RA.Store-3

Installation Manual

Rev. 1.04

ATON S.r.l. Sede Legale: Via Nuova Circonvallazione, 57/B 47923 Rimini(RN)
Sede Operativa:Via Guido Rossa, 5 41057 Spilamberto(MO) Tel: +39 059/783939Fax: +39 059/784323
E-mail: info@atonstorage.com Sito web: www.atonstorage.com

INDEX

1 Introduction

The present manual describes the procedures of installation and setting up of the system RA.Store-3.

It is absolutely compulsory to stick to the following instructions:

- Read this entire document before starting the installation phase.
- Keep a copy of this document nearby the product.

READ THE PRESENT MANUAL BEFORE STARTING ANY OPERATION

Before starting any operation, it is compulsory to read the present Installation Manual.

The guarantee of good functioning and the full compliance of the performances of the storage system are strongly connected to the correct commitment of all instructions that are contained in this Manual.

1.1 Symbols contained in the manual

NOTICE	It indicates actions that can cause material damages.
CAUTION	It indicates a dangerous situation that leads to a potential risk if the safety rules are not respected.
WARNING	It indicates a dangerous situation that leads to potential death or severe injuries if the safety rules are not respected.
DANGER	It indicates an extremely dangerous situation that leads to certain death or severe injuries if the safety rules are not respected.

1.2 Addressees

The present manual is addressed to technical staff that is authorized to install the system RA.Store-3 and must be in possession of all the technical and safety requirements foreseen by the law in force for the realization of electric works.

1.3 Use

The product RA.Store-3 is a storage system that must be used to store electrical energy produced from PV panels. The inappropriate use of this machine can lead to death or risk of severe injuries for users and third parties, as well as damages to the product itself and to other valuable objects.

1.4 Safety

In order to avoid any damages to people and objects during transport, installation and use, the next points must be followed:

- The storage system must be installed in fully compliance with the instructions contained in the present manual.
- The storage system must be installed exclusively by authorized and qualified staff, duly trained to execute electrical works in compliance with the law in force in the country of installation. Moreover that staff must be qualified, trained and authorized by Aton Srl.
- The storage system must be installed in an appropriate place according to the specifications indicated in this document.
- The transport and warehousing conditions indicated in this document must be respected.
- Use the storage system in its original condition. Any alteration of any type is strictly forbidden because it can limit the functioning or cause damages to people and/or objects.

1.4.1 Possible damages and risks due to non–compliance of installation specifications

The non-compliance of the instructions contained in this manual can cause damages to people and/or objects.

The machine must not be opened during the functioning.

The realization of works on the internal electrical system of the machine during the functioning can cause short-circuits and/or discharge arcs, creating then a risk of burns and /or electrocution.

1.4.2 Damages due to explosive atmosphere and inflammables materials

Do not install nor use the storage system in an atmosphere classified as potentially explosive or nearby materials that are highly inflammable.

1.4.3 Damages due to modifications on the product

Do not tamper with or bypass the protection devices.

Do not alter in any way the storage system.

Do not execute any modification on the electrical and/or data lines connected to the storage system.

1.4.4 Instructions to follow in case of fire

An initial fire can start on the electrical machines despite fireproof materials and an accurate engineering.

An initial fire nearby the storage system can start the fire even on this latter, causing the possible release of the material contained in the batteries.

In case of fire nearby the storage system or inside it, follow these instructions:

- Only the firemen equipped with the proper protection devices are authorized to enter the place where the storage system is located.
- The risk of electrocution is available during the phases of fire extinguishing because the storage system is switched on and in functioning.
- Before starting the fire extinguishing phases:

1. Switch off the storage system.
2. Insulate the electrical system of the user from the national electrical grid by lowering the magnetothermal breaker downstream the electricity meter.
3. The fire extinguishing must be executed by using conventional agents because the output voltage of the storage system is 400 Vac (classified as low voltage).
4. Water is recommended as extinguishing agent in order to cool the battery and prevent the release of chemical agents if the modules still have the whole external case.
5. The battery modules have a maximum voltage of 54 Vdc.
6. The battery modules do not contain metallic lithium.

1.5 Warnings

The following paragraphs contain specific warnings that must be always respected by executing any operation on the storage system.

DANGER

Risk of death due to electrocution!

Enter in direct contact with the internal components of the storage system can cause a risk of death due to electrocution.

- Do not touch internal components except when it is expressly required and according to the ways indicated in this manual.
- Do not remove any plastic cover or screen.
- Do not reach with fingers or tools any part covered by plastic screens.

IT IS STRICTLY FORBIDDEN

It is strictly forbidden to execute any operation without any of the following PPE:

- Anti-electrocution gloves
- Insulating carpet (for ex. for measuring on cables under tension)
- Safety shoes

ATTENTION

Each intervention non-compliant with what is described in this manual and in the technical datasheets of the system implies the guarantee forfeiture and discharges the producer any liability.

DANGER

Risk of death due to electrocution!

When the storage system is handled, follow these instructions:

- Switch off the storage system.
- Insulate and disconnect all the electrical lines connected to the storage system.
- Take every precaution to avoid the turning-on of the storage system during the electrical operations on it.
- Only technical staff in possession of the requirements described in the paragraph “1.4 Safety” is authorized to execute the handling activities.

WARNING

Risk of fire!

It is possible that very high short-circuit currents can develop.
During any operation on the battery modules, respect these instructions:

- Never execute any intervention on battery modules that are switched on.
- Before starting any operation, be sure to have completed the procedure of “Switch off the batteries” as described in the technical appendix.
- People who execute these operations are not allowed to wear any metal piece of jewellery.

NOTICE

Damage on battery modules due to deep discharge!

If disconnected from the public grid and PV panels, battery modules may discharge beyond their maximal limit and cause damages to the modules. Do not disconnect the storage system from the public grid and PV panels for long periods of time.

1.6 Pictograms and warnings on the machine

	Electrocution hazard – presence of electricity. It is therefore forbidden to try to enter the internal parts of the system. Placed nearby the electrical panel.
	Refer to the present manual – please always read this manual (and the installation manual in case of technical authorized staff) before starting any operation on the system. Placed nearby the electrical panel.
	It is forbidden to block or cover the air intakes of the system. Placed nearby the electrical panel.

2 Transport, warehousing and long period of non-use

2.1 Warehousing

The term “warehousing” means the condition in which the storage system stays when it is electrically disconnected from external electrical grids and the battery modules cannot be charged in an independent way.

2.2 Environmental conditions of warehousing

Please see technical appendix.

2.3 Warehousing and long period of non-use of battery modules

During the warehousing and long period of non-use, the battery modules discharge automatically to the minimum level of energy.

This process of deep discharge can damage the battery modules. For this reason the battery modules and the storage systems can be kept in the warehouse for a limited time by respecting anyway these instructions:

- The battery modules must have a good charge level before the warehousing (equal to or higher than 85% of the rated capacity).
- Do not keep the battery modules in the warehouse for a period of time longer than 6 months.
- During the warehousing period, the orange pole of the module must not be connected to other battery modules.

2.4 Transport of the battery modules

The lithium-ion batteries are dangerous products. During the transport, respect these instructions:

- Respect all the general regulations regarding transport according to the type of transport.
- Respect all the legal regulations.
- Consult an expert in dangerous transport matters.

The data of the battery modules regarding the transport are delivered in the following way:

- Class of dangerous wares: 9
- UN Number: UN3480 'lithium-ion batteries'
- Weight of the battery module (packaging included): 24 kg

2.5 Inspection ways to check damages due to transport

CAUTION

Risk of injuries due to the use and handling of damaged battery modules!

Remove the packaging from the battery modules immediately after the transport and check by sight if there is any damage.
In case of any damage (deformation and/or damages on the external case, liquid leakage towards outside):

- Do not use the battery module.
- Call immediately Aton to receive assistance.

2.6 Setting up of the temperature after transport

If the temperature of the storage system is highly lower in comparison with the room temperature in the installation place at the moment of the delivery, a condensation can be created inside the storage system that can be damaged.

Check inside the storage system before starting the installation.

Start with the installation steps only in absence of condensation inside the storage system.

If the system is transported at temperatures lower than 0 °C, proceed according the following steps:

- Place the storage system in a room appropriate to install it.
- Remove the external cover carters of the storage system.
- Wait 24 hours.
- Check that there is no condensation.
- Continue with the installation.

3 Installation

3.1 Procedure of installation

The procedure of installation is composed of four parts:

1. Placement of the machine
2. Wiring
3. Commissioning with functional test
4. Insertion of the installation data with check of data communication

The insertion part of the installation data is described in details in the specific manual “Site – Manual for the registration on the portal" and can be done before the installation and commissioning phases, having previous knowledge of the serial number of the machine.

Then check only the data communication towards ATON server: it is possible only after having finished the installation, with the storage system in function.

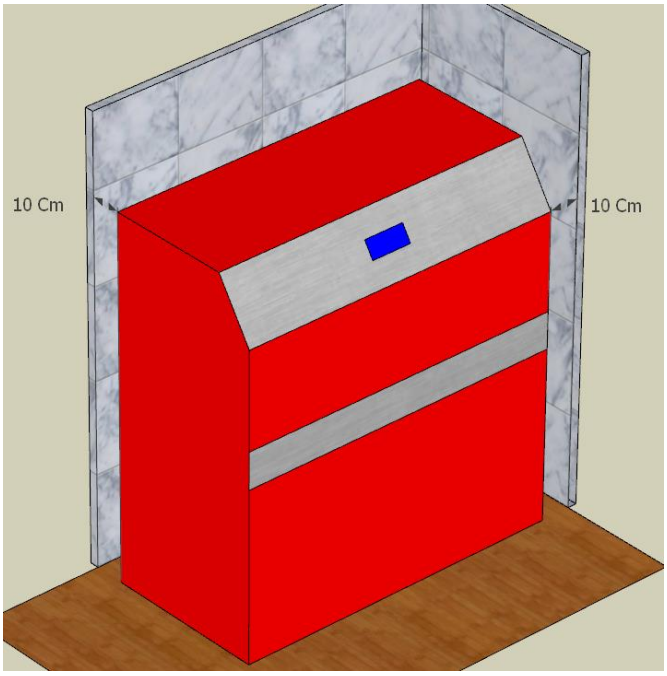
ATTENTION

Install the system

- in a room that must be: dry, covered with a roof, not floodable, not potentially explosive, without any rodents and inflammable materials nearby,
- sheltered from the direct rays of the sun,
- at a distance of 10 cm at least from the walls of the building in order to maintain a correct ventilation,
- on a surface capable to bear its weight.

3.2 Placement of the machine

The storage system must be placed and installed at a minimum distance of 10 cm from any wall or surface in order to allow the right ventilation and heat dissipation (see Picture 1).



Picture 1 – Minimum compulsory distances: 10 cm on each side

3.3 Wiring

DANGER

Risk of death due to electrocution!

When electrical works are executed on the storage system or the electrical grid during the installation phase, respect these instructions:

- Switch off the storage system.
- Insulate, disconnect and secure all the electrical circuits where the works will be realized.
- Take every precaution to avoid that the storage system turns on in an unauthorized way.
- After having secured the storage system and the circuits object of the works, execute electrical measures to be sure that all the parts that will be object of the works have really a potential of 0 V.
- Only technical staff in possession of the requirements described in the paragraph “1.4 Safety” is authorized to execute the handling works.

DANGER

Risk of death due to electrocution!

When electrical works are executed on the storage system or the electrical system during the installation phase, respect these instructions:

- Install a RCD (residual current device) on each electrical line in alternated current in output from the storage system.
- The RCD or RCDs must be of quadripolar type, with maximum residual current equal to 300 mA, class A.

NOTICE

Length of the electrical and data cables

All the electrical and data cables in entry and exit of the storage system must be checked by qualified technicians in order to respect the electrical regulations in force.

3.3.1 Preliminary stages

Be sure that all the protections on the electrical panel of the storage system are OFF.

Insulate the cables that come down from the PV panels strings.

3.3.2 Handling of the system

The machine RA.Store can be handled mechanically with transpallet, and in this case it is not necessary to disassemble its parts in order to reduce its weight.

If the handling needs some manual operations, disassemble some parts in order to reduce the weight of each single component.

The operations for the manual handling are:

- Removal of the external plastic parts
- Removal of the batteries
- Application of auxiliary handles on the basic structure
- Transport of the basic structure, batteries and plastic parts separated
- Disassembling of the auxiliary handles and reassembling of the batteries
- Reassembling of the plastic parts

Before executing the manual handling operations, please read the Appendix C.5 – Weights at page 71.

3.3.2.1 Removal of plastic parts

Unscrew the two screws that fix the upper panel to the rest of the structure, and then remove it by pushing as shown in the following picture.

Picture 2 – Removal of the upper panel

Disconnect the earth cable from the panel and put it on the floor, taking care that the panel does not scratch on the external side.

Picture 3 – Earth cable

Unscrew the 4 screws indicated in the picture to remove the two lateral panels (lift them slightly up before removing them).

Picture 4 – Removal of lateral panels

Disconnect the earth cable from both panels and put them on the floor, taking care that they do not scratch on the external side.
Then unscrew the 4 screws to remove the frontal panel at the bottom.
Disconnect the earth cable from the panel and put it on the floor, taking care that the panel does not scratch on the external side.

3.3.2.2 Removal of the batteries and BMS

WARNING

During the works on the battery modules, respect these precautions:

- Do not execute any electrical works on the connecting cables.
- The battery modules are always under tension.
- If the module of Battery Management System is off, the battery modules are not off and the poles have a potential of 48 Vdc or even higher.
- Use only the provided cables that are protected from direct contacts.

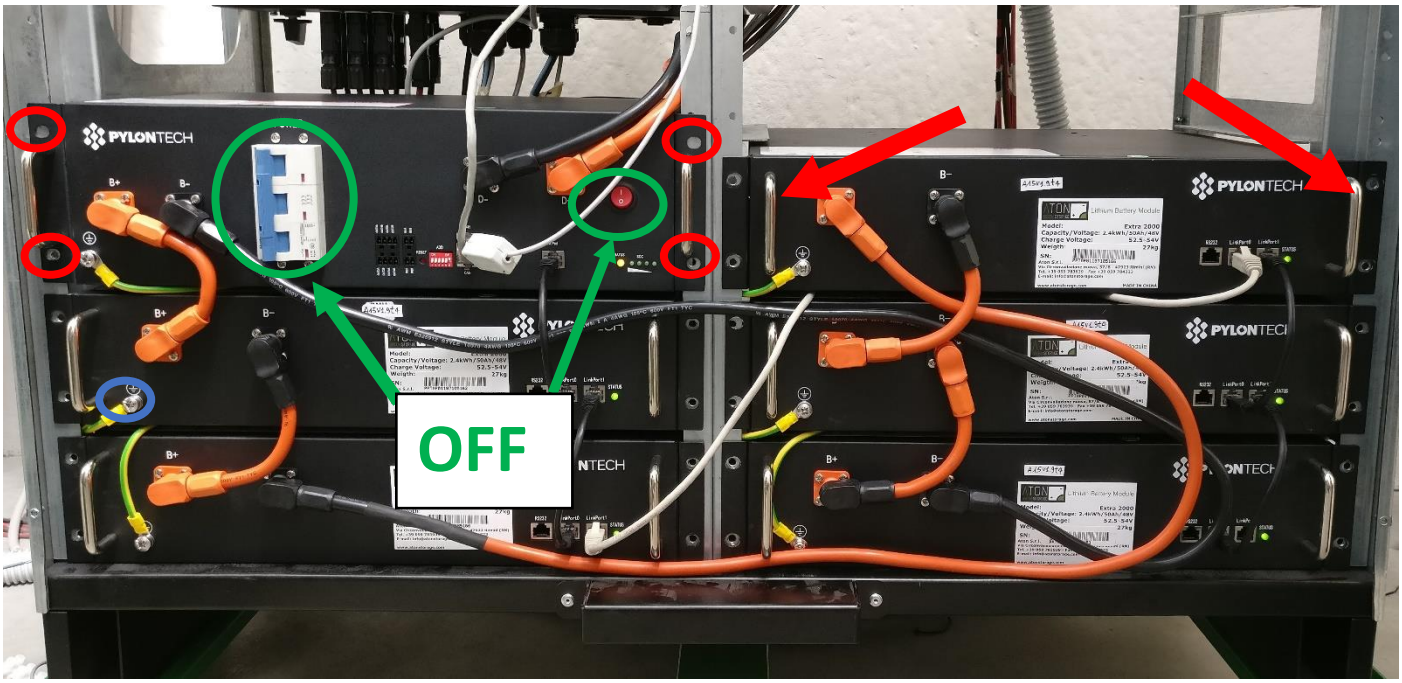
During the works on the DC circuit:

- Do not wear any metal piece of jewellery.
- Before starting any operation, switch off the storage system.
- Put on “OFF” all the protections contained in the electrical panel of the storage system.
- Switch off the module of Battery Management System by following the instructions given in the next paragraphs.

In picture 5 are shown:

- the handles with which the battery and the BMS (2 front handles shown by the red arrows) are equipped,
- the screws that keep it together with the structure (4 screws shown by the red circles),
- the screws that create the equipotential bond (1 screw shown by a blue circle).
- the magnetothermal breaker and the button “0/1” to switch on and off the module of the Battery Management System.

Before starting the works on the battery modules and disconnect any cables, put on "OFF" the magnetothermal breaker and the red button "0-1" available on the module of the Battery Management System (Picture 5 green circle).



Picture 5 – Wiring of the battery modules and BMS

ATTENTION

The handling of each battery must be executed by two people.

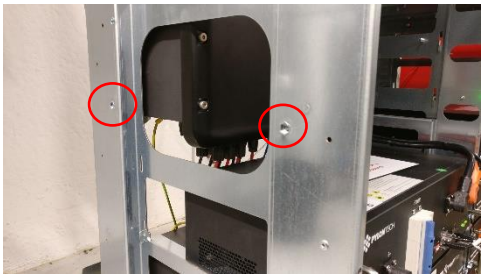
For each battery and for the BMS module:

- unscrew the 4 screws that keep it together with the chassis and the screw for the equipotential bond;
- remove the battery from its slot by using the frontal handles;
- remove completely the battery from its slot and put it on the floor

3.3.2.3 Application of auxiliary handles on the basic structure

Fix to the structure the special handles and reinforcement plates provided in the 4 points indicated in the following images (Picturere 5A, Picturere 6, Picturere 7). Screw the handles over the entire length of the thread. To move the structure manually it is necessary to correctly apply all 4 handles complete with the 2 plates supplied.

Picture 5A – yellow handles



Picture 6 – Indication of the fixing points of the handles on the left side;

the same points are present on the right side

Picture 7 - Application handles to the structure on the left side;

replicate the assembly on the right side

3.3.2.4 Transport of the basic structure, batteries and plastic parts separated

Lift the structure and move it in the desired location.

ATTENTION

The handling of the structure must be executed by 4 people and each person holds a different handle.

Move in the desired location the batteries and the plastic parts previously disassembled.

ATTENTION

Place the system

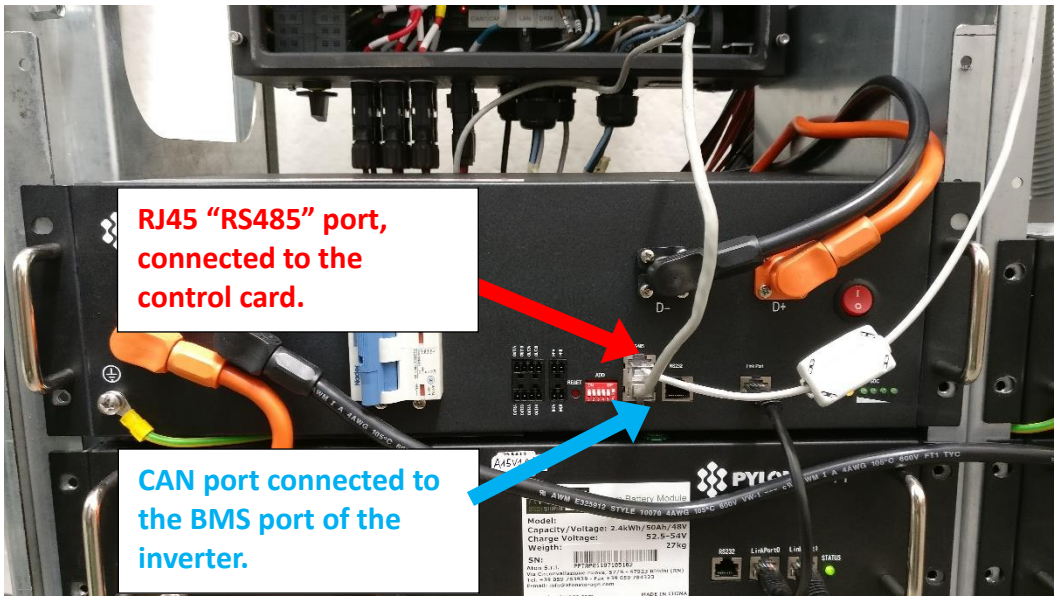
- in a room that must be: dry, covered with a roof, not floodable, not potentially explosive, without any rodents and inflammable materials nearby,
- sheltered from the direct rays of the sun,
- at a distance of 10 cm at least from the walls of the building in order to maintain a correct ventilation,
- on a surface capable to bear its weight.

