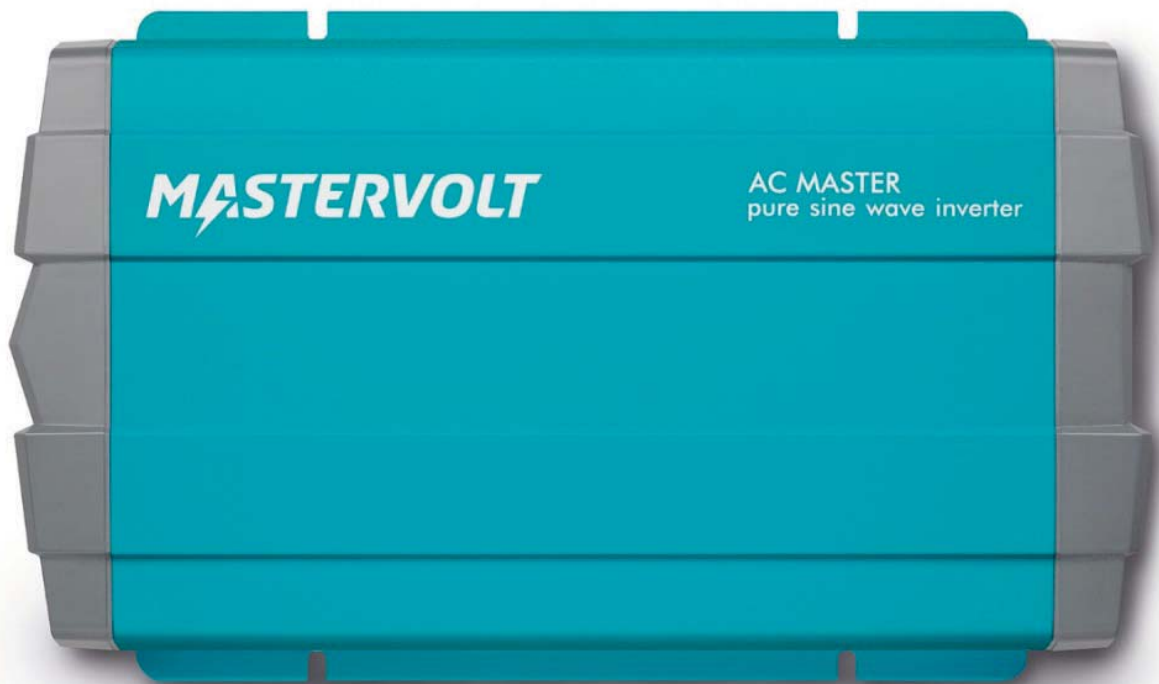


AC Master

PURE SINE WAVE INVERTER

12/2500-230, 24/2500-230, 12/3500-230

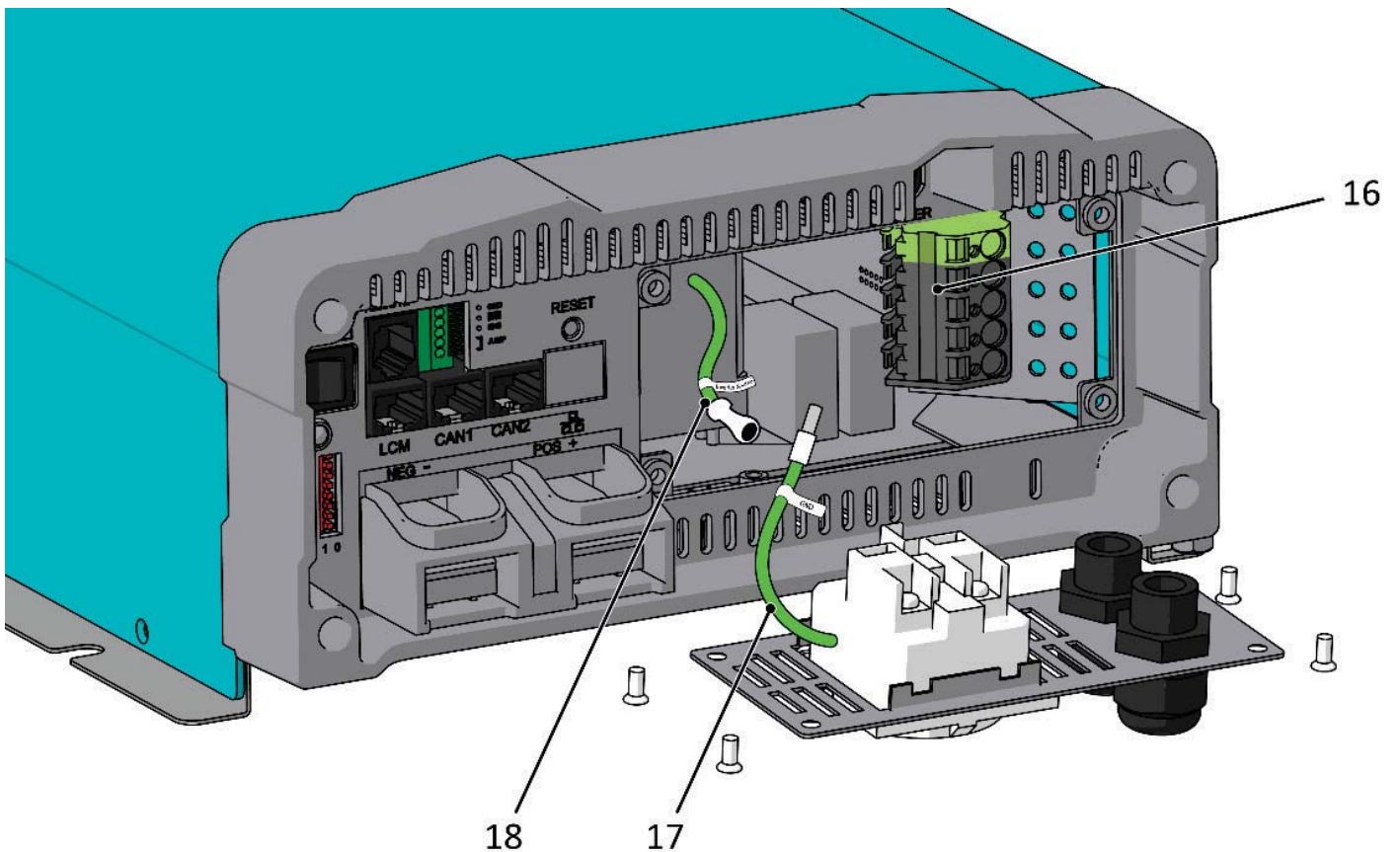
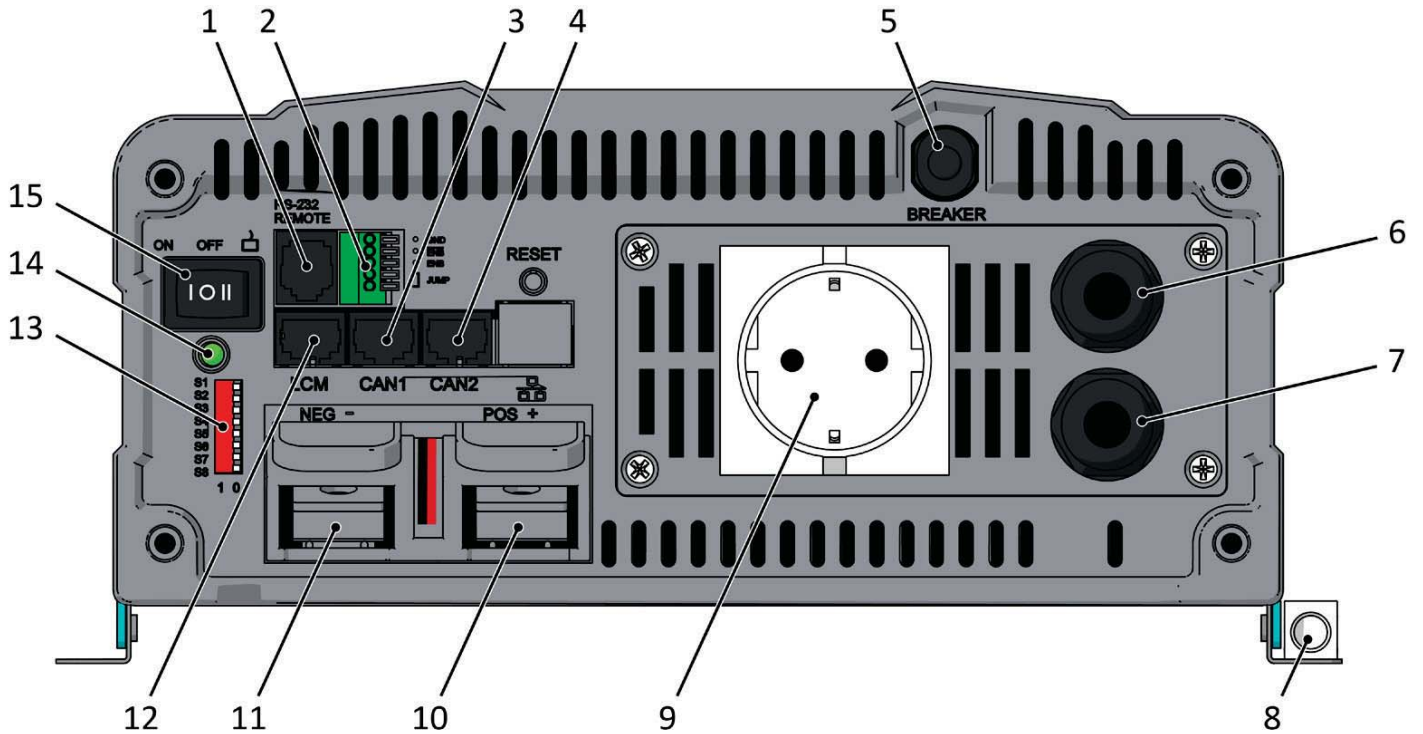


