zeroCO$_2$® large

Three-phase Hybrid Inverter - 5G
Operation Manual

This manual refer to
zeroCO$_2$ large (5-10)K inverter models:

RHI-3P5K-HVES-5G
RHI-3P6K-HVES-5G
RHI-3P8K-HVES-5G
RHI-3P10K-HVES-5G

Energy S.p.A.

Table of Content

Quick Guide

First Start

After making all the connections as per the diagrams provided, start the inverter according to the following instructions:

- Power the inverter on the AC side (grid connection).
- Turn the DC switch of the strings to the "ON" position (inverter side).
- Wait until inverter display is on (may occur 30")
- Turn on the batteries. The communication between the inverter and the batteries will take place in about 300".

Battery configuration

- Go to Main Menu.
- Go to ADVANCED SETTINGS.
- Type the password 0010 (DOWN -DOWN – UP – ENTER).
- Go to BATTERY CONTROL.
- Go to BATTERY SELECT.
- Select PYLON LV.
- OverDischarge SOC: 20%.
- ForceCharge SOC: 10% (PS: set FORCECHG current to 10A or 500W).

Meter configuration

- Go to Main Menu.
- Go to ADVANCED SETTINGS.
- Type the password 0010 (DOWN -DOWN – UP – ENTER).
- Go to STORAGE ENERGY SET.
- Go to METER SET.
- Select METER SELECT.
- Select EASTRON 3PH METER (Choice valid for both models: SDM630 - SDM630MCT).

Self use configuration

- Go to Main Menu.
- Go to ADVANCED SETTINGS.
- Type the password 0010 (DOWN -DOWN – UP – ENTER).
- Go to STORAGE ENERGY SET.
- Go to STORAGE MODE SELECT.
- Select SELF USE then ENTER.
- Select ON.
- Charging from grid: ALLOW.

Self Test CEI-0-21

- Go to Main Menu.
- Go to ADVANCED SETTINGS.
- Type the password 0010 (DOWN -DOWN – UP – ENTER).
- Go to SELF TEST CEI 0 21.
- Go to COMPLETE TEST.
- Select YES and wait for the threshold analysis to complete.
- Results are available from TEST REPORT (same menu).

Lmt by Epm mode

- Go to Main Menu.
- Go to ADVANCED SETTINGS.
- Type the password 0010 (DOWN -DOWN – UP – ENTER).
- Go to EXPORT POWER SET.
- Set On/Off $\rightarrow$ ON.
- Set Backflow power $\rightarrow$ +0000W (Maximum output power to the meter).
- Set Failsafe $\rightarrow$ OFF.

To deactivate Lmt by Epm mode set On/Off $\rightarrow$ OFF.
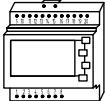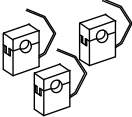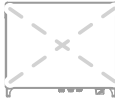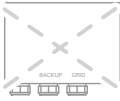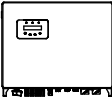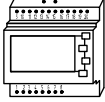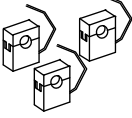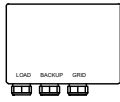
WiFi Configuration (site/app Solis Cloud)

The wifi configuration is important to fully validate the zeroCO$_2$ large product warranty.
The warranty can be extended from five to ten years only and exclusively by registering the product in the online portal: www.soliscloud.com.
For configuration information, refer to the WiFi guide for zeroCO2 available on the www.energysynt.com website.

Wiring diagrams

The following table shows the expected configurations.
By clicking on the link in the DIAGRAM column you can download the corresponding wiring diagram.

INVERTER	METER	CT	EPM	EPS BOX	SCHEMA
					Meter SDM630MCT WD047
					Meter SDM630MCT WD093

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1. Introduction

1.1 Product Description

zeroCO$_2$ large (5-10)K Series is designed for residential hybrid systems, which can work with batteries to optimize self-consumption.
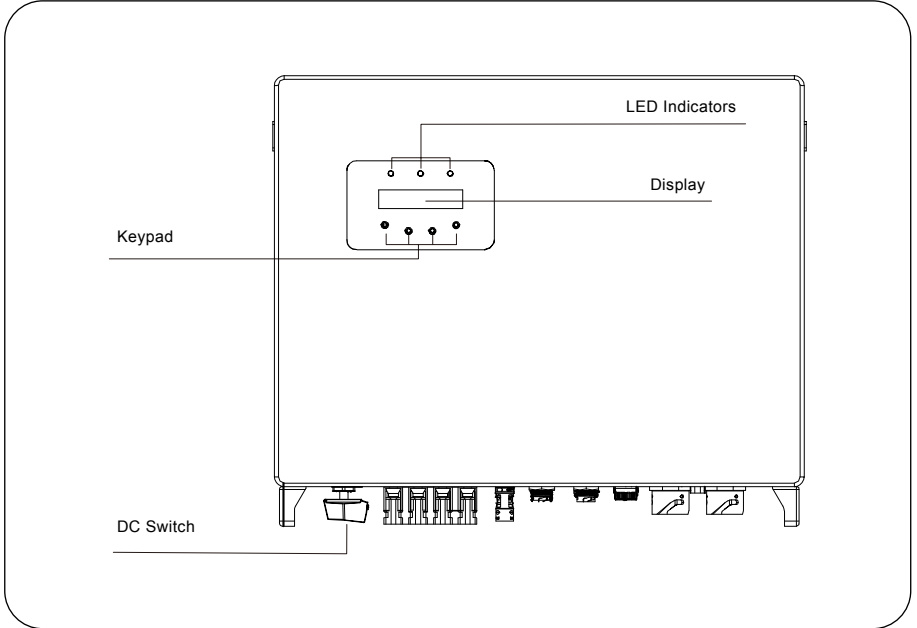
Figura 1 - Front side view
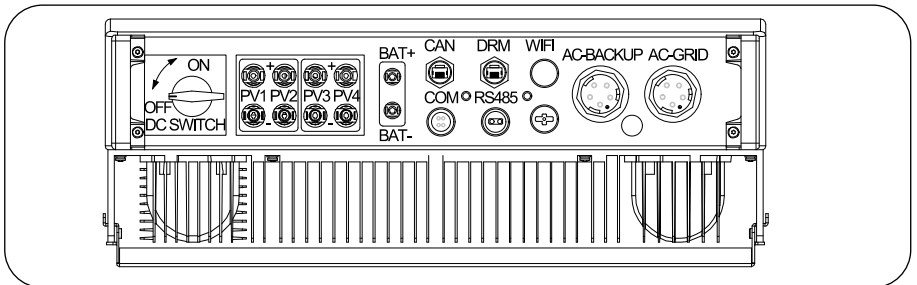
Figura 2 - Bottom side view

1. Introduction

1.2 Packing list

Please ensure that the following items are included in the packaging with your machine.

Inverter	mounting bracket	Fixing screws	Black AC–GRID Terminal
Red AC–BACKUP Terminal	DC (–) Connector	DC (+) Connector	Battery Connector
RS485 Meter Cable	RJ45 Connector Use both connectors for UK and AU	Eastron Meter	CT
If present, to be taken as a replacement of a part of the Wi-Fi module Wi-Fi Antenna × 1	User Manual × 1	Antenna and Wi-Fi module	
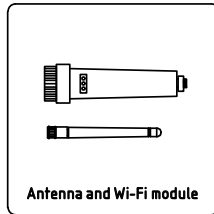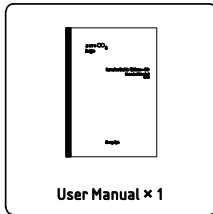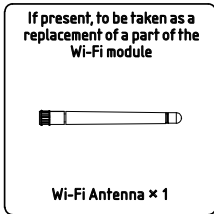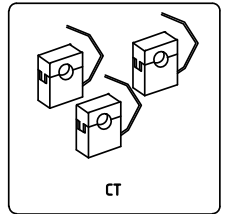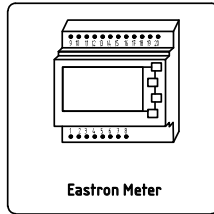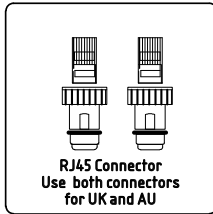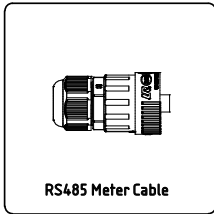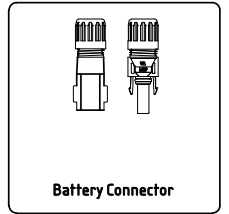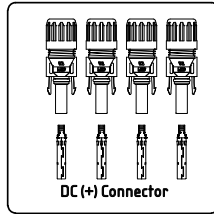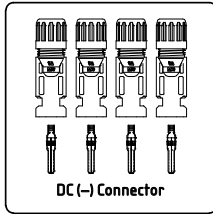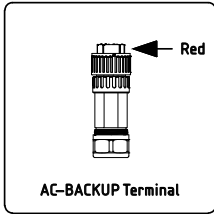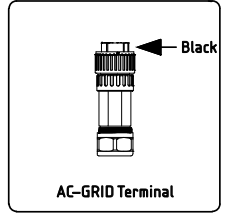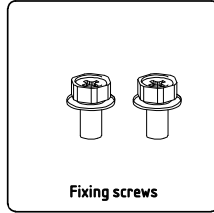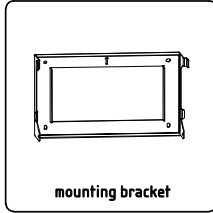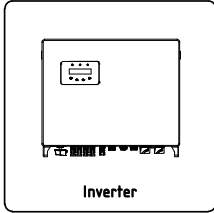
2. Safety & Warning

2.1 Safety

The following types of safety instructions and general information appear in this document as described below.

DANGER
"Danger"indicates a hazardous situation which if not avoided, will result in death or serious injury.

WARNING
"Warning" indicates a hazardous situation which if not avoided, could result in death or serious injury.

CAUTION
"Caution" indicates a hazardous situation which if not avoided, could result in minor or moderate injury.

NOTE
"Note" provides tips that are valuable for the optimal operation of your product.

2.2 General Safety Instructions

WARNING
Only devices in compliance with SELV (EN 69050) may be connected to the RS485 and USB interfaces.

WARNING
Please don't connect PV array positive (+) or negative (-) to ground, it could cause serious damage to the inverter.

WARNING
Electrical installations must be done in accordance with the local and national electrical safety standards.

WARNING
Do not touch any inner live parts until 5 minutes after disconnection from the utility grid and the PV input.

WARNING
To reduce the risk of fire, over-current protective devices (OCPD) are required for circuits connected to the inverter. The DC OCPD shall be installed per local requirements. All photovoltaic source and output circuit conductors shall have isolators that comply with the NEC Article 690, Part II. All **zeroCO$_2$ large** (5-10)K inverters feature an integrated DC switch..

2. Safety & Warning

CAUTION
Risk of electric shock, do not remove cover. There is no user serviceable parts inside, refer servicing to qualified and accredited service technicians.

CAUTION
The PV array supplies a DC voltage
when they are exposed to sunlight.

CAUTION
Risk of electric shock from energy stored in capacitors of the inverter, do not remove cover for 5 minutes after disconnecting all power sources (**service technician only**). Warranty may be voided if the cover is removed without authorization..

CAUTION
The surface temperature of the inverter can reach up to 75°C (167 F). To avoid risk of burns, do not touch the surface of the inverter while it's operating. Inverter must be installed out of the reach of children.

NOTE
PV module used with inverter must have an IEC 61730 Class A rating.

WARNING
Operations below must be accomplished by licensed technician or **zeroCO₂ large** (5-10)K authorized person.

WARNING
Operator must put on the technician's gloves during the whole process in case of any electrical hazards.

WARNING
AC-BACKUP of **zeroCO₂ large** (5-10)K series is forbidden to connected to the grid.

2. Safety & Warning

⚠ **WARNING**
The zeroCO$_2$ large (5-10)K series does not support parallel (three- and single-phase) operation on the AC-BACKUP port. Parallel operation of the unit will void the warranty.
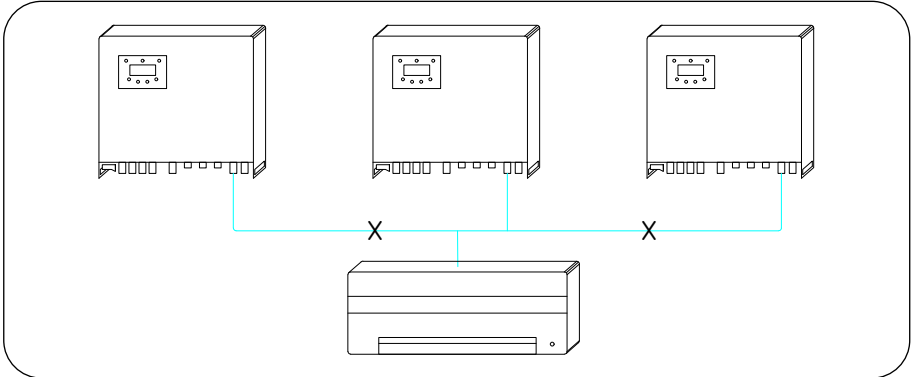
Figura 3 - Three-phase LOAD

⚠ **WARNING**
Please refer to the specification of the battery before configuration.