3.3.2.5 Disassembling of the handles and reassembling of the batteries and BMS

Unscrew the 4 handles used for the transport and keep them for the next installation.
For each battery, reconnect the earth cable previously disconnected and place it again inside the structure (inverted procedure compared to the removal).
For each battery and the BMS, screw the 4 screws that keep it together with the chassis and restore the equipotential bond.

3.3.2.6 Connection and switch-on of the BMS and batteries

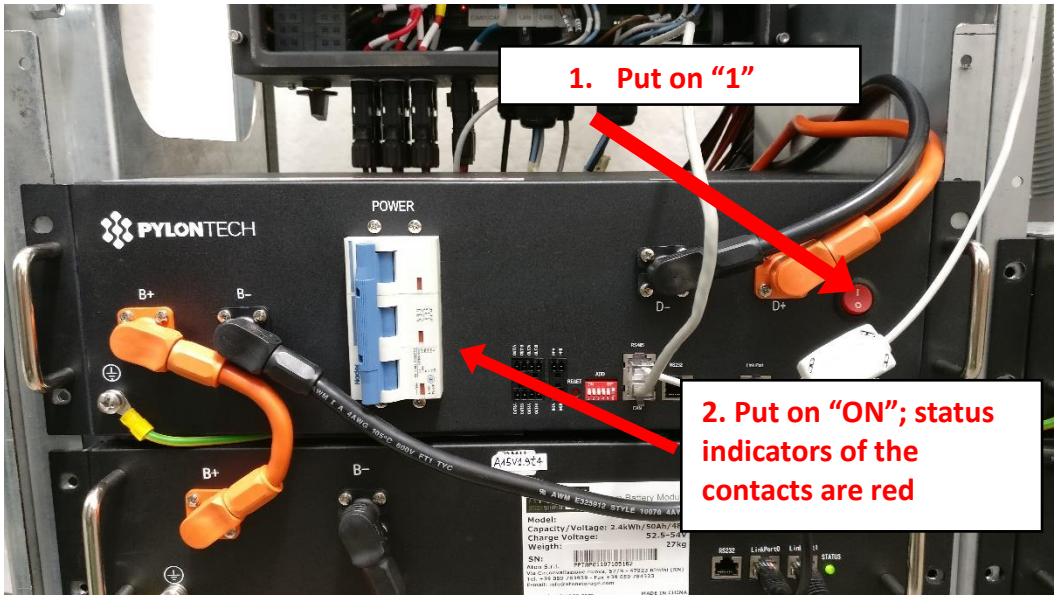
Reconnect the terminals “D+” and “D-“ of the BMS module to the red and black cables that must be inserted in the terminal box.
Reconnect the plug RJ45 that connects the grey cable of smaller diameter equipped with anti-interference filter to the RS485 port available on the BMS module (Picture 8).
Reconnect the plug RJ45 that connects the grey cable of bigger diameter to the CAN port available on the BMS module.
Restore the connection between the positive and negative poles on the different battery modules as shown in the technical schemes.
Restore the connection between the “Link Port 0” “Link Port 1” ports on the different battery modules as shown in the technical schemes.



Picture 8 – Connections of the BMS module

To switch on the module of Battery Management System follow in sequence these points (Picture 8A):

1. Put on “1” the red disconnector “0-1”
2. Put on “1 - ON” the magnetothermal breaker with the blue lever (the status indicators of the contacts are in red).



Picture 8A – Procedure of switching on the batteries and BMS

3.3.3 Placement of the antenna

Move the antenna with magnet base from inside to outside the structure.

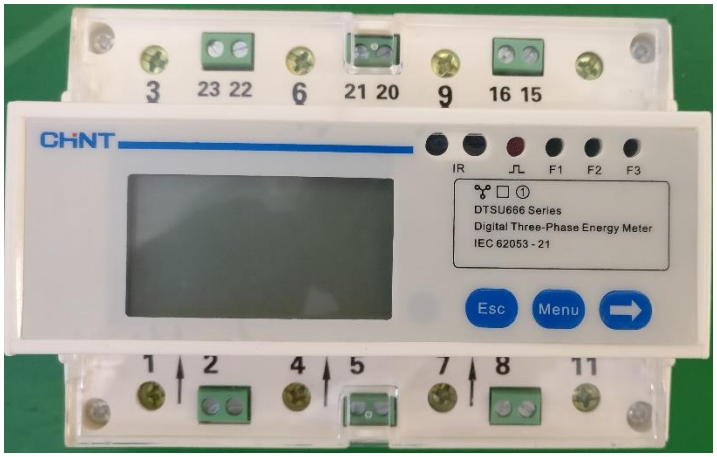
Picture 9 - Antenna

NOTE: The antenna cable will go through the slot of the upper panel in the back part of the system.

Picture 10 – Slot for the antenna cable

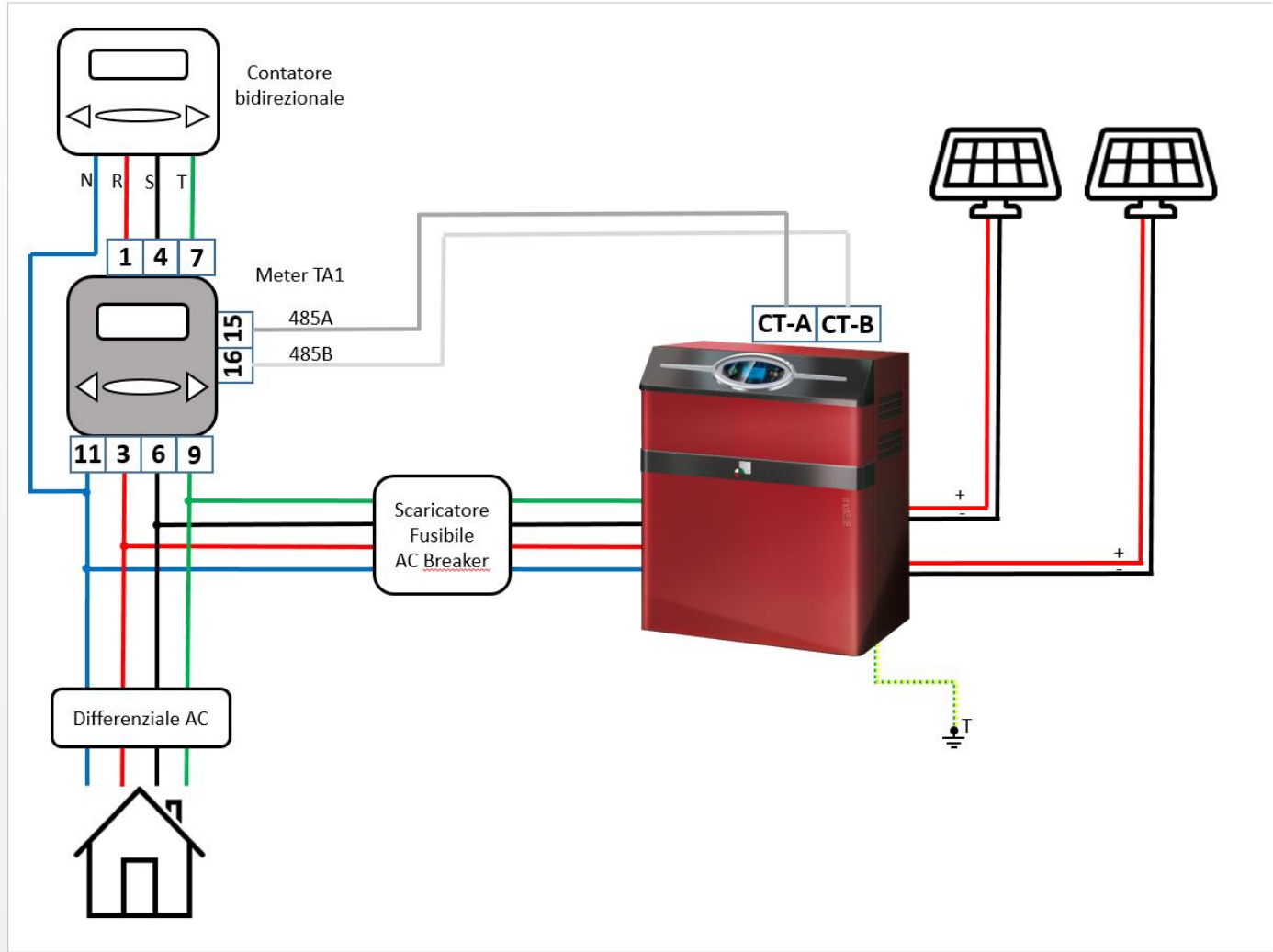
3.3.4 Placement and connection of the three-phase meter

In the following picture the three-phase meter is shown.
The meter is delivered already parameterized.
It is not allowed to execute any alterations or modifications on the functioning parameters.

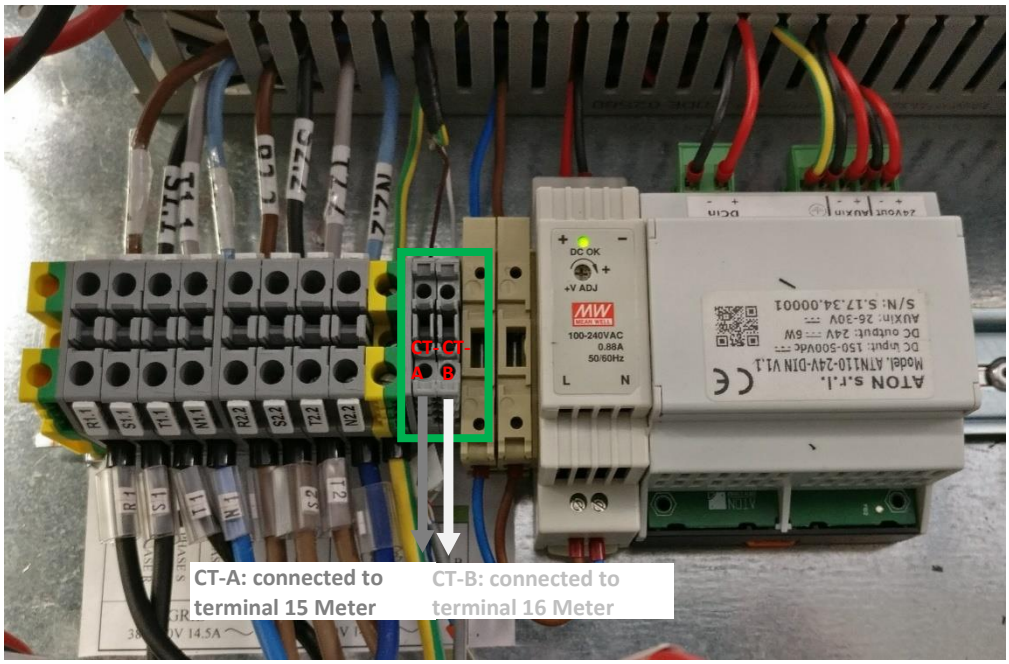


Picture 11 – Three-phase meter

The three-phase meter measures the current exchanged with the public grid.
Place the three-phase meter **just downstream the (bidirectional) meter of the public electrical grid, respecting the connection instructions in the electrical schemes and the ones in picture 12.**



Picture 12 – Base drawing of the meter connection



Picture 12A – Connection terminals to the meter

Line Meter Terminal box QG - M1:

Terminal CT-A terminal box QG - M1 **connected** to terminal n.15 Meter

Terminal CT-B terminal box QG - M1 **connected** to terminal n.16 Meter

3.3.5 Connection of PV panels cables

For the models 6K and 8K it is possible to connect one string for each MPPT entry.

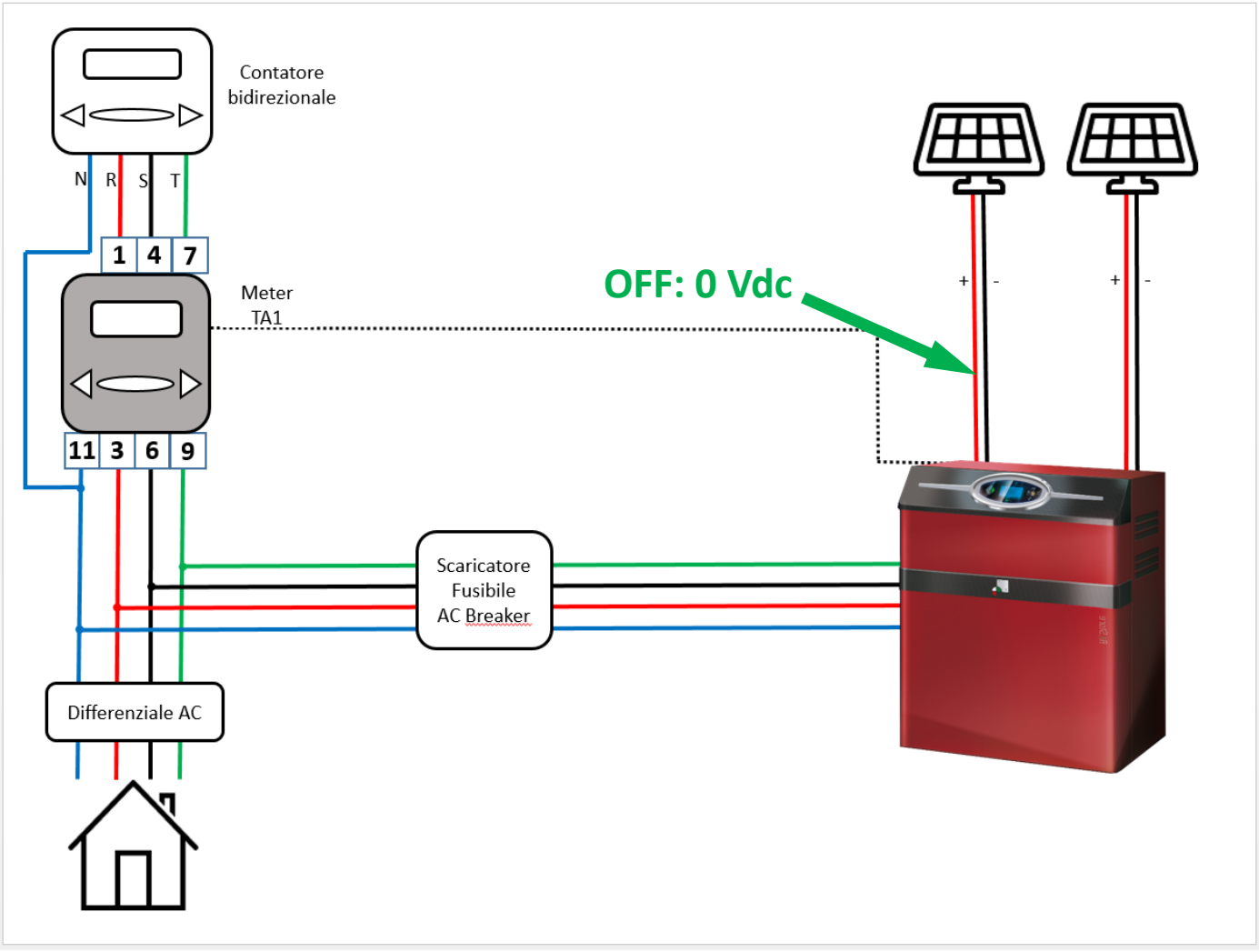
For the model 10K it is possible to connect one string for the entry MPPT “1” and two strings for the entry MPPT “2”.

ATTENTION

Electrocution risk. Use insulating gloves and carpet foreseen for works done on hazardous electrical components.

Before starting with the connection procedure, do the following checks on the electrical cables that come down from the PV panels:

- Check with a tester that on each line (string) is available a current lower than 950 Vdc.
- Check with a tester the right polarity of the cables (red cable = pole “+”; black cable = pole “-“).
- Insulate the cable tract that will be connected to the connector type MC4 (Picture 13).
- Before starting the installation of the connector MC4, check with a tester that the potential difference between the cable that is going to be connected and the Pe protective conductor of the electrical installation is equal to 0 V.

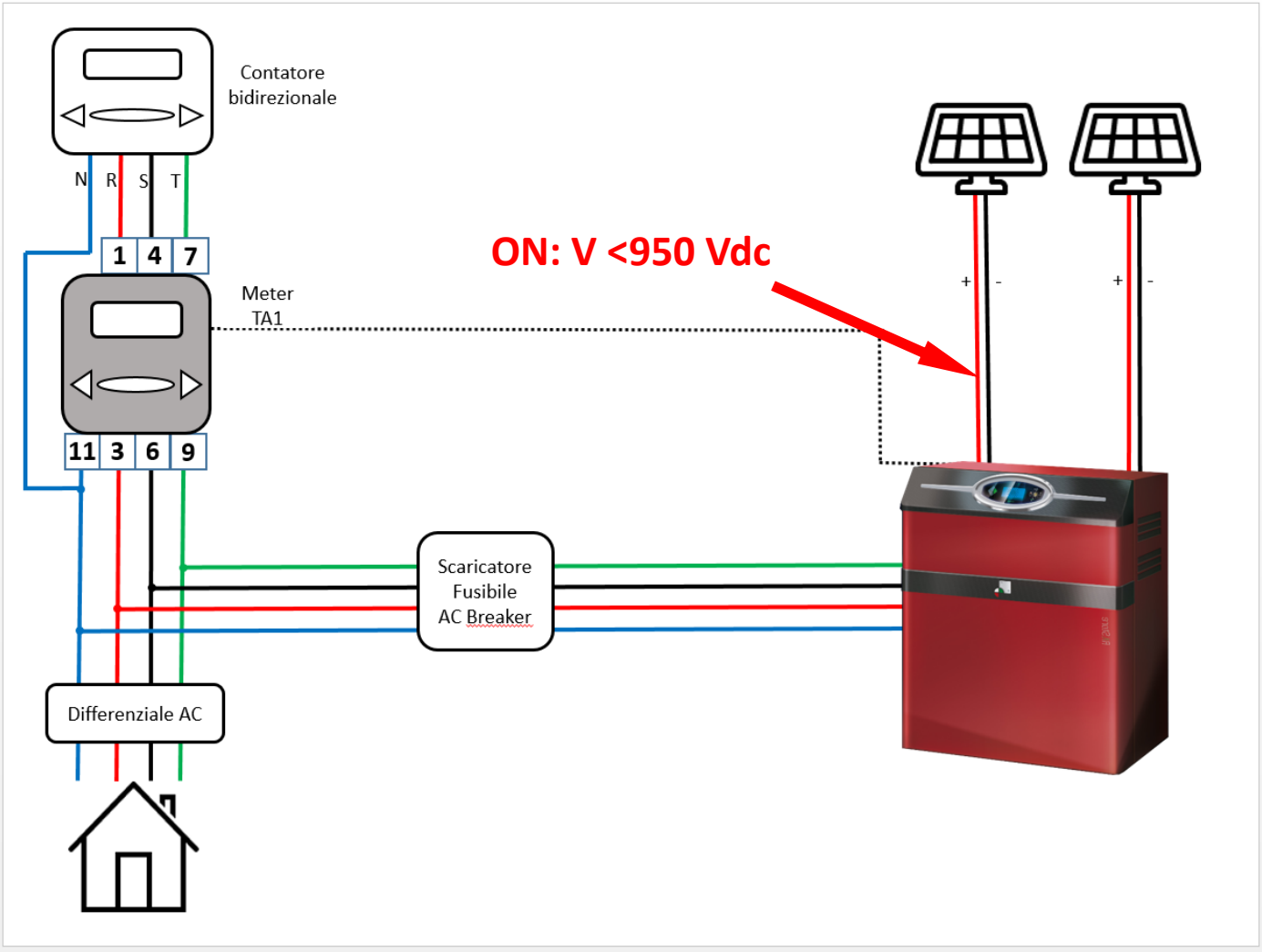


Picture 13 – Secure the derivation cables from the string panel before the connection with MC4 connectors

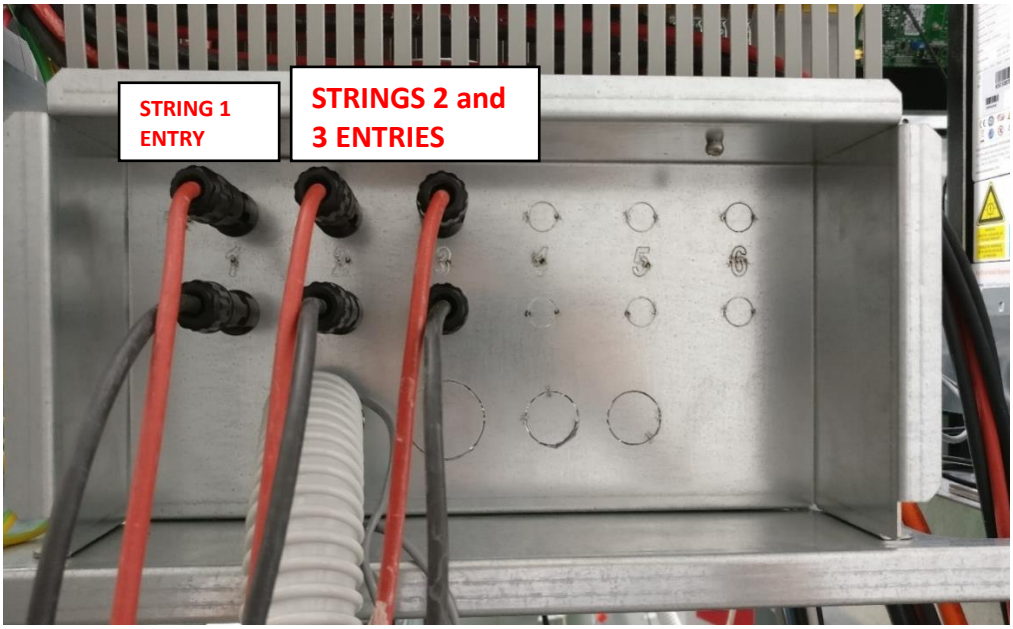
Equip the derivation cables from the string panel with the connectors type MC4, as shown in Picture 13A.