EN USER'S AND INSTALLATION MANUAL

10000011809/00

Product description

The AC Master is a sine wave inverter. The AC Master converts DC energy from the battery into AC output power. The AC Master 2500-3500 is equipped with an AC transfer switch and is suitable for creating systems with multiple units in parallel or 3 phase configuration.

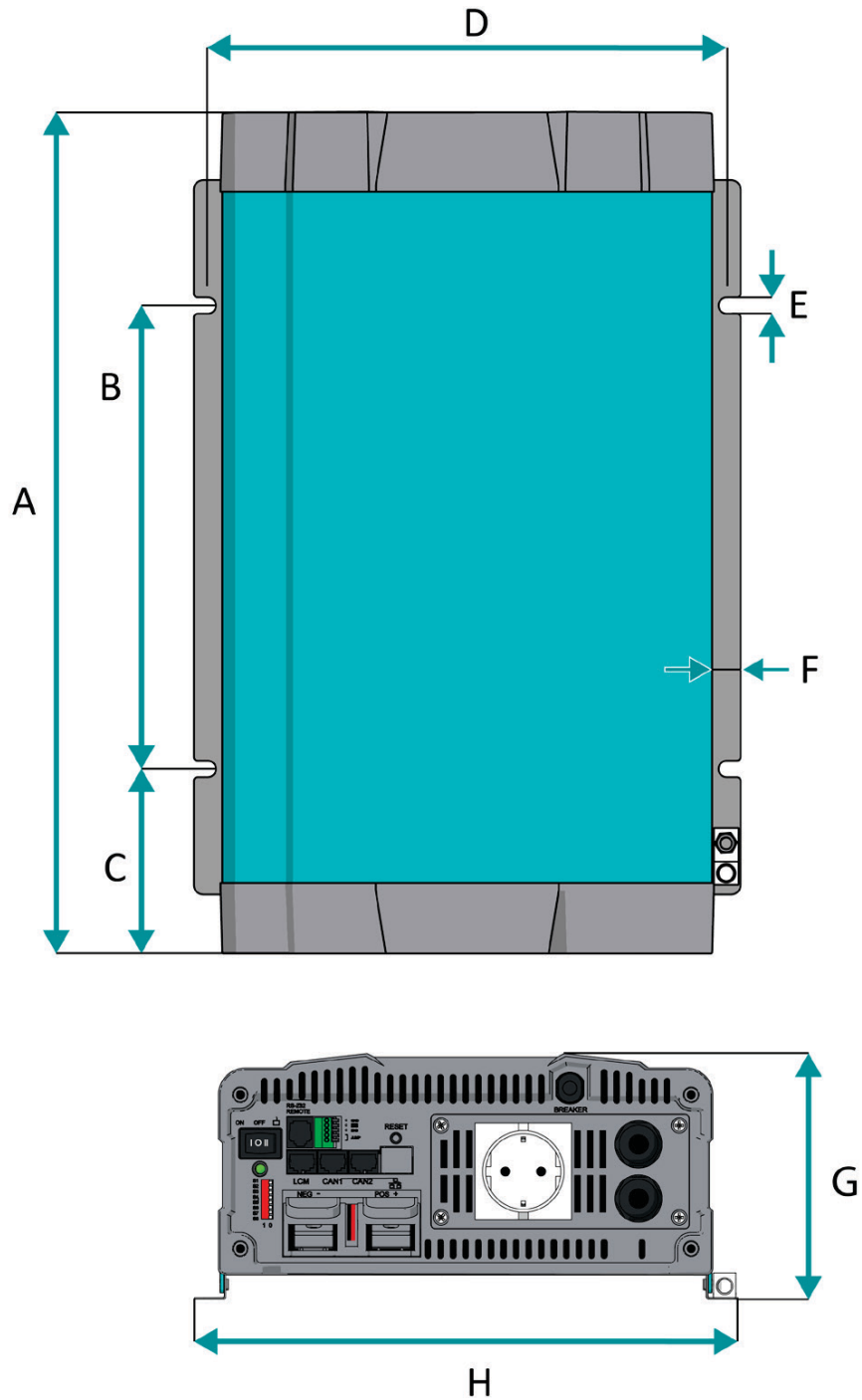


Front panel

- 1 Remote port (RS-232)
- 2 Terminal for remote switch and CAN termination
- 3 CAN1 port *
- 4 CAN2 port *
- 5 AC input circuit breaker 20 Amp
- 6 By-pass AC input
- 7 AC output
- 8 Chassis ground terminal
- 9 AC output socket
- 10 Battery input +
- 11 Battery input -
- 12 LCM port for LCD remote control panel **
- 13 DIP switches
- 14 LED indicator
- 15 Main switch
- 16 Hard-wire connection for AC output and AC input
- 17 Internal grounding cable (GND)
- 18 Internal grounding cable (Inverter Neutral)

* This is not a MasterBus port. Do not connect a CAN port to a MasterBus network. This will cause hardware damage.

** LCM is not supported by Mastervolt



Dimensions

Model

	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)	G (mm)	H (mm)
2500	436,0	240,0	95,6	268,6	8,5	11,5	128,0	283,0
3500	496,0	240,0	125,6	268,6	8,5	11,5	128,0	283,0

Identification label

MASTERVOLT



PartNo: 28022500

Type: AC MASTER 24/2500

Input: 24Vdc, 121Adc

AC input: 230Vac, 50/60Hz, 20A circuit breaker

AC output: 230Vac, 50/60Hz, 2500W (inverter mode)



Serial no.: FO06A0001

Made in the PRC

IP21



10R-05 13149

Installation instructions

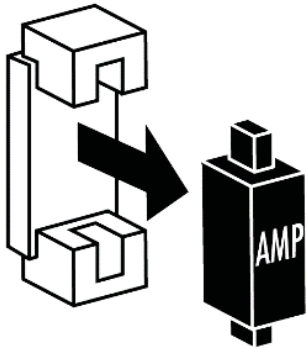


This section provides a step by step instruction of the basic stand-alone installation of the AC Master 2500/3500. Please read the entire manual for instructions on safety, grounding, configuration settings, additional features and creating systems with multiple units.

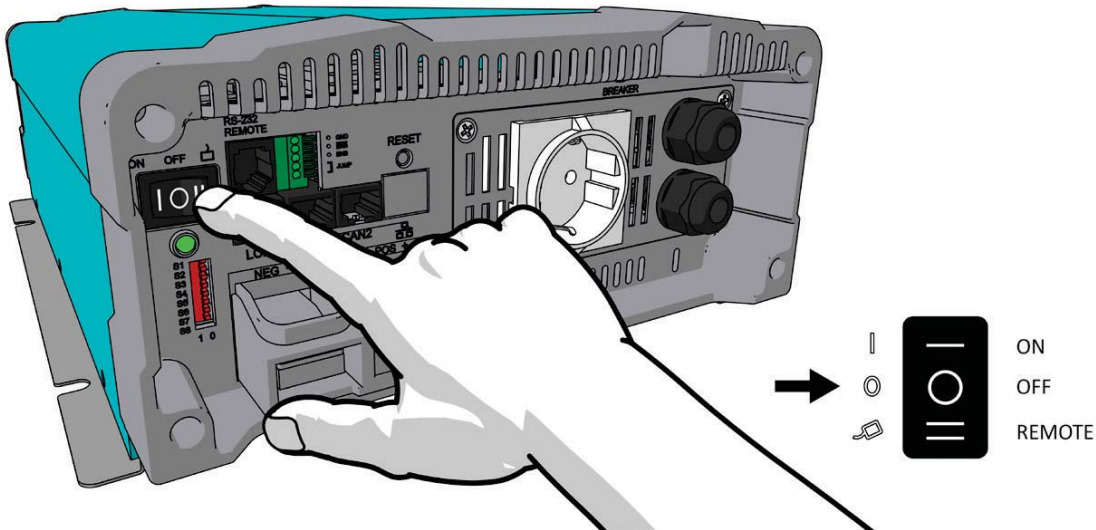


Read the safety instructions! See section 1 on page 11.
Use isolated tools!

