ZON.E

Installation Manual

Rev. 1.07

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1 Introduction

The present manual describes the procedures of installation and setting up of the system ZON.E.

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.

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.

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 Pictograms and warnings on the system

	Electrocution hazard – presence of electricity. It is therefore forbidden to try to enter the inner parts of the system. All the works executed on the system must be done by qualified technical staff. Placed nearby the electrical panel.
	Risk of burns due to hot surfaces. Some areas of the product may get hot during the functioning. Avoid the direct contact with the body during the functioning. Before executing any activity on the product, switch it off and leave it cool enough.
	Respect all the indications given in the manuals and in the technical datasheets.
	RAEE / WEEE Waste Do not dispose the product together with household waste, but respecting all the local and European laws regarding the disposal of electronical waste applicable in the country of installation.
	Alternating current
	Direct current
	CE Mark The product is compliant with the requirements applicable by the EU Directives.

	Appliance Class I The chassis of the machine is connected to the protection conductor of the product. The protection conductor of the product must be connected to the earthing protection conductor of the house.
	Refer to the present manual – please always read this manual (and the installation manual in case of technical authorized staff) before starting each 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.

1.3 Addressees

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

1.4 Use

The product RA.Store-K-F 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.

1.5 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.

1.5.1 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.

1.5.2 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.

1.5.3 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.

1.5.4 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 magneto-thermal 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 230 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 casing.
    5. The battery modules have a maximum voltage of 54 Vdc.
    6. The battery modules do not contain metallic lithium.

1.6 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 “1.5 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.

2 Transport and warehousing

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 of battery modules

During the warehousing period, 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.
- If the warehousing period is longer than 6 months, please contact Aton before the expiration date in order to receive instructions for the recharge of the batteries.
- 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 casing, liquid leakage towards outside):

- Do not use the battery module.
- Call immediately Aton in order 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 to 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 "*Website – 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 system.

Then check only the *data communication* to 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.

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 "1.5 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 alternating current in output from the storage system.
- The RCD or RCDs must be of bipolar 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 ZON.E can be handled mechanically with a pallet jack, 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.

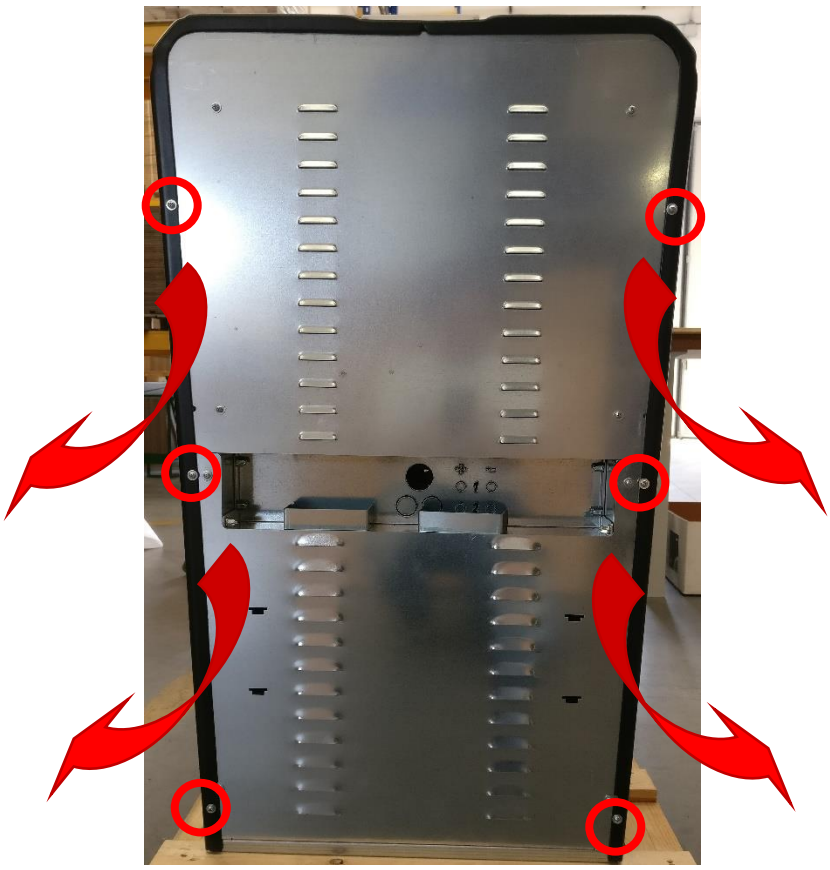
The operations for the manual handling are:

- Removal of the external panels
- Removal of the batteries
- Application of auxiliary handles on the basic structure
- Transport of the basic structure, batteries and plastic parts separated
- Disassembly of the auxiliary handles and reassembly of the batteries
- Reassembly of the external panels

Before executing the manual handling operations, please read the “Appendix D - Weights for the transport “.

3.3.2.1 Removal of the external panels

Unscrew the external fixing screws placed on the back side of the storage system (Picture 1); widen gently the carter to slip off the plastic parts of the sheet chassis and then proceed with the frontal removal of the carter (Picture 2). Disconnect the connector on the “flat cable” that connects the management system of the machine with the led lights available on the carter.



Picture 1 – Removal of the fixing screws of the external panels

Picture 2 – Removal of the carter

3.3.2.2 Removal of the batteries

WARNING

Risk of burns!

Very high short circuit currents may develop. During the works on the battery modules, respect these precautions:

- **Before executing any work, please be sure that the breaker "0/1" available on each battery module is on position "0".**

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.

NOTICE

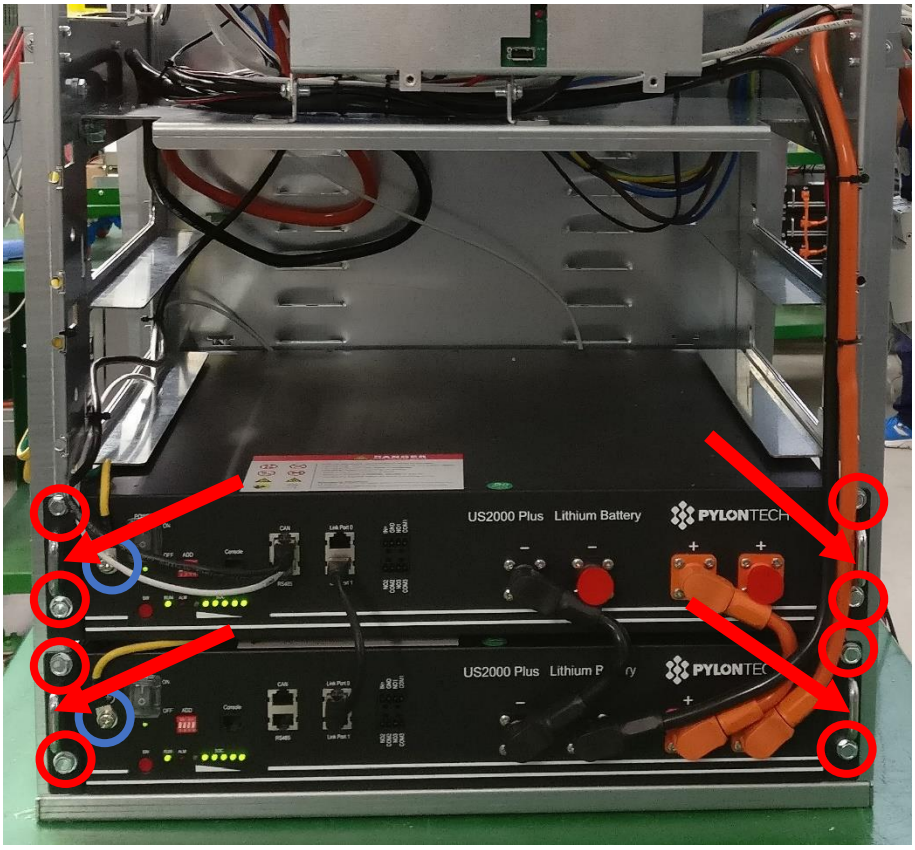
Damages to the battery modules caused by short circuit!

If during the works on the battery modules, a short circuit happens, follow these instructions:

- Do not install the battery modules involved by the short circuit.
- Contact Aton Srl.

In Picture 3 are showed:

- The screws that fix the battery modules to the chassis (4 screws indicated by red circles),
- the screws that create the equipotential bond (2 screws indicated by blue circles),
- the handles to move the battery modules (4 red arrows).



Picture 3 - Wiring of the battery modules

ATTENTION

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

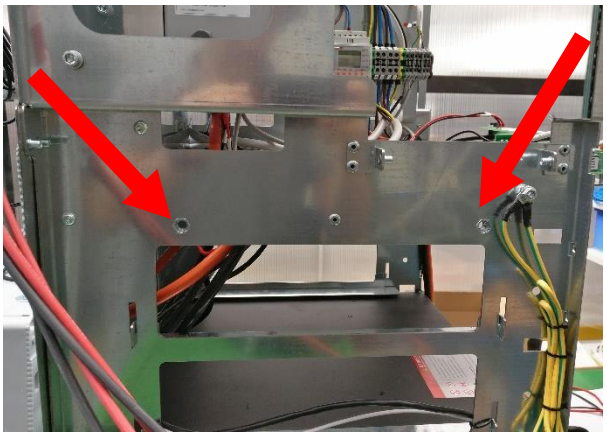
The following cables must be removed:

- unscrew the 4 screws that keep it together with the chassis and the screw for the equipotential bond;
- remove the plug RJ45 that enters in the port CAN of the upper battery (black cable);
- remove the plug RJ45 that enters in the port RS485 of the upper battery (grey cable);
- remove the ethernet patch cord that connect the battery modules (port “Link port 0” lower battery; port “Link port 1” upper battery);
- remove the red and black patch cords that connect the battery modules;
- remove the battery from its slot by using the frontal handles;
- remove completely the battery from its slot and put it on the floor.

