of the PV plant due to adverse weather conditions (rain, snow, high humidity).
	Solutions	Reset the alarm (see Figure 80). Do the following if the alarm persists after energy delivery is restored or alarm **A068** trips: Check if warnings pertaining to the fan faults are displayed (4.3.7). Decouple the PV field from the inverter and check if short-circuits or low-impedance paths occur between the PV field and the earth. Decouple the PV field from the inverter and check if high capacitive values (typically higher than 6uF) are to be found between each pole of the PV field and the earth. If the alarm persists, contact the Customer Service of Elettronica Santerno SpA.

A199	Description	Alarm sent by a remote device.
	Event	An alarm command has been sent via serial link.
	Possible Causes	Alarm sent by the user.
	Solutions	Reset the alarm (see Figure 80).

4.3.6.2. What to Do When an Alarm trips

Read and make a note of the data items displayed for the alarm tripped from the **ALARM HISTORY**.

Those data items are very useful to identify the cause responsible for the alarm and to find possible solutions.

The alarm data items are also required if you need to contact the Customer Service of Elettronica Santerno SpA.

1. The following pages provide a description of the alarms. Look for the section related to the alarm code you noted down and follow the instructions given.
2. Remove the external causes that triggered the protection.
3. Reset the alarm.
4. If the alarm condition persists and no solution can be found, please contact the Customer Service of Elettronica Santerno SpA.

An **ALARM RESET** command is required to reset an alarm tripped by accessing the Alarms menu from the touchscreen display. Do the following:

- Select the **Alarms** ( ) icon from the start menu;
- Select **L013 – ALARM RESET**; the screen below appears:

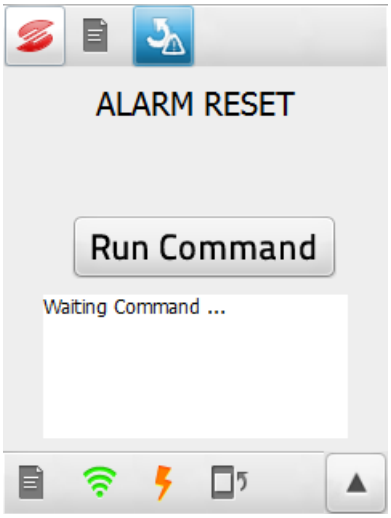


Figure 79: ALARM RESET screen

- Press the Run Command button;
- Wait for the success message;
- Quit the run command window by pressing the return button in the bottom-right corner ( ).

In summary:

*Select the **Alarms** icon*

*Select **L013 – ALARM RESET***

*Press the **Run Command** button*

Wait for the success message and quit by pressing the return button

Figure 80: Resetting an alarm

The SUNWAY M XS inverters implement the Autoreset function; this means that the inverter tries to automatically restart when an alarm trips. The factory setting is four restart attempts.
If the alarm persists even after 4 restart attempts occurring during a time interval of 5 minutes, the inverter enters an emergency condition that requires being manually reset by the user. All the alarms, even the autoreset alarms, are stored to the alarm history.

4.3.7. Status Menu

The Status Menu displays the information on the inverter operating conditions.

An example of a Status window is shown below.