1. Disconnect power supplies

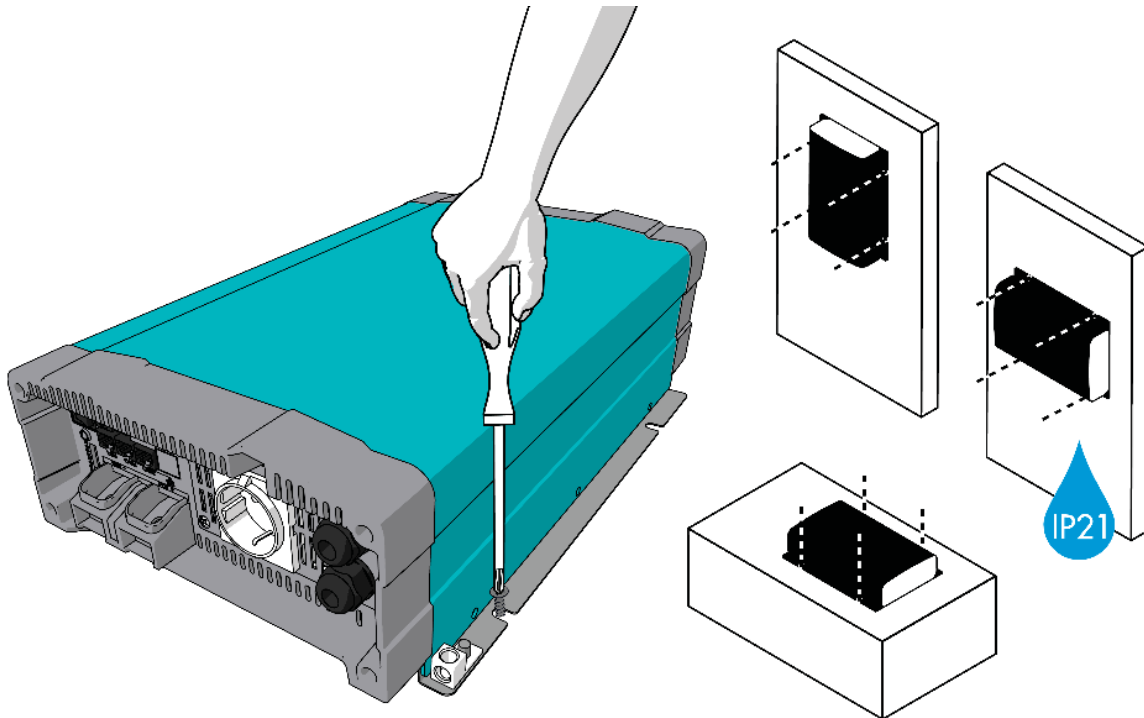


2. Switch OFF the AC Master

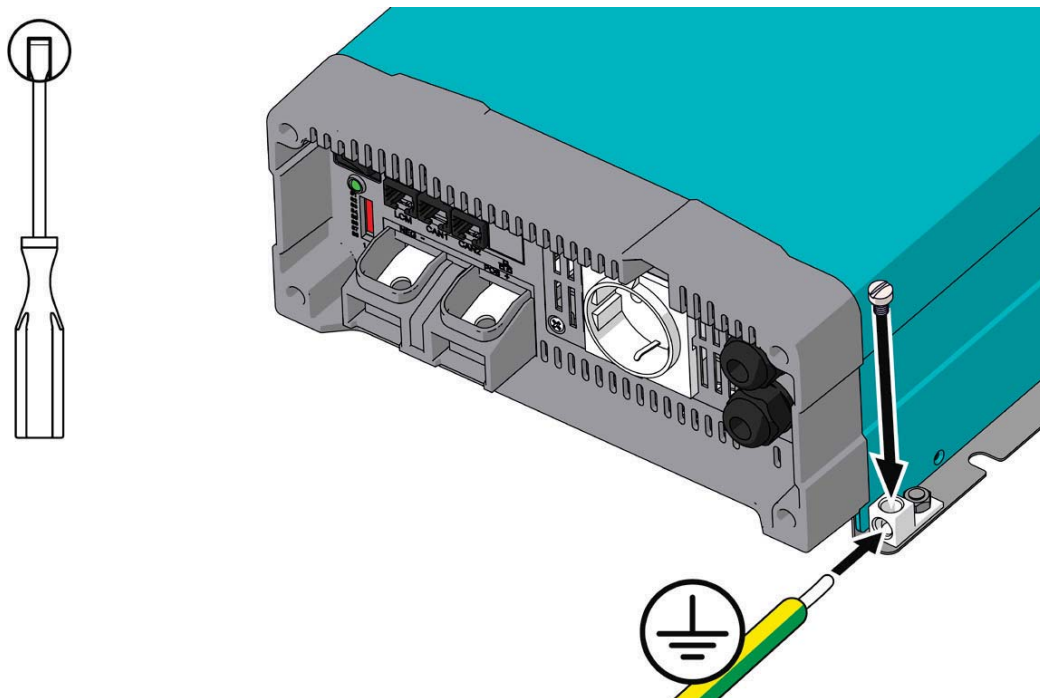


3. Select a location that complies with section 6 on page 12.

4. Mount the AC Master with four screws to a solid surface.

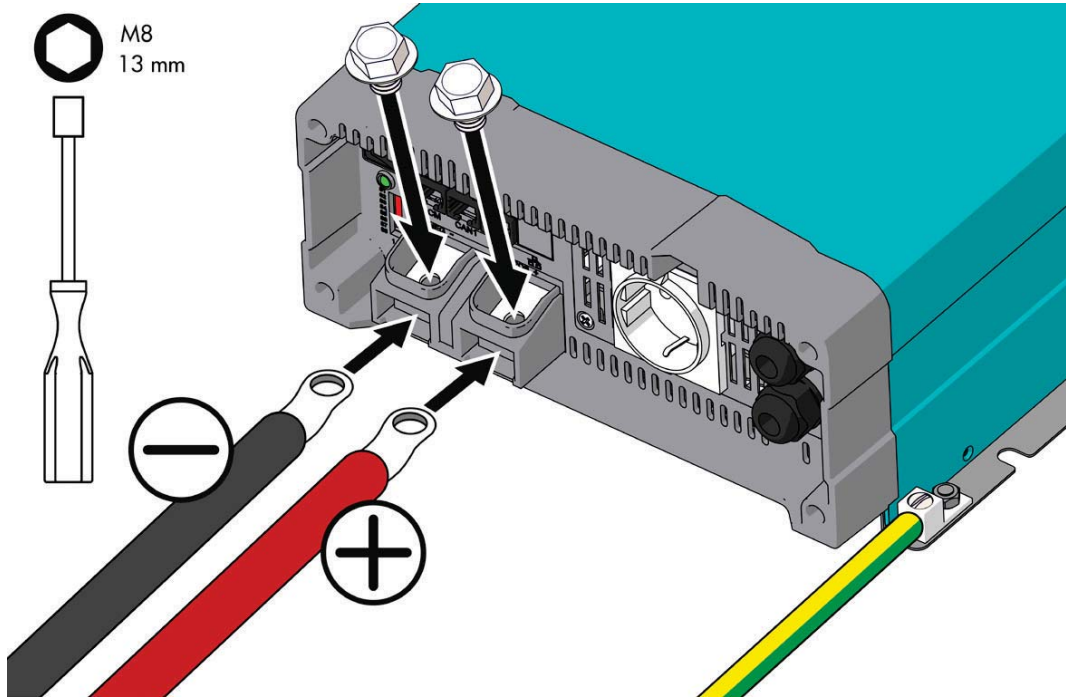


5. Connect the chassis ground terminal to the central grounding point of the vehicle/ship.

