



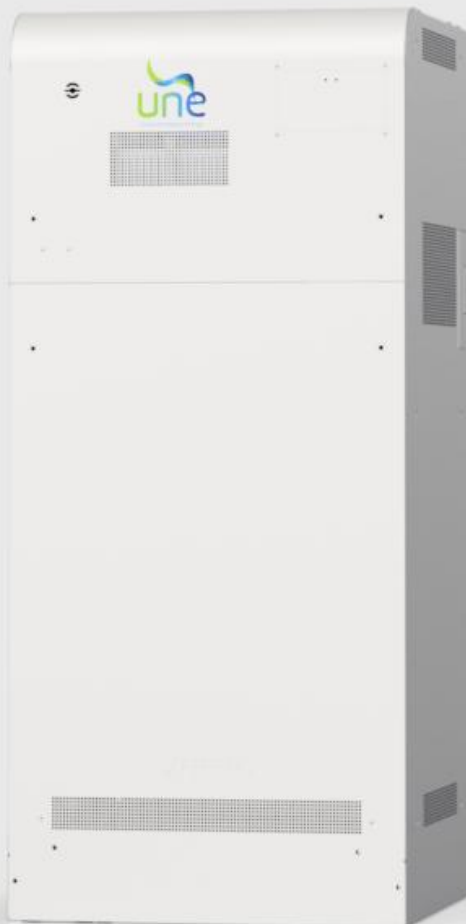
INSTALLATION AND USER MANUAL

UNE ZHERO S6

STORAGE SYSTEM INSTALLATION AND USER MANUAL

ALL-IN-ONE ZHERO S6 SINGLE-PHASE – RETROFIT – IBRIDO – OFF GRID

v 2.0



Dear customer, thank you for choosing UNE products.

Please contact us at info@unesrl.com for any information that may help us improve this manual.

Before operating on UNE ZHERO S6, please read this manual and the safety instructions carefully.

These operating instructions are intended for all installers, maintenance technicians and users of UNE ZHERO. They provide guidance for correct use of the system, so that it can operate as efficiently as possible.

These instructions are an integral part of UNE ZHERO and can be downloaded free of charge from the DOWNLOAD section of www.unesrl.com. They must therefore always be available to anyone using the equipment.

The symbols used to identify the chapters intended for the installer, maintenance technician and user are listed below:



"INSTALLER"

The chapter marked with this symbol must be read and understood by the installer of the UNE ZHERO S6 system



"MAINTENANCE"

The chapter marked with this symbol must be read and understood by the maintenance technician of the UNE ZHERO S6 system.



"USER"

The chapter marked with this symbol must be read and understood by the user of the UNE ZHERO S6 system

Summary

1.	   - GENERAL INFORMATION	8
1.1.	INTENDED AUDIENCE	8
1.2.	SCOPE OF VALIDITY	10
1.3.	TERMS OF DELIVERY AND WARRANTY	10
1.4.	SYMBOLS USED	11
1.5.	DEFINITIONS USED	13
1.6.	GENERAL INFORMATION	15
1.7.	PERSONAL PROTECTION	17
1.8.	STORAGE SYSTEM	18
1.9.	LIMITS OF THE FIELD OF APPLICATION	20
1.10.	RESIDUAL RISKS	21
2.	   - GENERAL PRODUCT OVERVIEW	22
2.1.	GENERAL DESCRIPTION	22
2.1.1.	ON-GRID SYSTEM	23
2.1.1.1.	UNE ZHERO S6 STANDARD	23
2.1.1.2.	UNE ZHERO S6 RETROFIT OR UNE ZHERO S6 HYBRID	24
2.1.2.	OFF-GRID SYSTEM	25
2.2.	BLOCK DIAGRAM	26
2.3.	NAMEPLATE OF UNE ZHERO S6	26
2.4.	TECHNICAL DATA	26
2.5.	BOX ZHERO S6	27
2.6.	SWITCH PANEL	29
2.7.	AC INPUT TERMINAL BLOCK	30
2.8.	COMMUNICATION CONNECTION	31
2.9.	PHOTOVOLTAIC CONNECTIONS	32

3.	 - OPERATIONS PRIOR TO INSTALLATION	34
3.1.	LIFTING AND TRANSPORTING	34
3.2.	TOOLS REQUIRED FOR INSTALLATION	36
3.3.	ENVIRONMENTAL AND GENERAL INSTALLATION CONDITIONS	37
3.4.	POSITIONING UNE ZHERO S6	38
3.5.	UNPACKING	39
3.6.	PRELIMINARY WORK ON ELECTRICAL CONNECTIONS	40
3.7.	DIMENSIONING THE PHOTOVOLTAIC SYSTEM	41
3.8.	STRING POLARITY CHECK	42
3.9.	MAIN SWITCH DOWNSTREAM OF THE EXCHANGE COUNTER	42
3.10.	USER ELECTRICAL SYSTEM	43
3.11.	PRELIMINARY OPERATIONS	43
3.12.	FURTHER GUIDELINES	43
3.13.	CONNECTION DIAGRAM OF UNE ZHERO S6	44
4.	 - INSTALLATION	47
4.1.	BATTERY INSTALLATION	47
4.2.	CONTROLLER DRAWER INSTALLATION	51
4.3.	CONNECTING THE PHOTOVOLTAIC SYSTEM	53
4.4.	AC CONNECTION	55
4.4.1.	CONNECTION: DISTRIBUTION GRID/ GEN-SET	55
4.4.2.	PRODUCTION METER IN-OUT CONNECTIONS (IF PROVIDED)	56
4.4.3.	BACKUP LINE CONNECTIONS (IF PROVIDED)	58
4.5.	CONNECTING THE METERS	59
4.5.1.	GAVAZZI ET112 METER	61

4.5.2.	GAVAZZI ET340 METER	66
4.5.3.	METER LOVATO DME D330 METERS	72
4.5.4.	METER FOR OFF-GRID APPLICATION	80
4.6.	INTERNET CONNECTION	81
5.	  - START-UP AND SHUTDOWN	83
5.1.	SWITCHING ON THE SYSTEM	83
5.2.	VERIFICATION WITH “ZHERO INSTALLER TOOL” SOFTWARE	84
5.3.	SHUTTING DOWN THE SYSTEM	85
6.	 - MAINTENANCE	86
7.	  - PRODUCT SERVICE	87
8.	  - REGULATORY COMPLIANCE	88
9.	   - DISPOSAL	89
10.	 - OPERATION OF THE SYSTEM	90
10.1.	TIPS FOR OPTIMAL USE	90
10.2.	SECURITY CHECKS	93
10.2.1.	INSULATION TEST	93
10.3.	ON-BOARD INV SWITCH TEST	94
10.4.	SYSTEM SUPERVISION	95
10.4.1.	WEBSERVER & WEBAPP	95
10.5.	SYSTEM WORKING STATUS	99
10.5.1.	EQUALISATION OR CYCLIC CHARGE	99
10.5.2.	SYSTEM MAINTENANCE MODE	99
10.5.3.	BATTERY WARM-UP, CHARGE AND DISCHARGE	99
2.	DEVICE IN STAND-BY	100
3.	GRID EXPORT	100

4.	BLACKOUT	100
5.	POWER RAMP	101
11.	   - FAILURE OR ANOMALY	102
11.1.	FAULT SIGNALLING	102
11.2.	IDENTIFICATION OF FAULTS OR ANOMALIES	103
11.2.1.	LOW INSULATION RESISTANCE	103
11.2.2.	STRING PRODUCTION ANOMALY	104
11.2.3.	BATTERY ANOMALY	104
11.2.4.	CONTROLLER ANOMALY	105
11.2.5.	INVERTER ANOMALY	106
11.2.6.	WEBSERVER COMMUNICATION ANOMALY	106
11.2.7.	FAILURE OF THE ON-BOARD COMBINED RESIDUAL-CURRENT AND OVERCURRENT CIRCUIT BREAKER	109
11.2.8.	FAILURE TO CONNECT TO THE DISTRIBUTION GRID / GENERATOR SET	110
12.	   - APPENDICES	111
12.1.	SYSTEM STATUS AND ALARMS TABLES	111
12.2.	PRODUCT DATASHEET	114

1. - GENERAL INFORMATION

All operators must comply with safety regulations, considering and assessing all risks to themselves and to others. The EMPLOYER is responsible for carrying out the risk assessment.

1.1. Intended audience

This manual contains important safety instructions that must be followed when using UNE ZHERO.

The original language of this document is Italian. In the event of inconsistencies, doubts or interpretation issues, please request the original document from UNE Srl.

Installation, commissioning and maintenance must only be carried out by qualified personnel.

Qualified personnel mean personnel considered suitable to work on live electrical installations in accordance with the regulations in force in the country of installation, for example personnel qualified to work on live electrical systems in the European Community, and who have received the UNE Srl authorised installer certificate for UNE ZHERO.

Personnel are authorised by UNE Srl after suitable training through online courses and after passing a final examination, through which they demonstrate their skills and knowledge of the unit structure.



ATTENTION: Access to UNE ZHERO is strictly prohibited for persons with mitral valve prostheses, pacemakers, or persons under the influence of alcohol or drugs.



ATTENTION: Anyone working on UNE ZHERO must use the protective equipment required by the laws and regulations of the country in which the system is installed.

Before commissioning UNE ZHERO, the installer and the maintenance technician shall provide the user with all the information required for correct use, including:

- **Instruction** on the hazards associated with the use of electrical equipment;
- **Instruction** on the use of a stand-alone system;
- **Instruction** on the safe use of batteries;
- **Instruction** on safe shutdown and disconnection procedures in the event of a fault;
- **Instruction** on how to secure the stand-alone system against reconnection;
- **Instruction** on maintenance and cleaning operations within the user's responsibility;
- **Knowledge of and compliance** with the operating instructions, including all safety warnings.

Additional warnings for the end user:



ATTENTION: The customer must always check that the installer is authorised by UNE Srl. Only personnel whose training has been verified may be considered experienced and reliable for the installation and maintenance of UNE ZHERO.



ATTENTION: The customer is responsible for checking the mental and physical condition of anyone approaching their UNE ZHERO system.



ATTENTION: The equipment must not be used in any way that does not comply with its intended field of application.

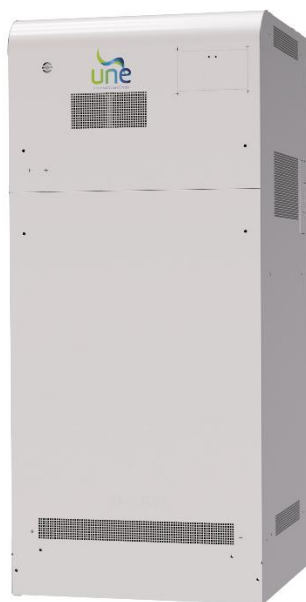


Figure 1 - UNE ZHERO S6

1.2. Scope of validity

These instructions for the installation, maintenance and use of UNE ZHERO apply to all firmware versions. The firmware version of your appliance can be consulted in your dedicated section on the site:

www.portal.zherosystem.com

or via web app in your smartphone/tablet under info.

This product may only be operated within its intended field of application, i.e., it is permitted for residential, commercial and industrial use, in **230V (Single-phase) 50 Hz TT and TN-S networks, not IT or TN-C**.

For further information and questions, please contact UNE srl via the channels indicated in the dedicated Ch. 7 .

1.3. Terms of Delivery and Warranty

The warranty conditions are described in the dedicated document supplied at the time of purchase and must be consulted. In particular, the guarantee conditions are only valid if:

- The installer and maintenance technician comply with all instructions in the manual;
- **NO unauthorised operations or operations** not in conformity with this document are performed on UNE ZHERO;
- Open-sump operations are only carried out on UNE ZHERO by **authorised personnel**;
- NO modifications are made to UNE ZHERO.

UNE srl is NOT liable for defects or malfunctions resulting from:

- **Improper use of equipment**;
- Alterations due to transport or particular environmental conditions;
- Lack of or improper maintenance;
- From tampering or precarious repairs;
- Installation or maintenance by unauthorised persons.

Furthermore, UNE srl declines all responsibility in the event of failure to comply with the regulations for correct installation in force in the country of installation.

1.4. Symbols used

Below is a list of the symbols used in this manual:



"ATTENTION".

Non-observance can be life-threatening and cause damage to the device.



"WARNING"

Failure to observe the warning may hinder an operating phase and possibly prevent optimal operation of the device.



"READ CAREFULLY"

The following usage tips can make it easier for you to use UNE ZHERO and improve its performance depending on the installation site.



"EXAMPLE"

Here you will find more practical examples.



"NOTE"

The following usage tips can make it easier for you to use UNE ZHERO S6 and improve its performance depending on the installation site.



"DANGEROUS VOLTAGE"

The highlighted information relates to parts of the converter that may operate or may still be at high voltages.



" WARM TEMPERATURE "

Some surfaces may become hot; wear appropriate personal protective equipment (PPE) when working with this product.



"DANGER OF CRUSHING "

Indicates risks of crushing hands or limbs caused by cutting or pressing parts. Danger of death!



" PROHIBITION OF ACCESS "

Indicates that unauthorised persons cannot access the system area (technical room).



REPAIRS, MAINTENANCE OR LUBRICATION CANNOT BE CARRIED OUT WITH THE SYSTEM IN OPERATION (ACTIVE).



"PROHIBITION OF USING WATER TO EXTINGUISH FIRES"

It is forbidden to use water or any other fluid to fight a fire.



"COMPULSORY READING OF INSTRUCTIONS"

Anyone intending to use the system must read this manual and become familiar with all the controls and equipment.



"SYSTEM OPERATING RANGE"

This symbol indicates the operating range.



" WAITING TIME"

Wait a certain period of time before taking the indicated action.

IP20

"DEGREE OF PROTECTION"

Indicates the degree of protection provided by mechanical and electrical enclosures against the intrusion of solid particles and access of liquids.



" AC POWER SUPPLY"

Indicates that a circuit must be AC.



"CLASS II DEVICE"

Class II devices do not require one of the two poles to be earthed.



" GROUNDING "

Identifies an earthing terminal.



"NON-ORDINARY WASTE"



"ELECTRONIC WASTE"

1.5. Definitions used

The following list includes the definitions used in this manual:

ELECTRICAL DEVICE

Device that absorbs electrical energy during its normal operation.

EXTRAORDINARY MAINTENANCE

Intervention carried out to restore the system following performance degradation or malfunction.

BMS

Battery Management System – Battery control system.

PHOTOVOLTAIC MODULE

A photovoltaic module is a device capable of converting incident solar energy into electrical energy through the photovoltaic effect.

DIRECT CURRENT

Type of current produced by the photovoltaic modules and use by the batteries.

MPPT

Maximum Power Point Tracker. Algorithm that optimises the energy input from the photovoltaic modules by adapting the generator to the load, so that the operating point corresponds to the maximum power point.

ALTERNATING CURRENT

Type of current supplied by the inverter and used in single-phase and three-phase electrical grid.

PARALLEL CONNECTION TO THE GRID

Condition in which a system can feed the energy it produces into the local grid operator's network.

DEALER

Your UNE ZHERO supplier.

AVAILABLE POWER

Amount of power the system can supply simultaneously.

FIRMWARE

Firmware is a program, i.e. a sequence of instructions, integrated directly into an electronic component in the broadest sense of the term.

SPD

Surge Protective Device - Overvoltage protection.

INSTALLER

Person who, after suitable training, operates on UNE ZHERO with competence and expertise.

STAND BY

Operating condition in which electrical/electronic devices are not active but are ready to switch from temporary inactivity to operating mode.

UTILITY EXCHANGE METER

Bidirectional energy meter installed by the electricity service provider, capable of measuring the energy imported from and exported to the grid.

UTILITY PRODUCTION METER

Bidirectional energy meter installed by the electricity service provider, capable of measuring the energy produced by the photovoltaic system.

(ZHERO) EXCHANGE METER

Bidirectional energy meter supplied by UNE, capable of measuring the energy imported from and exported to the grid.

(ZHERO) PRODUCTION METER

Bidirectional energy meter supplied by UNE, capable of measuring the energy produced by the photovoltaic system and exchanged with the grid..

INVERTER

An inverter is an electronic device capable of converting direct current into alternating current.

USER

Person who uses the services provided by UNE ZHERO.

IRRADIATION

In thermodynamics and electromagnetism, irradiation refers to the transfer of energy between two bodies by means of electromagnetic waves, such as sunlight incident on photovoltaic modules.

BACKUP

Function that, in the event of a blackout on the distribution grid, allows the selected important loads connected to the backup line to remain powered.

LED

In electronics, a light-emitting diode, or LED, is an optoelectronic device that exploits the optical properties of certain semiconductor materials to produce light.

WORKING MODE

Operating mode of UNE ZHERO. Depending on how the system is programmed, it may operate in Off-Grid mode or On-Grid mode, with or without backup.

$I_{\Delta n}$

Residual current at which the residual current circuit breaker trips.

PROTECTION INTERFACE

System used to disconnect the photovoltaic system in the event of grid anomalies, for example SPI or NS protection.

PHOTOVOLTAIC GENERATOR

Set of photovoltaic modules which, when properly connected, supplies energy to your system..

RETROFIT

Installation of a storage system within the electrical installation, capable of charging its batteries from a pre-existing external photovoltaic generator.

LOCAL GRID OPERATOR

The local grid operator is the legal entity responsible for operating the electricity grid at the installation site.

STAND-ALONE SYSTEM

System that is completely independent from the public grid for supplying energy to the user and is not connected in parallel with the local grid operator's electricity network.

GRID-CONNECTED SYSTEM

Traditional photovoltaic system connected in parallel with the local grid operator's electricity network.

ROUTINE MAINTENANCE

System inspection carried out to verify its integrity, with possible intervention to restore its operating condition and performance to the original level.

The safety warnings included in these instructions must always be observed. Failure to comply may result in damage to the equipment and danger to persons and property.

Read the safety warnings carefully before operating the system.

1.6. General information

The **UNE ZHERO S6 installer** must bear in mind the following warnings:



ATTENTION: Always keep the safety warnings and manuals supplied with the UNE ZHERO at hand.



ATTENTION: UNE srl declines all responsibility in the event of failure to comply with the rules for correct installation and is not liable for the proper execution of the systems upstream or downstream of the equipment supplied by it.



ATTENTION: For obvious reasons it is not possible to foresee the variability of installations and environments in which the equipment might be installed; the customer must advise the authorised installer of particular installation conditions.



ATTENTION: If malfunctions are found during installation or daily use, it is absolutely forbidden to use the product.



ATTENTION: Installation under environmental conditions other than those indicated in the chap 3.3.

The UNE ZHERO S6 maintenance technician must bear in mind the following warnings:



ATTENTION: UNE srl disclaims all liability in the event of failure to comply with the rules for proper maintenance and is not liable for the proper maintenance of systems upstream or downstream of the equipment it supplies.



ATTENTION: It is necessary for the customer to notify the maintainer of particular problems or anomalies it has encountered during its use.



ATTENTION: For cleaning, DO NOT use corrosive products that damage parts of the equipment and products that generate electrostatic charges.



ATTENTION: In the event of malfunctions, it is forbidden to use the product during maintenance until it has been fully restored.

The user of UNE ZHERO S6 should bear in mind the following warnings:



ATTENTION: In the event of fire, use CO2 extinguishers and use personal protection suitable for enclosed spaces.



ATTENTION: Operations on UNE ZHERO "open crankcase" may only be carried out by authorised personnel.



ATTENTION: Once the final positioning has been carried out by the installer, it is absolutely forbidden for the user to move and/or reposition it, even for short distances. If necessary, repositioning may only be carried out by authorised personnel.



ATTENTION: UNE srl has designed the product in such a way as to eliminate sharp edges and cutting parts wherever possible. This is not possible with all UNE ZHERO components and points; therefore the authorised installer must wear clothing and personal equipment in compliance with the regulations in the country of installation.



ATTENTION: The installer and/or maintenance technician must always pay attention to the environment in which they work, verifying that the minimum illuminance conditions necessary for correct vision in the system are in place.



ATTENTION: The installer and/or maintenance technician must always check that there is adequate space to guarantee the escape route.

1.7. Personal Protection

The assessment of risks to workers' health and safety carried out in the workplace or on any of the equipment used, as well as the assessment of residual risks affecting the system, as described in this manual, enables the EMPLOYER to assess the need to provide workers with the most suitable and appropriate **Personal Protective Equipment (PPE)**.



ATTENTION: In the event of fire, use CO2 extinguishers and use personal protection suitable for enclosed spaces.



ATTENTION: Maintenance work is to be carried out with the equipment disconnected from the grid, the photovoltaic generator and with the machine switched off, access to the system is only permitted 20 minutes after the power has been removed.



ATTENTION: Operations on UNE ZHERO "open crankcase" may only be carried out by authorised personnel.



ATTENTION: Once the final positioning has been carried out by the installer, it is absolutely forbidden for the user to move and/or reposition it, even for short distances. If necessary, repositioning may only be carried out by authorised personnel.



ATTENTION: The installer and/or maintenance technician must always pay attention to the environment in which they work, verifying that the minimum illuminance conditions necessary for correct vision in the system are in place.



ATTENTION: The installer and/or maintenance technician must always check that there is adequate space to guarantee the escape route.

1.8. Storage system

Dangerous currents and voltages are present inside UNE ZHERO.

Complete protection against contact can only be achieved by observing the instructions for use and:

- the appliance is **correctly assembled**;
- all **connections have been made according to the rules of the art** and following the instructions in this manual;
- the appliance is **correctly earthed** in relation to the place of installation and in accordance with the regulations in force;
- all **enclosures are correctly closed**;
- If you suspect the presence of a **fault**, contact the supplier/installer of the system directly.



ATTENTION: The installer must always report the presence of anomalies or deterioration due, for example, to wear and tear or ageing so that the initial conditions can be restored.



ATTENTION: UNE ZHERO is NOT designed for the supply of vital medical equipment.



ATTENTION: UNE ZHERO must not be used in installations where a power failure could cause personal injury.



ATTENTION: open crankcase operations must be carried out with the system switched off.



ATTENTION: It is strictly forbidden to install the system where there are obvious traces of tampering and integrity of the original packaging. Installation will result in the definitive loss of the warranty.



WARNING: in the event that the system is delivered damaged, you must either not collect the system or sign it with reservation by immediately notifying UNE, otherwise the damage will not be covered by warranty.

The battery may present a risk of high short-circuit current; the following precautions must be observed when working with batteries.



ATTENTION: it is strictly forbidden to open the battery in any of its parts; moreover, if it is at operating temperature ($>260^{\circ}\text{C}$), opening it may pose a burn hazard.



ATTENTION: even if the battery poses no risk of explosion or fire, it is strictly forbidden to violate its integrity in any way.

The Galvanic Transformer

Physically housed inside UNE ZHERO provides BASIC isolation from the mains supply.

The Residual Current Detection

or RCD is guaranteed by the isolation control with which UNE ZHERO is equipped and which is visible in the disconnecter panel at the top right, in the event of activation of the alarm the **inverter can still continue to operate safely**; however, you must contact your installer to check the cause of this signalling. **The isolation resistance is set at 50 k Ω** . The system immediately warns of this by flashing the operation light, as well as signalling via e-mail the user and installer who registered on the webserver when the device was associated with their account.



ATTENTION: UNE ZHERO must be installed with all the necessary precautions to make it suitable for the place of installation, in compliance with all local regulations and the rule of art.



ATTENTION: It is not possible to protect the user installation with UNE ZHERO's internal protections as they are not suitable. The user's electrical installation must be protected by appropriate equipment in accordance with local regulations.



ATTENTION: even if the battery has a maximum operating voltage of no more than 60V, it is still mandatory to ensure that it is switched off before performing any operation on it.



ATTENTION: It is forbidden to use the equipment in a way that does not comply with the field of application.



ATTENTION: In order to parallel the system with the local distributor's electricity grid, it is necessary to complete the technical and bureaucratic procedures required by the regulations in force in the country of installation.

1.9. Limits of the field of application

UNE ZHERO S6 is a complete intelligent power generation-storage-management system capable of working in different configurations depending on the user's needs, these configurations are shown in the chap 2.1.

The goal is to achieve the customer's energy independence, to be pursued through the production of energy from renewable sources, storage of this and intelligent management to enable conscious and efficient use. **UNE ZHERO is to be used in residential, commercial and industrial 230V (single-phase) - 50 Hz TT and TN-S networks, not IT or TN-C.**

UNE ZHERO is able to take the direct current from a correctly sized photovoltaic system, store it internally and transform it, when needed, into alternating current suitable for use by the user.

Any other use is considered unsuitable or dangerous.

In addition:

- **UNE ZHERO** cannot be used with photovoltaic modules which require one of the poles to be earthed;
- External batteries which have not been authorised by UNE srl cannot be connected to the system;
- **UNE ZHERO** can only be used in compliance with all the technical characteristics given in the technical data sheet;
- **UNE ZHERO** can only be used indoors where IP20 equipment is suitable, installation in adverse or unsuitable environmental conditions is prohibited;
- **Installation in places with a risk of fire or explosion risk is prohibited;**
- **Installation in places with particular flammable conditions** is forbidden;
- **It is forbidden** to deposit materials, particularly if flammable and/or explosive, in the vicinity of UNE ZHERO;
- **It is forbidden** to connect equipment outside the indicated limits of use;
- **It is forbidden** to use the equipment with the safety devices absent, not working or disabled;
- **It is forbidden** to use the protections incorporated in UNE ZHERO as the primary protection of the user installation;
- **It is forbidden** to use UNE ZHERO without having made the necessary connections to earth;
- **It is forbidden** to modify the working parameters of UNE ZHERO, particularly for On-Grid systems any variation must be agreed with the local distributor in compliance with the law;
- **It is forbidden** to use corrosive products or products which generate electrostatic charges for cleaning;
- **It is forbidden** to use the equipment without having read and understood the contents of the manuals;
- **It is forbidden** to obstruct the ventilation system;
- **It is forbidden** to use UNE ZHERO as a UPS as it is not certified for this use;
- **It is forbidden** to use UNE ZHERO to supply vital medical equipment;
- The system is certified **PD II (indoor, conditioned)**, this means that the installation environment must be dry and free of condensation.

Please contact your supplier for more information.

1.10. Residual risks

Despite efforts to make the system secure, there are still residual risks that cannot be eliminated:

Mechanical hazards

Such as loss of stability, crushing, investment is minimised if handling and transport are carried out in accordance with the instructions in this manual and by performing a professional installation.

Electrical hazards

such as electrocution, contact with live parts, burns, etc. are minimised if installations are carried out according to the instructions in this manual and by performing a professional installation.

Thermal hazards

Such things as burns, scalds, overheating are reduced to a minimum if installations are carried out according to the instructions in this manual and by performing a professional installation.

Other environmental hazards

They are reduced to a minimum if installations are carried out according to the instructions in this manual and carried out in a workmanlike manner.



ATTENTION: Verify the adequacy and safety of the user's electrical installation.



ATTENTION: During the day, the photovoltaic generator by its nature always remains live even after disconnecting the system.

If, during the course of the work, the **maintenance technician** discovers **obvious safety deficiencies** whose removal is outside his remit (e.g. obstructions to ventilation, changes to external UNE ZHERO installations which could lead to serious risks to people's safety), these **must be reported** in writing, pointing out the need to **eliminate them**.

2. - GENERAL PRODUCT OVERVIEW

2.1. General description

UNE ZHERO is a complete system whose objective is to help the customer achieve energy independence through the production of energy from renewable sources, the storage of this energy and intelligent management that enables conscious and efficient use.

Once correctly sized and installed according to the user needs, UNE ZHERO supplies the energy required to power the user electrical loads.

UNE ZHERO S6 can operate in different modes according to customer requirements and the installation site. Some operating modes may not be available in some countries. The external structure remains unchanged, while internally the system can be configured in four types:



Figure 2 - UNE ZHERO S6 product view

FUNCTIONALITY	STANDARD	RETROFIT	HYBRID	OFF-GRID
Line covered by backup	✓	✓	✓	✓
Line not covered by backup	✓	✓	✓	
Internal photovoltaic controllers	✓		✓	✓
External inverter		*	*	
UNE internal inverter	✓	✓	✓	✓
Exchange Meter	✓	✓	✓	
Production Meter		✓	✓	
Gen-Set connection				✓
Grid connection	✓	✓	✓	

LEGEND

DESCRIPTION

- +  The functionality **IS REQUIRED** in the product corresponding to its column;
- + The functionality **IS NOT PROVIDED** in the product corresponding to its column;
- + * The feature allows the energy produced by this device to be stored.

2.1.1. On-Grid System

There are three possible ON-GRID configurations: **Standard**, **Retrofit** and **Hybrid**.

2.1.1.1. UNE ZHERO S6 Standard

The UNE ZHERO S6 **Standard** system operates in parallel with the existing distribution grid to which the user is connected, making the user an active user.

Since the system operates in parallel, the power available to the user is the sum of the energy provided by UNE ZHERO, which varies according to photovoltaic and battery availability up to a **maximum of 6 kW**, and the power made available to the user by the distributor.

The system is designed to supply energy to the loads from the following sources, in the order indicated:

1. **photovoltaic energy, when available;**
2. **battery energy, when available;**
3. **distribution grid energy when the previous sources are not sufficient.**

In normal operation, the system attempts to **supply the loads using photovoltaic energy**. If this is absent or insufficient, the battery compensates. When the sum of these sources is insufficient, the remaining energy is supplied by the distribution grid, if available and not disconnected.

The battery charges according to its own charge curve. Photovoltaic surplus may therefore be fed into the grid even if the battery has not yet reached 100% charge. The optimal way to store the energy produced is over several hours with medium irradiance rather than over short periods with high production peaks.

Once the stored energy has been depleted, and in the absence of photovoltaic production, the home is fully supplied by the distribution grid until the batteries return to a sufficient charge level to resume energy delivery.

When the battery reaches its **minimum charge value** (default **20%**), energy delivery from the battery is interrupted and transferred to the distribution grid. Unless the system is in *equalisation/cyclic charge*, it resumes energy delivery only after reaching a charge level 5% higher than the minimum charge value (25%).

In UNE ZHERO S6 Standard, grid export can be enabled in accordance with the local regulations of each country. The system can therefore feed surplus energy produced by the photovoltaic system into the grid.

The backup line function supplies energy to the user in the event of blackout or absence of the distribution grid, only for the priority loads connected to the backup line. Do not connect the entire home to the backup line; only **important loads should be connected**. In this specific condition, the minimum battery charge value is **reduced to 10%**.

This function **must not be considered equivalent to a UPS**, because UNE ZHERO is not certified as a UPS but as a storage system with backup function. In addition, it does not filter or stabilise the distribution grid.

Carefully check that the loads connected downstream of UNE ZHERO can tolerate possible service interruptions or can be supplied directly by the distribution grid voltage, which is not filtered. UNE srl accepts no responsibility for the quality of the grid supply to the loads.



ATTENTION: If an interface protection device is present, brief interruptions caused by it may also occur on the “backup” line.