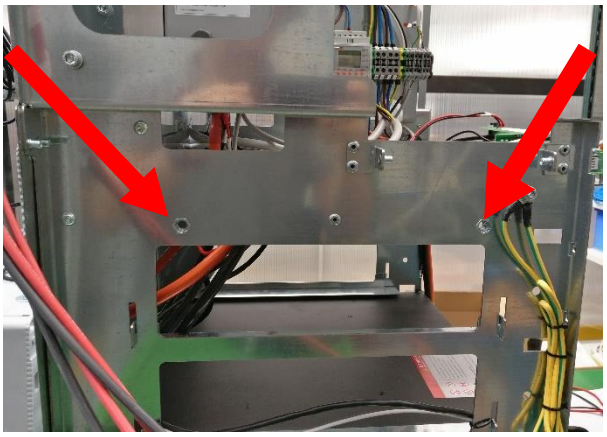
3.3.2.3 Application of auxiliary handles on the basic structure

Fix to the structure the adequate provided handles in the 4 points showed in the following pictures (Picture 4, Picture 5, Picture 6).

Picture 4 - Handles



Picture 5 – Fixing points of the handles on the left side



Picture 6 - Fixing points of the handles 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 chosen location.

ATTENTION

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

Reassemble in the right location the batteries and the external panels 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 Disassembly of the handles and reassembly of the batteries

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 screw the 4 screws that keep it together with the chassis and restore the equipotential bond.

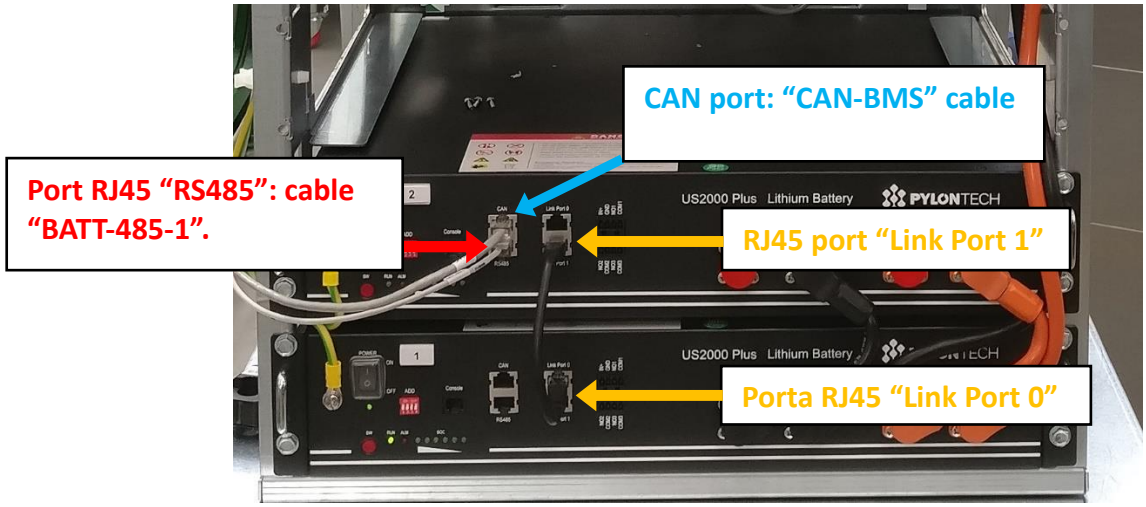
3.3.2.6 Connection and switching on of the batteries

Reconnect the plug RJ45, with the grey cable called “BATT-485-1”, to the port RS485 available on the upper battery module (Picture 7).

Reconnect the plug RJ45, with the black cable called “CAN-BMS”, to the port CAN available on the upper battery module (Picture 7).

Restore the connection between the positive and negative poles of the various battery modules as shown in the technical schemes and in Picture 7.

Restore the connection between the “Link Port 0” “Link Port 1” of the various battery modules as shown in the technical schemes and in Picture 7.

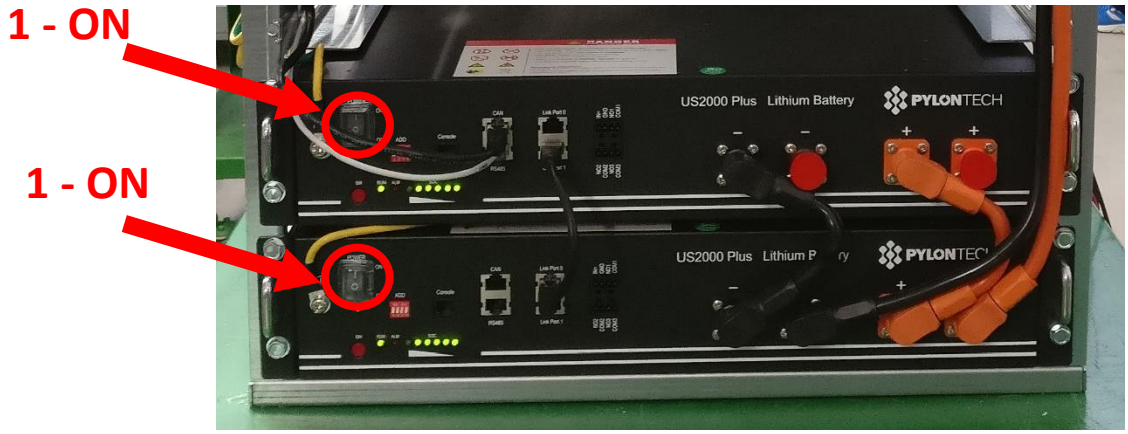


Picture 7 – Wiring of the batteries

To switch on the batteries:

1. Put on “1” the breakers of all batteries (Picture 8)
2. Press the red button of the first battery at the top (Picture 9)
3. Check that the led lights of all batteries are switched on (Picture 10)

For the procedure of switching off, follow the steps indicated in “Appendix B – Switch off and on the batteries”.



Picture 8 - Breakers “0/1” of the battery modules: put on “1”

Picture 9 - Press the red button of the upper battery

Picture 10 - Check that led lights of the battery modules are on

3.3.3 Placement of the antenna

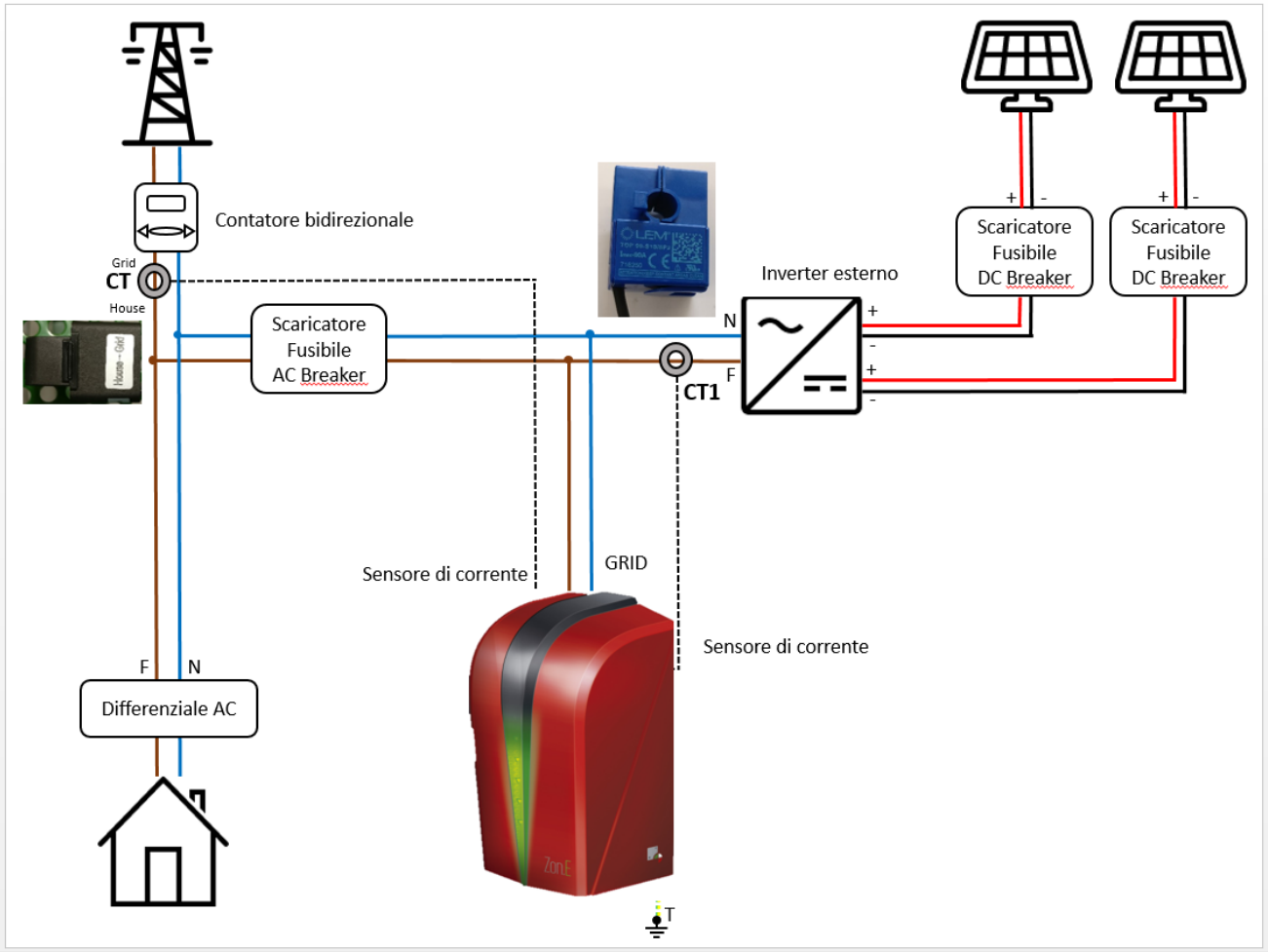
Move the antenna with magnet base from inside to outside the structure.