Picture 13A - Derivation cables from the string panel equipped with MC4 connectors

Label the cables deriving from the panels strings (string 1, string 2, if available string 3) and connect them to the connectors placed on the back side of the storage system (Picture 14).
Restore the connection of the strings and check with a tester that on each line (string) just connected is available a current lower than 950 Vdc (Picture 14A).



Picture 14A – Restore of the strings and check that on the connectors MC4: V < 950 Vdc



Picture 15 - RA.Store-3 10K: connectors MC4 connected

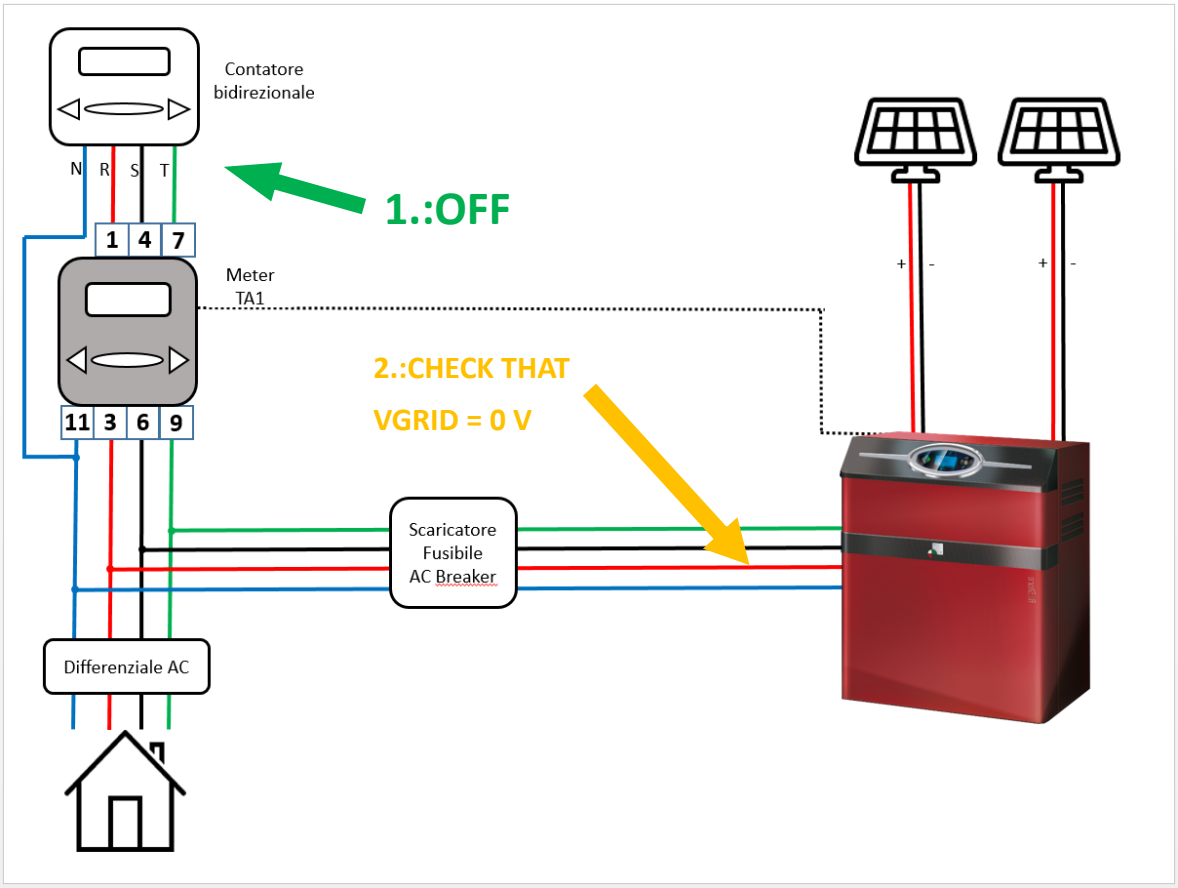
(MPPT1: connectors serigraphy “1”; MPPT2: connectors serigraphy “2” and “3”)

3.3.6 Connection of GRID and EPS cables

Inform the customer that the energy supply to the house will be disconnected for the time being due to the installation.

Lower the general (bidirectional) meter downstream the public grid.

Check with a tester the real lack of light on-site and the lack of tension at the ends of the GRID and EPS cables (Picture 15).

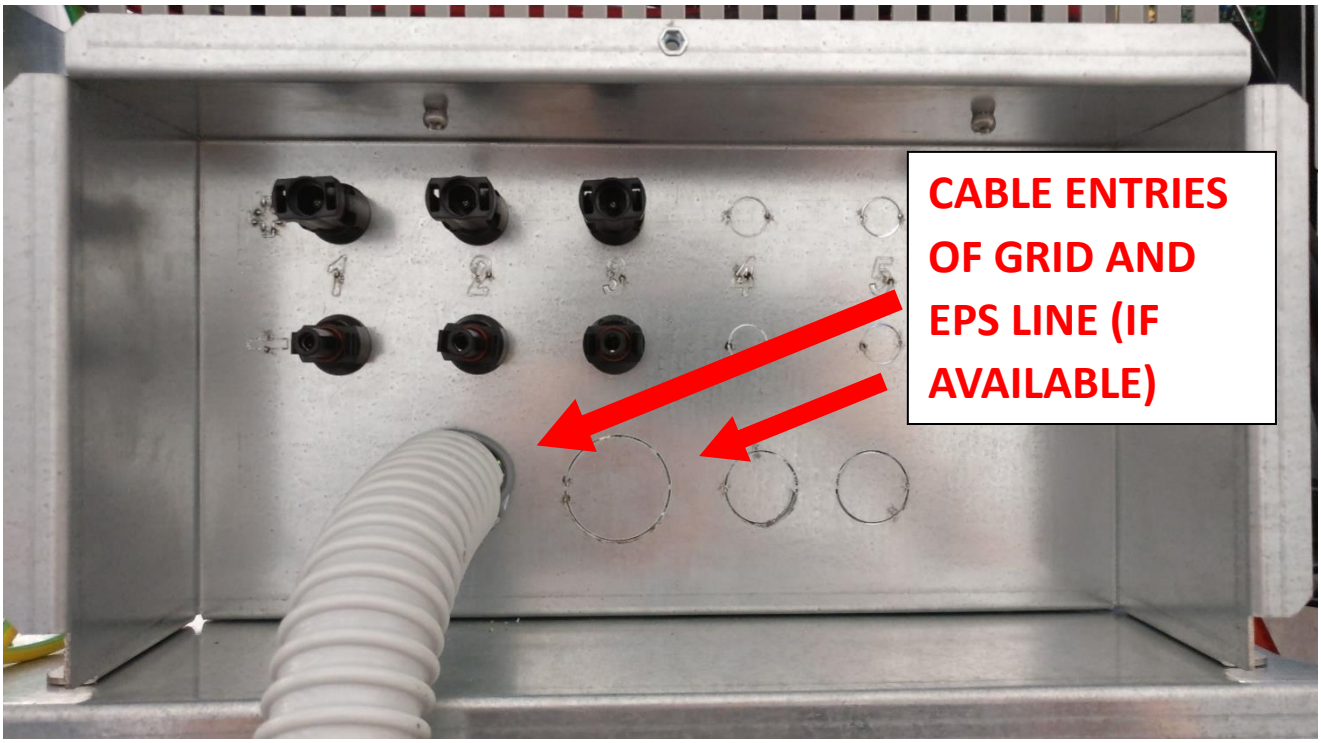


Picture 15 - Connection GRID line

ATTENTION

Electrocution risk. Use insulating gloves and carpet foreseen for works done on hazardous electrical components.

Label the cables of the GRID line and EPS line.
Sheathe the cables and pass them through a slot located on the back of the structure (Picture 16).

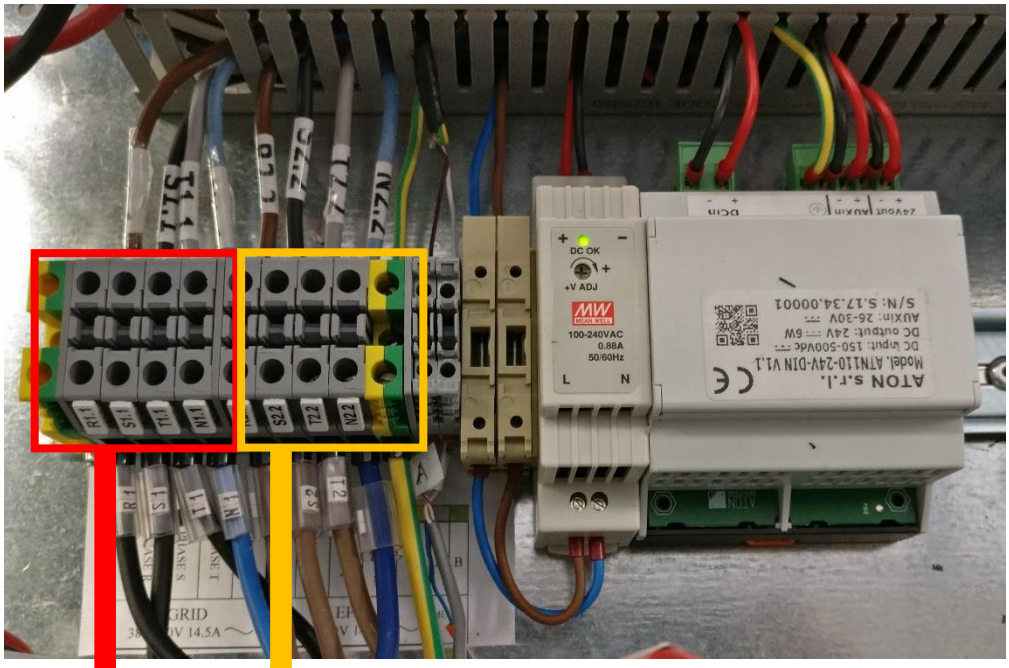


Picture 16 – Cable entries of the GRID and EPS line

Then connect them to the terminals respecting the indications of the electrical schemes:

Grid line Terminal box QG - M1:
PHASE R / L1: terminal R1.1
PHASE S / L2: terminal S1.1
PHASE T / L3: terminal S1.1
NEUTRAL: terminal N1.1
EARTH: terminal GND

EPS line Terminal box QG - M1:
PHASE R / L1: terminal R2.2
PHASE S / L2: terminal S2.2
PHASE T / L3: terminal S2.2
NEUTRAL: terminal N2.2
EARTH: terminal GND



Picture 17 – Terminal box QG-M1: Connections GRID and EPS lines

Inform the customer that the electricity supply is now available in the house.
Reconnect the electrical supply line of the house.

3.4 Commissioning

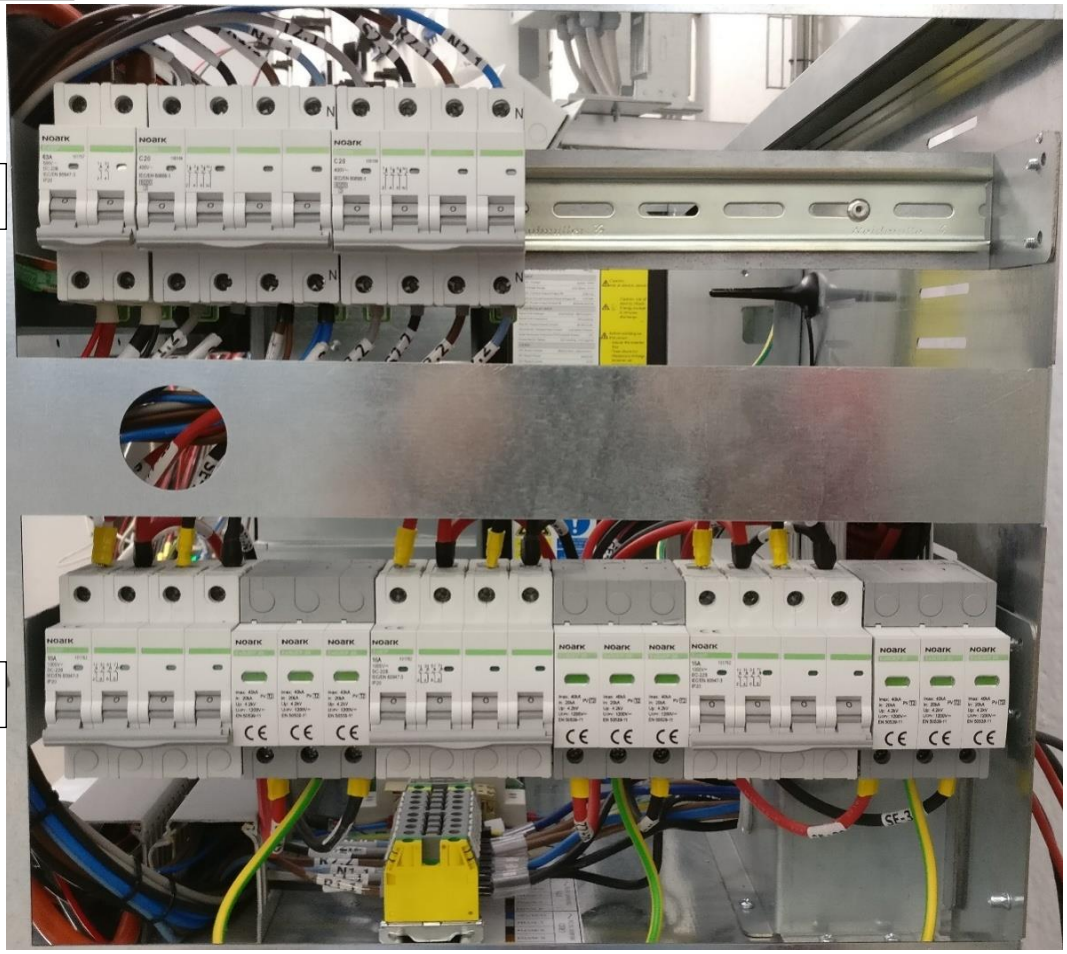
3.4.1 Commissioning of the electrical panel

Picture 18 shows the position in which the protection must be before starting the commissioning procedure.

COMPONENT STATUS	OFF	OFF	OFF
NAME OF THE ELECTRICAL SCHEME	QB1	QG1	QE1

ROW 1

ROW 2



Picture 18 – Starting position of the electrical panel protections of RA.Store-3

NAME OF THE ELECTRICAL SCHEME	QPV1	SPDPV1	QPV2	SPDPV2QPV3	SPDPV3
COMPONENT STATUS	OFF	OFF	OFF		

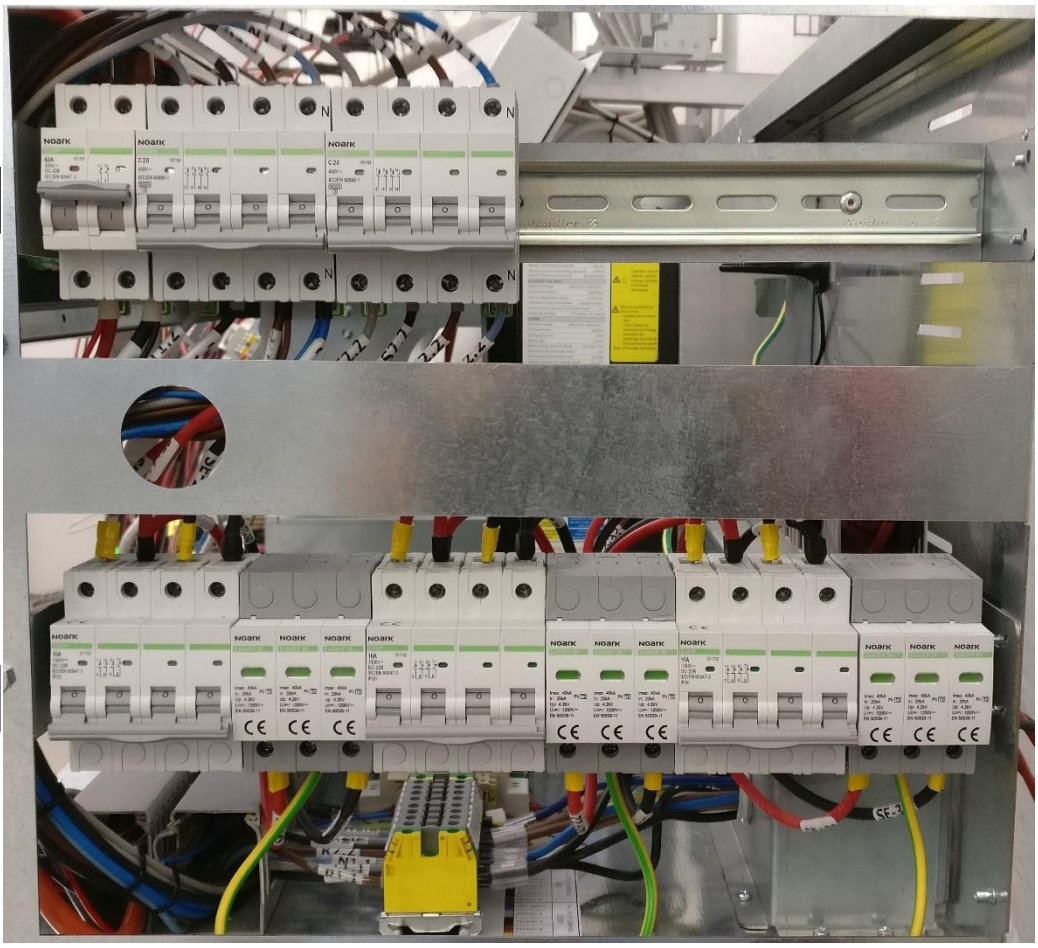
1. Put on ON the breaker QB1 that is installed on the ROW 1 (first row from on high).