WARNING: : In backup operating mode, the use of particularly energy-intensive equipment may cause system malfunction or increase operating costs. Contact your supplier to verify the suitability of specific equipment

2.1.1.2. UNE ZHERO S6 Retrofit or UNE ZHERO S6 Hybrid

The UNE ZHERO S6 **Retrofit** or **Hybrid** system operates in parallel with the existing distribution grid where a photovoltaic system is already in operation. Since it does not provide additional energy export to the national electricity grid, the export power already present in the production system is not modified in any way.

Retrofit: the system is connected downstream of a pre-existing photovoltaic system equipped with an independent grid inverter, **external** to the ZHERO system, from which it charges the system batteries.

Hybrid: the system is connected both to a **pre-existing** photovoltaic system equipped with an independent inverter, **external** to the ZHERO system, and to photovoltaic modules managed directly through **MPPT controllers inside the ZHERO system**. Both photovoltaic productions, internal and external to the ZHERO system, allow the system batteries to be charged.

The photovoltaic production system internal to ZHERO, and therefore controlled directly by the internal MPPT controllers, has the sole function of supplying the connected loads and charging the system batteries. It does not contribute to export to the distribution grid and therefore is not added to the pre-existing external production system.

In both configurations, the system is designed to supply energy only to the user loads and never to the national electricity grid, from the following sources in the order indicated:

4. **photovoltaic energy**, consisting of production from the external system and, only in the Hybrid configuration, from the modules connected to the internal MPPT controllers;
5. **battery energy**, when available;
6. **distribution grid energy**, when available.

In normal operation, the system attempts to supply the loads using photovoltaic energy. In the Hybrid configuration, this is the sum of production external and internal to the ZHERO system. If this energy is absent or insufficient, the battery compensates. When the sum of these sources is insufficient, the remaining energy is supplied by the distribution grid, if available.

The battery charges according to its own charge curve. Photovoltaic surplus may therefore be fed into the grid by the external photovoltaic system even if the battery has not yet reached 100% charge.

Once the stored energy has been depleted, reaching the minimum charge value, the loads are supplied by the distribution grid, in the absence of photovoltaic production, until the batteries return to a sufficient charge level to resume energy delivery.

When the battery reaches its **minimum charge value (default 20%)**, energy delivery from the battery is interrupted and transferred to the distribution grid. Unless the system is in cyclic equalisation, see Chapter 10.4.1, it resumes energy delivery only after reaching a charge level 5% higher than the minimum charge value (25%).

In both configurations, **grid export mode cannot be enabled on ZHERO**. Any export is managed independently by the external photovoltaic inverter, if already configured for this purpose.

The backup function supplies energy to the user in the event of blackout or absence of the distribution grid, only for the priority loads connected to the backup line if provided. In this specific condition, the minimum battery charge value is **reduced to 10%**.

This function must not be considered equivalent to a UPS, because UNE ZHERO is not certified as a UPS but as a storage system with backup function. In addition, it does not filter or stabilise the distribution grid.

Carefully check that the loads connected downstream of UNE ZHERO can tolerate possible service interruptions or can be supplied directly by the distribution grid voltage, which is not filtered. UNE srl accepts no responsibility for the quality of the grid supply to the loads.



ATTENTION: Before installing the system in Retrofit or Hybrid mode, it is mandatory to verify that the system configuration complies with the regulations in force at the installation site. UNE declines all responsibility for unauthorised configurations.

2.1.2. Off-Grid System

UNE ZHERO S6 OFF-GRID operates independently of any external grid, creates **its own grid** and supplies the loads relying only on it.

Since there is no other grid in parallel, the power available to the user is only the power provided by UNE ZHERO S6, which varies according to photovoltaic and battery availability, up to a **maximum of 6 kVA**.

If the system exhausts the energy available, it automatically enables an emergency source such as a generator, if connected, or a distribution grid, if connected and allowed by local regulations.

When the battery reaches its **minimum charge value (default 20%)**, energy delivery from the battery is interrupted and transferred to the distribution grid or emergency source. Unless the system is in equalisation/cyclic charge, it resumes energy delivery only after reaching a charge level 5% higher than the minimum charge value (25%). In the UNE ZHERO S6 OFF-GRID system, the lowest possible minimum charge value is **10%** in the absence of an emergency source, after which the battery is switched off.

Different system operating configurations are available:

- Mode 1: **battery charger** operation whenever the manually activated emergency source is detected;
- Mode 2: **continuous connection** to the emergency source, therefore source always active, but charging only when the configured minimum battery charge threshold is reached;
- Mode 3: **automatic activation** of the emergency source only when the configured minimum battery charge threshold is reached. This configuration must be requested at the time of purchase; the source is therefore not always active as in Mode 2.

The system can be customised, even after installation, by modifying:

- minimum charge level;
- number of batteries;
- number of controllers;
- cyclic charge check frequency;
- enabling connection to the distribution grid (bureaucratic procedures and request management not included);
- other minor settings.

Advice

NOTE: Read Chapter 10.1 carefully and follow the recommendations closely to optimise system use.

2.2. Block diagram

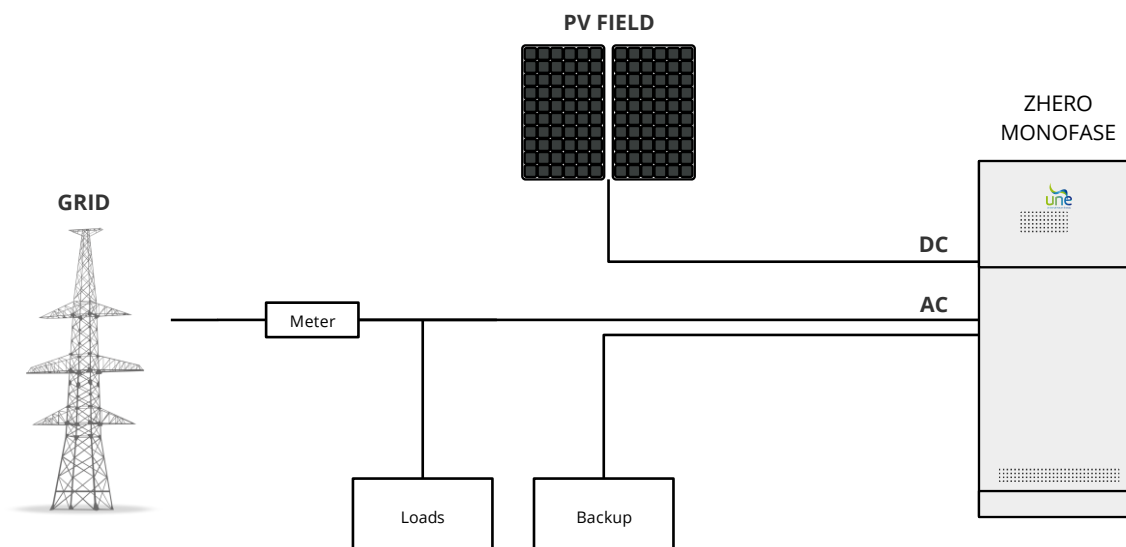


Figure 3 - Block diagram of UNE ZHERO S6

2.3. Nameplate of UNE ZHERO S6

Below is an example of a label that can be detected on the UNE ZHERO S6 system

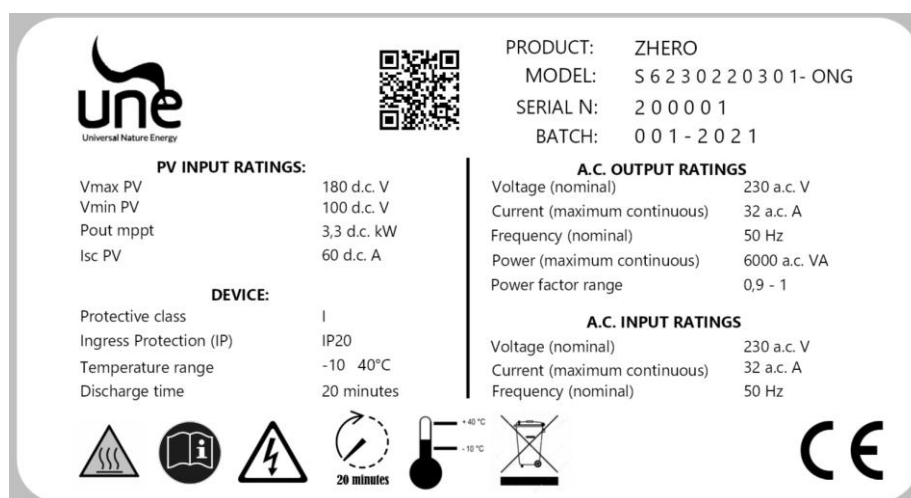


Figure 4 - UNE ZHERO S6 nameplate

2.4. Technical Data

The technical data of UNE ZHERO can be found in the datasheet in Ch. 0.

2.5. BOX ZHERO S6

BOX closed

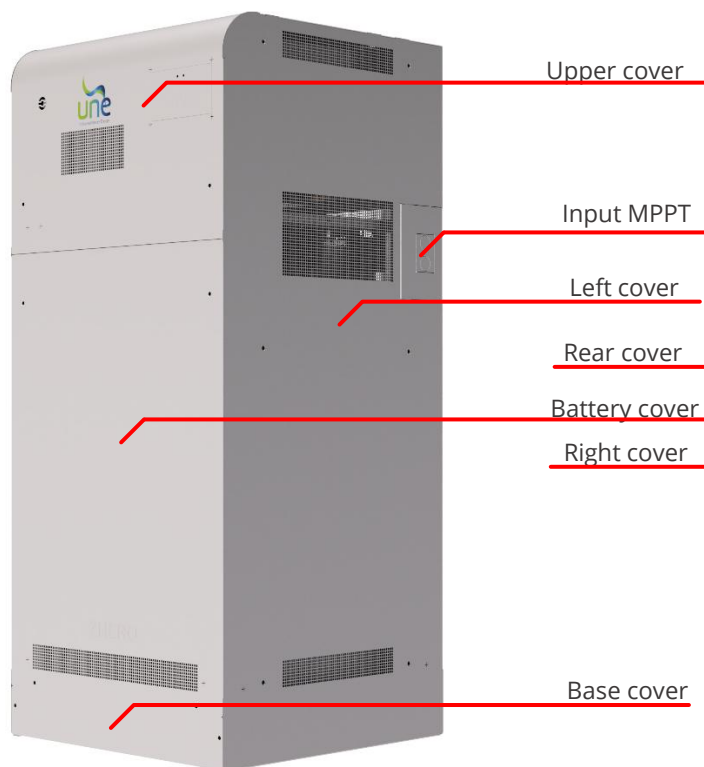


Figure 5 - Front view of battery box

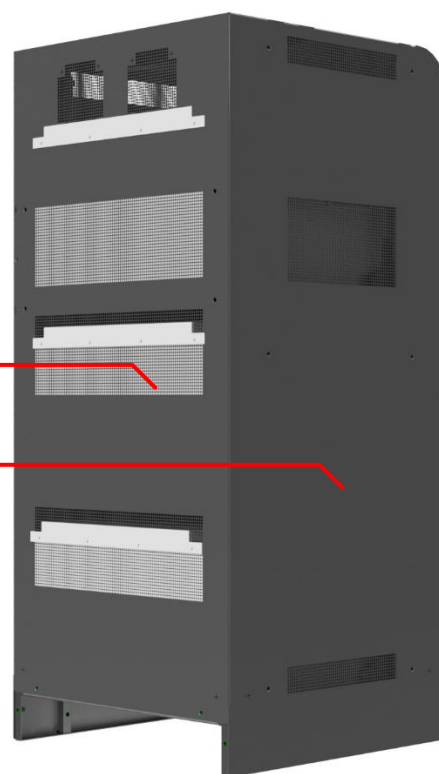


Figure 6 - Rear view of battery box

The following is a legend of the components:

LEGEND	DESCRIPTION
+ Top cover	Upper cover protecting the inverter compartment; it can be removed.
+ MPPT Input	Input for the strings coming from the photovoltaic system.;
+ Left cover	Left side cover of the battery box. It may only be removed during installation;
+ Rear cover	Rear cover of the system. It must never be removed);
+ Battery cover	Front left cover of the battery box. It may only be removed during installation;
+ Right cover	Right side cover of the battery box. It may only be removed during installation;
+ Base cover	Cover panel of the system base.

Opened box

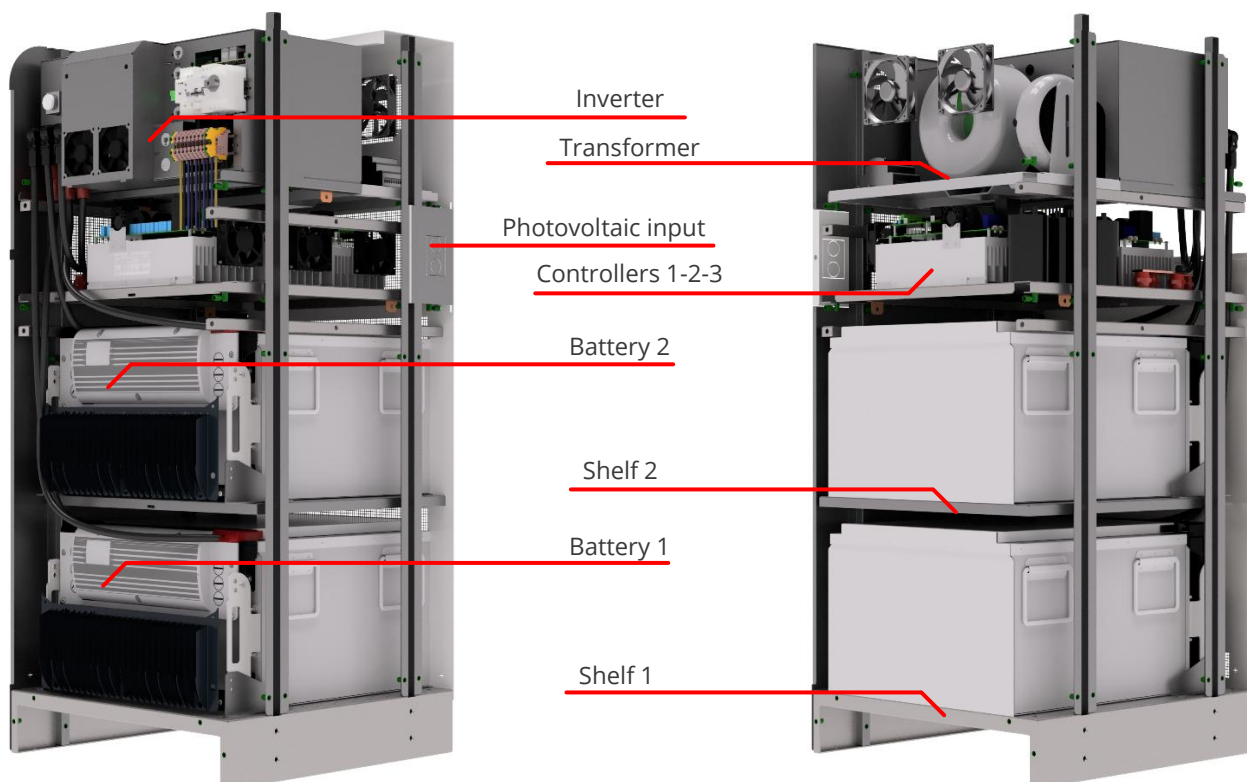


Figure 7 – Front view of the open battery box

Figure 8 – Rear view of the open battery box

Below is the component legend:

LEGEND	DESCRIPTION
+ Inverter	Inverter for battery management and grid exchange;
+ Photovoltaics	Input for photovoltaic system;
+ Battery 2	Second battery module;
+ Shelf 2	Main battery shelf;
+ Battery 1	Main battery module;
+ Shelf 1	Base shelf supporting the main battery;
+ Controllers 1-2-3	Charge controllers with MPPT technology;
+ Transformer	Toroidal transformer with inductor.

2.6. Switch Panel

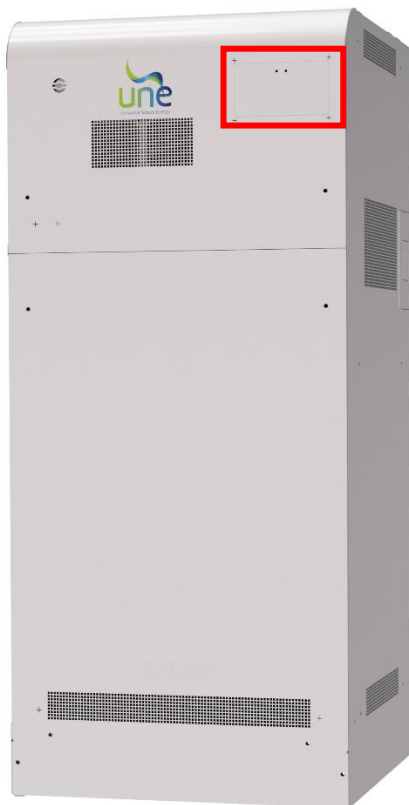


Figure 9 – Metal plate position

The UNE ZHERO S6 switch panel of the ZHERO system accessible by removing the metal plate at the front of the system.

The position of the UNE ZHERO S6 switch panel is located where indicated by the figure opposite.

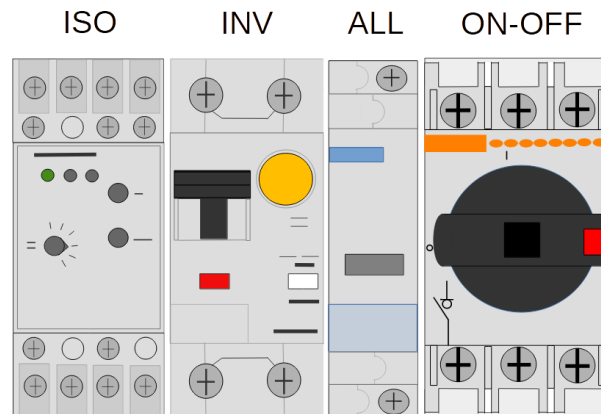


Figure 10 – UNE ZHERO S6 electrical modules

LEGEND	DESCRIPTION
+ ISO	DC insulation monitoring device;
+ INV	Residual-current circuit breaker at the inverter output (RCBO). It does not interrupt the user loads, but stops power supply from the battery + photovoltaic source;
+ ALL	Alarm button: allows the reset of a system alarm signalled by the red alarm light;
+ ON - OFF	This disconnecter allows the system to be switched on or off.

2.7. AC Input Terminal Block

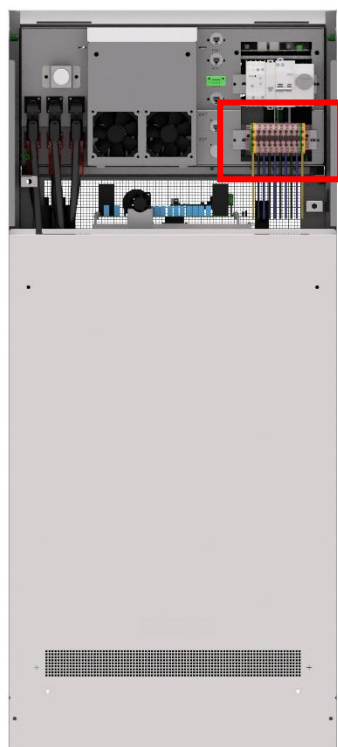


Figure 11 - Position of AC input terminal blocks

Below is the legend of the AC connections allocated in the upper part of the BOX Inverter.

The position of the UNE ZHERO S6 switch panel is located where indicated by the figure opposite.

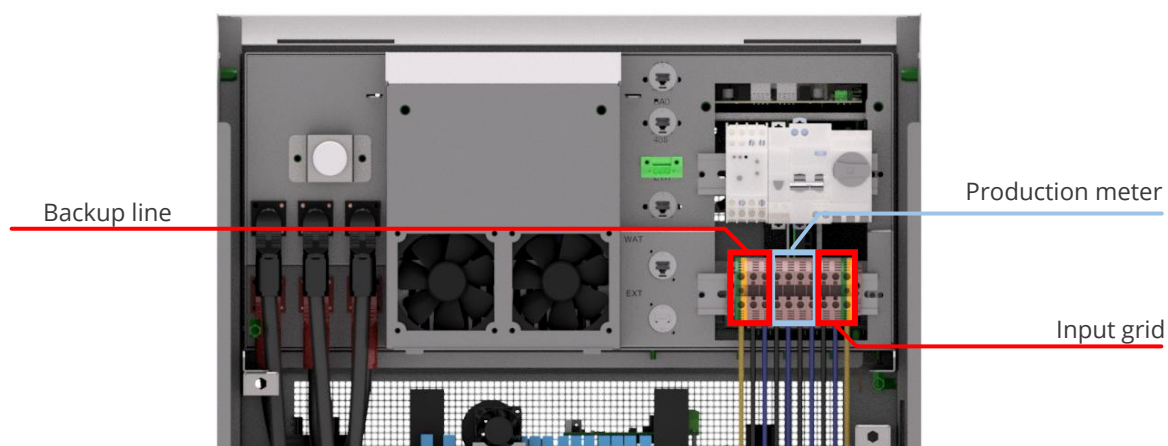


Figure 12 - Front view of the UNE ZHERO S6 system showing AC connections

LEGEND	DESCRIPTION
+ Backup line	Terminal block for connecting the backup line output from the system;
+ Production meter	Terminal block for connection to the production meter;
+ Grid input	Terminal block for connecting the electricity grid from the utility exchange meter.

2.8. Communication Connection

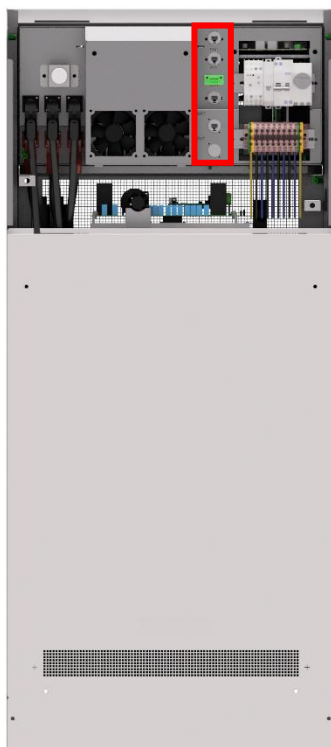


Figure 13 – Signals input position

The UNE ZHERO S6 communication connections are shown below.

The position of the UNE ZHERO S6 switch panel is located where indicated by the figure opposite.

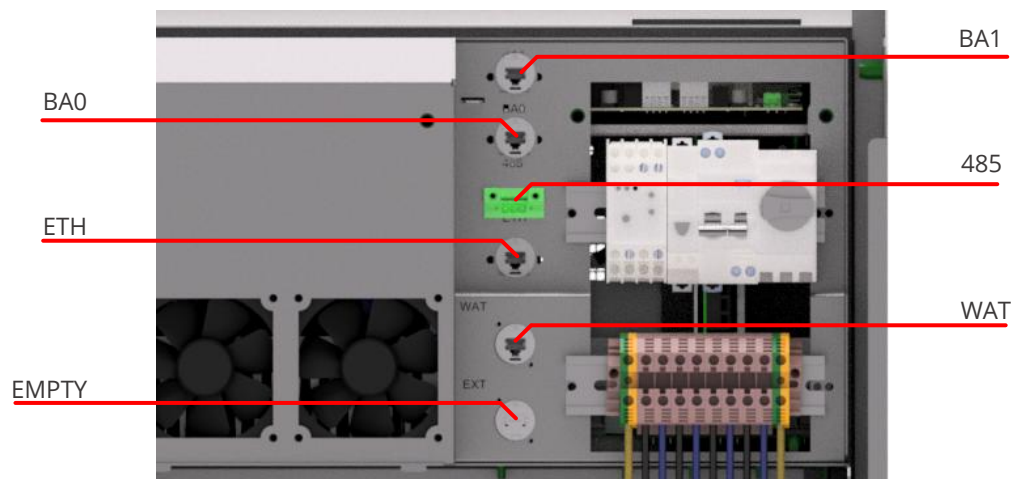


Figure 14 – View of signal connections

LEGEND	DESCRIPTION
+ BA1	Additional battery communication port;
+ BA0	Main battery communication port;
+ 485	485 connection port for home automation (not implemented);
+ ETH	UNE ZHERO S6 internet communication connection port;
+ WAT	Communication connection port between the meter(s) and UNE ZHERO S6;
+ EMPTY	Not in use.

2.9. Photovoltaic connections



ATTENTION: When sunlight irradiates the photovoltaic modules, DC voltage will be present from the photovoltaic system..



Figure 15 – Position of the photovoltaic DC inputs

The legend of the photovoltaic connections of the UNE ZHERO S6 system is provided below.

The position of the photovoltaic input connections of UNE ZHERO S6 is shown in the figure on the side, indicated by the red arrow. The plate must be removed by unscrewing the relevant fixing screws.

Once the plate has been reinstalled and the cables have been routed inside the system, they can be connected to the charge controllers using MC4 photovoltaic connectors.

Pay attention not to reverse the polarity of the photovoltaic connectors.

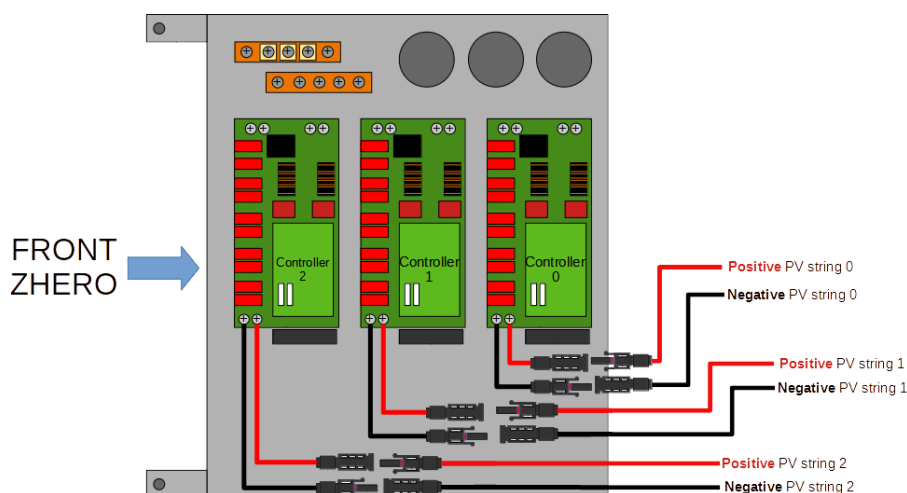


Figure 16 – View of left side casing for photovoltaic input

LEGEND	DESCRIPTION
+ Controller 2	3rd UNE ZHERO S6 MPPT controller;
+ Controller 1	2nd UNE ZHERO S6 MPPT controller;
+ Controller 0	1st UNE ZHERO S6 MPPT controller.

Battery connections

The legend of the UNE ZHERO S6 battery connections is shown below:

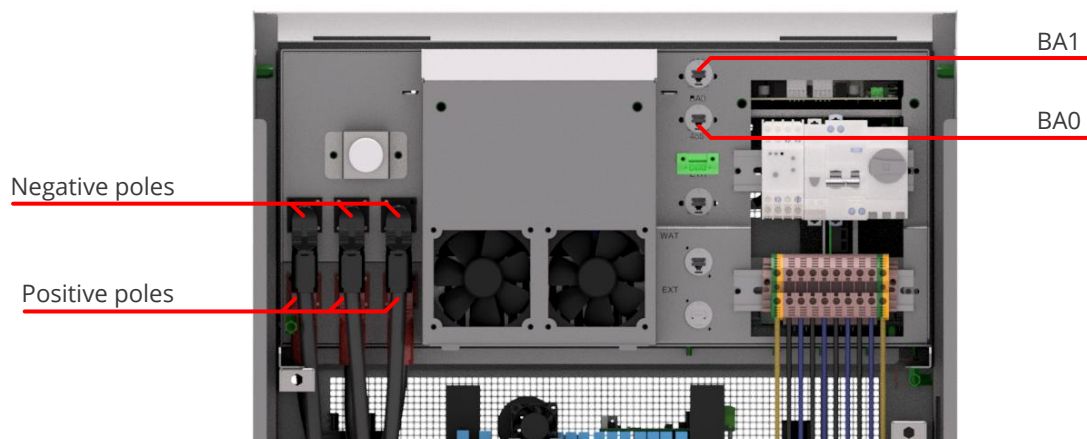


Figure 17 – View of power and signal connections of the UNE ZHERO S6 system

LEGEND	DESCRIPTION
+ BA1	Additional battery communication port;
+ BA1	Main battery communication port;
+ Negative poles	Connection of NEGATIVE battery poles;
+ Positive poles	Connection of POSITIVE battery poles.

3. - OPERATIONS PRIOR TO INSTALLATION

This chapter provides the complete installation instructions for the UNE ZHERO S6 product, do not proceed with the installation until you have fully understood the contents of the instructions below.

3.1. Lifting and transporting

UNE ZHERO is a very large and heavy product, so particular caution must be exercised during lifting, transport and handling so as not to cause hazards to property and persons.

Transport must be carried out using appropriate means, as UNE ZHERO contains components that could be sensitive to shocks, vibrations, etc.



Figure 18 – Suitable handling tools of UNE ZHERO S6

The product is delivered in packaging suitable for handling in order to facilitate its transport and handling must be carried out without the "Cover Panel".

The system may only be lifted from the base by hydraulic tools such as pallet trucks, forklifts, etc. and must be handled with care.



Figure 19 – Position of the base cover that must be removed in order to move the two objects



ATTENTION: The means used for lifting must be suitable for supporting the weight of the equipment in excess of 350 kg.



ATTENTION: Due to the weight and bulk of the UNE ZHERO it is always necessary to call in specialised personnel for transport, handling, loading and unloading.



ATTENTION: UNE ZHERO must be transported in an upright position.



ATTENTION: Although the battery does not present the transport hazards of normal batteries, it is still necessary to take the appropriate precautions dictated by the UNI 3292 standard for class 4.3 batteries. The battery is contained in its own dedicated IP55 casing to avoid contact with external liquids.

3.2. Tools required for installation

The following is a list of the main tools that an installer must be equipped with in order to properly install the UNE ZHERO S6 system.



"FUSES"

Suitable for the current and voltage of the photovoltaic system.



"SCREWDRIVER"

Slotted and star-shaped in various assortments.



"CURRENT CLAMP"

Capable of measuring alternating and direct current.



"ALLEN KEYS"

Complete set of Allen keys.



"SPANNER SET"

Complete spanner set.



"MC4 CONNECTORS"

Photovoltaic connectors to connect photovoltaic modules to the system.



"USB cable Type A-B"

This cable is necessary in order to be able to connect to the system and check its correct functioning and/or installation.



"NOTEBOOK"

Upgraded Windows PC with ZHERO Installer Tool monitoring software installed.



"ROUTER HOTSPOT"

Equip yourself with a mobile device that can provide a data network through which a technician can be connected in the event of a service request.

3.3. Environmental and General Installation Conditions

UNE ZHERO shall be installed in compliance with the regulations in force in the country of installation.

The proper installation based on the good engineering practice of the part of the electrical system downstream of UNE ZHERO is not the responsibility of UNE S.r.l.

The party responsible for the electrical system of the building shall consider UNE ZHERO as the local point of energy supply and shall act accordingly when selecting and installing the appropriate electrical components.