2.3 Usage warnings

The inverter has been constructed according to the applicable safety and technical guidelines. Use the inverter in installations that meet the following specifications ONLY:

● Permanent installation is required.
● The electrical installation must meet all the applicable regulations and standards.
● The inverter must be installed according to the instructions stated in this manual.
● The inverter must be installed according to the correct technical specifications.
● To protect the AC connection line of the inverter, it is recommended to install a type A differential device with a sensitivity greater than or equal to 100mA.

3. Overview

3.1 Screen

zeroCO$_2$ large (5-10)K series adopts LCD screen, it displays the status, operating information and settings of the inverter.

3.2 Keypad

There are four keys in the front panel of the inverter (from left to right):
ESC, UP, DOWN and ENTER keys. The keypad is used for:
● Scrolling through the displayed options (the UP and DOWN keys);
● Access and modify the settings (the ESC and ENTER keys).
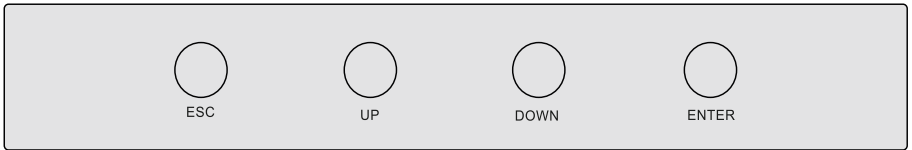
Figura 4 - Keypad

3.3 Terminal Connection

zeroCO$_2$ large (5-10)K series inverter is different from normal on-grid inverter, please refer to the instructions below before start connection.
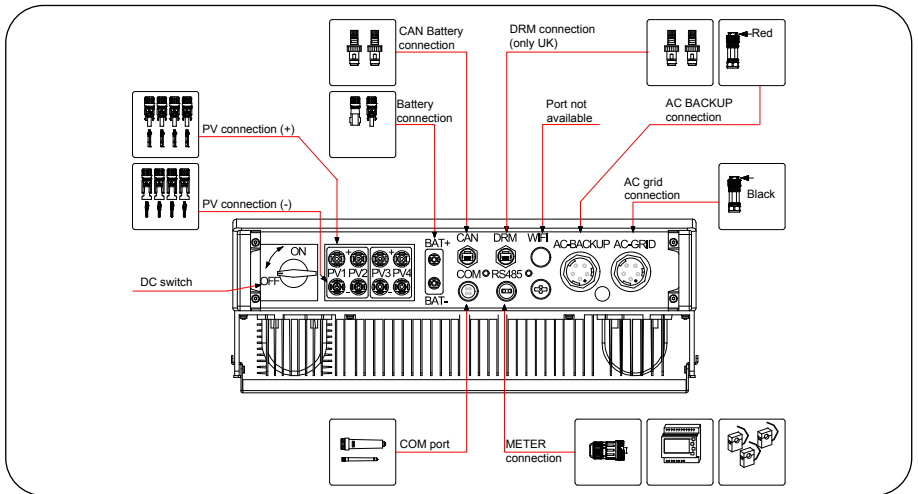
Figura 5 - Terminal connection

WARNING
Please refer to the specification of the battery before configuration.

4. Installation

4.1 Select a Location for the Inverter

To select a location for the inverter, the following criteria should be considered:

- Exposure to direct sunlight may cause output power derating. It is recommended to avoid installing the inverter in direct sunlight.
- It is recommended that the inverter is installed in a cooler ambient which doesn't exceed 104°F / 40°C.
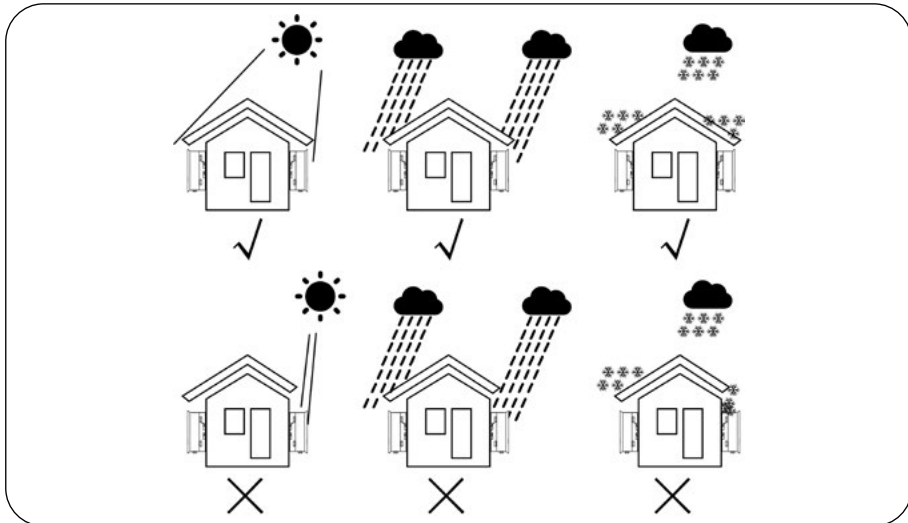
Figura 6 - Recommended Installation locations

> ⚠️ **WARNING: Risk of fire**
> Despite careful construction, electrical devices can cause fires.
> Do not install the inverter in areas containing highly flammable materials or gases.
> Do not install the inverter in potentially explosive atmospheres.

- Install on a wall or strong structure capable of bearing the weight of the machine (24 kg).
- Install vertically with a maximum incline of ±5 degrees, exceeding this may cause output power derating (see Figura 7 and Figura 8).
- To avoid overheating, always make sure the flow of air around the inverter is not blocked. A minimum clearance of 500mm should be kept between inverters or objects and 500 mm clearance between the bottom of the machine and the ground.

4. Installation
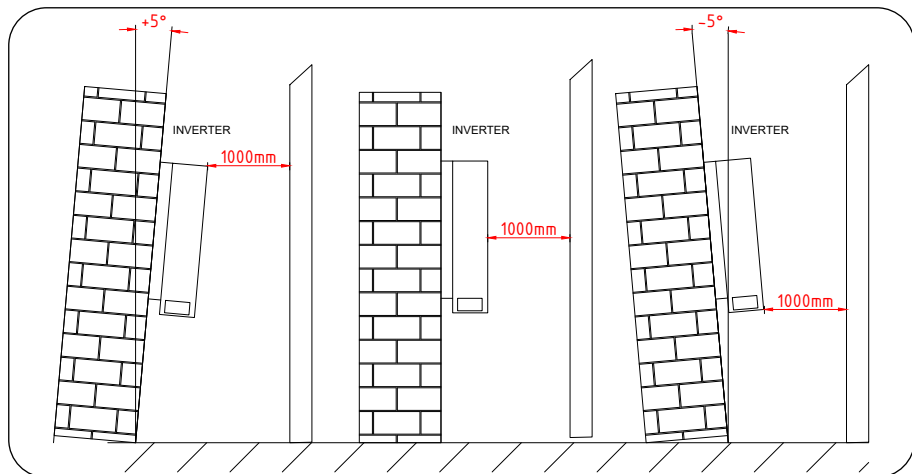
Figura 7 - Inverter Mounting clearance, side view
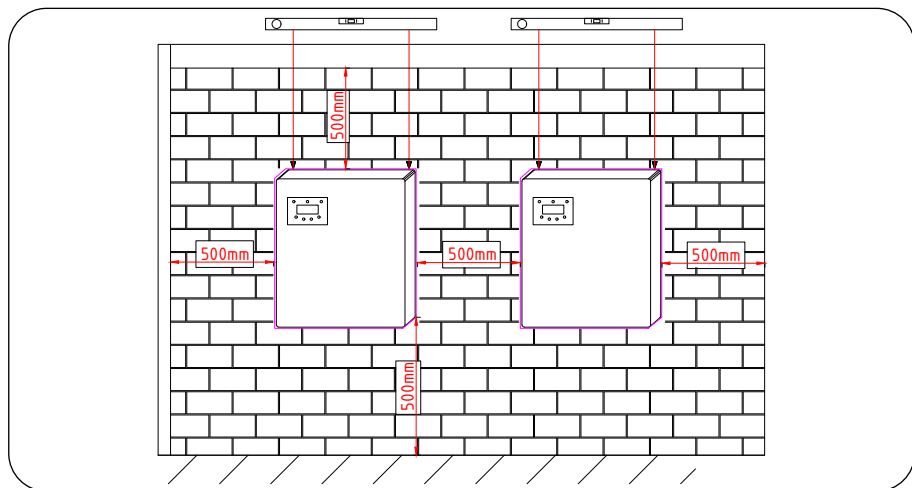
Figura 8 - Minimum inverter mounting clearance, front view

● Visibility of the LEDs and LCD should be considered.
● Adequate ventilation must be provided.

NOTE
Respect the indicated distances.

4. Installation

4.2 Equipment list to be used

Level and meter	PV Connector crimping tool	3mm Allen key for AC connectos fixing screws	Electrician screwdriver with insulated handles
Dowel insertion hammer and Pencil	Digital multimeter	Grounding Measuring tool	Torque wrench
Dielectric gloves	Wire stripper and electrician scissor	Drill with bits	For bricks wall 4 dowel and 4 screws (8mm)
RJ45 crimping tool	37 35 21 19 12		

4. Installation

4.3 Mounting the Inverter
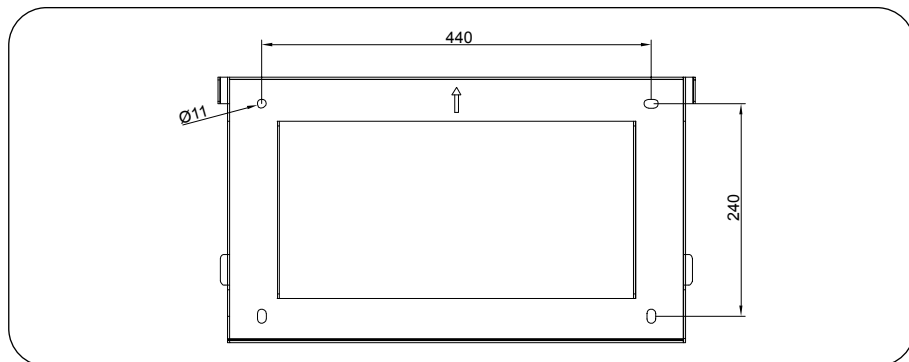
Figura 9 - Dimensions of mounting bracket

Once a suitable location has be found (accordingly to "4.1 Select a Location for the Inverter" at page 14) using Figura 9 and Figura 10 mount the wall bracket to the wall.
The inverter must be mounted vertically. The steps to mount the inverter are listed below:
- Select the mounting height of the bracket and mark the mounting holes
- Using a drill and a suitable bit, drill the holes in the previously marked points.
- Insert the dowels (if made of bricks) into the wall and fix the mounting bracket with the help of the screwdriver and 3 screws
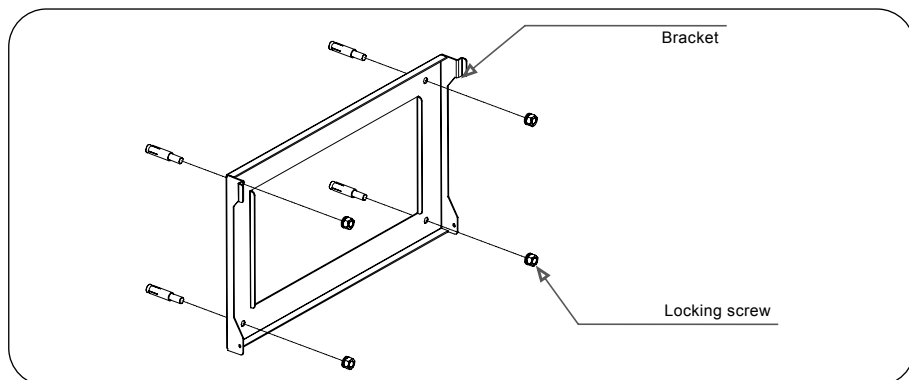
Figura 10 - Fix bracket on the wall

⚠️ **WARNING**
The inverter must be mounted vertically.

4. Installation

- Lift up the inverter (be careful to avoid body strain) and align the back bracket on the inverter with the convex section of the mounting bracket. Hang the inverter on the mounting bracket and make sure the inverter is secure (see Figura 11).
- After positioning the inverter on the bracket, lock it in the lower part with the screw supplied as shown in Figura 11.
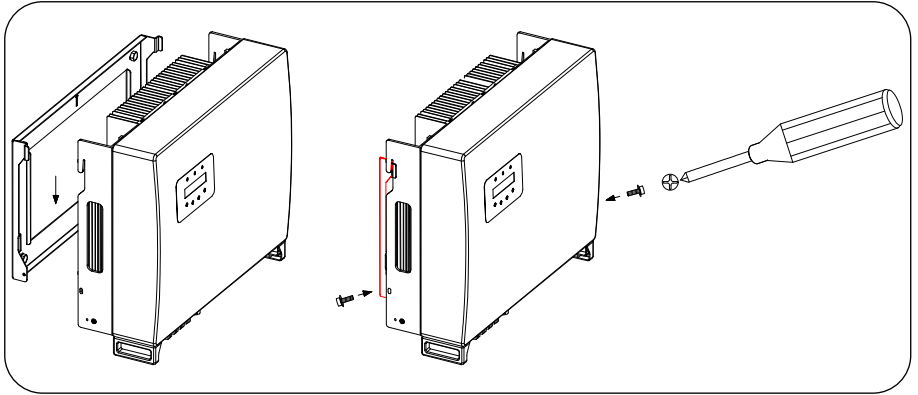
Figura 11 - Wall Mount Bracket

4.4 PV Input Terminal Assembly

Please ensure the following before connecting the inverter:
- Make sure the voltage of the PV string will not exceed the max DC input voltage (1000V DC). Violating this condition will void the warranty.
- Make sure the polarity of the PV connectors are correct.
- Make sure the DC-switch and AC-Grid are all in off-states.
- Make sure the PV resistance to ground is higher than 20K ohms.