COMPONENT STATUS	ON	OFF	OFF

NAME OF THE ELECTRICAL SCHEME	QB1	QG1	QE1

ROW 1

ROW 2



Picture 19 - QB1 (ON)

NAME OF THE ELECTRICAL SCHEME	QPV1	SPDPV1	QPV2	SPDPV2	QPV3	SPDPV3

COMPONENT STATUS	OFF	OFFOFF

2. Put on ON the protections of ROW 1 (first row frpm the top), starting from the breaker QG1 and then QE1 (Picture 20).
3. Put on ON all the protections of ROW 2 (the one at the bottom), starting from the breaker QPV1 and going towards the right side (Picture 20).

COMPONENT STATUS	ON	OFF	OFF

NAME OF THE ELECTRICAL SCHEME	QB1	QG1	QE1

FILA 1

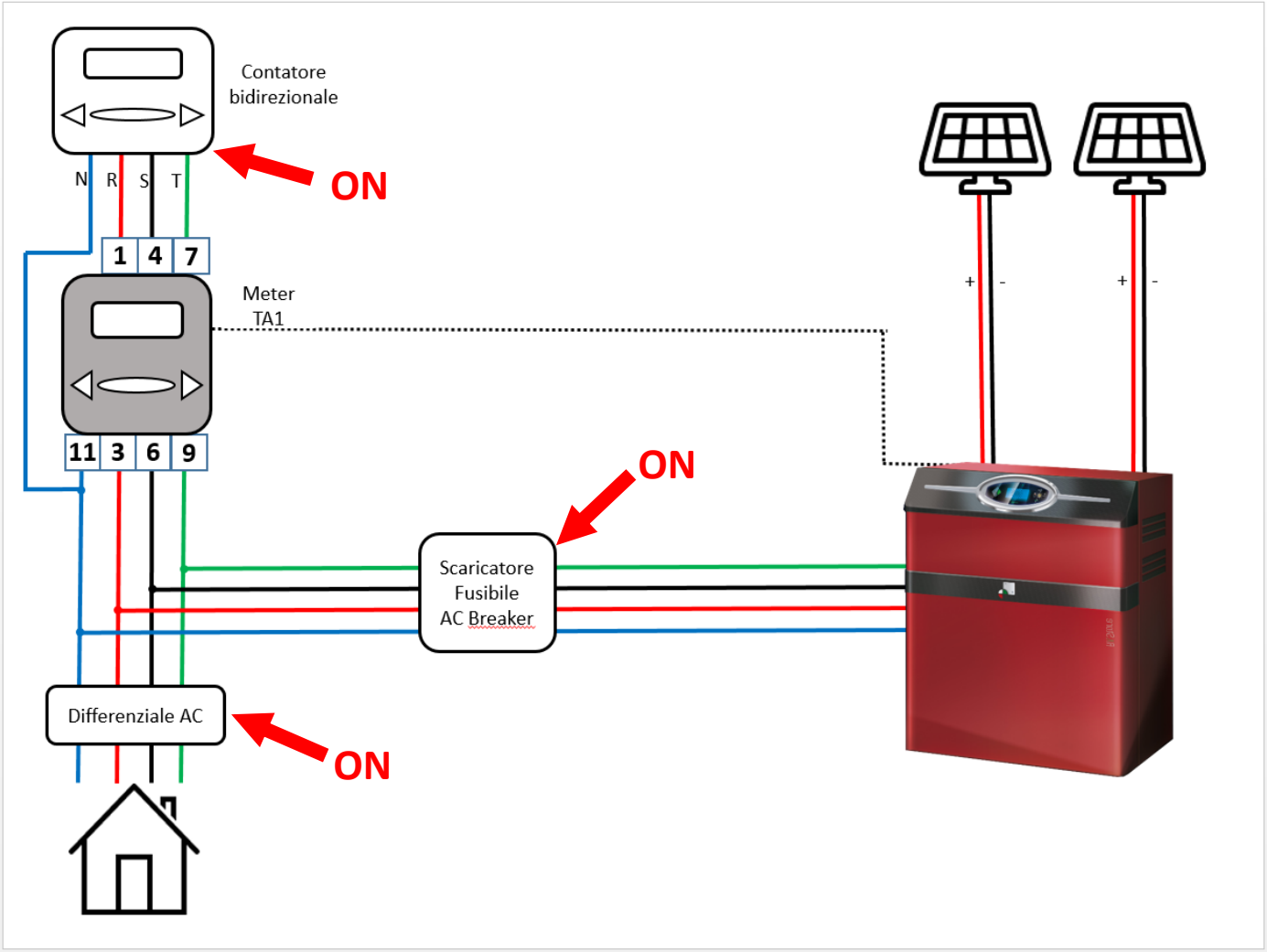
FILA 2

Picture 20 – Electrical panel protections are started (ON)

NAME OF THE ELECTRICAL SCHEME	QPV1	SPDPV1	QPV2	SPDPV2	QPV3	SPDPV3

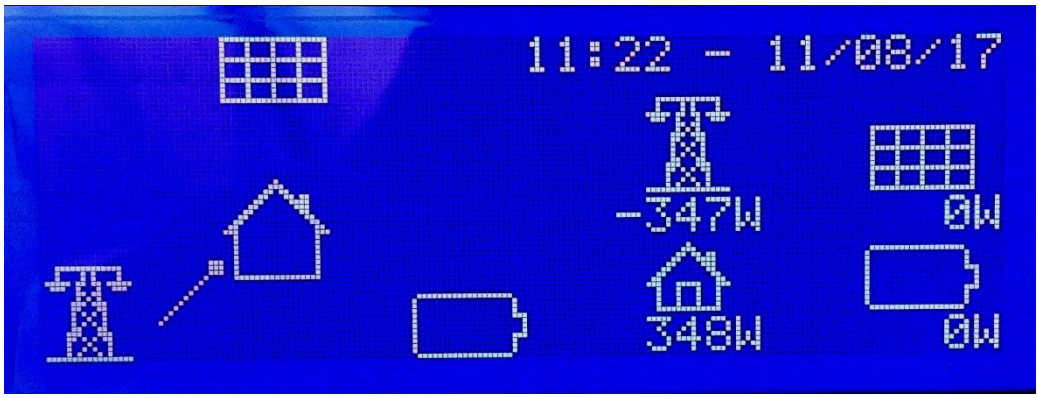
COMPONENT STATUS	ON	ONON

4. Put on ON all the protection and disconnection devices available on the GRID line (Picture 21).
5. Put on ON all the protection and disconnection devices regarding the customer line (Picture 21).



Picture 21 - Activation (ON) of the protection and disconnection devices on the electrical installation

The display of the machine will turn on and just after some seconds the main screen will be shown (Picture 22).



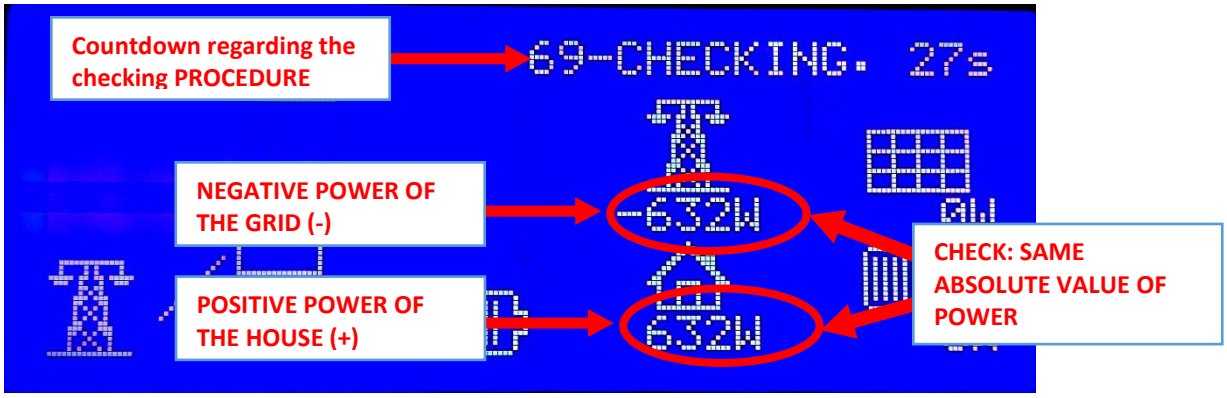
Picture 22 – Main screen

If the message "**58 - Err Comm. ETH"** appears, read the Appendix "A – Switch off and on the system" and execute the procedure of deactivation and reactivation.
If the message "**53 - CT Error"** appears, please read the point "3.3.43.3.4" and check that the connections executed are correct.

3.4.2 Check of the correct installation of the Meter

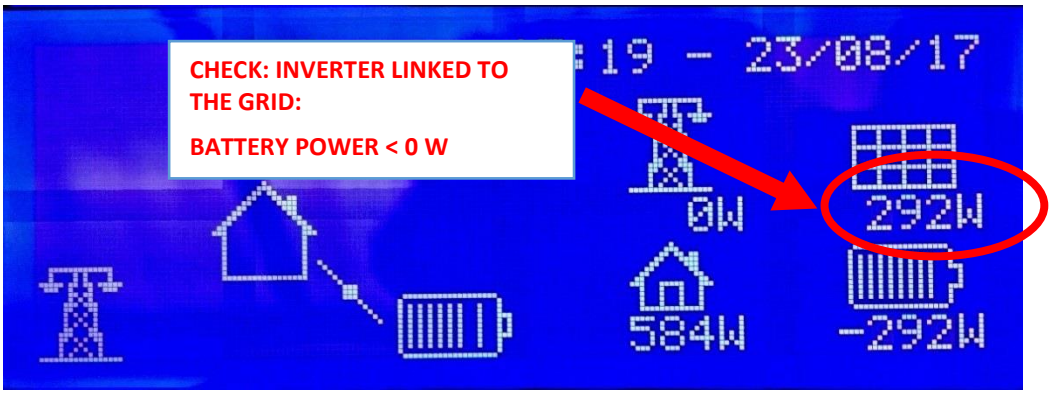
On the display, just after a few seconds from the activation of the protection and disconnection devices on the electrical installation (Picture 21), it will be shown the countdown regarding the checking procedure (Picture 21A).

1. **Before the countdown stops, check that the power placed under the icon of the HOUSE is equal to the power placed under the pylon of the GRID, but the two values must be of opposite sign.**



Picture 21A – Countdown regarding the Checking; check that HOUSE power = (- GRID power)

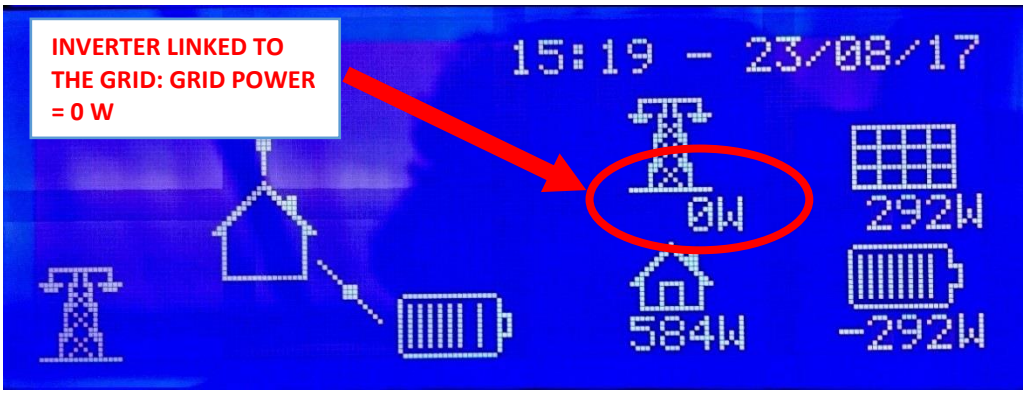
If the check is not possible because the inverter is linked up to the grid and the screen has changed as the following picture 22 ("panel power < 0 W" and/or "battery power ≠ 0 W").



Picture 22 - the Checking procedure is ended; panel power > 0 W

Lower (OFF) the magnetothermal breaker **QG1**; wait a minute and raise it, then check the condition above mentioned in point "1".
If the power shown under the icons **ELECTRICITY PYLON** and **HOUSE** is "0 W", check that the three-phase meter is correctly installed and there are no interruptions on the cable or any wrong connections.

After a few minutes, check that the power placed under the PYLON icon (grid power) is = 0 W (Picture 23).



Picture 23 – Grid power = 0 W

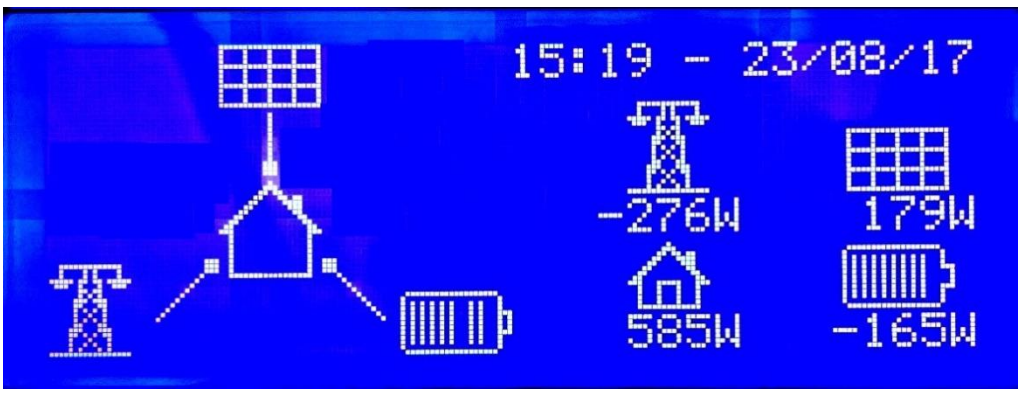
If the above mentioned conditions are checked, the installation is correct and the machine can be functioning.

IMPORTANT: Inform the customer that when the maintenance of the lines of the house is necessary, it is COMPULSORY to lower the disconnectors QG1 e QE2 (only if the GRID / EPS commutation panel is available).

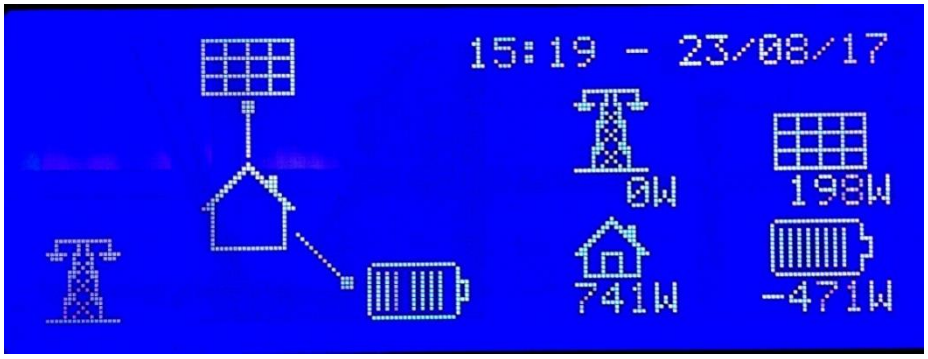
	ATTENTION **Before doing any maintenance on the AC lines of the building, lower the disconnectors GRID and EPS placed on the electrical panel on the storage system.**

3.4.3 Functioning test in ON-GRID mode

By switching on and off some household appliances with known watt consumption (e.g. hairdryer), check on the display of Ra.Store-3F that the energy is taken from the battery and the PV panels and given to the house (the arrow goes from the battery towards the house) and that the values shown on the display are compatible with the activated household appliances.



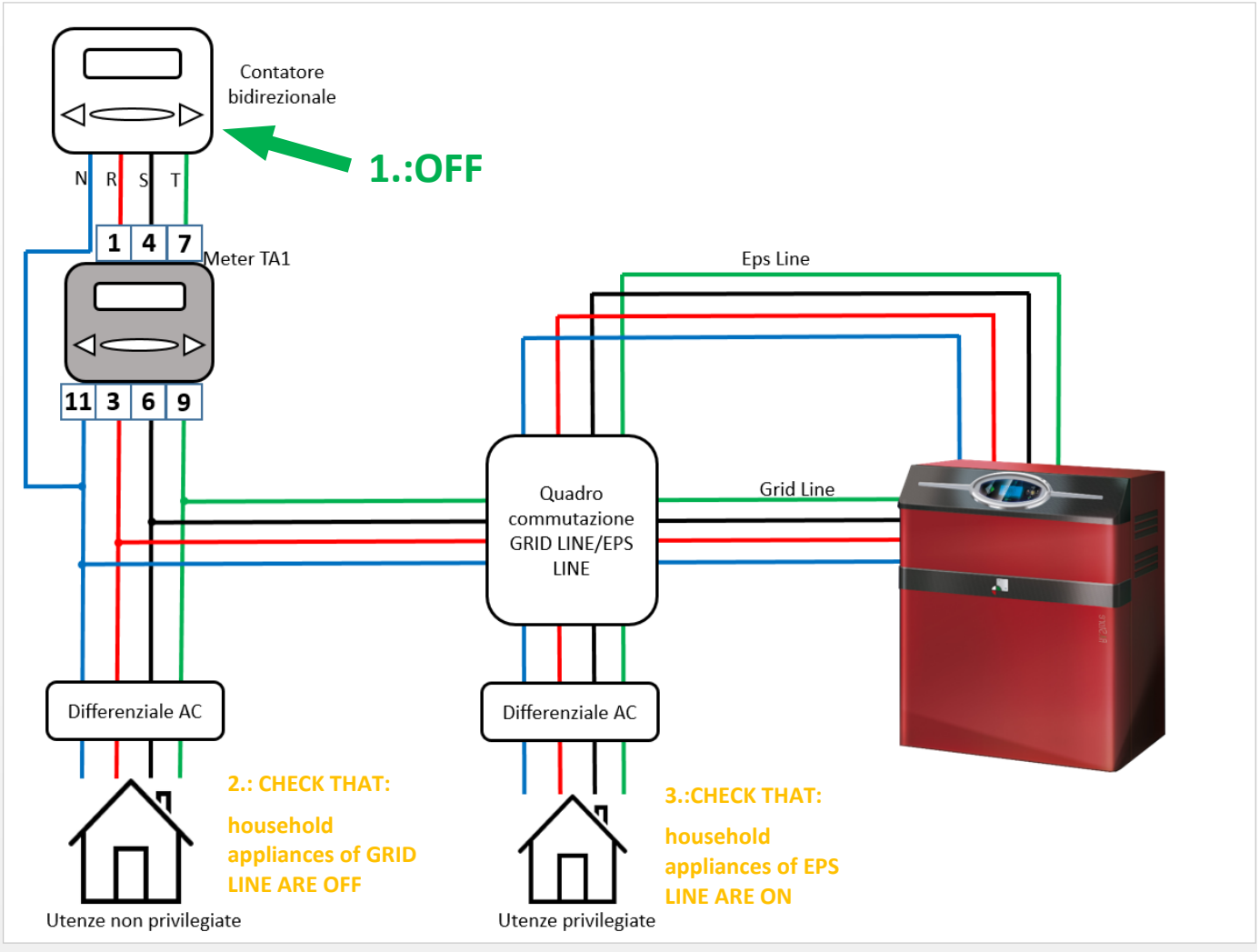
Picture 24 – Switch on of a known charge; in the first moments, the house takes energy from the grid



Picture 25 - Switch on of a known charge; in a short time, the energy taken from the grid ≥ 0 W

3.4.4 Functioning in EPS mode (EPS)
(only if the automatic GRID LINE/EPS LINE commutation panel is available on the machine)

Inform the customer that the energy supply to the non-privileged household appliances will be disconnected and to the privileged household appliances will be disconnected for 5 seconds.
Lower the general (bidirectional) meter downstream the public grid.



Picture 26 – Simulation of a black out by lowering the limiter of the bidirectional meter

Check that the machine gives the alternating sound signal that shows the lack of electric grid.

Check on the display that, under the battery icon, a positive electric power is shown (for ex. 410 W).

After the commutation of the EPS panel has been done, check that the privileged household appliances fed by the magnetothermal breaker “EPS LINE” (if available) are functioning.

Reconnect the electrical supply line of the house.