ATTENTION: UNE ZHERO shall be installed with all necessary measures required to make it suitable for the installation site, in compliance with all applicable local regulations and good engineering practice. The installer shall provide all documentation required by local regulations..



ATTENTION: Any operation on UNE ZHERO with the enclosure open is permitted only to personnel authorised and trained by UNE S.r.l.

The **backup function** allows power to be supplied to the user without interruption in the event of a blackout or absence of the distribution grid. However, this function **shall not be considered equivalent to a UPS**, since UNE ZHERO is not certified as such, but as an energy storage system with backup function. Furthermore, it does not filter or stabilise the distribution grid.

Carefully verify that the loads connected downstream of UNE ZHERO can tolerate possible disturbances or can be supplied directly by the grid voltage provided by the distributor, without filtering. **UNE S.r.l. assumes no responsibility for the quality of the grid supplied to the loads.**

During the site inspection, the authorised UNE ZHERO installer shall carry out the necessary environmental checks in order to identify, among the available options, a location compatible with the operating requirements of the ZHERO system in terms of temperature, humidity, ventilation and available space.

Please also note the following:

- UNE ZHERO shall be **installed exclusively indoors**, in locations suitable for equipment with **IP20** degree of protection. Installation in adverse or non-compliant environmental conditions is expressly prohibited;
- **Do not expose** UNE ZHERO to **direct sunlight**;
- The system shall not be installed near sensitive objects or systems whose functionality or safety could be affected by the presence of the ZHERO system;
- Do not install the system in a position where UNE ZHERO **ventilation would be obstructed**;
- Do not install the system in a position where maintenance and service operations could not be performed;
- Installation in areas classified as having a fire or explosion risk, or near flammable materials, is prohibited;
- Do not install the system in areas continuously occupied by people or where the acoustic noise emitted by UNE ZHERO could cause discomfort;
- **Never cover** the ZHERO system.



ATTENTION: Installations above 2000 metres may involve additional criticalities and shall therefore be assessed on a case-by-case basis with UNE S.r.l. technical staff.

3.4. Positioning UNE ZHERO S6

Once the conditions of the previous point have been verified, the positioning point itself must be assessed.

Positioning UNE ZHERO S6:

- On a flat floor;
- In easily accessible places;
- In a position to guarantee access to switches;
- In a position to guarantee the necessary space to carry out maintenance operations;
- In floors suitable to support the weight of UNE ZHERO.



ATTENTION: UNE ZHERO S6 must be anchored to the ground by means of the holes in the base to prevent it from tipping over.



ATTENTION: It is essential to assess the suitability of the floor on which UNE ZHERO is placed in order to determine its ability to support the weight of the system (approximately 250-350Kg) depending on the number of batteries.

In addition, to ensure the necessary ventilation, installation, maintenance and control operations, **the following distances must be observed:**



Figure 20 – Minimum distances of UNE ZHERO S6 for Battery and Inverter Boxes

MINIMUM DISTANCES	ZHERO BOX
Frontal distances	1500 mm
Rear distances	100 mm
Distances on the left side	500 mm
Right-hand side distances	500 mm
Upper distance	500 mm

Dimensions: 600 (L) x 600 (P) x 1360 (A) mm.

3.5. Unpacking

During the unpacking operation, **preliminarily check the integrity of the contents** and the presence of all components; if not, suspend all operations and contact UNE srl immediately.



ATTENTION: Some elements of the packaging such as cardboard, nails, etc. can be dangerous and cause damage to persons or property, so they must be removed by appropriate means.



ATTENTION: The packaging and components must not be within the reach of children, persons with limited abilities and in general anyone not entrusted with the installation of UNE ZHERO.

The system is delivered in the packaging shown in the figure below, the pallet may not be provided; below are the operations to be carried out to free **the ZHERO S6 BOX from their packaging**:



- a) Position the product, still packed, **on a flat, non-tilting surface** near the final assembly point;
- b) Cut the clamps;
- c) At this point it will be possible to **remove the cardboard** from UNE ZHERO S6;
- d) If delivered on a pallet, using a pallet truck suitable for the weight of the system purchased, lift the system and **position it at the exact point where you wish to install it**. For the correct use of the pallet truck, refer to the corresponding manual;
- e) It is mandatory to **anchor the rails to the floor** by means of the holes on the base.

Figure 21 - UNE ZHERO inside its packaging

3.6. Preliminary Work on Electrical Connections

In order to facilitate installation and maintenance of UNE ZHERO S6, it is **possible to dismantle all the painted external casings** of the UNE ZHERO S6 system with the **exception of the rear casing**, which provides considerable resistance to diagonal deformation.

Both the **batteries** and the **controller** drawer **can be removed** during installation and maintenance by removing the knurled fixing screws.

Before operating the system, it is necessary to:



"REMOVE RINGS OR OTHER METAL OBJECTS"



"REMOVE WATCHES"



"WEAR INSULATING RUBBER GLOVES"



"USE TOOLS WITH INSULATED HANDLES"



"WEAR INSULATING RUBBER BOOTS"



"IF NECESSARY, PROVIDE FOR THE USE OF PROTECTIVE GOGGLES"

3.7. Dimensioning the photovoltaic system

There are various types of **photovoltaic modules** on the market which are suitable for forming a photovoltaic generator compatible with UNE ZHERO.

All types of modules can be connected which do not require one of the poles of the electrical system to be earthed. If in fact one pole of the electrical system were to be connected to earth, the **UNE ZHERO's internal insulation resistance** control would detect an anomaly and block the supply of energy from the generator.

The use of class II photovoltaic modules is obligatory, otherwise it will be impossible to guarantee the electrical insulation of the DC side of the system; check that the "**CLASS "II" DEVICE**" symbol is shown on the back of the label.



Figure 22 – CLASS II symbol

The forms used must also:

- Comply with the **regulations in force in the country of installation**;
- Withstand an overall **system voltage $\geq 1000V$** ;
- Withstand a **reverse current $I_r \geq 15A$** .



ATTENTION: other restrictions due to specific installation conditions (particular classes of fire resistance, ammonia resistance, salt resistance, load resistance, etc.) must be assessed in advance by a competent technician.

As far as the integration of UNE ZHERO Retrofit is concerned, however, there are no such limitations, as the system will never be directly connected to the photovoltaic modules but will draw energy from the plant's AC grid.

The modules chosen as a result of the indications given above must be coupled in such a way as to enable correct operation with UNE ZHERO in accordance with the following indications.

The strings connected to each MPPT must all be the same, have the same orientation and inclination.

The strings must be made up of a series of modules that in total work in a voltage range of your choice between:

- **100 < Voc < 180** – (DC-DC MPPT low-voltage);
- **120 < Voc < 308** – (DC-DC MPPT medium voltage);

to be specified at the time of purchase, sizing must consider voltage deviations due to temperature variations.

The maximum voltage must **not be exceeded even at no load**.



ATTENTION: In accordance with **EN62109**, a photovoltaic arrester (SPD) must be installed, external to the machine, with an indication **Up (Voltage protection level) $\leq 2.5kV$** .

For optimal results, the aim is to even out production as much as possible between summer and winter and throughout the day.

Advice

ADVICE: For best results, the aim is to even out production as much as possible between summer and winter and throughout the day.



WARNING: Check that the inclination and positioning of the modules you intend to make can give satisfactory production even in winter. With the appropriate software you can check, based on the inclination and orientation of your modules, how much your system yields.

3.8. String polarity check

Before connecting the strings to the system, it must be verified that the **voltage of all strings** is within the voltage range indicated in the data sheet. In addition, the **correct** polarity must be checked before connecting.



ATTENTION: consider variations in module voltage as temperatures vary. Consult the technical data sheet of the photovoltaic modules that you intend to connect to UNE ZHERO.

3.9. Main switch downstream of the exchange counter

Immediately downstream of the metering unit of the energy supplied by the local distributor, there must be a **differential magnetothermal device to protect the line** running from the distributor's meter **to the UNE ZHERO input**.

Also carry out a lightning risk assessment to verify the need for surge protection.



ATTENTION: it is compulsory to always install an overvoltage protection device (SPD) in order to avoid quite considerable economic damage with $U_p \leq 1.5$ kV on the AC line entering the system.

The circuit breaker must have the following characteristics:

- Rated current: 32A;
- Differential current: 300mA;
- Class A;
- Curve C.

the breaking capacity must be higher than the maximum possible short-circuit capacity at the point of connection (given by the local distributor and/or local regulations).

A class A circuit breaker is recommended as a residual current circuit breaker; **the IΔn will have to be coordinated with the earth-termination system and local regulations in order to allow proper tripping.**



ATTENTION: the switchboard containing UNE ZHERO is metallic; it is therefore mandatory to install the appropriate upstream residual current device.

The cable downstream of the aforementioned meter, in connection with UNE ZHERO, must be suitably chosen and sized according to the installation conditions on site and the regulations in force in the country of installation, which cannot be determined here, never less than 6 sq. mm, usually a FG16 cable of 3G6 is recommended (purely indicative figure to be verified in accordance with the local regulations in force).

3.10. User electrical system

Before connecting the UNE ZHERO, a **check must be carried out on the customer's electrical installation**; the switch at the output of the UNE ZHERO serves to make the connection between the UNE ZHERO and the circuit breakers upstream of the electrical installation's protections but **does not in any way act as protection for the customer's electrical installation**.

Therefore, check that the user's electrical system is protected in accordance with the regulations in force at the place of installation.



ATTENTION: UNE srl is not responsible for the professional installation of the system downstream of its outlet to the user. This must be installed by an electrical professional in coordination with the switch in UNE ZHERO and in compliance with the regulations of the country of installation.

3.11. Preliminary Operations

Before making connections in UNE ZHERO, please proceed as follows:

In the UNE ZHERO S6 switch panel:

- Set the differential circuit breaker "INV" to OFF;
- Set the "ON - OFF" switch to OFF (downwards).

In the panel downstream of the distributor's meter (not supplied):

- Disconnect the earth leakage circuit breaker protecting the line.

In the utility protection main switchboard (not supplied):

- Disconnect the circuit breaker(s) protecting the consumers so that all loads are disconnected.

In the string frame (not supplied):

- Opening photovoltaic disconnectors.



ATTENTION: Carry out all connection operations without any live parts of the UNE ZHERO.



ATTENTION: Operations are to be carried out with the equipment disconnected from the grid, the photovoltaic generator and with the machine switched off; access to the system is only permitted 20 minutes after the power has been removed.



ATTENTION: Remember that dangerous voltages will be present in UNE ZHERO even after all switches have been opened. Pay attention to all operations and follow the rules in the dedicated chapter.

3.12. Further Guidelines

The electrical designer and the installer of the installation in which UNE ZHERO is inserted, each for their own tasks in accordance with and in compliance with the regulations in force at the place of installation, must check:

- Whether it is necessary to include a system to **isolate the generator's voltage in the perimeter of the generator installation site**; this is necessary in an emergency so that dangerous voltages do not remain in particular rooms crossed by the string cables;
- Whether it is safe to install in a basement before doing so;
- Whether the chosen installation site is free from the risk of flooding.



READ CAREFULLY: The above is not a substitute for professional advice but represents a useful indication to the person in charge of designing and positioning the system.

3.13. Connection diagram of UNE ZHERO S6

The general connection diagram of the system is shown below. For any further information please contact UNE srl directly (info@unesrl.com).

The connection diagrams of the **4 available types of UNE ZHERO S6 systems**:

- I. BLOCK DIAGRAM – UNE ZHERO S6 **STANDARD**;
- II. BLOCK DIAGRAM – UNE ZHERO S6 **RETROFIT**;
- III. BLOCK DIAGRAM – UNE ZHERO S6 **HYBRID**;
- IV. BLOCK DIAGRAM – UNE ZHERO S6 **OFF-GRID**.

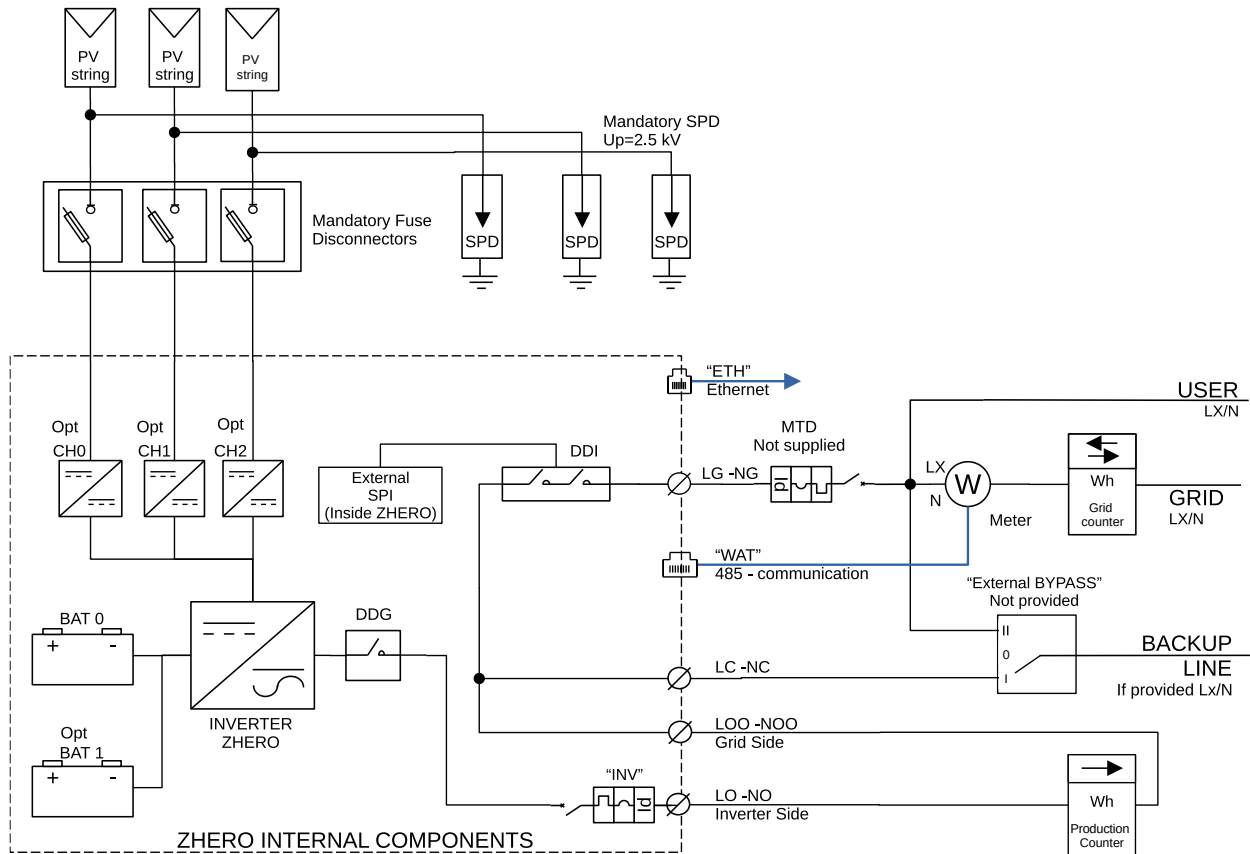


READ CAREFULLY: Before proceeding with the installation based on the diagrams below, make sure that the system you have purchased and the one to be installed match.

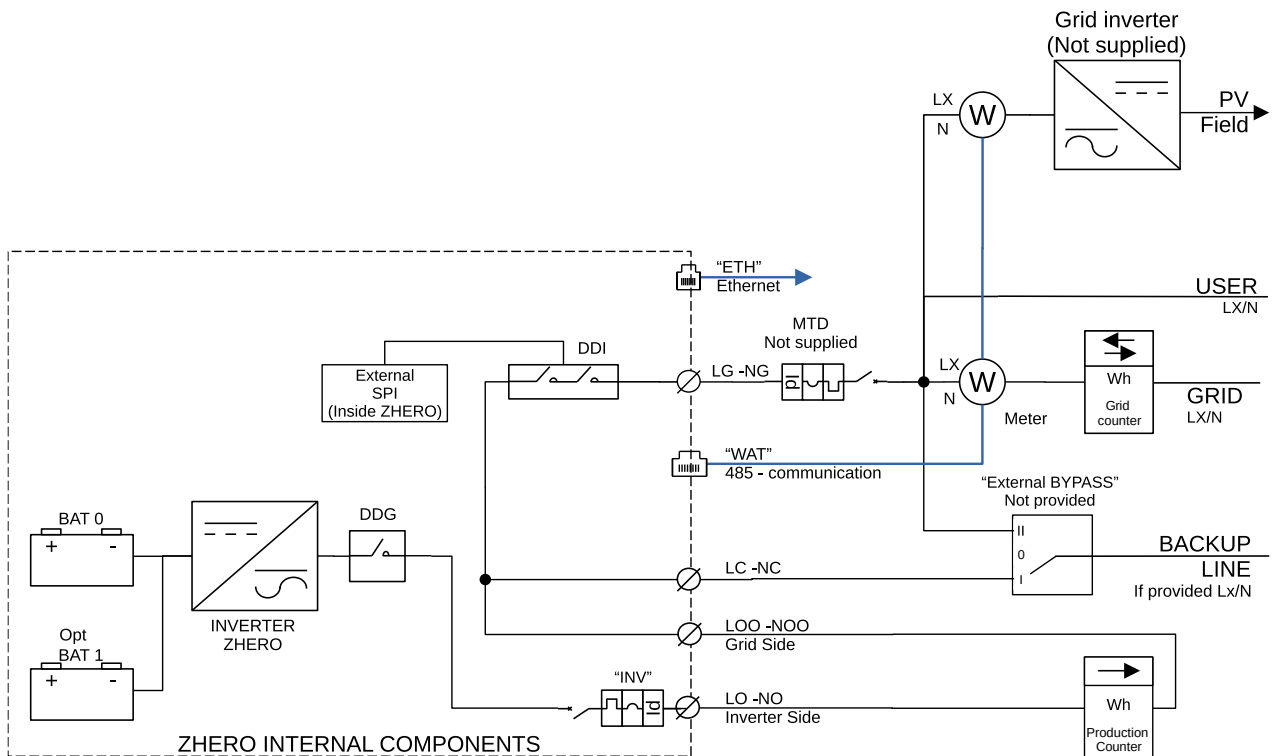
Advice

NOTE: In case of doubts or inconsistencies contact UNE.

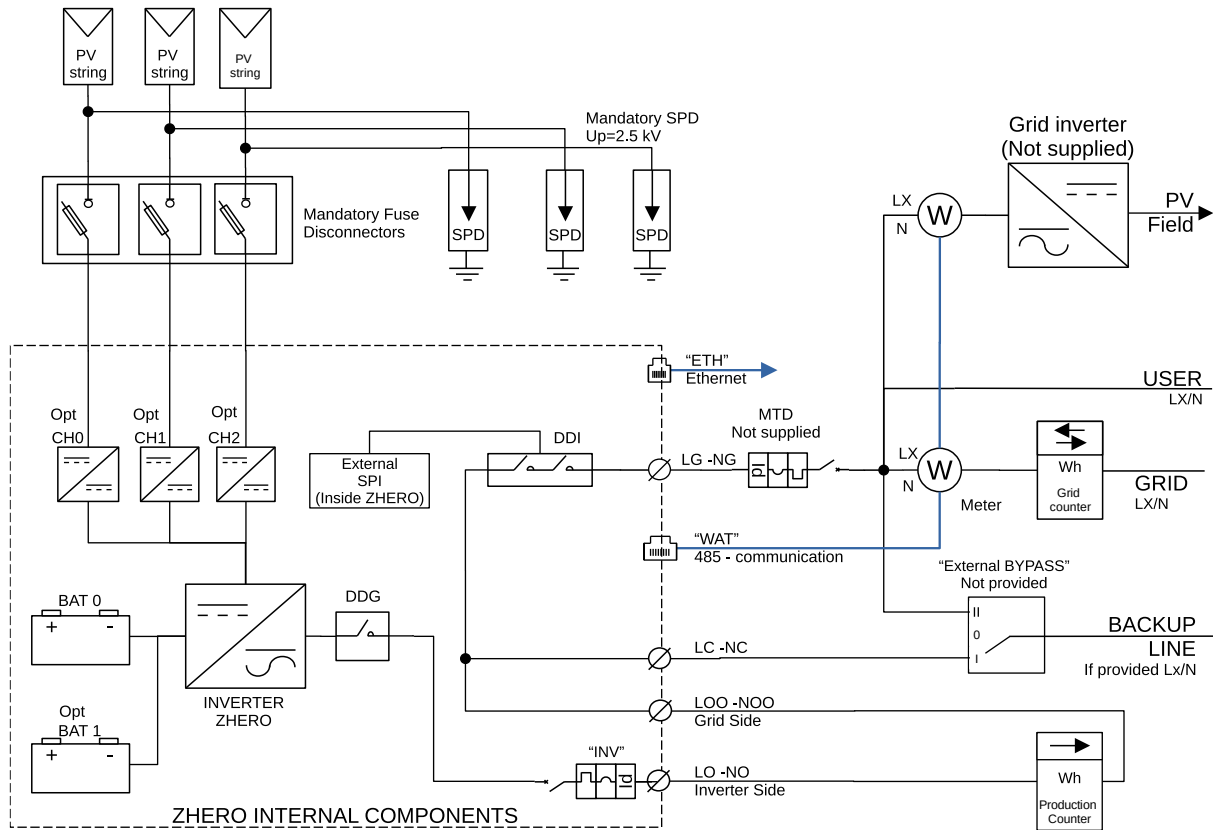
I. BLOCK DIAGRAM – UNE ZHERO S6 STANDARD



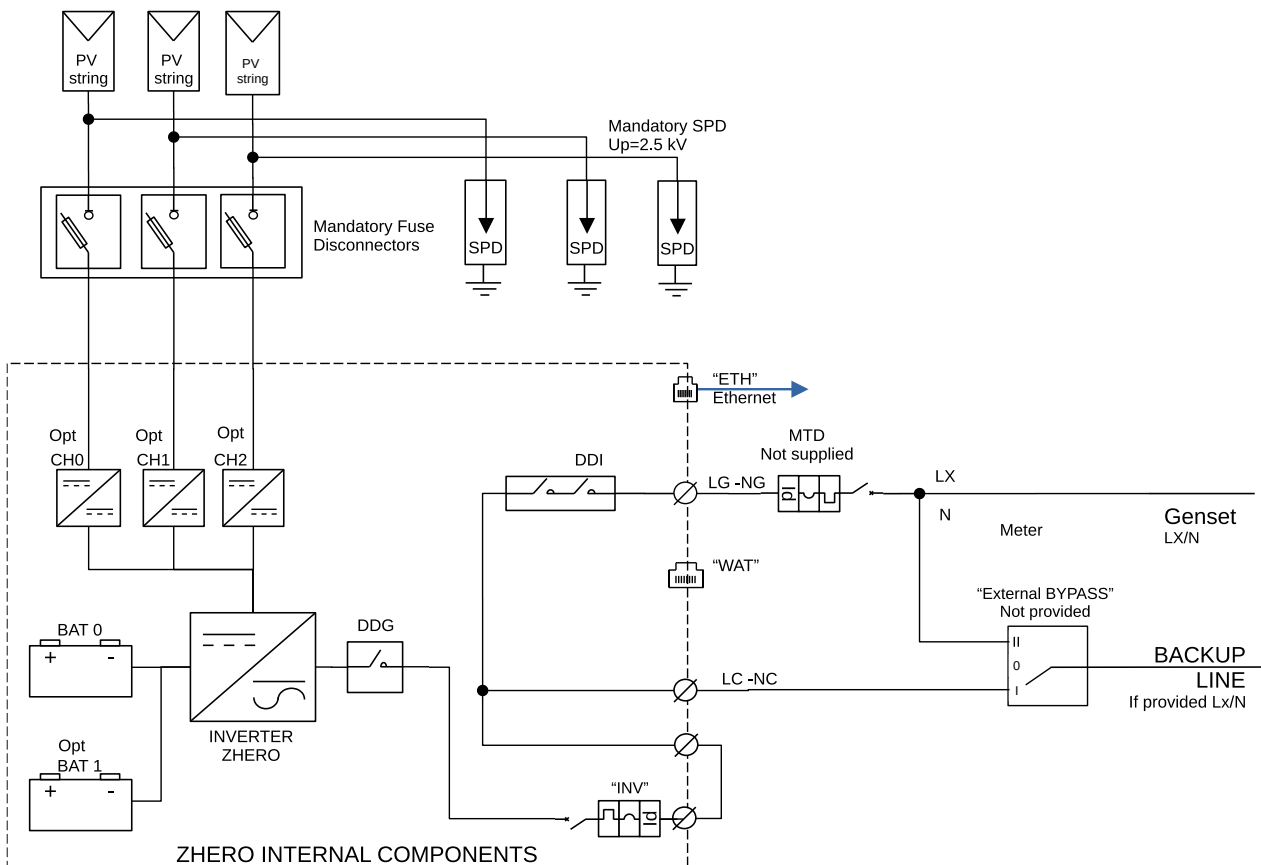
II. BLOCK DIAGRAM – UNE ZHERO S6 RETROFIT



III. BLOCK DIAGRAM – UNE ZHERO S6 HIBRID



IV. BLOCK DIAGRAM – UNE ZHERO S6 OFF-GRID



4. - INSTALLATION



ATTENTION: Carefully follow the instructions in the following chapter before proceeding with the first start-up of the system.



ATTENTION: All operations in the following chapter must be performed with **the system switched off** and **AC and DC inputs disconnected**.



ATTENTION: Waiting time is **20 minutes** from off with AC and DC sources disconnected, before the system can be operated.

4.1. Battery installation

UNE ZHERO S6 comes complete with batteries.



ATTENTION: A battery can pose a risk of electric shock and high short-circuit current. The following precautions must be observed when working on batteries:

- **Remove watches, rings or other metal objects.**
- Use tools with **insulated handles**.
- **Wear rubber gloves** and **boots**.
- Do not place tools or metal parts on top of batteries.
- **Disconnect charging source before connecting or disconnecting battery terminals.**
- Determine if battery is inadvertently grounded. If it is inadvertently grounded, remove the source from the earth.
- Contact with any part of a grounded battery **can cause electric shock**. The probability of such shocks can be reduced if such grounds are removed during installation and maintenance (applicable to remote equipment and batteries that do not have a grounded power circuit).

In some states it may still be necessary to transport separately. In this case, installation must be carried out as follows:

a) Remove the 2 front and top panels



Figure 23 – Position of battery box fixing screws

To remove them, use a screwdriver or Allen screwdriver to remove the **8 screws that secure** the front and top panels.

To facilitate removal of the crankcase, we recommend starting with the top one and then **moving on to the bottom one**.

The crankcases are grounded; to detach the crankcases completely, it will be necessary to unscrew the screws from the threaded inserts.

b) Battery insertion



Figure 24 – Battery insertion in the battery box

Place the battery on the pallet truck, bring it to the height of the drawer and slide it all the way down to the height of the side blocks for attachment.

It is recommended that more than one person perform this operation in order to have more control when inserting and/or removing the batteries.

The order of the batteries should be from bottom to top: **bottom battery is battery 0, top battery 1**.



ATTENTION: A suitable lifting system must be used to lift the battery, as it weighs more than 100 kg and cannot be handled manually.

c) Fixing batteries



Figure 25 – Battery fixing screw position

Once positioned, screw the batteries onto the **fixing lugs**, these are already screwed onto the fixing lugs and there are **2 per lug**.

Use an appropriate spanner to tighten an M6 **hexagon head screw**.

d) Connection of communication and power cables

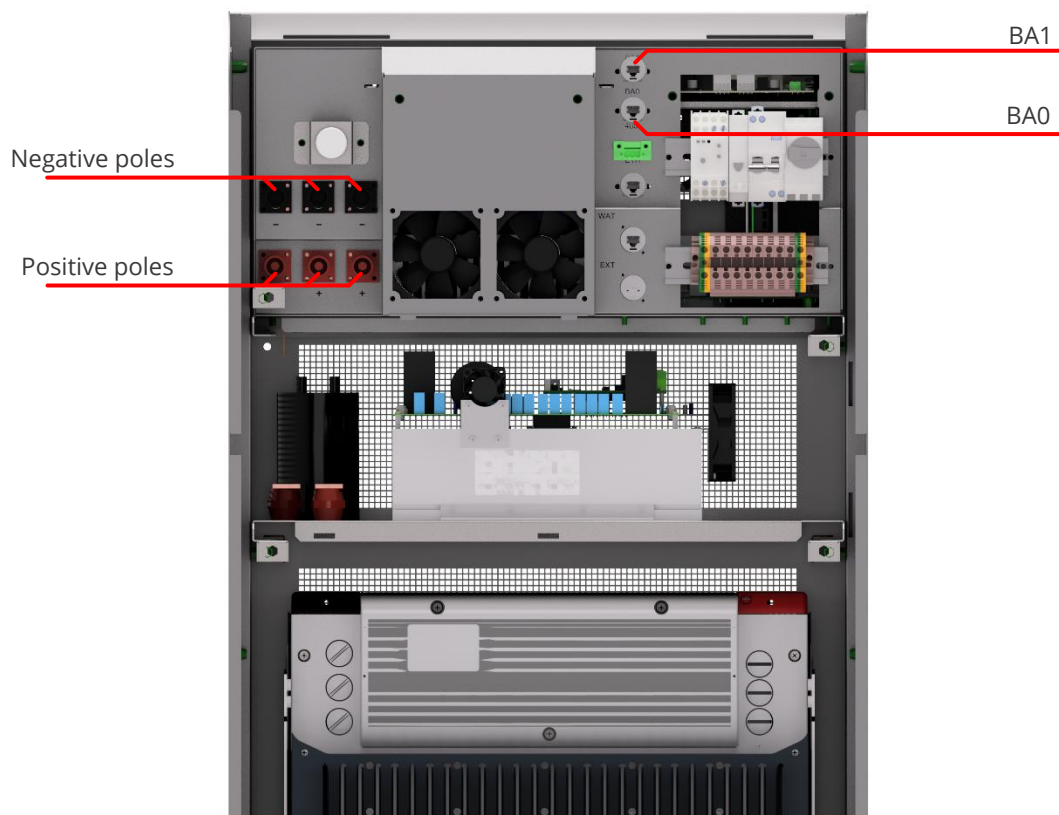


Figure 26 – Location of power and signal battery plugs

All connectors of this plug are in parallel, so there is no connection order.

Take care not to reverse the polarities of the plugs: respect both the symbols on the carpentry and the colour code:

- **Positive pole – Red colour – Symbol +**
- **Negative pole – Black colour – Symbol -**



ATTENTION:

- **The power cables** can be connected to any pole of the respective row;
- The BA0 and BA1 **signal cables must NOT be interchanged.**

4.2. Controller drawer installation

UNE ZHERO S6 is supplied complete with controller drawer. In some states it may still be necessary to transport separately.