Picture 11 - Antenna

NOTE: the cable of the antenna should be placed through the slot of the upper panel in the upper part of the system.

3.3.4 Placement and connection of the CT sensors

Here you can see the installation points of the CT (Current Transformer) sensors.



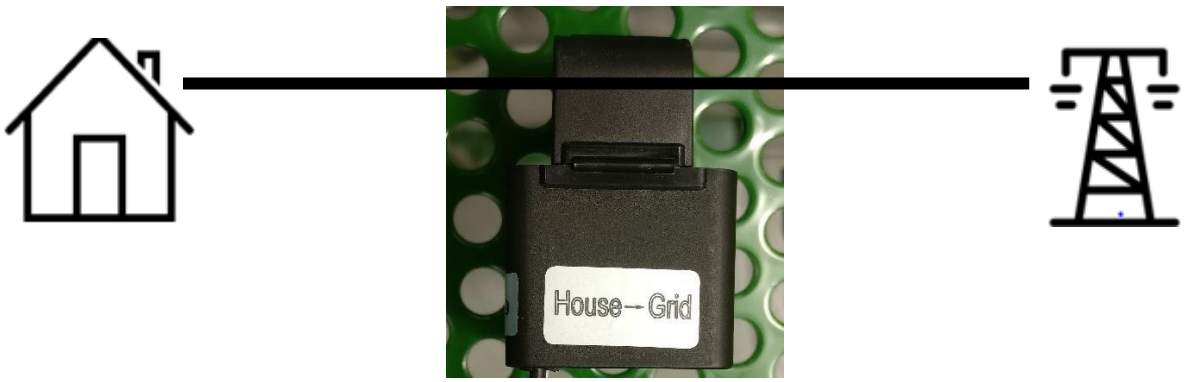
Picture 12 – Principle scheme of the connection CT and CT1

3.3.4.1 CT

The CT sensor (Picture 12), the black one, is different from CT1 for the external colour because they are not interchangeable.

It must include the phase cable that connects to the bidirectional meter (M1).

It must be placed so that the writing "House" goes towards the house (customer) and the writing "Grid" goes towards the bidirectional meter (M1).



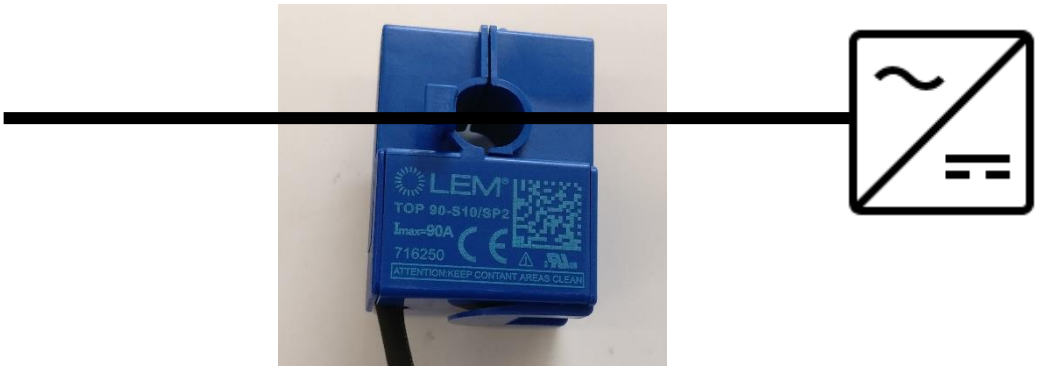
Picture 13 – CT: please respect the direction of installation

3.3.4.2 CT1

The CT1 sensor (Picture 14), the blue one, is different from CT for the external colour because they are not interchangeable.

It must include the phase cable in output from the external inverter.

Unlike CT, it does not need a direction of installation already fixed.



Picture 14 – CT1: the direction of installation is indifferent

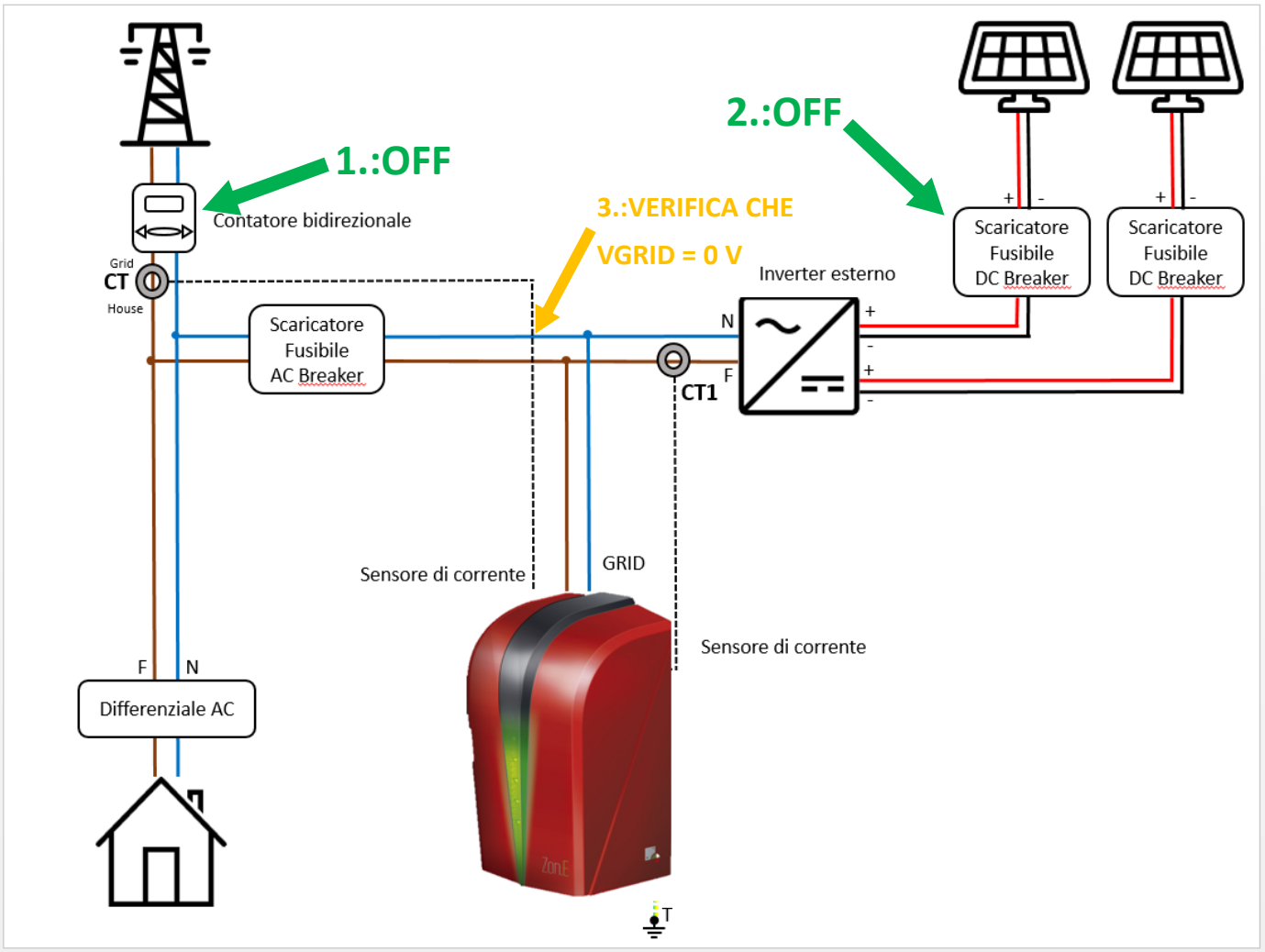
3.3.5 Connection of the cables GRID, EPS, CT, CT1

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

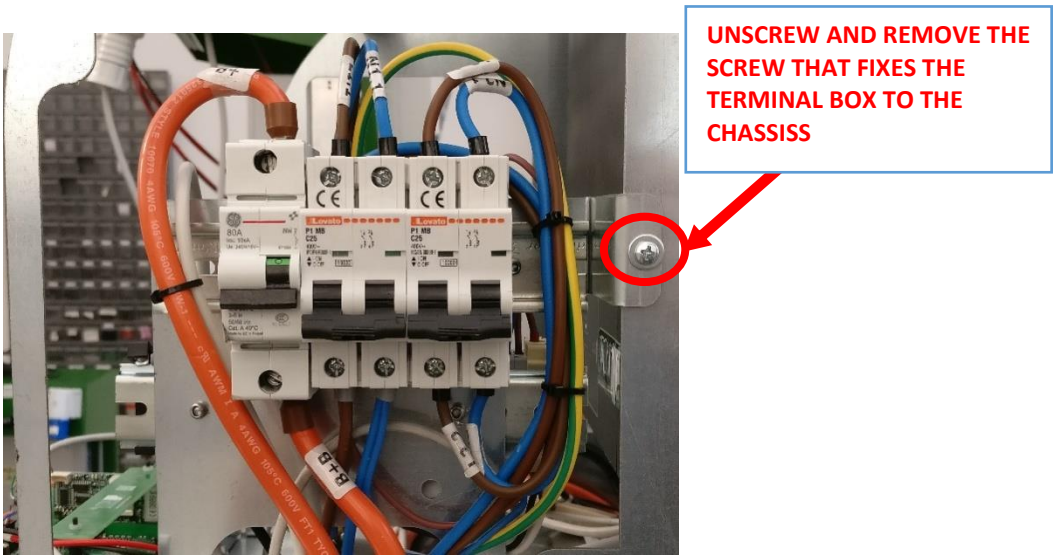
The terminals regarding the electrical line called EPS (terminals L2.2 and N2.2) must be connected only if the commutation panel is available (delivered separately).