The zeroCO$_2$ large (5-10)K series inverter uses the MC4 connectors.
Please follow the picture below to assemble the MC4 connectors.
PV wire diameter requirements: 2,5 ~ 4 mm².

4. Installation
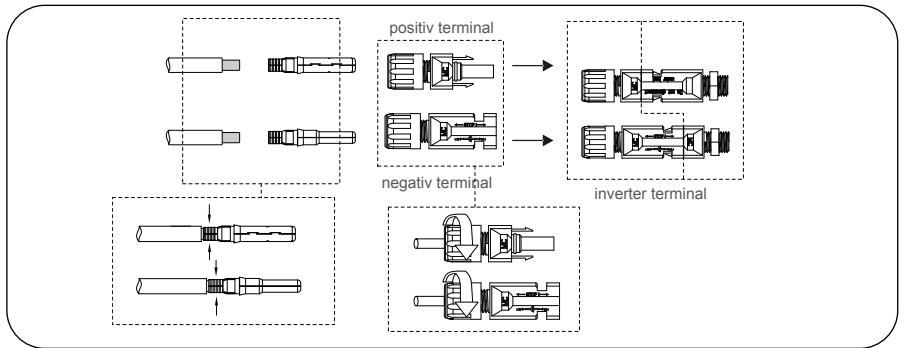
Figura 12 - Use appropriate crimping tools

4.5 Battery Terminal Components

Quick connector is used for battery connection. The connector is suitable for tin-plated cables with a conductor cross section of 2,5 - 6 mm² (AWG14-10).
Battery cable outside diameter range: 5,5 mm - 8,0 mm.

NOTE
A bladed screwdriver with a 3 mm wide blade is required to perform the connection.

1. Strip 15 mm off the conductor using a suitable stripping tool for this (Figura 13).
2. Open the spring using a screwdriver (Figura 14).
3. Insert the stripped wire with twisted litz wires all the way in. The wire ends have to be visible in the spring. And then close the spring (Figura 15).
4. Push the insert into the sleeve and tighten the cable gland with 2 Nm (Figura 16).
5. Fit the connectors to the battery ports at the bottom of the inverter with correct polarity: a "click" sound. (Figura 17).
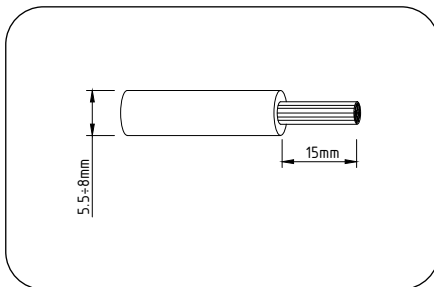
Figura 13
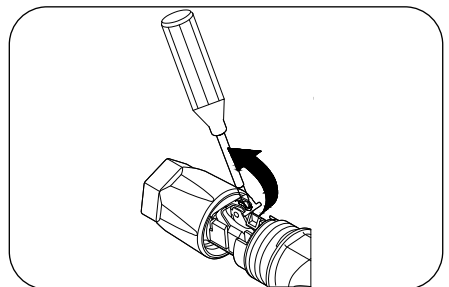
Figura 14

4. Installation

Figura 15

2 Nm

Figura 16

Battery positive socket

Battery negative socket
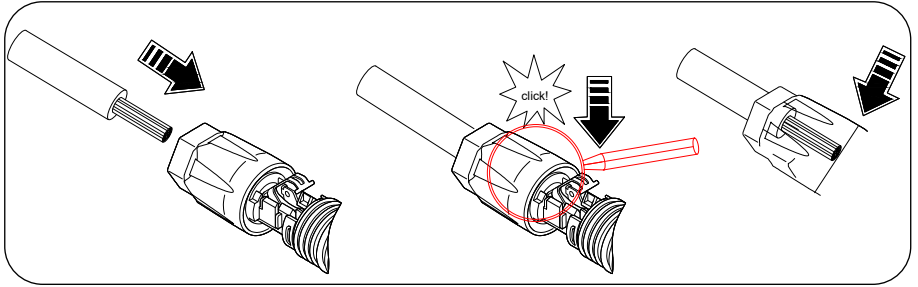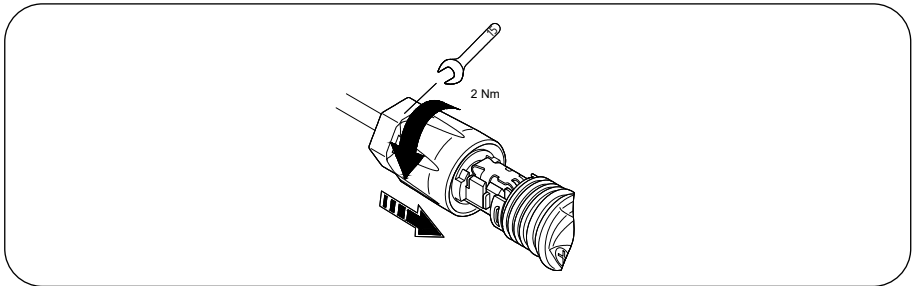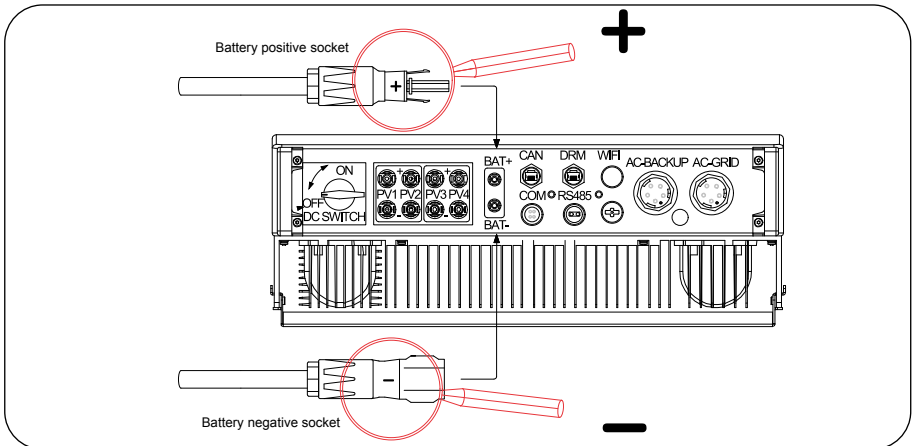
Figura 17

4. Installation

NOTE
Carefully read the battery's user manual before connecting the battery.
Perform the installation exactly as required by the battery manufacturer.

WARNING
Batteries power cables may be live.
Remove the connectors with suitable dielectric gloves.

4.6 Assembling the AC Connector

There are two AC terminals (AC backup and AC grid) and the assembly steps for both are the same. Take out the AC connector parts from the packaging.
● Make sure you use a cable within the correct specifications as shown in the table below:

CABLE SPECIFICATION

Wire diameter [mm]	13 ~ 25
Traverse cross sectional area [mm²]	6 ~ 13 (10-6 AWG)
Exposure Lenght [mm]	(8 ~ 15) 13

NOTE
Internal of AC connector signs "L1", "L2", "L3", "N" and "PE" five connection ports (see Figura 20). Three live wire are connected the "L1", "L2" and "L3" terminals respectively; ground wire connects "PE"; neutral wire connects "N" terminal.
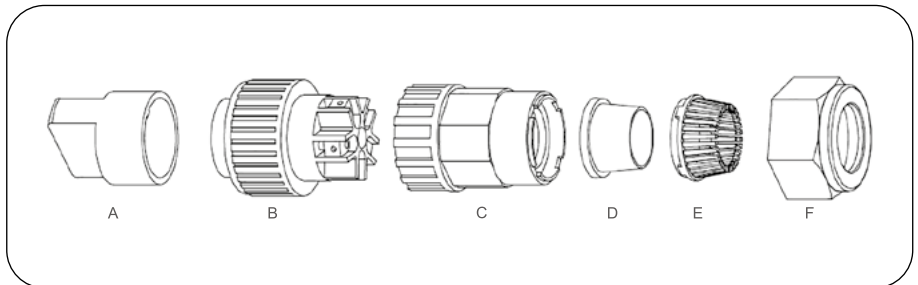
Figura 18 - AC Connector

4. Installation
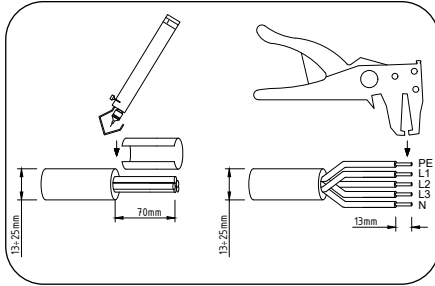
Figura 19 - Stripped and bared wire
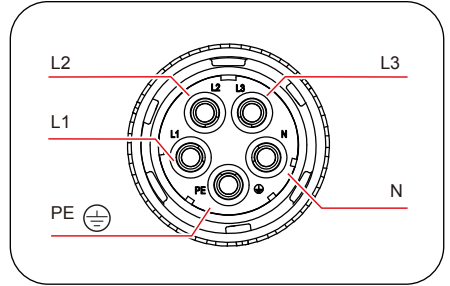
Figura 20 - Internal structure of AC connector

- Stripped the insulation sleeve of cable for 70 mm, up to discover the connector with copper core for 13mm (Figura 19). Pass the cable through the nut and the sleeve of the socket element, insert corresponding terminals and tighten with allen wrench. Torque is 1,5-2,5 Nm (see Figura 21).
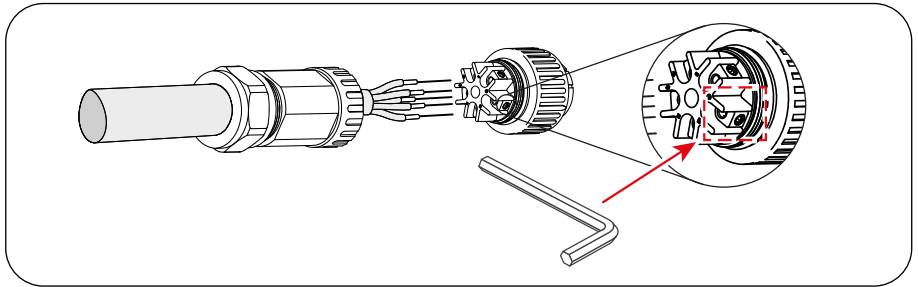
Figura 21 - Cable connection

NOTE
After insertion, tighten cable with 3,0 mm allen wrench (focus in dotted box, see Figura 21). WARNING: Allen screw is easy to drop off, don't screw out completely.

- Clip plastic fixture (auxiliary tighten) in socket element, tighten adapter in socket element, then tighten swivel nut with 2,5-4 Nm torque as shown in Figura 22.

4. Installation
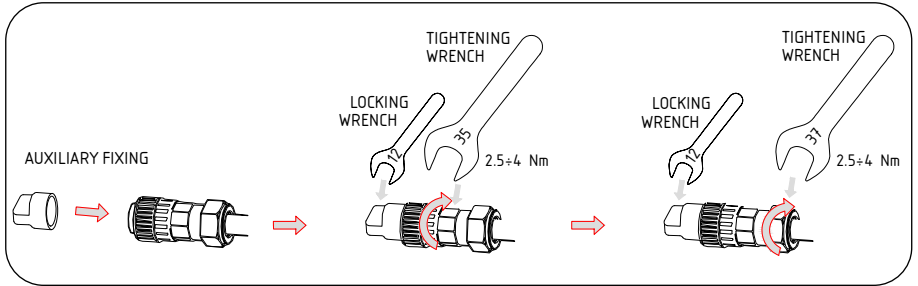
Figura 22 - Assembly AC terminal

● Connect AC connector with inverter, then tighten AC connector for clockwise (see Figura 22): a slight clicking sound indicates connection succeed Figura 22.
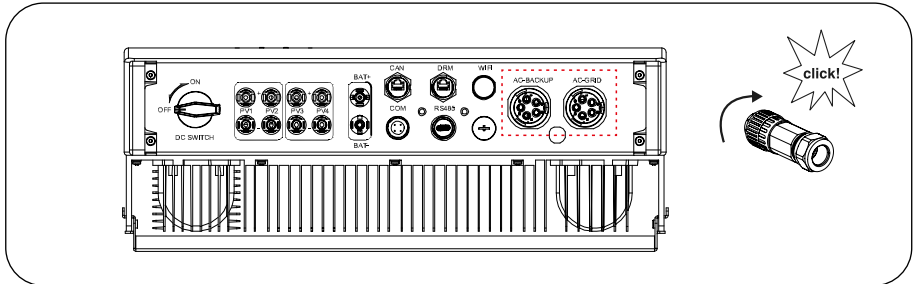
Figura 23 - AC connector to inverter

4.7 Meter Installation

zeroCO$_2$ large (5-10)K series inverter integrated export power control function: this function need connect a Three-Phase power meter for export power controlling.

Meter MODELS
Eastron 3ph meter (with ct): SDM630MCT
Eastron 3ph meter (direct insertion): SDM630 (optional)

To install the zeroCO$_2$ large (5-10)K series three-phase inverter with the zeroCO$_2$ sun charger wallbox, refer to the wallbox operation manual downloadable at this link.