In this case, the installation must be carried out as follows:

- a) **Remove the DC connectors on the connection panel and, if necessary, any other cables obstructing the cassette input**



Figure 27 – cables obstructing the cassette input

- b) **Insert the controller shelf all the way into its drawer**



Figure 28 – Detail of MPPT drawer insertion in ZHERO S6

c) Screw in the 2 front screws of the drawer



Figure 29 – Position of the panel fixing screws

d) Connect the 485 plug and power cables from the front panel

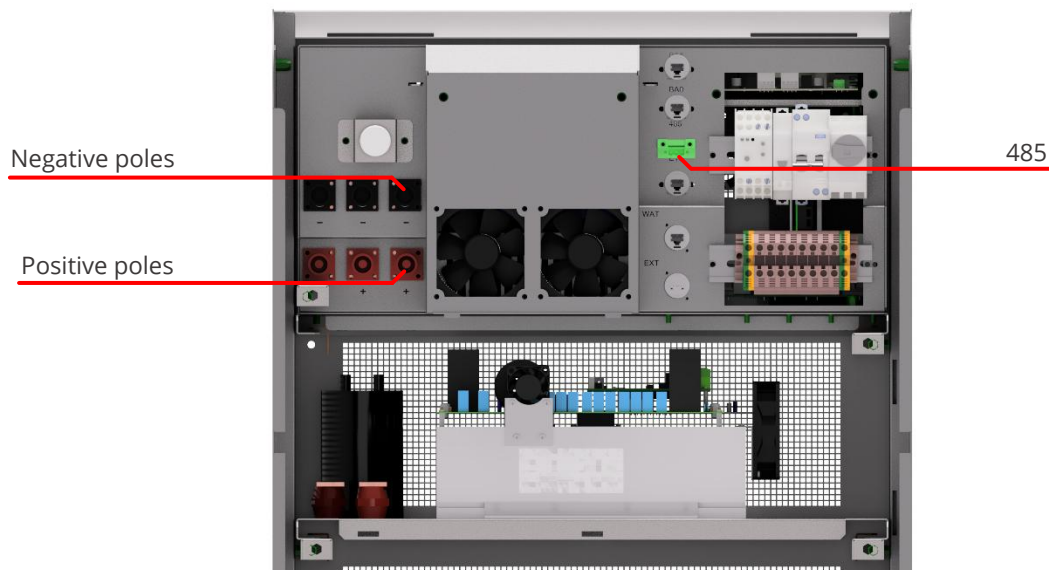


Figure 30 – Location of controller power and signal plugs

On the left, arrows indicate the position of the negative (**top**) and positive (**bottom**) power connectors.

Take great care not to reverse the polarities of the plugs: respect both the symbols on the carpentry and the colour code:

- **Positive pole** – Red colour – Symbol +
- **Negative pole** – Black colour – Symbol –

4.3. Connecting the photovoltaic system

Once the preliminary checks described in the previous paragraphs have been carried out, the connection between UNE ZHERO and the PV generator can be made.

The number of strings that can be connected to the system varies depending on the model purchased from 0 to 3.

The installation consists of connecting the cables from the photovoltaic to the MC4 of the charge controllers, taking great care not to reverse the polarity.



Figure 31 – Left side view of the Inverter BOX

To connect the photovoltaic strings, connect the positive and negative MC4s of the cables coming from the photovoltaic system to the pairs of MC4s coming out of the terminals.

Take care **not to reverse polarities**:



NETWORK CONNECTION (LEFT TO RIGHT)

MC4 Female	→	PV input: Negative - ;
MC4 Male	→	PV input: Positive + .

LINE	COLOUR	SYMBOL	NOMENCLATURE
PV	Red		PV+
PV	Black		PV-



ATTENTION: The MC4 connectors used at the system input support a string current of up to 59 A nominal. Use only connectors compatible with this power and 6 or 10 sq. mm photovoltaic cables with double insulation for connection.



ATTENTION: Do not connect or disconnect the connectors under load and/or with UNE ZHERO switched on.

Cables laid outside UNE ZHERO, i.e. not protected by its enclosure, must be protected by **firmly anchored ducts** with a **degree of protection appropriate** to the installation site.



ATTENTION: UNE accepts no liability for breakages and/or malfunctions caused by incorrect wiring of elements external to the system.



ATTENTION: It is mandatory to **protect the strings** (externally to UNE ZHERO) by means of an overvoltage arrester (SPD) suitably sized according to the type of installation being realised with an **Up 2.5 kV rating**.



ATTENTION: It is mandatory to use the fuse “**G1014582**” or equivalent to protect UNE ZHERO from the photovoltaic generator.



ATTENTION: Parallel connection increases current, while series connection increases voltage. **Select suitable fuse holders and fuses accordingly.**

Depending on the type of controller installed, ensure that the string voltage is within the range of 100–180 V or 120–308 V. **Before applying the open-circuit string voltage, verify the accepted voltage range indicated on the ZHERO nameplate.**

Pay attention to the following:

- Do not connect strings with a different number of photovoltaic modules to the same controller.
- Do not connect different photovoltaic modules to the same controller.
- Photovoltaic modules connected to the same controller shall be installed on the same roof pitch.
- Connect the photovoltaic string to the MPPT controllers according to the sequence shown in the figure.
- Ensure that the photovoltaic string is not energised during connection.
- Secure the cables to the base using cable ties to prevent cable movement.
- Ensure that the controller ventilation openings are not obstructed.

4.4. AC connection

Before proceeding with the connection, pay attention to the following points:



ATTENTION: do not reverse Phase, Neutral and Earth.



ATTENTION: Cables laid outside UNE ZHERO, i.e. not protected by its enclosure, must be protected by conduits, firmly anchored, with a degree of protection appropriate to the installation environment and in compliance with the regulations in force at the place of installation.

4.4.1. Connection: **distribution grid/ Gen-set**

This is a dedicated input to which the local distributor's electricity grid can be connected or, in the case of an isolated system not reached by a public grid, an auxiliary generator.

The system handles this input differently depending on the **working mode** set during production.

The grid input/Gen-set consists of the 3 terminals to the right of the terminal block shown below.

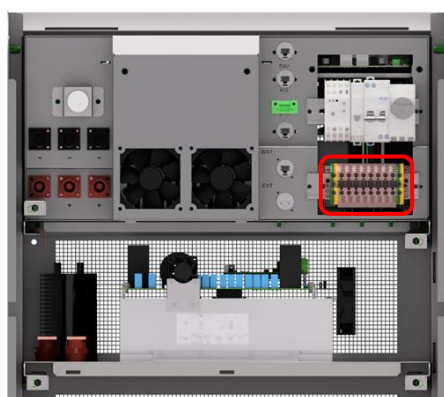


Figure 32 – Terminal block position

NETWORK CONNECTION (LEFT TO RIGHT)

Eighth terminal	→	Grid/Gen-set: Phase;
Ninth terminal	→	Grid /Gen-set: Neutral;
Tenth terminal	→	Grid /Gen-set: Ground;

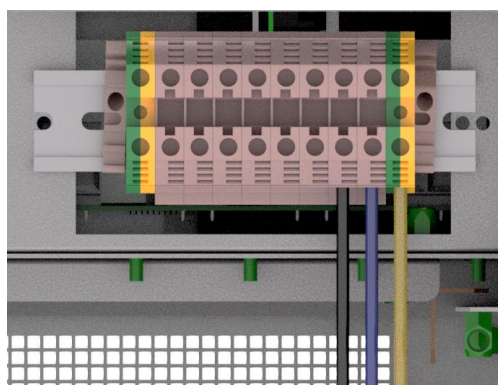


Figure 33 – Detail incoming AC grid connection

ATTENTION: the colour code used complies with EN 60446:

LINE	COLOUR	SYMBOL	NOMENCLATURE
L	Black		LG
N	Blue		NG
GND	Green/Yellow		GND

If it is an "OFF-GRID" genset system that can be connected to UNE ZHERO it must have the following characteristics:

- **AC frequency** between 48.5 and 52.5 Hz to keep the connection active;
- **AC frequency** between 49 and 51 Hz to connect;

- **Voltage** 230V +/- 10%;
- **Power:** at least 15% more powerful than the maximum power required.

In the event of frequency or voltage values outside this range, it is possible that UNE ZHERO disconnects from GE as its protection mechanism.

If it is an 'ON GRID' system, this becomes the input for the public grid to which the system will connect, and the acceptance range will be that defined by the Grid code of the country in which it is installed.

4.4.2. Production meter in-out connections (if provided)

In some countries, regulations require the installation of a production meter at the same time as the installation of the photovoltaic system. This meter in many cases cannot be included in the system because it must be managed and supplied by the local distributor.



ATTENTION: In the case of **off-grid application**, the terminals must not be removed.

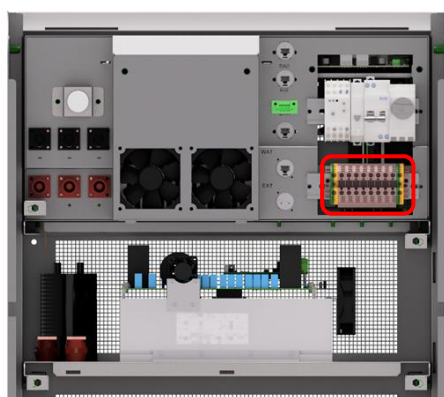


Figure 34 – Terminal block position

Meter input-output is represented by the 4 central terminals

INVERTER-SIDE METER CONNECTION (LEFT TO RIGHT)

Fourth terminal	→	Inverter side: Phase;
Fifth terminal	→	Inverter side: Neutral.

GRID-SIDE METER CONNECTION (LEFT TO RIGHT)

Sixth terminal	→	Grid side: Phase;
Seventh terminal	→	Grid side: Neutral;

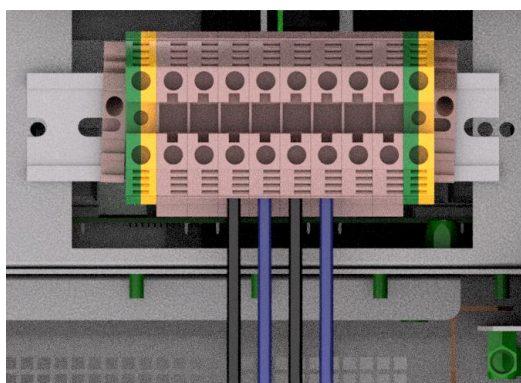


Figure 35 – Detail of AC connection in and out of the production counter

ATTENTION: the colour code used complies with EN 60446:

LINE	COLOUR	SYMBOL	NOMENCLATURE
L	Black		L0 – L00
N	Blue		N0 – N00

UNE ZHERO has been prepared for the installation of this external component, the procedure is as follows:

- Switch off UNE ZHERO by means of the "ON-OFF" disconnecting switch;
- Set the "INV" disconnecting switch to off;
- The input from the local distribution grid must be safely disconnected;
- Connect a Class II sheathed cable to the "L00" and "N00" terminal block as shown in the attached wiring diagram (tightening torque 2.4 Nm), the cable must be of a cross-section and capacity suited to the system power and in accordance with local regulations;
- Connect the other end of the cable to the input of the production meter (tightening torque 2.4 Nm);
- Connect a class II sheathed cable with the same characteristics as the previous one to the output of the meter and stand in the terminal block in "L0" and "N0" as shown in the enclosed circuit diagram (tightening torque 2.4 Nm).

Depending on the countries where the installation will be carried out, for the protection of its own technicians who will carry out the meter installation, the local distributor may require the insertion of two additional omnipolar disconnectors at the inlet and outlet of the meter in order to have the disconnection operation carried out directly by its own operators.



ATTENTION: The installation of the inlet-outlet must be carried out following not only the rules in this manual, but also the regulations in force at the place of installation and the prescriptions of the local distributor who is to insert the meter.

4.4.3. Backup line connections (if provided)

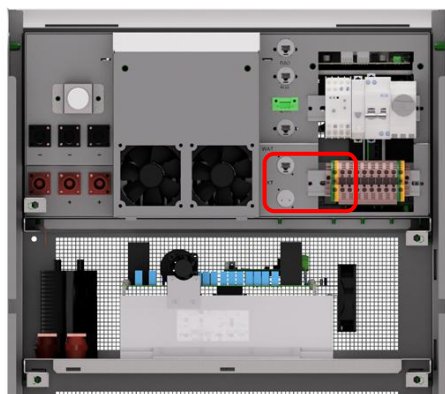


Figure 36 – Terminal block position

The backup output is represented by the 1st connection group:

BACKUP LINE CONNECTION (LEFT TO RIGHT)

First terminal	→	Backup: Ground;
Second terminal	→	Backup: Phase;
Third terminal	→	Backup: Neutral;

Take care not to reverse the order of connection.

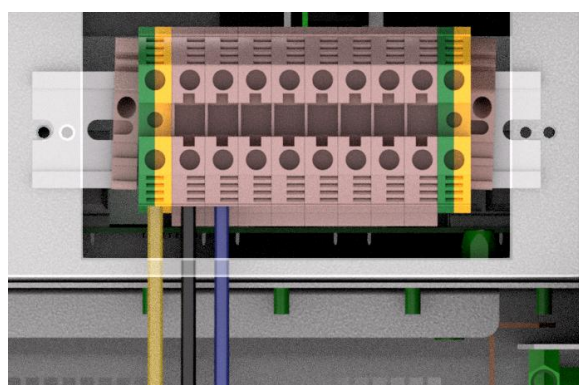


Figure 37 – Detail AC connection backup line (if applicable)

The output of the backup line shall be protected by a **differential magnetothermal switch** having the following characteristics:

- Rated current: **32A;**
- Differential current: **300mA;**
- Class A;
- Curve C.

ATTENTION: the colour code used complies with EN 60446:

LINE	COLOUR	SYMBOL	NOMENCLATURE
L	Black		LC
N	Blue		NC
GND	Green/Yellow		GND



ATTENTION: The 'backup' line shall have a peak power not exceeding 6 kW and spike not exceeding 50 A.



ATTENTION: The neutral conductor of the backup line (NC) **must be kept strictly separate** from the grid neutral conductor (NG)

We also recommend **not supplying all the utilities through the backup line**, due to the inherent limitations during grid outages, which could lead to a rapid battery discharge in the absence of photovoltaic production. **Only critical loads** that require power during a grid outage should be connected to the backup line. Please note that, in the absence of photovoltaic production, the power supplied by the system is lower than 6 kW and depends on the maximum discharge capability of the battery installed.

As shown in the diagrams in Chapter 3.13, the installation of an external bypass selector switch (not supplied by UNE) is recommended. This allows the loads connected to the backup line to be switched back to the grid in the event that the system is unable to provide power.

4.5. Connecting the meters



READ CAREFULLY: The number and configuration of the meters may vary depending on the application for which the UNE ZHERO S6 system was ordered. Carefully check the information below.

THE EXCHANGE METER

Present in all ON-GRID systems (Standard, Retrofit and Hybrid), this is a **meter external** to UNE ZHERO S6, which must be installed in series with the exchange meter of the home/business so that it measures exactly what is measured by the exchange meter. Its purpose is **to measure the energy exchanged** with the grid and correctly account for energy withdrawn from and fed into the grid.

THE PRODUCTION METER

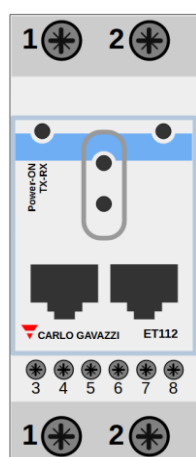
Present only in Retrofit and Hybrid systems, this is a meter external to UNE ZHERO S6. It must be installed in series with the external photovoltaic grid inverter. Its purpose is to measure photovoltaic production and correctly account for all measurements managed by UNE ZHERO S6.

Pay close attention not to swap the production meter with the exchange meter and vice versa, otherwise system malfunctions will occur.

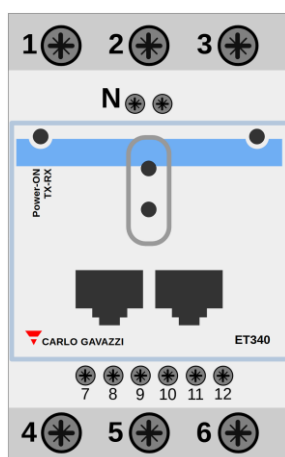
The meters count and measure only the energy downstream of the device. Anything upstream cannot be managed by UNE ZHERO.

APPLICATION	N° METER	EXCHANGE METER	PRODUCTION METER
UNE ZHERO S6 Standard	1	✓	✗
UNE ZHERO S6 Retrofit	2	✓	✓
UNE ZHERO S6 Hybrid	2	✓	✓
UNE ZHERO S6 Off-Grid	0	✗	✗

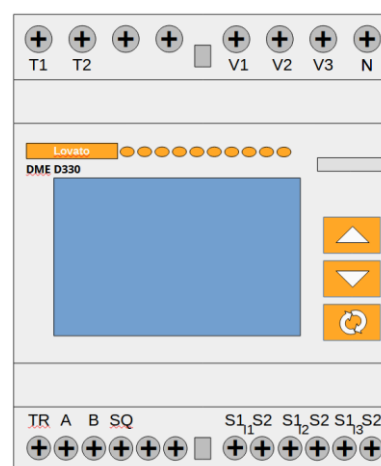
The models used by UNE ZHERO S6 are:



GAVAZZI
ET 112



GAVAZZI
ET 340



LOVATO
DME D330

When provided:

- ET 112** : Single-phase or three-phase systems to 100 A per phase;
- ET 340** : Three-phase systems with current up to 65 A per phase;
- DME D330** : Single-phase or three-phase systems where faster compensation is required and/or currents greater than 100 A per phase are expected.



ATTENTION: The cable connecting the meter to the system must not exceed 100m in length.



ATTENTION: It is forbidden to connect two different ZHERO systems to the same meter.



ATTENTION: Do not install more than one meter with the same function in series or in parallel, for example two exchange meters or two production meters.



ATTENTION: In the case of three-phase systems with three UNE ZHERO systems, each UNE ZHERO system must have its own meter.

The meter is supplied with the **UNE ZHERO S6 product**, the device is already parameterised, configured and tested. DO NOT use a device not supplied unless explicitly agreed with UNE.

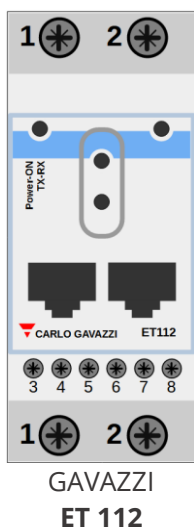


READ CAREFULLY: Always use shielded **RJ-45 FTP cables of category 5e or higher** with a **metal connector head**.

The possible configurations for each meter model are listed below.

METER MODEL	SECTION	POSSIBLE CONFIGURATIONS
GAVAZZI ET112	Errore. L'origine riferimento non è stata trovata.	A1 - COMMUNICATION CONNECTION - ZHERO STANDARD A2 - POWER CONNECTION - ZHERO STANDARD B1 - COMMUNICATION CONNECTION - ZHERO RETROFIT AND HYBRID B2 - POWER CONNECTION - ZHERO RETROFIT AND HYBRID
GAVAZZI ET340	Errore. L'origine riferimento non è stata trovata.	A1 - COMMUNICATION CONNECTION - ZHERO STANDARD A2 - POWER CONNECTION - ZHERO STANDARD B1 - COMMUNICATION CONNECTION - ZHERO RETROFIT AND HYBRID B2 - POWER CONNECTION - ZHERO RETROFIT AND HYBRID
LOVATO DME D330	Errore. L'origine riferimento non è stata trovata.	A1 - COMMUNICATION CONNECTION - ZHERO STANDARD A2 - POWER CONNECTION - ZHERO STANDARD IN SINGLE-PHASE GRID A3 - POWER CONNECTION - ZHERO STANDARD IN THREE-PHASE GRID B1 - COMMUNICATION CONNECTION - ZHERO RETROFIT AND HYBRID B2 - POWER CONNECTION - ZHERO RETROFIT AND HYBRID IN SINGLE-PHASE GRID B3 - POWER CONNECTION - ZHERO RETROFIT AND HYBRID IN THREE-PHASE GRID B4 - POWER CONNECTION - 3 ZHERO RETROFIT AND HYBRID SYSTEMS IN THREE-PHASE GRID

4.5.1. GAVAZZI ET112 meter



The Exchange Meter

The exchange meter is installed at the output of the exchange meter, so that the system can count the energy exchanged with it and zero the withdrawal..

Production Meter

The production meter is installed at the output of the external grid inverter, so that the system can count the energy produced and determine the energy that can be absorbed by the inverter.

Use an **RJ-45 FTP cable of category 5e or higher**. If it runs next to power cables or underground, use a suitable shielding level. The cable must be **shorter than 100 m** and must use a **metal connector**.



READ CAREFULLY: use twisted cables; do not use cross cables.

The connection must be made **regardless of the colour code of the RJ-45 cables**, considering only the PIN number of the RJ-45 connector and using the connector marked "WAT".

A1 – COMMUNICATION CONNECTION – ZHERO STANDARD

Connect the RJ-45 cable from the **WAT** port of UNE ZHERO S6 to the RJ-45 port of the **exchange meter**:

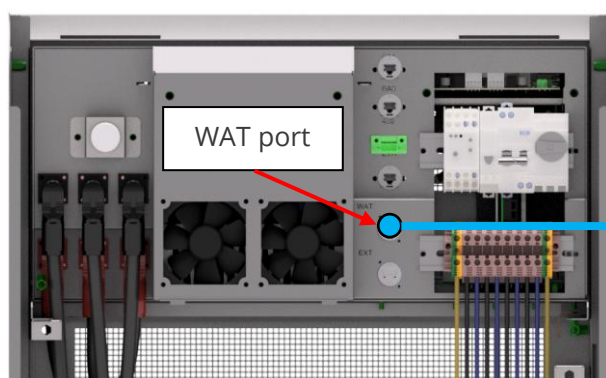


Figure 38 – Connecting the meter to the UNE ZHERO S6 panel.

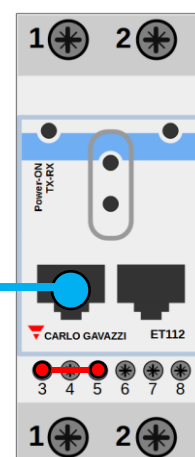
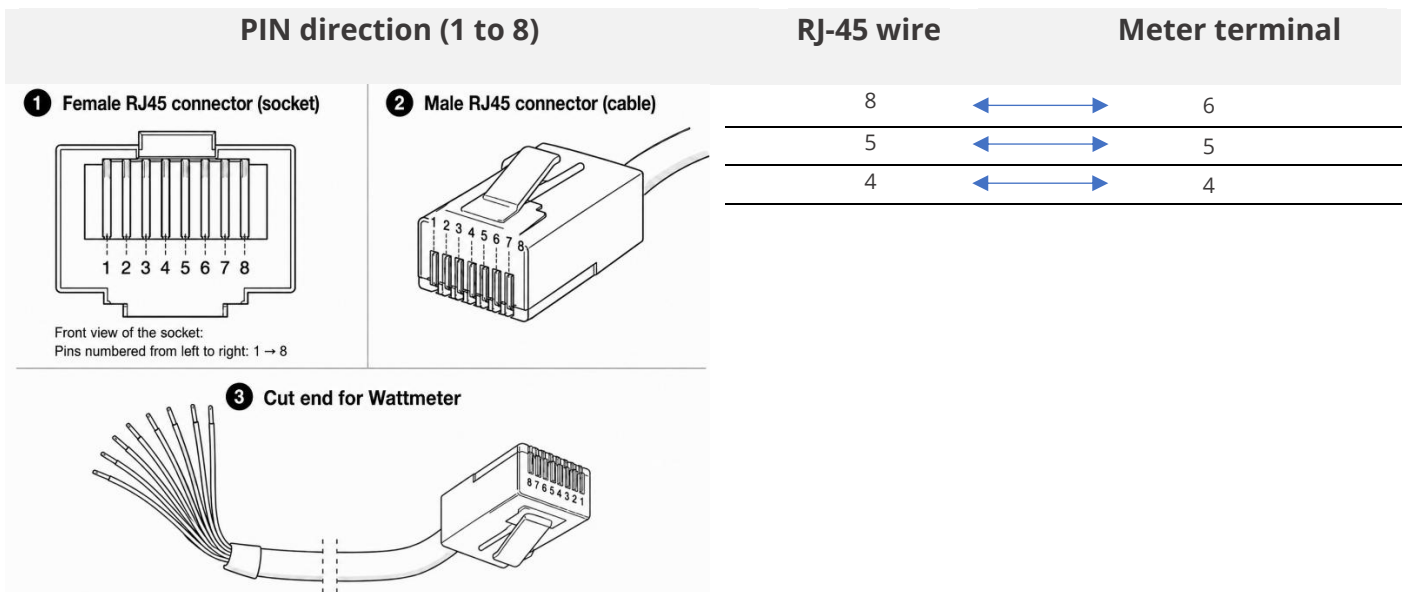


Figure 39 – RJ-45 connection of the ET112 meter (blue) with terminator (red) on the last device.

Make a jumper between Pin 3 and 5 of the meter (only on the last meter).

As an alternative to the RJ-45 cable, **the communication terminals may be used**:



WARNING: The meters count and measure what is connected downstream of the device. Anything upstream cannot be managed by UNE ZHERO.

To verify correct installation, once the meter has been powered and the UNE ZHERO system has been switched on, check that the indicated LED flashes green/orange or check using the ZHERO Installer Tool software.

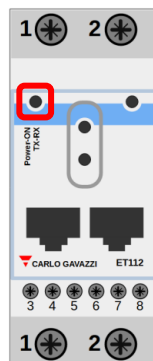
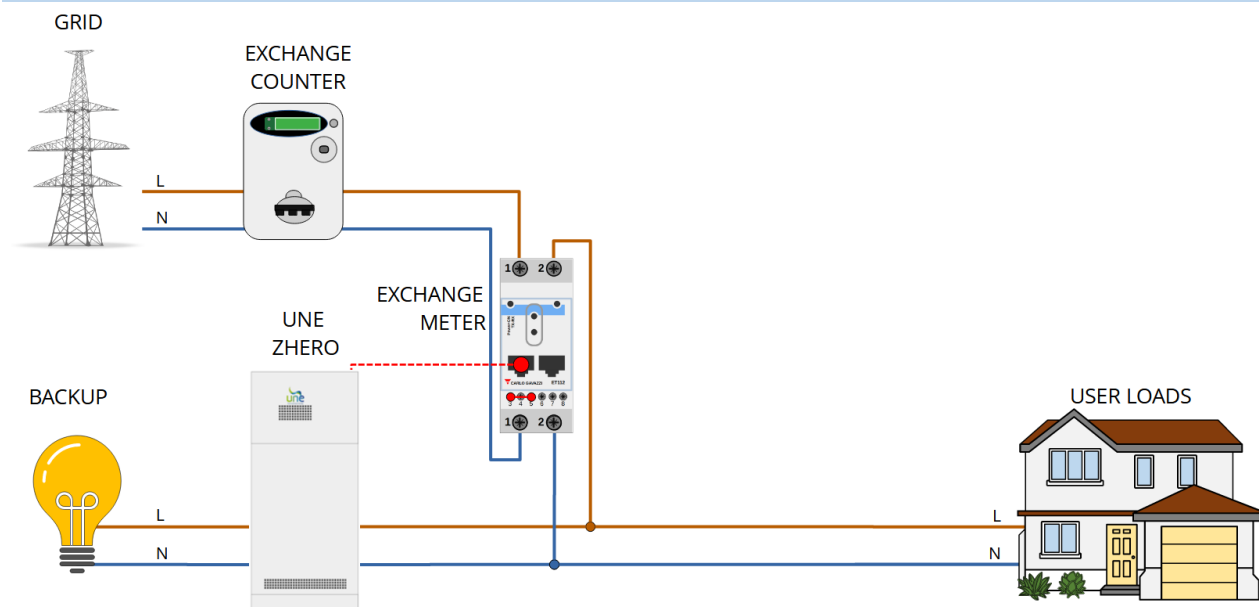


Figure 40 – Meter ET112 communication confirmation LED detail

A1 – POWER CONNECTION – ZHERO STANDARD



METER	TERMINAL	ORIGIN
EXCHANGE METER	1	Phase from the exchange meter;
	2	Phase to loads and ZHERO system;
	1 → N	Neutral from the exchange meter;
	2 → N	Neutral to loads and ZHERO system.

B1 – COMMUNICATION CONNECTION - ZHERO RETROFIT & HYBRID

Connect the RJ-45 cable from the **WAT** port of UNE ZHERO S6 to the RJ-45 port of the **exchange meter**, as shown in the figure below:

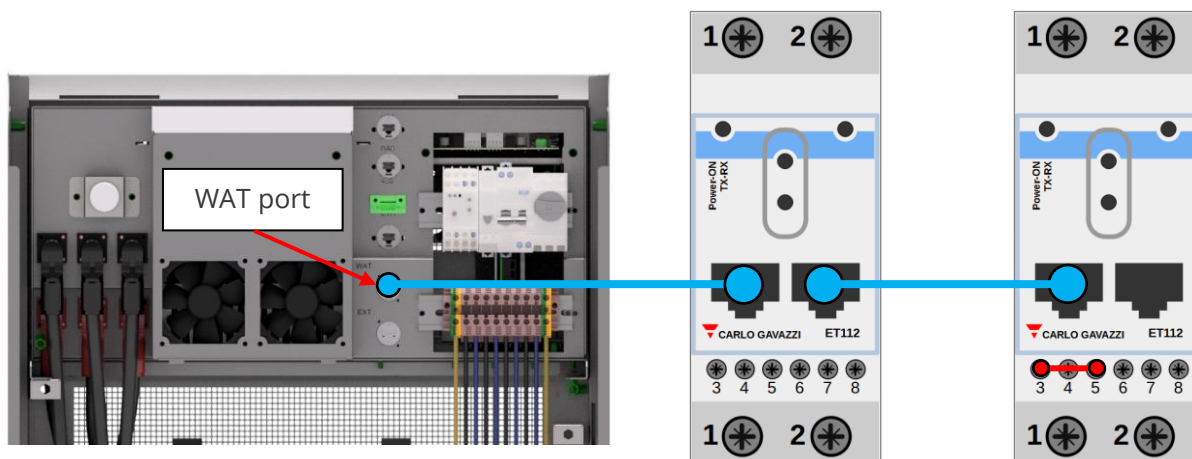
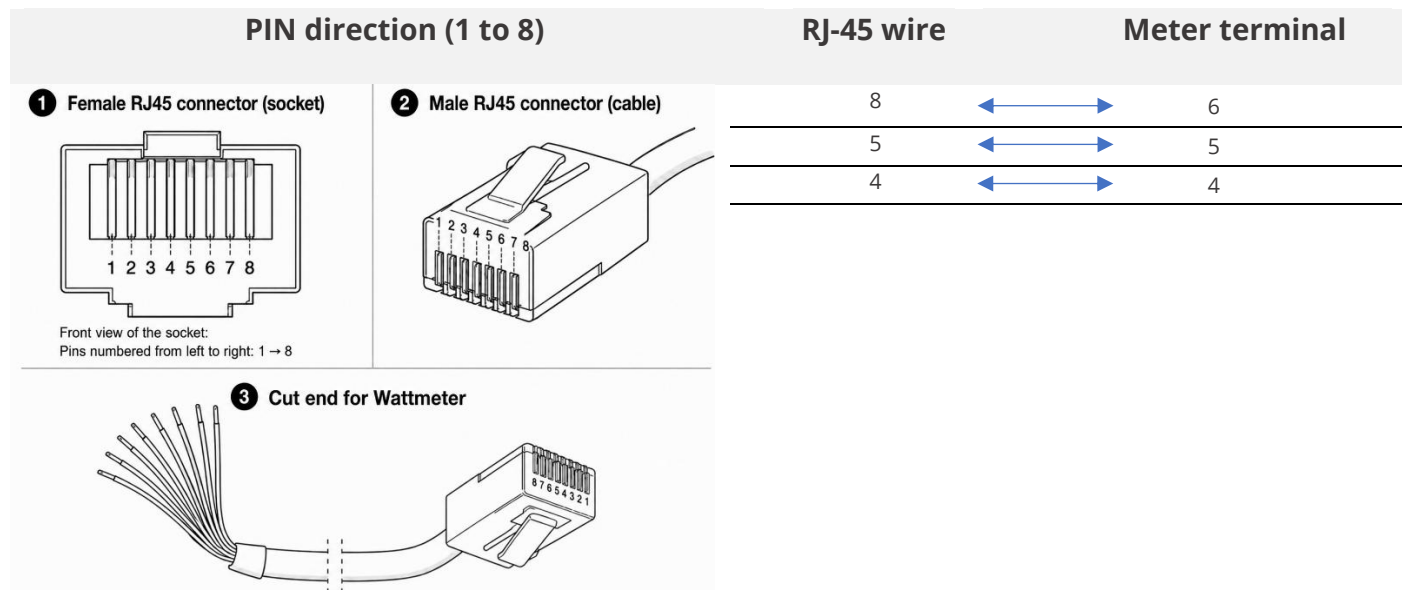


Figure 41 – Connecting the meter to the UNE ZHERO S6 panel.