3.4.5 Communication of the system

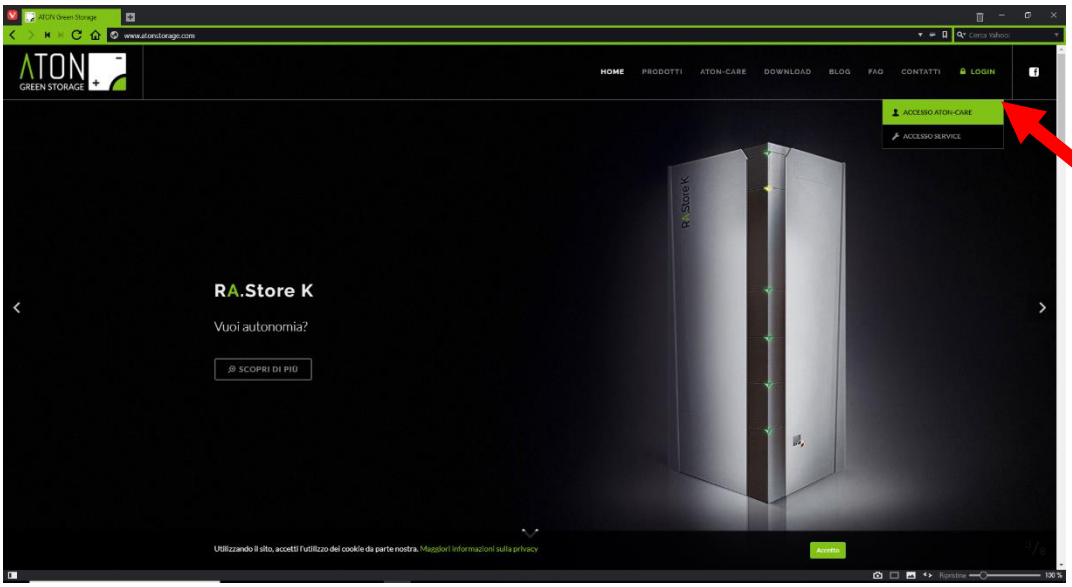
Check on the display that inside the symbol of the house appear two arrows with alternate directions.

Picture 27 – The double arrows with alternate direction show that the storage system exchanges information with Aton portal

In case these arrows are not displayed, contact the technical support.

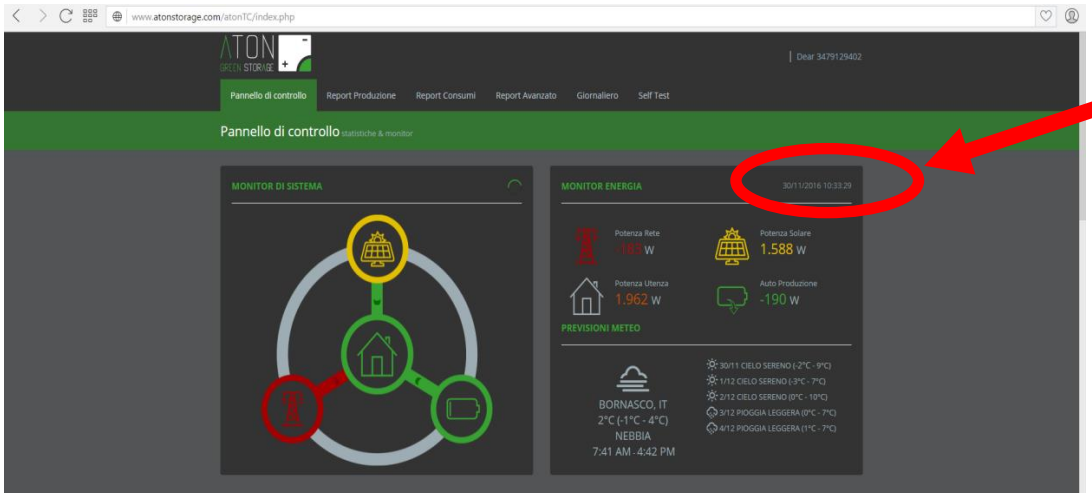
3.4.6 Communication test with Aton portal

Connect through a PC, Smartphone or tablet to the website www.atonstorage.com, click on the **"LOGIN" and "ACCESSO ATON-CARE"** button, and then insert Username and Password (created during the registration of the machine on the portal) that refer only to the machine you are going to install.



Picture 28 – Access to Aton portal

Access the website, then wait some minutes and check that the date of the screen updates.



Picture 29 – Remote control of the machine

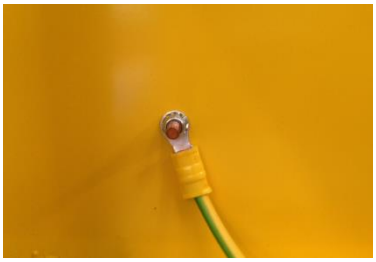
If this does not happen, contact the technical support.

3.4.7 Access to Aton portal for the final customer

Tell the final customer the access data (Username and Password) to Aton portal that have been created during the registration of the machine.

3.5 Reassembling of the structure

Reconnect the earth cable previously disconnected to the frontal panel and fix it to the structure by screwing in the 4 screws to the sides of the structure (2 of the 4 screws are indicated in red in the following picture, whereas the other two are on the side diametrically opposite to the one shown).



Picture 30 – Equipotential bond of the panel

Picture 31 – Screws of the frontal panel

Reconnect the earth cables to the lateral panels, and then fix them to the structure by screwing in the 4 screws indicated as follows.

Picture 32 - Screws of the lateral panels

Reconnect the earth cable previously disconnected to the upper panel, and then fix it to the structure by screwing in the 2 screws indicated.

Picture 33 - Screws of the upper panel

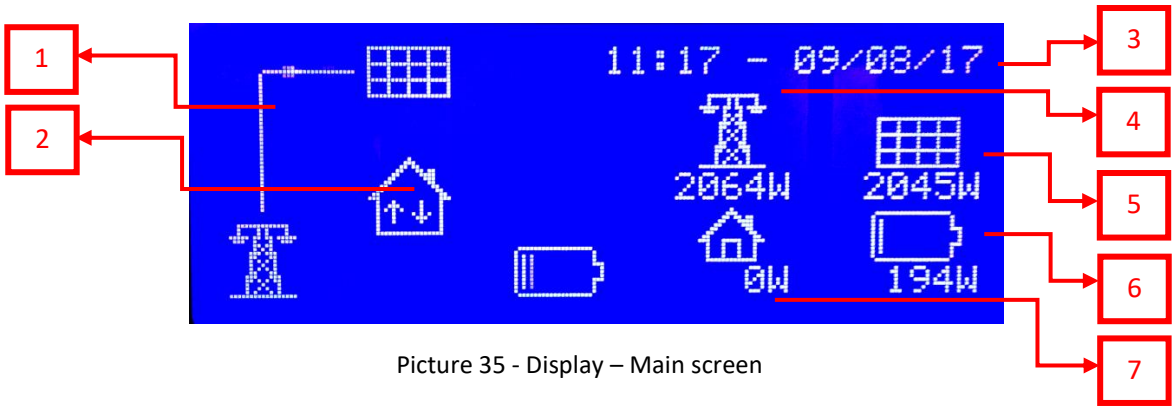
4 Functionalities of the interface board

Picture 34 – Interface board of RA.Store-3

The interface board shows the following parts (Picture 34):

- *Graphic display with capacitive keyboard* (6): it shows information regarding to the functioning of the system and it allows to interact with it.
- *Key Enter* (8) *and key Esc* (7): together with the display they allow to interact with the system.
- *Status led lights of the system:*
  - *Active system* (3): switched on if the system is active and switched off if the system is not active.
  - *Solar* (1): switched on if the panels are supplying energy to the system, switched off in the opposite case.
  - *Grid* (4): switched on if the public electric grid functions correctly, switched off in case of blackout, and flashing in case of blackout and run down battery.
  - *WiFi Communication* (5): switched on if the system is communicating the data regarding its functioning through the WiFi card (optional), flashing if the system cannot communicate its data, and switched off if the WiFi communication is not activated.
  - *Fault* (2): switched on or flashing if there is an active alarm, switched off in the opposite case.
- *Status led lights of the battery* (9): led lights represent visually the amount of energy in the battery. Moreover the discharge and recharge phases are indicated with particular sequences of switching on of the led lights.
- *Hidden button:* it is located in the bottom right angle of the display. It is used for accessing the setting up menu of the machine.

4.1 Display - Main screen



Picture 35 - Display – Main screen

The interface board shows the following parts (Picture 35):

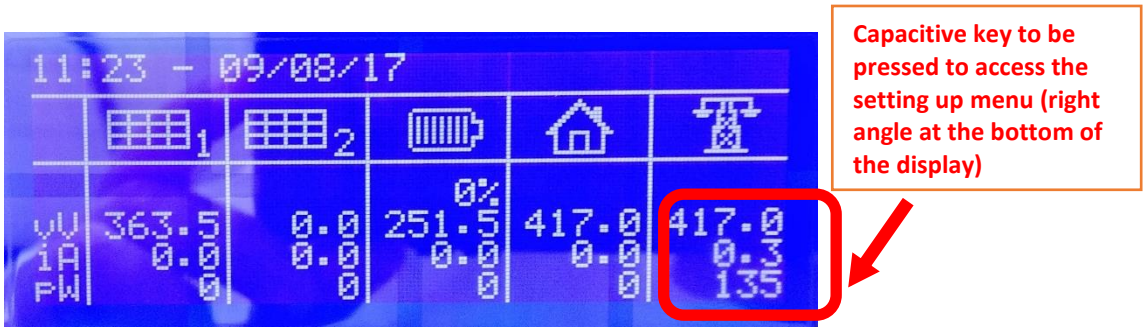
- *Flux line of the energy* (1): it shows the progress of the electric energy between PV panels, electrical grid, the consumer, the battery. The flux is shown by the indicating line.
- *Communication with the storage system* (2): the presence of the arrows in alternating direction shows that the communication has been done.
- *Date and time* (3): indication of date and time.
- *Indication of instantaneous active power of electrical grid* (4): it shows the active power given to or purchased from the national electrical grid expressed in Watt. If the visualized power is positive, then it means that the machine is giving energy to the electrical grid. If the visualized power is negative, then it means that the machine is taking energy to the electrical grid.
- *Indication of instantaneous active power of PV panels* (5): it shows the active power produce by the PV panels expressed in Watt.
- *Indication of instantaneous active power of battery* (6): it shows the active power given or taken from the battery expressed in Watt. If the visualized power is positive, then it means that the machine is charging the battery. If the visualized power is negative, then it means that the machine is discharging the battery.
- *Indication of instantaneous active power of the house* (7): it shows the active power requested by the house expressed in Watt. It is always expressed with a positive number.

4.2 Setting up menu

To access the setting up menu of the machine proceed as follows:

Press the "**Enter**" key (Picture 36) until you reach the screen with the numerical data, then press the capacitive key on the display at the bottom on the right (Picture 37).

Picture 36 – Access to the setting up menu: press the Enter key

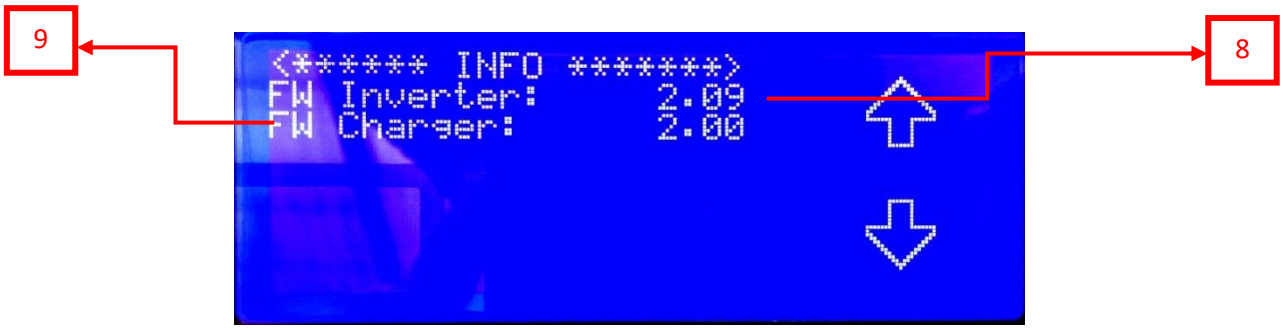


Picture 37 – Screen with the numerical data and capacitive key to be pressed

Picture 38 – Setting up menu, main page

4.2.1 Info

Picture 39 - Info, screen 1



Picture 40 - Info, screen 2

The submenu “Info” contains information regarding the storage system and shows the following parts (Picture 39 and Picture 40):

- *MQ Matricola Quadro (1):* it shows the registration number of the machine (storage system). It is the same number written on the external plate of the machine.
- *MC Matricola Controller (2)*: it shows the registration number of the control card of the machine.
- *FW Firmware of the control card (3):* it is the version of the firmware installed on the control card and the installation date.
- *Bios (4):* it is the version of Bios installed on the control card and the installation date.
- *SN inverter (5):* it shows the Serial Number of the inverter.
- *Safety (6):* it shows the national regulation with which the inverter is compliant.
- *FW Manager (7):* it is the version of the firmware of the Manager card inside the inverter.
- *FW Inverter (8):* it is the version of the firmware of the inverter.
- *FW Charger (9):* it is the version of the firmware of the Charger.

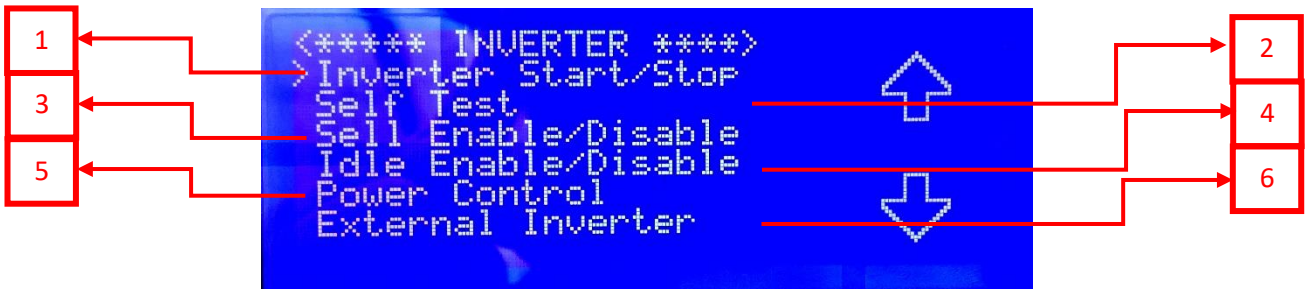
4.2.2 Command

Picture 41 - Command

The submenu “Command” shows the following parts (Picture 41):

- *Restart Controller (1):* by pressing the Enter key, the machine executes a complete reset (it switches off and then re-switches on).
- *Reset Statistics (2):* by pressing the Enter key, the machine cancels all the functioning historical data stored up to now, excluded the last 24 hours of functioning.
- *Keyboard/Led Test (3):* by pressing the Enter key, the machine executes a test of all the led lights available on the interface board and on the display (the display is switched on but does not visualize any information). In order to finish the test press the Esc key.

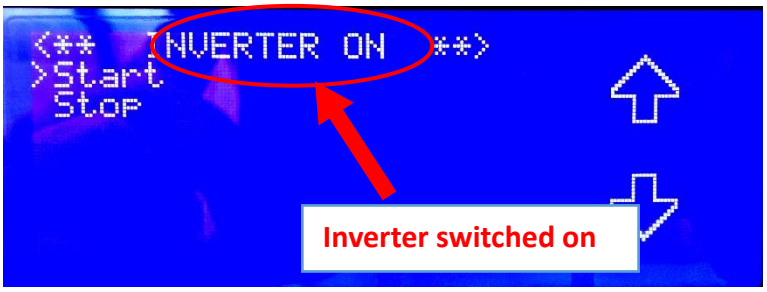
4.2.3 Inverter



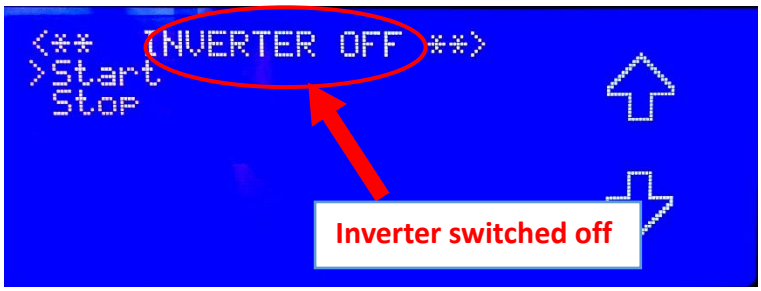
Picture 42 - Inverter

The submenu “Inverter” shows the following parts (Picture 42):

- *Inverter Start/Stop (1):* by pressing the Enter key, you access the screen where it is possible to switch off (press the Enter key on Stop) or switch on the inverter (press the Enter key on Start) (Picture 43). The status of the inverter is visualized in the first line at the top between the symbols “<>”.



Picture 43 - Start and Stop Inverter: inverter switched on (INVERTER ON)



Picture 44 - Start and Stop Inverter: inverter switched off (INVERTER OFF)

- *Self Test (2):* from the submenu "Self Test" it is possible to access the screen with the following commands (Picture 45):

- Start Test: to execute the Self Test according to the regulation CEI 0-21 (Picture 45).
- Test report: to visualize the result of the last Self Test stored (Picture 46)
- Info: to visualize the firmware version of the internal equipments

Picture 45 - Self Test: "Start Test" to execute the test

Picture 46 - Test Report

Picture 47 - Info: it visualizes the firmware versions of the components

- *Sell Enable/Disable (3):* from the submenu “Sell Enable/Disable” it is possible to enable or disable the transfer of the surplus energy towards the grid:
    - Sell Enable: the transfer of energy towards the grid is enabled
    - Sell Disable: the transfer of energy towards the grid is disabled

Picture 48 - Sell Enable/Disable: Sell Enabled

Picture 49 - Sell Enable/Disable: Disabled

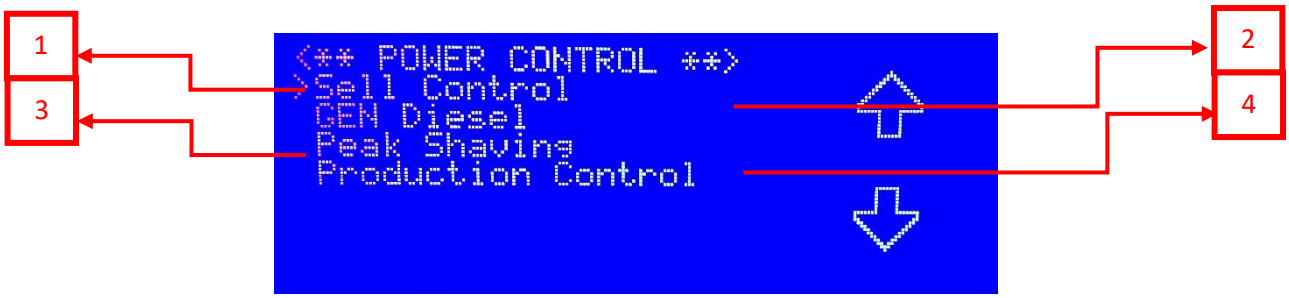
- *Idle Enable/Disable (4):* from the submenu “Idle Enable/Disable” it is possible to enable or disable the function of idle mode (switching off of the machine in case of low request of power) (Picture 50 and 51):

Picture 50 - Idle Mode Enable/Disable: Enabled

Picture 51 - Idle Mode Enable/Disable: Disabled

4.2.3.1 Power Control

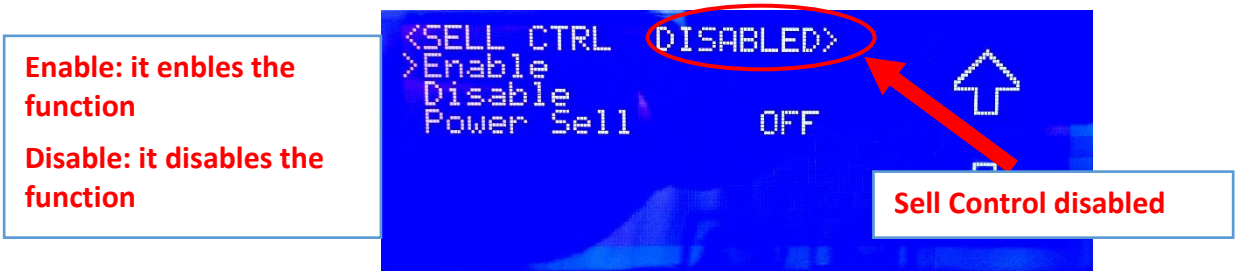
- *Power Control (5):* from the submenu "Power Control" you can access the special functions of the inverter (Picture 52):



