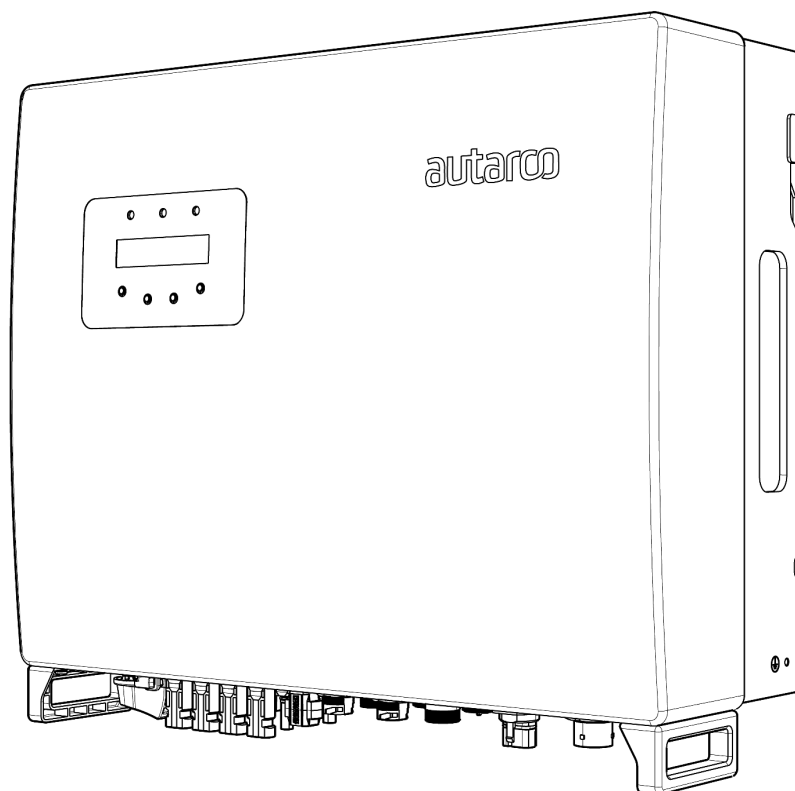




Installation and Operation Manual

Hybrid Solar Inverters LH series



Contact Information

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Other Information

This manual is an integral part of the unit. Please read the manual carefully before installation, operation or maintenance. Keep this manual for future reference.

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1 Introduction

1.1 Read this first

This manual contains important information for use during installation and maintenance of the series Autarco inverter.

To reduce the risk of electrical shock, and to ensure the safe installation and operation of the series Autarco inverters, the following safety symbols appear throughout this document to indicate dangerous conditions and important safety instructions.



WARNING! Indicates safety instruction, which if not correctly followed, can result in injury or property damages.



RISK OF ELECTRIC SHOCK! Indicates safety instructions, which if not correctly followed, could result in electric shock.



HOT SURFACE! Indicates safety instructions, which if not correctly followed, could result in burns.

1.2 Target Audience

This manual is intended for anyone who is using Autarco LH series inverters. Before any further action, the operators must first read all safety regulations and be aware of the potential danger to operate high-voltage devices. Operators must also have a complete understanding of this device's features and functions.



ATTENTION! Qualified personnel means a person with valid license from the local authority in:

- Installing electrical equipment and PV power systems (up to 1000 V).
- Applying all applicable installation codes and using Personal Protective Equipment.
- Analyzing and reducing the hazards involved in performing electrical work.



WARNING! Do not use this product unless it has been successfully installed by qualified personnel in accordance with the instructions in chapter 4 "Installation".

1.3 Product versions covered by this document

The main purpose of this user manual is to provide instructions and detailed procedures for installing, operating, maintaining, and troubleshooting the series of Autarco inverters which includes the following models:

- S2.LH5000
- S2.LH6000
- S2.LH8000
- S2.LH10000

The “S2.” In the product code means the product is a grid-tied inverter.

The item code or SKU will include an additional number at the end. The final number references the default grid standard and colour of inverter. For example, S2.LH5000S.1 is the 5kW model with Dutch grid standard as default and Autarco blue cover.

If the product has an “S” at the end it comes with integrated DC switches.

Please keep this user manual available at all times in case of emergency.

2 Preparation

2.1 Safety instructions



DANGER! Do not touch any internal components whilst the inverter is in operation.



DANGER! Do not stand close to the inverter during severe weather conditions such as lightning, etc.



Make sure you completely cover the surface of all PV arrays with opaque (dark) material before wiring them or make sure the DC circuit breaker or equivalent DC isolator is disconnected.

This is because photovoltaic (PV) arrays create electrical energy when exposed to light, and could cause a hazardous condition.



The series inverter must only be operated with PV arrays of protection class II, in accordance with IEC 61730, class A.



WARNING! The PV inverter will become hot during operation; please don't touch the heat sink or peripheral surface during or shortly after operation.



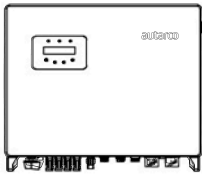
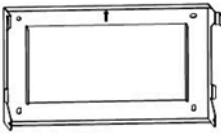

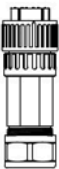
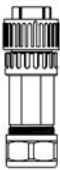
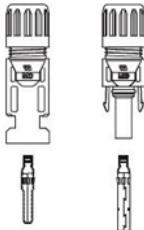



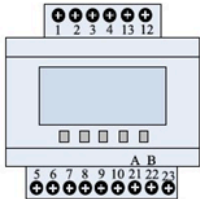
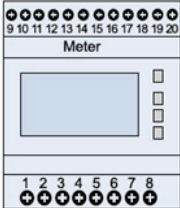


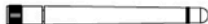

NOTICE! Do not directly connect AC output of the inverter to any private AC equipment. The PV inverter is designed to feed AC power directly into the public utility power grid.



WARNING! The installation, service, recycling and disposal of the inverters must be performed by qualified personnel in compliance with national and local standards and regulations. Please contact your dealer to get the information of authorized repair facility for any maintenance or repairmen.

Any unauthorized actions including modification of product functionality of any form will affect the validation of warranty service; Autarco may deny the obligation of warranty service accordingly.







2.2 Package contents

 <p>Inverter x1</p>	 <p>Back plate x1</p>	 <p>Fastening screw x2</p>	 <p>AC grid terminal x1</p>
 <p>AC backup terminal x1</p>	 <p>DC connector x4</p>	 <p>Battery connector x1</p>	 <p>Dust cover x2</p>
 <p>Meter RS485 cable x1</p>	 <p>Acrel Meter x1 (For the Europe)</p>	 <p>Easton Meter x1 (Only for the Italy)</p>	 <p>CT x3</p>
 <p>RJ45 connector x1 (UK and AUS are x2)</p>	 <p>Wifi antenna x1</p>	 <p>Manual</p>	

2.3 Internal DC switch

Please verify whether your Autarco LH series inverter is equipped with internal DC switches. This switch can be found on the bottom of the inverter. If there isn't an internal DC switch it is important to apply an external DC disconnect in order to completely disconnect the solar PV module strings from the inverter.

2.4 Explanations of symbols on inverter

	<p>DANGER - HIGH ELECTRIC VOLTAGE</p> <p>This device is directly connected to the public grid. All work to the inverter shall be carried out by qualified personnel only. There might be residual currents in inverter for up to 10 minutes because of large capacitors.</p>
	<p>ATTENTION</p> <p>This device is directly connected to electricity DC generators and the public AC grid.</p>
	<p>DANGER – HOT SURFACES</p> <p>The components inside the inverter will get hot during operation, DO NOT touch aluminum housing during operating.</p>
	<p>ATTENTION</p> <p>In case of any work to the inverter, always refer to this manual for detailed product information.</p>
	<p>ATTENTION</p> <p>This device SHALL NOT be disposed of in residential waste. Please go to Chapter 9 “Recycling and Disposal” for proper treatments.</p>
	<p>CE MARK</p> <p>This equipment conforms to the basic requirements of the EU guideline governing low voltage and electromagnetic compatibility.</p>

3 Product information

3.1 Overview

Autarco series grid tied inverters are state of the art, high efficiency, robust and reliable grid tied inverters at the best price quality ratio available. They are easy to install and carry a standard 5 year product warranty which is extendable to 15 years. Our rigorous quality control and testing facilities guarantee Autarco inverters meet the highest quality standards possible. These inverters are the key to our international track record of delivering extremely reliable solar power solutions.

Key features:

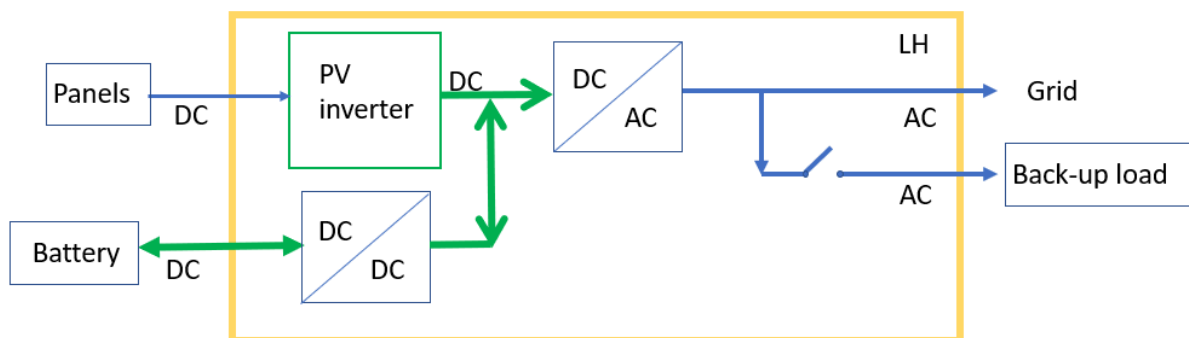
- Maximum efficiency of 97.5%
- Wide MPPT voltage range
- Low turn off voltage
- High enclosure protection class IP65
- Intelligent redundant fan-cooling
- Standard 5 year product warranty, extendable to 15 years
- Multiple monitoring options
- Integrated DC switch

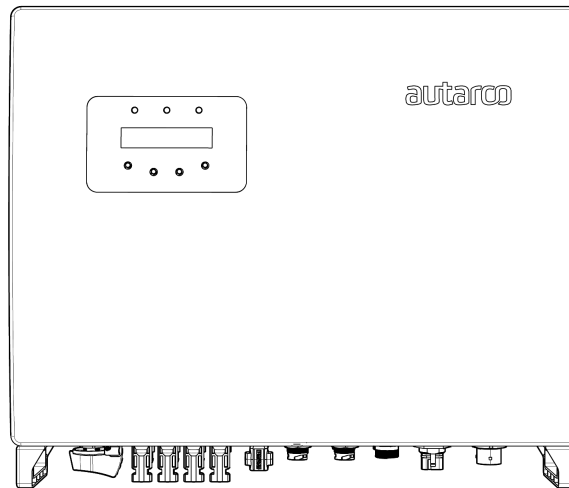
For full specifications: please see chapter 9 “Product specifications”.