Figure 42 – RJ-45 connection of ET112 meters (blue) with terminator (red) on the last device.

Make a jumper between pins 3 and 5 of the meter, only on the last device.

As an alternative to the RJ-45 cable, the communication terminals may be used:



ATTENTION: The meters cannot be swapped, whereas the RJ-45 communication connection order can be changed.



WARNING: The meters count and measure what is connected downstream of the device. Anything upstream cannot be managed by UNE ZHERO.

To verify correct installation, once the meter has been powered and the UNE ZHERO system has been switched on, check that the indicated LED flashes or check using the ZHERO Installer Tool software.

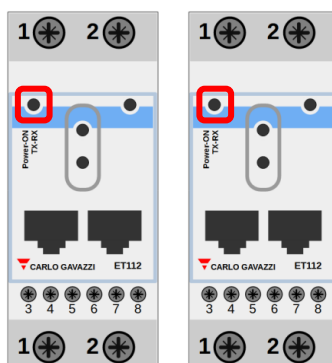
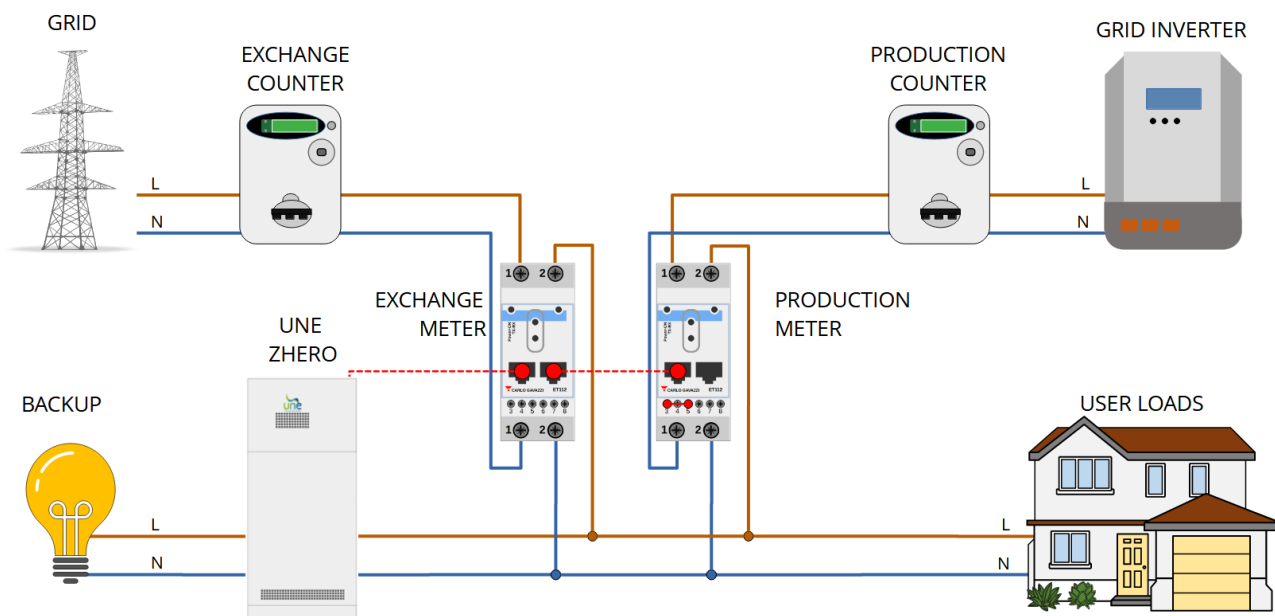


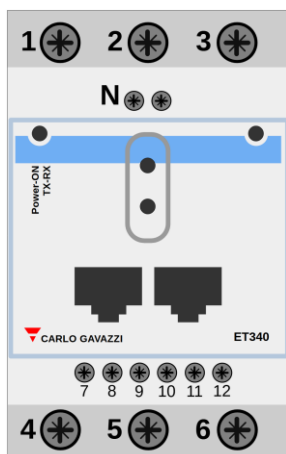
Figure 43 – Meter ET112 communication confirmation detail

B2 – POWER CONNECTION - ZHERO RETROFIT & HYBRID



METER	TERMINAL	ORIGIN
EXCHANGE METER	1	Phase from exchange meter;
	2	Phase to loads and ZHERO system;
	1 → N	Neutral from exchange meter;
	2 → N	Neutral to loads and ZHERO system.
PRODUCTION METER	1	Phase from mains inverter;
	2	Phase to loads and ZHERO system;
	1 → N	Neutral from mains inverter;
	2 → N	Neutral to loads and ZHERO system.

4.5.2. GAVAZZI ET340 meter



GAVAZZI
ET 340

The Exchange Meter

The exchange meter is installed at the output of the exchange meter, so that the system can count the energy exchanged with it and zero the withdrawal.

Production Meter

The production meter is installed at the output of the external grid inverter, so that the system can count the energy produced and determine the energy that can be absorbed by the inverter.

The exchange meter and production meter installation principles are the same as described above. Use an **RJ-45 FTP cable of category 5e or higher, shorter than 100 m, with a metal connector**. Use twisted cables and do not use crossover cables.



READ CAREFULLY: use twisted cables; do not use cross cables.

The connection must be made regardless of the colour code of the RJ-45 cables, considering only the PIN number of the RJ-45 connector and using the connector marked "WAT".

A1 – COMMUNICATION CONNECTION - ZHERO STANDARD

Connect the RJ-45 cable from the **WAT** port of UNE ZHERO S6 to the RJ-45 port of the **exchange meter**, as shown in the figure below:

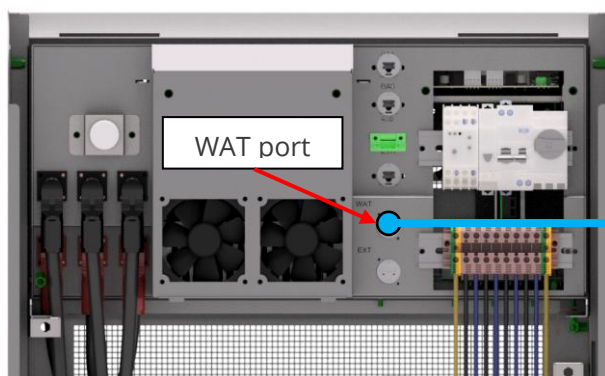


Figure 44 – Connecting the meter to the UNE ZHERO S6 panel.

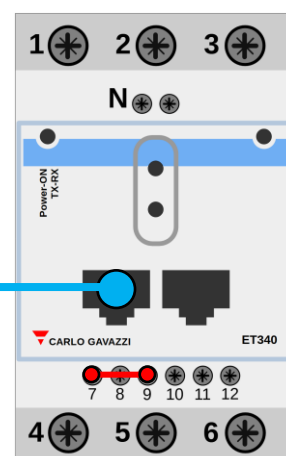
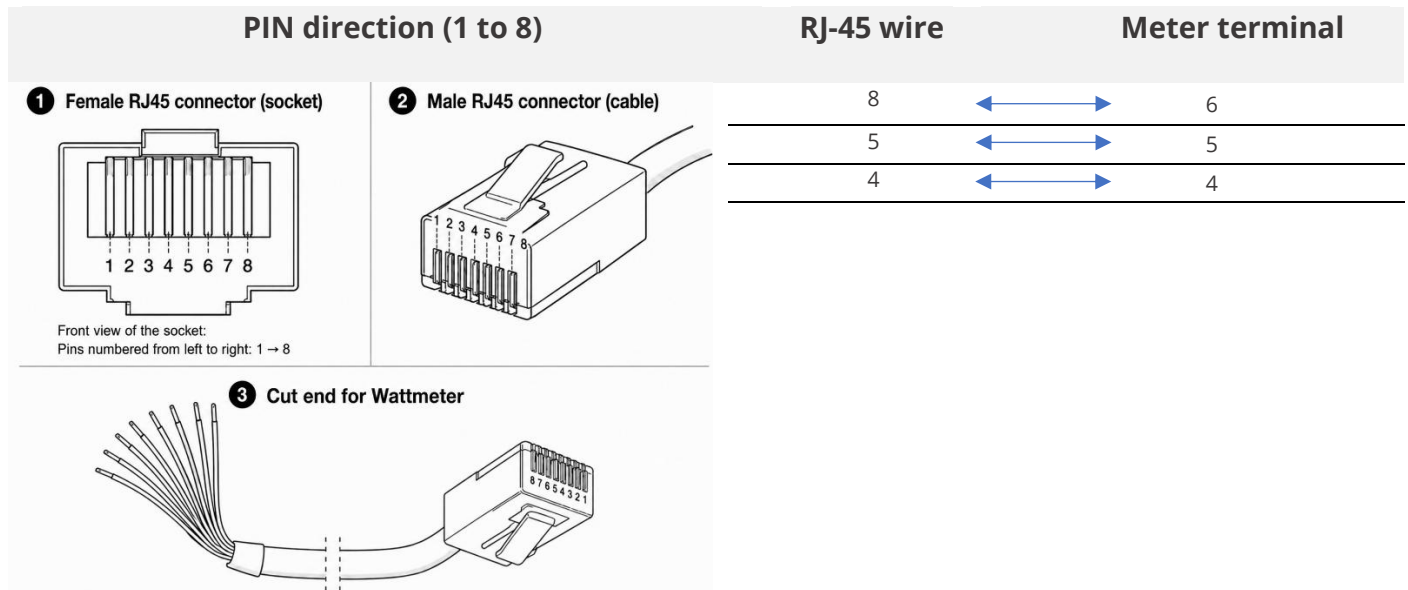


Figure 45 – RJ-45 connection of ET340 meter (blue) with terminator (red) on the last device.

Make a jumper between pins 7 and 9 of the meter (only on the last device).

As an alternative to the RJ-45 cable, **the communication terminals may be used:**



WARNING: The meters count and measure what is connected downstream of the device. Anything upstream cannot be managed by UNE ZHERO.

To verify correct installation, once the meter has been powered and the UNE ZHERO system has been switched on, check that the indicated LED flashes or check using the ZHERO Installer Tool software.

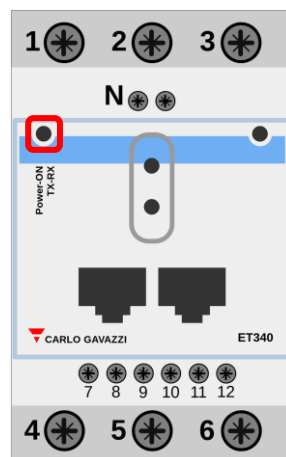
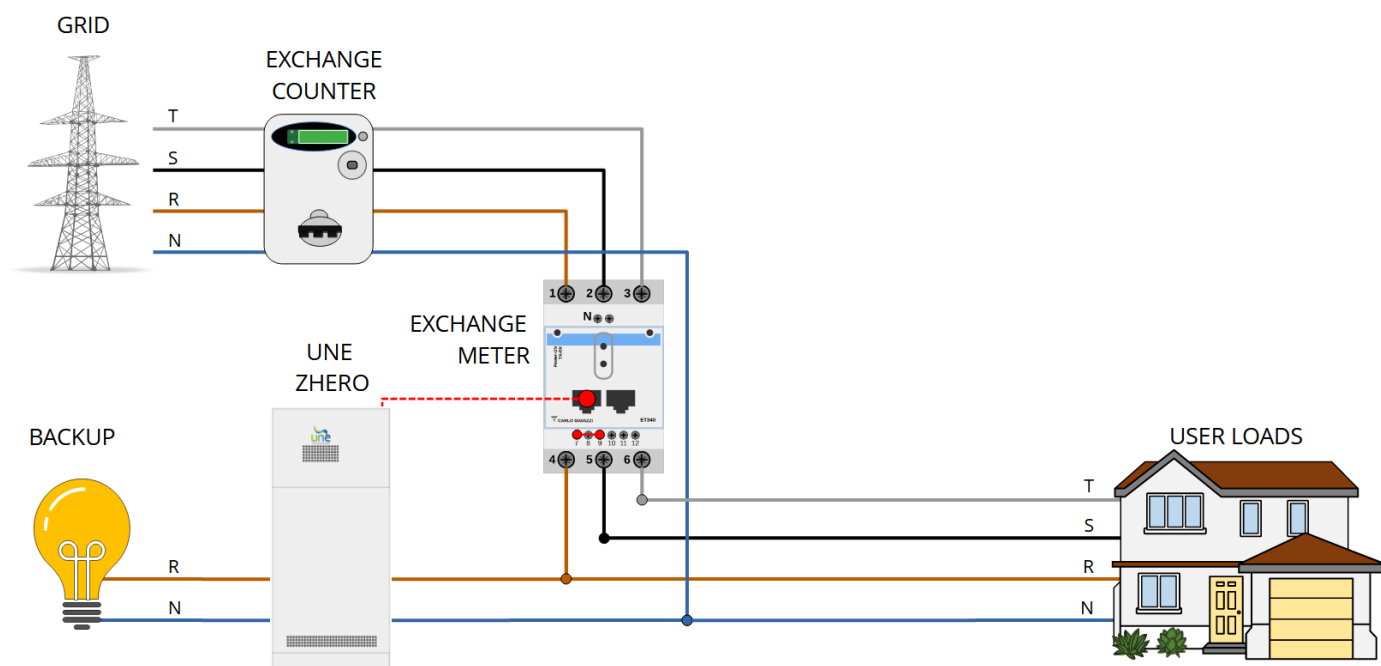


Figure 46 – Meter ET340 communication confirmation detail

A2 – POWER CONNECTION - ZHERO STANDARD



Connection directions:

METER	TERMINAL	ORIGIN
EXCHANGE METER	1	Phase 1 from the exchange meter;
	2	Phase 2 from the exchange meter;
	3	Phase 3 from the exchange meter;
	4	Phase 1 to loads and the ZHERO system;
	5	Phase 2 to loads and the ZHERO system;
	6	Phase 3 to loads and the ZHERO system.

B1 – COMMUNICATION CONNECTION - ZHERO RETROFIT & HYBRID

Connect the RJ-45 cable from the **WAT** port of UNE ZHERO S6 to the RJ-45 port of **the exchange meter**, as shown in the figure below:

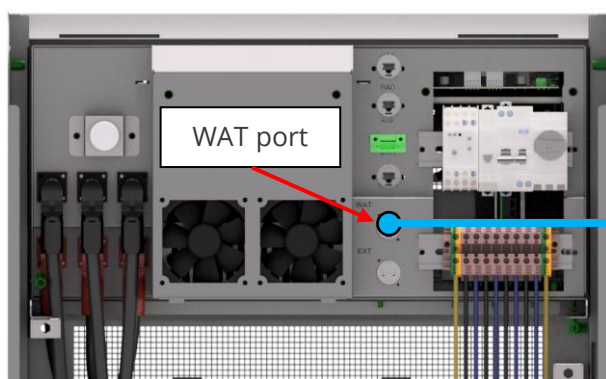


Figure 47 – Connecting the meter to the UNE ZHERO S6 panel.

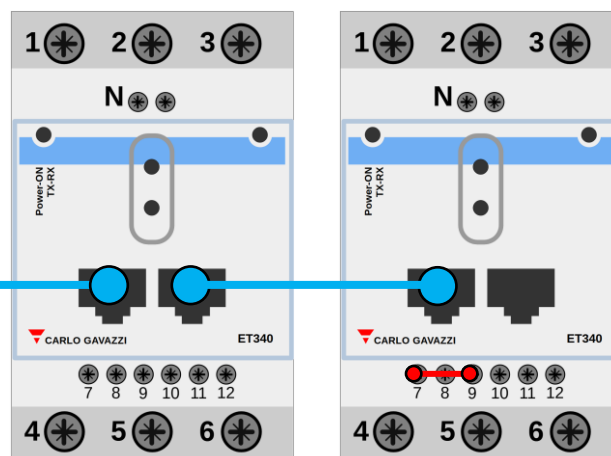
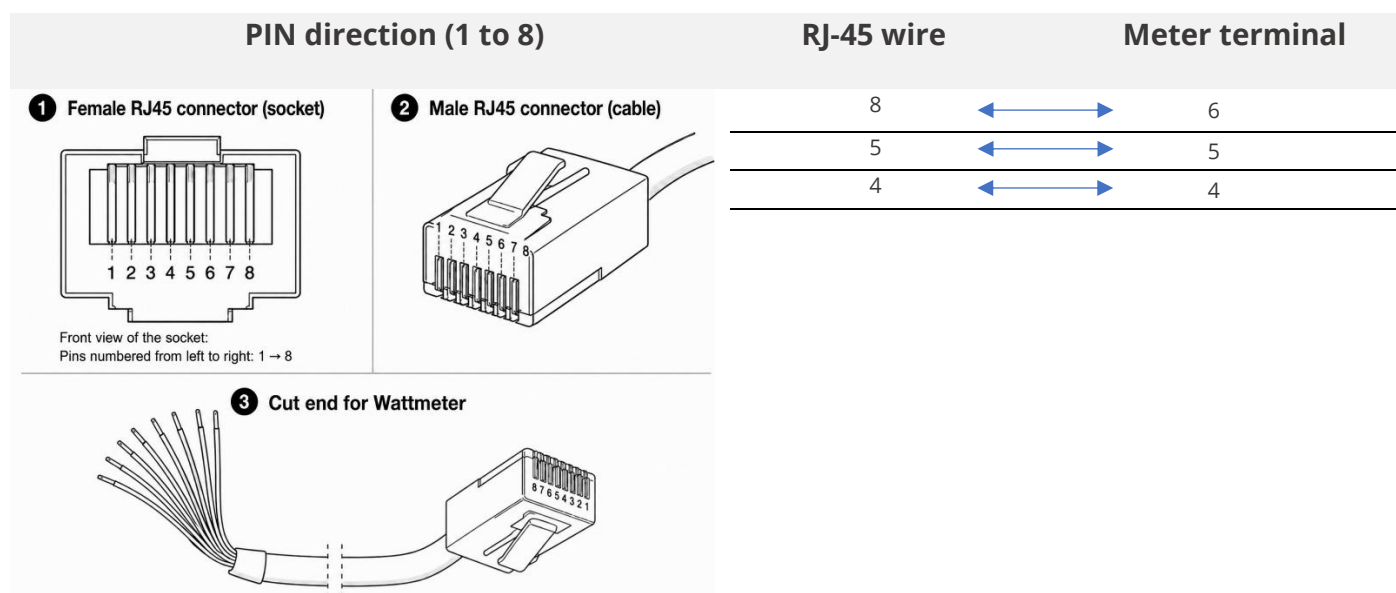


Figure 48 – RJ-45 connection of ET340 meters (blue) with terminator (red) on the last device.

Make a jumper between pins 7 and 9 of the meter, only on the last device.

As an alternative to the RJ-45 cable, **the communication terminals may be used:**



ATTENTION: The meters cannot be swapped, whereas the RJ-45 communication connection order can be changed.



WARNING: The meters count and measure what is connected downstream of the device. Anything upstream cannot be managed by UNE ZHERO

To verify correct installation, once the meter has been powered and the UNE ZHERO system has been switched on, check that the indicated LED flashes or check using the ZHERO Installer Tool software:

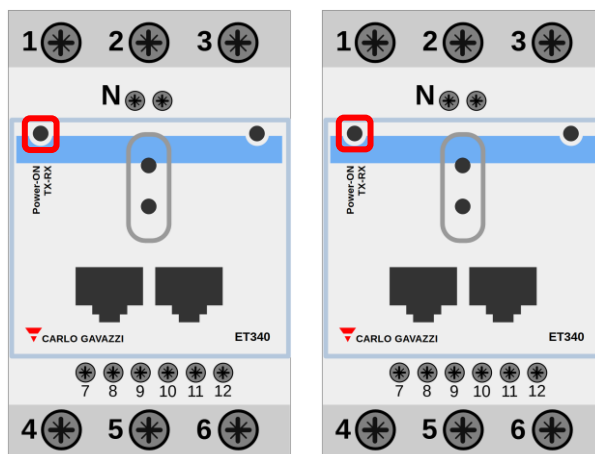
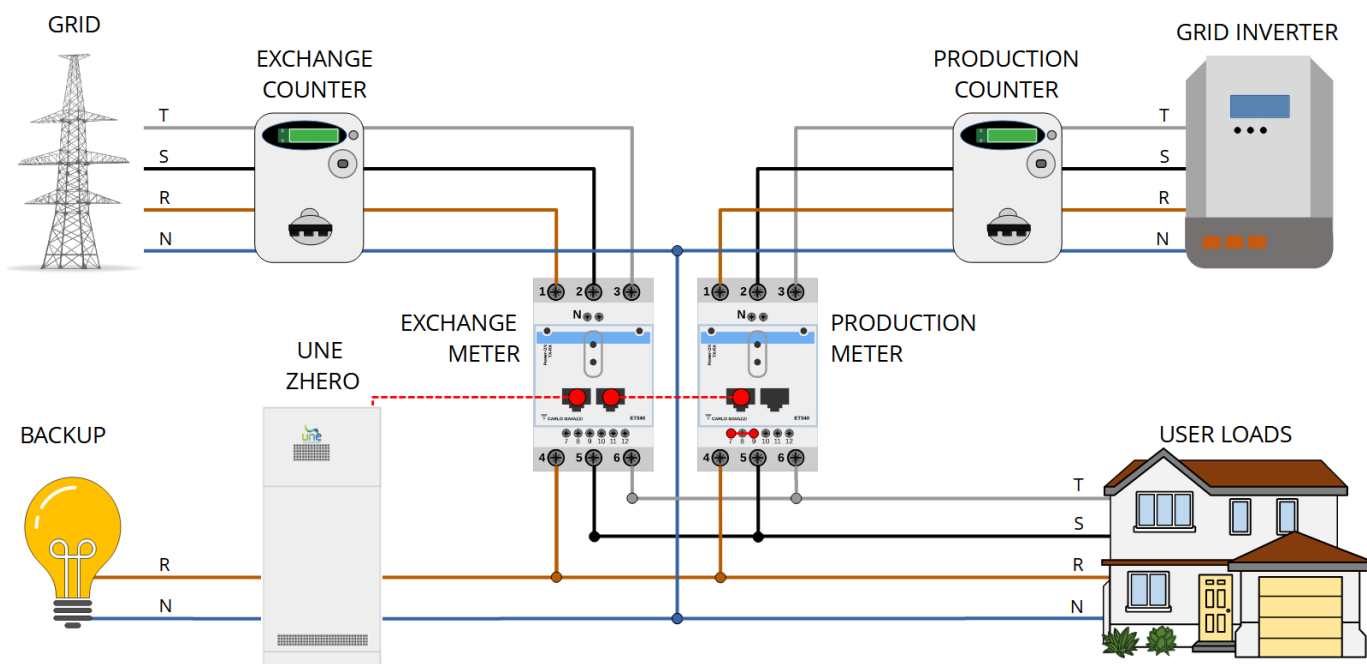


Figure 49 – Meter ET340 communication confirmation detail

B2 – POWER CONNECTION - ZHERO RETROFIT & HYBRID



Connection directions:

METER	TERMINAL	ORIGIN
EXCHANGE METER	1	Phase 1 from the exchange meter;
	2	Phase 2 from the exchange meter;
	3	Phase 3 from the exchange meter;
	4	Phase 1 towards users and the ZHERO system;
	5	Phase 2 towards users and the ZHERO system;
	6	Phase 3 towards users and the ZHERO system;
PRODUCTION METER	1	Phase 1 from the mains inverter;
	2	Phase 2 from the mains inverter;
	3	Phase 3 from the mains inverter;
	4	Phase 2 towards users and the ZHERO system;
	5	Phase 2 towards users and the ZHERO system;
	6	Phase 3 towards users and the ZHERO system.

4.5.3. Meter LOVATO DME D330 meters



LOVATO
DME D330

The Exchange Meter

The exchange meter is installed at the output of the exchange meter, so that the system can count the energy exchanged with it and zero the withdrawal.

Production Meter

The production meter is installed at the output of the external grid inverter, so that the system can count the energy produced and determine the energy that can be absorbed by ZHERO.

Use an **RJ-45 FTP cable of category 5e or higher**. If it runs next to power cables or underground, use a suitable shielding level. The cable must be **shorter than 100 m** and must use a **metal connector**.



READ CAREFULLY: use twisted cables; do not use cross cables.

The connection must be made regardless of the colour code of the RJ-45 cables, considering only **the PIN number of the RJ-45 connector** and using the connector marked **"WAT"**.

A1 – COMMUNICATION CONNECTION – ZHERO STANDARD

The communication connection must be made by inserting the RJ-45 cable in the **WAT** port of the **UNE ZHERO S6** to the **RJ-45 port** of the exchange meter, as shown in the figure below:

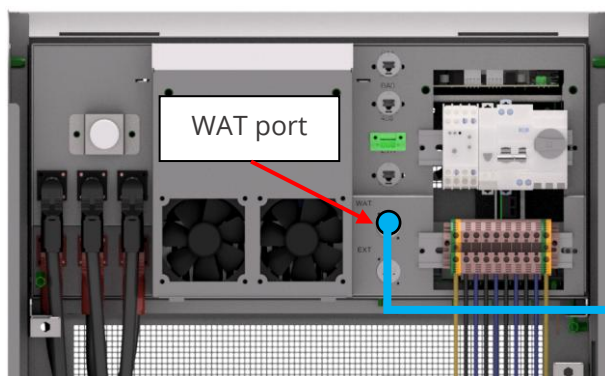


Figure 50 – Connecting the meter to the UNE ZHERO S6 panel.

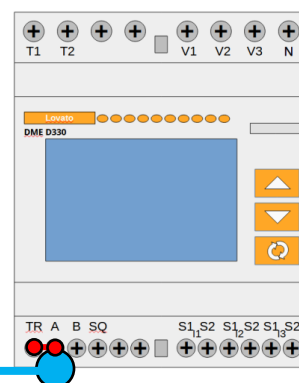
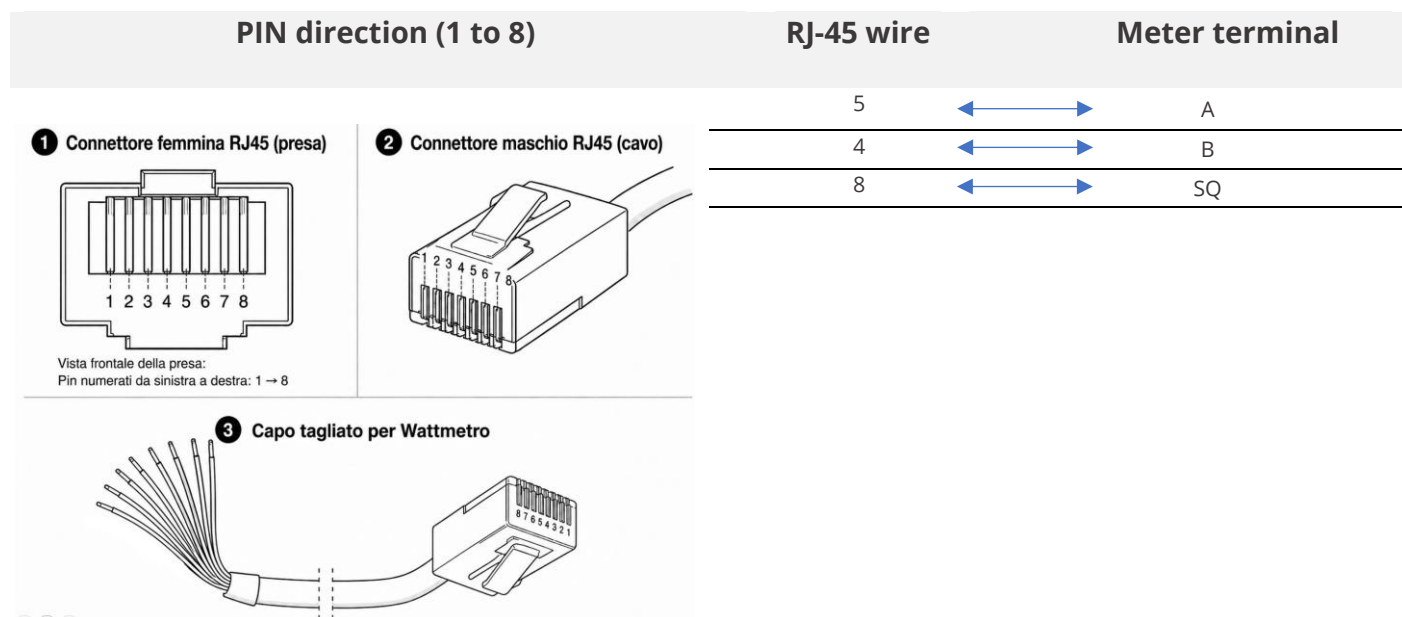


Figure 51 – RJ-45 connection of the DME D330 meter (blue) with terminator (red) on the last device.