Proceed as follows:

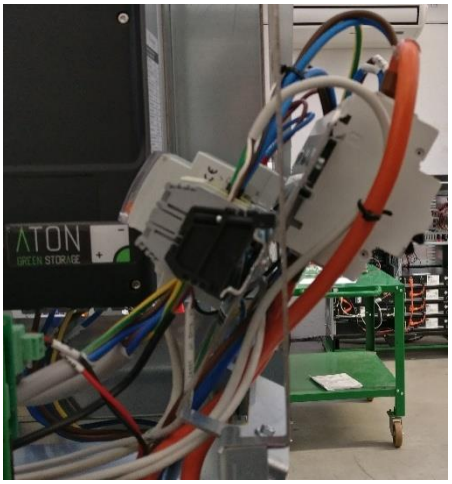
1. Lower the general (bidirectional) meter downstream the public grid.
2. Open the disconnectors inside the string panels (**OFF**).
3. Check with a tester the real lack of voltage on-site and the lack of electricity at the ends of the GRID cables (Picture 15).
4. Lower (**OFF**) all the protections in the electrical panel of ZON.E (Picture 16).
5. Unscrew and remove the screw that fixes the DIN self-stabilizing runner to the chassis (Picture 16)
6. Tilt the DIN runner of the electrical panel as shown in Picture 18 and the following ones.



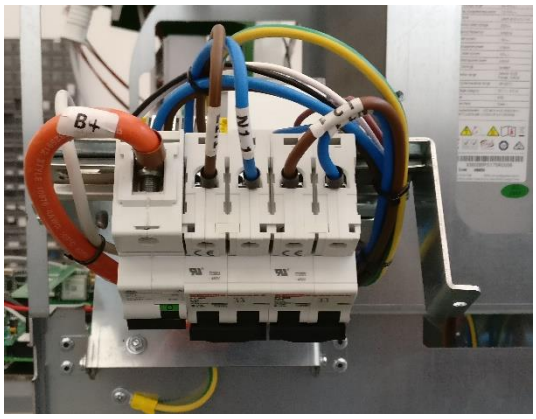
Picture 15 – Connection of the GRID line



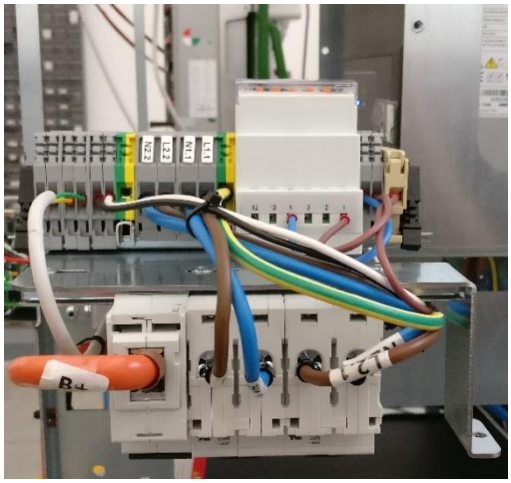
Picture 16 – Protections of the electrical panel in **OFF status**; remove the screw of the terminal box



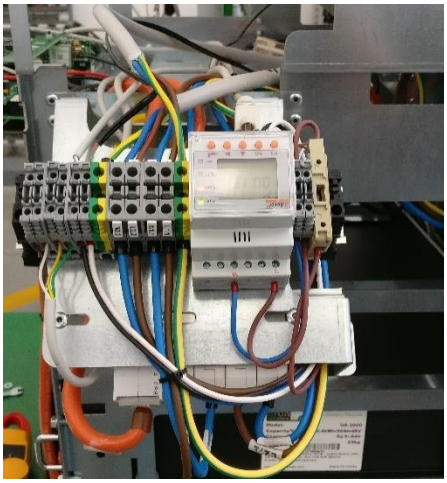
Picture 18 – Tilt the electrical panel



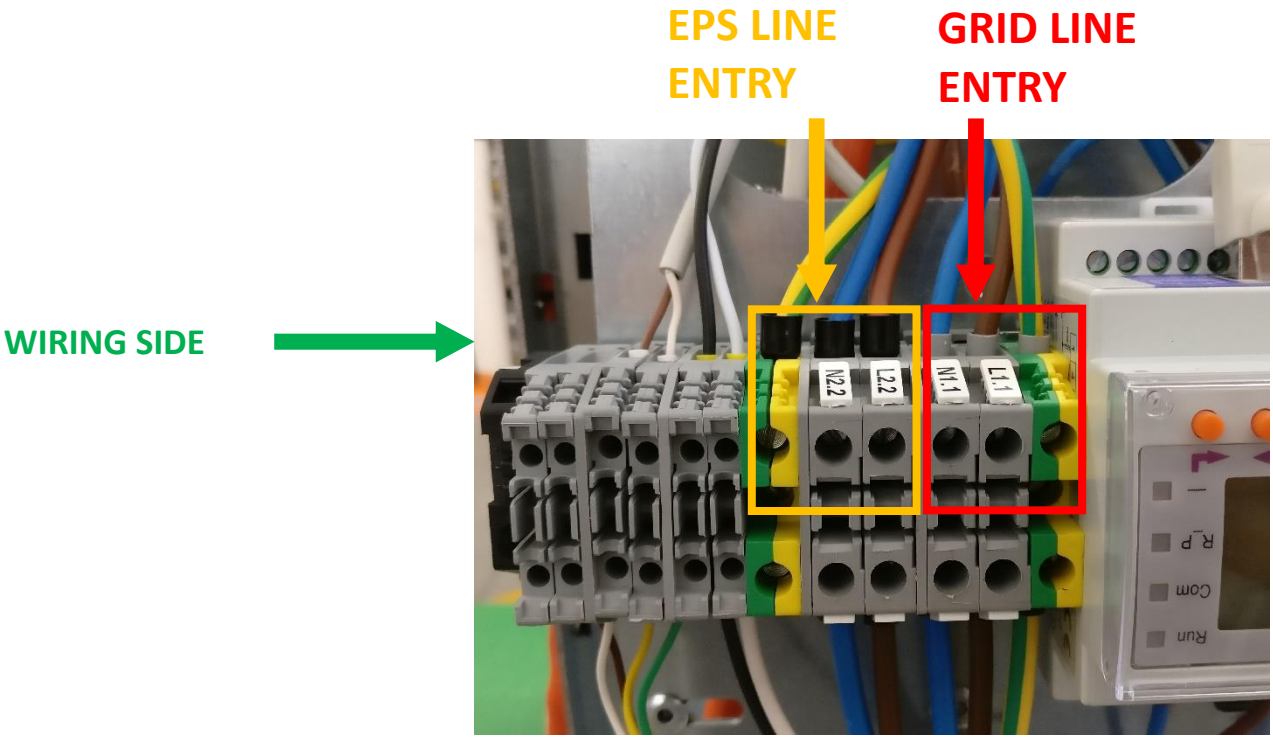
Picture 17 - Tilt the electrical panel



Picture 19 – Access to the terminal box



Picture 20 - Tilt the electrical panel



Picture 21 – Terminal box ZON.E lines GRID and EPS

7. Connect the GRID line and the (eventual) EPS line to the terminals by respecting the instructions of the electrical schemes and of Picture 24:

Grid line - terminal box QG - M1:

PHASE: terminal L1.1

NEUTRAL: terminal N1.1

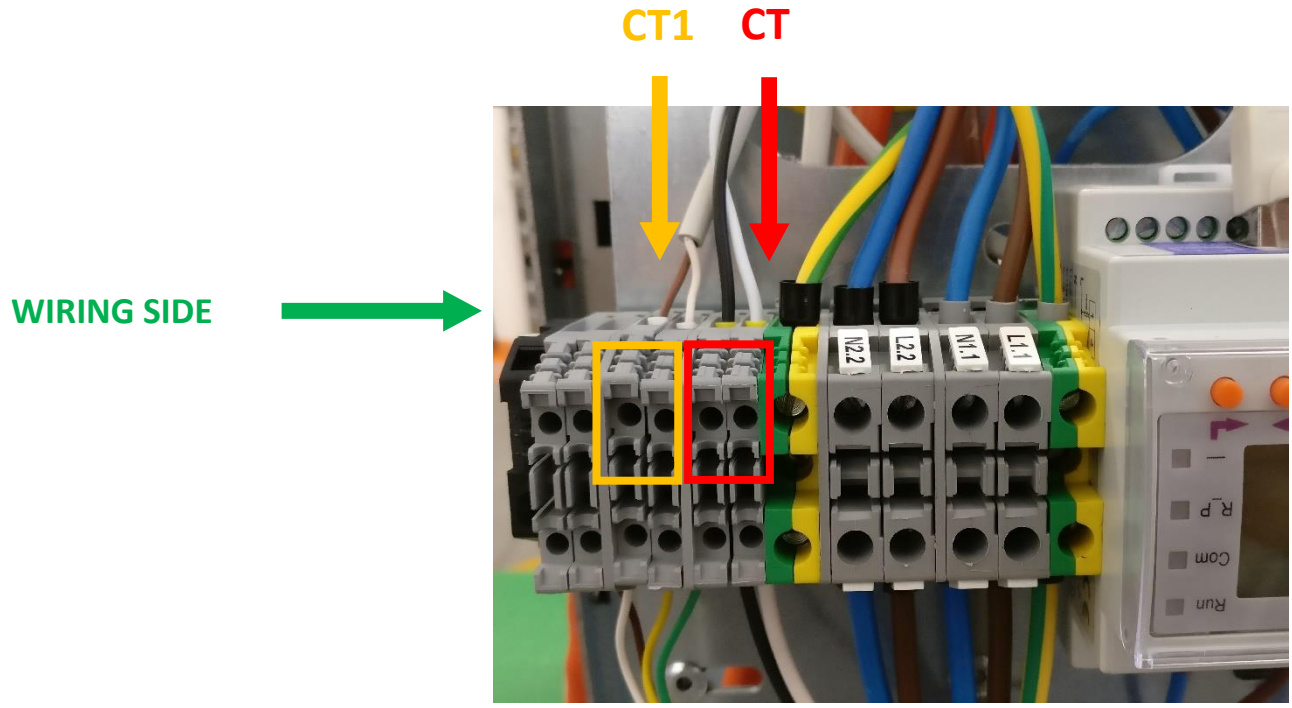
EARTH: terminal GND

EPS line - terminal box QG - M1 (connect only if the GRID/EPS commutation panel is available):

PHASE: terminal L2.2

NEUTRAL: terminal N2.2

EARTH: terminal GND



Picture 22 - Terminal box ZON.E lines CT1 and CT2

8. Connect the **CT** line and the **CT1** line to the terminals by respecting the instructions of the electrical schemes and of Picture 25:

Line CT1 - QG - M1:

White cable: terminal n.5

Black cable: terminal n.6

Line CT1 - QG - M1:

Black cable: TA1A

Black/white cable: TA1B

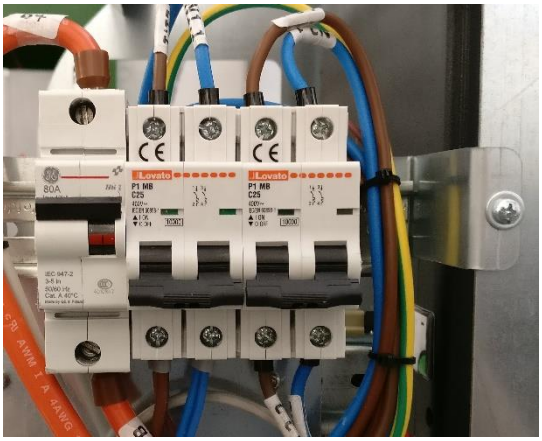
9. Place again the terminal box inside the chassis and fix it with the screw previously removed (Picture 16).

Moreover connect the earth cable to the chassis in the back part of the system.

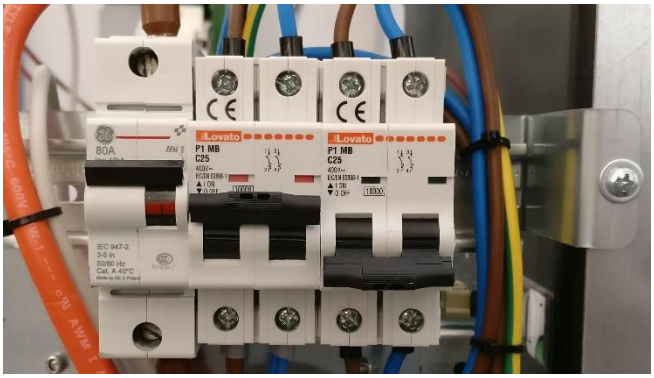
3.4 Commissioning and check

3.4.1 Switching on ZON.E and access to the main menu

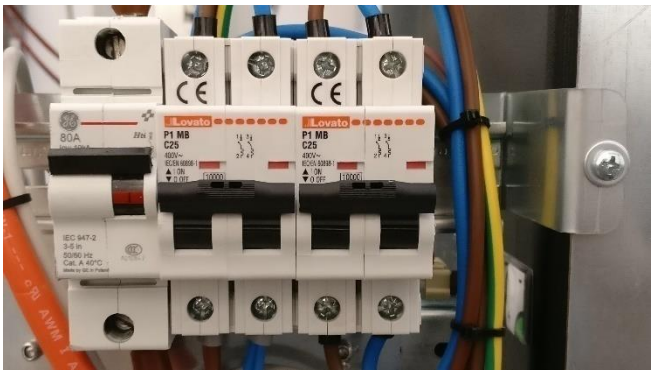
Raise up the protections in the electrical panel of ZON.E in sequency as shown in Picture 23 - QB1 ON and the following ones.



Picture 23 - QB1 ON

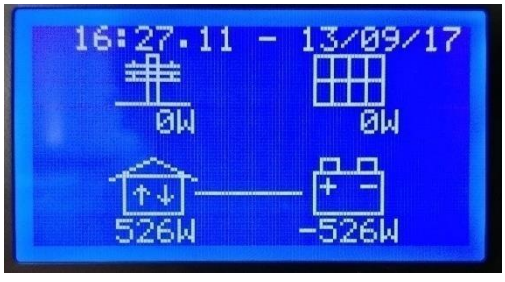


Picture 24 - QG1 “GRID LINE” ON



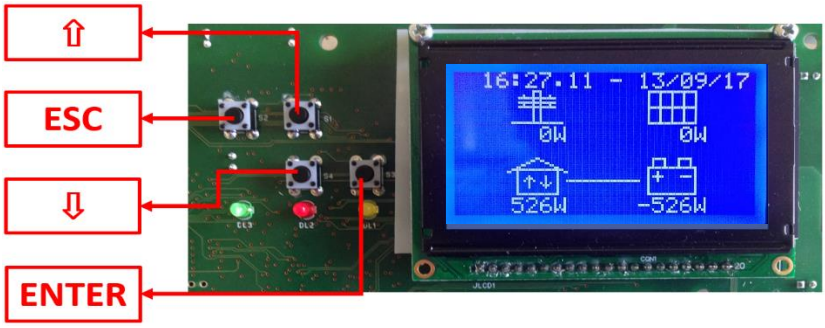
Picture 25 - QE2 “EPS LINE” ON

Wait until the screen showed on the display of ZON.E indicates the 4 icons: “pylon”, “panel”, “house”, “battery”, as shown in the following picture.



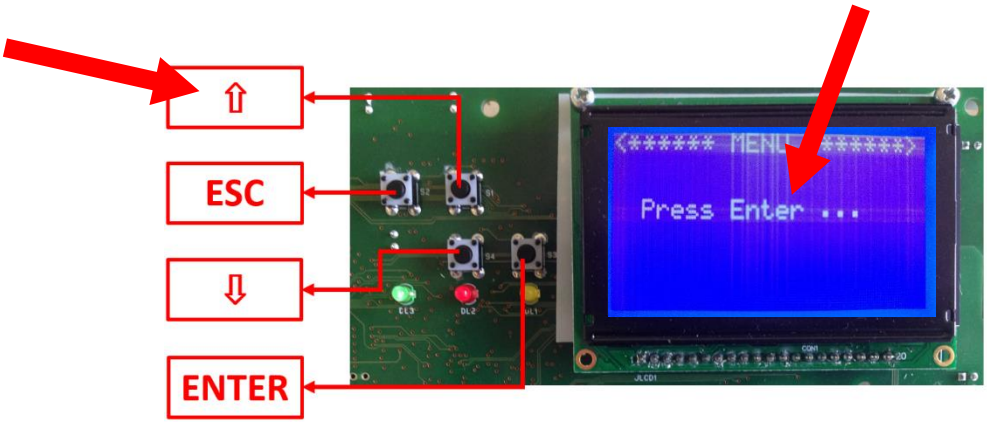
Picture 26 – Starting display

Here you can see the different screens and keys of the system



Picture 27 – Functionalities keys

To access the main menu, press twice the key "**arrow up**", then the screen "**Press enter...**" is showed, then press the "Enter" key.



Picture 28 – Access to the main menu

Picture 29 – Main menu

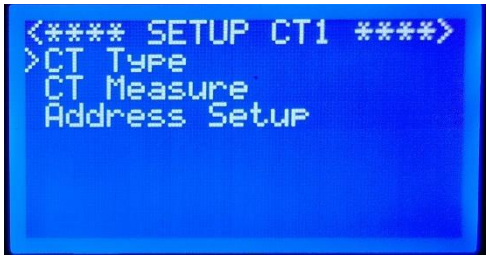
To configurate the CT (from CT1 to CT4), proceed as follows:

1. With the "**arrow up**" and "**arrow down**" keys, place the cursor next to the menu "**Inverter**" and press the "**Enter**" key (Picture 29).
2. With the "**arrow up**" and "**arrow down**" keys, place the cursor next to the menu "**External CT Setup**" and press the "**Enter**" (Picture 30).
3. With the "**arrow up**" and "**arrow down**" keys, place the cursor next to the menu "**CT1 Setup**" and press the "**Enter**" key (Picture 31).