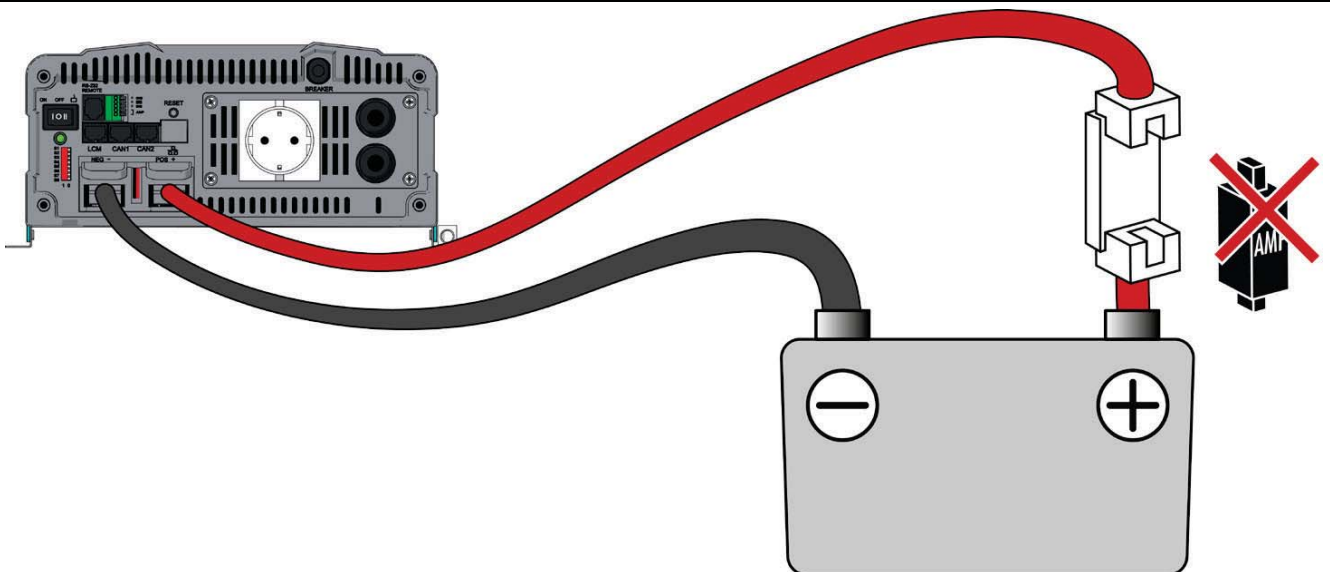


6. Optional: Connect remote panel or remote switch, see section 6 on page 12.

7. Connect the battery to the DC input.



8. Integrate a fuse holder in the positive battery wire, but do not place the fuse yet.

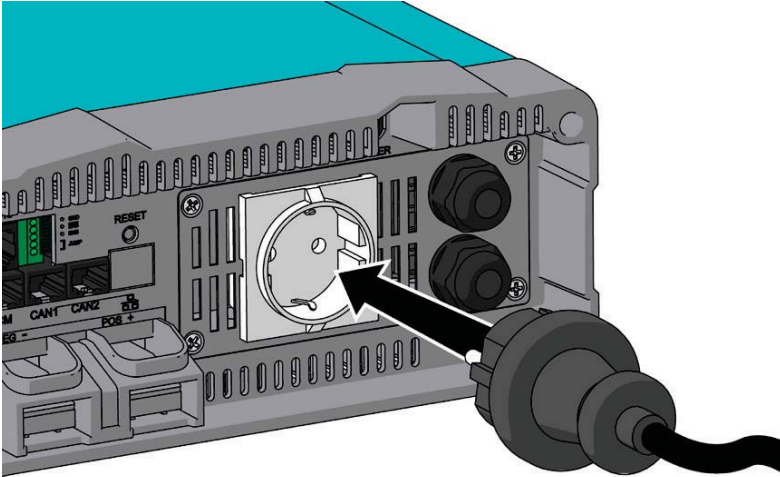


9. Connect the AC load.

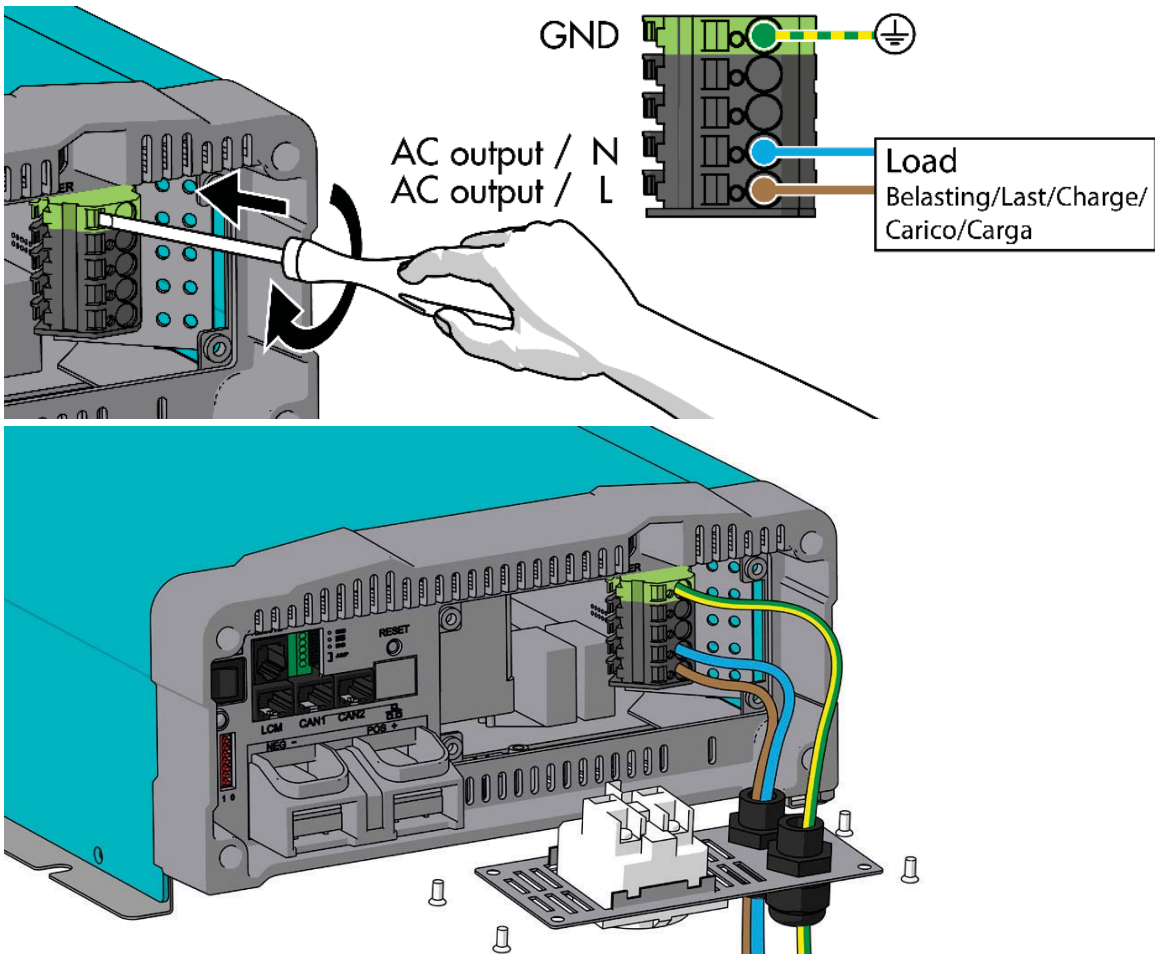


See section 5 on page 12 for instructions on neutral grounding.