3.2 Product identification

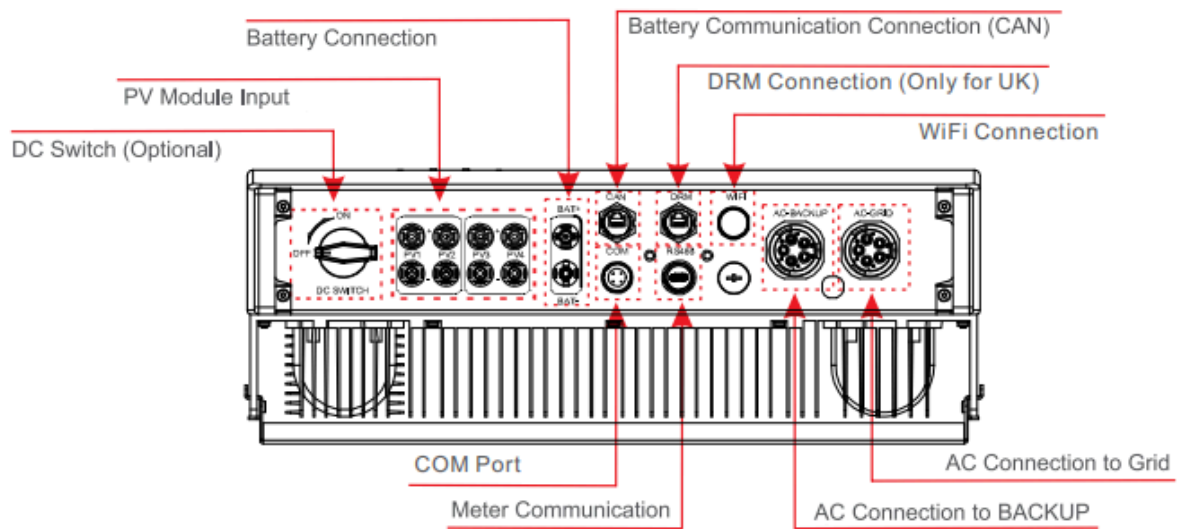
You can identify the inverter by the serial number (S/N) sticker on the side of the inverter. Important electrical specifications can also be found on the label which can be found on the right side of the inverter housing. Do not remove the label or the serial number as this voids the product warranty.

3.3 Product overview

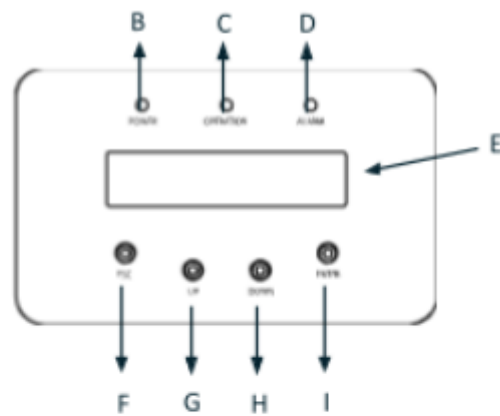




Front view



Bottom view



- A: Inverter cover
- B: LED light – POWER
- C: LED light – OPERATION
- D: LED light – ALARM
- E: LCD display 2x16 characters
- F: Escape key
- G: Up key
- H: Down key
- I: Enter key

4 Installation

4.1 Safety



DANGER! Do not install the inverter near flammable or explosive items.



WARNING! The installation must be performed by qualified personnel and in compliance with national and local standards and regulations.
This inverter will be connected to a high voltage DC power generator and AC grid. Inappropriate installation may also jeopardize the life span of the inverter.



The installation site must have good ventilation conditions. Direct exposure to intense sunshine is not recommended. Energy production may be lower than expected.

4.2 Appropriate Mounting Location



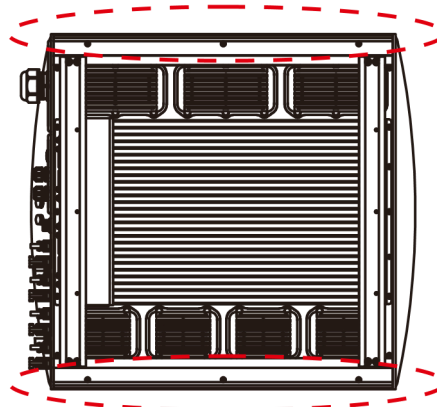
The heat sink can reach a temperature of 75°C under operation.

- Make sure the mounting wall is strong enough to hold the weight of the inverter.
- The ambient temperature of the installation site should be between -20 °C and +60 °C.
- Make sure of ample ventilation at installation site, insufficient ventilation may reduce the performance of the electronic components inside the inverter and shorten the lifespan of the inverter.
- The inverter has fans that will intelligently cool the inverter if the internal components exceed 100°C. The fan noise should not exceed 60dB.

4.3 Mounting instructions

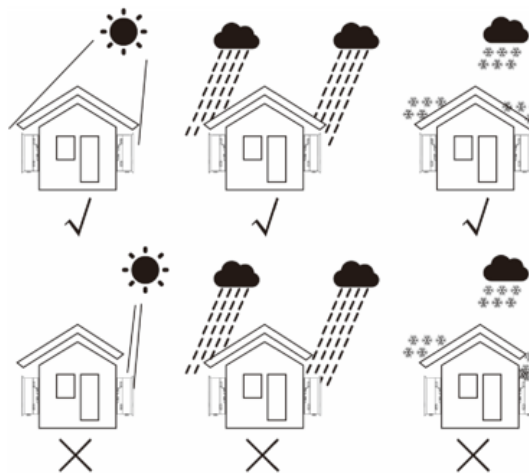


Two people are required to remove the inverter from the carton and install the inverter. Handles are formed into the heatsink for ease of handling the inverter.

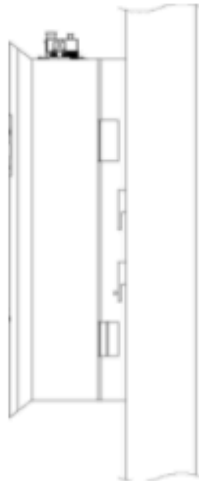


▲ Figure 4.2 Inverter handles

- The inverter is suitable for outdoor and indoor installation.
- Vertical installation is recommended, with a maximum inclination of 15° backwards.



Max. 15°



4.4 Safety clearance

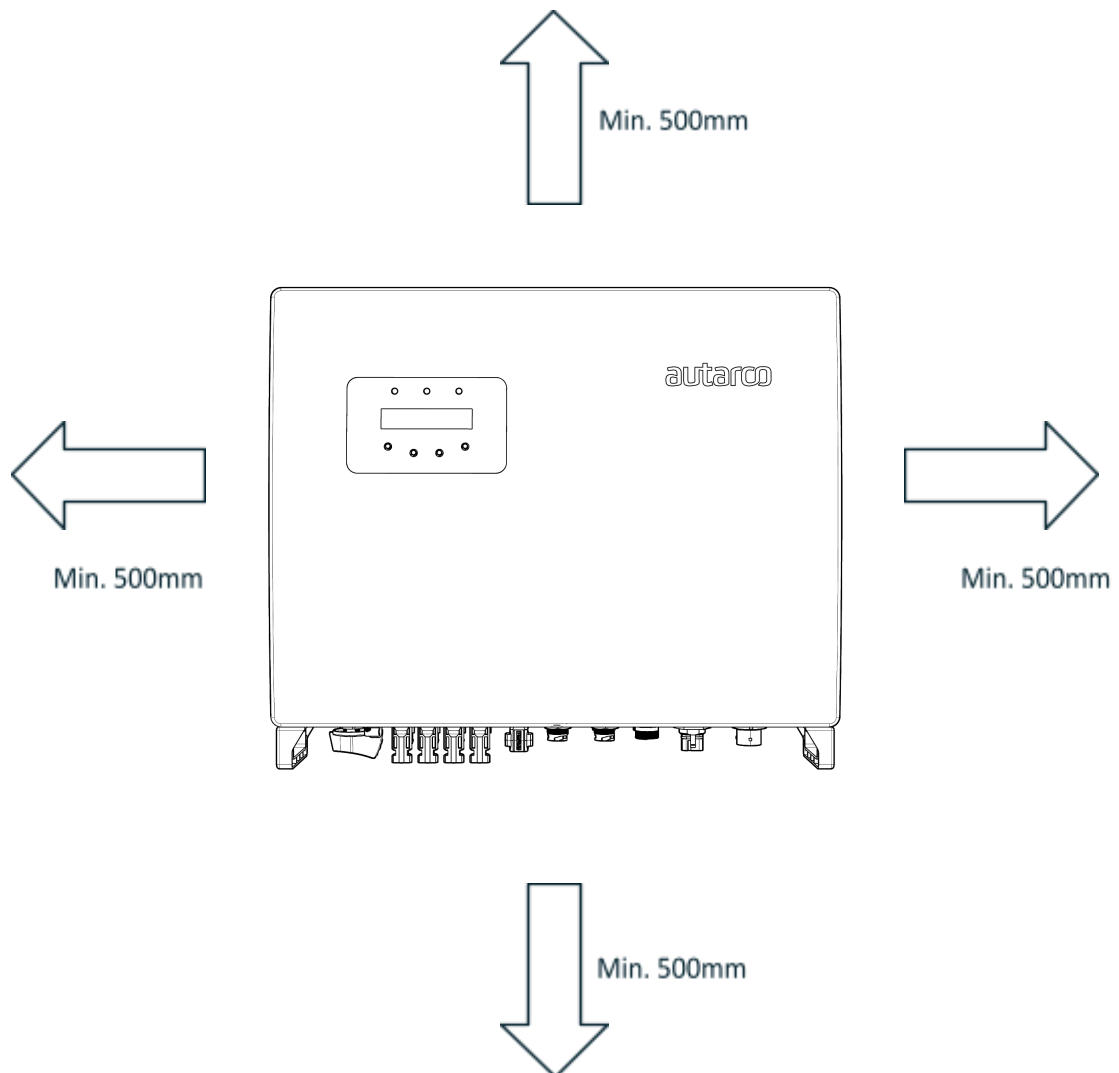


CAUTION! Make sure heat sinks are out of reach of children.



