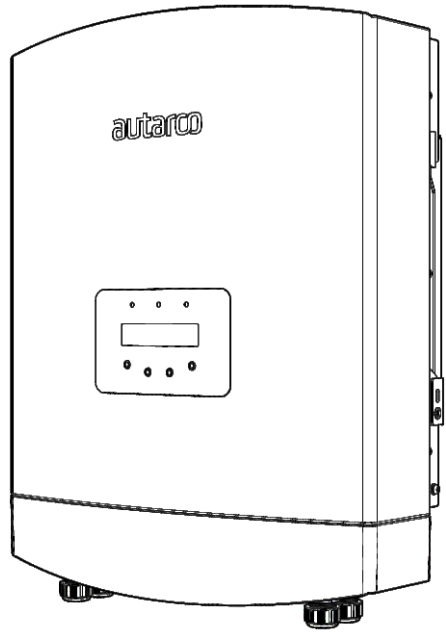
Installation and Operation Manual

Solar Retrofit Battery Charger MR series



IM-S2.MR-EN-V1.0

autarco

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.

Product information is subject to change without notice. All trademarks are recognized as the property of their respective owners.

Table of contents

1 Introduction

1.1 Read this first

This manual contains important information for use during installation and maintenance of the Autarco single phase MR series Retrofit battery chargers.

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

WARNING! Symbol indicates important safety instructions, which if not correctly followed, could result in serious injury or death.

NOTE! Symbol indicates important safety instructions, which if not correctly followed, could result in some damage or the destruction of the battery charger.

CAUTION, RISK OF ELECTRIC SHOCK! Symbol indicates important safety instructions, which if not correctly followed, could result in electric shock.

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

1.2 Target audience

This manual is intended for anyone who uses the Autarco single phase MR series Retrofit battery chargers. Before any further action, operators must first read all safety regulations and be aware of the potential danger in operating 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.

NOTE! Symbol indicates important safety instructions, which if not correctly followed, could result in some damage or the destruction of the battery charger.

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 Autarco single phase MR series Retrofit battery chargers.This series contains one model which is listed below:

- S2.MR3000

The 'S2' in the product code indicates that this product belongs to our product group of inverters, hybrid inverters, retrofit battery chargers and monitoring devices. The item code or SKU will include an additional number at the end. The final number references the default grid standard and color of the battery charger. For example, S2.MR3000.1 is the 3kW model with Dutch grid standard as default and Autarco blue cover.

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

1.4 Product information

Autarco MR series Retrofit battery chargers are state of the art products, highly efficient, robust and reliable at the best price quality ratio available. They are easy to install and carry a standard 5 year product warranty. Our rigorous quality control and testing facilities guarantee Autarco Retrofit battery chargers meet the highest quality standards possible. These battery chargers are the key to our international track record of delivering extremely reliable solar power solutions.

Key features:

- Uninterrupted power supply, 20ms response time
- Easily added to existing Solar PV systems
- Compatible with any existing grid-tied Solar PV system
- Off-grid backup function during blackouts
- Intelligent Energy Management System (EMS) function
- Natural cooling without external fan
- Standard 5 year product warranty, extendable up to 15 years
- Rs485 communication port for WiFi, LAN and GPRS communication (4G benoemd ook in datasheet)

For full specifications please see chapter 9 "Specifications".

1.5 Product identification

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

1.6 Product description

The MR series single phase Retrofit battery charger is used for the upgrade of an existing on-grid power generation system to a hybrid system which can work with batteris, to optimize self-consumption. Product description for MR series below.

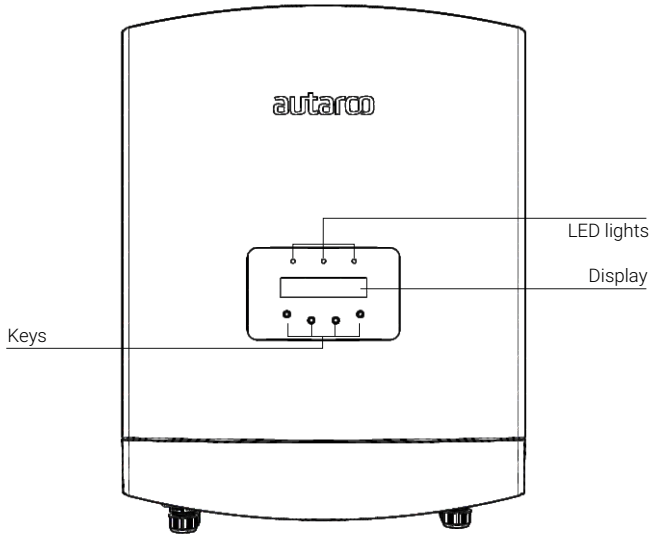


Figure 1.1 Front side view

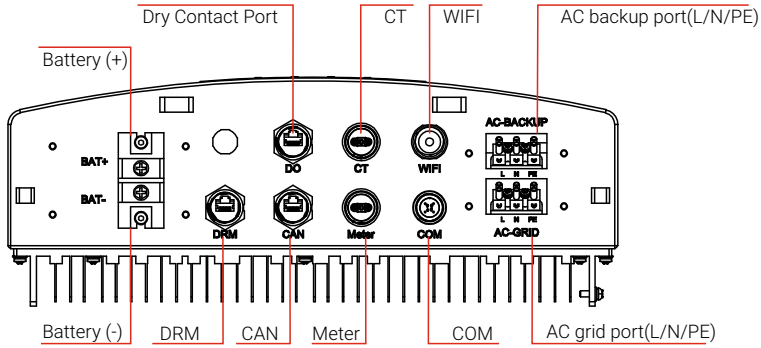
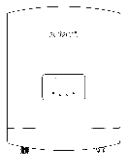
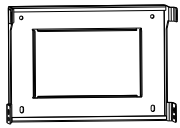


Figure 1.2 Bottom side view

1.7 Package contents

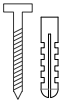
Package contents for MR series are listed below.

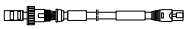

Battery charger x1

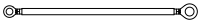

Mounting bracket x1

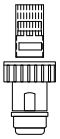

Europe type terminal x6


Locking screws x2

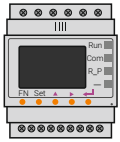

Fixing screws x4
(For mounting bracket)


CAN cable x1

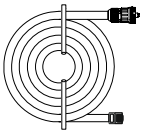

Battery power cable x2


RJ45 connector x2

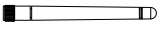

CT x1



Acrel Meter x1


RS485 Meter cable x1
(For Acrel Meter)

Battery temperature sensor
(optional)


WiFi antenna x1

User manual x1

2 Preparation

2.1 Safety instructions

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

DANGER! Do not stand close to the battery charger during severe wheater conditions such as lightning, etc.

DANGER! 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.

NOTICE! The MR series Retrofit battery charger must only be operated with PV arrays of protection class II, in accordance with IEC 61730, class A.

WARNING! The battery charger 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 battery charger to any private AC equipment. The battery charger is designed to feed AC power directly into the public utility power grid.