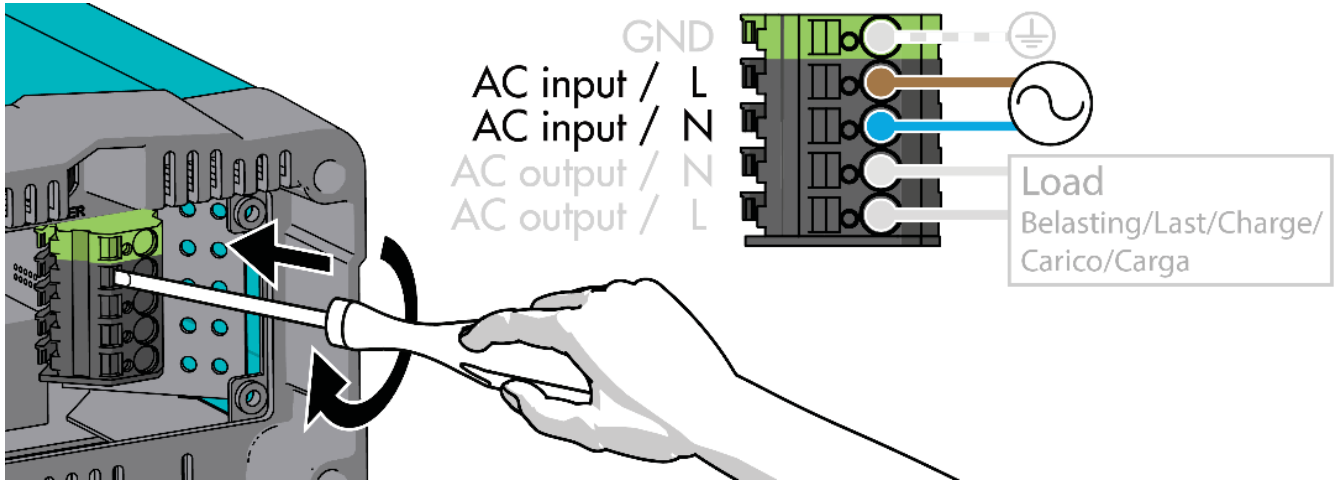
AC socket



AC hard-wired



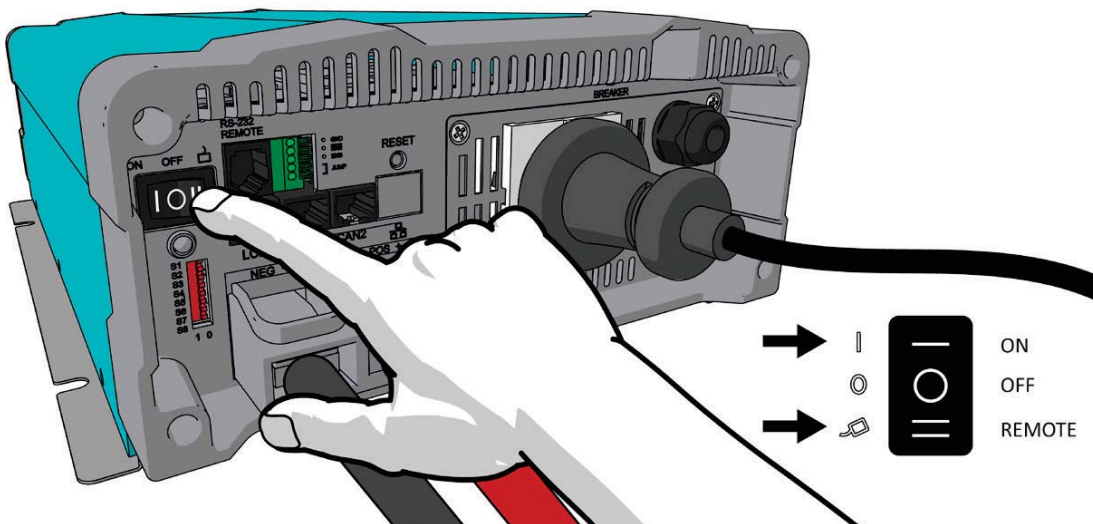
10. Optional: Connect AC input, see section 7 on page 16.



11. Set the desired output voltage and other configuration settings, see section 8 on page 16.

12. Check all wiring. If all wiring is OK: Place the inverter fuse.

13. Switch ON the AC Master. In case of remote operation choose REMOTE.



1. Safety instructions



WARNING!

Read the entire manual before using the AC Master. Keep the manual at a safe location for future reference.

- Use the AC Master following the instructions and specifications stated in this manual.
- Connections and safety features must be executed according to the locally applicable regulations.
- Operation of the AC Master without proper grounding may lead to hazardous situations!
- Use DC-cables with an appropriate size, see recommended wire sizes DC in section 6.
- Integrate an appropriate fuse in the positive wiring and place it nearby the battery, see technical specifications table on page 26.
- If the positive and negative wires on the DC-input (battery) are exchanged, the AC Master will be damaged. Damage of this kind is not covered by guarantee. Check whether all connections are connected correctly before placing the fuse.
- Do not connect the AC-output of the AC Master to an incoming AC source.
- Never open the housing as high voltages may be present inside!

2. Liability

Mastervolt cannot be held liable for:

- Consequential damage resulting from the use of the AC Master.
- Possible errors in the included manual and the consequences of these.
- Use that is inconsistent with the purpose of the product.

3. Warranty

Mastervolt assures the product warranty of the AC Master during two years after purchase, on the condition that the product is installed and used according to the instructions in this manual.

Installation or use not according to these instructions may result in under performance, damage or failure of the product and may void this warranty. The warranty is limited to the cost of repair and/or replacement of the product. Costs for labour or shipping are not covered by this warranty.

4. Correct disposal of this product

(Waste Electrical & Electronic Equipment)



This product is designed and manufactured with high quality materials and components, which can be recycled and reused. When this crossed-out wheeled bin symbol is attached to a product, it means the product is covered by the European Directive 2012/19/EU.

Please be informed about the local separate collection system for electrical and electronic products.

Please act according to your local rules and do not dispose of your old products with your normal household waste. The correct disposal of your old product will help prevent potential negative consequences to the environment and human health.

5. Neutral grounding

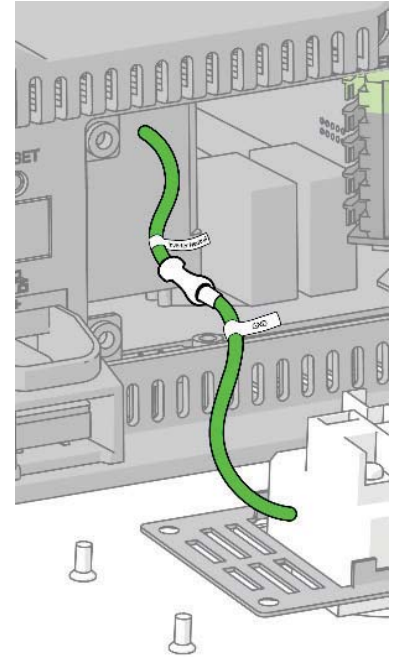
For neutral grounding you need to connect the internal ground cables: Open the front panel and connect the neutral conductor of the AC output (labelled 'Inverter Neutral') to the safety ground (labelled 'GND'), see picture. Integrate a ground fault circuit-interrupter (GFCI) in the wiring of the AC output.

The neutral grounding is only applicable when the unit is in Inverter mode, see section 7.

For neutral grounding of systems with multiple units, see section 10.

Furthermore:

- The chassis ground terminal must be connected to the central grounding point of the vehicle/ ship.
- Refer to locally applicable regulations regarding grounding of autonomous power systems.



6. Installation

The basic installation of a stand-alone unit is described step-by-step at the beginning of this manual. The location requirements, the recommended wire sizes, the optional remote panel and the remote switch are described in the following sections.

Choosing a location to install

- Install the AC Master in a well-ventilated room protected against rain, snow, spray, vapour, bilge, moisture and dust.
- Ambient temperature: $-25 \dots 40 \text{ }^{\circ}\text{C}$ / $-13 \dots 104 \text{ }^{\circ}\text{F}$.
- Never use the AC Master at a location where there is danger of gas or dust explosions.
- Mount the AC Master in such a way that obstruction of the airflow through the ventilation openings is prevented. No objects must be located within a distance of 10 cm / 4 inch around the AC Master.
- Do not install the AC Master in the same compartment as the batteries. Do not mount the AC Master straight above the batteries because of possible corrosive sulphur fumes.

Recommended wire sizes DC

Model	Minimum cross section
12/2500	95 mm ²
24/2500	50 mm ²
12/3500	120 mm ²

Recommended wire sizes AC

Model	Minimum cross section output	Minimum cross section input
2500	2,50 mm ²	4,00 mm ²
3500	4,00 mm ²	4,00 mm ²

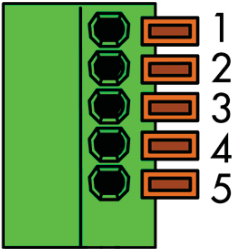
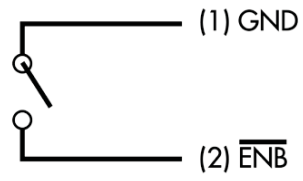
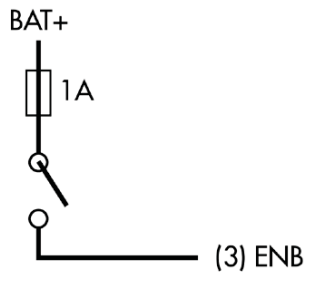
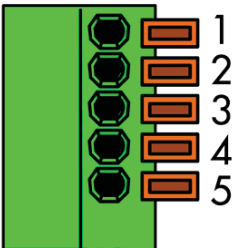
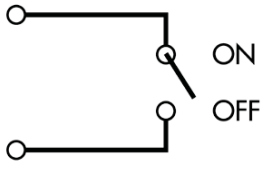
Remote panel (optional)

Optionally the remote panel is connected to the remote port (RS-232). Before using the remote panel, make sure the main switch is at “REMOTE” position before startup.

Terminal for remote switch and CAN termination

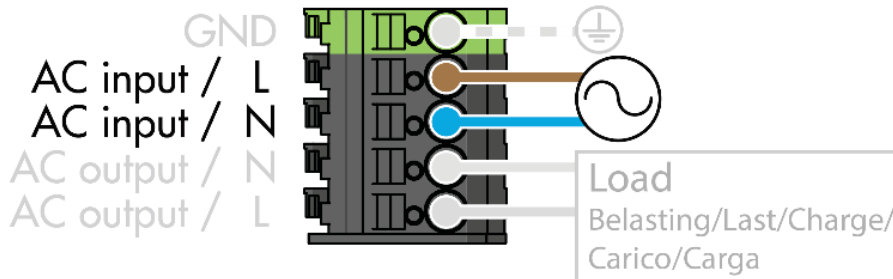
This terminal offers two functions:

- Remote switch
Install a switch for remote operation. Make sure the main switch is at “REMOTE” position.
- Jumper for CAN termination
By connecting the jumper slots the CAN port communication line is terminated. This is necessary in a system with multiple units, see section 10.