Picture 52 - Power Control

- *Sell Control (1):* the function *"Sell Control"* makes switch over the contacts of the relay RL2 (terminal box J23 of the control card of the machine; terminals n. 4 / 5 / 6) when the power given to the electrical grid exceeds a limit set up in the parameter "Power Sell" continuously for a period of 60 seconds. If the power given to the National electrical grid stays equal to 0 W continuously for a period equals or longer than 5 seconds, the relay RL2 gets back to switch over its contacts (Picture 57) (moreover it is possible to bring back the variation of the power sold to the grid in the range set up on an analogical exit 0-10 V available on the card at the connector J23). **It is recommended for controlling water electrical water storage systems**. In order to enable it:

- Set up in "Enable" the function "Sell Control" (Picture 54)
- Set up the parameter "Power Sell" (Picture 56)

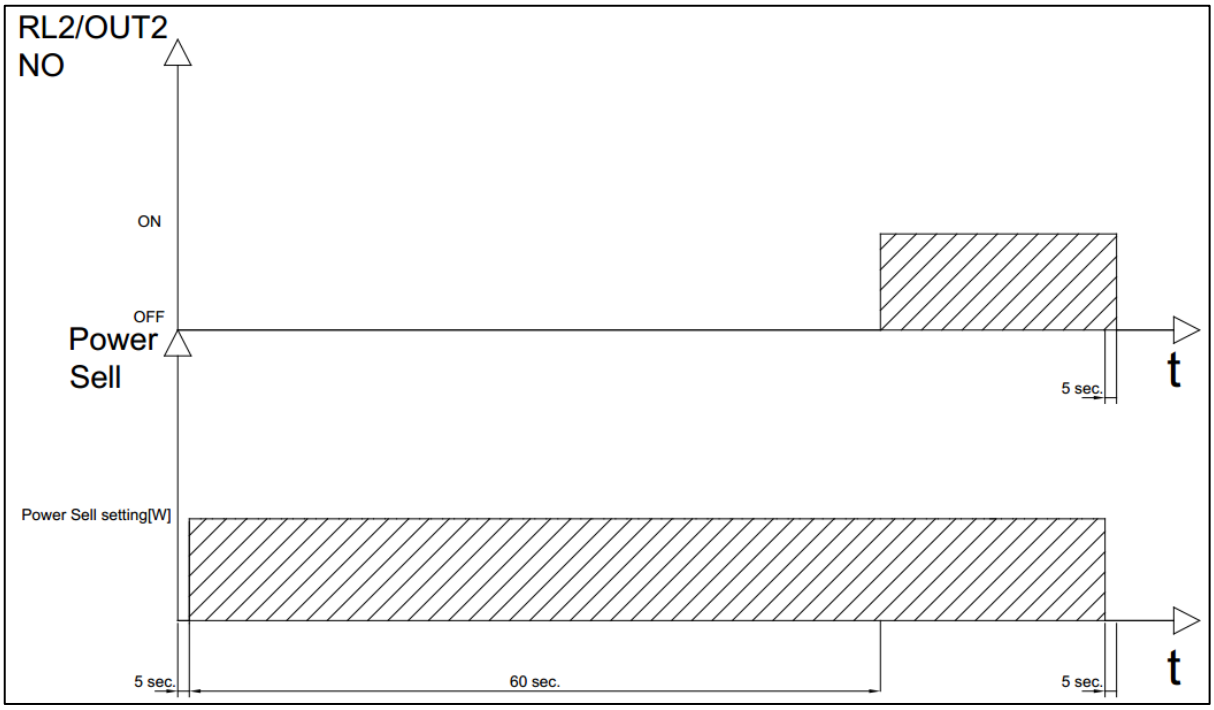


Picture 53 - Sell Control: Disabled

Picture 54 - Sell Control: Enabled

Picture 55 - Sell Control: Screen of setting up “Power Sell”, the value of power given to the grid beyond which it switch over the relay RL2 (OUT2) available on the control card of the machine

Picture 56 - Sell Control: Screen of setting up “Power Sell”, the value of power given to the grid beyond which it switch over the relay RL2 (OUT2) available on the control card of the machine; example of setting up at 3500 W



Picture 57 - Sell Control: Time diagram of functioning

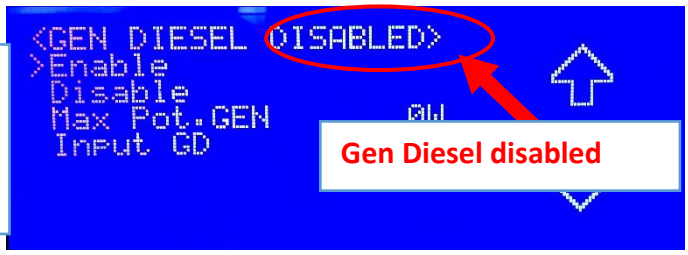
- *Gen Diesel (2):* the function “Gen Diesel” enables the function of charge of the batteries through the terminals of the inverter that depend on the electrical line labelled “Grid Line”. It is necessary to parameterize a maximum power from the grid (parameter “Max Pot.GEN”) and an entry that enables the function (entry in tension = active function of battery charge from electrical grid). **It is recommended if on the electrical installation it is available a generating set with a thermal engine that can charge the batteries in case of need (for ex. a mountain hut without fixed electrical grid)**. In order to enable it:

- Set up in “Enable” the function “Gen Diesel” (Picture 59)
- Set up in the parameter “Max Pot.Gen” (Picture 60) the maximum power permissible during charge from the grid
- Set up in the parameter “Input GD” (Picture 61 and 62) the digital entry available on the control card of the machine, that enables (D.I. = 1) or disables (D.I. = 0) the function “GEN DIESEL”. The combination between the terminals to be connected an the chosen entry is set by the following table:

INPUT GD	TERMINALS CONNECTOR DIGITAL ENTRIES OF THE CONTROL CARD OF THE MACHINE
1	9 / 1
2	9 / 2
3	9 / 3
4	9 / 4

Enable: it enables the function

Disable: it disables the function



Picture 58 - Gen Diesel: Disabled

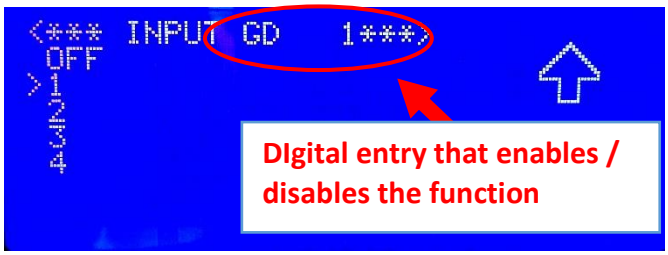
Picture 59 - Gen Diesel: Enabled

Max Pot.GEN: max. permissible power from the electrical grid to charge the batteries

Picture 60 - Gen Diesel: setting up of the parameter “Max Pot.Gen”

Input GD: external contact NO that enables (1) or disables (0) the function GEN DIESEL

Picture 61 - Gen Diesel: setting up of the parameter “Input GD”



Picture 62 - Gen Diesel: choice of the digital entry available on the control card of the machine that enables/disables the function “GEN DIESEL”

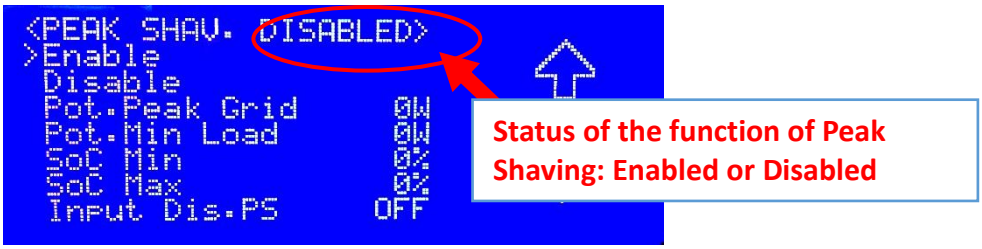
Picture 63 - Gen Diesel: final screen after having set up all the parameters regarding the functioning

- *Peak Shaving* (Power Control) (3): the function “Peak Shaving” is used to limit the power peaks from the national electrical grid. Enabled if SOC is > 20%, it supplies energy from the battery when the absorption of power from the national electrical grid is higher than the parameter “Pot.Peak Grid”; the supply continues until the SOC goes down to 20% or the electrical power absorbed by the grid goes down under the limit set up in the parameter “Pot.Peak Grid”. If, at the end of the cycle of Peak Shaving, the SOC is inside the range set up in the parameters of the function of Peak Shaving (SOC Min and SOC Max), and there is energy available coming from the PV panels, the charge of the battery has the priority on the charge of the house until the SOC exceeds the value set up in the parameter SOC Max. If, at the end of the cycle of Peak Shaving, the SOC is lower than the value set up in the parameter SOC Min, the batteries charge also from the electrical grid up to the achievement of this threshold.

The parameters to be set are the following ones:

- Set up in “Enable” the status of the function.
- Pot.Peak Grid: the maximum power taken from the grid without enabling the function of “Peak Shaving”; if the charge exceeds this threshold, the battery starts to supply energy to take back the value of the energy purchased from the grid under this value (Picture 65).
- Pot.MinLoad: the maximum power that requires the house under which the battery can recharge by absorbing energy from the electrical grid if necessary (Picture 66).
- SoC Min: the value of SoC under which the battery can recharge from the grid (Picture 67).

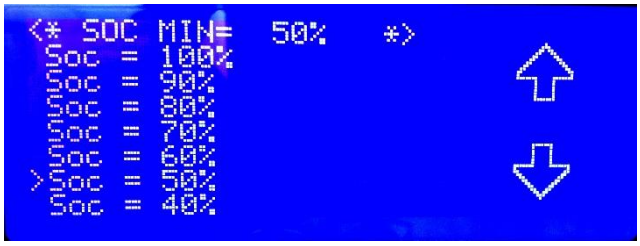
- SoC Max: the value of SoC over which the charge of the battery from the PV panels does not have the priority any more on the charge of the house (Picture 68).
- Input Dis.PS: digital entry available on the control card of the machine that, if enabled, disables the function of Peak Shaving.



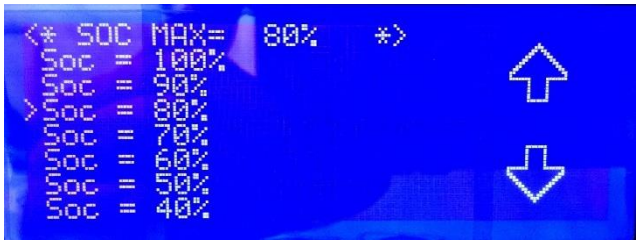
Picture 64 - Peak Shaving: starting screen without parameterization

Picture 65 - Peak Shaving: setting up of the parameter Pot. Peak Grid

Picture 66 - Peak Shaving: setting up of the parameter Pot. Min Load



Picture 67 - Peak Shaving: setting up of the parameter SoC Min

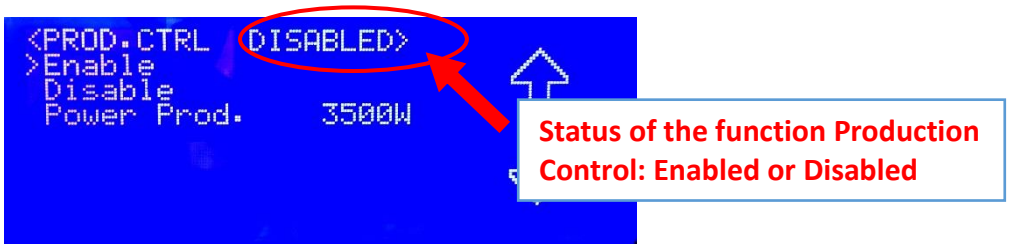


Picture 68 - Peak Shaving: setting up of the parameter SoC Max

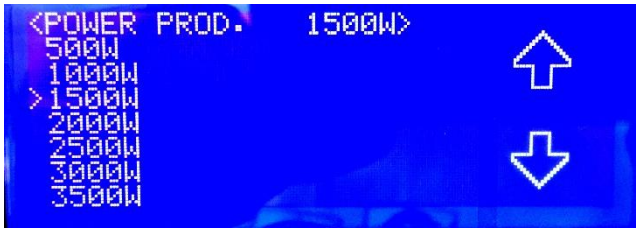
Picture 69 - Peak Shaving: example of setting up of the working parameters; the inhibition entry is not enabled

- *Production Control* (4): the function "Production Control" makes switch over the contacts of the relay RL2 (terminal box J23 of the control card of the machine; terminals n. 4 / 5 / 6) when the power produced by the PV panels exceeds immediately a limit set up in the parameter "Power Production". If the power produced by the PV panels goes down under the value set up in the parameter "Production Control", the relay RL2 gets back to switch over its contacts. **It is recommended to control heat pumps**. In order to enable it:

- Set up in "Enable" the function "Sell Control" (Picture 70)
- Set up the parameter "Power Production" (Picture 71)



Picture 70 - Production Control: Disabled and Enabled



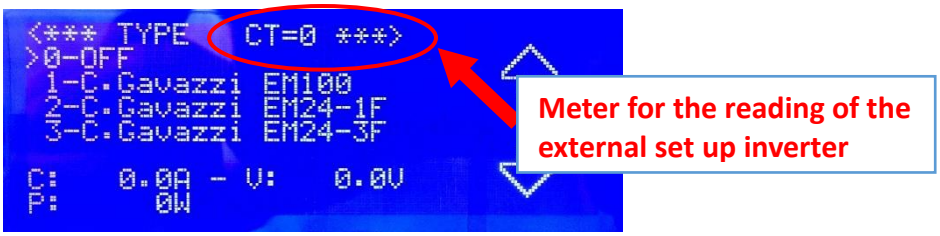
Picture 71 - Production Control: setting up of the parameter Power Production

Picture 72 - Production Control: example of setting up of working parameters

- *External Inverter* (6): from this menu it is possible to configure an energy measuring unit like a meter, installed on the exit of the AC side of an inverter available on the installation but not connected to the storage system. It is necessary that together with the meter it is also available the converter RS232/RS485 Aton (article KIT232-485-DIN) in order to realize the communication with the manager card of the storage system (Picture 73).

The possible choices are the following:

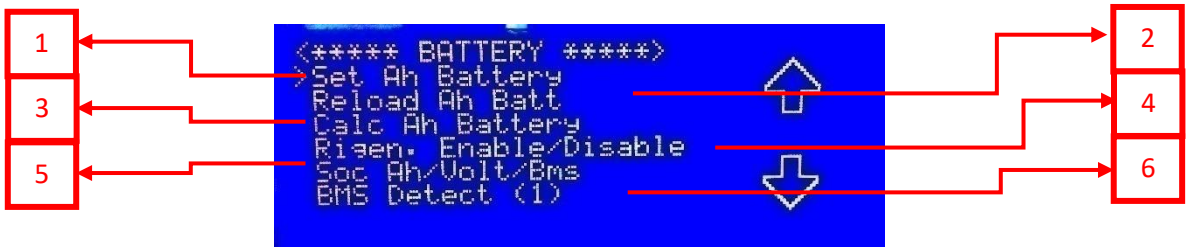
- 0: disabled function
- 1: single phase meter brand Carlo Gavazzi model EM100
- 2: three-phase meter connected to a single phase inverter brand Carlo Gavazzi, model EM24 (article EM24DINAV93XISX).
- 3: three-phase meter connected to a three-phase inverter brand Carlo Gavazzi, model EM24 (article EM24DINAV93XISX).



Picture 73 - External Inverter: choice of the meter Carlo Gavazzi

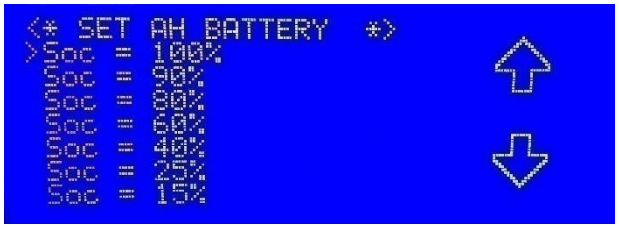
4.2.4 Battery

The submenu “Battery” shows the following parts (Picture 74):



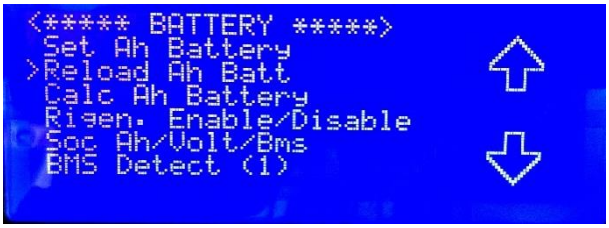
Picture 74 – Menu Battery

- *Set Ah Battery* (1): with this command it is possible to force the Soc of the battery to a percentage value that it is not the one really calculated by the manager card of the storage system (Picture 75).



Picture 75 - Set Ah Battery

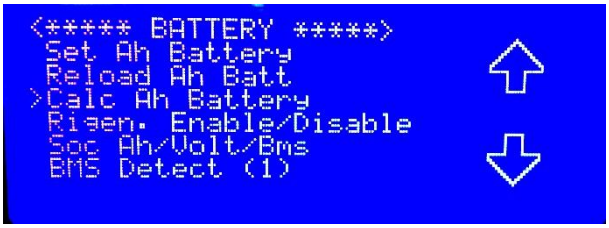
- *Reload Ah Battery* (2): with this command it is required to the manager card of the storage system to recharge; as data of “Ah caricati”, the last reading executed (every 5 minutes a reading is done), (Picture 76).



Picture 76 - Reload Ah Battery

- *Calc. Ah Battery* (3): with this command it is required to the manager card of the storage system to calculate the value of Ah charged in the battery. The calculation can be done in 2 different ways:

- If the parameter “Soc Ah/Volt/BMS” (Picture 79) is set up at the value “Ah” or “Volt”, the card realizes a calculation according to the tension in which the battery is, that as a result creates a value of Ah stored in this latter.
- If the parameter “Soc Ah/Volt/BMS”) is set up at the value “BMS”, the value of Ah charged in the battery is read by the Battery Management System.



Picture 77 – Calc. Ah Battery

- *Rigen.Enable/Disable* (4): from this menu it is possible to give the following instructions (Picture 78):

- Rigen.90% Enable: this command enables the function “recharge battery up to 90% of the Soc”; if in the last 15 days of the solar month the battery did not execute a charge up to 90% of the Soc, the first day of the month the storage system uses first the energy of the PV panels to charge the battery up to 90% of the Soc, rather than giving it to the house.
- Rigen.90% Disable: this command disables the function “recharge battery up to 90% of the Soc”.
- Rigen.90% Start: this command enables the function “recharge battery up to 90% of the Soc”.
- Rigen.90% Stop: this command stops the function “recharge battery up to 90% of the Soc”.

Picture 78 - Rigen. Enable/Disable

- *Soc Ah/Volt/BMS* (5): from this menu you can choose how the card visualizes the Soc value (Picture 79):

- Soc Ah: according to the charged Ah in 24 hours, it is calculated a value of Soc according to the capacity of rated storage of the battery.
- Soc Volt: according to the tension of the battery, it is calculated a value of Soc.
- Soc BMS: the Soc value is visualized according to the value of Soc read by the Battery Management System.

Picture 79 - Soc Ah/Volt/BMS: choice

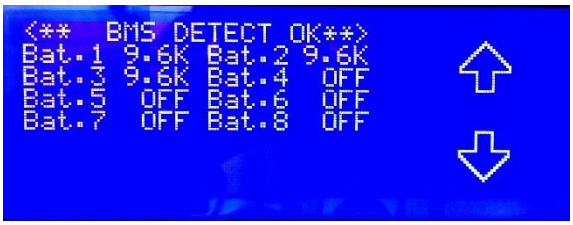
- *BMS Detect* (6): this command has a double function:

1. The data communication between the module (or card) Battery Management System and the single battery modules happens through it. The communication speed visualized must not be necessarily equal for all the battery modules, but anyway there must be a value different from “OFF” if the battery module is available and installed on the storage system (for example: if there are 3 battery modules correctly configured, to the command “BMS Detect” “Bat.1”, “Bat.2” and “Bat.3” must react with a value that indicates the communication speed; Picture 82).