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

2.2 Additional install safety instructions

Types of safety instructions:

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.

Additional 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 positive (+) or negative (-) cable to ground, it could cause serious damage to the battery charger.

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 7 minutes after disconnection from the utility grid and the DC input.

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! Risk of electric shock from energy stored in capacitors of the battery charger, do not remove cover for 7 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 battery charger can reach up to 75°C (167 F).To avoid risk of burns, do not touch the surface of the battery charger while it's operating. Battery charger must be installed out of the reach of children.

WARNING! Operations below must be accomplished by licensed technician or Autarco authorized person.

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

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

CAUTION! The PV array (solar panels) supplies a DC voltage when they are exposed to sunlight.

2.3 Notice for use

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

- Permanent installation is required.
- The electrical installation must meet all the applicable regulations and standards.
- The battery charger must be installed according to the instructions stated in this manual.
- The battery charger must be installed according to the correct technical specifications.
- The battery charger must be installed acording to the correct technical specifications.

2.4 Notice for disposal

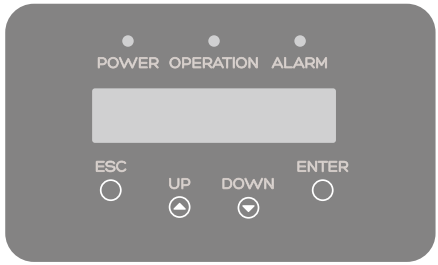
This product shall not be disposed of with household waste. It should be segregated and brought to an appropriate collection point to enable recycling and avoid potential impacts on the environment and human health. Local rules in waste management shall be respected.

2.5 Internal DC switch

MR series Retrofit battery chargers are equipped with an internal DC switch. This switch can be found at the bottom of the battery charger.

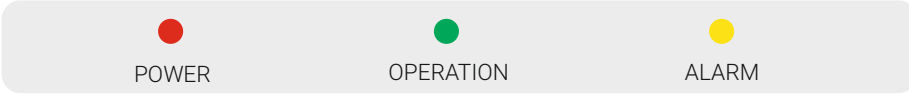
3 Display and indicator lights

3.1 Front panel display



3.2 LED status indicator lights

There are three LED indicators on the MR Retrofit battery charger (red, green, and orange) which indicate the working status of the battery charger.



Light	Status	Description
POWER	ON	The battery charger detects DC power
	OFF	The battery charger does not detect DC power
OPERATION	ON	The battery charger is fully operational
	OFF	The battery charger has stopped operating
	FLASHING	The battery charger is initializing
ALARM	FLASHING	The battery charger detects a fault (refer to display and chapter 9)
	OFF	The battery charger is operating normally

3.3 Keypad

There are four keys in the front panel of the battery charger (from left to right): ESC, UP, DOWN and ENTER.

The keypad is used for:

- Scrolling through the displayed options (the UP and DOWN keys)
- Access to modify the adjustable settings (the ESC and ENTER keys)

3.4 LCD

The two-line Liquid Crystal Display (LCD) is located on the front panel of the battery charger, which shows the following information:

- operation status and data
- settings

3.5 Terminal connection

Autarco MR series Retrofit battery chargers are different from normal on-grid inverters. Please refer to the instructions below before start to connect.

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

4 Installation

4.1 Select a location for the battery charger

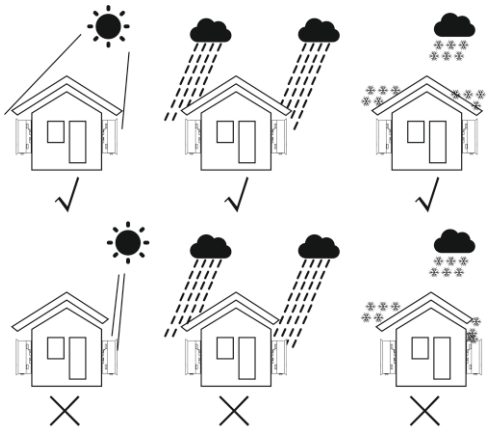
To select a location for the battery charger, the following criteria should be considered:

WARNING! Risk of fire. Despite careful construction, electrical devices can cause fires.
- Do not install the battery charger in areas containing highly flammable materials or gases.
- Do not install the battery charger in potentially explosive atmospheres.

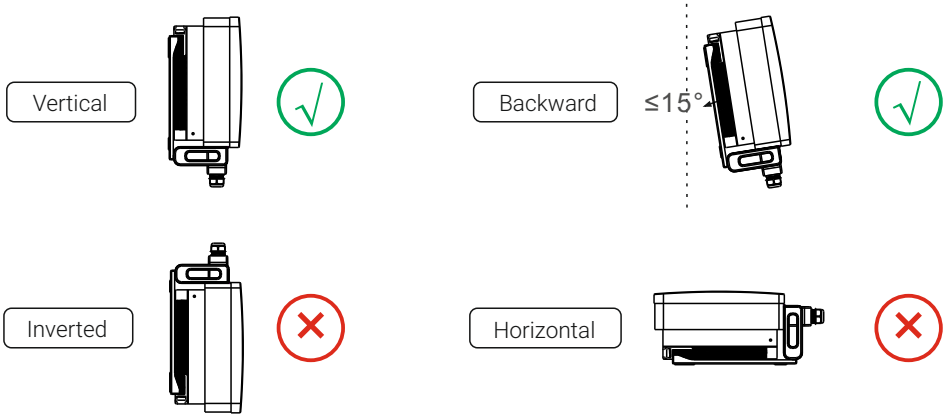
- Do not install in small closed spaces where air can not circulate freely. To avoid overheating, always make sure the flow of air around the battery charger is not blocked.

- Exposure to direct sunlight will increase the operational temperature of the battery charger and may cause output power limiting. Autarco recommends to avoid the battery charger to be in direct sunlight or rain.

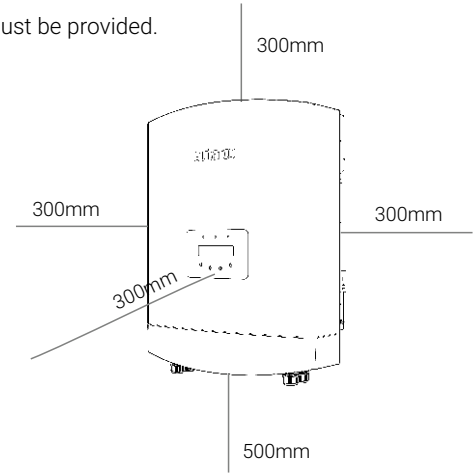
- To avoid overheating the ambient air temperature must be considered when choosing the battery charger installation location. Autarco recommends using a sun shade minimizing direct sunlight when the ambient air temperature around the unit exceeds 40°C (104F).



NOTE! Nothing should be stored on or placed against the battery charger.