4. Installation

4.7.1 Three-Phase Meter Installation (installation with CT)

UTENZA 400V AC
LOAD 400V AC

L1
L2
L3
N

L1

L2

L3

N

CAVO DI COMUNICAZIONE RS485
RS485 COMMUNICATION CABLE

L3
L2
L1
N

IMPIANTO FOTOVOLTAICO
PHOTOVOLTAIC SYSTEM

SISTEMA DI ACCUMULO
BATTERY ENERGY
STORAGE SYSTEM

ROSSO / RED RS485 A+
NERO / BLACK RS485 B-

+   -

TIPICO INVERTER ZERO CO2
TRIFASE
TYPICAL ZERO CO2 INVERTER
3Ph

ON
OFF
DC
SWITCH

PV1+
PV1-
PV2+
PV2-
PV3+
PV3-
PV4+
PV4-

+   +   +   +
PV1   PV2   PV3   PV4
-        -   -   -

BAT+
BAT-
BAT+

BAT-

CAN   DMR

COM   RS485

WIFI

AC-BAC

Figura 24 - Connection diagram of the three-phase power r

4. Installation

CT DI MISURA
MEASUREMENT SYSTEM

L1
L2
L3
N

CONTATORE BIDIREZIONALE
DI SCAMBIO
(ACQUISTO E VENDITA)
BIDIRECTIONAL MEASUREM.

RETE ENEL
ENEL POWER SUPLIER

NERO/BLACK
BIANCO/WHIT.
NERO/BLACK
BIANCO/WHIT.
NERO/BLACK
BIANCO/WHIT.

METER
SDM630MCT

9 10 11 12 13 14 15 16 17 18 19 20

QUADRO DI PROTEZIONE
SWITCH PROTECTION BOX

1 2 3 4 5 6 7 8

CONTATORE DI PRODUZIONE
PRODUCTION MEASUREMENT

QUADRO DI PROTEZIONE
SWITCH PROTECTION BOX

L1
L2
L3
N
PE

CKUP AC GRID

meter CT SDM630MCT 3pH (installation with CT) included in the kit

4. Installation

4.8 Communication Cable Assembly

zeroCO$_2$ large (5-10)K series inverter uses RS485 cable to communicate with the meter and CAN to communicate with the battery's BMS. The image below shows the assembly of the RS485 / CAN communication cables.
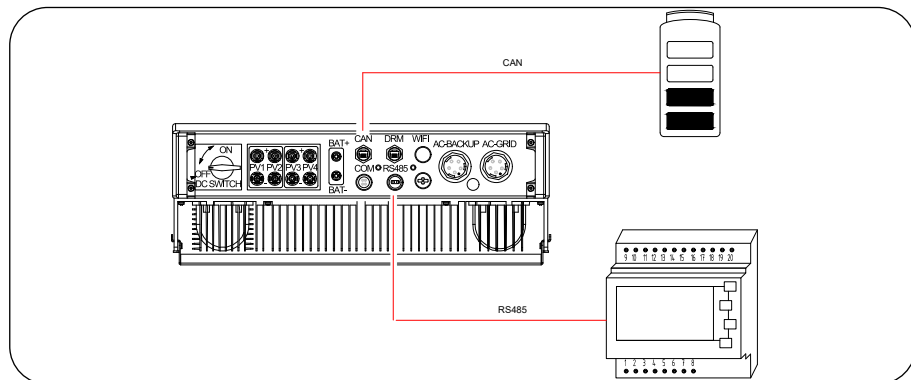
Figura 25

NOTE
The CAN cable enables the communication between the inverter and the Li-ion battery from Pylontech. Please check for latest model compatibility before installation.

● Procedure for connecting the CAN cable:
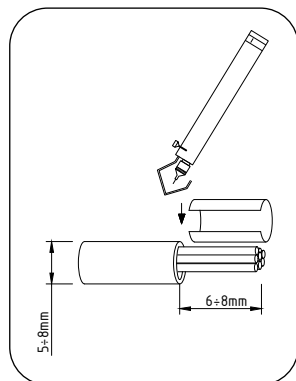
Figura 26 - Strip cable
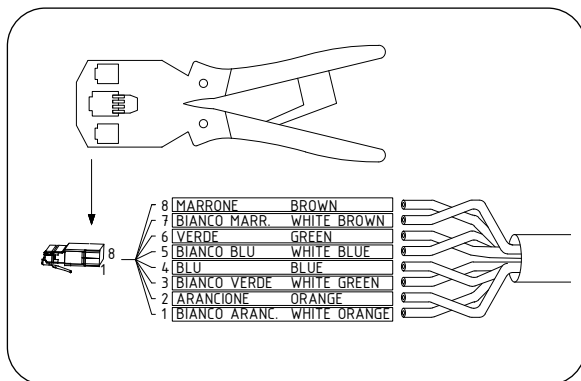
Figura 27 - Inserting and crimping cable

NOTE
For CAN cable pin 4 (blue) and pin 5 (white-blue) are used for the communication.

4. Installation
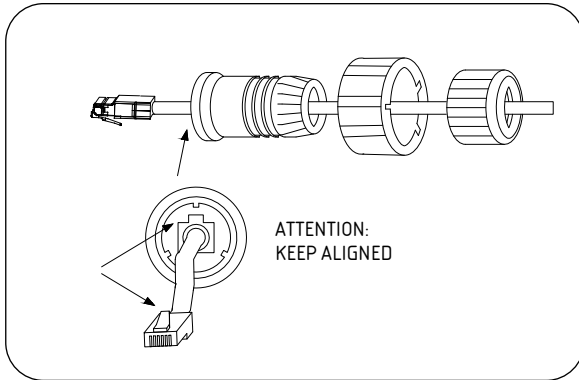
Figura 28 - Connectorized cable insertion
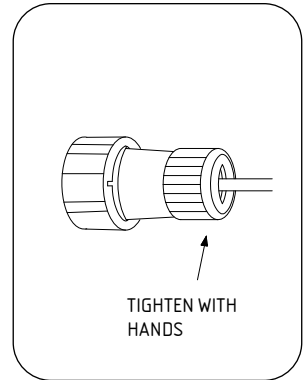
Figura 29 - CAN cable

● Procedure for connecting the RS485 cable:
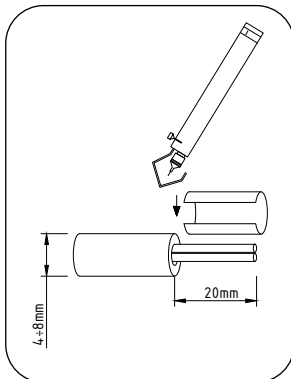
Figura 30 - Strip cable
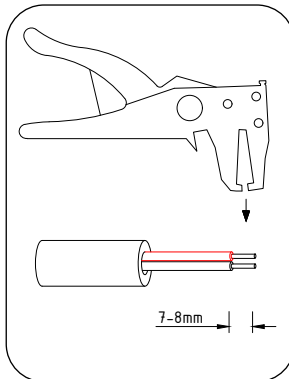
Figura 31 - Strip wire
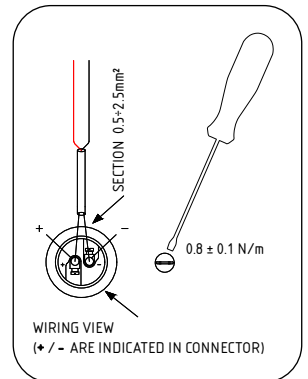
Figura 32 - Wiring
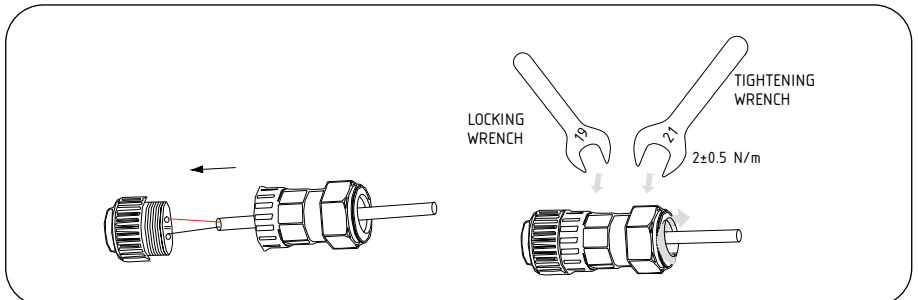
Figura 33 - Assembly and tighten of component

4. Installation

4.9 External ground connection

An M4 screw is provided on the right side of the inverter for the earth connection.
Connect a yellow/green cable with a section between 2.5 and 6mm². The section of the cable
must be equivalent to or greater than that used for the AC connection (see 4.5).
It is recommended to use an M4 size ring lug, crimped using suitable tools. Tighten the screw
with a torque of 2 Nm.
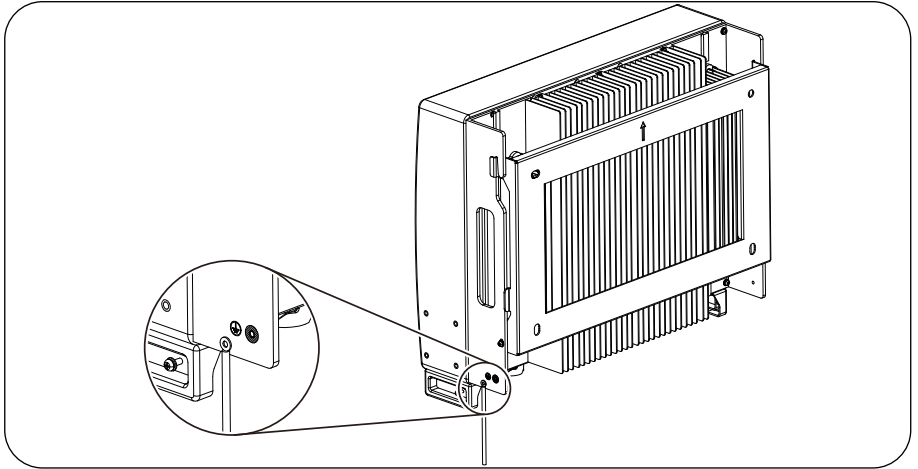
Figura 34 - Connect the external grounding conductor

4.10 Preparation of Commissioning

- Ensure all the devices are accessible for operation, maintenance and service.
- Check and confirm that the inverter is firmly installed.
- Space for ventilation is sufficient for one inverter or multiple inverters.
- Nothing is left on the top of the inverter or battery module.
- Inverter and accessories are correctly connected.
- Cables are routed in safe place or protected against mechanical damage.
- Warning signs and labels are suitably affixed and durable.

4.11 Commissioning procedure

If all the items mentioned above meet the requirements, proceed as follows to start up the
inverter for the first time.

- Switch on the AC-backup and AC-grid.
- Select grid standard.
- Configure parameters.
- Before switch on DC inverter switch, switch on DC battery switch and check polarity.
- Switch on DC inverter switch.
- Check inverter initialization.

4. Installation

4.12 Inverter monitoring connection

The inverter can be monitored via Wi-Fi or LAN (optional). For connection instructions, please refer to "WiFi Configuration (site/app Solis Cloud)" at page 5.
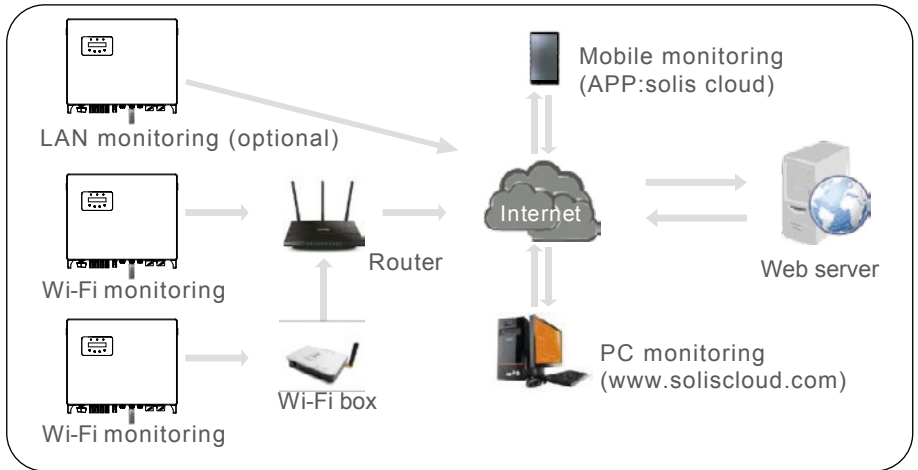
Figura 35 - Wi-Fi o LAN communication function

> **NOTE**
> **Connect the inverter online to make sure you receive the latest firmware version available and extend the warranty from 5 to 10 years.**

5. Operation

5.1 LED indicators

There are three LED indicators on the zeroCO$_2$ large (5-10)K inverter (green, green and red) which indicate the working status of the inverter.