4. With the “**arrow up**” and “**arrow down**” keys, place the cursor next to the menu “**CT Type**” and press the “**Enter**” key (Picture 32).
5. With the “**arrow up**” and “**arrow down**” keys, place the cursor next to the command “**0-Wired**” and press the “**Enter**” key (Picture 33).
6. Press the “**ESC**” key once.
7. With the “**arrow up**” and “**arrow down**” keys, place the cursor next to the menu “**CT Measure**” and press the “**Enter**” key.
8. With the “**arrow up**” and “**arrow down**” keys, place the cursor next to the command “**1-Inverter**” and press the “**Enter**” key (Picture 34).
9. Press the “**ESC**” key until you go back to the main screen with the 4 icons (Picture 26).

Picture 30 - Inverter menu: External CT Setup

Picture 31 - External CT Setup: CT1 Setup



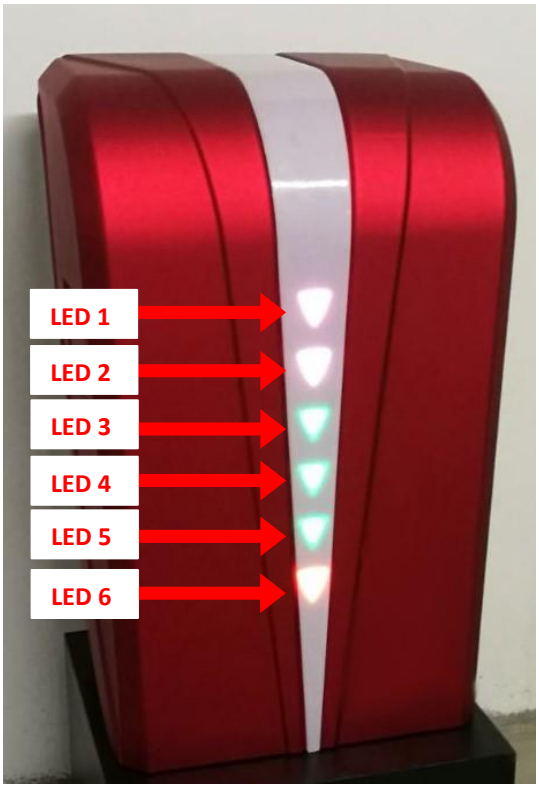
Picture 32 - CT1 Setup: CT Type

Picture 33 - CT Type: 0-Wired

Picture 34 - CT Measure: 1-Inverter

Take this configuration for the CT1, CT2 sensors (if present on the system), CT3 (if present on the plant), CT4 (if present on the plant).

3.4.2 Statuses and problems of the system (meaning of the led lights)



Picture 35 – Led lights of ZON.E

ZON.E is equipped with 6 multicolour led lights:

- N. 4 (Picture 35) of them show the quantity of energy stored in the battery:

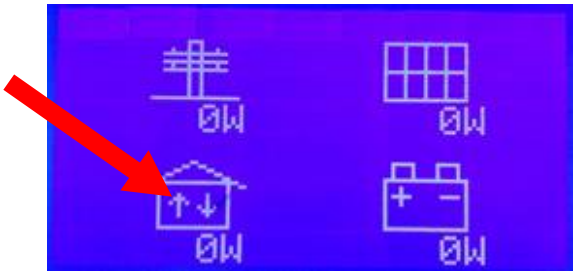
Energia Soc%	**Led 6** *(at the bottom)*	**Led 5**	**Led 4**	**Led 3**
Soc ≥ 90%	green	green	green	green
60% ≤ Soc < 90%	green	green	green	off
30% ≤ Soc < 60%	green	green	off	off
20% ≤ Soc < 30%	green	off	off	off
Soc < 20%	orange	off	off	off

- N.1 led light (Picture 35) shows the statuses of functioning:

Status	**Led 2**	**Led 1** *(at the top)*
OFF	off	off
Energy is coming from the PV panels	yellow	----
In activity	---	Light blue
Problem	---	red
Lacking grid	---	Flashing red

3.4.1 Communication of the system

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

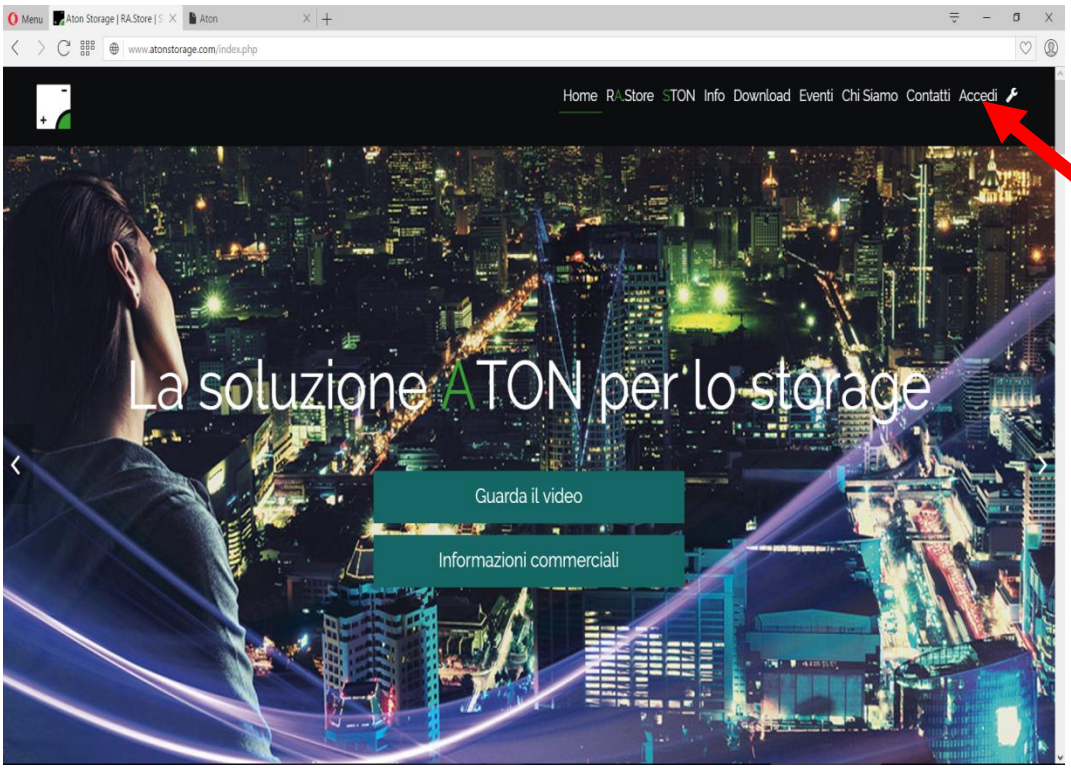


Picture 36 – Main screen

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

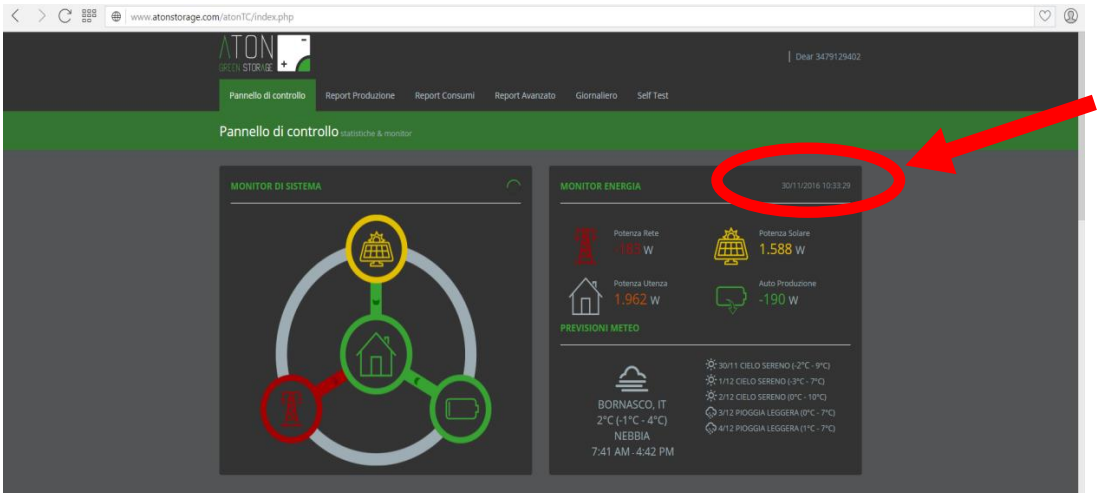
3.4.2 Communication test with Aton portal

Connect through a PC, Smartphone or tablet to the website **www.atonstorage.com,** click on the **"Accedi"** button, then insert **Username** and **Password** (created during the registration of the machine on the portal).



Picture 37 – Access to Aton web portal

Access the website with the customer credentials, then wait some minutes and check that the date of the screen updates (Picture below).



Picture 38 – Check of the correct communication

If this does not happen, contact the technical support.

3.4.3 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 Reassembly of the external panels

Place again the plastic parts previously removed and proceed to fix them by the external screws provided.

4 Replacement of a battery module

Finish the procedure of deactivation of the storage system as described in the technical Appendix “Appendix A - Switch off and on the system”.

Then start with the removal of the plastic parts, as described in the paragraph “3.3.2.1 R”.

Finish the procedure of switching off the battery modules as described in the technical Appendix “Appendix B – Switch off and on the batteries”.