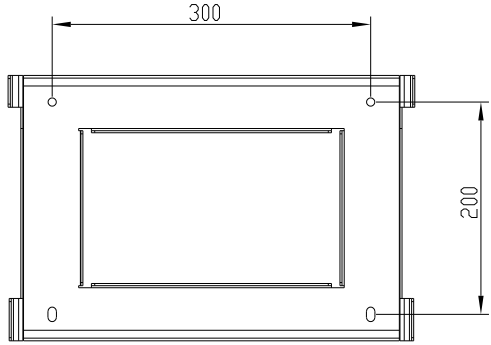


- Install on a vertical surface and structure capable of bearing the weight.
- Install the battery charger vertically. If the battery charger cannot be mounted vertically, it may be tilted backward to a maximum of 5° from the vertical. Exceeding this may cause output power limiting.
- To avoid overheating, always make sure the flow of air around the battery charger is not blocked. A minimum clearance of 300mm should be kept between battery chargers or objects and 500mm clearance between the bottom of the battery charger and the ground.
- The visibility of the LED status indicator lights and LCD display screen should be considered.
- Adequate ventilation must be provided.

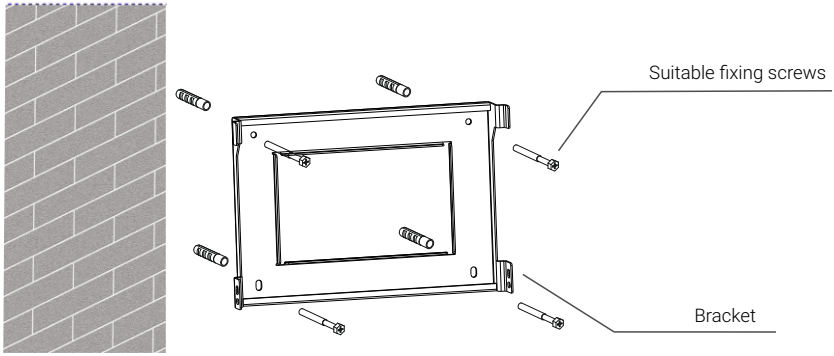


4.2 Mounting the battery charger

Dimensions of mounting bracket:



The battery charger shall be mounted vertically.
The steps to mount the battery charger are listed below.

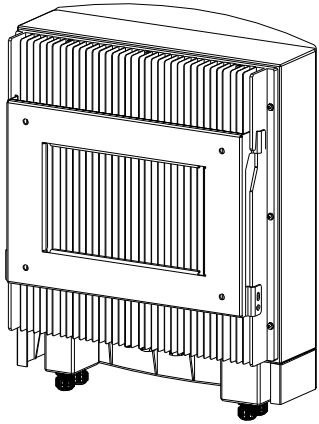


1. Make sure the bracket is in landscape position and the mounting holes are marked correctly.

2. Drill the holes into the wall at your marks.

3. Use the suitable expansion screws to fix the bracket on the wall.

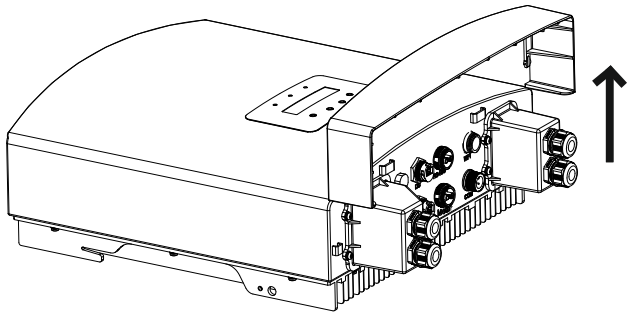
WARNING! The battery charger must be mounted vertically.



4. Lift the battery charger and align the back bracket on the battery charger with the convex section of the mounting bracket. Hang the battery charger on the mounting bracket and make sure it is secured.

Please make sure to remove the cover at the bottom of the battery charger before assembling the terminals.

Remove the cover as shown in the picture and follow the direction to lift the cover, make sure the buckles on the left and right sides are correctly loosened.

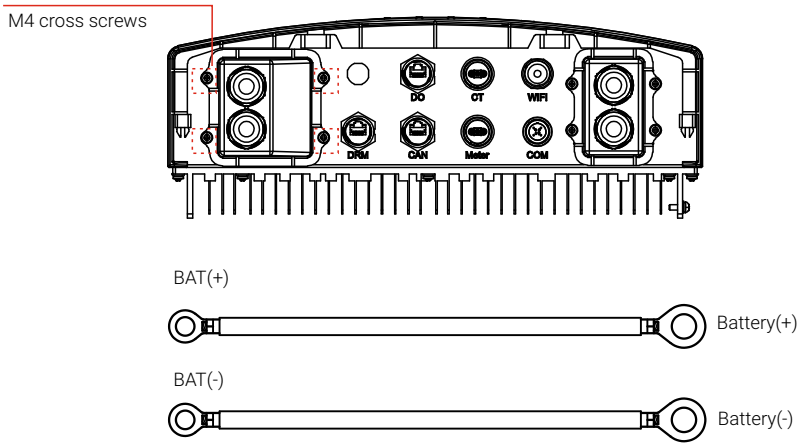


4.3 Assemble the battery cables

WARNING! Incorrect polarity of the battery cable may lead to permanent damage on the device.

WARNING! To avoid DC Arc, Autarco recommends installing DC switch between batteries and Retrofit battery charger. Ensure the correct polarity of batteries before connecting to the battery charger

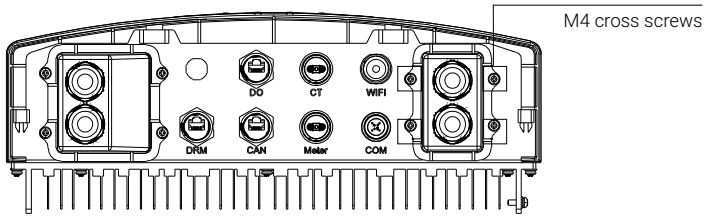
1. Unlock the 4*M4 screws on the battery port protection cover as shown in the below figure.
2. Insert the battery power cables (in package) into the water-proof swivel nut on the cover (break the plastic film on it).
3. Fasten the battery power cables onto the BAT+ and BAT- terminals on the battery charger. Please make sure the labels on cable and battery charger match up.
4. Lock the 4*M4 screws and fix the cover onto the battery charger.
5. Connect the other side of the battery power cables to the battery.



4.4 Assemble the AC cables

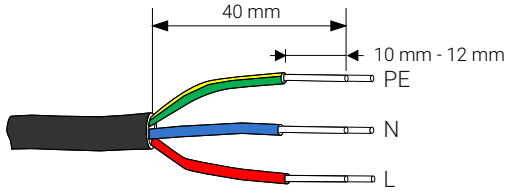
There are two AC terminals and the assembly steps for both are the same (AC backup port and AC grid port).

1. Unlock the 4*M4 screws on the AC ports protection cover as shown in the below figure.

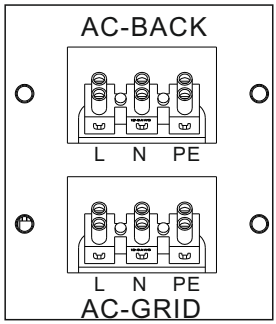


2. Insert the AC grid cables and AC backup cables into the corresponding water-proof swivel nut on the cover (break the plastic film on it). Make sure you use a cable within the correct specifications as shown in the table below. Remove a length of 40mm of the cable jacket and strip the wire insulation to a length of 10-12mm.