Remote switch		
	1 Ground (GND) (same polarity with negative battery input)	
	2 Enable – ($\overline{\text{ENB}}$)	
	3 Enable + (ENB)	
Jumper for CAN termination		
	4 Jumper slot	
	5 Jumper slot	

7. AC input mode

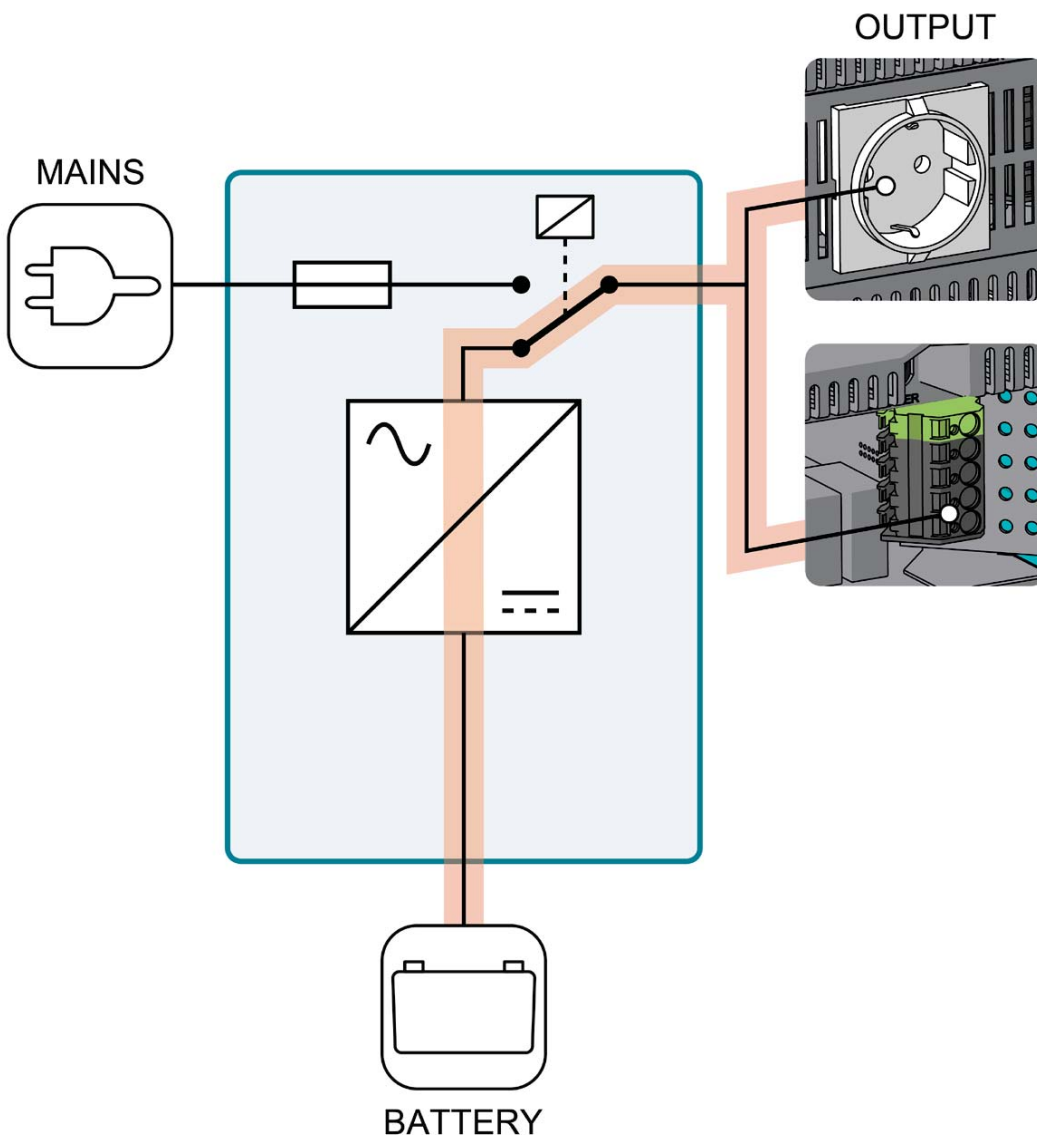
In AC input mode the inverter switches from the default Inverter mode to Bypass mode when an approved mains power supply is detected at the AC input. In Bypass mode the mains are directly connected to the load, saving battery power. The AC input is available on the hard-wire terminal behind the front panel.



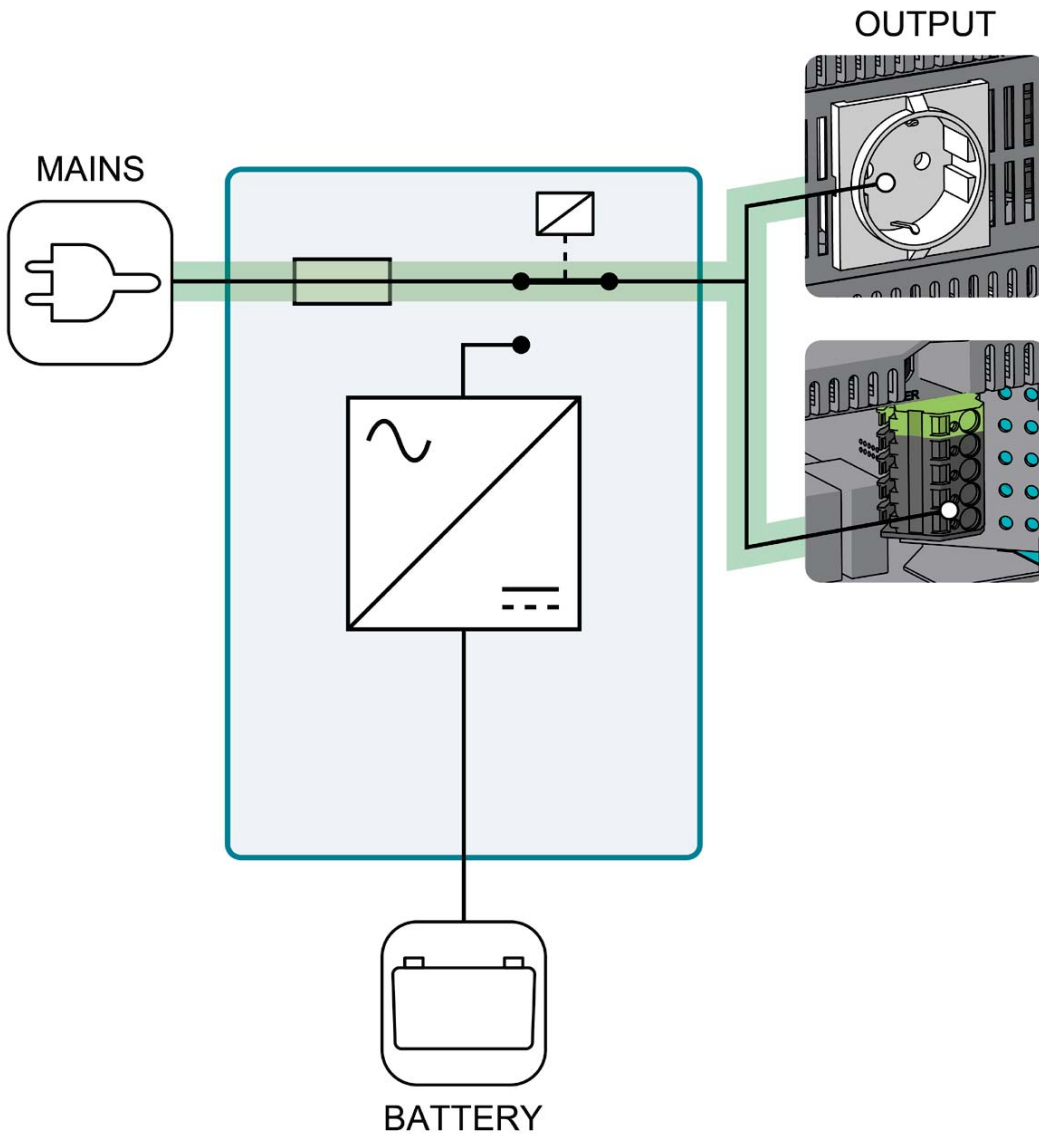
The inverter continuously checks if a mains power supply is available and meets the voltage and frequency requirements as set with the DIP switches. The AC input is equipped with a 20 Amp circuit breaker.

The AC input mode is configured with DIP switch 2, see section 8.

Inverter mode



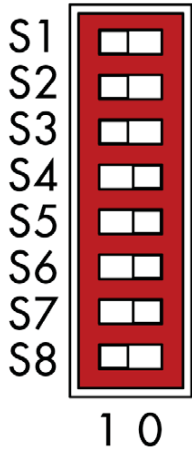
Bypass mode



8. Configuration

Always switch OFF all DC and AC power sources to activate new dipswitch settings.