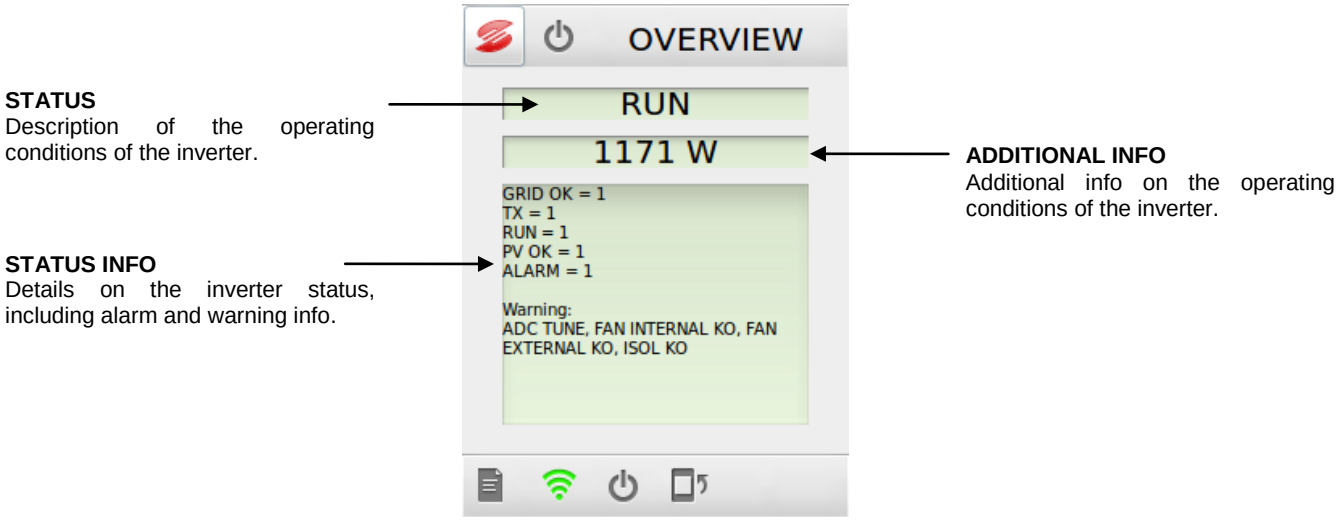


Figure 81: Example of a status window

More details on the Status icon are given in section 4.1.3.

4.3.7.1. Status Conditions

The status conditions of the inverter are as follows:

Status message	M089	Description
STOP	102	The inverter is stopped. The inverter is in STOP status when: o it is at its first startup; o the **STOP** button has been pressed from the graphic interface module. The inverter quits this status only after the **START** button is pressed from the front panel.
POWER DELIVERY	106	The inverter is operating in parallel to the grid and is delivering power. While the inverter is in this status, the Additional Info field displays the power being delivered.
INITIALIZATION	108	The inverter is initializing.
LIMITING	109	The inverter is limiting output power. Limiting causes are the inverter internal temperature (**M057**), the heatsink temperature (**M059**), the field voltage (**M000** e **M021**).
INSULATION TEST	112	The inverter is performing the earth insulation test of the PV field.
RELAY TEST	113	The inverter is performing the insulation test of the integrated grid coupling device.
GRID SYNCHRO	114	The inverter is synchronizing with the grid.
START TIMEOUT	130	The inverter is waiting for the timeout set in **P021** to elapse; a timer shows the countdown.
ALARM	116	An alarm has tripped, that cannot be autoreset. While the inverter is in the Alarm status, the *Additional Info* field displays the code of the alarm tripped.
ALARM (R)	117	An autoresettable alarm has tripped. While the inverter is in the Alarm (R) status, the *Additional Info* field displays the code of the alarm tripped.
RESET	118	The alarm has been reset by the user or by the autoreset function. The inverter is restarting.
STAND BY GRID	119	The inverter has detected that the grid voltage/frequency is out of the allowable range.
INVERTER AUTOTEST	129	The autotest procedure is running.
WEAK SOLAR RADIATION	130	The grid voltage is lower than the value set in **P020**. The Weak Solar Radiation condition will last until the field voltage exceeds the set threshold.
POWER OFF	134	The inverter is shutting down after having detected a field voltage value lower than 125V for the time set in **P041**.

Table 25: Status messages for the SUNWAY M XS inverters

4.3.7.2. Status Info

The *Status Info* field lists important operating conditions for the inverter operation:

- GRID OK, when the grid voltage is in the allowable range for the inverter operation (this is based on the geographic location; Italy: 230V+/-20%, 50Hz+/-0.3Hz);
- FIELD OK, when the field voltage is in the allowable range for the inverter operation (startup: 150V; running: 125V);
- MPPT ON, when the MPPT is activated;
- RUN, when the inverter is producing energy.

4.3.8. Warnings

Warnings are service messages addressed to the user and are displayed in the *Status Info* field in the inverter Status window. When a warning appears, the Status window will include the "Warning" wording followed by the active warnings.

Figure 82: Example of a warning

NOTE Warnings are neither protections nor alarms and are not stored to the Alarm History.