POWER   OPERATION   ALARM

LIGHT	STATUS	DESCRIPTION
POWER	ON	The inverter can detect DC power
	OFF	No DC power.
OPERATION	ON	The inverter is fully operational.
	OFF	The inverter has stopped operating.
	FLASHING	The inverter is initializing.
ALARM	ON	Fault condition is detected.
	OFF	No fault condition detected.
	FLASHING	Either the grid or solar cannot be detected.
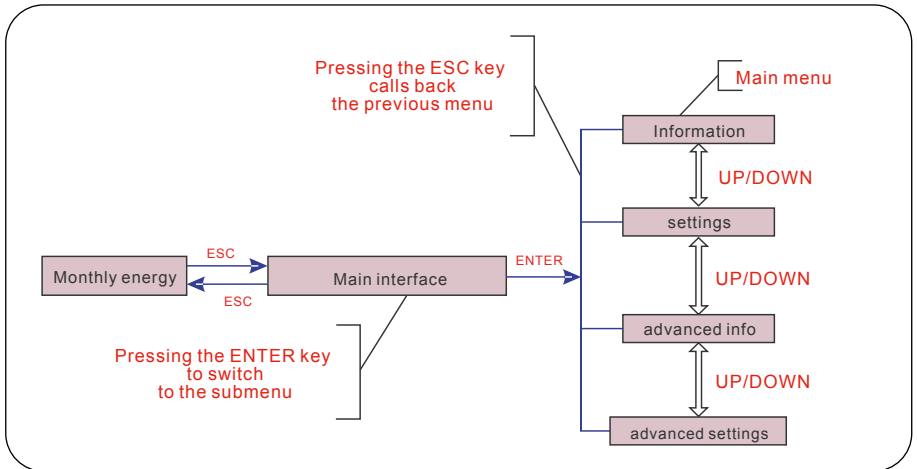
Figura 36 - Operation Overview

4. Operation

5.2 Main Menu

There are four submenu in the Main Menu (Figura 36):
1. Information
2. Settings
3. Advanced Info
4. Advanced Settings

5.3 Information

In the "Information" section, operating data and information data can be viewed.
Sub-sections include::
1. General Info
2. System Info
3. Energy Records
4. BMS Info
5. Meter Info

The example displays are shown in the following figures.

DISPLAY	DESCRIPTION
Inverter SN: FFFFFFFFFFFFFFFF	Shows the inverter serial number.
Device: Waiting	Shows the status of the device.
Battery: Waiting	Shows the status of battery.
Backup: Waiting	Shows the status of the backup circuit.
Grid: Waiting	Shows the status of the AC grid.
DRMNO: 08	Shows the DRM operating mode (effective for UK / AUS).
Model: 00	Shows the model number of the device.
SoftVer.: 000000	Shows the firmware version of the device.

Figura 37 - General info

5. Operation

DISPLAY		DESCRIPTION
V_DC1:	000.0V	V_DC1: shows input 01 voltage value.
I_DC1:	000.0A	I_CC1: shows input 01 current value.
V_DC2:	000.0V	V_DC2: shows input 02 voltage value.
I_DC2:	000.0A	I_DC2: shows input 02 current value.
V_A:	000.0V	V_A: shows the grid's voltage value (L1-N phases misure).
I_A:	000.0A	I_A: shows the grid's current value (L1 phase).
I_B:	000.0A	V_B: shows the grid's voltage value (L2-N phases misure).
V_B:	000.0V	I_B: shows the grid's current value (L2 phase).
I_C:	000.0A	V_C: shows the grid's voltage value (L3-N phases misure).
V_C:	000.0V	I_C: shows the grid's current value (L3 phase).
Grid Frequency 00,00Hz		Shows the grid's frequency value.
Battery V:	000.0V	Battery V: shows the battery voltage.
Battery I:	000.0A	Battery I: shows the battery current.
Backup V:	000.0V	Backup V: shows the voltage of the backup port.
Backup P:	00.0kW	Backup P: shows the power of the backup port.
Charge P:	00.0kW	Charge P: shows the battery charging power.
DisCharge P:	00.0kW	Discharge P: shows the battery discharge power.

Figura 38 - System info

DISPLAY	DESCRIPTION
BattChgE Total: 0000000kWh	Shows the total battery charged energy.
BattChgE Today: 000.0kWh	Shows today's battery charged energy.
BattChgE Lastday: 000.0kWh	Shows yesterday's battery charged energy.
BattDisChgE Total: 0000000kWh	Shows the total energy discharged from the battery
BattDisChgE Today: 000.0kWh	Shows the energy discharged from the battery today
BattDisChgE Lastday: 000.0kWh	Shows the energy discharged from the battery yesterday
GridGetE Total: 000.0kWh	Shows the total energy absorbed by the grid
GridGetE LastdayT: 000.0kWh	Shows the total energy absorbed by the grid up to yesterday (total excluding today)
GridGetE Today: 000.0kWh	Shows the total energy absorbed by the grid today

Figura 39 - Energy Records

5. Operation

DISPLAY	DESCRIPTION
GridGetE Lastday: 000.0kWh	Shows the total energy absorbed by the grid yesterday
GridSendE Total: 000.0kWh	Shows the total energy fed into the grid
GridSendE LastdayT: 000.0kWh	Shows the total energy fed into the grid up to yesterday (total excluded today)
GridSendE Today: 000.0kWh	Shows the energy fed into the grid today
GridSendE Lastday: 000.0kWh	Shows the energy fed into the grid yesterday
LoadE Total: 000.0kWh	Shows the total energy consumed by the loads
LoadE Todayl: 000.0kWh	Shows the total energy consumed by loads year to date
LoadE Lastday: 000.0kWh	Shows the total energy consumed by loads yesterday
PV E Total: 000.0kWh	Shows the total PV generation.
PV E Today: 000.0kWh	Shows today's PV generation.
PV E Lastday: 000.0kWh	Shows yesterday's PV generation.

Figura 39 - Energy Records

DISPLAY	DESCRIPTION
Battery V: 000.0V Battery I: +00.0A	Battery V: shows battery voltage (from BMS). Battery I: shows battery current (from BMS).
ChargeILmt: 000.0A DischargeILmt: 000.0A	ChargeILmt: shows battery charge current limit (from BMS). DischargeILmt: shows battery discharge current limit (from BMS).
ChargeVLmt: 000.0V DischargeVLmt:000.0V	ChargeVLmt: shows battery charge voltage limit (from BMS). DischargeVLmt: shows battery discharge voltage limit (from BMS).
SOC Value: 000.0% SOH Value: 000.0%	SOC Value: shows battery state of charge. SOH Value: shows battery state of health.
BMS Status: CAN Fail	Shows that battery BMS communication status.
BMS Version: 0.0	Shows installed firmware version.

Figura 40 - BMS info

5. Operation

DISPLAY	DESCRIPTION
Grid Meter	It's just a viewing window
PhaseA Power: +000000W	Shows phase A power on the meter.
PhaseB Power: +000000W	Shows phase B power on the meter.
PhaseC Power: +000000W	Shows phase C power on the meter.
Meter Energy: 0000000.00kWh	Show energy records on the meter.
Output Energy: 0000000.00kWh	Show export energy records on the meter.
Input Energy: 0000000.00kWh	Show import energy records on the meter.
Meter Status: RS485 Fail	Shows meter's communication status.

Figura 41 - Meter info

5. Operation

5.4 Settings

The following submenus are displayed when "Settings" menu is selected:
1. Set Time/Date
2. Set Address

5.4.1 Set Time/Date

This function allows time and date setting. When this function is selected, the LCD will display a screen as shown in Figura 42.

```
NEXT=<ENT> OK=<ESC>
   01-01-2020 00:00
```
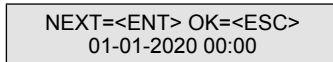
Figura 42 - Set Time

Press the UP/DOWN keys to set time and data. Press the ENTER key to move from one digit to the next (from left to right). Press the ESC key to save the settings and return to previous menu.

5.4.2 Set Address

This function is used to set the address when multi inverters are connected. The address number can be assigned from "01" to "99". The default address is "01".

```
NEXT=<ENT> OK=<ESC>
   Set Address: 01
```
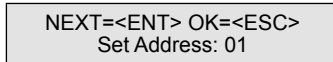
Figura 43 - Set Address

Press the UP/DOWN keys to set the address. Press the ENTER key to save the settings. Press the ESC keys to cancel the change and return to the previous menu.
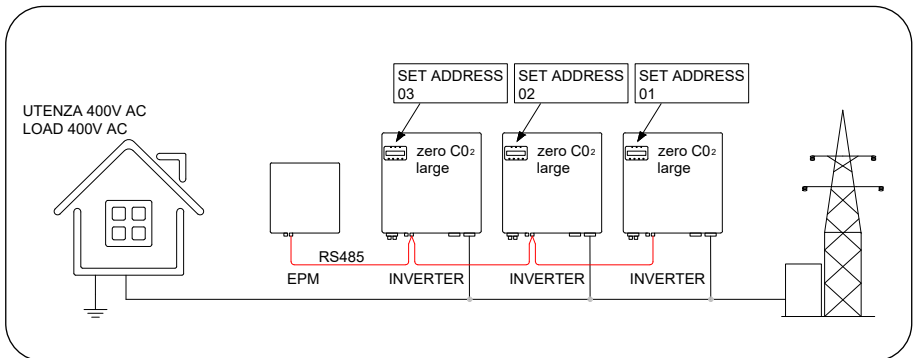
Figura 44

5. Operation

5.5 Advanced Information

NOTE
To access to this area is for fully qualified and accredited technicians only.
Enter menu "Advanced Info." (Password "0010").

Select "Advanced Info" from the main menu.
The screen will require the password as below:

> Input Password
> X X X X

Figura 45 - Enter Password

After enter the correct password, the main menu will display a screen and be able to access to the following information.:
1. Alarm Message
2. Warning Message
3. Running Status
4. Communication Data
5. Yield Profile
6. Inspection

The screen can be scrolled manually by pressing the UP/DOWN keys.
Pressing the ENTER key gives access to a submenu.
Press the ESC key to return to the Main Menu.

5.5.1 Alarm Message

The screen shows the 100 latest alarm messages.
Screens can be scrolled manually by pressing the UP/DOWN keys.
Press the ESC key to return to the previous menu.

> Alm000: MET_Comm-FAIL T:
> 00-00 00:00 D: 0000

Figura 46 - Alarm Message

5.5.2 Warning Message

The screen shows the 100 latest warn messages.
Screens can be scrolled manually by pressing the UP/DOWN keys.
Press the ESC key to return to the previous menu.

> Msg000:
> T: 00-00 00 : 00 D: 0000

Figura 47 - Warning Message

5. Operation

5.5.3 Running Status

This function is for maintenance person to receive messages related to the operation, such as internal temperature, Standard NO. etc. Values are for reference only

DISPLAY	DESCRIPTION
DC Bus Voltage: 000.0 V	Shows DC bus voltage.
Power Factor: +00.0	Shows power factor of the inverter.
Power Limit%: 000%	Shows the power output percentage of the inverter.
Inverter Temp: +000.0degC	Shows internal IGBT temperature of the inverter.
Grid Standard	Shows current effective grid standard.
Flash State: 00000000	Reserved for Energy S.p.A. Technicians
DC Bus Voltage: 000.0V	DC bus voltage
Power Factor: +0.00	Power factor
Power limit%: 000%	Percent power limitation
Inverter Temp: 000.1 degC	Inverter temperature
Grid Standard: CEI 0-21	Reference legislation
Flash State: 00000	Reserved for zeroCO$_2$ large technicians

Figura 48 - Running Status

NOTE
The Advanced Status is reserved for zeroCO$_2$ large technicians.

5. Operation

5.5.4 Communication Data

The screen shows the internal data of the inverter, which is for service technicians only.

```
01-05: 00 00 00 00 00
06-10: 00 00 00 00 00
```

Figura 49 - Communication Data

5.5.5 Yield Profile

The yield profile includes: Energy Battery, Energy Grid and Energy Backup.
All the historical energy generation records can be easily viewed in this section.

```
Energy Battery
Energy Grid
```

Figura 50 - Communication Data

5.5.6 Inspection

The screens display the operating parameters which guarantee compliance of the inverter with the CEI 0-21 standard. With UP and Down you can view the following pages.

DISPLAY	DESCRIPTION
Grid Standard: CEI 0-21	Shows the actual current grid standard.

Figura 51 - Inspection

5. Operation

5.6 Advanced Settings

NOTE
To access to this area is for fully qualified and accredited technicians only.
Enter menu "Advanced Info." (Password "0010").

Select "Advanced Settings" from the Main Menu.
The screen will require the password as below:

Input Password:
X X X X

Figura 52 - Enter password

Select "Advanced Settings" from the main menu to access the following options:
1. Select Standard
2. Grid Switches
3. Battery Control
4. Backup Control
5. Storage Energy Set
6. STD. Mode Settings
7. Software Update
8. Export Power Set
9. Reset Password
10. Restart HMI
11. Self Test CEI 0-21
12. Compensation Set
13. Special settings

5.6.1 Select Standard

This function is used to select the grid's reference standard.

YES=<ENT> NO=<ESC>
Standard: CEI021

Figura 53

Press the UP/DOWN keys to select the standard (G98, G99, VDE4015, EN50549L, CEI021, AS4777-15, NRS097, User-Def, ecc.). See "9. Appendix" at page 58.
Press the ENTER key to confirm the setting.
Press the ESC key to cancel changes and returns to previous menu.

NOTE
For different countries, the grid standard needs to be set as different according to local requirements. If there is any doubt, please consult zeroCO$_2$ large service.

5. Operation

5.6.2 Grid Switches

This function is used to start or stop the generation of the inverter.
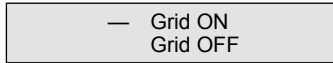
— Grid ON
Grid OFF

Figura 54 - Set Grid ON/OFF

Screens can be scrolled manually by pressing the UP/DOWN keys.
Press the ENTER key to save the setting.
Press the ESC key to return to the previous menu.