DIP switch functions



1	AC output voltage setting
2	AC input mode
3	AC output frequency setting
4	Power saving or Master/Slave setting
5	Power saving or Master/Slave setting
6	Power saving or Master/Slave setting
7	Power saving mode or Master/Slave mode
8	LCM remote or DIP switch control

AC output voltage setting

Output voltage	DIP switch 1
230 V	0
240 V	1

AC input mode

Mode	Inverter- to Bypass mode when AC input is <u>in</u> the range of:	Bypass- to Inverter mode when AC input is <u>out</u> of range of:	DIP switch 2
0	230V* +/-12%	230V* +12%, -25%	0
1 (Sensitive loads)	230V* +/-12% and 47~57Hz (53~63Hz)**	230V* +12%, -25% or 46~58Hz (52~64Hz)**	1

* AC output voltage setting

** AC output frequency setting is 60Hz

AC output frequency setting

Frequency	DIP switch 3
50 Hz	0
60 Hz	1

Power Saving mode or Master/Slave mode select

Mode	DIP switch 7
Power Saving Mode ON	0
Master/Slave mode ON (in a system with multiple units)	1

Power Saving setting

The Power Saving mode saves energy from the battery in no load operation. The inverter scans the output and compares the detected load to the set threshold value. When a load is detected which is lower than the Power Saving threshold value, the inverter switches into Power Saving Mode. When a load is detected which is approximately 2~3 times the threshold value, the inverter is switched back on. Power Saving is not available when the inverter is in Master/Slave mode (DIP switch 7 = 1).

The Power Saving threshold value is set with DIP switch 4, 5 and 6. Make sure that Power Saving Mode is selected (DIP switch 7 = 0).

Power Saving setting

Model	Threshold value	DIP switch 4	DIP switch 5	DIP switch 6	DIP switch 7
2500/3500	Power saving disabled	0	0	0	0
2500 3500	50 W 70 W	1	0	0	0
2500 3500	75 W 105 W	0	1	0	0
2500 3500	100 W 140 w	1	1	0	0
2500 3500	125 W 175 w	0	0	1	0
2500 3500	150 W 210 w	1	0	1	0
2500 3500	175 W 245 w	0	1	1	0
2500 3500	200 W 280 w	1	1	1	0

Master/Slave mode setting

Master/Slave mode is only applicable when the unit is used in a system with multiple units for parallel configuration or 3 phase configuration. Make sure that Master/Slave mode is selected (DIP switch 7 = 0).

Parallel configuration

	DIP switch 4	DIP switch 5	DIP switch 6	DIP switch 7
Master	0	0	0	1
Slave	0	0	1	1

3 phase configuration









	DIP switch 4	DIP switch 5	DIP switch 6	DIP switch 7
Master (0°)	0	0	0	1
Slave (-120°)	1	0	0	1
Slave (120°)	1	0	1	1




LCM remote or DIP switch control select

	DIP switch 8
LCM remote control ON	0
DIP switch control ON	1

9. Operation

LED indicator

LED color	LED indication	Meaning	What to do?
Green	 Solid	Power OK	Normal operation
Green	 Slow blinking	Power Saving Mode	Normal operation
Green	 Intermittent blinking	Bypass	Normal operation
Orange	 Fast blinking	Warning: DC-input voltage too high	Check battery voltage and switch off charger.
Orange	 Slow blinking	Warning: DC-input voltage too low	Check if DC input voltage is too low because of voltage drop across the DC cables due to too long or too narrow cables. Reduce the length of the DC cables or use cables with a larger gauge. Loose or corroded connections: Tighten the connections; burnt cables must be corrected immediately. Flat battery: Disconnect the load and recharge the battery.
Red	 Intermittent blinking	Shutdown: Internal temperature too high	Check the airflow through the inverter. The operation of the cooling fan may not be blocked.
Red	 Fast blinking	Shutdown: DC-input voltage too high	Check battery voltage and switch off charger.
Red	 Slow blinking	Shutdown: DC-input voltage too low	Check if DC input voltage is too low because of voltage drop across the DC cables due to too long or too narrow cables. Reduce the length of the DC cables or use cables with a larger gauge. Loose or corroded connections: Tighten the connections; burnt cables must be corrected immediately. Flat battery: Disconnect the load and recharge the battery.

Red	 Solid (+ audible beep)	Shutdown: Over Load Protection	Reduce the load and/or check the AC wiring for possible short circuits. Then reset the inverter manually by switching the main switch off and on again.
Red	 Intermittent blinking	Shutdown: Fan failure	Contact your reseller.
Red	 Intermittent blinking	Shutdown: Hardware failure	Contact your reseller.

Buzzer

The inverter is equipped with a buzzer. The buzzer sound is audible at start-up and when an error occurs.

10. Creating systems with multiple units

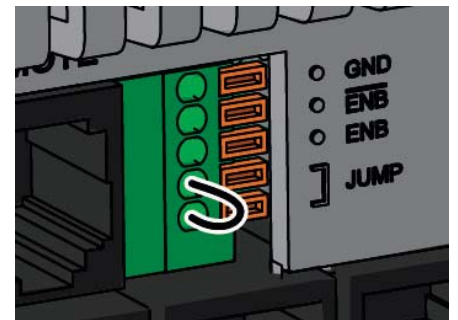
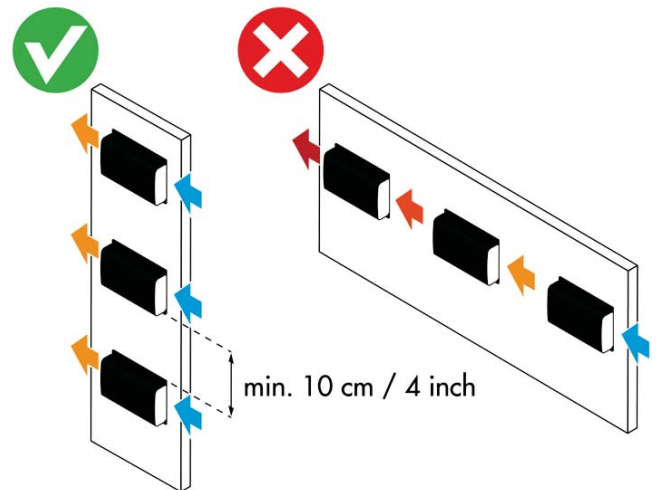
The AC Master 2500/3500 allows you to create the following systems with multiple units:

- Parallel configuration with 2 to 15 units to create more output power.
- 3 phase configuration with 3 units to create 3 phase output.

Installation guidelines

When creating a system with multiple units always make sure that:

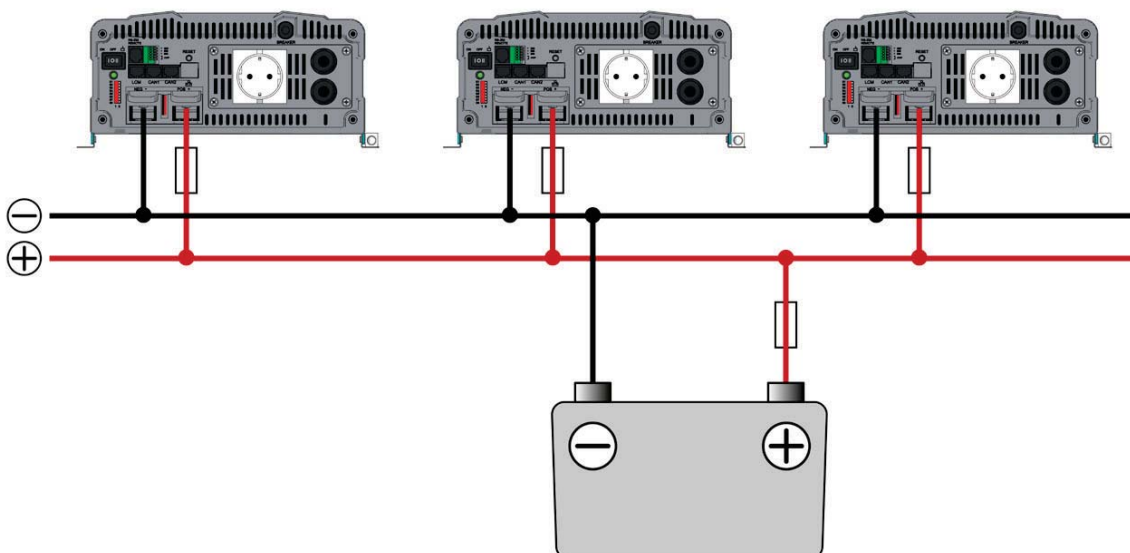
- you only use identical AC Master units with the same article numbers;
- you install the units with at least 10 cm / 4 inch free space between the units;
- you do not position a unit in the air flow of another unit, see picture;
- the main switch is OFF before you start configuring each unit;
- DIP switch 7 and 8 are set to '1' for each unit;
- each unit in the system is set to the same AC output voltage and frequency with DIP switches 1 and 3;
- you always have one Master unit in your system;
- terminate the communication for one CAN port on the first and the last unit. This is done by connecting the two jumper slots, see picture.