Warning Message	Causes of the Warning
INTERNAL FAN FAULT	The inverter has detected an internal fan fault. Reset the inverter. If the problem persists, contact the Customer Service of Elettronica Santerno SpA. The inverter does not stop, but performance will be affected by the high ambient temperature.
EXTERNAL FAN FAULT	At least one of the external fans is faulty. (NOTE: external fans are fitted only on size 3800). Reset the inverter. If the problem persists, contact the Customer Service of Elettronica Santerno SpA. The inverter does not stop, but performance will be affected by the high ambient temperature.
VARISTOR FAULT	The varistors integrated into the DC input are faulty because the protection against atmospheric overvoltage has tripped. Reset the inverter. If the problem persists, contact the Customer Service of Elettronica Santerno SpA.. The inverter does not stop, but the IP rating is adversely affected due to lack of integrity of the product.
INSULATION FAILURE	Weak insulation to earth (lower than 700 kΩ).

Warning Message	Causes of the Warning
POSITIVE POLE INSULATION FAILURE	The insulation to earth of the positive pole of the PV field is too weak (lower than 700 kΩ).
NEGATIVE POLE INSULATION FAILURE	The insulation to earth of the negative pole of the PV field is too weak (lower than 700 kΩ).
FIELD VOLTAGE LIMITING	The inverter is in limiting mode because the field voltage is higher than the maximum MPPT voltage.
OVERTEMPERATURE LIMITING	The inverter is in limiting mode because the internal temperature (**M057**) or the heatsink temperature (**M059**) is out of the allowable range.

MWRN			
Warning	**Range**	0 ÷ 65535	N/A
	Id/Address	1/1456	
	Level	ADVANCED	
	Function	Represents the warning status. The bit interpretation of the value read from the address is as follows: 1. Internal fan fault 2. External fan fault 3. Varistor fault 4. Insulation failure 6. Positive pole insulation failure 7. Negative pole insulation failure 9. Field voltage limiting 11. Overtemperature limiting	

4.3.9. Wi-Fi Status Menu

The Wi-Fi Status menu shows the info relating to the inverter Wi-Fi functionality. The Wi-Fi Status menu displays the activation status of the Wi-Fi functionality, the details of the Wi-Fi connection and the activation status of the Technical Support service.

The figure below shows an example of Wi-Fi Status window.

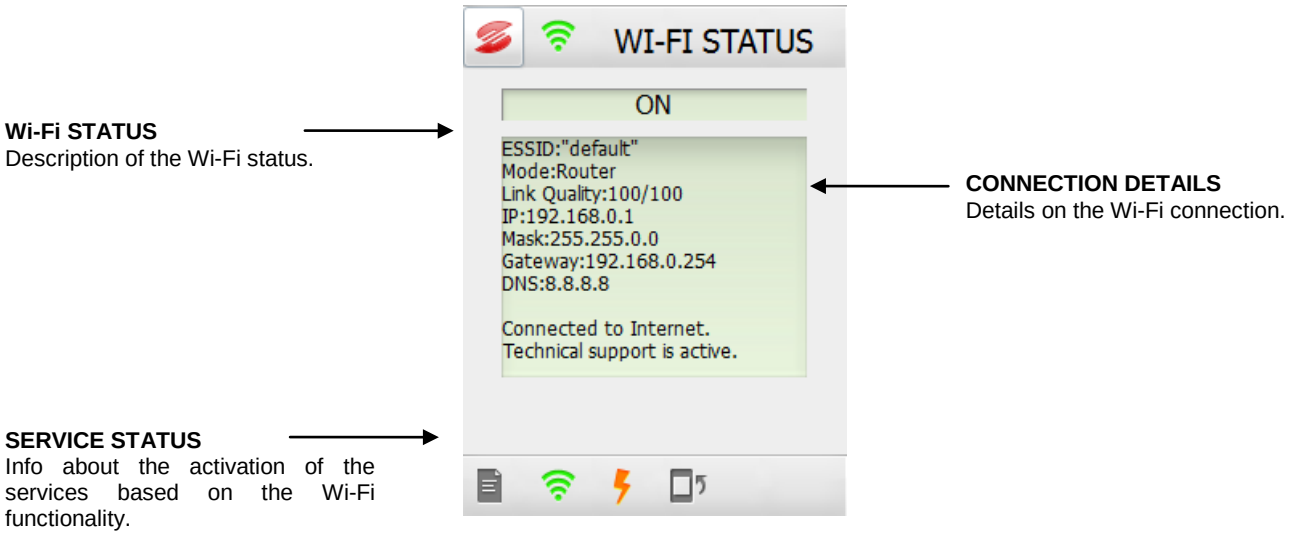


Figure 83: Example of the Wi-Fi Status window

4.3.9.1. Wi-Fi Status

The *Wi-Fi Status* window shows the activation status of the Wi-Fi functionality set from the Wi-Fi submenu in the Connectivity menu (3.7).
The Wi-Fi status icon shows additional brief information about the Wi-Fi connectivity status, as described in section 4.3.9.