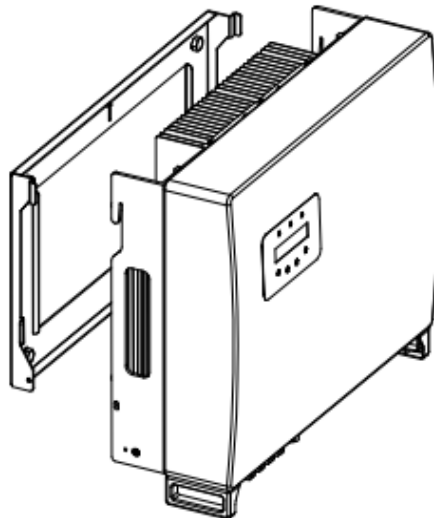
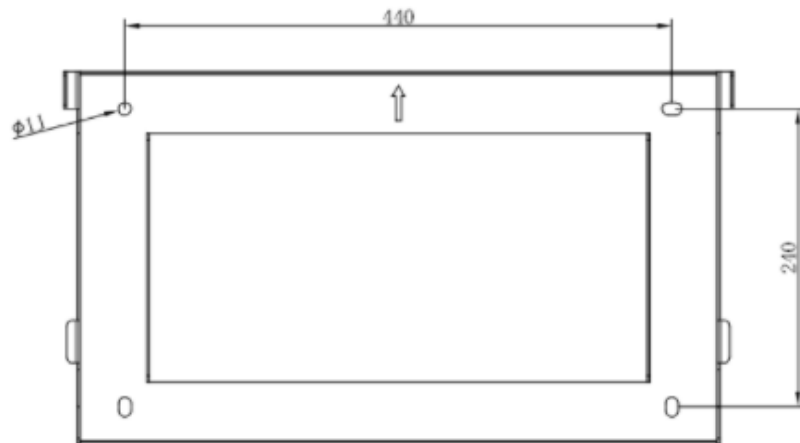
WARNING! When installing multiple inverters, make sure there is sufficient clearance between them. High temperatures may affect performance. Make sure inverter controls are reachable in case of emergency.

Observe the following minimum clearances to walls and other inverters. Front clearance shall be 1000 mm.



4.5 Mounting procedure

- Step 1 —** Mount the wall bracket onto the mounting wall with appropriate screws plugs
- Step 2 —** Lower the inverter onto the bracket
- Step 3 —** Use screws in the package to fix the bottom of the inverter to the mounting bracket



5 Electrical installation



DANGER! This inverter will be connected to a high voltage DC power generator and AC grid. The installation must be performed by qualified personnel and in compliance with national and local standards and regulations

5.1 Grounding



DANGER! Never connect or disconnect the connectors under load.



NOTICE! The AC connection to the electrical distribution grid must be performed only after receiving authorization from the utility that operates the grid.



NOTICE! Make sure to set the correct grid standard as part of system commissioning, see chapter 6.6.

There are two options for ground protection: through grid terminal connection and external heat sink connection.

If AC terminal is used to connect ground, please refer to the contents of 5.3.2.

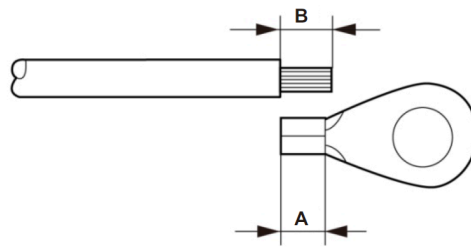
If the heat sink is used to connect the ground, please follow the steps below.

- 1) Prepare the grounding cable: recommended to use the 16-35mm² outdoor copper-core cable.
- 2) Prepare OT terminals M4



WARNING! No matter what kind of grounding connection is adopted, it is strictly forbidden to connect the ground of the inverter with the lightning protection of a building, otherwise Autarco will not be responsible for any damage caused by lightning.

- 3) Strip the grounding cable insulation to the suitable length as shown in Figure 5.7.

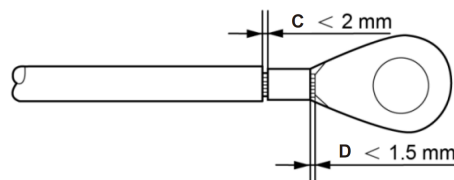


▲ Figure5.7 suitable length



IMPORTANT! B (insulation stripping length) is 2-3mm longer than A (OT cable terminal crimping area)

- 4) Insert the stripped wire into the OT terminal crimping area, and use an hydraulic clamp-tool to crimp the terminal to the wire (as shown in Figure 5.8).

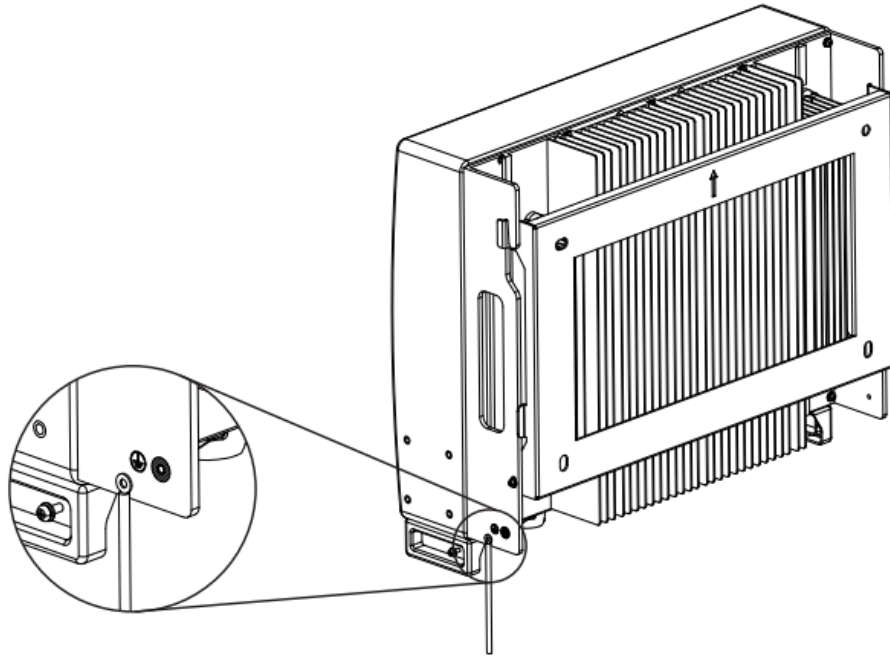


▲ Figure5.8 strip wire



IMPORTANT! After crimping the terminal to the wire, inspect the connection to ensure the terminal is solidly crimped to the wire.

- 5) Remove the screw from the heat sink ground point
- 6) Use the screw of the ground point to attach the grounding cable (as shown as in Figure 5.9). Tighten the screw securely. Torque is 2 Nm.



IMPORTANT! In order to improve the corrosion resistance of the grounding terminal, we recommend that the external grounding terminal is coated with silica gel or paint for protection after installation of the grounding cable.

5.2 AC connection



DANGER! Never connect or disconnect the connectors under load.

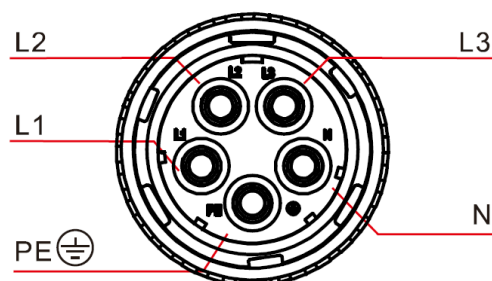
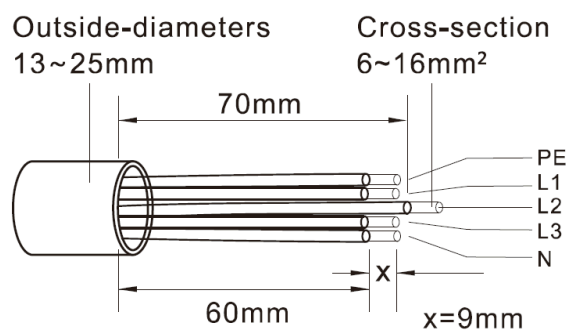
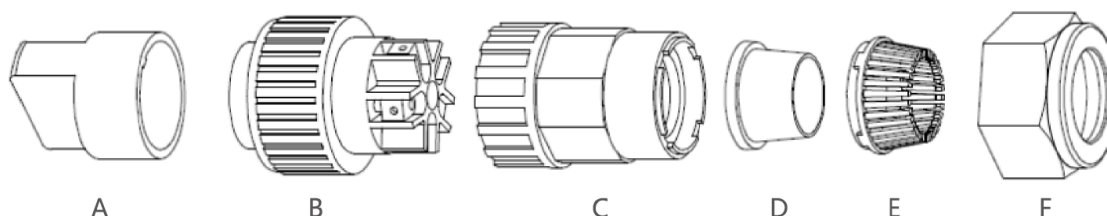


NOTICE! The AC connection to the electrical distribution grid must be performed only after receiving authorization from the utility that operates the grid.

There are two AC terminals on this inverter and the assembly steps for both are the same. Take out the AC connector parts from the packaging.

Description	Numerical Value
Wire Diameter	13-25 mm
Traverse cross sectional area	6-13 mm ² (10-6AWG)
Exposure Length	13 mm

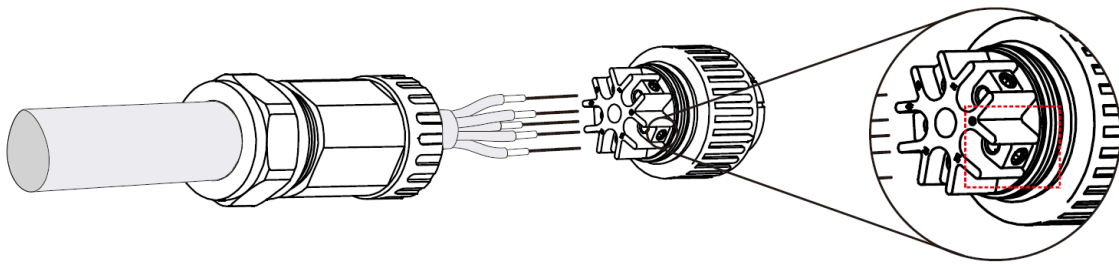
Inside the AC-connector "L1", "L2", "L3", "N" and "PE" are printed next to the port. The 3 live wires are connected to L1, L2 and L3 terminals respectively. The ground wire connects to PE. The neutral wire connects to the N.



The AC cable used must be dimensioned in accordance with any local and national directives on cable dimensions which specify requirements for the minimum conductor cross-section. Cable dimensioning factors are e.g.: nominal AC current, type of cable, type of routing, cable bundling, ambient temperature and maximum specified line losses.