Describe	Numerical value
Wire diameter	6~12mm
Traverse cross sectional area	6mm2
Exposure Length	12mm



3. Fasten the AC onto the terminals on the battery charger. Please make sure the correct polarity. Ensure that the correct conductor is fastened (0.7 N.m. torque) to the correct terminal.

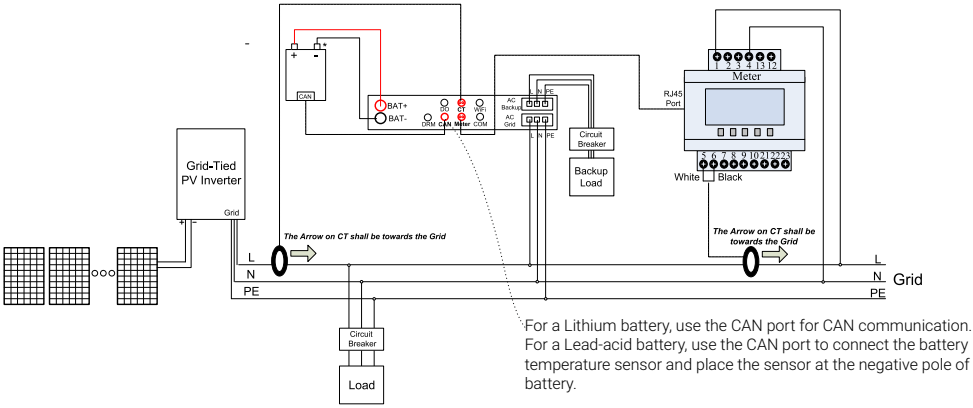


WARNING! Observe the terminal layout of the terminal block. Do not connect the phase lines to the “PE” terminal, otherwise the battery charger will not function properly.

4. Lock the 4*M4 screws and fix the cover onto the battery charger.

4.5 Meter/CT installation

The MR series battery charger requires a smart meter to measure the power flow at the grid connection point to achieve the self-use control algorithm. The smart meter and the communication cable are provided as a standard accessory in the package. Please refer to below system diagram to connect the smart meter at the grid connection point. Meanwhile, a smart CT sensor is provided in order to measure the generation of the grid-tied solar inverter.



Smart meter for grid power flow measurement (external CT provided within the meter package).

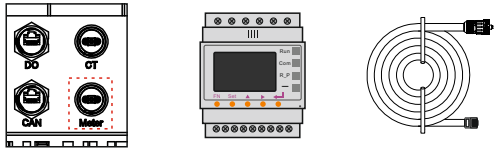


Figure 4.13

Smart CT sensor for PV generation measurement.

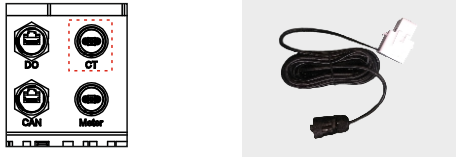
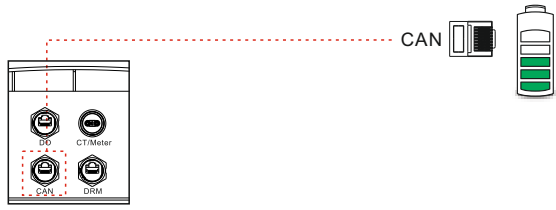


Figure 4.14 2-pin CT cable

4.6 Assemble other cables

4.6.1 Battery CAN communication cable



NOTE! The CAN cable enables the communication between the battery charger and the Li-ion battery from BYD, PYLON, etc.
Check for latest model compatibility before installation.

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

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

NOTE! Lead-Acid and other older-technology battery types require experienced and precise design, installation and maintenance to work effectively. For MR series battery chargers there is no temperature compensation, thus the client need BTS (battery temperature sensor) which is connected to the CAN port at one side and the battery negative pole at the other side. BTS is optional. For further information please contact Autarco. For lead-acid battery, battery SOC calculation may not be accurate according to battery inconformity between cells, battery aging or other specifications of lead-acid battery, etc.

4.6.2 Logic interface communication cable

Logic interface is required by some local regulations. It can be operated by a simple switch or contactor (not available in South Africa).

When the switch is closed the battery charger operates normally. When the switch is opened, the battery charger will reduce its output power to zero within 5s. Pin5 and Pin6 of RJ45 terminal are used for the logic interface connection.
Please follow the steps below to assemble the RJ45 connector.

1. Insert the network cable into the communication connection terminal of Rj45.

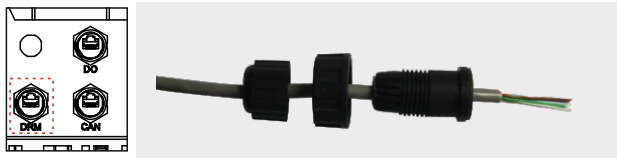


Figure 4.16. RJ45 communication connection terminal

2. Use the network wire stripper to strip the insulation layer of the communication cable. According to the standard line sequence of figure 4.17, connect the wire to the plug of Rj45. Then use a network cable crimping tool to make it tight.

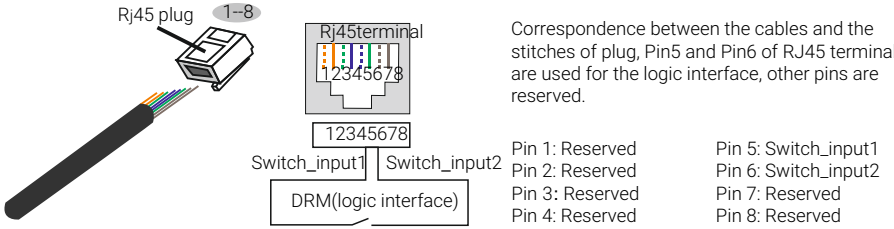


Figure 4.17 Strip the insulation layer and connect to RJ45 plug

3. Connect RJ45 to DRM port (logic interface) .

NOTE! To use this function, please contact the manufacturer.

4.7 External ground connection

An external ground connection is provided at the right side of battery charger.
Prepare the OT terminals: M4. Use proper tooling to crimp the lug to the terminal.
Connect the OT terminal with ground cable to the right side of battery charger. The torque is 2Nm.