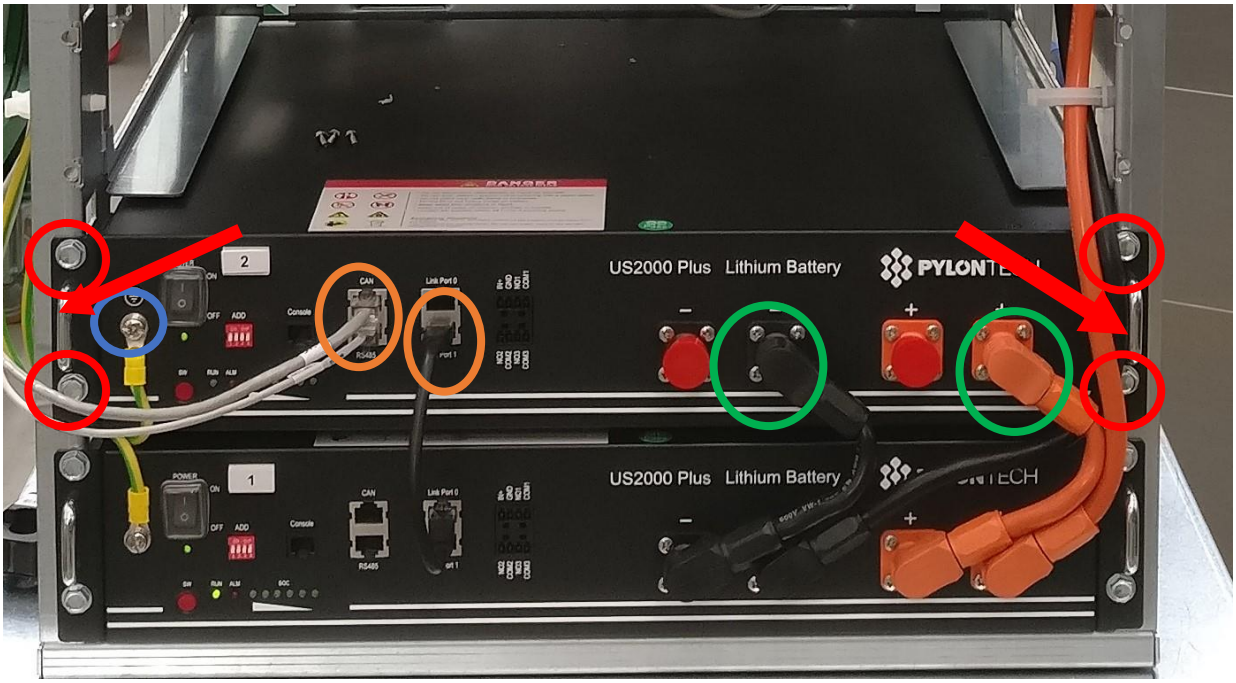
On the battery module that must be replaced, execute the following steps (Picture 39):

- Unscrew the 4 screws that keep it together with the structure (indicated with a red circle) and the screw for the equipotential bond (indicated with a blue circle);
- Disconnect all the connections regarding the “positive” and “negative” poles (indicated with a green circle);
- Disconnect all the connections regarding the data signals (indicated with a brown circle);
- Remove the battery from its slot by using the frontal handles (indicated with a red arrow);
- remove completely the battery from its slot and put it on the floor;

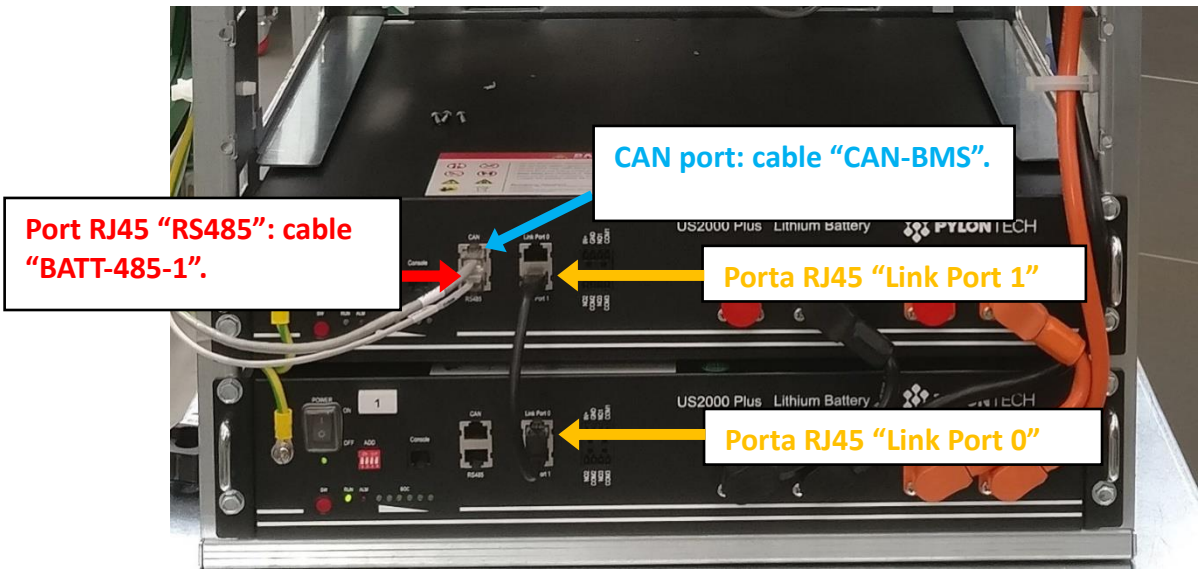
On the battery module that must be installed, execute the following steps (Picture 39):

- Put the battery module to be installed in the slot where the battery module to be replaced has already been removed
- Connect all the connections regarding the data signals (indicated with a brown circle);
- Connect all the connections regarding the “positive” and “negative” poles (indicated with a green circle);
- Screw the 4 screws that keep it together with the structure (indicated with a red circle) and the screw for the equipotential bond (indicated with a blue circle);
- Finish the procedure of switching on the battery modules as described in the technical Appendix B – Switch off and on the batteries”.
- Then place again the plastic parts in their location, as described in the paragraph “3.5 Reassembly of the external panels”

Finish the procedure of switching on the storage system as described in the technical Appendix “Appendix A - Switch off and on the system”.



Picture 39 - Replacement of battery module – Removal module fixing screws, equipotential bond screw, signal and power connections.



Picture 40 – Connections restoration: data signals cables

Picture 41 - Connections restoration: data signals cables

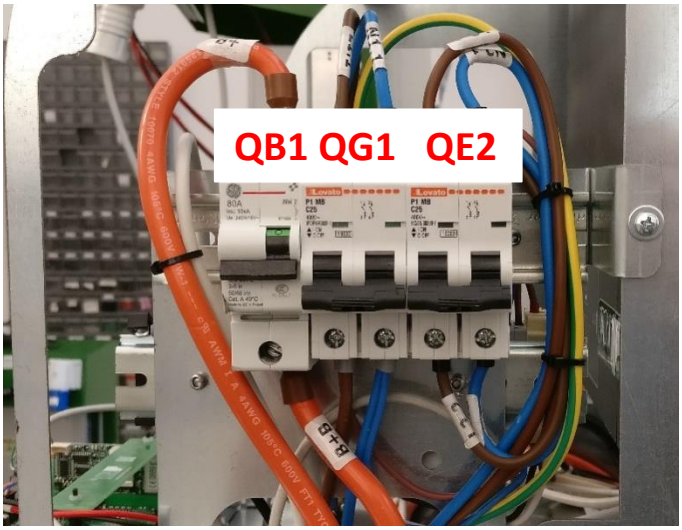
Appendix A - Switch off and on the system

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

1. *Magnetothermal breaker* **QE2 (EPS LINE)**
2. *Magnetothermal breaker* **QG1 (GRID LINE)**
3. *Magnetothermal breaker* **QB1**

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

1. *Magnetothermal breaker* **QB1**
2. *Magnetothermal breaker* **QG1 (GRID LINE)**
3. *Magnetothermal breaker* **QE2 (EPS LINE)**



Picture 42 - Electrical panel of ZON.E

Appendix B – Switch off and on the batteries

In order to switch off:

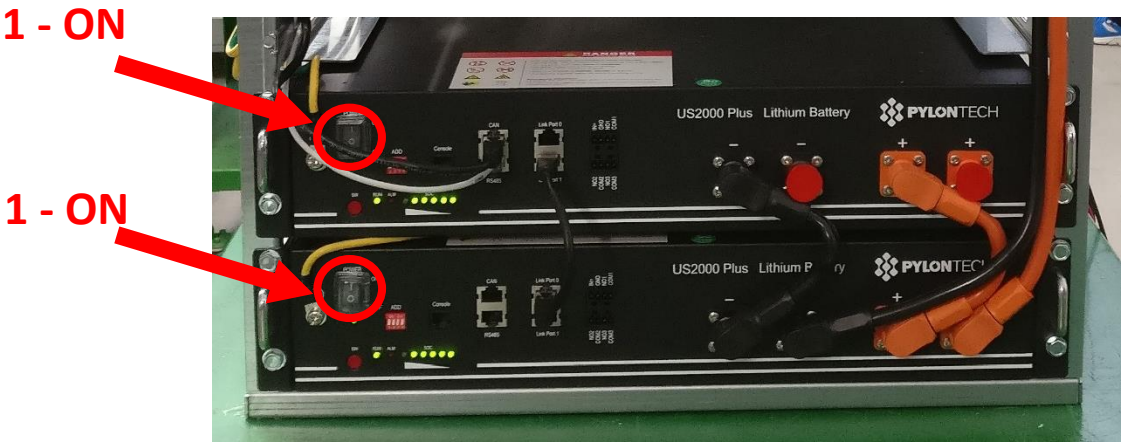
1. press once only the red button “SW” of the first battery starting from the top;
2. Put the breakers on each battery in the position “0”.