4.3.9.2. Connection Details

The *Connection Details* field shows detailed information on the Wi-Fi connection. Information is periodically updated. The following values are displayed:

- **ESSID:** Name of the target Wi-Fi network
- **Mode:** Type of connection that is established, based on the settings in parameter **L305 – CONNECTION TYPE**
- **Link quality:** quality of the connection expressed as a percentage.
  - **0/100:** no connection established; the Wi-Fi status icon is grey or red;
  - **1/100 to 10/100:** connection established, low signal; the Wi-Fi status icon is yellow;
  - **11/100 to 100/100:** connection established, good signal; the Wi-Fi status icon is green.
- **IP:** current IP address of the inverter. If the IP address is set to DHCP, the display shows the address assigned by the router to the inverter; if the IP address is set to STATIC (**L307 – IP TYPE**), the display shows the address set by the user.
- **Subnet:** current subnet mask. If the IP address is set to DHCP, the display shows the address assigned by the router to the inverter; if the IP address is set to STATIC (**L302 – SUBNET MASK**), the display shows the address set by the user.
- **Gateway:** current gateway of the inverter. If the IP address is set to DHCP, the display shows the address assigned by the router to the inverter; if the IP address is set to STATIC (**L303 – GATEWAY**), the display shows the address set by the user.
- **DNS:** IP address of the DNS for the URL resolution. The display shows the value set for parameter **L311 – DNS**.

4.3.9.3. Services Status

The **Services Status** field indicates the activation of the services based on the Wi-Fi functionality of the inverter (4.3.4.2). . The following messages are displayed:

- **Connected to Internet:** This means that the inverter is correctly connected to the Internet. In that case, data may be correctly sent to Sunwayportal.it and the Technical Support functionality may be activated.
- **Technical Support is active:** This means that the inverter is correctly connected to the Technical Support service, once this has been activated from the Services submenu in the Connectivity menu. In that case, the Customer Service of Elettronica Santerno SpA may operate on the inverter in remote mode.

5. ADVANCED INSTALLATION

5.1. Serial Communications

5.1.1. General

The SUNWAY M XS 2200, 3000 and 3800 inverters may be connected to a PC via serial link. This allows reading and writing all the parameters normally managed through the touchscreen display as well as the acquisition of the data processed by the inverter.

The 3-wire RS485 standard is used, which ensures better immunity to disturbance even on long cable paths, thus limiting communication errors.

The inverter behaves as a slave device (i.e. it can only respond to queries sent by another device); a master device (the PC or a Data Logger board) is then needed to implement serial communications.

It is possible to connect only SUNWAY M XS directly to one PC (or equivalent device).

5.1.2. Direct Linking

If a direct linking configuration is chosen, the electrical standard RS485 may be used provided that the PC is equipped with a RS485 port. If the PC is equipped only with a serial RS232-C port or a USB port, as it typically is, a RS232-C/RS485 converter or a USB/RS485 converter is required.

Logic ‘1’ (usually called a ‘MARK’) means that terminal TX/RX A is positive in respect to terminal TX/RX B (vice-versa for logic ‘0’, usually called a ‘SPACE’).

5.1.3. Connection

The 9-pole, male D connector located beneath the front cover of the inverter is required. If a female connector is mounted on the inverter, use the gender changer supplied.

The pins-signals matching is given in the table below.

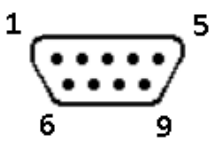
Pins of the DB-9 Connector	Name	Function
1, 3	A-Line	(TX/RX A) Differential input/output A (bidirectional) depending on standard RS485. Positive polarity in respect to pins 2 – 4 for one MARK.
2, 4	B-Line	(TX/RX A) Differential input/output B (bidirectional) depending on standard RS485. Negative polarity in respect to pins 1 – 3 for one MARK.
5	GND	(0 V) Control board zero volts.
6	N.C.	(VTEST) Test power supply input – **Do not connect**
7, 8	GND	Not connected
9	+5V	+5 V, max. 100 mA for the power supply of an optional, external converter (RS485/RS232 or RS485/USB)
PINOUT		

Table 26: DB9 connector - RS485 serial port

The metal case of the connector is connected to the inverter grounding. Connect the braid of the shielded duplex cable used for serial communications to the metal case of the female connector that is to be connected to the inverter.