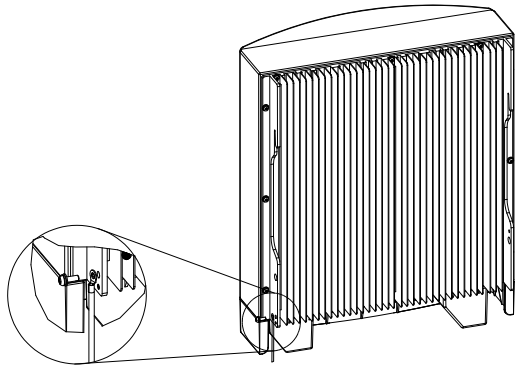
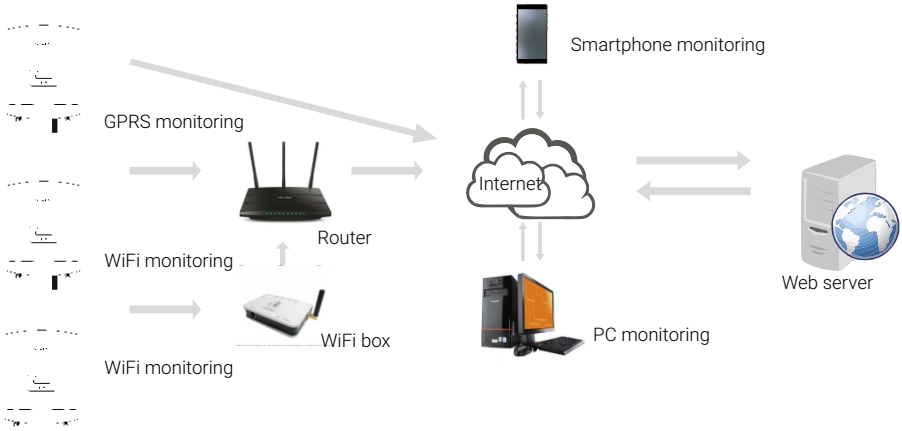


Figure 4.18 Connect the external grounding conductor

4.8 Battery charger monitoring connection

The battery charger can be monitored via WiFi or GPRS. All Autarco communication devices are optional. For connection instructions, please refer to the Autarco monitoring device installation manuals.



5 Operation

During normal operation, the display alternately shows the power and operation status (see figure 5.1) with each screen lasting for 10 seconds. The screen can be scrolled manually by pressing the UP/DOWN keys. Pressing the ENTER key gives access to Main Menu.

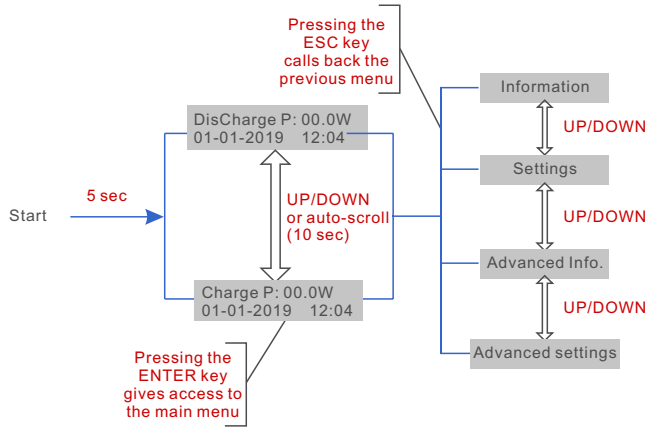


Figure 5.1 Operation Overview

5.1 Main menu

There are four submenus in the Main Menu (see figure 5.1):

1. Information
2. Settings
3. Advanced Info
4. Advanced Settings

5.2 Information

The Autarco MR Retrofit battery chargers main menu provides access to operational data and information. The information is displayed by selecting "Information" from the menu and then by scrolling up or down.

There are 6 submenus in the Information menu:

1. General Info
2. System Info
3. Energy Records
4. BMS Info
5. Meter Info
6. CT Info

Display	Description
Inverter SN: FFFFFFFFFFFFFF	Serial number of the battery charger.
Device: Waiting	Device Status.
Battery: Waiting	Battery Status.
Backup: Waiting	Backup Status.
Grid: Waiting	Grid Status.
DRMNO.: 08	DRM No.
Model.: 00	Model number of the battery charger.
SoftVer.: 090000	Firmware version of the battery charger.

Figure 5.2 Information list (General Info)

Display	Description
Grid Power: +000000W	Grid Power.
Grid Voltage: 000.0V	Grid Voltage.
Grid Frequency: 00.00Hz	Grid Frequency.
Battery Voltage: 000.0V	Battery Voltage.
Backup Voltage: 000.0V	Backup Voltage.

Figure 5.3 Information list (System Info)

Display	Description
Backup Power: 00.0W	Backup Power.
Charge P: 00.0kW	Battery Charge Power.
DisCharge P: 00.0kW	Battery Discharge Power.
Battery Temperature : +000.00degC	Battery Temperature.

Figure 5.4 Information list (System Info)

Display	Description
BattChgE Total: 0000000kWh	Total battery charge energy.
BattChgE Today: 000.0kWh	Today battery charge energy.
BattChgE Lastday: 000.0kWh	Yesterday battery charge energy.
BattDisChgE Total: 0000000kWh	Total battery discharge energy.
BattDisChgE Today: 000.0kWh	Today battery discharge energy.
BattDisChgE Lastday: 000.0kWh	Yesterday battery discharge energy.
GridGetE Total: 0000000kWh	Total energy imported from grid.
GridGetE Today: 000.0kWh	Today energy imported from grid.

Figure 5.5 Information list (Energy Records)

Display	Description
GridGetE Lastday: 000.0kWh	Yesterday energy imported from grid.
Grid SendE Total: 0000000kWh	Total energy exported to grid.
Grid SendE Today: 000.0kWh	Today energy exported to grid.
Grid SendE Lastday: 000.0kWh	Yesterday energy exported to grid.
Backup Total: 0000000kWh	Total backup consumption.
Backup Today: 000.0kWh	Today backup consumption.
Backup Lastday: 0000000kWh	Yesterday backup consumption.

Figure 5.6 Information list (Energy Records)

Display	Description
Battery V: 00.00V Battery I: +00.0A	Battery voltage and current.
Charge Lmt: 000.0A Discharge Lmt: 000.0A	Battery charge/discharge current limitation.
SOC Value: 000% SOH Value: 000%	SOC and SOH of battery.
BMS Status: CAN Fail	BMS communication status.

Figure 5.7 Information list (BMS Info)

Display	Description
Meter Voltage: Null	Meter Voltage.
Meter Current: Null	Meter Current.
Meter Power: Null	Meter Power.
Meter Energy: Null	Meter Energy.
Output Energy: Null	Output Energy.
Input Energy: Null	Input Energy.
Meter Status: Null	Meter Status.

Figure 5.8 Information list (Meter Infomation)

Display	Description
Grid-CT Voltage: 000.0V	Grid-CT Voltage.
Grid-CT Current: 00.00A	Grid-CT Current.
Grid-CT Power: +00.0kW	Grid-CT Power.

Figure 5.9 Information list (CT Infomation)

5.3 Settings

The following submenus are displayed when the Settings menu is selected:

1. Set Time
2. Set Address

5.3.1 Set time

This function allows time and date setting. When this function is selected, the LCD will display a screen as shown in figure 5.10.

Figure 5.10 Set Time

Press the UP/DOWN keys to set time and date. 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 the previous menu.

5.3.2 Set address

This function is used to set the address when multiple battery charger are connected to the monitor. The address number can be assigned from "01"to "99"(see figure 5.11). The default address number of the battery charger is "01".