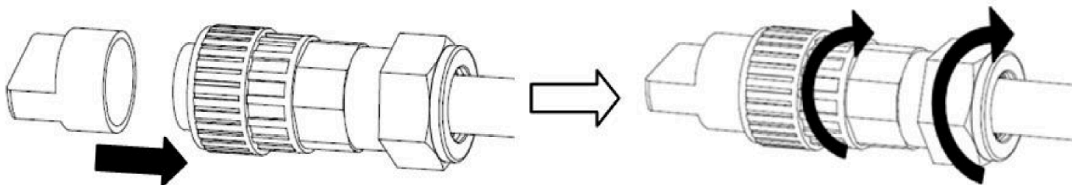
The steps to assemble AC grid terminal connector are listed as follows:

Step 1 — Strip the outer jacket 70mm and strip off each cable isolation for about 13 mm. Put the cable through the nut and sleeve of the socket element, insert corresponding terminals and tighten with Allen wrench.

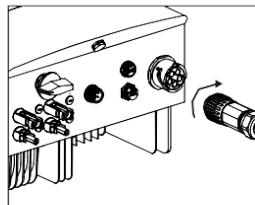


Tighten cable with 3.0 mm Allen wrench. The allen screw is very small and can fall out easily, so don't screw it out completely.

Step 1 — Clip plastic fixture in socket element, tighten adapter in socket element, then tighten swivel nut with 2.5-4 Nm torque.



Step 2 — Connect AC connector with inverter, then tighten AC connector clockwise (see figure below), until hearing a slight clicking sound indicating connection succeeds.



Repeat these steps for the second AC-connector.



NOTICE! It is important that the AC wires are connected to the right terminals as indicated by the "L1", "L2", "L3", "N" and "Ground" symbols on each AC connector. Damage to the inverter by wrong connections are not covered under warranty !.

In some countries a second protective conductor is required. In each case, observe the applicable regulations for the site.



The AC connection to the electrical distribution grid must be performed only after receiving authorization from the utility that operates the grid.

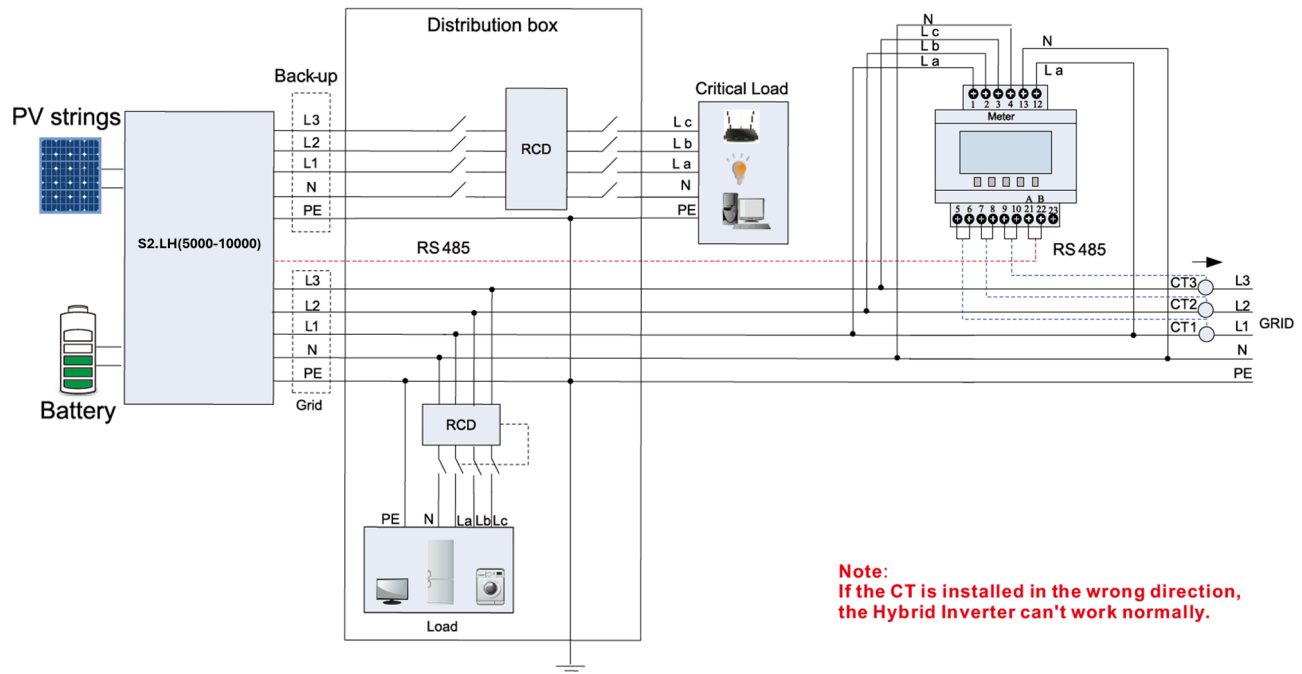
Always use separate fuses for consumer load. Use dedicated circuit breakers with load switch functionality for load switching.



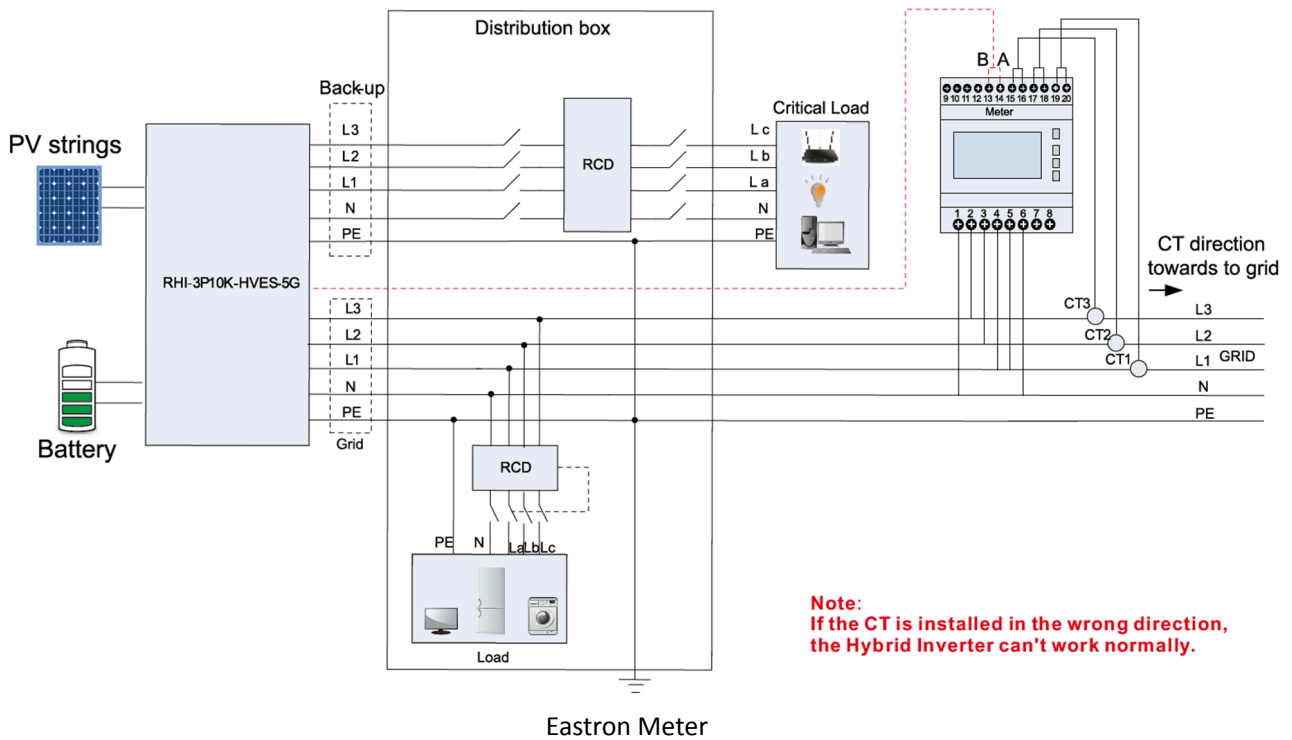
DANGER! No consumer load should be applied between the mains circuit breaker and the inverter.

5.3 Meter installation

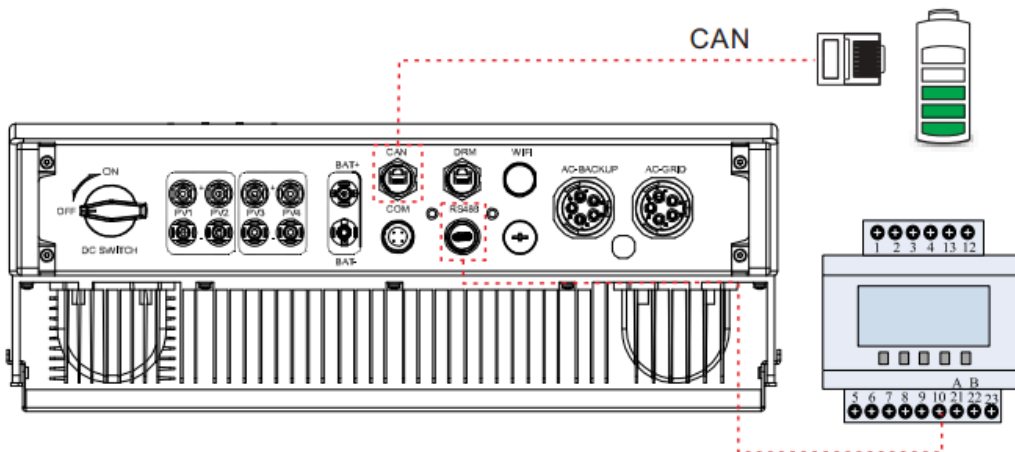
5.3.1 Three phase meter installation



Acrel Meter



The Autarco LH series inverter uses RS485 cable to communicate with the Meter and the CAN-bus to communicate with the battery's Battery Management System (BMS). The image below shows the assembly of the RS485/CAN communication cables.



NOTE: The CAN cable enables the communication between the inverter and the Li-ion battery, please check for latest model compatibility before installation.

Procedure for connecting the CAN-cable.

1. Take out the CAN cable (terminal marks 'CAN' on one end and 'to Meter' on the other end).
2. Unscrew the swivel nut from CAN port.
3. Insert the RJ45 terminal with CAN label into the CAN port, then fasten the swivel nut.
4. Connect the other end to the battery.



NOTE: For CAN cable pin 4 (blue) and pin 5 (white-blue) are used for the communication. Check with the battery supplier which pins they use. This may be different per vendor.

Procedure for connecting the RS485 cable.

1. Take out the RS485 cable (terminal marks 'RS485' on one end and 'to Battery' on the other end).
2. Unscrew the swivel nut from RS485 port.
3. Insert the Two-pin terminal with RS485 label into the RS485 port, then fasten the swivel nut.
4. Connect the other end to the Meter.