Picture 43 - Press the SW button only of the first battery at the top

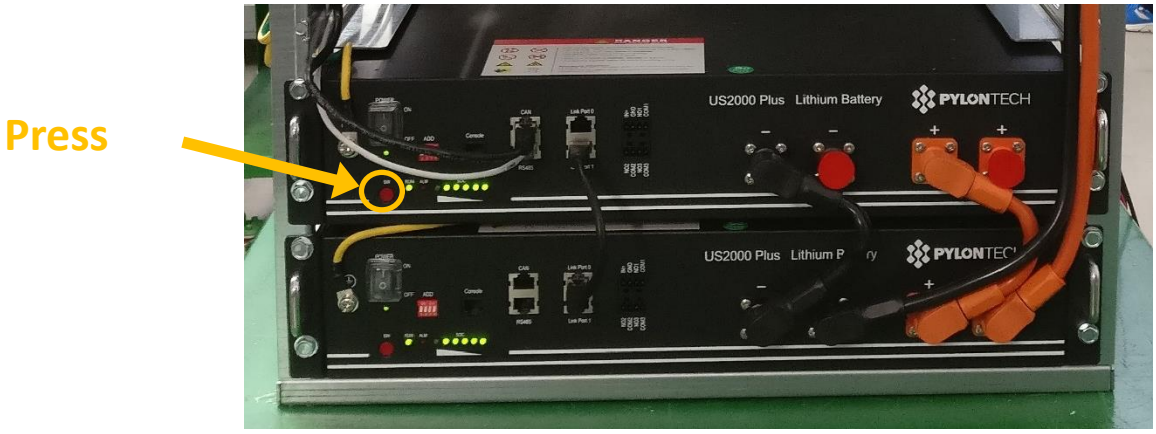
Picture 44 - Breakers “0/1” of the battery modules: put on “1”

In order to switch on the batteries:

1. place on “1” the breakers of all batteries;
2. press the red button “SW” of the first battery at the top;
3. check that all the led lights of all the batteries are switched on.



Picture 45 - Breakers “0/1” of the battery modules: put on “1”



Picture 46 – Press the red button of the first battery at the top

Picture 47 – Check that led lights of the battery modules are on

Appendix C - Technical datasheets

Model	ZN2K2.5L	ZN3K2.5L	ZN4K5L	ZN5K5L
AC Output (On-grid)				
Wave form	Sinusoidal single phase	Sinusoidal single phase	Sinusoidal single phase	Sinusoidal single phase
Nominal output power to utility grid [W] [1]	2000	3000	3680	4600
Max. output apparent power to utility grid [VA] [1]	2200	3300	4050	5100
Max. input apparent power from utility grid [VA] [1]	4000	6000	7360	9200
Rated voltage [V]	230	230	230	230
Rated frequency [Hz]	50/60	50/60	50/60	50/60
Maximum discharge current [A]	8,7	14	16	20
Maximum charge current [A]	17,4	28	32	40
Adjustable displacement factor	0,8 overexcited 0,8 underexcited	0,8 overexcited 0,8 underexcited	0,8 overexcited 0,8 underexcited	0,8 overexcited 0,8 underexcited
Total harmonic distortion (THD)	<3%	<3%	<3%	<3%
AC Output (EPS-Back up)				
Wave form	Sinusoidal single phase	Sinusoidal single phase	Sinusoidal single phase	Sinusoidal single phase
Maximum apparent power in discharge [VA][1]	2000	3000	3680	5000
Maximum apparent peak power in discharge (10 sec) [VA][1]	2400	3600	4416	5500
Rated voltage [V]	230 (+/-2%)	230 (+/-2%)	230 (+/-2%)	230 (+/-2%)
Rated frequency [Hz]	50/60 (+/- 0.2%)	50/60 (+/- 0.2%)	50/60 (+/- 0.2%)	50/60 (+/- 0.2%)
Maximum discharge current [A]	8,7	13,1	16	22,8
Total harmonic distortion (THD)	<3%	<3%	<3%	<3%
Battery				
Battery type	LiFePO4			
Rated voltage [V]	48 – 51,2			

Maximum charge current [A][1]	41,5	62,5	75	100
Maximum discharge current [A][1]	41,5	62,5	75	100
Nr. of battery modules standard configuration	1	1	2	2
Maximum permissible energy [kWh]	2,4	2,4	4,8	4,8
Usable energy [kWh]	1,92	1,92	3,84	3,84
DoD [kWh]	80%	80%	80%	80%
Minimum number of working cycles @ 25°C	4000	4000	4000	4000
Number of battery modules at maximum capacity[12]	4	4	4	4
Maximum permissible energy at maximum capacity [kWh] [1]	9,6	9,6	9,6	9,6
Efficiency				
Maximum conversion efficiency	95,5%	95,5%	95,5%	95,5%
Protections				
Anti-islanding	Yes	Yes	Yes	Yes
Overvoltage protection	Yes	Yes	Yes	Yes
Short circuit protection in output	Yes	Yes	Yes	Yes
Overtemperature protection	Yes	Yes	Yes	Yes
AC lines protection	Magneto-thermal breaker	Magneto-thermal breaker	Magneto-thermal breaker	Magneto-thermal breaker
Battery protection	Magneto-thermal breaker	Magneto-thermal breaker	Magneto-thermal breaker	Magneto-thermal breaker
General data				
Working temperature range for normal functioning [°C]	from -5 to +45	from -5 to +45	from -5 to +45	from -5 to +45
Inverter type	HF insulated	HF insulated	HF insulated	HF insulated
Relative humidity	0 % ÷ 95 %	0 % ÷ 95 %	0 % ÷ 95 %	0 % ÷ 95 %
Maximum altitude [m]	< 2000	< 2000	< 2000	< 2000

[1]Limited from BMS to 35 A for each battery module and from the rated voltage of the battery module.

[2] Expandable up to 19,2 kWh with nr. 2 modules of expansion (4 battery modules)

Cooling	Natural convection (Fanless)	Natural convection (Fanless)	Natural convection (Fanless)	Natural convection (Fanless)
Noise annoyance [dB]	< 25	< 25	< 25	< 25
Weight [kg] (standard nr. of batteries)	81	81	104	104
Dimensions [Length x width x H.] [mm]	590x485x965	590x485x965	590x485x965	590x485x965
Assembly	On the floor	On the floor	On the floor	On the floor
Protection type	IP20	IP20	IP20	IP20

Interfaces				
GPRS (standard)	2G Dual band	2G Dual band	2G Dual band	2G Dual band
WiFi (optional)	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
LAN (optional)	10/100 Mbps	10/100 Mbps	10/100 Mbps	10/100 Mbps
Wireless home automation (optional)	EnOcean 868 MHz	EnOcean 868 MHz	EnOcean 868 MHz	EnOcean 868 MHz
Certifications and Regulations				
Certifications	CE, CEI0-21/2017, VDE-AR-N4105, DIN VDE 0126-1-1/A1 VFR2014, ERDF-NOI-RES_13E			
Safety Regulations	IEC62477 & IEC62040			
EMC Compatibility	EN61000-6-1, EN61000-6-2, EN61000-6-3, EN61000-6-4			
Spare parts and accessories				
Inverter	ATZ-2K	ATZ-3K	ATZ-4K	ATZ-5K
Battery module	US2000B	US2000B	US2000B	US2000B
Control card	ATN820 + ATN823	ATN820 + ATN823	ATN820 + ATN823	ATN820 + ATN823
GPRS communication card equipped with antenna and connection cable	ATN811	ATN811	ATN811	ATN811
WiFi communication card equipped with antenna and connection cable	ATN813	ATN813	ATN813	ATN813
LAN communication card (only applicable on SLOT1 card ATN820)	ATN816	ATN816	ATN816	ATN816
Communication card RS485	AT814 + ATN105 + GD814-105	AT814 + ATN105 + GD814-105	AT814 + ATN105 + GD814-105	AT814 + ATN105 + GD814-105

Single phase power meter	C.Gavazzi EM111DINA V81XS1PFB			
Three-phase power meter	C.Gavazzi EM24DINA V93XISX	C.Gavazzi EM24DINA V93XISX	C.Gavazzi EM24DINA V93XISX	C.Gavazzi EM24DINA V93XISX
Led card	ATN821	ATN821	ATN821	ATN821
Led lights bar (led lights are not supplied)	-	-	-	-
Upper panel	-	-	-	-
Right panel	-			
Left panel	-			
Front panel	-			

Number of battery modules, nominal storage capacity and weight

Model ZON.E	Nr. of battery modules	Nominal storage capacity [kWh]	Total weight [kg]
ZN2K2.5L	1	2,5	81
ZN2K5L	2	5	104
ZN2K7.5L	3	7,5	127
ZN2K10L	4	10	150
ZN3K2.5L	1	2,5	81
ZN3K5L	2	5	104
ZN3K7.5L	3	7,5	127
ZN3K10L	4	10	150
ZN4K2.5L	1	2,5	81
ZN4K5L	2	5	104
ZN4K7.5L	3	7,5	127
ZN4K10L	4	10	150
ZN5K2.5L	1	2,5	81
ZN5K5L	2	5	104
ZN5K7.5L	3	7,5	127
ZN5K10L	4	10	150

Appendix D - Weights for the transport

	ZN2KxxL	ZN3KxxL	ZN4KxxL	ZN5KxxL
Weight of the base structure without batteries [kg]	49,5	49,5	49,5	49,5
Weight with one battery module [kg]	72,5	72,5	72,5	72,5
Weight with two battery modules [kg]	95,5	95,5	95,5	95,5
Weight with three battery modules [kg]	118,5	118,5	118,5	118,5
Weight with four battery modules [kg]	141,5	141,5	141,5	141,5