The Modbus-IDA association (http://www.modbus.org) defines the type of connection for Modbus communications over serial link RS485, which is used by the inverter, as a '2-wire cable' configuration. The following specifications are recommended for the cable:

Type of cable	Shielded cable composed of a balanced pair named D1/D0 + common conductor ("Common")
Recommended cable	Belden 3106 (distributed by Cavitec)
Minimum cross-section of the conductors	AWG24 corresponding to 0.25mm^2; for important lengths, cross-sections up to 0.75mm^2 are recommended
Recommended maximum length	500 metres, referred to the max distance measured between any two stations
Characteristic impedance	Greater than 100Ω (recommended), typically 120Ω
Standard colours	Yellow/brown for D1/D0, grey for "Common" signal

Table 27: Specifications of the RS485 serial port

A 120Ohm termination resistor and the polarization resistors are integrated into the inverter.

5.1.4. Communications Protocol

The implemented serial communications protocol is the Modbus RTU standard.

The inverter parameters are queried at the same time as they are read from the touchscreen display, so that both devices can be used at a time. Parameter modification is also managed along with the touchscreen display. Note that the inverter will always consider as valid the latest value set either via serial link or through the touchscreen display.
Because the inverter is controlled by two microprocessors, it will be considered by the master as if it were two devices, one with address 1 (section A) and one with address 2 (section B).

5.1.5. Specifications of the Serial Communications

Baud rate	115200 (fixed)
Data format	8-bit
Parity (1)	NO
Stop bit	1
Protocol	MODBUS RTU
Supported functions	03 h (Read Holding Registers) 10 h (Preset Multiple Registers)
Device address	1 section A, 2 section B
Electrical standard	RS485
Inverter response delay	10ms
End of message timeout	50ms

Table 28: Specifications of RS485 serial port

(1) Ignored when receiving communication messages.

5.2. USB Connection

The inverters of the SUNWAY M XS series are provided with a USB connector featuring IP67 degree of protection. The USB connector is utilized for the connection of an external Wi-Fi dongle or a USB memory stick for the inverter software update.

5.3. Grid Interface Protection Autotest

The Grid Interface Protection Autotest enables checking the operation of the grid disconnecting device (Interface Protection) as required by the National Grid Administrator.

The following tests may be carried out:

- test for the minimum voltage protection trip;
- test for the maximum voltage protection trip;
- test for the minimum frequency protection trip;
- test for the maximum frequency protection trip.

During the test, the inverter automatically varies the trip threshold of the variable to be tested until the protection trips, thus allowing checking if the integrated relay connecting the inverter to the grid opens. When this happens, the inverter stops, the interface contactor opens and the threshold value is fixed to the trip value. At the same time, the trip time of the protection is displayed.

After few seconds, the normal operation of the inverter is automatically resumed and the default values are reset.

The inverter decoupling events are stored to the Event History.

The inverter is to be producing energy (parameters FIELD OK = 1, GRID OK = 1 and RUN = 1 on the inverter Status page). The Status page may be accessed by pressing the Icon status from the status bar.

Figure 84: RUN status page

When the test is inactive, the trip thresholds of the protections are fixed and set to the values required by the standards in force:

Variable	Required value	Nominal value of the variable (factory setting)	Value of the trip threshold (factory setting)
Minimum voltage trip threshold	0.8 * nominal grid voltage	230 Vac	184 Vac
Maximum voltage trip threshold	1.2 * nominal grid voltage	230 Vac	276 Vac
Minimum frequency trip threshold	49.7 Hz (49 Hz) (1)	50 Hz	49.7 Hz
Maximum frequency trip threshold	50.3 Hz (51 Hz) (1)	50 Hz	50.3 Hz

Table 29: Protection trip times

* In some cases, the National Grid Administrator may require to change the values in brackets. If this is the case, please contact the Customer Service of Elettronica Santerno SpA.