Use the communication terminals as follows:



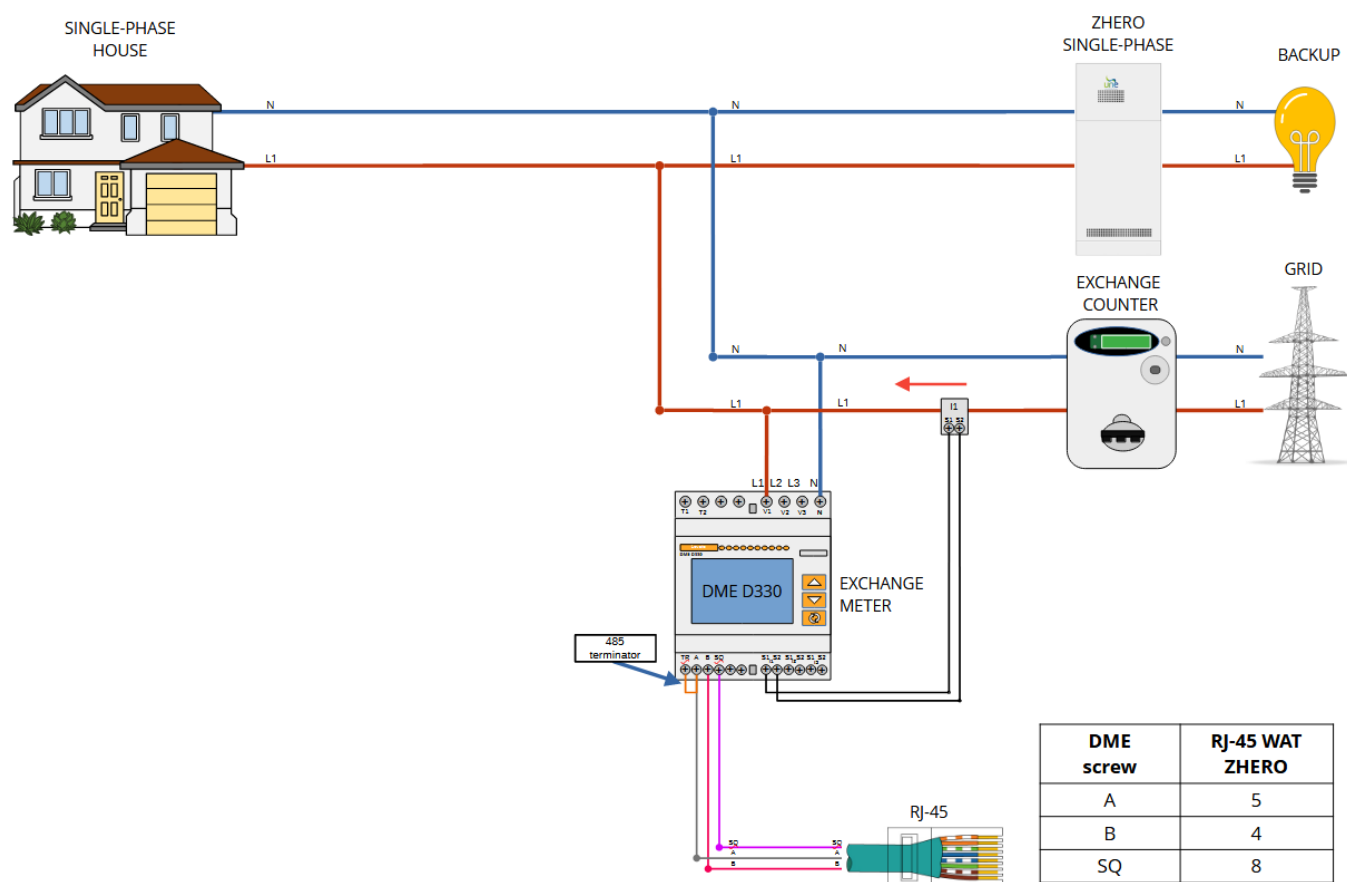
Make a jumper between pins TR and A of the Meter (only on the last device).



WARNING: The meters count and measure what is connected downstream of the device. Anything upstream cannot be managed by UNE ZHERO.

To verify correct installation, once the meter has been powered and the UNE ZHERO system has been switched on, check using the ZHERO Installer Tool software.

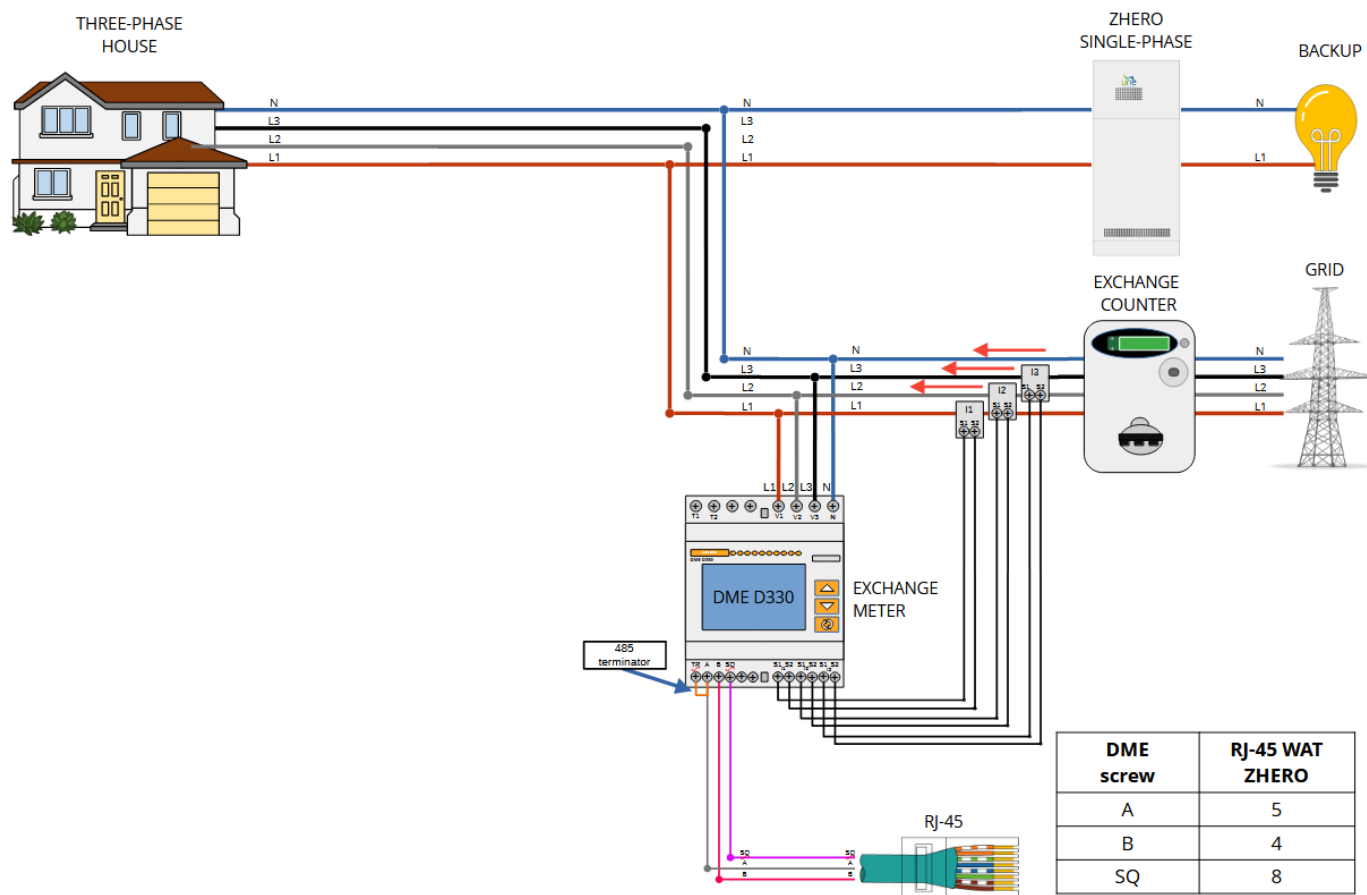
A2 – POWER CONNECTION - ZHERO STANDARD IN SINGLE-PHASE GRID



Connection directions:

METER	TERMINAL	ORIGIN
EXCHANGE METER	V1	Phase 1 from the exchange meter;
	V2	---
	V3	---
	N	Neutral from exchange meter;
	I1 - S1	TA on Phase 1 - arrow from meter to house;
	I1 - S2	TA on Phase 1 - arrow from meter to house;
	I2 - S1	---
	I2 - S2	---
	I3 - S1	---
	I3 - S2	---

A3 – POWER CONNECTION - ZHERO STANDARD IN THREE-PHASE GRID



Connection directions:

METER	TERMINAL	ORIGIN
EXCHANGE METER	V1	Phase 1 from the exchange meter;
	V2	Phase 2 from the exchange meter;
	V3	Phase 3 from the exchange meter;
	N	Neutral from exchange meter;
	I1 - S1	TA on Phase 1 - arrow from meter to house;
	I1 - S2	TA on Phase 1 - arrow from meter to house;
	I2 - S1	TA on Phase 2 - arrow from the meter to the house;
	I2 - S2	TA on Phase 2 - arrow from the meter to the house;
	I3 - S1	TA on Phase 3 - arrow from meter to house;
	I3 - S2	TA on Phase 3 - arrow from meter to house.

B1 – COMMUNICATION CONNECTION - ZHERO RETROFIT & HYBRID

Connect the RJ-45 cable from the **WAT** port of UNE ZHERO S6 to the RJ-45 port of the **exchange meter**, as shown in the figure below:

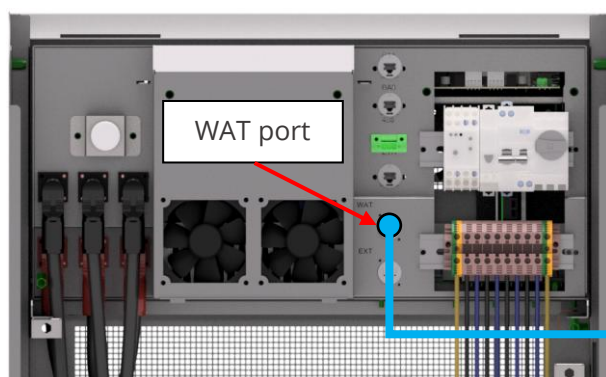


Figure 52 – Connecting the meter to the UNE ZHERO S6 panel.

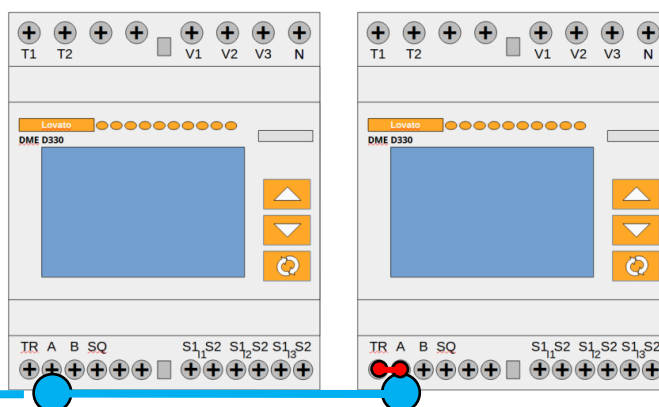


Figure 53 – RJ-45 connection of ET340 meters (blue) with terminator (red) on the last device.

Make a jumper between pins TR and A of the meter (only on the last device). For the communication link between the first and second meter the in-out connection can be made directly on terminals A, B and SQ of the DME D330.

Use communication terminals as follows:

PIN direction (1 to 8)

RJ-45 wire

Meter terminal

1 Connettore femmina RJ45 (presa)

Vista frontale della presa:
Pin numerati da sinistra a destra: 1 → 8

2 Connettore maschio RJ45 (cavo)

5	↔	A
4	↔	B
8	↔	SQ

3 Capo tagliato per Wattmetro

To verify correct installation, once the meter has been powered and the UNE ZHERO system has been switched on, check using the ZHERO Installer Tool software.

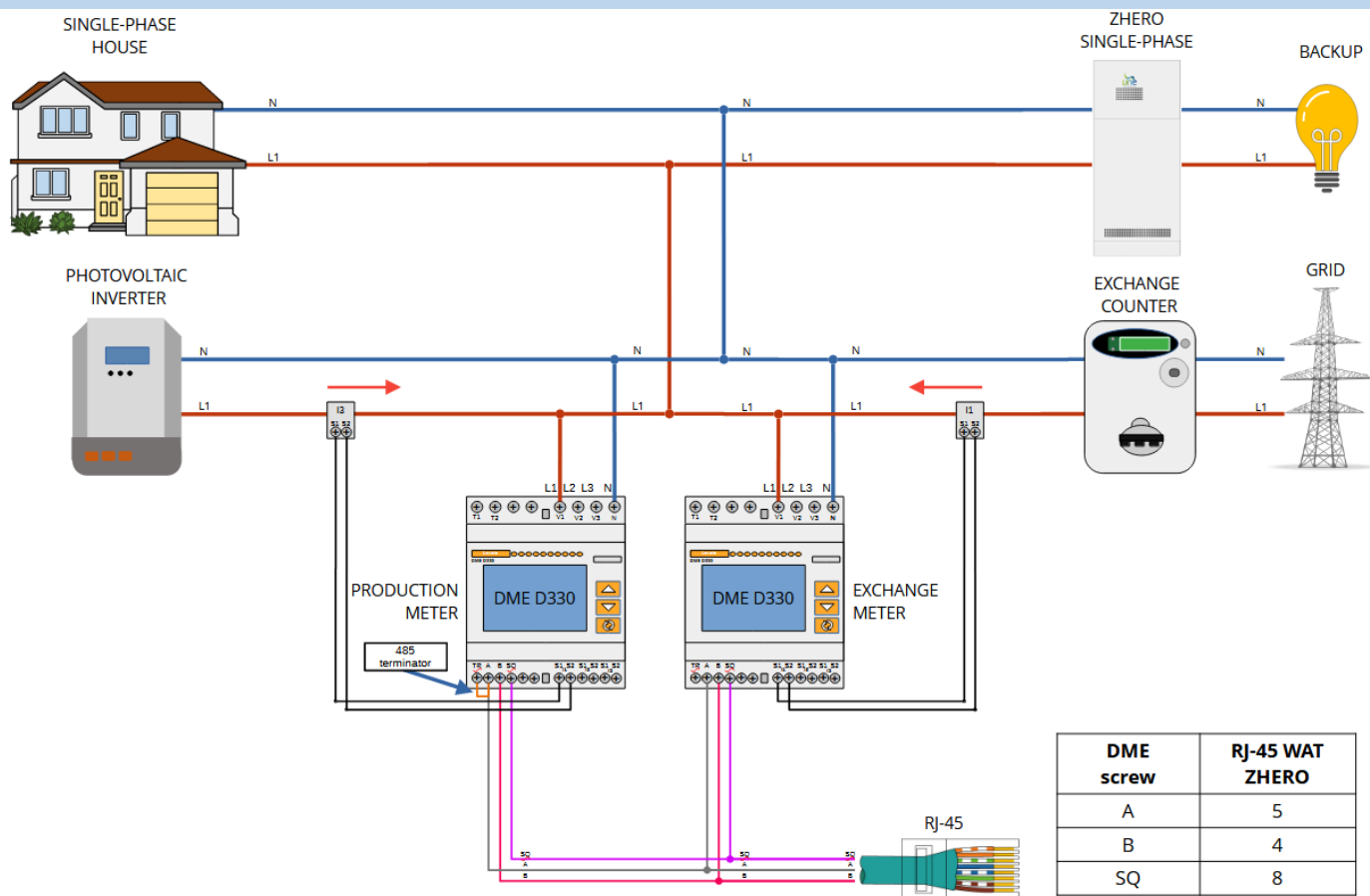


ATTENTION: The meters cannot be swapped, whereas the RJ-45 communication connection order can be changed.



WARNING: The meters count and measure what is connected downstream of the device. Anything upstream cannot be managed by UNE ZHERO.

B2 – POWER CONNECTION - ZHERO RETROFIT & HYBRID IN SINGLE-PHASE GRID

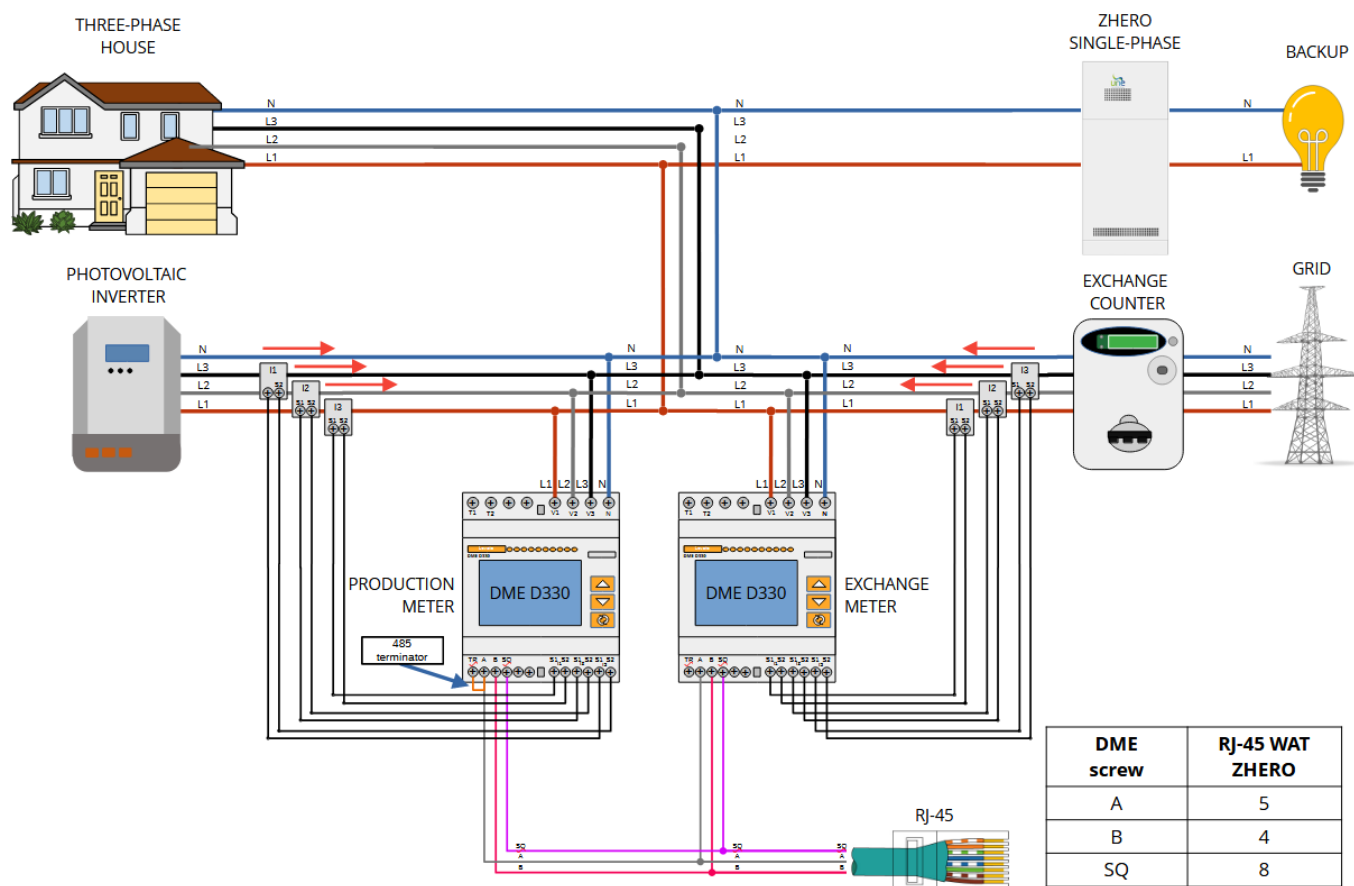


Connection directions:

METER	TERMINAL	ORIGIN
EXCHANGE METER	V1	Phase 1 from the exchange meter;
	V2	---
	V3	---
	N	Neutral from exchange meter;
	I1 - S1	TA on Phase 1 - arrow from meter to house;
	I1 - S2	TA on Phase 1 - arrow from meter to house;
	I2 - S1	---
	I2 - S2	---
	I3 - S1	---
	I3 - S2	---
	V1	Phase 1 from the inverter;
	V2	---
PRODUCTION METER	V3	---
	N	Neutral from the inverter;
	I1 - S1	TA on Phase 1 - arrow from inverter to house;
	I1 - S2	TA on Phase 1 - arrow from inverter to house;
	I2 - S1	---
	I2 - S2	---
	I3 - S1	---
	I3 - S2	---

POWER CONNECTION – ZHERO RETROFIT & HYBRID IN THREE-PHASE NETWORK

B3- POWER CONNECTION - ZHERO RETROFIT & HYBRID IN THREE-PHASE GRID



Connection directions:

METER	TERMINAL	ORIGIN
EXCHANGE METER	V1	Phase 1 from the exchange meter;
	V2	Phase 2 from the exchange meter;
	V3	Phase 3 from the exchange meter;
	N	Neutral from exchange meter;
	I1 - S1	TA on Phase 1 - arrow from meter to house;
	I1 - S2	TA on Phase 1 - arrow from meter to house;
EXCHANGE METER	I2 - S1	TA on Phase 2 - arrow from the meter to the house;
	I2 - S2	TA on Phase 2 - arrow from meter to house;
	I3 - S1	TA on Phase 3 - arrow from meter to house;
	I3 - S2	TA on Phase 3 - arrow from meter to house;
PRODUCTION METER	V1	Phase 1 from the inverter;
	V2	Phase 2 from the inverter;
	V3	Phase 3 from the inverter;
	N	Neutral from the inverter;
	I1 - S1	TA on Phase 1- arrow from the inverter to the house;
	I1 - S2	TA on Phase 1 - arrow from the inverter to the house;

I2 – S1	TA on Phase 2 – arrow from the inverter to the house,
I2 – S2	TA on Phase 2 – arrow from the inverter to the house;
I3 – S1	TA on Phase 3 – arrow from the inverter to the house;
I3 – S2	TA on Phase 3 – arrow from the inverter to the house.

4.5.4. Meter for OFF-Grid Application

The OFF-Grid configuration does not require the installation of any meters.

4.6. Internet connection

The system, whether for warranty, monitoring or service purposes, must be connected to the Internet; the **ETH** port on **UNE ZHERO S6** is located where indicated by the figure below.

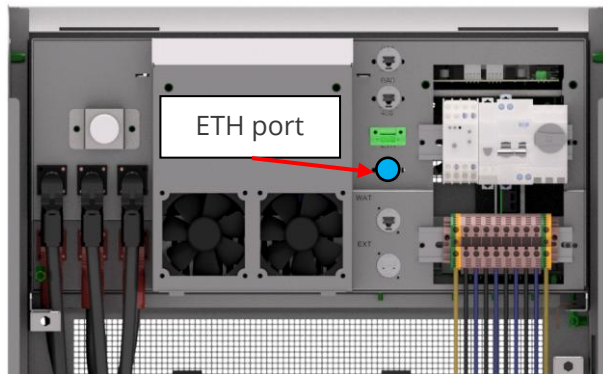


Figure 54 – Ethernet input position detail

Before making the connection, check that the cable connection is working, and if possible, check that the data communication on the webserver is successful.

The Ethernet cable coming out of the system must be **led directly to the router** or a network switch connected to it as shown in the figure:

Always use shielded **RJ-45 FTP cables of category 5e or higher with a metal connector head**.

Three different connection modes are possible between UNE ZHERO S6 and the router:

a) Connection - RJ-45 cable

Before making the connection, check that the **cable connection is working**, and if possible, check that the data communication on the webserver has taken place.

The Ethernet cable coming out of the system must be led directly to the router or a network switch connected to it as shown in the figure:



Figure 55 - Direct Ethernet connection

b) Connection - Range extender

In the event that such a connection is not possible, a WIFI-REPEATER with an Ethernet port, configured as a range extender for your network, should be used.



Figure 56 - Connection via range extender

No special features are required of this device; however we recommend purchasing a mid-range product, possibly supporting **mesh networking, dual band 2.4 and 5 GHz and with an antenna powerful enough to reach the router.**

c) Connection - Powerline

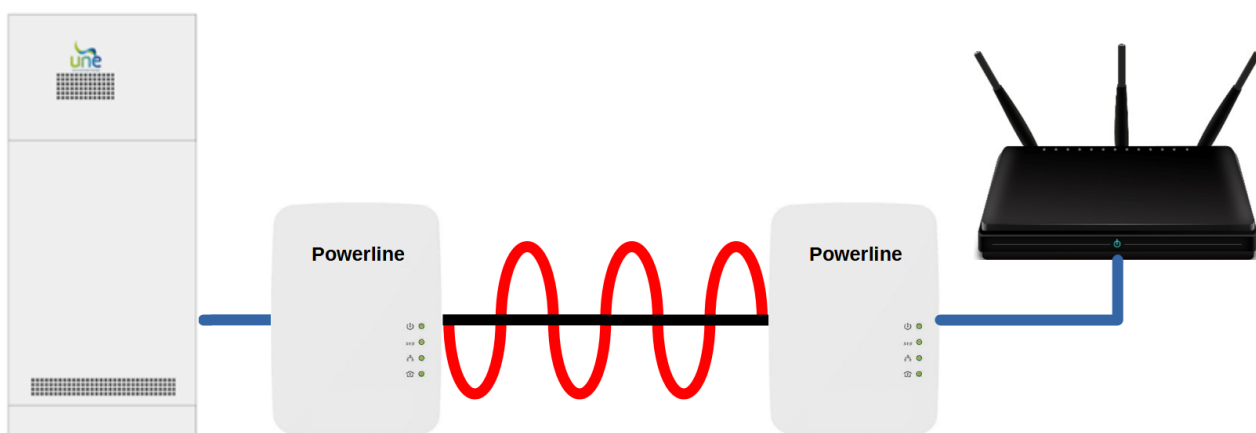


Figure 57 - Connection via powerline

No special features are required of this device; however we recommend purchasing a good quality product.



READ CAREFULLY: powerline devices must necessarily be installed along the same phase of the power line.

In the event of connection problems, carry out the steps indicated in the chap **Errore. L'origine riferimento non è stata trovata.**Errore. L'origine riferimento non è stata trovata..

5. - START-UP AND SHUTDOWN

5.1. Switching on the system

Preliminary verifications:

- **Verify** the electricity grid connection;
- **Verify** that the exchange meter and production meter are enabled;
- **Verify** that the meter power cables are correctly connected;
- **Verify** that the 485 meter terminator is only on the last meter in the series;
- **Verify** that any 485/CAN data lines are correctly connected;
- **Verify** the connection of the Internet cable to the "ETH" port;
- **Verify** the tightening of the screws on the backup line, if present;
- **Verify** that the photovoltaic system is enabled at the system input;
- **Verify** that the grid inverter is enabled (if present).

On-board operations:

- **Enable "INV";**
- **Enable** all users downstream and upstream of the system (external to the system);
- **Enable** the **"ON-OFF"** switch to **ON**;

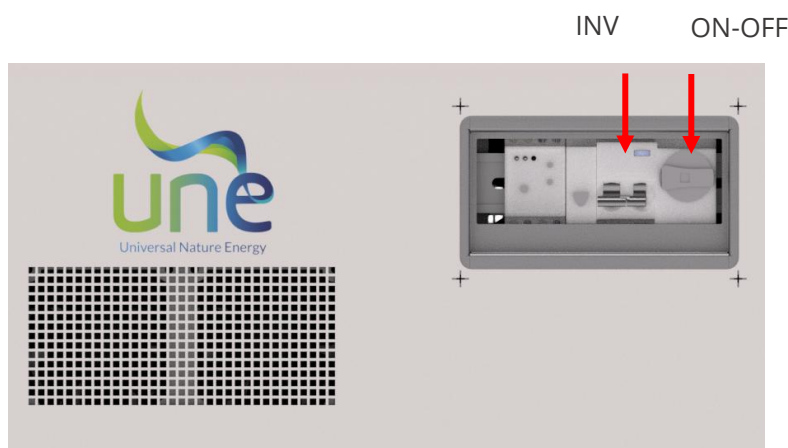


Figure 58 - Detail of switch panel of switch disconnectors to be enabled



ATTENTION: From this moment on, the backup line will be powered, otherwise something in the start-up phase has not been correctly executed.

The system will **warm-up the battery** to operating temperature (approx. 260°C).



ATTENTION: The Warmup phase of the batteries can last up to 14 hours and serves to raise the **internal temperature to 250°C / 260°C**. Once this temperature is reached, the system will proceed independently to normal operation; no further operations are required either by the user or the installer.



ATTENTION: During the Warmup phase, photovoltaic production will be limited to the consumption of the battery's internal heaters (always less than 1 kW); once the Warmup phase is over, production will reach normal working levels.

In the absence of photovoltaics if the machine does not complete the warm-up procedure after 24 hours, switch it off and contact your installer.

5.2. Verification with “ZHERO Installer Tool” software

Following the first power-up, the correct installation must be **verified using the ZHERO Installer TOOL software**. The Warmup status will remain active until the Warmup is complete, at which point the system will begin normal operation.



Figure 59 - ZHERO Installer Tool opening logo



ATTENTION: In the event of malfunctions, switch off the system via the 'ON-OFF' switch and bypass any backup line via the external diverter wired by the installer.

The programme is necessary in order to be able to verify the correct installation of the UNE ZHERO system, since **verification of the correct installation** is not provided by the UNE operator but must only be contacted in the event of a serious fault.

The software can be downloaded free of charge from the official UNE website in the **download section**:

<https://unesrl.com/en/download/>

Always refer to **the last available version** of ZHERO Installer Tool *user guide*, which can be downloaded together with the software.

5.3. Shutting down the system

To switch off UNE ZHERO S6 you need to:

- **Disable** the **"ON-OFF"** switch by setting it to **OFF**;

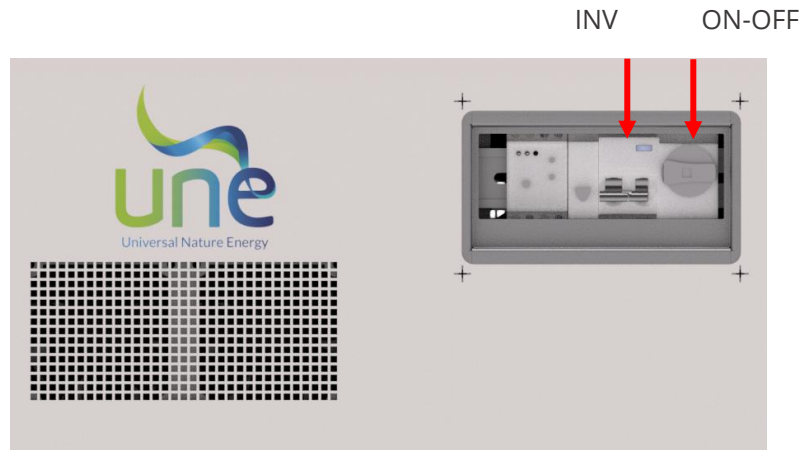


Figure 60 - Switch panel detail

If you intend to work on the system, you will also need to:

- **Disable** the **"INV"** circuit breaker by setting it to **OFF**;
- **Disable** the differential circuit breaker at the system input (not part of UNE ZHERO S6);
- **Open the photovoltaic circuit breakers.**



ATTENTION: Maintenance work must be carried out with the equipment disconnected from the grid, the photovoltaic generator and with the machine switched off, access to the system is only permitted **20 minutes after the power has been removed.**

6. - MAINTENANCE



There is no routine maintenance to be carried out on the system, but it is advisable to check the general state of cleanliness of the system and to visually inspect UNE ZHERO S6 annually to ensure that there are no obvious situations that could affect its proper functioning.