2. It is possible to communicate to BMS that one or more battery modules has/have been added or removed. Give this command and check that all the battery modules available react with a value of communication speed different from “0”: this is a necessary and compulsory activity when the actual number of battery modules is changed (i.e. battery modules are added or removed).

Picture 80 - BMS Detect: procedure in execution

Picture 81 - BMS Detect: procedure finished, 1 identified battery



Picture 82 - BMS Detect: procedure finished, 3 identified batteries

4.2.5 WiFi

The submenu “WiFi” shows the following parts (Picture 83):

Picture 83 - WiFi: OFF

- *Start:* with this command the WiFi card is enabled to communicate the data of the storage system. After having given the command, the screen appears like the one in Picture 84 (the top writing is “WIFI ON”).
- *Stop:* with this command the WiFi card is disabled to communicate the data of the storage system. After having given the command, the screen appears like the one in Picture 83 (the top writing is “WIFI OFF”).

Picture 84 - WiFi: ON

- *Info:* with this command you access the screen that contains information regarding the card and the WiFi connection.
- *Reset:* with this command you reset the WiFi card and you cancel the data regarding the WiFi network previously configured.
- *Configure:* with this command you enable the WiFi card to execute the procedure of configuration described later.

4.2.5.1 Configuration for the communication of the WiFi card

The submenu “WiFi” that you have entered in the previous paragraph appears like in Picture 83.

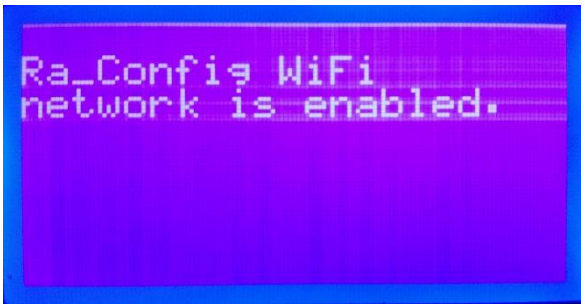
In order to configure the WiFi card, proceed as follows:

1. Place the cursor next to the writing “**Start”**; press the key “**ENTER”** to enable the WiFi communication.

   The first writing of the menu WiFi changes from “WIFI OFF” to “WIFI ON”, as shown in Picture 84.

2. By pressing the keys “**arrow up**” or “**arrow down**” place the cursor next to the writing “**Configure**”, then press the key “**ENTER”**.

After a few seconds, if the screen becomes like the one in Picture 85, it means that the WiFi card is correctly enabled to the configuration:

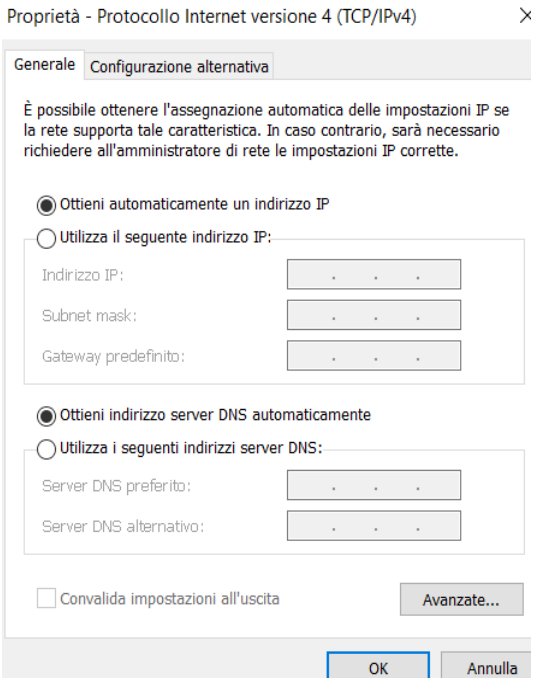


Picture 85 – After having given the command “Configure”,

the screen that appears shows that the card is enabled to the configuration

If the visualized screen shows the message “RA_Config WiFi network is busy”, it means that the card is not ready to receive the configuration data of the network; so wait a few minutes and repeat the command “Configure”.

3. In order to finish the procedure of configuration, use any device equipped with WiFi connectivity and Web Browser (PC, smartphone and tablet);
4. If you use a smart device (smartphone or tablet with WiFi port), go to point 6;
5. Be sure that the WiFi card of the PC used is configured in DHCP (“get automatically an IP address”), as shown in Picture 86:

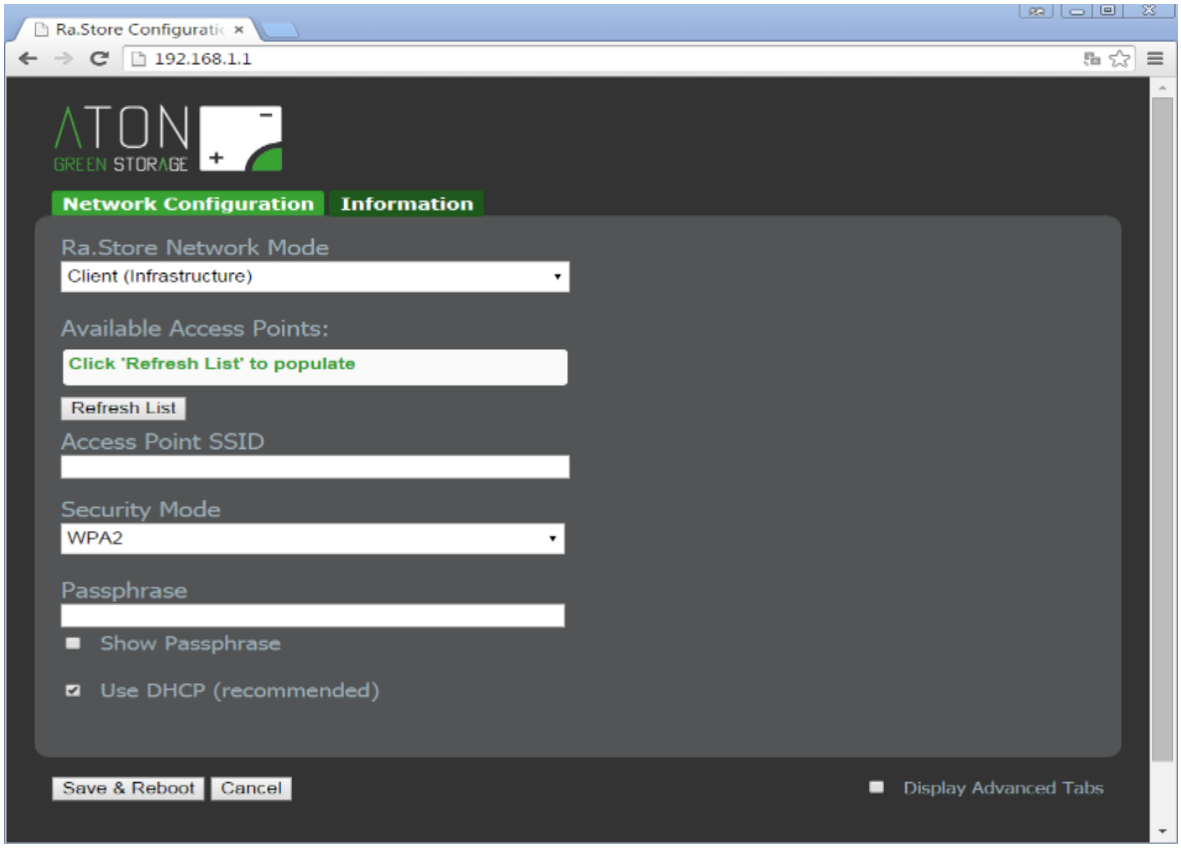


Picture 86 – Check that the WiFi port of the PC is configured in DHCP

6. Connect the PC to the WiFi network **Ra_Config** (Picture 87).

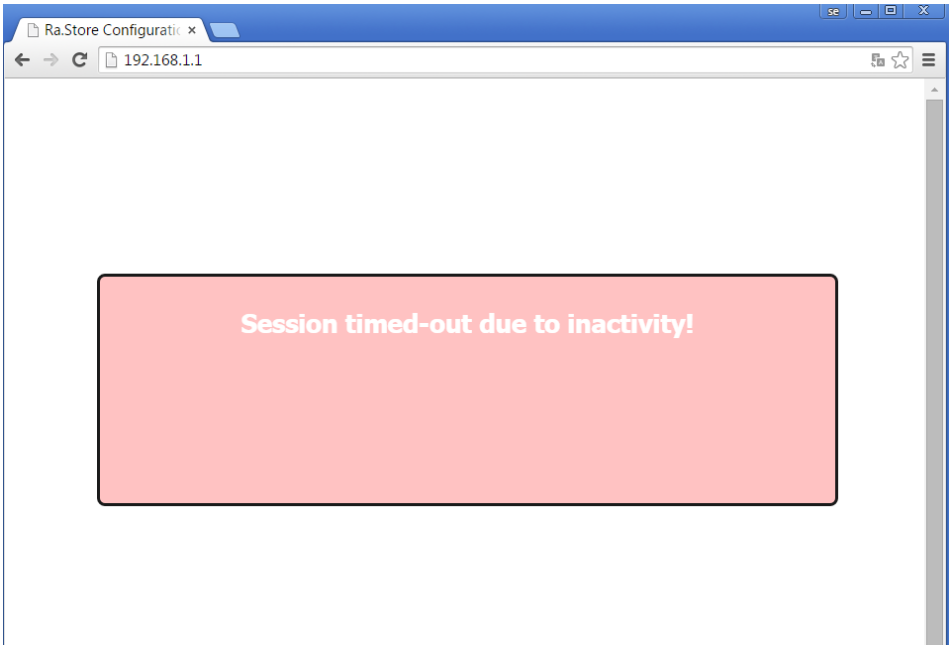
Picture 87 – Connect the PC or smart device to the network Ra_Config

7. Launch the Web Browser of the PC or smart device
8. Digit **192.168.1.1** in the address bar. The page showed in Picture 88 will appear on the screen.



Picture 88 – Configuration page from Web Browser of the WiFi card

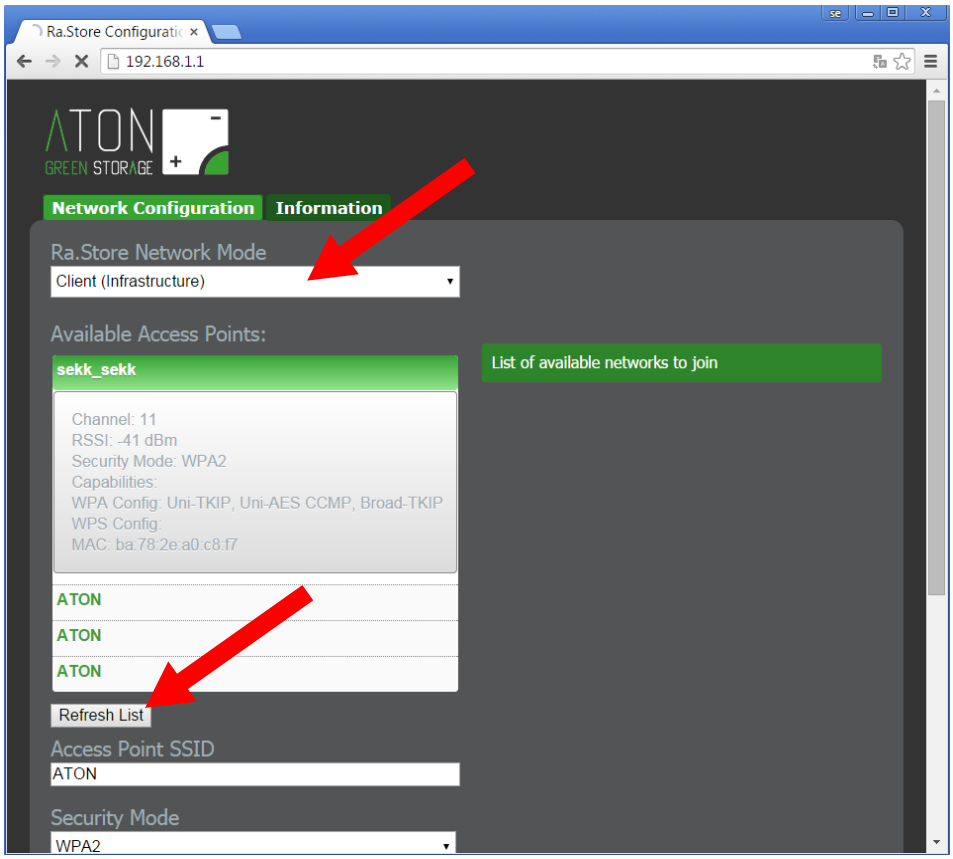
NOTE: if in any moment of the procedure, a table with a red background should appear (Picture 89), please go back to point 1.



Picture 89 – Session of timed-out configuration due to inactivity

9. Select in the field **Network Mode** the item **Client (Infrastructure)** (Picture 90).

10. Click on the button **Refresh List**. The module will scan the available networks and will show in **Available Access Points** a list of the ones found (Picture 90).



Picture 90 – Configuration of the WiFi network

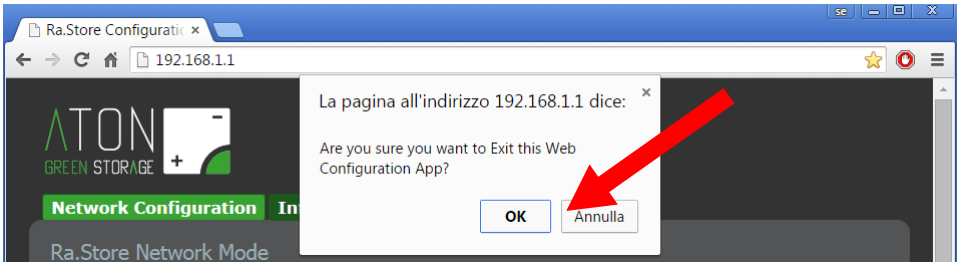
11. Select with a click the network among the ones listed and the fields **Access Point SSID** and **Security Mode** will be filled in automatically (for the WiFi networks without password select the item “Open”). If in the list the wished WiFi network will not be shown, click on **Refresh List** in order to execute again the searching.

12. Digit the password of the WiFi network in the field **Passphrase** (put the tick on **Show Passphrase** to visualize the written password)

13. **(Optional)** The module uses DHCP as default. If you wish to give the module a static IP, remove the tick on **Check to enable DHCP** and insert static IP, subnet mask, and gateway.

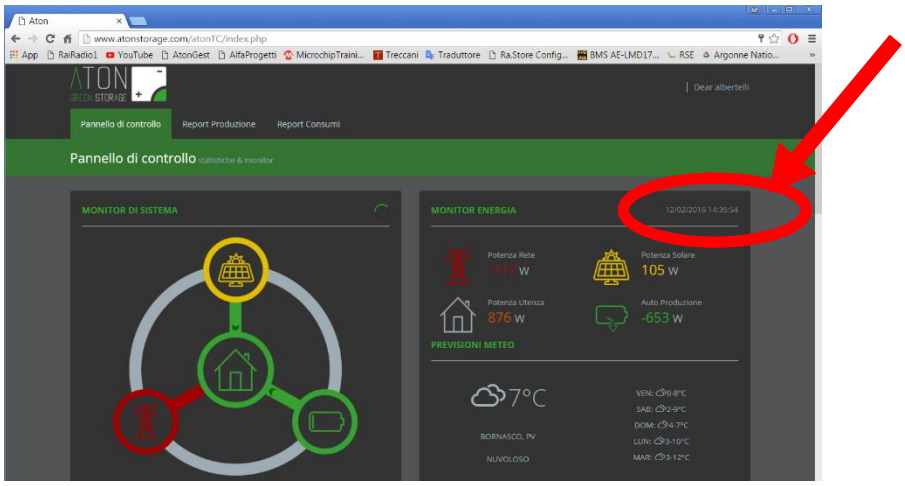
14. Click on **Save & Reboot** in order to save the given settings.

15. Press **OK** in the pop-up window in order to confirm the exit (Picture 91), then close the Web Browser.



Picture 91 – Save of the configuration of the WiFi network

16. Access the Webpage regarding your installation, then wait a few minutes and check that the date of the screen updates. Repeat the procedure in case this does not happen (Picture 92).



Picture 92 – Check of the right communication on the Web portal of Aton

4.2.6 GPRS

The submenu “GPRS” shows the following parts (Picture 93):

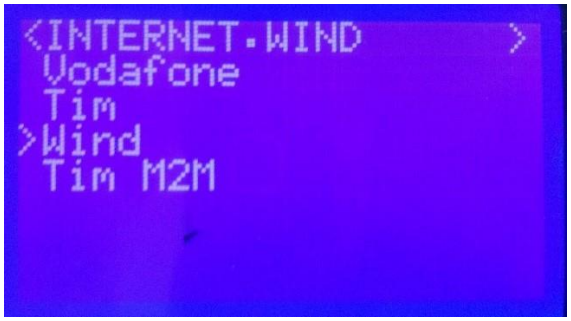
Picture 93 - GPRS: ON

- *Start GPRS:* with this command the GPRS card is enabled to communicate the data of the storage system. After having given the command, the screen appears like in Picture 93 (the top writing is “GPRS ON”).
- *Stop GPRS*: with this command the GPRS card is disabled to communicate the data of the storage system (the top writing is “GPRS OFF”).
- *Info GPRS:* it is used to visualize the actual status of the GPRS communication (Picture 94):
    - *“Macro”: the status “Macro”, if the communication is correct, must be “GO_SERVLET”.*

- *"Micro": the status "Micro", if the communication is correct, can be "SENDING" or "RECEIVING".*
- *"Qlty": it indicates the quality of the network connectivity to which the GPRS card is connected; it must be higher than "25.0" in order to guarantee a continuous and stable communication.*
- *"Ntlk": it indicates the network to which the GPRS card is connected, and it must be compliant with the configuration of the parameter "Apn Sim Card" (for ex. If the parameter Apn Sim Card is configured on "Wind", the status of "Ntlk" must be "Wind"; for ex. If the parameter Apn Sim Card is configured on "Vodafone", the status of "Ntlk" must be "Vodafone").*
- *"GPRS": it indicates the status of GPRS communication; if "attached" it means that the GPRS card is connected to a GPRS (Network); if "deattached" it means that the GPRS card is not connected to a GPRS network.*
- *"Reg": if it is "home network", the GPRS card is connected to the network of the same provider of which it has the inserted Sim Card; if it is "roaming" the GPRS card is connected to the network of another provider, different from the one of which it has the inserted Sim Card.*
- *"Opr": if it is "automatic" the GPRS card chooses automatically the GPRS network to which connect; if it is "manual" the GPRS card chooses the set up network (the manual set up of the network can be done only through PC and software Aton).*

Picture 94 - Info GPRS

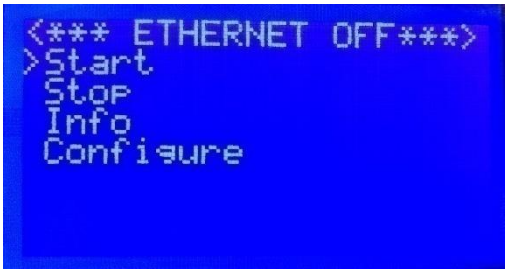
- *Restart Modem:* with this command the GPRS modem is restarted.
- *Stop Connection 300s:* with this command the GPRS communication is blocked for 300 seconds.
- *Start Connection:* this command starts the GPRS communication.
- *Apn SimCard:* this is the parameter where the provider of the Sim Card located inside the GPRS card can be configured.



Picture 95 - Apn Sim Card

4.2.7 Ethernet

The submenu "**Ethernet**" appears like the following picture (Picture 96).

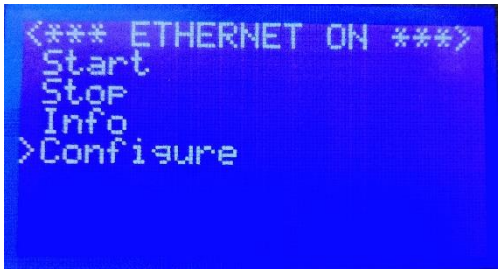


Picture 96 - Menu Ethernet: Ethernet OFF

- *Start:* with this command the LAN card is enabled to communicate the data of the storage system. After having given the command, the screen appears like in Picture 97 (the top writing is "ETHERNET ON").
- *Stop:* with this command the LAN card is disabled to communicate the data of the storage system. After having given the command, the screen appears like in Picture 96 (the top writing is "ETHERNET OFF").
- *Info:* it shows the data regarding the LAN connection (Picture 98).
- *Configure:* this command enables the data communication on the LAN card.