NOTE

Value set on the inverters delivered in Italy starting from 01/04/2012 and identified by the relative label, compliant with CEI 0-21 according with deliberation 84/2012/R/EEL. For the inverters delivered before 01/04/2012, this parameter is set to 0.3Hz according to the previous standards in force, so it has to be set to 1Hz.

The protection trip times are as follows for Italy:

Variable	Time
Maximum voltage trip threshold	200 ms *
Minimum voltage trip threshold	400 ms *
Maximum voltage frequency threshold	100 ms *
Minimum voltage frequency threshold	100 ms *

Table 30: Trip times

* approximate value.
The trip times that can be checked for the autotest match with the values given in the table and detected by the system, apart from a negligible error.

The autotest procedure is as follows:

- from the start menu, select the **Tools** ( ) icon;
- use the arrow keys (02 / 02) from the status bar to scroll to the second page and select the **Commands** (COMMANDS) submenu;
- select the relevant icons from the **Autotest** submenu; carry out the following tests in sequence: minimum voltage and maximum voltage; minimum frequency and maximum frequency;
- press the **Run Command** (Run Command) button to enable the test: the trip value starts varying until it matches with the measured value (see Figure 85);
- if the test succeeds, the inverter temporarily disconnects from the grid and the test window shows the value of the trip threshold causing the inverter to stop and the time when the protection has tripped;
- if the test fails, the inverter does not stop. This means that the interface protection has tripped. Please contact the Customer Service of Elettronica Santerno SpA.

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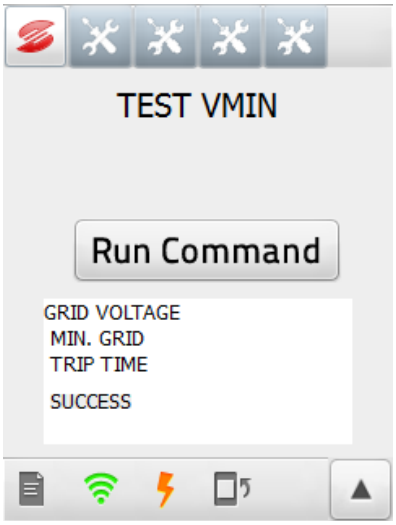


Figure 85: Test page

Press the arrow button on the bottom-right corner to quit the test mode, or press the desired icon from the navigation bar. Press to return to the **Start Menu.**

5.4. Maintenance

The degree of protection IP65 limits scheduled maintenance only to the external parts of the product.
Every two years, clean the external fans and the rear heatsink with compressed air to remove dust. The frequency of scheduled maintenance may need to be increased depending on the installation conditions. It is to be increased if the inverter is installed outdoor or in a dusty environment.

It is recommended that the inverter operation be periodically checked using the diagnostic means made available from the touchscreen display. It is advisable to read the alarm history and to perform the autotest procedure.

5.5. Removing the Inverter

Follow the sequence below to remove the inverter from its installation place:

1. Set the inverter to OFF to cease power delivery; make sure that the  symbol appears on the status bar of the display.
2. Decouple the inverter from the grid by opening the moulded-case circuit breaker; make sure that the inverter is disconnected (the display is to be off).
3. Set the PV field disconnect switch (if any) to OFF.
4. Remove the cable cover.
5. Remove the grid connector.