Logic Interface Connection

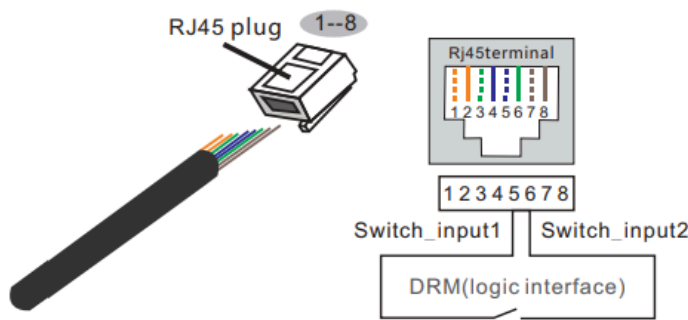
The logic interface is required by some local regulations that can be operated by a simple switch or contactor (Not available in South Africa). When the switch is closed the inverter can be operated normally. When the switch is opened, the inverter will reduce its output power to zero within 5 seconds.

Pin 5 and Pin 6 of an RJ45 terminal are used for the logic interface connection.

Please follow below steps to assemble the RJ45 connector.

1. Insert the network cable into the communication connection terminal of RJ45.
2. Use the network wire stripper to strip the insulation layer of the communication cable. According to the standard line sequence of figure 4.22 connect the wire to the plug of RJ45, and then use a network cable crimping tool to make it tight.
3. Connect RJ45 to DRM (logic interface) .





Correspondence between the cables and the stitches of plug, Pin5 and Pin6 of RJ45 terminal is used for the logic interface, other Pins are reserved.

Pin 1: Reserved; Pin 2: Reserved

Pin 3: Reserved; Pin 4: Reserved

Pin 5: Switch_input1; Pin 6: Switch_input2

Pin 7: Reserved; Pin 8: Reserved



NOTE: To use this function, please contact Autarco if this function is supported in your country.

To protect the inverter's AC grid connection conductors, Autarco recommends installing breakers that will protect against overcurrent. The following table defines OPCD ratings for each model;

Inverter	Rated 3 phase Voltage (V)	Rated Output (kW)	OPCD: Current for protection device (A)
S2.LH5000	400 V	5	16
S2.LH6000	400 V	6	16
S2.LH8000	400 V	8	16
S2.LH10000	400 V	10	20

The Autarco inverter is equipped with an integrated Residual Current Protective Device (RCPD) and Residual Current Operated Monitor (RCOM). The RCOM will detect leakage currents and compare it with the expected value; if the leakage current exceeds the permitted range, the RCPD will disconnect the inverter from the AC load.

If regulations in the country of installation stipulate an external Residual Current Device (RCD), you must use a device with a tripping threshold of 300 mA or more. A type "A" RCD can be used in accordance with our "Manufacturer's declaration for usage of residual current devices". Contact Autarco for advice.

5.4 Communication cable assembly

The Autarco LH series inverter has an integrated export power control function (PELD). To let this function work, you need to connect a 3-Phase power meter for export power control.

5.5 DC connections

Always use the MC4 connectors from the inverter box to connect strings to the inverter.

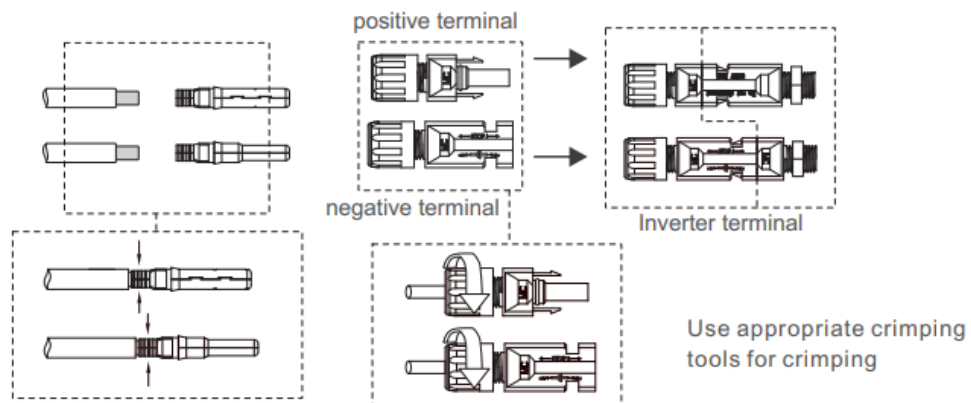


DANGER! Never connect or disconnect the connectors under load.

Please ensure the following before connecting the inverter:

- Make sure the voltage of the PV string will not exceed the max DC input voltage (1000 Vdc). Violating this condition will void the warranty.
- Make sure the polarity of the PV connectors are correct.
- Make sure the DC-switch, battery, AC-BACKUP, and AC-Grid are all in their off-states.
- Make sure the PV resistance to ground is higher than 20K ohms.

Please follow the picture below to assemble the MC4 connectors. To connect the PV generator to the inverters we use 4mm² or 6mm² PV cable and MC4 connectors. For details on how to assemble MC4 connector please refer to our MC4 connector manual.



DANGER! Do not connect the strings with an open circuit voltage greater than the Max DC voltage of the inverter.



DANGER! For protection against electric shock, MC4 connectors must be isolated from the PV array while being assembled or disassembled.



DC connections must not be unplugged while under load. They can be placed in a no-load state by switching off the DC/AC converter or breaking the DC circuit interrupter. Plugging while under voltage is permitted.



CAUTION! MC4 connectors are watertight IP67 but cannot be used permanently under water. Do not leave MC4 connectors directly on the roof surface, but always tie them up..



If any tools or parts are used in the MC4 connector assembly other than those listed in the MC4 connector manual, neither safety nor compliance with the technical data can be guaranteed.

5.6 Battery Terminal Components

A quick connector is used for the battery connection. The connector is suitable for tin-plated cables with a conductor cross section of 2.5-6 mm². The battery cable outside diameter range must be between 5.5 mm - 8.0 mm. Use a flat blade 3 mm screwdriver for this installation.

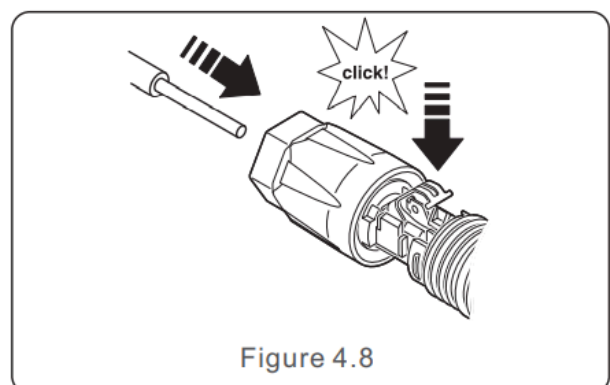
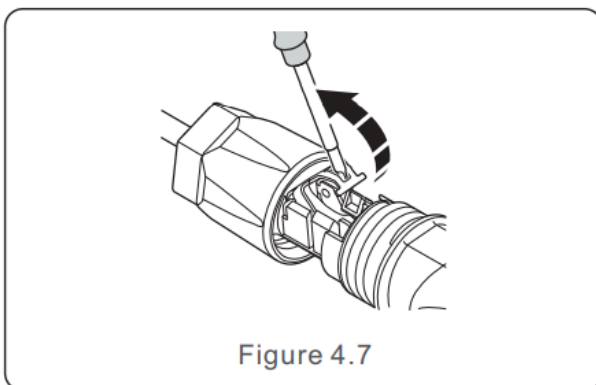
Step 1. Strip 15mm off the conductor using a suitable stripping tool.

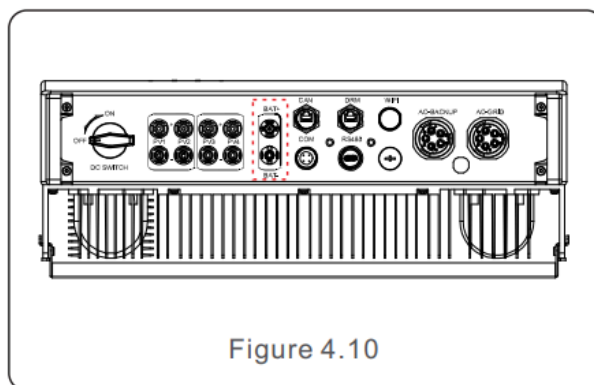
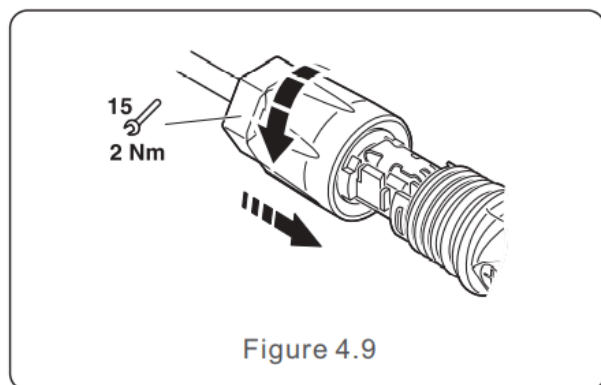
Step 2. Open the spring using a screwdriver as below. (see figure 4.7)

Step 3. Insert the stripped wire with twisted litz wires all the way in. The wire ends have to be visible in the spring. Next close the spring. (see figure 4.8)

Step 4. Push the insert into the sleeve and tighten the cable gland with 2N.m torque. (see figure 4.9)

Step 5. Fit the connectors to the battery ports at the bottom of the inverter with correct polarity and a "click" sound. (see figure 4.10)





5.7 Status LED indicators

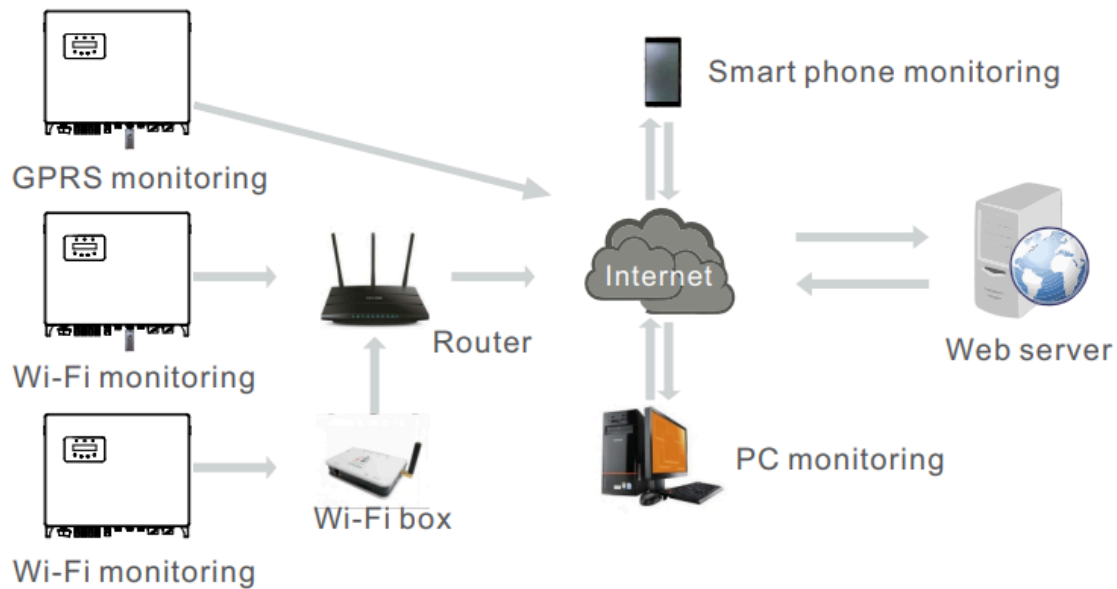
There are three LED status indicator lights at the front panel of series inverters. The left POWER light (red) indicates power status of the inverter. The middle OPERATION light (green) indicates the operation status. The right ALARM light (yellow) indicates the alarm status. Table 3.1 explains their meanings.