5.6.3 Battery Control

This section is used to select the corresponding battery and set the battery wakeup function.
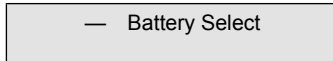
— Battery Select

Figura 55 - Battery Control

5.6.3.1 Battery Select

This product is compatible with the following battery modules:

Brand	Model	Setting
Pylontech	H48074 (CEI 0-21) / H48050 (CEI 0-21) / Force H1 (CEI 0-21) / Force H2 (CEI 0-21)	Select "Pylon"

If hybrid inverter is not connected to a battery, then select "No Battery" to avoid alarms.
For above compatible battery modules, only two parameters need to be defined:
● OverDischg SOC (10% ~ 40%, default 20%)
  Inverter will not discharge the battery when the OverDischg SOC is reached. Battery self-discharge is unavoidable, SOC may go lower than the limit if the battery can't get charged for a long period of time.

Battery Select:
PYLON
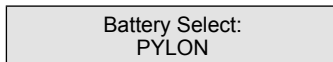
Figura 56 - Battery Select
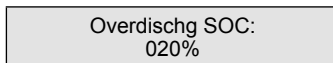
Overdischg SOC:
020%

Figura 57 - Overdischg SOC

5. Operation

5.6.4 Backup Control

This section is used to set the configuration of the backup port.

> — Backup ON/OFF
>   Backup Settings
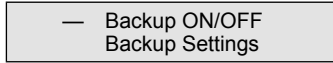
Figura 58 - Backup Control

5.6.4.1 Backup ON/OFF

This switch can enable/disable the electrical connection of the backup port.

> Set Backup:
> OFF

Figura 59 - Backup ON/OFF

5.6.4.2 Backup Settings

This section shows the parameter of the backup port.

> Backup Voltage:
> 230.0V
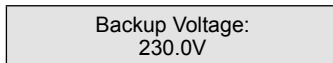
Figura 60 - Backup Settings

5.6.5 Storage Energy Set

There are two settings available in this section: Meter Select and Storage Mode Select.

> — Meter Select
>   Stg Mode Select
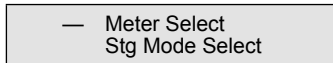
Figura 61 - Storage Energy Set

5.6.5.1 Meter Set

Two settings are available in this section: meter select and meter placement.

5. Operation

5.6.5.1.1 Meter Select

This setting is used to select the meter type based on the actual configuration. When using the meter (insertion with CT) supplied with the inverter, select "Eastrom 3ph Meter".

5.6.5.1.2 Meter Placement

In "Meter Placement" setting three operating modes can be selected:
● GRID: Meter installed at the connection point of the grid.
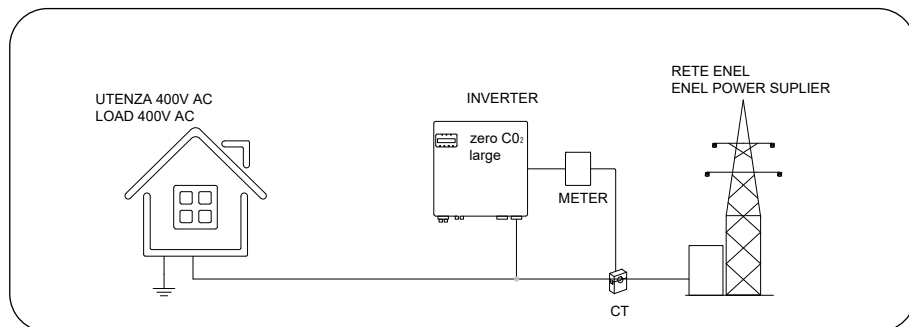
Figura 62 - Grid

● LOAD; Meter installed on the branch circuit of the load.
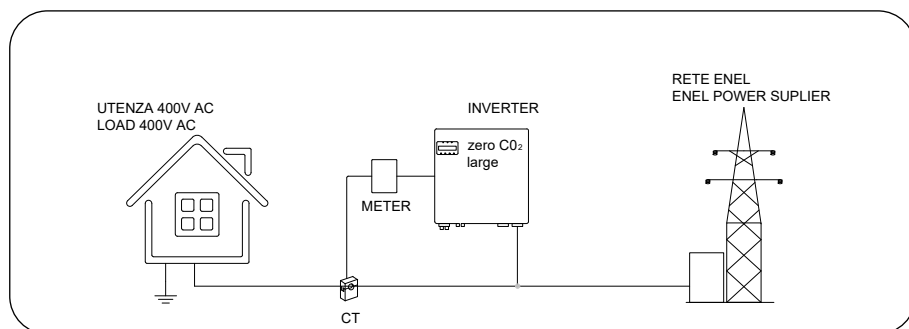
Figura 63 - Load

5. Operation

● GRID+PV Inverter: One meter is connected to the grid connection point, the other meter is connected to the AC output port of an additional PV inverter (Easton Meter supported).
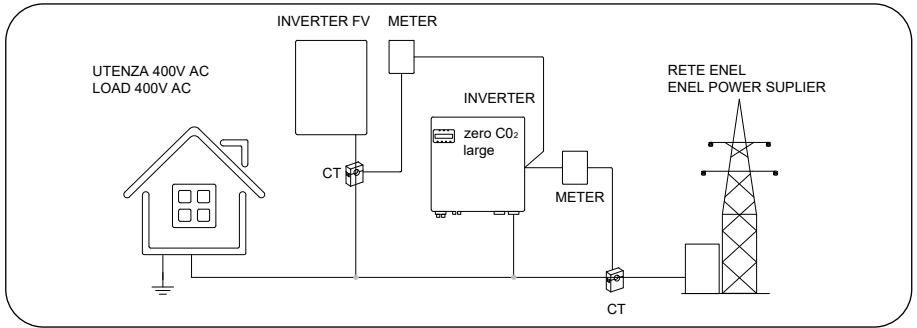
Figura 64 - Grid + PV Inverter

● The meter can not be installed in this configuration.
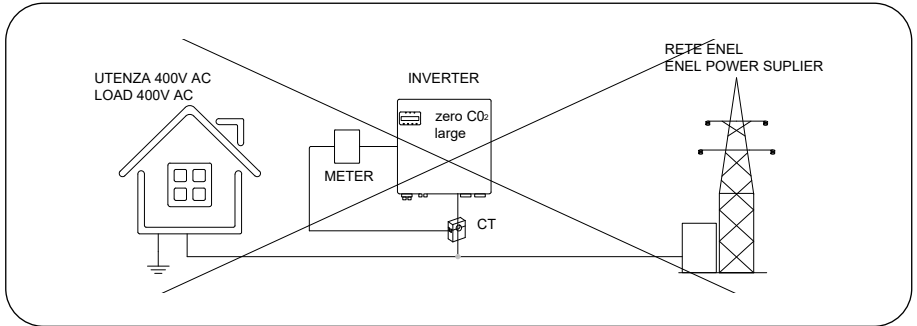
Figura 65

5.6.5.2 STG Mode Select

Four optional modes are available:
1. Self-Use
2. Feed In Priority
3. Backup
4. Off-Grid

NOTE
Warning: if a mode is activated (ON) the others must be positioned to OFF.

5. Operation

1. **Self-Use (maximize the usage of PV) sequence is: load, battery, grid.**
   PV Power Using Priority: Load>Battery>Grid.
   Load Support Priority: PV>Battery>Grid.
   Battery Charging Power comes from PV (if "Charging From Grid" is allowed, it can also come from Grid).
   If "Time of Use" is "Run", the logic will follow the charging/discharging settings and time settings as defined in "Time of Use". For those undefined period of time, it will still follow the Self-Use logic.
   Time of Use for Self use
   Path: Advanced Settings-> Storage Energy Set-> Storage Mode Select-> Self-Use Mode-> ON-> Time of use for Self use
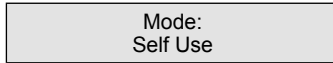
   ```
   Mode:
   Self Use
   ```
   Figura 66

2. **Feed In Priority Mode Logic (feed the excess PV to Grid in order to gain subsidies) sequence is: grid, load, battery.**
   PV Power Using Priority: Load>Grid>Battery.
   Load Support Priority: PV>Battery>Grid.
   Battery Charging Power comes from PV (if "Charging From Grid" is allowed, it can also come from Grid).
   If "Time of Use" is "Run", the logic will follow the charging/discharging settings and time settings as defined in "Time of Use". For those undefined period of time, it will still follow the Feed in Priority logic.
   Time of Use for Feed for priority.
   Path: Advanced Settings-> (Storage Energy Set-> Storage Mode Select-> Feed in Priority Mode->ON-> Time of use for Feed for priority.
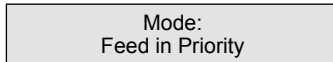
   ```
   Mode:
   Feed in Priority
   ```
   Figura 67

3. **Backup Mode Logic (keep the Battery at a certain SOC and only use it during power outage).**
   Backup Mode Logic: Keep the Battery at a certain SOC and only use it during power outage.
   Backup SOC Setting Range: From Battery "Overdischarge SOC" to 100%.
   PV Power Using Priority: Battery>Load>Grid
   Load Support Priority: PV>Grid>Battery
   Battery Charging Power comes from PV (if "Charging From Grid" is allowed, it can also come from Grid). The "Backup Mode" is not applicable for Lead-acid batteries.
   Charging from grid for Backup mode.
   Path: Advanced Settings->Storage Energy Set-> Storage Mode Select->Backup Mode-> ON->Backup SOC-> Charging from grid for Backup mode.
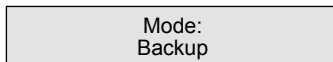
   ```
   Mode:
   Backup
   ```
   Figura 68

5. Operation

4. Off-Grid Mode Logic (for Off-grid use and AC-Grid Port Disconnected).
OverDischg SOC for Off-Grid Setting Range: From Battery "Forcecharge SOC" to 100%.
PV Power Using Priority: Load>Battery
Load Support Priority: PV>Battery
Battery Charging Power comes from PV.
Off-Grid Mode.
Path: Advanced Settings->Storage Energy Set->Storage Mode Select-> Off-Grid Mode->ON-
>Off Grid Mode

```
Mode:
Off-grid
```
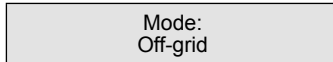
Figura 69

5.6.6 STD Mode Settings

These settings are reserved for maintenance personnel and technicians.
Do not change anything without instruction.
Selecting "STD Mode. Settings", displays the sub-menu shown below:
1. Working Mode Set
2. Power Rate Limit
3. Freq. Derate Set
4. 10mins Voltage Set
5. 3Tau Settings
6. Initial Settings

```
—   Working Mode Set
    Power Rate Limit
```
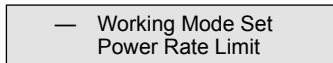
Figura 70 - STD Mode Settings

5.6.7 Software Update

The software update includes l'HMI and DSP. Corresponding firmware version can be checked
in this setting. Press "ENT" to enter the upgrading mode.

```
—   HMI Update
    DSP Update
```
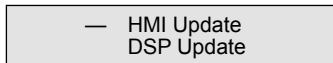
Figura 71 - STD Mode Settings

5. Operation

5.6.8 Export Power Set

This function is used to set the export power control.
1. EPM ON/OFF
2. Backflow Power
3. Failsafe ON/OFF

Settings 2 and 3 are only valid when Setting 1 is set to "ON".

5.6.8.1 EPM ON/OFF

Enable/ Disable the function.

```
EPM ON/OFF:
OFF
```

Figura 72 - EPM ON/OFF

5.6.8.2 Backflow Power

Determine the allowed backfeed power (system export to the grid).

```
Backflow Power:
+0000W
```

Figura 73 - Backflow Power

5.6.8.3 FailSafe ON/OFF (not used in Italy)

When this FailSafe function is ON,the inverter will shutdown once it loses communication with the meter in case of any backflow power exceeding the limit.

```
FailSafe ON/OFF:
ON
```

Figura 74 - FailSafe ON/OFF

5.6.9 Reset Password

Reset password: in this menu, user can reset the inverter password, but the admin password is always valid.

```
Input New Password:
X X X X
```

Figura 75 - Reset Password

5. Operation

5.6.10 RESTART HMI

This function is to reboot the LCD screen.

5.6.11 Self Test CEI 0-21

Function is available only when the Italian standard CEI021 is selected.

5.6.12 Compensation Set

This function is used to calibrate the energy and output voltage of the inverter. Two sections are included: Power Parameter and Voltage Parameter.

```
—   Power Parameter
    Voltage Parameter
```

Figura 76 - Compensation Set

```
YES=<ENT> NO=<ESC>
   Power Para.:1.000
```

Figura 77 - Power Parameter

```
—   Vg-A-zero: +0.0
    Vg-B-zero: +0.0
```

Figura 78 - Voltage Parameter

5. Operation

5.7 Special Settings

Inverters have the built-in AFCI function which can detect the arc fault on the DC circuit and shut down the inverter to prevent a fire disaster.

5.7.1 Enable AFCI function

AFCI function can be enabled as below:
Path: Advanced Setting -> Password: 0010 -> Special Settings -> AFCI Set -> AFCI ON/ OFF -> ON

— AFCI ON/OFF AFCI Level	— ON OFF

Figura 79 - Enable AFCI function

NOTE
If you find that the user interface of your inverter is different from that of the installation guide, please contact the after-sales engineer or technical support.

WARNING
The "AFCI Level" is reserved for technicians ONLY. Do not change the sensitivity otherwise it will lead to frequent false alarms or malfunctions. Manufacturer is not responsible for any further damages caused by unauthorized modifications.

WARNING
The setting also corresponds to the current state which can be used to control the ON/ OFF state of the AFCI function.