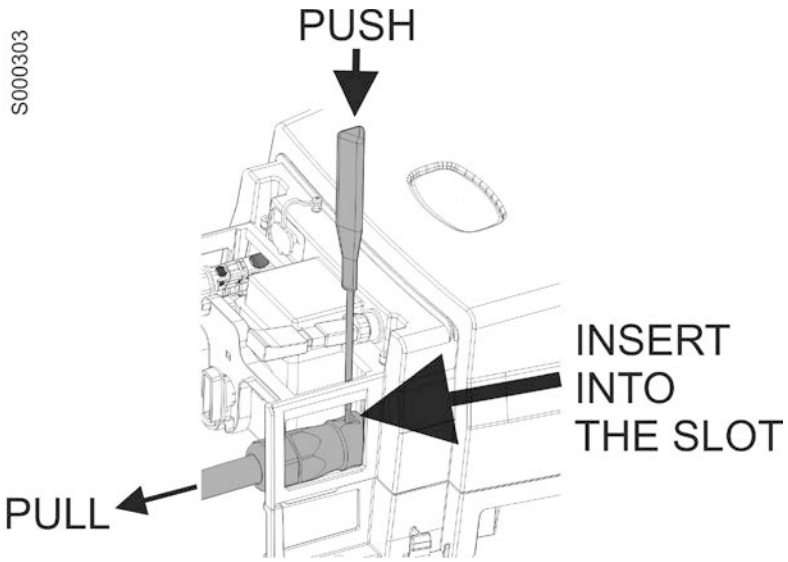


Figure 86: Removing the grid connector

6. Remove the quick-coupling connectors using the pliers supplied.

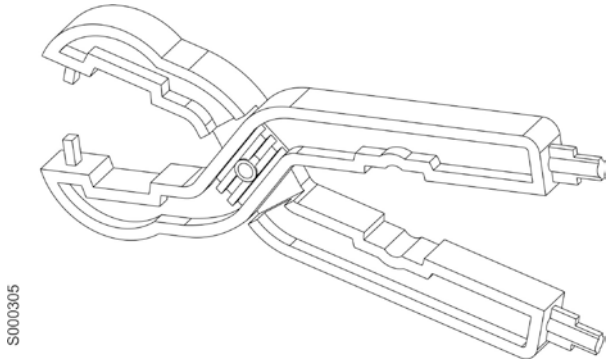


Figure 87: Pliers to remove the quick-coupling connectors

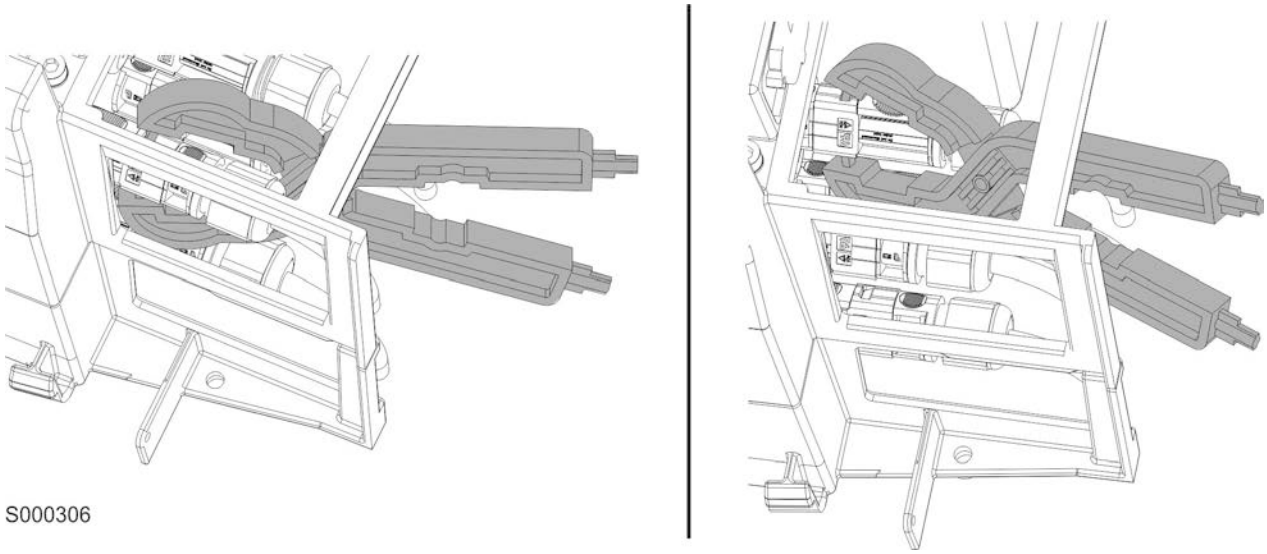


Figure 88: Removing the quick-coupling connectors

7. Remove the serial link connector (if any)
8. Remove the inverter

Figure 89: Removing the inverter

6. SPECIFICATIONS

SUNWAY M XS Model	2200	3000	3800
Nominal output power (W)	2200	3000	3800
Maximum efficiency (%)	96.3	96.3	96.4
European efficiency (%)	95.3	95.4	95.6
INPUT			
Maximum peak power (Wp) suggested by the photovoltaic generator	2640	3600	4500
MPPT range (Vdc)	125 ÷ 480		
Maximum open-circuit voltage (Vdc)	580		
Number of independent MPPTs	1	2	2
Maximum current of the photovoltaic generator (A)	12.5	2*10	2*12.5
Harmonic residual voltage (%)	< 5		
OUTPUT			
Nominal voltage (Vac)	230 ±20 % single-phase		
Grid frequency (Hz)	50 (may be set to 60) +/-2 %		
Nominal output current (Aac)	9.6	13.3	16.5
Nominal short-circuit current **	1.5 * Nominal output current		
Power factor (cosφ)	1		
Output current distortion	<3 % (total)		
GENERAL DATA			
Conversion bridge	IGBT		
Grid interface relay (kV)	2.1		
Insulation voltage between input and output (kV)	2.1		
Impulse withstand voltage	4kV AC-side and DC-side		
Overvoltage safety devices	Through varistors installed on each input polarity of the PV field		
Overvoltage category	II on DC-side, III on AC-side		