Light	Status	Description
● POWER (red)	ON	The PV array provides power to the inverter
	OFF	The PV array does not provide power to the inverter
● OPERATION (green)	ON	The inverter is feeding AC power to the grid
	OFF	The inverter is not feeding AC power to the grid
	FLASHING	The inverter is initializing
● ALARM (yellow)	ON	There is a fault. Refer to the inverter display and chapter 11 of this manual for details
	OFF	The inverter is operating normally

When the inverter DC switch and AC switch have been turned on the inverter will start initializing. After approx. 3 minutes the inverter will start normal operation with the inverter display showing GENERATING.

5.8 Inverter monitoring

The inverter can be monitored via Wi-Fi or GPRS. All Autarco communication devices are optional. For connection instructions, please refer to the Autarco Monitoring Device installation manuals.



5.9 Inverter commissioning sequence

Before switching on any inverter, please make sure that:

- the device is accessible for safe operation , maintenance and service
- check and confirm that the inverter is properly installed
- space for ventilation is sufficient
- no tools or other materials are left on the inverter or the battery
- all accessories, inverter and battery are correctly connected
- durable warning signs and labels are affixed

Turn ON inverter	Turn OFF inverter
<ol style="list-style-type: none"> 1. Connect AC side and AC- back-up 2. Select grid standard 3. Configure all parameters 4. Check polarity of the battery and turn on its DC-switch 5. Turn on solar DC side 6. Check that the inverter initialises 	<ol style="list-style-type: none"> 1. Switch OFF the AC switch 2. Switch OFF the DC switches




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 tests 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

6 Operation

6.1 LED indicator lights

There are three LED status indicator lights in the front panel of Autarco xxxx series inverters. The left POWER light (red) indicates power status of the inverter. The middle OPERATION light (green) indicates the operation status. The right ALARM light (yellow) indicates the alarm status. Table 3.1 explains their meanings.

Light	Status	Description
 POWER (red)	ON	The PV array provides power to the inverter
	OFF	The PV array does not provide power to the inverter
 OPERATION (green)	ON	The inverter is feeding AC power to the grid
	OFF	The inverter is not feeding AC power to the grid
	FLASHING	The inverter is initializing
 ALARM (yellow)	ON	There is a fault. Refer to the inverter display and chapter 10 of this manual for details
	OFF	The inverter is operating normally
		FLASHING: Either the grid or the AC cannot be detected.

When the inverter DC switch and AC switch have been turned on the inverter will start initializing. After approx. 3 minutes the inverter will start normal operation with the inverter display showing GENERATING.

6.2 Inverter display

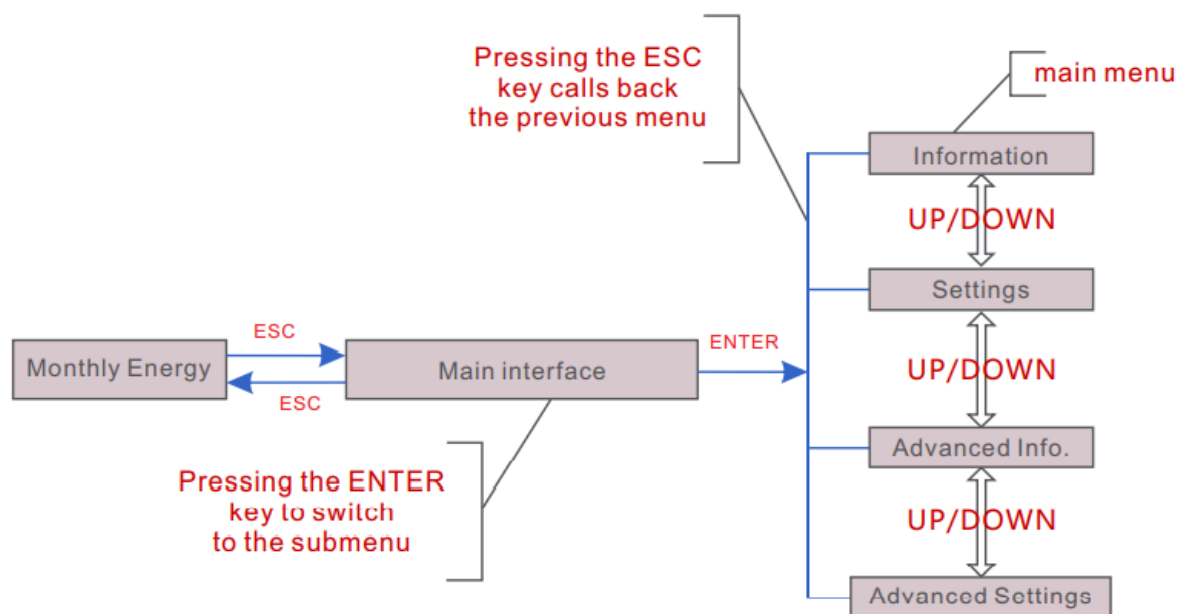


NOTICE! During normal operation, make sure the integrated DC switch is switched “on”.

The display content consists of 2 lines. During regular operation the display shows the current power and operation status alternatively for 10 seconds. Pressing the UP or DOWN buttons will manually cycle through these two displays. Pressing the ENTER button gives access to the main menu which has four sub menus:

- Information, described in detail in chapter 6.3.
- Settings, described in detail in chapter 6.4.
- Advanced information, described in detail in chapter 6.5.
- Advanced settings, described in details in chapter 6.6.

By pressing UP or DOWN keys you can cycle through these sub menus and click ENTER to go into the submenu.



6.3 Information

In the information section, operating data and information data can be viewed. Sub-sections include:

- General info
- System info
- Energy Records
- PV Energy records
- BMS Info
- Meter info

Examples of displayed values are shown in the following figures. Values are for reference only.

Each value is displayed for 10 seconds.

Display	Duration	Description
Inverter SN: FFFFFFFFFFFFFF	10 sec	Shows the inverter serial number.
Device: Waiting	10 sec	Shows the status of the device.
Battery: Waiting	10 sec	Shows the status of the battery.
Backup: Waiting	10 sec	Shows the status of the backup circuit.
Grid: Waiting	10 sec	Shows the status of the AC grid.
DRMNO. : 08	10 sec	Shows the DRM operating mode (Effective for UK/AUS).
Model. : 00	10 sec	Shows the model number of the device.
SoftVer. : 000000	10 sec	Shows the firmware version of the device.

General Information

Display	Duration	Description
V_DC1: 000.0V I_DC1: 000.0A	10 sec	V_DC1: Shows input 01 voltage value. I_DC1: Shows input 01 current value.
V_DC2: 000.0V I_DC2: 000.0A	10 sec	V_DC2: Shows input 02 voltage value. I_DC2: Shows input 02 current value.
V_A: 000.0V I_A: 000.0A	10 sec	V_A: Shows the grid's voltage value. I_A: Shows the grid's current value.
V_B: 000.0V I_B: 000.0A	10 sec	V_B: Shows the grid's voltage value. I_B: Shows the grid's current value.
V_C: 000.0V I_C: 000.0A	10 sec	V_C: Shows the grid's voltage value. I_C: Shows the grid's current value.
Grid Frequency 00.00Hz	10 sec	Shows the grid's frequency value.
Battery V: 000.0V Battery I: 000.0A	10 sec	Battery V: Shows the battery voltage. Battery I: Shows the battery current.
Backup V: 000.0V Backup P: 00.0kW	10 sec	Backup V: Shows the voltage of the backup port Backup P: Shows the power of the backup port.
Charge P: 00.0kW Discharge P: 00.0kW	10 sec	Charge P: Shows the battery charging power. Discharge P: Shows the battery discharging power.

System Information

Display	Duration	Description
BattChgE Total: 0000000kWh	10 sec	Shows the total battery charged energy.
BattChgE Today: 000.0kWh	10 sec	Shows today's battery charged energy.
BattChgE Lastday: 000.0kWh	10 sec	Shows yesterday's battery charged energy.

Energy records

Display	Duration	Description
PV E Total: 0000000kWh	10 sec	Shows the total PV generation.
PV E Today: 000.0kWh	10 sec	Shows today's PV generation.
PV E Lastday: 000.0kWh	10 sec	Shows yesterday's PV generation.
PV E ThisMonth: 0000000kWh	10 sec	Shows PV generation of this month.
PV E LastMonth: 0000000kWh	10 sec	Shows PV generation of last month.
PV E Thisyear: 0000000kWh	10 sec	Shows PV generation of this year.
PV E Lastyear: 0000000kWh	10 sec	Shows PV generation of last year.

PV Energy records

Display	Duration	Description
Battery V: 000.0V Battery I: +00.0A	10 sec	Battery V: Shows battery voltage(From BMS). Battery I: Shows battery current(From BMS).
ChargeLmt: 000.0A DischargeLmt: 000.0A	10 sec	ChargeLmt: Shows battery charge current limit(From BMS). DischargeLmt: Shows battery discharge current limit(From BMS).
ChargeVLmt: 000.0V DischargeVLmt: 000.0V	10 sec	ChargeVLmt: Shows battery charge voltage limit(From BMS) DischargeVLmt: Shows battery discharge voltage limit(From BMS).
SOC Value: 000.0% SOH Value: 000.0%	10 sec	SOC value: Shows battery state of charge. SOH value: Shows battery state of health..
BMS Status: CAN Fail	10 sec	Shows that Battery BMS communication status.