7. - PRODUCT SERVICE

Technical support for the UNE ZHERO storage system is provided by contacting the customer service UNE at: assistenza@unesrl.com.

The service department is aimed at providing support to **professionals** and **installers** to whom the private individual must, in any case, turn in case of need.

To speed up the procedure, the following data must be provided:

- **Serial number** (SN: XXXXXX);
- **Mail and Telephone Retrieval;**
- Indicative **date and time of the event** encountered;
- **Description**, as complete and detailed as possible, of the event/problem.

Once the email has been sent, UNE will receive the request for assistance and an operator will respond as quickly as possible.

8. - REGULATORY COMPLIANCE

SYSTEM - REGULATORY COMPLIANCE

Mark	+	CE
Certifications	+	EN 62109-2
	+	EN 62109-3
	+	CEI EN 61000-6-1 (2007)
	+	CEI EN 61000-6-3 (2007)
	+	CEI 0-21: 2019-04
	+	VDE 4105 -0124 06/2020

9. - DISPOSAL

UNE srl is registered with COBAT (Consorzio Nazionale Raccolta e Riciclo) for the disposal of electrical waste. UNE ZHERO, at the end of its life cycle, must be stored and disposed of according to the regulations in force in the country of installation.

The following procedure must be followed for dismantling and subsequent scrapping:

- Have authorised personnel disconnect UNE ZHERO from all incoming and outgoing equipment.
- Consult the body responsible for the disposal of UNE ZHERO in accordance with the regulations in force in the country in which the system is installed.
- Have the dismantling of UNE ZHERO carried out by personnel authorised in the country in which the disposal is being carried out, taking care to separate the component materials according to their nature.
- Carry out the unloading of the components in accordance with the regulations in force at the disposal site (the various components that make up UNE ZHERO will be disposed of in different places, depending on whether they are solid, special or toxic waste depending on the classification in force at the disposal site).

Please refer to the enclosed battery manual for battery disposal.



Figure 61 – Electronic waste symbol

10. - OPERATION OF THE SYSTEM

This chapter provides general explanations of system operation and recommendations for using the system as effectively as possible according to the user needs.

10.1. Tips for optimal use

This section provides useful recommendations to help users make the most of UNE ZHERO.

A few simple habits are enough to consume energy in a more intelligent way, saving energy without giving up everyday comfort.

Advice

NOTE: To make the most of the recommendations in this section, become familiar with the supervision system, where all the information needed to understand system behaviour is available.

First, it is useful to introduce a few basic concepts that help explain the correct operating logic. When UNE ZHERO is set to Off-Grid, it operates as a stand-alone system.

Unlike grid-connected systems, it does not generate energy continuously whenever the “fuel” is available, meaning sunlight. It generates energy when sunlight is available and, at the same time, there is a load requesting that energy, such as a discharged battery, a household appliance or another electrical device.

When sunlight is available, there is potential production. If the battery is fully charged and no electrical loads are being used, this potential production is not used and is therefore lost automatically.

If the system is set to On-Grid, unused energy is not automatically lost but is fed into the local distribution grid, where it is generally valued significantly less than energy that is self-consumed or stored in the battery.

The first objective is therefore to maximise the amount of energy used when production capacity is high. When production and consumption occur at the same time, the use of the battery is less demanding.

The following example uses a washing machine in four different situations, always with the battery fully charged:

- I. during the day with high solar irradiation;
- II. during the day with low solar irradiation in the morning;
- III. during the day with low solar irradiation in the evening;
- IV. during the night.

I. DURING THE DAY WITH HIGH SOLAR IRRADIATION

In the first case, the production capacity of the system is higher than the energy required to operate the appliance. The washing machine will draw all the energy it needs from the photovoltaic system, leaving the battery charge unchanged. **This is the optimal method of use.**

Advice

NOTE: Having enough production capacity to supply an appliance does not necessarily mean that the appliance uses all available production capacity. Use the supervision system to check whether there is still margin to connect other loads at the same time, provided that the battery does not need to be charged..



WARNING: Always respect the instantaneous absorption limits of the purchased system. If this limit is exceeded, the system disconnects the loads

II. DURING THE DAY WITH LOW SOLAR IRRADIATION IN THE MORNING

In the second case, production capacity covers only part of the energy required by the appliance. The washing machine will draw part of its energy from the photovoltaic system and part from the battery. The battery will then have the rest of the day to recharge using generator production capacity not used by other loads and will be ready for the night period. **This is a good method of use.**

III. DURING THE DAY WITH LOW IRRADIATION IN THE EVENING

In the third case, production capacity again covers only part of the energy required by the appliance. The washing machine will draw part of its energy from the photovoltaic system and part from the battery. However, the battery will not have the rest of the day to recharge using unused generator production capacity. This still reduces battery discharge and leaves more charge available for the night period. **This method is less effective than the previous one, but still reasonable.**

IV. DURING THE NIGHT

In the fourth case, production capacity is zero. The washing machine will draw all the energy it needs from the battery, together with any other loads operating during the night.

This means that any production capacity available during the day was not used and was therefore lost in Off-Grid operation. As a result, less stored energy is available overnight without support from the grid or generator. **This is the least recommended method of use.**

This does not compromise system functionality. These are recommendations for optimal use: the system will continue to operate normally even if the battery becomes discharged.

The battery available in UNE ZHERO S6 has high storage capacity; therefore, even when using demanding appliances such as ovens or washing machines, the night period alone may not be enough to fully discharge it.

However, if weather conditions are poor the following day and/or the loads used are particularly demanding, the battery may not have sufficient charge. This may require the use of the local distribution grid or generator, with a consequent increase in costs.

The rule is therefore always the same: use appliances when production capacity is available. In Off-Grid operation, unused production capacity is lost if it is not consumed.

The washing machine is only an example used to explain the operating logic. The same approach should be applied to all electrical devices in the home, such as an iron, vacuum cleaner and similar loads. The selected UNE

ZHERO model must have a battery capacity suitable for the intended use, so that this capacity is sufficient to cover night-time demand.

It is not necessary to radically change everyday habits: users may continue to use the oven in the evening, lighting, televisions, computers and other appliances as before. However, careful use can reduce costs and make access to the grid only occasional.

Optimal use is therefore the use that maximises the production capacity of the system while minimising battery use, which is highly achievable with careful energy management.

This is even easier when programmable and less energy-intensive appliances are used.

Additional recommendations:

- use the programming function on appliances whenever available;
- when purchasing new appliances, choose the highest available energy class;
- use only energy-saving lighting devices;
- switch off lights and appliances that are not in use;
- open the refrigerator door as infrequently as possible;
- run washing cycles with full loads whenever possible;
- avoid leaving appliances in stand-by;
- carry out the required maintenance on installed appliances;
- avoid using the tumble dryer during summer periods whenever possible.

10.2. Security checks

To ensure correct operation, it is advisable to perform periodic checks on the system to prevent possible issues. The following checks must be carried out:

- **monitor** any warning emails sent by the system;
- **check** the cleanliness and integrity of the external enclosure;
- **check** that there are no obstructions or objects leaning against the system, especially near the ventilation slots;
- **perform** the safety tests listed in the following subsections.

10.2.1. Insulation test

To verify the effectiveness of the electrical insulation monitoring system, the insulation monitoring test must be performed once a month. This confirms that the system **can detect and signal the relevant hazard in a timely manner**.

To perform the test, press and hold the TEST button on the “ISO” insulation monitoring module in the main panel for **10 seconds**.

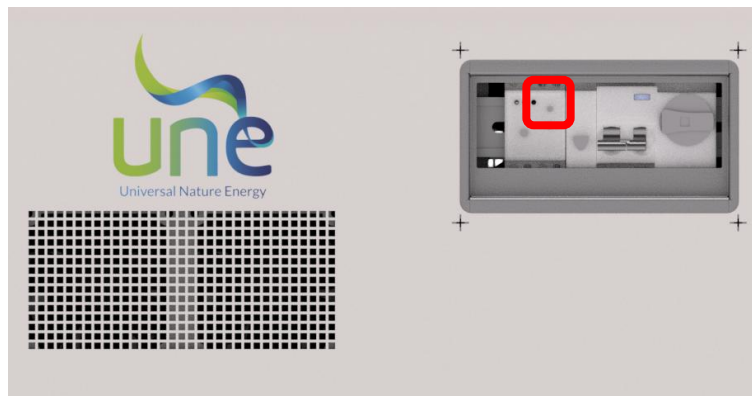


Figure 62 – ZHERO switchboard, isolation test button

The main system **alarm lamp will flash 3 times in sequence, followed by a 1-second pause, and then flash 3 times again**. This indicates correct operation of the insulation monitoring detection and signalling function.

To restore normal operation, simply release the test button.

10.3. On-board INV switch test

To verify correct operation of the residual-current protection device on board ZHERO, proceed as follows:

- disconnect as many household loads as possible;
- disconnect the photovoltaic system;
- press the test button on the “INV” module as shown in the figure.

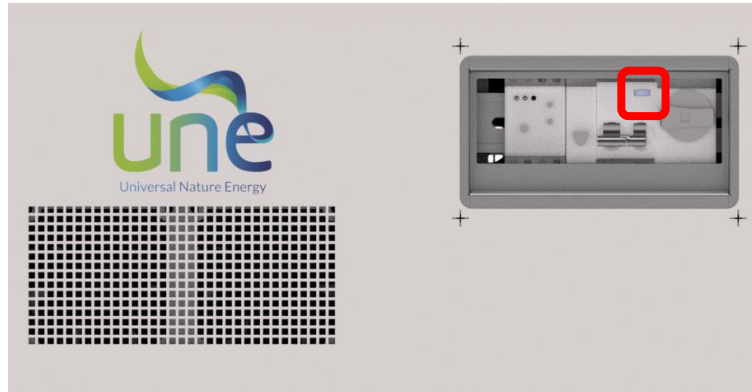


Figure 63 – ZHERO switchboard INV test button

The relevant **switch should trip immediately**. To restore normal system operation, raise the lever that has just tripped. Once the test has been completed, all household loads may be restored.

This test must be performed at least once every six months.

10.4. System Supervision

The system can be monitored through the following tools:

1. Zhero Installer Tool (for installers);
2. Webserver/Web App (for installers and end users);
3. UneSrlCommunication (accessible to UNE technicians via password during remote support activities).

These tools allow verification of the correct installation and proper operation of the UNE ZHERO system. Installation verification is not normally carried out by UNE personnel unless specifically requested; UNE technical support should only be contacted in the event of significant faults or situations that cannot be resolved through standard procedures.

The use of Zhero Installer Tool is recommended to verify the correct installation of the system. In the presence of alarms or abnormal conditions, refer to the dedicated section of this manual.

The software can be freely downloaded from the official UNE website in the Download section:

<https://unesrl.com/download/>

For instructions on the use of Zhero Installer Tool, refer to Chapter 5.2 and to the dedicated manual available on the website.

10.4.1. Webserver & Webapp

The use of the webserver is covered in depth in the portal's On-Line Course: UNE CAMPUS after registering for the portal by clicking on the following link:

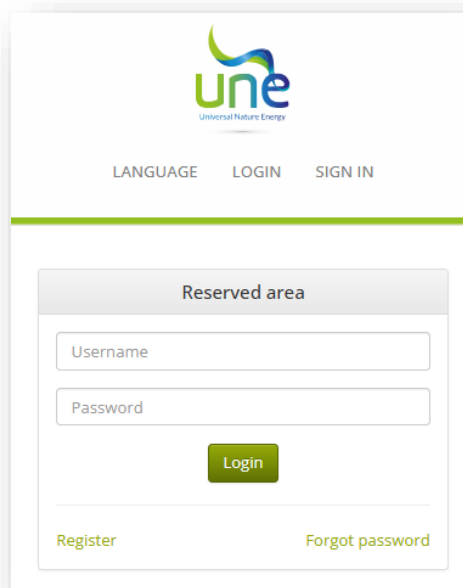
<https://unecampus.thinkific.com/courses/corso-webserver-une>

The main steps for Webserver registration and access are summarised below.

Access

Open a browser (Chrome, Edge or Firefox) and enter the following address in the search bar:

<http://portal.zherosystem.com/login>



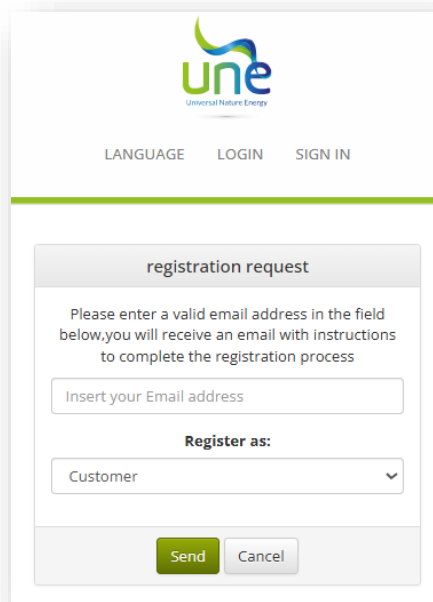
The screenshot shows the login interface of the UNE ZHERO system. At the top, there is the UNE logo and the text 'Universal Nature Energy'. Below the logo, there are three links: 'LANGUAGE', 'LOGIN', and 'SIGN IN'. A horizontal green line separates the header from the main content area. The main content area is titled 'Reserved area' and contains a login form. The form has two input fields: 'Username' and 'Password'. Below these fields is a green 'Login' button. At the bottom of the form, there are two links: 'Register' and 'Forgot password'.

- Press **“Register”** if this is the first access.

- If an account is already available, enter the "Username" and the relevant password, then press "Login".
- If the password has been lost, follow the procedure by clicking "**Forgot password**" to recover the access credentials.

Registration

- The **user** and the **installer** must enter their email address and select the level of their profile.
- Important: the installer must never register as user and the user must never register as installer.
- Only one installer account and one user account can be associated with each system.
- In the event of incorrect association, contact technical support at assistenza@unesrl.com.



The image shows a web form titled "registration request" for the "une" portal. At the top, there is a header with the "une" logo and navigation links for "LANGUAGE", "LOGIN", and "SIGN IN". The form itself has a title bar "registration request" and a message: "Please enter a valid email address in the field below. you will receive an email with instructions to complete the registration process". Below this is a text input field labeled "Insert your Email address". Underneath the input field is a dropdown menu labeled "Register as:" with "Customer" selected. At the bottom of the form are two buttons: "Send" (in green) and "Cancel" (in grey).

An email will be sent to the indicated address. If it is not visible within 10 minutes, **check the spam folder**.

Richiesta di registrazione

Ciao,
ricevi questa email perchè qualcuno ha utilizzato l'indirizzo **utenteesempio@outlook.it** per richiedere la registrazione al portale UNE s.r.l.

Se sei tu che hai richiesto la registrazione, clicca il link qui sotto per procedere, in caso contrario ignora semplicemente questo messaggio.

Grazie,
Lo Staff di UNE s.r.l.

[Sì, voglio registrarmi](#)

Il link scadrà alle 14:43 di sabato, 13 giugno 2026

Registration Request

Hello,

You are receiving this email because someone has used the email address **utenteesempio@outlook.it** to request registration on the UNE S.r.l. portal.

If you requested this registration, please click the link below to complete the process. If you did not make this request, simply ignore this message.

Thank you,

UNE S.r.l. Team

[Yes, I want to register](#)

Premere **“Si, voglio registrarmi”**. Il link vi porterà ad una pagina web del webserver per il completamento del processo di registrazione.

Una volta reindirizzati alla pagina del portale **completare la registrazione** inserendo:

- La propria mail
- La password scelta
- Ripetere inserimento della password scelta

Premere infine il pulsante **“Procedi”**.

In caso l'account utente venga registrato dall'installatore, quest'ultimo dovrà inserire l'indirizzo mail e password del suo cliente.

Inserire i **dati anagrafici** completi nella schermata **“Inserimento dati utente finale”**. Questa operazione sarà necessaria per poter localizzare i nostri clienti ed intervenire sul campo.

Cliccare su **“Salva”** a fine completamento.

Press [“Yes, I want to register”](#). The link will be redirect to a Webserver page where the registration process can be completed.

Once redirected to the portal page, complete registration by entering:

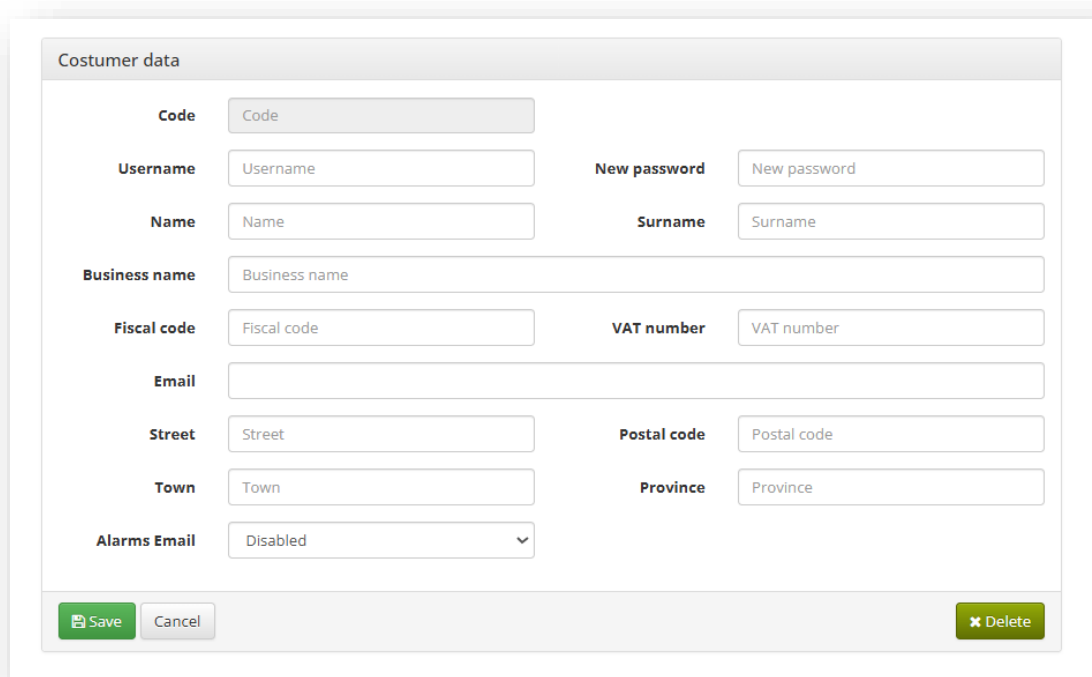
- the email address;
- the chosen password;
- the chosen password again.

Then press **“Proceed”**.

If the user account is registered by the installer, the installer must enter the customer email address and password.

Enter the complete personal data in the “End user data entry” screen. This operation is required to locate customers and perform on-site interventions when necessary.

Click **“Save”** after completing the form.



The screenshot shows a web form titled "Customer data". It contains several input fields for customer information. At the bottom, there are "Save", "Cancel", and "Delete" buttons.

Customer data	
Code	
Username	
New password	
Name	
Surname	
Business name	
Fiscal code	
VAT number	
Email	
Street	
Postal code	
Town	
Province	
Alarms Email	Disabled

Device association

L'*utente* e l'*installatore* dovranno cliccare su "**DISPOSITIVI**"; a seguire nel menù a tendina cliccare "Associa un dispositivo".

Una volta effettuata la registrazione verrà generato un codice come segue:

- Per l'**utente**: "xxxxxx"
- Per l'**installatore**: "DEALxxxxx"

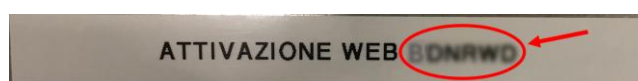
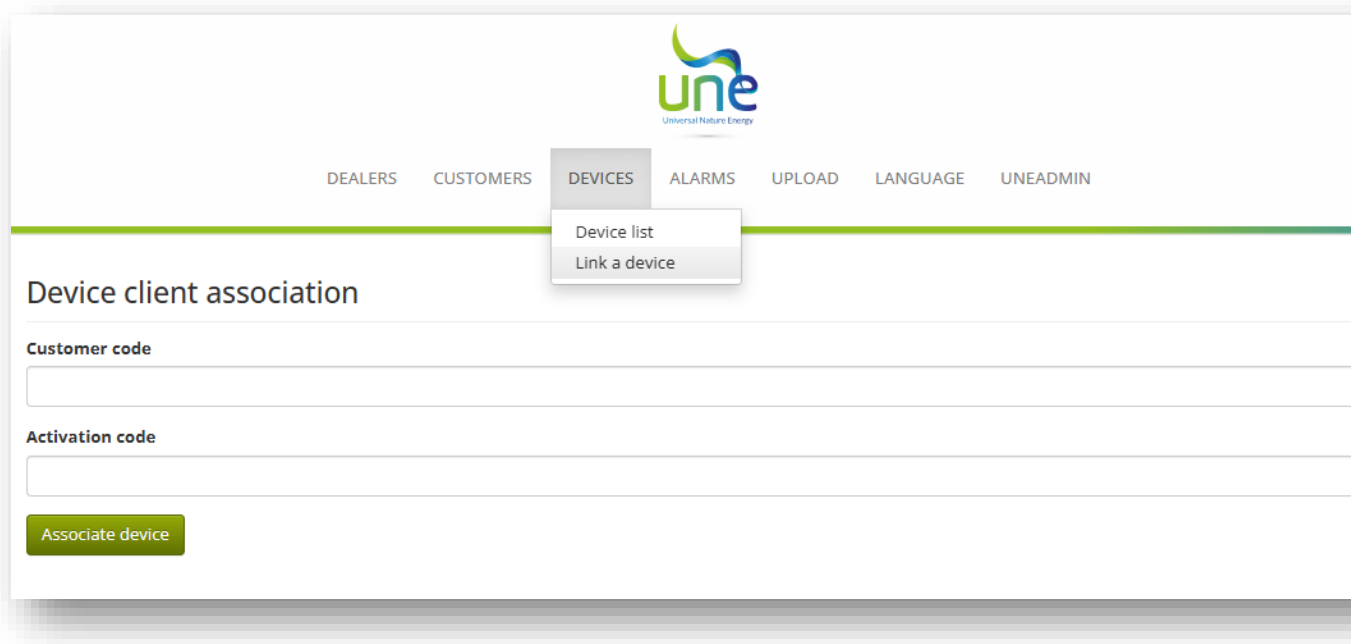
Procedere all'associazione inserendo il codice generato dalla registrazione sopraindicata ed il codice "ATTIVAZIONE WEB:XXXXXX" riportato su una etichetta situata sotto il coperchio frontale e sul lato destro del sistema. Questo codice andrà quindi riferito al cliente al momento dell'installazione.

The user and installer must click "**DEVICES**"; then, from the drop-down menu, click "**Link a device**".

Once registration has been completed, a code will be generated as follows:

- for the user: "xxxxxx";
- for the installer: "DEALxxxxx".

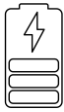
Proceed with the association by entering the code generated during registration and the "WEB ACTIVATION: XXXXXX" code shown on the label located under the front cover and on the right side of the system. This code must therefore be communicated to the customer during installation.

The screenshot shows the UNE web interface. At the top, there is a navigation bar with the UNE logo and several menu items: DEALERS, CUSTOMERS, DEVICES, ALARMS, UPLOAD, LANGUAGE, and UNEADMIN. The 'DEVICES' menu is currently selected, and a dropdown menu is open showing two options: 'Device list' and 'Link a device'. Below the navigation bar, the main heading is 'Device client association'. There are two input fields: 'Customer code' and 'Activation code'. At the bottom of the form, there is a green button labeled 'Associate device'.

10.5. System Working Status

10.5.1. Equalisation or cyclic charge



For correct system operation and correct battery management, every 7 or 15 days the system must reach 100% charge. To achieve this, all loads are transferred to the distribution grid and the battery is charged by the photovoltaic system and by the grid whenever the available surplus is not sufficient.

In firmware versions prior to UAV 08.05.0049, the battery performs the cyclic charge only from the photovoltaic system. In the event of poor production, this process may therefore require several days. This does not affect the percentage of self-consumed energy or total production; the use of this energy is simply shifted to the following days

10.5.2. System maintenance mode



When the battery reaches its minimum charge value (default 20%), energy delivery from the battery is interrupted and the loads are transferred to the distribution grid.

Unless the system is in cyclic charge, it resumes energy delivery only after reaching a charge level 5% higher than the minimum charge value (default 25%).



ATTENZIONE: If two batteries are installed, the minimum charge level is not the average value shown on the webserver, but the lowest charge value of the two batteries. The minimum SOC shown may therefore be slightly higher than the configured minimum value (default 20%).

10.5.3. Battery warm-up, charge and discharge



A completely cold battery may take up to 14 hours to enter operation. This operation is performed only after:

- switch-on;
- system restart;
- excessive discharge in the absence of the distribution grid.

Once the battery has entered operation, the system will not switch it off again except in the event of anomalies.

The system can discharge up to 6 kW when photovoltaic production is available. Each battery can be discharged up to 3.3 kW. Since the inverter is rated at 6 kW, a two-battery system will reasonably discharge each battery up to approximately 3 kW.

The system is designed to provide the user with all stored energy, but not necessarily always at maximum power. Discharge is therefore managed compatibly with responsible battery use, avoiding excessive wear due to rapid discharges while still providing all available energy by the end of the cycle.

Like any storage device, battery charging follows a specific charge curve and can reach a maximum of 2.5 kW depending on the state of charge and internal battery temperature. A two-battery system can therefore be charged up to 5 kW.

Photovoltaic production is not slowed down or inhibited in any way. The user loads always have priority and, where provided, surplus energy is fed into the distribution grid through

net metering/export management.viene venduto alla rete di distribuzione tramite scambio sul posto, se previsto.

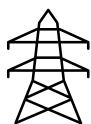
2. Device in stand-by



Normally, the “Device in stand-by” message, with the machine switched on, indicates an issue with internet communication.

If the device shows a green lamp, the system is operating correctly. If the lamp is red, an anomaly is present (see Chapter 11). If the lamp is off, the device is actually in the OFF condition.

3. Grid export



If the system is configured for grid export, it automatically feeds surplus energy into the grid. Once the batteries are charged compatibly with their charge curve and the user loads are supplied, the remaining energy is fed into the grid through the applicable export/net metering arrangement.

This function is inhibited during the initial battery Warm-up phase.

4. Blackout



For loads not connected to the “backup” line, any service interruption causes loss of supply to all loads.

For loads connected to the “backup” line, in the event of a distributor blackout, the system automatically and dynamically switches to BACKUP mode. It guarantees continuity of service on the “backup” line until the batteries are depleted (default minimum in this condition is 10%, no longer 20%) or until the local distribution grid is restored. In the latter case, normal operation resumes.

This function must not be considered equivalent to a UPS, because UNE ZHERO is not certified as a UPS but as a storage system with backup function. In addition, it does not filter or stabilise the distribution grid. Flickering may therefore occur due to the inverter start-up ramp.

Carefully check that the loads connected downstream of UNE ZHERO can tolerate possible service interruptions or can be supplied directly by the distributor grid voltage, which is not filtered. UNE srl accepts no responsibility for the quality of the grid supply to the loads.

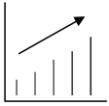


ATTENTION: If an interface protection device is present, brief interruptions caused by it may also occur on the “backup” line.



WARNING: In backup operating mode, the use of particularly energy-intensive equipment may cause system malfunction or increase operating costs. Contact your supplier to verify the suitability of specific equipment.

5. Power ramp



When the system must operate Off-Grid due to blackout or because the distribution grid is outside the regulatory parameters, connection of loads on the “backup” line may be affected by a micro-interruption followed by a ramped restart of power, which may cause a brief flickering of lights.

This is normal operation when supplying loads in the absence of the grid. The system will continue supplying the loads until all useful stored energy is depleted. The default minimum value in the absence of the grid is 10%, no longer 20%.

11. - FAILURE OR ANOMALY

11.1. Fault Signalling

Alarm or anomaly notifications are provided to both the user and the installer through the following methods: by means of the indicator light on the system and/or by email notification.



Figure 64 – Fixed red light detail on BOX Inverter

WARNING LIGHT ON UNE ZHERO S6

The **RED** indicator light signals the presence of an active alarm within the system.

The alarm indication may be temporary and may be automatically cleared by the system within a few hours. To speed up the recovery process, the alarm reset button located behind the switch cover on UNE ZHERO may be pressed.

If this operation does not restore the normal operating condition (indicated by the **GREEN** light), the user shall contact their UNE-authorized installer. Using the **ZHERO Installer Tool** software, the installer will perform an initial analysis of the system notification.

Only if the issue cannot be resolved by the installer may the installer request on-site or remote assistance by contacting the official support channel at assistenza@unesrl.com, as described in Chapter 7.



Figure 65 – Example of e-mail notification

EMAIL NOTIFICATION TO USER AND INSTALLER

By registering on the portal (see Chapter 10.4.1) and providing a valid email address, alarm notifications can be enabled for the system.

An example of an alarm notification email is shown alongside.

Notifications will only be sent if the alarm email notification option **has been enabled** through the corresponding checkbox. Portal registration alone is not sufficient to activate email notifications.



ATTENTION: Any anomaly reported through the indicator light and/or email notification **MUST** be analysed by a UNE-authorized installer using the **ZHERO Installer Tool** software, available for free download from the official website in the **DOWNLOAD** section, before contacting UNE technical support.

11.2. Identification of Faults or Anomalies

The following section lists some fault or anomaly conditions that may occur during the operation of the UNE ZHERO system.

For each case, the following information is provided:

- **Indicator:** whether an automatic indication is generated by the system;
- **Event:** description of the system behaviour when the fault or anomaly occurs;
- **Possible causes:** probable causes that may have led to the fault or anomaly. These may originate either within the ZHERO system or from external conditions;
- **User/Installer action:** recommended actions to be taken by the user or installer.



ATTENTION: Not all anomalies can be detected automatically by the system. Some conditions require technical verification by the installer, as they do not generate any visual indication or notification.

The following alarms generate a visual indication through the lamp indicator on the system:

ALLARME	SPIA	EVENTO
ALM_ISOLAMENTO	3 GREEN-RED flashes	Insulation fault
ALM_OVERLOAD	Solid RED	Maximum deliverable power exceeded
ALM_OVERVOLTAGE	Solid RED	Maximum DC bus voltage exceeded
ALM_BATT_FERMA_BLOCCO	Solid RED	Maximum number of automatic restart attempts exceeded
ALM_OVERTEMP	Solid RED	Temperature threshold exceeded

11.2.1. Low insulation resistance



Indicator Lamp

The indicator light signal is present. The light flashes RED-GREEN.



Event

If the ZHERO system, through the insulation resistance monitoring device, detects leakage to earth from one of the two poles of the DC side of the system, it will behave as follows:

- A message and an e-mail notification are sent to the user and installer reporting the presence of an earth fault;
- The system signals the fault by flashing the green/red light.

The system will continue to operate.



Fault causes

Low insulation resistance occurs when an active part starts leaking current to earth.

The most common causes are:

- Failure or degradation of the insulation of the photovoltaic modules;
- Damage to the sheath of the photovoltaic cables;
- Ageing of the photovoltaic string connectors;
- Triggered surge protection devices on one of the photovoltaic poles.