PV field polarity anti-mismatch protection	Through short-circuit diode		
Grid connection relay	Mod. Zettler AZ2150W		
Insulation loss detecting device	Integrated		
Noise at 1 metre from 16 Hz to 20 kHz (dB)	65		
Cooling system	Natural ventilation	Natural ventilation	Forced ventilation
Degree of protection	IP65		
Dimensions w x d x h (mm) *	338 x 570 x 218		
Weight (kg) *	17.5	20.8	21.6
Maximum ambient operating temperature (°C)	-25 ÷ +60		
Storage temperature (°C)	-25 ÷ +70		
Maximum relative humidity (%)	100		

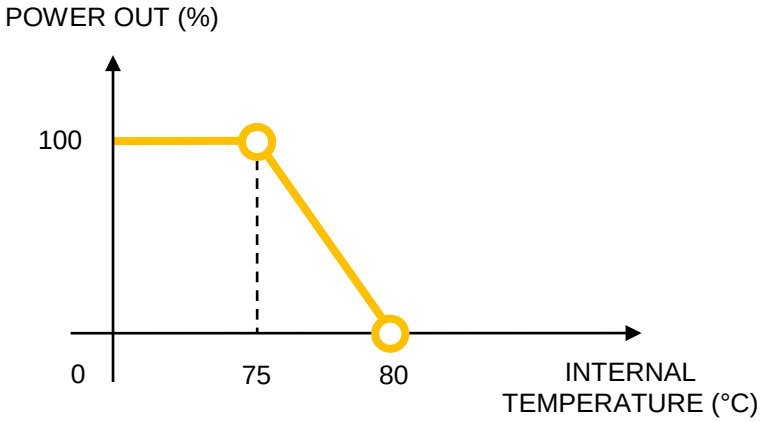
Table 31: Specifications of the SUNWAY M XS inverters

* Weights and measures may vary based on the options required.
* The actual value depends on the real operating conditions of the grid.

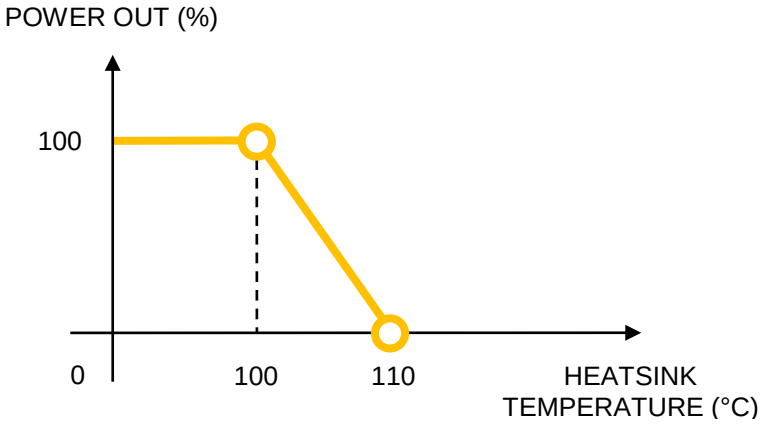
Power Limiting

The Sunway M XS inverters may limit their output power based on 3 factors:

- o Internal temperature
  The power limiting associated with the internal temperature decreases the power output by 20% every °C over 75 °C. This means that the output power is zero when the internal temperature reaches 80 °C.



- o Heatsink temperature
  The power limiting associated with the heatsink temperature decreases the output power by 10% every °C.



- Field voltage
  When the field voltage is out of the allowable range from 160V (185V for 2200) to 480V, the inverter limits its output power due to the achievement of the maximum field current or to an exceedingly high input voltage.