5.7.2 EPS Mode

NOTE
The data shown in the following screen must only be modified by Energy S.p.A. ualified technicians.

When the network is available, only the Network Port is enabled and the load supported via the EPS box from the network.
When the network is lost, the Network Port will be disabled and after the "Switching Time", the Backup Port will be enabled and then the load will be supported through the EPS box by the Backup Port.
Give up the backup port UPS function and set the switching time manually. This mode must work with the EPS Box.
Otherwise, it may cause unexpected control errors.
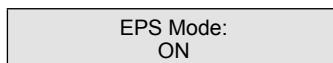
EPS Mode: ON

Figura 80 - EPS Mode

To connect see "9.1 EPS Box Installation" at page 58

6. Maintenance

6.1 Cleaning

zeroCO$_2$ large (5-10)K series inverter does not require any regular maintenance. However, cleaning the heatsink will help inverter dissipating heat and increase the lifetime of inverter. The dirt on the inverter can be cleaned with a soft brush.
The LCD and the LED status indicators lights can be cleaned with cloth if they are too dirty to be read.

CAUTION
Do not touch the surface when the inverter is operating. Some parts may be hot and cause burns. Turn OFF the inverter and let it cool down before you do any maintenance or cleaning of inverter.

NOTE
Never use any solvents, abrasives or corrosive materials to clean the inverter.

7. Troubleshooting

7.1 Error messages and solutions

Error messages and solutions
The inverter has been designed in accordance with international grid tied standards for safety, and electromagnetic compatibility requirements. Before delivering to the customer the inverter has been subjected to several test to ensure its optimal operation and reliability.
In case of a failure the LCD screen will display an alarm message. In this case, the inverter may stop feeding energy into the grid. The alarm descriptions and their corresponding alarm messages are listed in Tab. 1 at page 51

When faults occur, the "Fault" state will be shown on the main screen.

Follow the steps below to check what fault occurs:
Step: Enter → Down → Advanced Information → Enter → Alarm Message.

- **STEP1:** press Enter.
- **STEP2:** press DOWN to select "Advanced Information", press ENTER.

> — Advanced Info
> Advanced Settings
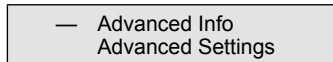
Figura 81

- **STEP3:** type the password.

> Input Password
> X X X X
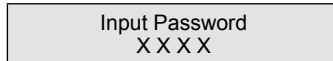
Figura 82

- **STEP4:** press DOWN to select "Alarm Message", press ENTER.

> Alm000: MET_Comm-FAIL T:
> 00-00 00:00 D:0000

Figura 83

7. Troubleshooting

Alarm Message	Failure description	Solution
ARC-FAULT	ARC detected in DC circuit	Check if there's arc in PV connection and restart inverter.
AFCI Check FAULT	AFCI module self check fault	Restart inverter or contact installer.
DCinj-FAULT	High DC injection current	Restart inverter or contact installer.
DSP-B-FAULT	Comm. failure between main and slave DSP	Restart inverter or contact installer.
DC-INTF	DC input overcurrent	Restart inverter. Identify and remove the string to the fault MPPT. Change power board.
G-IMP	High grid impedance	Use user define function to adjust the protection limit if it's allowed by electrical company.
GRID-INTF01/02	Grid interference	Restart inverter. Change power board.
IGBT-OV-I	Over IGBT current	
IGFOL-F	Grid current tracking fail	Restart inverter or contact installer.
IG-AD	Grid current sampling fail	
ILeak-PRO 01/02/03/04	Leakage current protection	Check AC and DC connection. Check inverter inside cable connection.
INI-FAULT	Initialization system fault	Restart inverter or contact installer.
LCD show initial-izing all the time	Can not start-up	Check if the connector on main board or power board are fixed. Check if the DSP connector to power board are fixed.
NO-Battery	Unconnected battery	Check the wire of battery power is connected correctly or not. Check the output voltage of battery is correctly or not.
No power	Inverter no power on LCD	Check PV input connections. Check DC input voltage single phase >120 V, three phase >350 V). Check if PV +/- is reversed.
NO-GRID	No grid voltage	Check connections and grid switch. Check the grid voltage inside inverter terminal.
OV-BUS	Over DC bus voltage	Check inverter inductor connection. Check driver connection.
OV-DC01/02/03/04	Over DC voltage	Reduce the number of PV modules in series.
NET-COMM-FAIL	Meter communication failure	Check connection and data cable between meter and inverter
CAN-COMM-FAIL	Battery data communication failure	Check connection and data cable between battery and inverter

Tab. 1 - Alarm messages

7. Troubleshooting

Alarm Message	Failure description	Solution
OV-DCA-I	DC input overcurrent	Restart inverter. Identify and remove the string to the fault MPPT. Change power board.
OV-G-V01/02/03/04	Over grid voltage	Resistant of AC cable is too high. Change bigger size grid cable. Adjust the protection limit if it's allowed by electrical company.
OV-G-I	Over grid current	Restart inverter. Change power board.
OV-G-F01/02	Over grid frequency	Use user define function to adjust the protection limit if it's allowed by electrical company.
OV-IgTr	AC side transient overcurrent	Restart inverter. Return-factory repair.
OV-ILLC	LLC hardware overcurrent	
OV-VBackup	Backup overvoltage	
OV-TEM	Over temperature	Check inverter surrounding ventilation. Check if there's sunshine direct on inverter in hot weather.
OV-Vbatt1	Battery overvoltage	Check the protect point for over voltage sets correctly or not. Restart inverter.
OV-Vbatt-H	Battery overvoltage hardware fault	Check the environment surrounding the inverter. Restart inverter.
Over-Load	Overload	Check the load of backup port is over 3kW or not. Reduce the load of backup port, then restart inverter.
PV ISO-PRO01/02	PV isolation protection	Remove all DC input, reconnected and restart inverter one by one. Indentify which string cause the fault and check the isolation of the string.
RelayChk-FAIL	Realy check fail	Restart inverter or contact installer.
UN-BUS01/02	Under grid voltage	Check the inverter inductor connection. Check driver connection.
UN-G-F01/02	Under grid frequency	Use user define function to adjust the protection limit if it's allowed by electrical company.
UN-G-V01/02	Under DC bus voltage	
12Power-FAULT	12V power supply fault	Restart inverter or contact installer.

Tab. 1 - Alarm messages

7. Troubleshooting

NOTE
If the inverter displays any alarm message as listed in Table 8.1; please turn off the inverter and wait for 5 minutes before restarting it. If the failure persists, please contact Energy S.p.A. service center.

Please keep ready with you the following information before contacting us.
- Serial number of zeroCO$_2$ large (5-10)K;
- The distributor/dealer of zeroCO$_2$ large (5-10)K (if available);
- Installation date;
- The description of the problem, i.e. the alarm message displayed on the LCD and the status of the LED status indicators lights.
- Other readings obtained from the Information submenu (refer to "5.3 Information" at page 31) will also be helpful;
- The PV array configuration, e.g.: number of panels, capacity of panels, number of strings, etc.;
- Your contact details.

8. Specifications

8.1 Technical data

Model	RHI-3P5K-HVES-5G	RHI-3P6K-HVES-5G
Input DC (PV side)		
Recommended max. PV power [W]	8000	9600
Max. input voltage [V]	1000	
Rated voltage [V]	600	
Start-up voltage [V]	160	
MPPT voltage range [V]	200-850	
Full load MPPT voltage range [V]	200-850	240-850
Max. input current [A]	13.0	
Max. short circuit current [A]	19.5	
MPPT number / Max. input strings number	2/2	
Battery		
Battery type	Li-ion	
Battery Voltage range [V]	160 - 600	
Maximum Charging Power [kW]	5	6
Maximum Charge / Discharge current [A]	25	
Communication	CAN/RS485	
Output AC (grid side)		
Rated output power [kW]	5	6
Max. apparent output power [kVA]	5.5	6.6
Operation phase	3/N/PE	
Rated grid voltage [V]	380 / 400	
The grid voltage range [V]	320 / 480	
Rated grid frequency [Hz]	50/60	
AC grid frequency range [Hz]	45-55/55-65	
Rated grid output current [A]	7,6/7,2	9,1/8,7
Max. output current [A]	8,4/8,0	10,0/9,6
Power Factor	> 0,99 (0,8 leading... 0.8 lagging)	
THDi [%]	< 2	
Output AC (Back-up)		
Rated output power [kW]	5	6
Max. apparent output power [kVA]	1000 @60"	1200 @60"
Back-up switch time [ms]	<40	
Rated output voltage [V]	3/N/PE, 380/400	
Rated frequency [Hz]	50/60	
Rated output current [A]	7.6/7.2	9.1/8.7
THDv(@linear load) [%]	<2	

Model	RHI-3P5K-HVES-5G	RHI-3P6K-HVES-5G
Efficiency		
Max. efficiency of Solar Inverting [%]	98,4	
EU efficiency of Solar Inverting [%]	97,7	
MPPT efficiency [%]	99,9	
Battery charge/discharge efficiency [%]	97,5	
Protection		
Anti-islanding protection	Si	
Ground fault monitoring	Si	
Residual current monitoring unit	Si	
Output overcurrent protection	Si	
Output shortcircuit protection	Si	
Output overvoltage protection	Si	
DC switch	Si	
Reverse polarity protection	Si	
Overvoltage protection	Si	
Battery reverse protection	Si	
General Data		
Dimensions [WxHxD mm]	535 x 455 x 181	
Weight [kg]	25.1	
Topology	Transformerless	
Self consumption (night) [W]	< 7	
Operation temperature range [°C]	-25 ~ +60	
Humidity [%]	0-100	
Protection class	IP65	
Noise emission [dB]	<30	
Cooling concept	Natural convection	
Max. operation altitude [m]	4000	
Grid connection standard	G98 or G99, VDE-AR-N 4105 / VDE V 0124, EN 50549-1,VDE 0126 / UTE C 15 /VFR:2019, RD 1699/RD 244 / UNE 206006 / UNE 206007-1, CEI 0-21, C10/11, NRS 097-2-1, TOR, EIFS 2018.2, IEC 62116, IEC 61727, IEC 60068, IEC 61683, EN 50530, MEA, PEA	
Safety / EMC standard	IEC 62109-1/-2 ,EN 61000-6-1/-3	
Features		
DC connection	MC4 connector	
AC connection	Quick connector plug	
Display	LCD, 2X20 Z	
Communication	RS485, Optional: WiFi, LAN	
Warranty [years]	5 standard (extendable to 10)	

8. Specifications

Model	RHI-3P8K-HVES-5G	RHI-3P10K-HVES-5G
Input DC (PV side)		
Recommended max. PV power [W]	12800	16000
Max. input voltage [V]	1000	
Rated voltage [V]	600	
Start-up voltage [V]	160	
MPPT voltage range [V]	200-850	
Full load MPPT voltage range [V]	210-850	200-850
Max. input current [A]	26/13	26/26
Max. short circuit current [A]	39/19.5	39/39
MPPT number / Max. input strings number	2/3	2/4
Battery		
Battery type	Li-ion	
Battery Voltage range [V]	160 - 600	
Maximum Charging Power [kW]	8	10
Maximum Charge / Discharge current [A]	25	
Communication	CAN/RS485	
Output AC (grid side)		
Rated output power [kW]	8	10
Max. apparent output power [kVA]	8.8	10
Operation phase	3/N/PE	
Rated grid voltage [V]	380 / 400	
The grid voltage range [V]	320 / 480	
Rated grid frequency [Hz]	50/60	
AC grid frequency range [Hz]	45-55/55-65	
Rated grid output current [A]	12.2/11.5	15.2/14.4
Max. output current [A]	13.4/12.8	15.2/14.4
Power Factor	> 0,99 (0,8 leading... 0.8 lagging)	
THDi [%]	< 2	
Output AC (Back-up)		
Rated output power [kW]	8	10
Max. apparent output power [kVA]	1600 @60"	
Back-up switch time [ms]	<40	
Rated output voltage [V]	3/N/PE, 380/400	
Rated frequency [Hz]	50/60	
Rated output current [A]	12.2/11.5	15.2/14.4
THDv(@linear load) [%]	<2	

8. Specifications

Model	RHI-3P8K-HVES-5G	RHI-3P10K-HVES-5G
Efficiency		
Max. efficiency of Solar Inverting [%]	98,4	
EU efficiency of Solar Inverting [%]	97,7	
MPPT efficiency [%]	99,9	
Battery charge/discharge efficiency [%]	97,5	
Protection		
Anti-islanding protection	Si	
Ground fault monitoring	Si	
Residual current monitoring unit	Si	
Output overcurrent protection	Si	
Output shortcircuit protection	Si	
Output overvoltage protection	Si	
DC switch	Si	
Reverse polarity protection	Si	
Overvoltage protection	Si	
Battery reverse protection	Si	
General Data		
Dimensions [WxHxD mm]	535 x 455 x 181	
Weight [kg]	25.1	
Topology	Transformerless	
Self consumption (night) [W]	< 7	
Operation temperature range [°C]	-25 ~ +60	
Humidity [%]	0-100	
Protection class	IP65	
Noise emission [dB]	<30dB (A)	
Cooling concept	Natural convection	
Max. operation altitude [m]	4000	
Grid connection standard	G98 o G99, VDE-AR-N 4105 / VDE V 0124, EN 50549-1, VDE 0126 / UTE C 15/VFR:2019, RD 1699/RD 244 / UNE 206006 / UNE 206007-1, CEI 0-21, C10/11, NRS 097-2-1, TOR, EIFS 2018.2, IEC 62116, IEC 61727, IEC 60068, IEC 61683, EN 50530, MEA, PEA	
Safety / EMC standard	IEC 62109-1/-2 ,EN 61000-6-1/-3	
Features		
DC connection	MC4 connector	
AC connection	Quick connector plug	
Display	LCD, 2X20 Z	
Communication	RS485, Optional: WiFi, LAN	
Warranty [years]	5 standard (extendable to 10)	

9. Appendix

9.1 EPS Box Installation

UTENZA 400V AC
LOAD 400V AC

UTENZE NON PRIORITARIE
NO CRITICAL LOAD

UTENZE PRIORITARIE
CRITICAL LOAD

L1
L2
L3
N

EPS BOX

GRID   BACKUP   LOAD

L1
L2
L3
N

L1
L2
L3
N

L1
L2
L3
N

SISTEMA DI ACC
BATTERY ENER(
STORAGE SYST

IMPIANTO FOTOVOLTAICO
PHOTOVOLTAIC SYSTEM

QUADRO PROTEZ.
SWITCH PROT.BOX

TIPICO INVERTER ZERO CO2 TRIFASE
TYPICAL ZERO CO2 INVERTER 3Ph

ON
OFF
DC
SWITCH

PV1+ PV1-
PV2+ PV2-
PV3+ PV3-
PV4+ PV4-
BAT+ BAT-

PV1 PV2 PV3 PV4

BAT+
BAT-

Figura 84 - I

9. Appendix

RETE ENEL
ENEL POWER SUPLIER

L1
L2
L3

N

CT DI MISURA
MEASUR. SYSTEM

L1
L2
L3
N

NERO/BLACK
BIANCO/WHIT
NERO/BLACK
BIANCO/WHIT
NERO/BLACK
BIANCO/WHIT

METER
SDM630MCT

CONTATORE BIDIREZ.
DI SCAMBIO
(ACQUISTO E VENDITA)
BIDIRECTIONAL MEASUR.