BMS Information

Display	Duration	Description
PhaseA Power: +000000W	10 sec	Shows phase A power on the meter.
PhaseB Power: +000000W	10 sec	Shows phase B power on the meter.
PhaseC Power: +000000W	10 sec	Shows phase C power on the meter.
Meter Energy: 0000000.00kWh	10 sec	Shows the energy record on the meter.
Output Energy: 0000000.00kWh	10 sec	Shows the export energy record on the meter.
Input Energy: 0000000.00kWh	10 sec	Shows the import energy record on the meter.
Meter Status: RS485 Fail	10 sec	Shows meter communication status.


BMS Information

Display	Duration	Description
PhaseA Power: +000000W	10 sec	Shows phase A power on the meter.
PhaseB Power: +000000W	10 sec	Shows phase B power on the meter.
PhaseC Power: +000000W	10 sec	Shows phase C power on the meter.
Meter Energy: 0000000.00kWh	10 sec	Shows the energy record on the meter.
Output Energy: 0000000.00kWh	10 sec	Shows the export energy record on the meter.
Input Energy: 0000000.00kWh	10 sec	Shows the import energy record on the meter.
Meter Status: RS485 Fail	10 sec	Shows meter communication status.

Meter Information

6.4 Settings

The following options are available under the Settings submenu:

Set Time and Date	<p>Press UP/DOWN keys to set change element</p> <p>Press ENTER key to move to next element</p> <p>Press ESC key to save date and return</p>
Set Address	<p>Assign a number (##) to the inverter to distinguish between multiple inverters when using parallel communication with WIFI-BOX or GPRS-BOX</p> <p>Press UP/DOWN keys to set change number</p> <p>Press ENTER key to save the setting</p> <p>Press ESC key to return.</p> <div>  <p>Changing the Address when using a WIFI-STICK or LAN-STICK may result in monitoring to stop working.</p> </div>

6.5 Advanced info



WARNING! Access to this section of the menu is for Autarco qualified and accredited technicians only. Unauthorized access will void the product and system warranty.

Screen can be scrolled through with UP/DOWN keys to see the information as per the table below. Press ENTER key to enter a submenu. Press ESC key to go back to the main menu.

Alarm Messages	The display shows the 100 latest alarm messages (see Figure 7.6). Press UP/DOWN keys to cycle through alarm messages Press ESC key to return																		
Warning Message	The display shows the latest 100 warning messages.																		
Running Status	<p>General status: this function is for maintenance personnel to scroll through measured and set values such as internal temperature, Standard NO. etc. Screens can be scrolled manually by pressing the UP/DOWN keys.</p> <table><tr><th>Display</th><th>Duration</th><th>Description</th></tr><tr><td><div>DC Bus Voltage: 000.0V</div></td><td>10 sec</td><td>Shows DC bus voltage.</td></tr><tr><td><div>Power Factor: +00.0</div></td><td>10 sec</td><td>Shows power factor of the inverter.</td></tr><tr><td><div>Power Limit%: 000%</div></td><td>10 sec</td><td>Shows the power output percentage of the inverter.</td></tr><tr><td><div>Inverter Temp: +000.0degC</div></td><td>10 sec</td><td>Shows internal IGBT temperature of the inverter.</td></tr><tr><td><div>Grid Standard:</div></td><td>10 sec</td><td>Shows current effective grid standard.</td></tr></table>	Display	Duration	Description	<div>DC Bus Voltage: 000.0V</div>	10 sec	Shows DC bus voltage.	<div>Power Factor: +00.0</div>	10 sec	Shows power factor of the inverter.	<div>Power Limit%: 000%</div>	10 sec	Shows the power output percentage of the inverter.	<div>Inverter Temp: +000.0degC</div>	10 sec	Shows internal IGBT temperature of the inverter.	<div>Grid Standard:</div>	10 sec	Shows current effective grid standard.
	Display	Duration	Description																
	<div>DC Bus Voltage: 000.0V</div>	10 sec	Shows DC bus voltage.																
	<div>Power Factor: +00.0</div>	10 sec	Shows power factor of the inverter.																
	<div>Power Limit%: 000%</div>	10 sec	Shows the power output percentage of the inverter.																
	<div>Inverter Temp: +000.0degC</div>	10 sec	Shows internal IGBT temperature of the inverter.																
	<div>Grid Standard:</div>	10 sec	Shows current effective grid standard.																
<p>Advanced Status: these messages are for technicians only</p>																			
Communication data	The screen shows information for service technicians only																		
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.																		

6.6 Advanced Settings



WARNING! Access to this section of the menu is for Autarco qualified and accredited technicians only. Unauthorized access will void the product warranty and any kWh Guarantee.

Screen can be scrolled through with UP/DOWN keys to see the information as per the table below. Press ENTER key to enter a submenu. Press ESC key to go back to the main menu.



WARNING! Set GRID OFF (see below) before changing this setting.

Press UP/DOWN keys to cycle through available standards

Press ENTER key to save the setting - Press ESC key to cancel and return

When selecting User defined the following upper and lower values have to be set for voltage and frequency:

Select grid standard

OV-G-V1: 236---335V	OV-G-F1: 50.2-53Hz(60.2-63Hz)
OV-G-V1-T: 0.1---9s	OV-G-F1-T: 0.1---9s
OV-G-V2: 248---341V	OV-G-F2: 51-53Hz(61-63Hz)
OV-G-V2-T: 0.1---1s	OV-G-F2-T: 0.1---9s
UN-G-V1: 173---236V	UN-G-F1: 47-49.5Hz(57-59.5Hz)
UN-G-V1-T: 0.1---9s	UN-G-F1-T: 0.1---9s
UN-G-V2: 132---219V	UN-G-F2: 47-49Hz(57-59Hz)
UN-G-V2-T: 0.1---1s	UN-G-F2-T: 0.1---9s

Press UP/DOWN keys to scroll through these values

Press ENTER key to edit the selected value

Press UP/DOWN keys to change the selected value

Press ENTER key to save and return

Press ESC key to cancel and return



WARNING! Set GRID ON (see below) before new standard is activated.



WARNING! Please note that the User-Def standard is not to be used without the agreement of the local grid authority.

Grid ON/OFF	<p>Press UP/DOWN keys to cycle through grid ON/OFF options</p> <p>Press ENTER key to save</p> <p>Press ESC key to return</p>												
Battery Control	<p>This setting is used to select the connected battery type and set the battery wake-up function.</p> <p>Battery Select: choose from the table below. More battery types may be added when available.</p> <table><tr><td>Brand</td><td>Model</td><td>Setting</td></tr><tr><td>Pylontech</td><td>H48074(CEI 0-21)/H48050(CEI 0-21)/ Force H1(CEI 0-21)/Force H2(CEI 0-21)</td><td>Select "Pylon"</td></tr><tr><td>AOBOET</td><td>Uhome-LFP 2400/ 5000 Battery</td><td>Select "AoBo"</td></tr><tr><td>Soluna</td><td>Soluna 10K Pack HV/Soluna 15K Pack HV</td><td>Select "Soluna"</td></tr></table> <p>If no battery is connected, select “NoBattery” to avoid alarms</p> <p>For above compatible batteries only 2 parameters need to be defined; OverDischg SOC (10...40%, default is 20%. The inverter will not discharge the battery if the SoC is lower than the set value. Battery self-discharge is unavoidable, SOC may fall below the specified value if the battery is not recharged for a longer time.</p>	Brand	Model	Setting	Pylontech	H48074(CEI 0-21)/H48050(CEI 0-21)/ Force H1(CEI 0-21)/Force H2(CEI 0-21)	Select "Pylon"	AOBOET	Uhome-LFP 2400/ 5000 Battery	Select "AoBo"	Soluna	Soluna 10K Pack HV/Soluna 15K Pack HV	Select "Soluna"
Brand	Model	Setting											
Pylontech	H48074(CEI 0-21)/H48050(CEI 0-21)/ Force H1(CEI 0-21)/Force H2(CEI 0-21)	Select "Pylon"											
AOBOET	Uhome-LFP 2400/ 5000 Battery	Select "AoBo"											
Soluna	Soluna 10K Pack HV/Soluna 15K Pack HV	Select "Soluna"											
Backup control	<p>This parameter is used to set the configuration of the back-up port.</p> <p>Backup ON/OFF: this switch is used to enable/disable the electrical connection of the back-up port</p> <p>Backup settings: the voltage of the back-up port can be specified here e.g. 230 Volt</p>												
Storage Energy Set	<p>There are 2 settings available in this section:</p> <ol style="list-style-type: none">1. Meter type select: e.g. 3PhMeter2. Storage Mode Select: there are 3 options<ol style="list-style-type: none">1. AUTO2. Time Charging3. Off-grid mode <p>Default is AUTO: this mode is not shown and cannot be selected This mode uses the following logic: store excess PV energy into the battery and use it to support loads instead of exporting to the grid. (maximise self-consumption)</p> <p>To change back to default mode, set option 2 and 3 to OFF.</p> <p>Time-charging:</p> <p>Customer can define the charge/discharge current as well as the time when to charge/discharge the battery.</p>												

Display	Duration	Description
Time-of-Use: Run	10 sec	Turn ON/OFF the mode
Charge Limit: 010.0A	10 sec	Set the charge current limit
Discharge Limit: 010.0A	10 sec	Set the discharge current limit
Charge Time: 00:00 - 00:00	10 sec	Define the charge time
Discharge Time: 00:00 - 00:00	10 sec	Define the discharge time
Chg Total Time: 00:00	10 sec	Define the total charge time

Off-grid mode:

Enable the mode for off-grid systems

The AC Grid Port must be physically disconnected.

STD Mode Settings

These settings are reserved for maintenance personnel and technicians.
Do not change anything without prior instructions.

The following submenu will be shown:

1. Working Mode Set
2. Power Rate Limit
3. Freq Derate Set
4. 10mins Voltage Set
5. 3Tau-settings
6. Initial Settings

Software update

The following submenu will be shown:

HMI Update

DSP Update

The current firmware version will be shown.