In adverse environmental conditions, for example particularly violent storms, moisture may penetrate the connectors and cause temporary leakage that disappears once the site has dried. In this case, even if the ZHERO system can restart normally, verification is required.



User action

If the problem is temporary, the system will reset automatically. If the problem occurs frequently, contact your installer to identify the cause of the fault.

11.2.2. String production anomaly



Indicator Lamp

The indicator light signal is NOT present.



Event

If, during normal operation, a string stops delivering power, a significant reduction in photovoltaic production will be observed. This anomaly does not generate any e-mail notification or red indicator light.



Fault causes

A string stops delivering current when there is a physical interruption in the circuit, possibly due to:

- A blown photovoltaic string fuse;
- A fault in an internal charge controller, if provided.

This signal is not blocking and the system will continue to operate.



User action

The user must contact their installer, who will carry out the necessary verification.

11.2.3. Battery anomaly



Indicator Lamp

The indicator light signal is present. The light turns RED.



Event

In the event of a critical battery error, the ZHERO system will attempt to reset the battery and will behave as follows:

- A message and an e-mail notification are sent to the user and installer reporting battery shutdown;
- The system signals the anomaly by means of the red light.

The system will disconnect the inverter. If the user is in Off-Grid mode, the loads will remain without power for a few minutes.

Meanwhile, the system will attempt to restore the battery. If the reset is successful, the system will return to operation. Otherwise, the ZHERO system will supply the loads only from the local distribution grid, if in On-Grid mode, or from the emergency source, if in Off-Grid mode.

For loads supplied by the backup line, the system can be bypassed using the external changeover switch, if present.



User action

The user must contact their installer, who will carry out the necessary verification.

11.2.4. Controller anomaly



Indicator Lamp

The indicator light signal is present. The light turns RED.



Event

If UNE ZHERO detects a controller anomaly, it will behave as follows:

- A message and an e-mail notification are sent to the user reporting communication failure with the controller.

This alarm may also be present when photovoltaic production is absent; therefore, at night or on cloudy days, it should not be considered an anomaly.

The system will continue to operate using the battery as long as energy is available. Once the available energy has been depleted, UNE ZHERO will supply the user only from the local distribution grid, if in On-Grid mode, or from the backup generator, if in Off-Grid mode.



Fault causes

It may be due to a problem in the data connection or to an internal anomaly of UNE ZHERO.



User action

Contact your installer for an on-site inspection.

11.2.5. Inverter anomaly



Indicator Lamp

The indicator light signal is present. The light turns RED.



Event

In the event of an inverter anomaly, UNE ZHERO will no longer be able to deliver current from either the photovoltaic generator or the battery. The system will signal the anomaly as follows:

- A message and an e-mail notification are sent to the user reporting system shutdown;
- The system signals the anomaly by means of the red light.

If present, bypass the system using the external changeover switch in order to supply the backup line from the grid. In the most severe case, if the inverter cannot be switched on, it stops operating and may prevent the loads from being supplied even from the local distribution grid, if in On-Grid mode, or from the emergency source, if in Off-Grid mode.



Fault causes

It may be due to an internal inverter fault.



User action

Call your installer for a prompt intervention. If immediate restoration is not possible, the ZHERO system can be excluded by manually switching to the local distribution grid using the external changeover switch that the installer must provide if the backup line is present.

11.2.6. Webserver communication anomaly



Indicator Lamp

The indicator light signal is NOT present.



Event

If a powered-on system suddenly interrupts previously functioning communication with the Webserver, it is plausible that the data connection has been interrupted. The system will not send any warning e-mail and will not turn on the red indicator light



Fault causes

This anomaly may occur in the presence of specific network configurations or restrictions imposed by the Internet service provider. In some cases, the data traffic generated by the UNE ZHERO system may be incorrectly classified as anomalous traffic, such as spam, and therefore automatically blocked by the router or by the provider.

This behaviour occurs more frequently with devices using routers with data SIM cards and weak signal, compared with routers connected to a fixed line, such as ADSL or fibre optic.



User action

Since this problem is related to the customer's local network, and UNE is not responsible for the configuration of the external communication network or for the provision of the Internet service, no direct intervention by UNE technical personnel is foreseen.

It is therefore recommended to contact the Internet service provider or a trusted network technician to analyse and resolve the block.

Notes:

Connected device: the "Zhero" storage system communicates with an external webserver, the UNE webserver, through Modbus TCP/IP protocol on **TCP and UDP port 9090**. Communication is bidirectional.

The **Zhero device is configured in DHCP**; therefore, once connected to a network, it is assigned a local IP address by the router.

The router/firewall identifies Zhero with the hostname "lwip" or with a name starting with "une", depending on the model.

It is not necessary to open incoming ports. All connections are outgoing.

If a firewall blocks outgoing connections, enable all outgoing connections on TCP and UDP port 9090 to the destination address "portal.zherosystem.com".

The problem may be located in one of the following points:

a) Switch block

Connect UNE ZHERO directly to an RJ45 port on the router, if network switches are present, in order to remove any hardware between the router and UNE ZHERO.

b) Router, firewall or IP conflict block

Enable outgoing connections on TCP and UDP port 9090 to the destination address "portal.zherosystem.com".

Check that UNE ZHERO is visible in the router LAN, that it has received an IP address from the DHCP server, and that this address is not in conflict with other static IP addresses assigned to other devices, such as home automation devices.

Try removing all protections and filters from the entire router to check whether communication resumes.

ATTENTION: Data communication occurs every 15 minutes and several hours may be required for communication to resume.

c) Internet service provider block

UNE cannot provide a direct solution in this case. If the ETH module is visible on the network, all traffic to and from the module must be allowed.

The Internet service provider may have supplied a paid “antivirus” service that must be properly configured or disabled.

The Internet service provider may silently interrupt the connection between the machine and the portal after a few minutes of inactivity, especially on cellular networks. For the system, this usually causes the loss of about half of the data records.

Any timeout for cutting the connection due to inactivity must be at least 30 minutes, in order to allow communication every 15 minutes while keeping the connection open.

d) Hardware integrity of the cabling

Check the integrity of the RJ45 communication cable by trying to browse the LAN using the cable that would be connected to the ETH port of UNE ZHERO.

ATTENTION: It is mandatory to use a **shielded FTP Cat. 5e or higher** cable and a metallic RJ45 connector. If shielded components are not used, the cables effectively behave like antennas that pick up disturbances and may corrupt the data packets sent by ZHERO. The same applies to the RJ45 cable of the wattmeter.

e) Temporarily use a different network as a check

Connect UNE ZHERO to another network and check whether communication resumes from there. Wait at least 30 minutes. If communication resumes, the hardware problem of UNE ZHERO can be definitively excluded.

Recommendation: use mobile phone tethering. Use the mobile phone hotspot by connecting the phone directly to the ZHERO system through an adapter that allows the phone, for example USB-C, to be connected to the RJ45 port of the system. To enable this function on the phone, select “Ethernet tethering”, which becomes active once the adapter is connected to the phone and the other end is connected to the RJ45 port.

f) RJ45 input line filtering

Especially in the case of intermittent communication, but also in the case of interrupted communication, it is recommended to apply a ferrite both to the RJ45 cable entering the Internet network and to the RJ45 cable of the wattmeter.

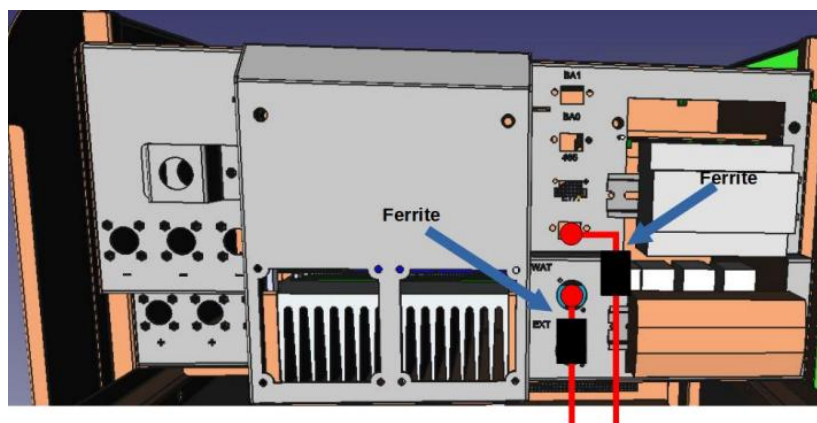


Figure 66 - Positioning of ferrites on RJ45 cables

g) Filtering/shielding of the incoming utility line

If Internet communication is frequently interrupted, intermittent, or requires a restart, the main cause is likely to be electromagnetic disturbances coming from the grid. It is therefore recommended to apply an input mains filter and ferrites, externally to the machine but nearby, to the incoming distribution grid cables of the machine according to the configuration shown in Figure 67.

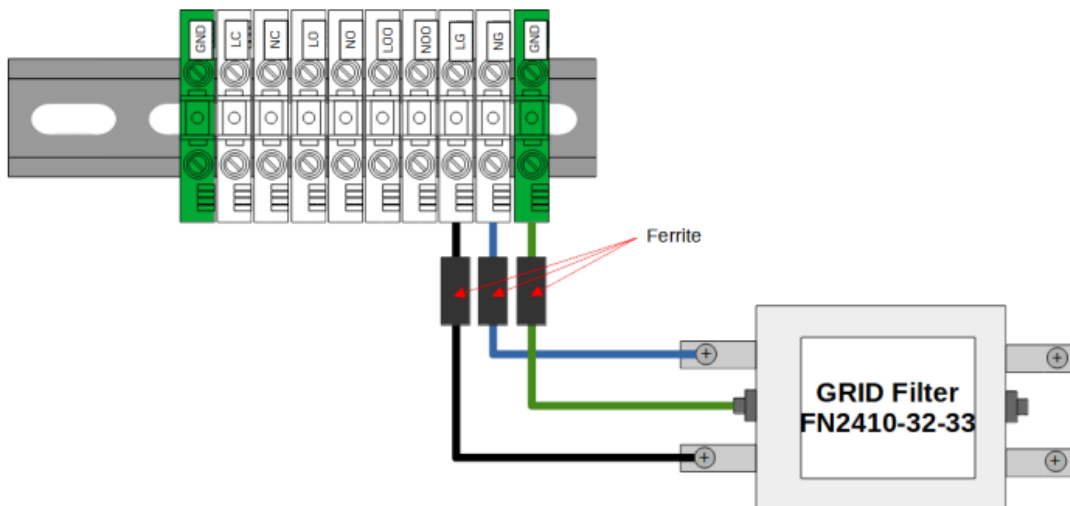


Figura 67 - Ferrite positioning

h) Connection sharing through a PC

Check whether system communication fails even when using an updated PC with Windows 8.1 or higher.

- Connect the PC to the hotspot network of a mobile device, such as a 3G/4G router, mobile phone or tablet;
- Connect the RJ45 port of the PC to the ETH port of ZHERO;
- Follow these steps:
 - Control Panel\\Network and Internet\\Network Connections;
 - Access type: Ethernet;
 - Properties > Sharing;
 - Select: Allow other network users to connect through this computer's Internet connection;
 - OK > Close;
- Wait 15/20 minutes to check whether the Internet connection resumes;
- Disable the settings applied to the PC after the check has been completed.

Use a shielded RJ45 FTP Cat. 5e or higher cable with a maximum length of 1.5 metres.

i) Replacement of the communication board

If none of these interventions resolves the issue and the customer assumes that the problem is attributable to the UNE ZHERO system, the following intervention may be carried out: replacement of the communication board.

ATTENTION: The replacement intervention must be carried out by qualified UNE personnel.

11.2.7. Failure of the on-board combined residual-current and overcurrent circuit breaker



Indicator Lamp

The indicator light signal is NOT present.



Event

If the on-board “INV” combined residual-current and overcurrent circuit breaker does not trip during the test, or no longer remains active, your electrician must be contacted immediately in order to replace it.

The system will not send any alarm and the red indicator light will not turn on.



Fault causes

The combined residual-current and overcurrent circuit breaker may be faulty.



User action

Contact your electrician immediately in order to replace it.

11.2.8. Failure to connect to the distribution grid / generator set



Indicator Lamp

The indicator light signal is NOT present.



Event

The system does not connect to the distribution grid or to the generator set. If the system does not connect to the distribution grid, the voltage or frequency may be outside the ranges accepted by UNE ZHERO according to the CEI 0-21 standard. See Chapter 4.4.1.

The system will signal the anomaly as follows:

- A message and an e-mail notification are sent to the user and installer reporting system disconnection from the grid;
- No indicator light signal is generated.



a) Fault causes - On-Grid system

If the system does not connect to the distribution grid, the voltage or frequency may be outside the ranges accepted by the CEI 0-21 standard for UNE ZHERO reconnection.

The system will nevertheless compensate the consumption of the loads connected to the backup line.

b) Fault causes - Off-Grid system

If the system does not connect to the generator set, the voltage or frequency may be outside the ranges accepted by UNE ZHERO.



User action

In the event of service interruptions along the backup line, it is recommended to bypass the system by connecting the loads to the grid. In Off-Grid mode, it is recommended to check that the generator set is operating correctly.

12. - APPENDICES

12.1. System Status and Alarms Tables

SUMMARY - STATUSCYCLE - Agen					
	bit	ALARM NAME	BLOCKING ALARM	POSSIBLE CAUSE	POSSIBLE SOLUTION
STATUSCYCLE - Agen0	0	ALL_UNDERV_DC	NO	There is no photovoltaic production and the battery is off	if it does not reset within ten minutes, reset using the "ALL" button, if this does not work, contact: assistenza@unesrl.com
	1	ALL_OVERV_DC	YES	Possible overvoltage from the controller or inverter.	Disconnect one controller at a time and check the cause, if the alarm persists, the cause could be the inverter, in this case contact assistenza@unesrl.com.
	2	ALL_ISOLAMENTO	NO	Possible loss of insulation of the photovoltaic system.	check that by disconnecting the photovoltaic system the alarm is reset; at that point check the integrity of the photovoltaic system.
	3	ALL_SENS_IRR	NO	The sensor is dirty, covered or not connected.	Check the integrity of the photovoltaic system and electrical connections.
	4	ALL_OVERLOAD	NO	User connected too high load.	Disconnect high load and perform alarm reset.
	5	ALL_OVERV_AC_IN	YES	Power surge from the network. Reset the alarm using the "ALL" button; if possible, perform a system restart.	If frequent, it is recommended to install AC arresters to protect the line.
	6	ALL_BATTERY_LOW	YES	the system has dropped below its minimum charge level because it was disconnected from the distributor network	Check the presence of the distributor network and verify that the rated voltage and frequency are always within the limits of the regulations.
	7	EMPTY		Not used	Not used
STATUSCYCLE - Agen8	8	WAR_CARICA_CICLICA	NO	If the battery does not reach 100% within 7 days, the system stops discharging the battery until the photovoltaic system has fully recharged it.	No action is required.
	9	WAR_CP1	NO	High theoretical calculated irradiation and additional energy available; requires irradiation sensor.	No action is required.
	10	WAR_WARMUP	NO	The system battery is warming up to bring it to a temperature of 265 ° C can take up to 14h, once completed the system will begin to work regularly.	No action is required.
	11	WAR_BACKUP	NO	the system has dropped below its minimum charge level because it was disconnected from the distributor network: either due to voltage outside the 230 +/- 10% range or due to a distributor network blackout.	If the event occurs frequently, contact your distributor.
	12	ALL_SYSTEM_DISCONNECTED	YES	Generic system alarm.	contact: assistenza@unesrl.com.
	13	WAR_UPLOAD_AVAILABLE	NO	A firmware update is available	Restart the system
	14	ALL_T_AMB_OUT_OF_RANGE	YES	The ambient temperature in which the ZHERO system is installed is out of range.	All the necessary precautions must be taken so that the ambient temperature of the system in which ZHERO is located remains in the range 10 + 40 ° C.
	15	ALL_SENS_T_AMB	NO	Ambient temperature sensor not present or disconnected.	if present, check the wiring, if not supplied, no operation is necessary.
STATUSCYCLE - Agen16	16	ALL_OG_GENERALE		Not used	Not used
	17	ALL_RETE_ENEL	YES	Distributor network not present, phase / neutral inverted, earth not correctly connected.	Check the correct connection of the distributor network.
	18	ALL_RETE_OG		Not used	Not used
	19	ALL_SPI	NO	SPI interface forces the system to disconnect from the distributor network because it is absent or outside the parameters of the regulations.	If frequent, contact the local energy distributor for a network check.
	20	TEST_SPI	NO	The "ALL" button was pressed for more than 15 seconds.	Press and hold the "ALL" button for 15 seconds.
	21	ALL_DISSERVIZIO_USER	YES	Excessive consumption of the users along the backup line or battery shutdown during a blackout of the distributor network.	Check the loads connected under the backup line.
	22	WAR_SOC_MIN	NO	It represents a state of operation, no activity is required.	No action is required.
	23	ALL_EEPROM	NO	The EEPROM memory of the CPU board is corrupted, it is necessary to request the replacement of the board.	Contact assistenza@unesrl.com to have the board replaced.
STATUSCYCLE - Agen24	24	WAR_RIARMO_BATTERIA_ATTIVO		The battery pack has been restarted, must wait for the end of the cycle charge before resuming normal operation.	Only if frequent, contact: assistenza@unesrl.com
	25	EMPTY			
	26	EMPTY			
	27	EMPTY			
	28	EMPTY			
	29	EMPTY			
	30	EMPTY			
	31	EMPTY			

SUMMARY - STATUSCYCLE - Adevice

	bit	ALARM NAME	BLOCKING ALARM	POSSIBLE CAUSE	POSSIBLE SOLUTION
STATUSCYCLE - Adevice0	0	ALL_B0_FERMA	YES	Too many battery reset occurred in a short time. If the problem persists, there may be a problem with the battery.	Reset the alarm using the "ALL" button. If the problem turns out to be frequent, contact: assistenza@unesrl.com.
	1	ALL_B0_BLOCCO	NO	Possible battery anomaly or inappropriate use. If the events are sporadic it's not necessary to perform any operations.	No action is required.
	2	ALL_B0_PRE_OL	NO	The user has connected a load that is too high and the system reports it.	if the problem occurs frequently, contact: assistenza@unesrl.com.
	3	ALL_B0_LIMP_STRING	NO	The battery works with reduced storage capacity.	Contact assistenza@unesrl.com only if this reduction occurs within 2 years of installation.
	4	ALL_B1_FERMA	YES	Too many battery reset occurred in a short time. If the problem persists, there may be a problem with the battery.	Reset the alarm using the "ALL" button. If the problem turns out to be frequent, contact: assistenza@unesrl.com.
	5	ALL_B1_BLOCCO	NO	Possible battery anomaly or inappropriate use. If the events are sporadic it's not necessary to perform any operations.	No action is required.
	6	ALL_B1_PRE_OL	NO	The user has connected a load that is too high and the system reports it.	if the problem occurs frequently, contact: assistenza@unesrl.com.
	7	ALL_B1_LIMP_STRING	NO	The battery works with reduced storage capacity.	Contact assistenza@unesrl.com only if this reduction occurs within 2 years of installation.
STATUSCYCLE - Adevice8	8	EMPTY			
	9	EMPTY			
	10	EMPTY			
	11	EMPTY			
	12	ALL_COM_INV0	NO	possible data cable disconnection or general anomaly.	Possible breakage of the power board or interruption of the CPU - INVERTER communication cable; to contact: assistenza@unesrl.com.
	13	EMPTY			
	14	EMPTY			
	15	ALL_COM_B0	NO	Probable battery shutdown due to restart.	try to reset the alarm by pressing the "ALL" button; restart the system, if this is not restored, contact: assistenza@unesrl.com.
STATUSCYCLE - Adevice16	16	ALL_COM_B1	NO	Probable battery shutdown due to restart.	Reset the alarm by pressing the "ALL" button; restart the system, if this is not restored, contact: assistenza@unesrl.com.
	17	Vuoto			
	18	ALL_COM_CH0	NO	with lack of photovoltaic production the controller is not communicating; if production is present, check the integrity of the communication cable	If the communication cable is intact and the photovoltaic voltage is present but there is no communication, contact: assistenza@unesrl.com.
	19	ALL_COM_CH1	NO	without photovoltaic production the controller is not communicating; if production is present, check the integrity of the communication cable.	If the communication cable is intact and the photovoltaic voltage is present but there is no communication, contact: assistenza@unesrl.com.
	20	ALL_COM_CH2	NO	with lack of photovoltaic production the controller is not communicating; if production is present, check the integrity of the communication cable.	If the communication cable is intact and the photovoltaic voltage is present but there is no communication, contact: assistenza@unesrl.com.
	21	ALL_INV0_OFF	YES	The inverter is in protection mode.	Reset the alarm or restart the system, if the problem does not disappear contact: assistenza@unesrl.com.
	22	ALL_INV0_OVERTEMP	NO	System placed in a too hot place.	Disconnect loads and allow system to cool. Place it in a cool, dry and ventilated place.
	23	ALL_INV0_GENERALE	YES/NO	Check the inverter alarm table.	
STATUSCYCLE - Adevice24	24	EMPTY			
	25	EMPTY			
	26	EMPTY			
	27	EMPTY			
	28	EMPTY			
	29	EMPTY			
	30	ALL_INV_DERATING	YES	Power supplied by the battery reduced due to the high temperature of the inverter.	Consider improving the ventilation of the room where the ZHERO is installed.
	31	ALL_INV_FERMO_BLOCCO	YES	Probable inverter breakdown.	contact: assistenza@unesrl.com.

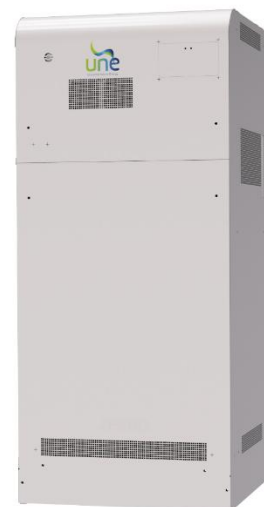
SUMMARY - INVO - alarms					
	bit	ALARM NAME	BLOCKING ALARM	POSSIBLE CAUSE	POSSIBLE SOLUTION
INVO - alarms0	0	RELE	YES	Relay stuck or distributor mains voltage too high	Contact: assistenza@unesrl.com
	1	PH_OVC	YES	Excessive inrush current	Check that your backup line does not have loads with spikes greater than 50A, intervene to reduce the starting point of the devices connected to the ZHERO backup line.
	2	BUS_OVV	YES	Possible overvoltage on the DC BUS	If it happens frequently contact: assistenza@unesrl.com
	3	ISO	NO	Loss of electrical insulation on the DC side of the machine	Check the insulation of the photovoltaic strings
	4	RCD	YES	Inverter malfunction during start-up	Contact: assistenza@unesrl.com
	5	TEMP	YES	Inverter overtemperature	Improve ventilation of the room where ZHERO is installed, temporarily reduce line loads.
	6	COM	YES	Inverter communication error	Possible breakage of the power board or interruption of the CPU - INVERTER communication cable; contact: assistenza@unesrl.com
	7	EEPROM	YES	Corrupted EEPROM memory	Contact: assistenza@unesrl.com
INVO - alarms8	8	BAT_UNV	YES	Possible battery shutdown	Contact assistenza@unesrl.com only if the problem persists
	9	BAT_OVV	YES	Possible overvoltage caused by the charge controllers or the battery	Contact assistenza@unesrl.com only if the problem persists
	10	OUT_UND	YES	Possible disruption caused by the inverter	Contact assistenza@unesrl.com only if the problem persists
	11	OUT_OVV	YES	Possible overvoltage from the grid	Contact assistenza@unesrl.com only if the problem persists
	12	FREQ	YES	Distributor network frequency error	If the problem persists, contact the energy distributor
	13	PB_BATT		possible breakdown of the inverter internal power supply	Contact: assistenza@unesrl.com
	14	SW_PH_OVC	NO	Excessive inrush current	Check that your backup line does not have loads with spikes greater than 50A.
	15	START	YES	Generic startup error	Contact assistenza@unesrl.com only if the problem persists
INVO - alarmsh_0	0	EXT_COM	NO	communication between ZHERO and Exchange meter is broken	Check that ZHERO and Meter are powered, check integrity and correct connection of the cables
	1	EXT_COM1	NO	Communication between ZHERO and Production meter is broken	Check that ZHERO and Meter are powered, check integrity and correct connection of the cables
	2	Empty			
	3	Empty			
	4	Empty			
	5	Empty			
	6	Empty			
	7	Empty			
INVO - alarmsh_8	8	Empty			
	9	Empty			
	10	Empty			
	11	Empty			
	12	Empty			
	13	Empty			
	14	Empty			
	15	Empty			
	16	Empty			
	17	Empty			

12.2. Product datasheet

UNE ZHERO S6 is a **monophase** storage system for residential and small businesses, based on the use of salt battery.

The system allows the PV system and salt batteries to be connected to the grid; it is also equipped with a backup line that can supply utilities even in the event of a blackout.

Conformal coating applied to electronic boards;
Free of toxic materials;
No harmful gas emissions;
Redundant safety devices (battery and BMS);
Sustainable and recyclable system.



DC SPECIFICATIONS

Input power	d.c. kW	1 – 9.9
N° PV input strings	N°	0 – 3
N° MPPT tracker	N°	0 – 3
Input voltage (Models according to availability)	d.c. V	100 – 180 120 – 308
P max output per MPPT	d.c. kW	3.3
Max current per MPPT	d.c. A	40
Maximum backfeed current	d.c. A	1192 A peak over 0.7 ms, RMS value 69 A over 12.6 s
ISC	d.c. A	60

AC SPECIFICATIONS

Type of power supply		Monophase
Rated voltage AC	a.c. V	230
Output power	a.c. kW	6
Backup line power	a.c. kW	6
Rated frequency	Hz	50
Output connection	N°	1 (Backup)
Maximum output power "Backup"	a.c. kW	6
Harmonic distortion	%	< 3
Allowed cos φ	φ	0.9 – 1
Short-circuit current (Phase-Neutral)	a.c. A	52
Short-circuit current (Phase-Ground)	a.c. A	11
Type of grid		TT / TN-S
Components efficiency	%	Up to 97

GEN-SET CONNECTION

Hanging frequency range	Hz	49 - 51
Working frequency range	Hz	48.5 – 52.5

Working voltage range	a.c. V	210 – 253
BATTERY DATA		
Rated voltage	d.c. V	48
Storage capacity	kWh	7.6 – 19.2
Depth of discharge (Off-grid)	%	90
Depth of discharge (On-grid)	%	80
Battery type	Sodium chloride – Nickel	
Battery warranty	Years	10* (see warranty)
Battery self-consumption	W	115

ENVIRONMENTAL SPECIFICATIONS		
Environmental conditions	Indoor, conditioned	
Ingress protection	IP	20
Maximum working temperature	°C	+ 40
Minimum working temperature	°C	- 10
Relative humidity	%	5 - 85
Pollution degree	PD	II
Maximum altitude	m	2000 a.s.l.

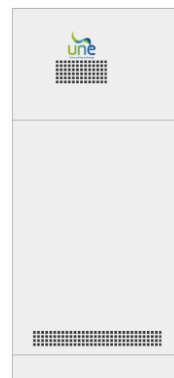
SAFETY / PROTECTIVE DEVICE		
Galvanic insulation	Yes	
Protective class	CLASS	I (IEC 62109)
AC overvoltage category	OVC	III
DC overvoltage category	OVC	II
AC Differential protection	a.c. A	0.3
CC SPD (U _p) – Not supplied	kV	2.5
AC SPD (U _p) – Not supplied	kV	1.5

REGULATORY COMPLIANCE		
Marking	-	CE
Certifications	-	IEC EN 62109-1: 2011
	-	IEC EN 62109-2: 2011
	-	CEI EN 61000-6-1 (2007)
	-	CEI EN 61000-6-3 (2007)
	-	CEI 0-21: 2019-04
	-	VDE 4105 -0124: 06/2020

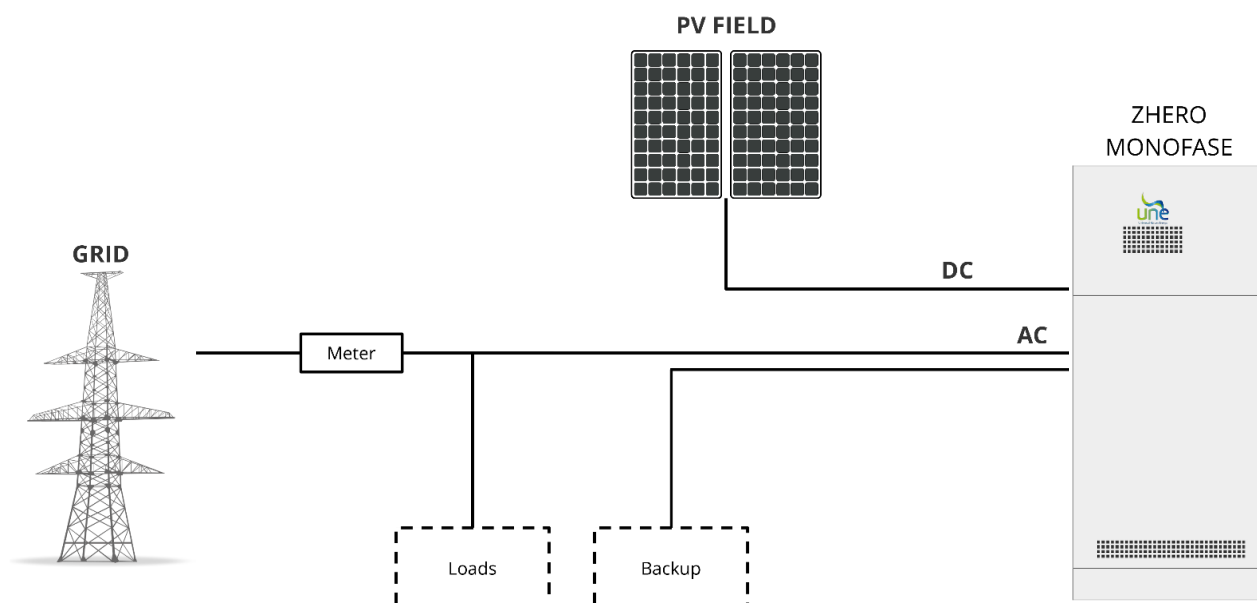
MONITORING		
Remote monitoring	ETHERNET	
Local monitoring	USB	

MECHANICAL SPECIFICATIONS

Dimensions	mm	600 (W) x 600 (D) x 1360 (H)
Weight	kg	210 (1 battery) – 340 (2 batteries)
Acoustic emissions	dB	≤ 35
Air ventilation		Forced
Maximum N° of batteries	N°	2



TYPICAL CONFIGURATION:





U N I V E R S A L N A T U R E  E N E R G Y

UNE Srl – Via Modena 48/E – 42015 Correggio (RE) – **Tel.** +39 0522 69 35 66 – Fax +39 0522 14 83 326
P.Iva 02513460358 – Pec info@pec.unesrl.com – Mail info@unesrl.com – www.unesrl.com