Figure 5.11 Set Address

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

5.4 Advanced info - technicians only

NOTE! The access to this area is for fully qualified and accredited technicians only. Enter menu "Advanced Info" and "Advanced settings" (password needed).

Select "Advanced Info" from the Main Menu. The screen will require the password:

Figure 5.12 Enter password

Press "down" to move the cursor, press "up" to select the number.
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

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.

5.4.1 Alarm message

The display shows the 100 latest alarm messages (see figure 5.13). Screens can be scrolled manually by pressing the UP/ DOWN keys. Press the ESC key to return to the previous menu.

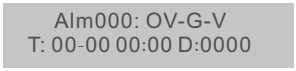


Figure 5.13 Alarm Message

5.4.2 Warning message

The display shows the 100 latest warning messages (see figure 5.14). Screens can be scrolled manually by pressing the UP/ DOWN keys. Press the ESC key to return to the previous menu.

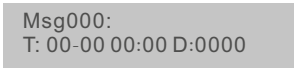


Figure 5.14 Warning Message

5.4.3 Running status

This function is for maintenaince person to get running messages.

General status includes: DC bus voltage, power factor, power limit, battery charger's temperature, grid standard.
Advanced status includes: Control word status, Grid filter No.,Ground voltage, etc.

Screens can be scrolled manually by pressing the UP/DOWN keys.

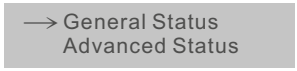


Figure 5.15 Running status

5.4.4 Communication data

The screen shows the internal data of the battery charger (see figure 5.16), which is for service technicians only.

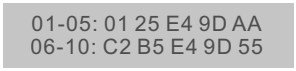


Figure 5.16 Communication Data

5.4.5 Yield profile

This section shows the energy records of the battery, grid, load and backup port.

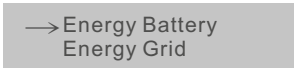


Figure 5.17 Yield profile

5.5 Advanced settings - technicians only

NOTE! The access to this area is for fully qualified and accredited technicians only. Please follow 5.4 to enter password to access this menu.

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**

5.5.1 Selecting standard

This function is used to select the grid's reference standard (see Figure 5.18).

Figure 5.18

Press the UP/DOWN keys to select the standard.
Press the ENTER key to confirm the setting.
Press the ESC key to cancel changes and returns to previous menu.

NOTE: This function is for technicians use only.

Selecting the “User-Def” menu will provide access to the following submenu (see figure 5.19),

Figure 5.19

NOTE! The "User-Def" function can only be used by the service engineer and must be allowed by the local energy supplier.

Below is the setting range for “User-Def”. By using this function, the limits can be changed manually.

OV-G-V1:	240---270V	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:	240---300V	OV-G-F2:	50.2-53Hz(60.2-63Hz)
OV-G-V2-T:	0.1---1S	OV-G-F2-T:	0.1---9S
UN-G-V1:	170---210V	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:	110---210V	UN-G-F2:	47-49Hz(57-59.5Hz)
UN-G-V2-T:	0.1---1S	UN-G-F2-T:	0.1---9S
Startup-T:	10---600S	Restore-T:	10---600S

Press the UP/DOWN keys to scroll through items. Press the ENTER key to edit the highlighted item. Press the UP/DOWN keys again to change the setting. Press the ENTER key to save the setting. Press the ESC key to cancel changes and returns to the 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 Autarco service technicians for details.

5.5.2 Grid switches

This function is used to start up or stop operation of the batter charger (see figure 5.20).

Figure 5.20 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.

5.5.3 Battery Control

This function is used for set the battery.

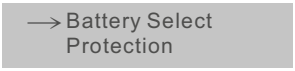


Figure 5.21 Battery control

5.5.3.1 Battery select

There are some options for battery modules. When a specific battery module is selected, pre-settings will be imported and the user doesn't need to configure the battery parameters, except for the over discharge SOC and forced charge SOC.

Battery module options:

1. Lead Acid
2. No Battery
3. Pylon
4. User-Def
5. BYD
6. LG

This product is compatible with the following battery modules:

Brand	Model	Setting
BYD	Box Pro 2.5-13.8	Select "B-BOX"
LG Energy Solution	RESU 3.3/6.5/10/13	Select "LG Chem"
Pylontech	US2000(CEI 0-21)/US3000(CEI 0-21)/ ForceL1(CEI 0-21)/ForceL2(CEI 0-21)/ Phantom-S/US2000C/US3000C/UP5000	Select "Pylon"
Dyness	Powerdepot/Powerbox/B4850	Select "Dyness"
Puredrive	48V-100Ah	Select "Puredrive"
Jiawei	Home E11	Select "Jiawei"
Soluna	4K PACK	Select "Soluna"
Highstar	HSD5870	Select "Highstar"
FOX	LV5200	Select "FOX"

When some battery module is selected, pre-settings will be imported, user doesn't need to configure the battery parameters except for over discharge SOC and forced charge SOC.

NOTE! Available batteries with built-in protocol: BYD, LG, Pylon.

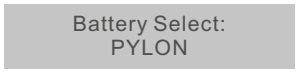


Figure 5.22 Battery select

The OverDischg SOC can be set from 10% to 40%.
The ForceChagre SOC can be set from 5% to OverDischg SOC.

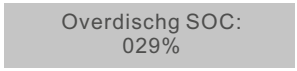


Figure 5.23 Overdischg SOC

NOTE:
Products support lead-acid battery. Select "Lead-Acid" in the "Battery Select" and configure the following parameters according to different lead-acid batteries.
1. Battery Capacity:Define the capacity of the battery.
2. I_Max Discharge: Define the max discharge current.
3. I_Max Charge: Define the max charge current.
4. Equalizing Voltage: Define the voltage of equalizing charge.
5. Floating Voltage:Define the voltage of floating charge.
6. Floating Current:Define the current of floating charge.
7. Overdischg Voltage: the min voltage that the battery can be discharged.
8. Force Charg Voltage: the min voltage that the battery will be force charged against the self-discharge of the battery.
9. Temp.Compensation:the value shall be set according to lead-acid specification.
10. Evironment Temp.:If there is NTC,the option is not necessary to define (Warm/Hot/Cold).
After configuration, save and send. Select the Environment Temp based on real condition. (Norm/Cold/Hot)

WARNING:
Lead-acid battery is not recommended for general customers as it requires experienced installers and technicians who can fully understand the battery parameters and configure the settings and installations correctly. Due to the inconformity between battery cells, damages will be less likely to be avoided. Autarco is not responsible for any potential damages caused by the use of lead-acid batteries.

5.5.3.2 Protection

Define battery Over voltage (46V~62V) and Under voltage (40V~48V).

Figure 5.24 Define battery overvoltage limit and under voltage

5.5.3.3 Battery wakeup

This function should be activated only after the installation. In the case of a low battery voltage shutdown, the battery charger will shut down. This setting can be enabled, so when the battery charger detects PV or grid it wakes up the battery. This function conflicts with the battery reverse polarity protection (if the installer connects cables with the wrong polarity, the battery charger can protect itself from damage). To avoid the possible damage during installation, do not activate the battery wakeup function before finishing the first commissioning.