Press ENT to enter the upgrade mode

Export Power Set

This function sets the export power limit (PELD-function)

1. EPM ON/OFF: enable /disable PELD-function
2. Backflow power: set the maximum allowed power to feed into grid
3. Failsafe ON/OFF

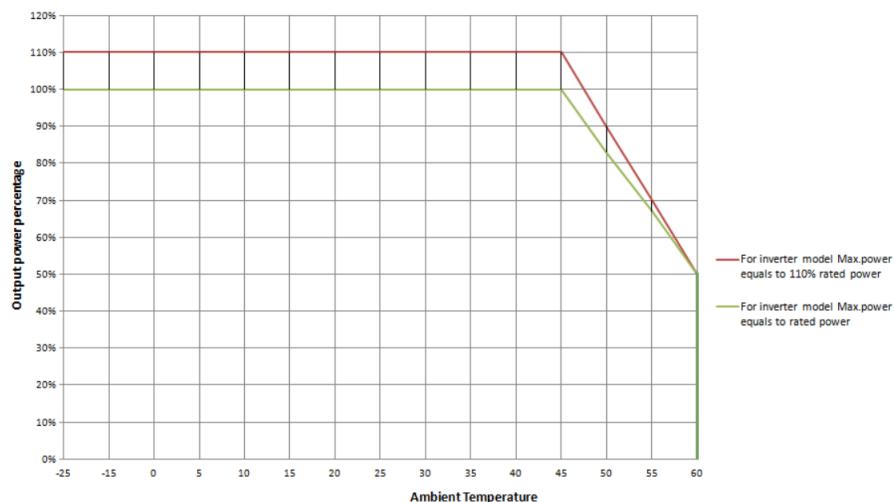
Setting 2 and 3 are only valid when setting 1 is ON

When the Failsafe function is ON, the inverter will shutdown if it loses communication with the meter to avoid backflow power exceeds the limit.

Reset password	Reset Password: In this menu, user can reset the inverter password, but the admin password remains valid.
Restart HMI	This function is to reboot LCD-screen.
Selftest CEI0-21	This function is only applicable for Italy and available when Italian standard CEI021 is selected
Compensation Set	<p>This function is used to calibrate inverter output energy and voltage. Two submenu's are provided:</p> <ol style="list-style-type: none"> 1. Power Parameter 2. Voltage Parameter.
AFCI	<p>Inverters have built-in AFCI function which can detect arc faults on the DC circuit and shut down the inverter. There are 2 submenu's:</p> <ol style="list-style-type: none"> 1. AFCI ON/OFF 2. AFCI Level <p>Standard AFCI operation is as follows: If a DC arc is detected during the normal operation within a certain timeframe the inverter will shut down. The display will show "ARC-fault" Your installer needs to check thoroughly all connections and repair and then press 3 seconds at the ESC-button below the LCD to restart the system.</p>

6.7 Temperature derating

The output power of the inverter varies with ambient temperature, as shown in the figure below.



7 Maintenance



CAUTION! Do not touch the heat sink when the inverter is in operation. Turn OFF the inverter (see section 5.5) and allow for cooling down before cleaning or maintenance.



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

The series inverters require general maintenance to be performed once per year. Impurities such as dust and dirt accumulation on the heat sink may negatively affect the inverter's ability to dissipate heat. Any dirt or dust can be removed with a cloth or soft brush.

8 Disposal

To comply with European Directive 2002/96/EC on waste Electrical and Electronic Equipment (WEEE) and its implementation as national law, electrical equipment that has reached the end of its life must be collected separately and returned to an approved recycling facility. Ignoring this EU Directive may have severe effects on the environment and public health.

9 Troubleshooting

9.1 General

Display message	Action
Blank screen	<ul style="list-style-type: none"> • Check that all switches are in the ON position (including internal DC switch if present) • Check AC, back-up AC and DC power supply. • If switches are on and AC and/or DC power supply is available please contact installer.

Alarm Message	Failure description	Solution
ARC-FAULT	ARC detected in DC circuit	1. Check if there's arc in PV connection and restart inverter.
AFCI Check FAULT	AFCI module self check fault	1. Restart inverter or contact installer.
DCinj-FAULT	High DC injection current	1. Restart inverter or contact installer.
DSP-B-FAULT	Comm. failure between main and slave DSP	1. Restart inverter or contact installer.
DC-INTF	DC input overcurrent	1. Restart inverter. 2. Identify and remove the string to the fault MPPT. 3. Change power board.
G-IMP	High grid impedance	1. Use user define function to adjust the protection limit if it's allowed by electrical company.
GRID-INTF01/02	Grid interference	1. Restart inverter. 2. Change power board.
IGBT-OV-I	Over IGBT current	
IGFOL-F	Grid current tracking fail	1. Restart inverter or contact installer.
IG-AD	Grid current sampling fail	
ILeak-PRO 01/02/03/04	leakage current protection	1. Check AC and DC connection. 2. Check inverter inside cable connection.
INI-FAULT	Initialization system fault	1. Restart inverter or contact installer.
LCD show initializing all the time	Can not start-up	1. Check if the connector on main board or power board are fixed. 2. Check if the DSP connector to power board are fixed.
NO-Battery	Unconnected battery	1. Check the wire of battery power is connected correctly or not. 2. Check the output voltage of battery is correctly or not.
No power	Inverter no power on LCD	1. Check PV input connections. 2. Check DC input voltage (single phase >120V, three phase >350V). 3. Check if PV+/- is reversed.
NO-GRID	No grid voltage	1. Check connections and grid switch. 2. Check the grid voltage inside inverter terminal.
OV-BUS	Over DC bus voltage	1. Check inverter inductor connection. 2. Check driver connection.

Alarm Message	Failure description	Solution
OV-DC01/02/03/04	Over DC voltage	1. Reduce the module number in series.
OV-DCA-I	DC input overcurrent	1. Restart inverter. 2. Identify and remove the string to the fault MPPT. 3. Change power board.
OV-G-V01/02/03/04	Over grid voltage	1. Resistant of AC cable is too high. Change bigger size grid cable. 2. Adjust the protection limit if it's allowed by electrical company.
OV-G-I	Over grid current	1. Restart inverter. 2. Change power board.
OV-G-F01/02	Over grid frequency	1. Use user define function to adjust the protection limit if it's allowed by electrical company.
OV-IgTr	AC side transient overcurrent	1. Restart inverter. 2. Return-factory repair.
OV-ILLC	LLC hardware overcurrent	
OV-VBackup	Bypass overvoltage fault	
OV-TEM	Over Temperature	1. Check inverter surrounding ventilation. 2. Check if there's sunshine direct on inverter in hot weather.
OV-Vbatt1	The detection of battery overvoltage	1. Check the protect point for over voltage sets correctly or not. 2. Restart inverter.
OV-Vbatt-H	Battery overvoltage hardware fault	1. Check the circle whether the circuit for battery power jumps. 2. Restart inverter.
Over-Load	Bypass overload fault	1. Check the load of Backup port is over rating output power or not. 2. Reduce the load of Backup port, then restart inverter.
PV ISO-PRO01/02	PV isolation protection	1. Remove all DC input, reconnect and restart inverter one by one. 2. Identify which string cause the fault and check the isolation of the string.
RelayChk-FAIL	Relay check fail	1. Restart inverter or contact installer.

Alarm Message	Failure description	Solution
UN-BUS01/02	Under DC bus voltage	1. Check inverter inductor connection. 2. Check driver connection.
UN-G-F01/02	Under grid frequency	1. Use user define function to adjust the protection limit if it's allowed by electrical company.
UN-G-V01/02	Under grid voltage	
12Power-FAULT	12V power supply fault	1. Restart inverter or contact installer.



If the inverter displays any alarm message as listed above: please turn off the inverter and wait 5 minutes before restarting it. If the fault persists, contact your installer or Autarco.

Have the following information available:

- serial number of the inverter
- name of the installer or distributor of the inverter
- type of battery installed and system configuration
- installation date
- INFORMATION ON THE PV Array (number of panels,...)
- information on the fault (check LCD and LED's)

10 Product specifications

	S2.LH5000	S2.LH6000	S2.LH8000	S2.LH10000
Input				
Max. DC voltage (V)	1000			
MPPT voltage range (V)	200-850			
Turn on voltage (V)	160			
Full load MPPT range (V)	200-850			
Number of MPP trackers	2			
Max. DC current per MPPT (A)	13	13	26/13	26
Number of DC connections per MPPT	1	1	2/1	2
Total number of strings	2	2	3	4
DC connection type	MC4			
Battery				
Battery type	Li-Ion			
Battery communication	CAN/RS485			
Battery voltage range (Vdc)	160-600			
Max charging power (KW)	3		4	
Max charge/discharge current (A)	25			
Output AC grid side				
Nominal AC power (kW)	5	6	8	10
Max. apparent AC power (kVA)	5.5	6.6	8.8	10
Rated grid output AC current (A)	7.6/7.3	9.2/8.7	12.2/11.6	15.2/14.5
Max. output AC current (A)	8.4	10	13.4	16.7
Power connection	3P/NE/PE (Three phase)			
Grid voltage range (V)	380/400 (According to EN50549 VDE 0126-1-1, UL1741, G99)			
AC Grid frequency range (Hz)	45..55/55..65 (According to EN50549 VDE 0126-1-1, UL1741, G99)			
Rating grid frequency (Hz)	50/60 (According to EN50549 VDE 0126-1-1, UL1741, G99)			
Power factor (at rated output power)	> 0.99 (0.8 leading ...1... 0.8 lagging)			

Harmonic distortion at nom. output (THDI)	<2%			
Output AC backup				
Peak output power (VA)	10 kVA, 60 sec	12 kVA, 60 sec	16 kVA, 60 sec	16 kVA, 60 sec
Back-up switch time (sec)	< 40 ms			
Rated output voltage (V)	3P/NE/PE (Three phase 380 /400)			
Rated frequency (Hz)	50/60			
Rated output current (A)	7.6/7.3	9.2/8.7	12.2/11.6	15.2/14.5
THDv (@linear load)	<2%			
Efficiency				
Max. efficiency (solar inverter)	98.40%			
Euro efficiency	97.70%			
MPPT efficiency	99.90%			
Battery (dis)charge efficiency	97.50%			
Safety protection				
Anti-island protection	Yes			
Internal overvoltage protection	Yes			
Insulation resistance detection	Yes			
Residual current monitoring unit	Yes			
Earth fault protection	Yes			
Earth fault current monitoring	Yes			
Output over current protection	Yes			
Output short protection	Yes			
Output over voltage protection	Yes			
DC-switch	Yes			
DC-reverse polarity protection	Yes			
PV Over voltage protection	Yes			
Battery reverse protection	Yes			
General data				
Dimensions (W x H x D) (mm)	535 x 455 x 181			
Weight	25.1kg			
Installation environment	Indoor or outdoor			

Type of inverter	Transformerless
Self consumption (night) (W)	< 7 W
Mounting	Wall bracket
Operating temperature range (°C)	-25°C to 60°C
Relative humidity	0-100%
Maximum altitude	4000m
IP protection rating	IP65 according to EN60529
Isolation type	Transformerless
Cooling concept	Natural convection
Noise level (dB)	< 30
LED indicators	3
Grid connection standards	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
LCD display	2x 20 character
Communication interfaces	4 pins RS485 connector
Optional interfaces	Wi-Fi, GPRS, LAN
Standard warranty	5 years (extendable to 15 years)