9 10 11 12 13 14 15 16 17 18 19 20

1 2 3 4 5 6 7 8

QUADRO DI PROTEZIONE
SWITCH PROTECTION BOX

L3
L2
L1
N

CONTATORE DI PRODUZIONE
PRODUCTION MEASUREMENT

ACCUMULO
GY
EM

ROSSO / RED RS485 A+
NERO / BLACK RS485 B-

+   -

QUADRO DI PROTEZIONE
SWITCH PROTECTION BOX

CAN   DMR   WIFI
COM   RS485

AC-BACKUP

L1L2 L3 N PE

L1
L2
L3
N
PE

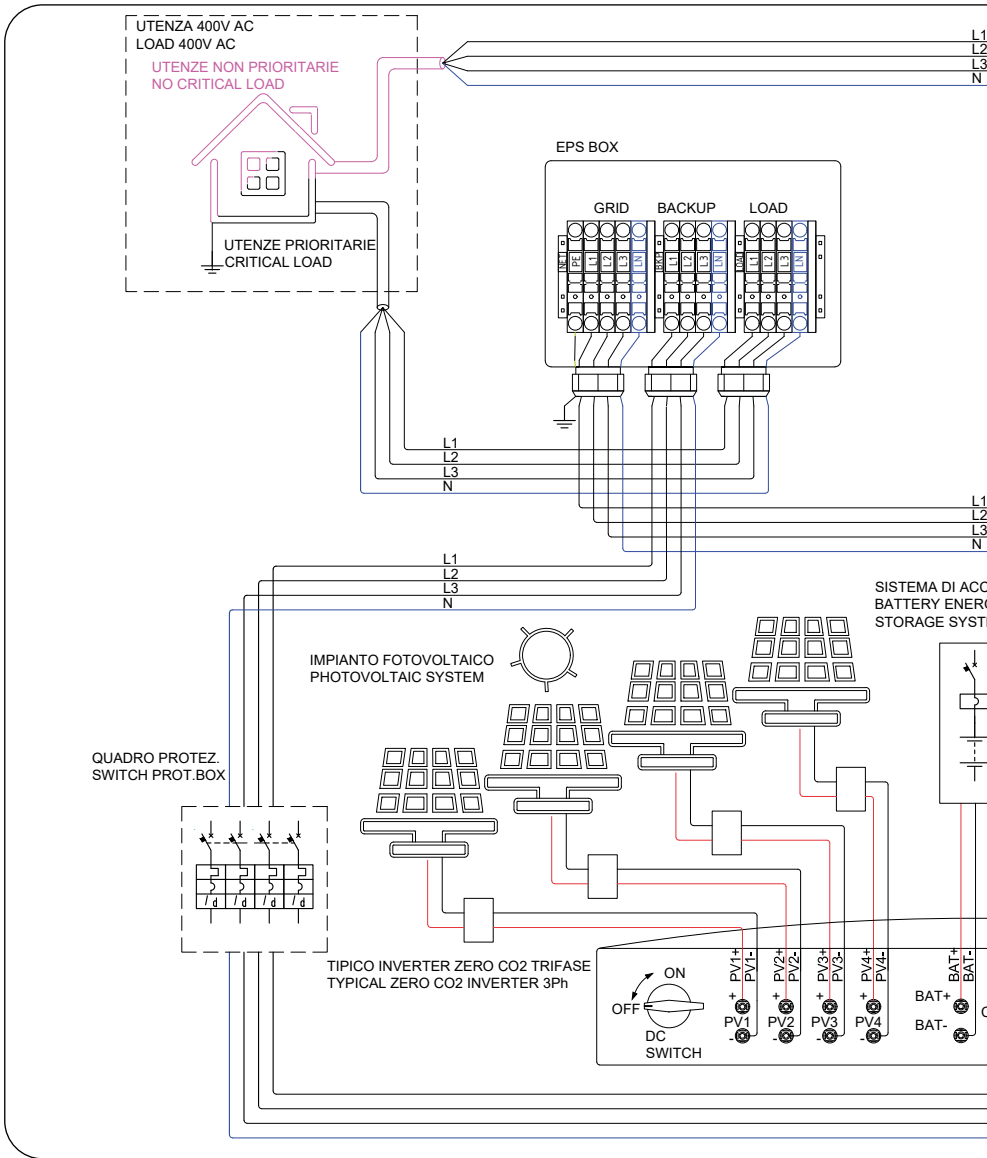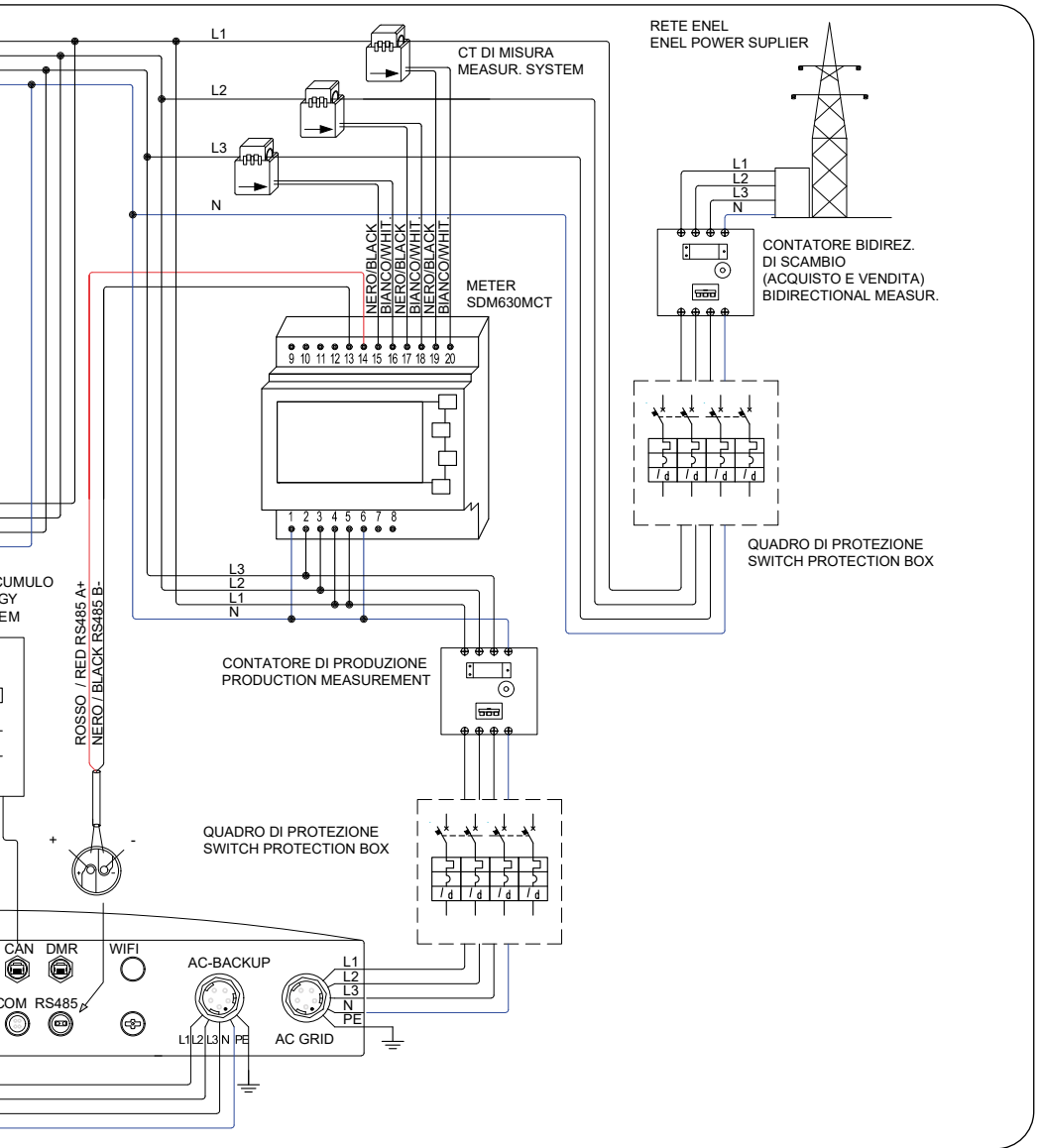AC GRID

EPS Box Installation

. 59 .

9. Appendix

EPS box, in compliance with the standard (cf. CEI 0-21 ed 2019 - Par. 8.4.3), allows the inverter to be used for emergency services in the absence of grid, allowing the load to be powered both from the public grid, and from the product system, ensuring that it does not operate in parallel with the Distributors's grid, by means of interlocked contactors.

Interlocked is electrically and mechanically, in accordance with the provisions of the above-mentioned standard.

In order to ensure safety in island operation, the EPS box grounding the neutral during operation alone in the absence of a grid.
For details of the electrical connections inside the EPS Box, please refer to the instruction sheet and to the correct accessory.

For some markets such as Italy, etc., the backup port and grid port should not be powered at the same time.
When the grid is present, the grid port should be used to support the loads.
When the grid is lost, the backup port should be used to support the loads.
An interlocking function between the backup port and grid port is necessary.
Therefore, a separate EPS box (optional) and firmware upgrade is needed to achieve this function.
Please consult Energy S.p.A. technicians for details and refer to the EPS box installation manual.

9.2 Grid standard selection guide

NOTE
Please check if the grid code setting comply with local requirement.

For different countries and regions, corresponding grid code needs to be selected in the inverter LCD to meet the requirements of local network provider.
This instruction indicates how to change the grid code and what code should be selected in different places.
This following list illustrates the grid standard options in the inverter which are subject to change. It is for your reference only. If customer has any doubts or uncertainty, please consult service department for confirmation.

To set the corrects grid code,please enter the following path: Advanced Settings-> Password:0010 -> Select Standard.

Detailed protection limits can be viewed when choosing the code.
Please select "Save&Send" to enforce the code.

9. Appendix

NO.	Code in LCD	Country/Region	Comments
1	VDE4015	Germany	For German Low Voltage Grid.
2	EN50549 PO	Poland	For Polish Low Voltage Grid.
3	EN50549 NL	Netherlands	For Dutch Low Voltage Grid.
4	EN50438 L	—	General EN50438 Requirement. Possible to be used in Austria, Cyprus, Finland, Czech Republic, Slovenia, etc.
5	EIFS- SW	Sweden	For Swedish Low Voltage Grid.
6	France	France	For French Low Voltage Grid.
7	C10/11	Belgium	For Belgian Low Voltage Grid.
8	NRS097	South Africa	For South African Low Voltage Grid.
9	CEI0-21	Italy	For Italian Low Voltage Grid (default).
10	EN50549L (EN50549-1)	—	General EN50549-1 requirement which meets local requirements of most European countries
11	G98	UK	For UK Low Voltage Grid <16A
12	G99	UK	For UK Low Voltage Grid <16A
13	G98 NI	North Ireland	For North Ireland Low Voltage Grid <16A
14	G99 NI	North Ireland	For North Ireland Low Voltage Grid >16A
15	User-define	—	Customized Protection Limits
16	Gen50	—	Generator Connected, frequency-Derating, 50Hz
17	Gen60	—	Generator Connected, frequency-Derating, 60Hz
18	DK1	East Denmark	For East Danish Low Voltage Grid
19	DK2	West Denmark	For West Danish Low Voltage Grid
20	50438IE	Ireland	For Irish Low Voltage Grid
21	RD1699	Spain	For Spanish Low Voltage Grid
22	EN50549 L	—	General EN50549 Requirement. Possible to be used in Cyprus, Finland, Czech Republic, Slovenia, Jamaica