5.5.4 Backup control

This function is used for set the backup port.

Figure 5.25 Backup control

5.5.4.1 Backup ON/OFF

This switch is to enable or disable the backup port of the battery charger.

Figure 5.26 Backup ON/OFF

5.5.4.2 Backup settings

Set the voltage/frequency of the backup port.
Enable or disable the voltage droop.

Figure 5.27 Backup settings

5.5.5 Storage energy set

There are three optional modes:

1. Meter Select
2. Stg Mode Select
3. CT Install

5.5.5.1 Meter select

There are 2 options in this setting: 1 phase (1Ph) meter and 3 phase (3Ph) meter.

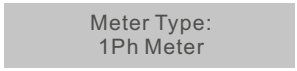


Figure 5.28 Meter Select

5.5.5.2 STG mode select

In this section, you can set the “Time charging mode”.
User can enable the “Time charging mode” and define the corresponding parameters:

1. Time of Use (Run/Stop)
2. Charge Limit (0~90A)
3. Discharge Limit (0~90A)
4. Charge Time
5. Discharge Time

The default mode is called "AUTO" mode (which is not shown and can't be selected).
The "AUTO" mode logic is: store excess PV energy into the battery and then use it to support loads instead of exporting to the grid (maximize system self-consumption rate).

To change back to the default mode, simply set all the other modes as OFF.

5.5.5.3 CT install

This setting is to define the position where the CT is installed:
1. Grid
2. PV Inverter

7.5.9 STD mode settings

There are 6 settings under STD mode settings:

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

This function is applicable by maintenance personnel only, wrong operation will prevent the battery charger from reaching maximum power.

5.5.6.1 Enable logic interface settings

When select G98 or G99 standard to use the logic interface function, please follow below settings to enable the DRM. DRM default setting is "OFF". If DRM is set "ON", but the logic interface is disconnected to the switch or the switch is open, the battery charger HMI will display "Limit by DRM" and the batter charger output power will be limited to zero.

1. Select Initial Settings
2. Select DRM and set it "ON"

5.5.7 Software update

There are 2 settings under Software Update:

1. HMI Update
2. DSP Update

This function is applicable by maintenance personnel only, wrong operation will prevent the battery charger from working properly.

5.5.8 Export power set

Select EPM Settings from the Main Menu to access the following options:

1. EPM ON/OFF
2. Backflow Power
3. FailSafe ON/OFF

5.5.8.1 EPM ON/OFF

There are 2 settings in this menu as below:

1. ON
2. OFF

5.5.8.2 Backflow power

This submenu is used for setting the allowed power that the battery charger can send to grid.

Figure 5.29 Backflow Power

5.5.8.3 Fail Safe ON/OFF

This setting is used to give out an alarm (stops battery charger to generate as well) when the CT/Meter connection is lost during operation. It can prevent potential backflow power into the grid when the system loses control.

Figure 5.30 Set the Fail Safe ON/OFF

It is only mandatory to turn on this function when the battery charger is installed in the UK, due to the G100 regulation. For other regions, customers can enable or disable the function as they wish.

NOTE! When the failsafe function is ON and CT/Meter is disconnected somehow, the battery charger will stop generation and give "Fail Safe" alarm on the screen. When the fail safe function is OFF and the CT/Meter is disconnected somehow, the battery charger will keep the output power as the last moment when the CT/Meter is still connected. After a restart, the battery charger will output at full power without limit.

5.5.9 Reset password

This function is used for set the new password for menu “Advanced info.” and “Advanced information”.

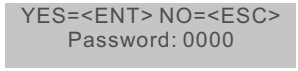


Figure 5.31 Reset password

Enter the right password before set new password. Press the DOWN key to move the cursor. Press the UP key to revise the value. Press the ENTER key to execute the setting. Press the ESC key to return to the previous menu.

5.5.10 Restart HMI

This function is used for restarting the HMI.

This function is applicable by maintenance personnel only, wrong operation will prevent the battery charger from working properly.

5.5.11 Self Test CEI 0-21

This function is used only for Italy market.
There are 3 settings under Self Test CEI 0-21:

1. Complete Self Test
2. Single Protect Test
3. Test Report

5.5.12 Compensation set

This function is used to calibrate battery charger's output energy and voltage. It can compensate for minor power and voltage measurement errors in the battery charger measurement circuit. Two sections are included: Power Parameter and Voltage Parameter.

The screen shows:

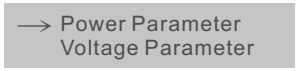


Figure 5.32 Compensation Set

This setting is used for grid operators, do not change this setting unless specifically instructed to.

6 Commissioning

6.1 Preparation of commissioning

- Ensure all the devices are accessible for operation, maintenance and service.
- Check and confirm that the battery charger is firmly installed.
- Space for ventilation is sufficient for one battery charger or multiple.
- Nothing is left on the top of the battery charger or battery module.
- Battery charger 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.

6.2 Commissioning procedure

1. Verify the battery voltage and polarity are satisfactory.
2. Turn on the battery switch between battery charger and battery.
3. Verify the battery charger initializes.
4. Set the grid standard to your local grid requirements.
5. Configure the battery charger to your system requirements.

7 Maintenance

Autarco MR Retrofit battery chargers do not require any regular maintenance. However, cleaning the dust on the heat-sink will help the battery charger to dissipate the heat and increase its life time. The dust can be removed with a soft brush.

CAUTION! Do not touch the battery charger's surface when it is operating. Some parts of the it may be hot and cause burns. Turn off the battery charger and wait for a cool-down period before any maintenance or cleaning operation.

The LCD and the LED status indicator lights can be cleaned with a damp cloth if they are too dirty to be read.

NOTE! Never use any solvents, abrasives or corrosive materials to clean the battery charger.

The battery charger has been designed in accordance with international grid tied standards for safety, and electromagnetic compatibility requirements. Before delivering to the customer the battery charger 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 battery charger may stop feeding energy into the grid. The alarm descriptions and their corresponding alarm messages are listed in table 8.1:

8 Troubleshooting

Alarm Message	Failure description	Solution
OV-G-V	Grid Overvoltage	Check if the grid is correctly connected, wait for the grid to be normal.
UN-G-V	Grid Undervoltage	Check if the grid is correctly connected, wait for the grid to be normal.
OV-G-F	Grid Overfrequency	Check if the grid is correctly connected, wait for the grid to be normal.
UN-G-F	Grid Underfrequency	Check if the grid is correctly connected, wait for the grid to be normal.
NO-Grid	No Grid	Check if the grid is correctly connected, wait for the grid to be normal.
OV-BUS	DC Bus overvoltage	Restart the battery charger, if the fault still exists, contact Autarco after-sale service.
UN-BUS	DC Bus voltage sampling Error	Restart the battery charger, if the fault still exists, contact Autarco after-sale service.
DC-INTF.	Battery Overcurrent	Restart the battery charger, if the fault still exists, contact Autarco after-sale service.
IGFOL-F	Grid Current Tracking Error	Restart the battery charger, if the fault still exists, contact Autarco after-sale service.
OV-G-I	Grid Overcurrent	Restart the battery charger, if the fault still exists, contact Autarco after-sale service.
AC Transient over current	AC Transient Overcurrent	Check if the backup port is shorted, Restart the battery charger, if the fault still exists, contact Autarco after-sale service.
DCInj-FAULT	Over DC injection	Restart the battery charger, if the fault still exists, contact Autarco after-sale service.
IGBT-OV-I	IGBT Overcurrent	Restart the battery charger, if the fault still exists, contact Autarco after-sale service.
OV-TEM	Internal Over Temperature	Check if the battery charger, installation meets the requirements listed in the manual, Restart the battery charger, if the fault still exists, contact Autarco after-sale service.
RelayChk-FAIL	Relay Fault	Restart the battery charger, if the fault still exists, contact Autarco after-sale service.
GRID-INTF02	Grid Interference 02	Restart the battery charger, if the fault still exists, contact Autarco after-sale service.
IG-AD	Grid Current Sampling Error	Restart the battery charger, if the fault still exists, contact Autarco after-sale service.
OV-IgTr	Grid Transient Overcurrent	Restart the battery charger, if the fault still exists, contact Autarco after-sale service.
OV-Vbatt-H	Battery Hardware Overvoltage	Check if the battery is correctly connected or the battery contactor is disconnected, Restart the battery, Restart the battery charger, if the fault still exists, contact Autarco after-sale service.

Alarm Message	Failure description	Solution
OV-ILLC	LLC Hardware Overcurrent	Restart the battery charger, if the fault still exists, contact Autarco after-sale service.
OV-Vbatt	Battery Overvoltage	Check if the battery overvoltage setting is reasonable, if the battery reaches its end of life.
UN-Vbatt	Battery Undervoltage	Check if the battery overvoltage setting is reasonable, if the battery reaches its end of life.
DSP-B-FAULT	Slave DSP Check Error	Restart the battery charger, if the fault still exists, contact Autarco after-sale service.
NO-Battery	Battery Not Connected	Check if the battery is correctly connected or the battery contactor is disconnected, Restart the battery.
OV-Vbackup	Inverting Overvoltage	Restart the battery charger, if the fault still exists, contact Autarco after-sale Service.
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 battery charger.
CT-Fail	CT Installed Fail	Check if CT is correctly installed or the cables are broken/loosen .
MET_Comm_FAIL	Meter COM Fail	Check if the CT/Meter setting is correct or the cables are broken/loosen.
CAN_Comm_FAIL	Battery CAN Fail	Check if the CAN cable is correctly connected or the cables are broken/loosen.
DSP_Comm_FAIL	DSP COM Fail	Restart the battery charger, if the fault still exists, contact Autarco after-sale service.
Alarm-BMS	Battery BMS Alarm	Retart the battery, if fault still exists, please contact battery manufacturer or installer.
BatName-FAIL	Wrong Battery Model	Make sure the actual battery model matches the selection on battery charger LCD.

Table 8.1 Fault message and description

NOTE! If the battery charger displays any alarm message as listed in table 8.1; please turn off the battery charger and wait for 5 minutes before restarting it. If the failure persists, please contact your local distributor or the service center. Please have ready the following information before contacting us:

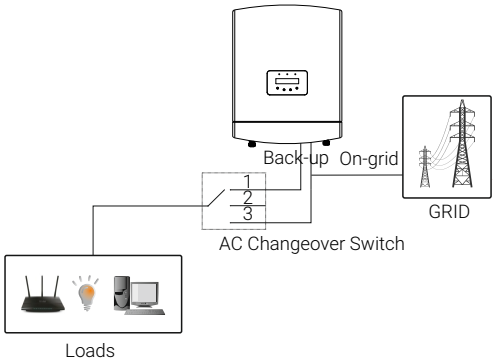
1. Serial number of Autarco battery charger
2. The distributor/dealer of Autarco battery charger (if available)
3. Installation date
4. The description of problem (i.e. the alarm message displayed on the LCD and the status of the LED status indicator lights. Other readings obtained from the Information submenu (refer to Section 6.2) will also be helpful.)
5. The PV array configuration (e.g. number of panels, capacity of panels, number of strings, etc.)
6. Your contact details

9 Specifications

Technical Data	S2.MR3000
Output AC(Grid side)	
Rated output power	3000 W
Max. apparent output power	3.3 kVA
Operation phase	1/N/PE
Rated grid voltage	220V/230 V
The grid voltage range	184-264 V
Rating grid Frequency	50 HZ/ 60 Hz
AC grid frequency range	45-55 Hz/ 55-65 Hz
Rating grid output current	13.6A/13 A
Max. output current	20 A
Power Factor	>0.99 (0.8 leading - 0.8 lagging)
THDi	<3%
Battery	
Battery Type	Li-ion / Lead-acid
Battery voltage range	40-60 V
Battery capacity	50-2000 Ah
Maximum charging Power	3kW
Max.charge/discharge current	60 A
Communication	CAN
Output AC(Back-up)	
Rated output power	3 kW (requires battery voltage higher than 55V)
Max. apparent output power	4.5 kVA
Back-up switch time	<10 ms
Rated output voltage	1/N/PE, 220 V / 230 V
Rated frequency	50 Hz / 60 Hz
Rated output current	13.6 A / 13 A
THDv (@linear load)	<3%
Input AC (Grid side)	
Input voltage range	184-264 V
Max. input current	32 A
Frequency range	45-55 Hz/ 55-65 Hz

Efficiency	
Max. battery charge efficiency	94.0%
Max. battery discharge efficiency	94.5%
Protection	
Battery reverse protection	Yes
Battery over and under voltage protection	Yes
Short circuit protection	Yes
Output over current protection	Yes
Output over voltage protection	Yes
Temperature protection	Yes
General data	
Dimensions(W*H*D)	403*525*170 mm
Weight	15 kg
Topology	High frequency isolation
Operation temperature range	-25~+60 ?
Ingress Protection	IP65
Noise emission (Typical)	<35 dB (A)
Cooling concept	Natural convection
Max.operation altitude	2000 m
Safty/EMC 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, MEA, PEA
Grid connection standard	IEC 62477, EN 61000-6-2/-3
Features	
DC connection	Screw Terminal
AC connection	Screw clamp terminal (Max 6 mm²)
Display	LCD, 2X20 Z
Communication	Rs485, CAN, Optional:Wi-Fi, GPRS
Warranty	5 years (extend to 15 years)

10 Special back-up connection



If battery charger needs maintenance, then just switch the AC changeover switch to position 3 as shown above. This way the loads will be supplied by grid. An AC changeover switch is a 3rd party item that is not supplied by Autarco.

11 Grid standard selection

NOTE! Please check if the grid code setting complies with the local requirements.

For different countries and regions, the corresponding grid code needs to be selected in the battery charger LCD to meet the requirements of the local network provider.
This instruction indicates how to change the grid code.

If the customer has any doubts or uncertainty, please consult the Autarco support department for confirmation.

To set the correct grid code, please enter the following path:
Advanced Settings > Password > Select Standard

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