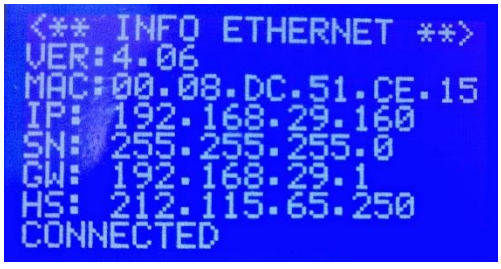
In order to configure the LAN card, proceed as follows:

1. Place the cursor next to the writing "**Configure**"; press the key "**ENTER**" in order to enable the communication **Ethernet LAN**.
2. The first writing of the menu **Ethernet** changes from **ETHERNET OFF**" to "**ETHERNET ON**", as shown in the following picture. This means that the Ethernet LAN communication has been fixed.



Picture 97 - Menu Ethernet: Ethernet ON

3. Then place the cursor next to the writing "**Info"** and press the key **"ENTER"**.



Picture 98 - Menu Ethernet: Info

4. Check that the last writing that appears on the display is "**CONNECTED**".

If this does not happen, restart the storage system as described in the Appendix "A", and repeat the procedure of configuration from point 1.

A - Appendix A - Switch off and on the system

In order to switch off the system, lower the disconnectors in the following order:

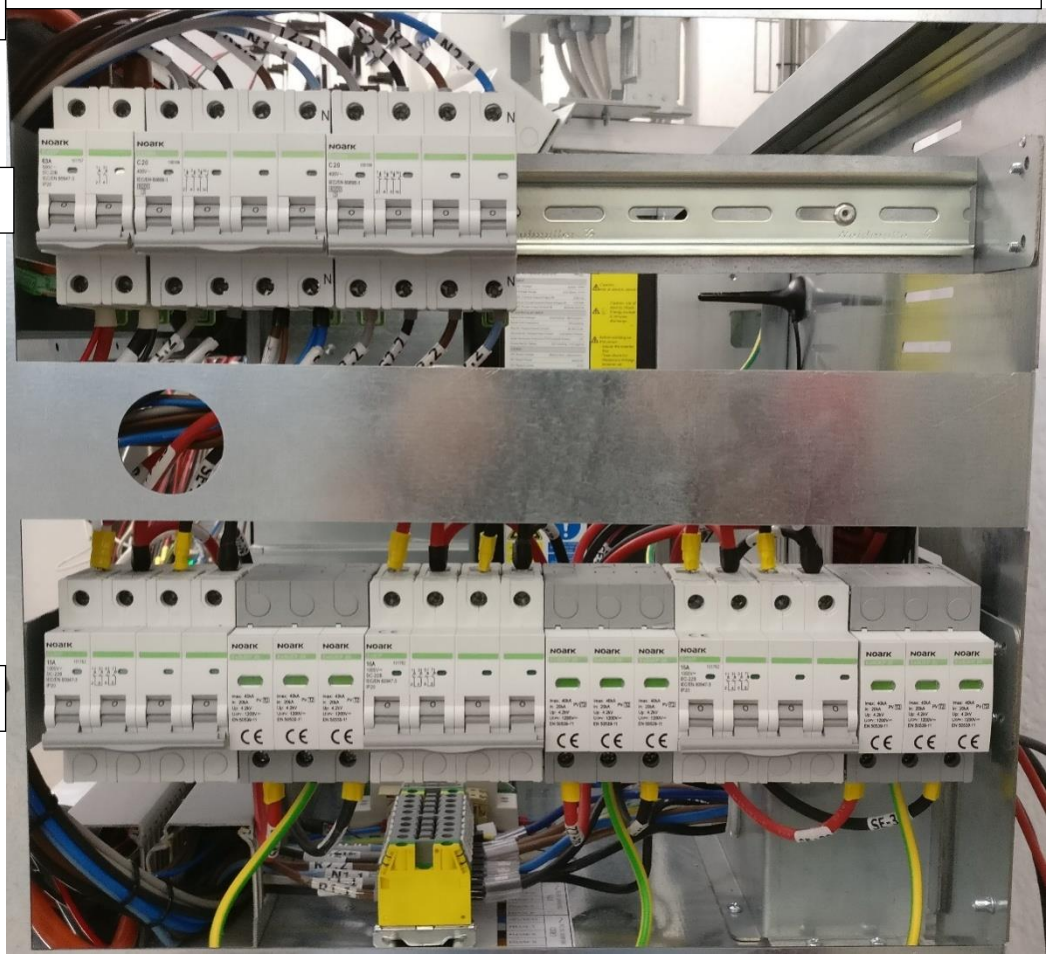
1. *ROW 2: FPV3*
2. *ROW 2: FPV2*
3. *ROW 2: FPV1*
4. *ROW 1: QE1*
5. *ROW 1: QG1*
6. *ROW 1: QB1*

In order to switch on again the system, raise the disconnectors in the following order:

1. *ROW 1: QB1*
2. *ROW 1: QG1*
3. *ROW 1: QE2*
4. *ROW 2: FPV3*
5. *ROW 2: FPV2*
6. *ROW 2: FPV1*

NAME OF THE ELECTRICAL SCHEME	QB1	QG1	QE1

ROW 1



ROW 2

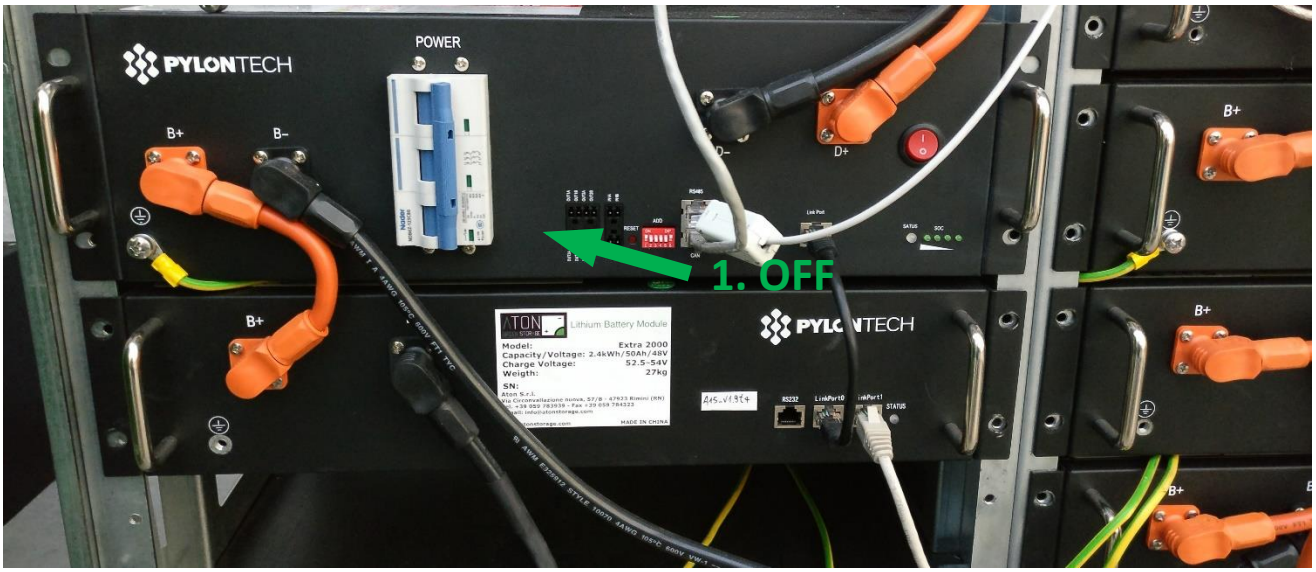
Picture A – Protections of the electrical panel of RA.Store-3

NAME OF THE ELECTRICAL SCHEME	FPV1	SPDPV1	FPV2	SPDPV2	FPV3SPDPV3

B - Appendix B – Switch off and on the batteries

In order to switch off the batteries:

1. Put on “0” (OFF; status indicators are green) the magnetothermal breaker
2. Put on “0” (OFF) the red button “0/1”.

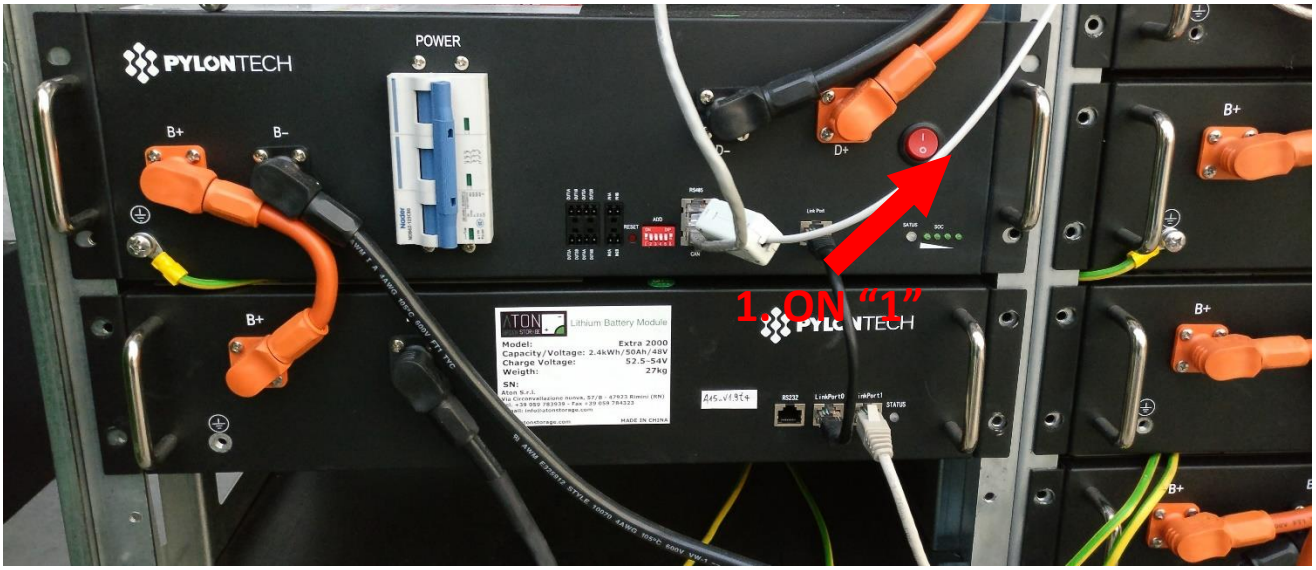


Picture B1 – Magnetothermal breaker of the batteries OFF (status indicator: green)

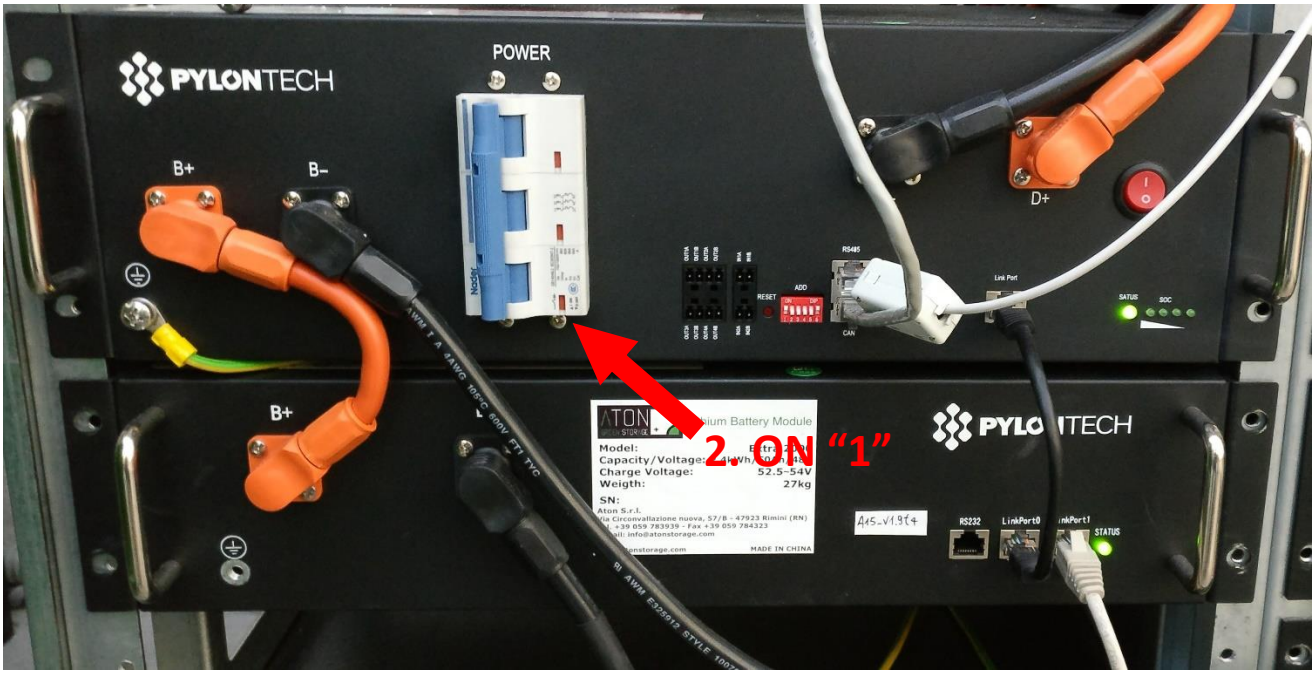
Picture B2 – Red button “0/1” of the batteries in position“0”

In order to switch on the batteries:

1. Put on “1” (ON) the red button “0/1”
2. Put on “1” (ON; status indicators are red) the magnetothermal breaker.



Picture B3 – Red button “0/1” of the batteries in position “1”



Picture B4 – Magnetothermal breaker of the batteries ON (status indicator: red)

Appendix C - Technical datasheets

RA.Store-3	5K	6K	8K	10K
Maximum input power DC [W]	6000	8000	10000	12000
Input voltage range DC [V]	200 ÷ 950	200 ÷ 950	200 ÷ 950	200 ÷ 950
MPP voltage range (full load) [V]	230 ÷ 800	230 ÷ 800	370 ÷ 800	370 ÷ 800
Number of MPP independent controllers	2	2	2	2
Number of strings per MPP entry	1/1	1/1	1/1	½
Maximum input current (per string / par MPP) [A]	11/11	11/11	11/11	11/20
Maximum current of short circuit (per string / par MPP) [A]	14/14	14/14	14/14	14/23
AC Output (On-grid)				
Wave form	Sinusoidal three-phase	Sinusoidal three-phase	Sinusoidal three-phase	Sinusoidal three-phase
Maximum output active power @ cosϕ=1 [W]	5000	6000	8000	10000
Maximum output apparent power [VA]	5000	6000	8000	10000
Voltage range [V]	342 ÷ 440	342 ÷ 440	342 ÷ 440	342 ÷ 440
Frequency [Hz]	50/60	50/60	50/60	50/60
Output rated current [A]	7,2	8,7	11,6	14,5
Maximum output current [A]	8,0	9,6	12,8	16,0
Adjustable displacement factor	0,8 overexcited 0,8 undexcited	0,8 overexcited 0,8 undexcited	0,8 overexcited 0,8 undexcited	0,8 overexcited 0,8 undexcited
Total harmonic distortion (THD)	<2%	<2%	<2%	<2%
AC Output (EPS-Back up)				
Wave form	Sinusoidal three-phase	Sinusoidal three-phase	Sinusoidal three-phase	Sinusoidal three-phase
Maximum output apparent power [VA]	5000	6000	8000	10000
Maximum peak output apparent power (60 sec) [VA]	10000	12000	14000	14000
Voltage range [V]	400	400	400	400
Frequency [Hz]	50/60	50/60	50/60	50/60
Output rated current [A]	7,2	8,7	11,6	22,8
Batteria				
Type	LiFePO4	LiFePO4	LiFePO4	LiFePO4
Rated voltage of batteries [V]	192	192	192	240

Voltage range [V]	170 ÷ 500	170 ÷ 500	170 ÷ 500	170 ÷ 500
Maximum charge current [A]	25	25	25	25
Maximum discharge current [A]	25	25	25	25
Rated current of charge / discharge [VA]	4800	4800	4800	6000
Number of standard battery configuration modules	4	4	4	5
Maximum permissible energy [kWh]	9,6	9,6	9,6	12
Maximum usable energy [kWh]	7,68	7,68	7,68	9,8
Usable energy (DoD 90% EPS Mode) [kWh]	8,64	8,64	8,64	10,8
DoD	80%	80%	80%	80%
DoD in EPS mode (EPS)	90%	90%	90%	90%
Cycles of charge / discharge	4000	4000	4000	4000
Battery options				
Number of additional/total modules	1 ÷ 4 / 5 ÷ 8	1 ÷ 4 / 5 ÷ 8	1 ÷ 4 / 5 ÷ 8	1 ÷ 3 / 6 ÷ 8
Maximum permissible energy [kWh]	19,2	19,2	19,2	19,2
Maximum usable energy [kWh]	15,36	15,36	15,36	15,36
Permissible energy [kWh]	2,4 kWh * N° moduli	2,4 kWh * N° moduli	2,4 kWh * N° moduli	2,4 kWh * N° moduli
Usable energy [kWh]	1,92 kWh * N° moduli	1,92 kWh * N° moduli	1,92 kWh * N° moduli	1,92 kWh * N° moduli
Usable energy (DoD 90% EPS Mode) [kWh]	2,16 kWh * N° moduli	2,16 kWh * N° moduli	2,16 kWh * N° moduli	2,16 kWh * N° moduli
Rated power in charge / discharge [VA]	1200 VA * N° moduli	1200 VA * N° moduli	1200 VA * N° moduli	1200 VA * N° moduli
Rated voltage of battery group [Vdc]	48 V * N° moduli	48 V * N° moduli	48 V * N° moduli	48 V * N° moduli
Safety and protection devices				
Overload protection	si	si	si	si
Overtemperature protection	Si	Si	Si	Si
AC lines protection	Magnetothermal breakers	Magnetothermal breakers	Magnetothermal breakers	Magnetothermal breakers
Battery protection	Magnetothermal breakers	Magnetothermal breakers	Magnetothermal breakers	Magnetothermal breakers
DC - PV lines protection	Disconnectors + SPD	Disconnectors + SPD	Disconnectors + SPD	Disconnectors + SPD
Switch time EPS mode	5 s	5 s	5 s	5 s
General data				
Working temperature range [°C]	da 0 a +45	da 0 a +45	da 0 a +45	da 0 a +45
Weight [kg] (standard battery number)	85	85	109	109
Dimensions [L. x H x P] [mm]	1045x1245x545	1045x1245x545	1045x1245x545	1045x1245x545

Installation	On the floor	On the floor	On the floor	On the floor
Protection type	IP20	IP20	IP20	IP20
Interfaces				
LCD Display with capacitive keyboard	yes	yes	yes	yes
GPRS (standard)	2G Dual band	2G Dual band	2G Dual band	2G Dual band
WiFi (opzionale)	2.4 GHz IEEE Std. 802.11 b/g	2.4 GHz IEEE Std. 802.11 b/g	2.4 GHz IEEE Std. 802.11 b/g	2.4 GHz IEEE Std. 802.11 b/g
Wireless home automation (opzionale)	EnOcean 868 MHz	EnOcean 868 MHz	EnOcean 868 MHz	EnOcean 868 MHz
Regulations and Certifications				
Certifications	VDE0126-1-1A1:2012 / VDE-AR-N4105 / G59-3 / AS4777 / EN50438 / CEI 0-21 / IEC62619 / ISO13849-2 / SN29500 / IEC615086	VDE0126-1-1A1:2012 / VDE-AR-N4105 / G59-3 / AS4777 / EN50438 / CEI 0-21 / IEC62619 / ISO13849-2 / SN29500 / IEC615086	VDE0126-1-1A1:2012 / VDE-AR-N4105 / G59-3 / AS4777 / EN50438 / CEI 0-21 / IEC62619 / ISO13849-2 / SN29500 / IEC615086	VDE0126-1-1A1:2012 / VDE-AR-N4105 / G59-3 / AS4777 / EN50438 / CEI 0-21 / IEC62619 / ISO13849-2 / SN29500 / IEC615086