DC wiring

High currents will pass through the wiring. For safe installation:

- All wiring must be correctly sized and fused according to the locally applicable standards.
- DC connection cables between the DC-distribution and the AC-Masters must be of equal length and cross-section.
- Keep the cable lengths as short as possible.
- Use only one battery bank.



Parallel configuration

Two configuration options are available for parallel usage:

1. Without an external AC power source
2. With an external AC power source



WARNING!

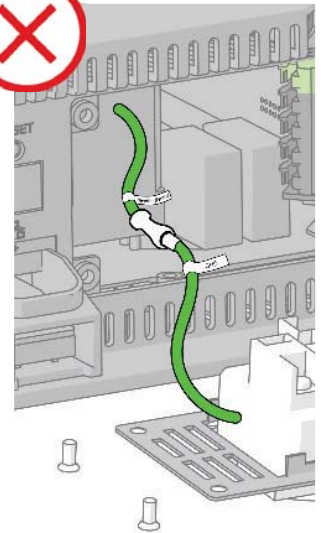
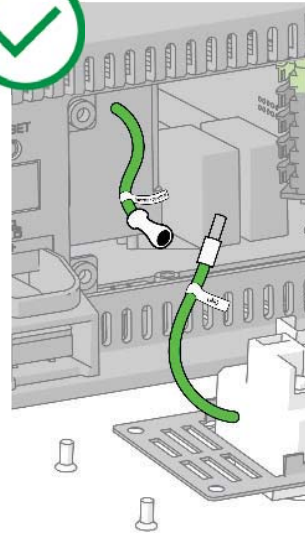
Do not use the AC input mode as described in section 7. Automatically switching between different power sources (e.g. inverter and utility grid) must be achieved by adding an external transfer system (e.g. MASTERVOLT Masterswitch 0).

Make sure that the parallel configuration meets the following requirements:

- Maximum number of 15 units.
- Only hardwired AC connections.
- Neutral grounding, if needed, is connected externally:
 - Make sure that the internal ground cables are not connected.
 - Connect the common neutral conductor (N) of the combined AC output to the safety ground (PE/GND) externally.
 - Integrate a ground fault circuit-interrupter (GFCI) in the combined AC output circuit.
 - Refer to locally applicable regulations regarding grounding of autonomous power systems.

Follow these steps for installation of a parallel configuration:

1. Examine the diagram on page 23.
2. Switch OFF all DC- and AC power sources.
3. Switch OFF each AC-Master.
4. Connect AC wiring.
5. Connect DC wiring.
6. Connect CAN cabling and CAN termination.
7. Assign one unit to be Master.
8. Assign the other units to be Slave.
9. Set each unit to the same output voltage and -frequency.
10. Check all wiring. Disconnect any connected internal ground cables, see picture.
11. Place the inverter fuse.
12. Switch ON the DC power source.
13. Switch ON each AC-Master.



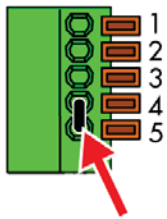
WARNING!

Do not remove any CAN connections during operation.

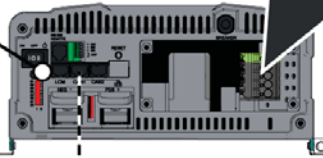
Be aware that Power saving mode is not available.

Parallel: Configuration 1 + 2

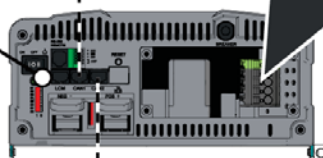
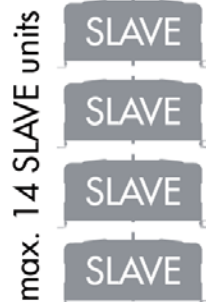
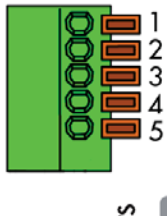
MASTER



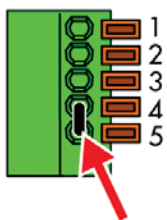
CAN termination



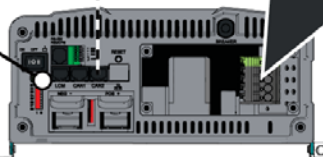
SLAVE



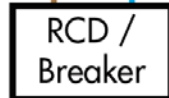
SLAVE (last)



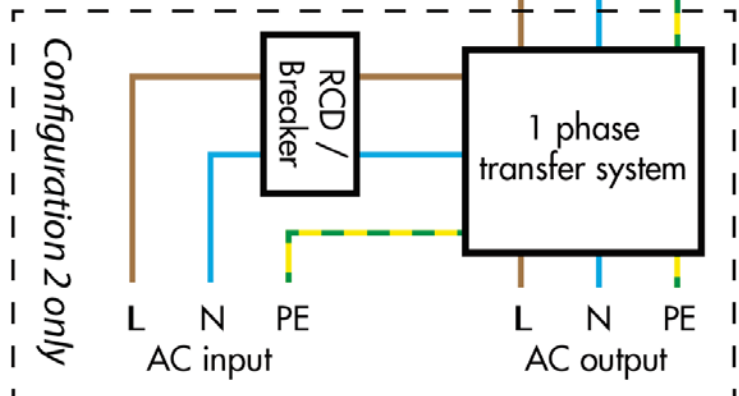
CAN termination



Neutral*
grounding



* Refer to locally applicable regulations regarding grounding of autonomous power systems.



3 phase configuration

Two configuration options are available for 3 phase usage:

1. Without external AC power sources
2. With an external AC power source



WARNING!

Do not use the AC input mode as described in section 7. Automatically switching between different power sources (e.g. inverter and utility grid) must be achieved by adding an external 3 phase transfer system.

Make sure that the 3 phase configuration meets the following requirements:

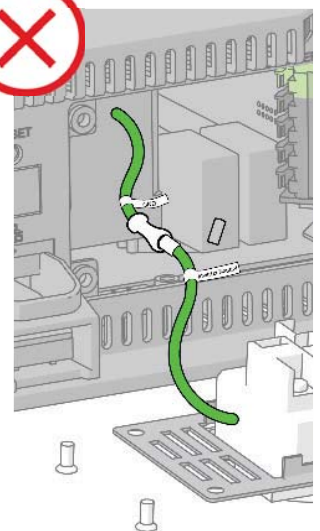
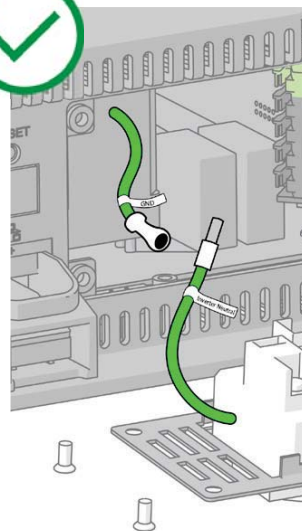
- Maximum number of 3 units (one unit per phase).
- Only hardwired AC connections.
- For neutral grounding:
 - Make sure that the internal ground cables are not connected. Connect the common neutral conductor (N) of the combined AC output to the safety ground (PE/GND) externally. Integrate a ground fault circuit-interrupter (GFCI) in the combined AC output circuit.
 - Refer to locally applicable regulations regarding grounding of autonomous power systems.
- The phases are connected in the correct order. The AC Master is not able to detect if the phase configuration is incorrect.

Follow these steps for installation of a 3 phase configuration:

1. Examine the diagram on page 25.
2. Switch OFF all DC- and AC power sources.
3. Switch OFF each AC-Master.
4. Connect AC wiring.
5. Connect DC wiring.
6. Connect CAN cabling and CAN termination.
7. Assign unit to be Master or Slave:

L1	Master (0°)
L2	Slave (-120°)
L3	Slave (120°)

8. Set each unit to the same output voltage and -frequency.
9. Check all wiring. Disconnect any connected internal ground cables, see picture.
10. Place the inverter fuse.
11. Switch ON the DC power source.
12. Switch ON each AC-Master.



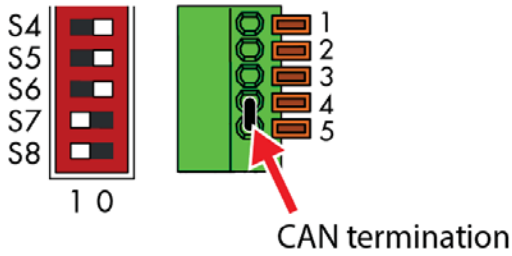
WARNING!

Do not remove any CAN connections during operation.

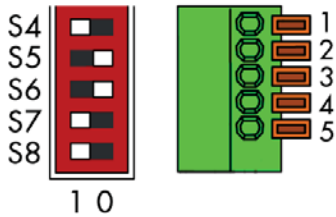
Be aware that Power saving mode is not available.

3 Phase: Configuration 1 + 2

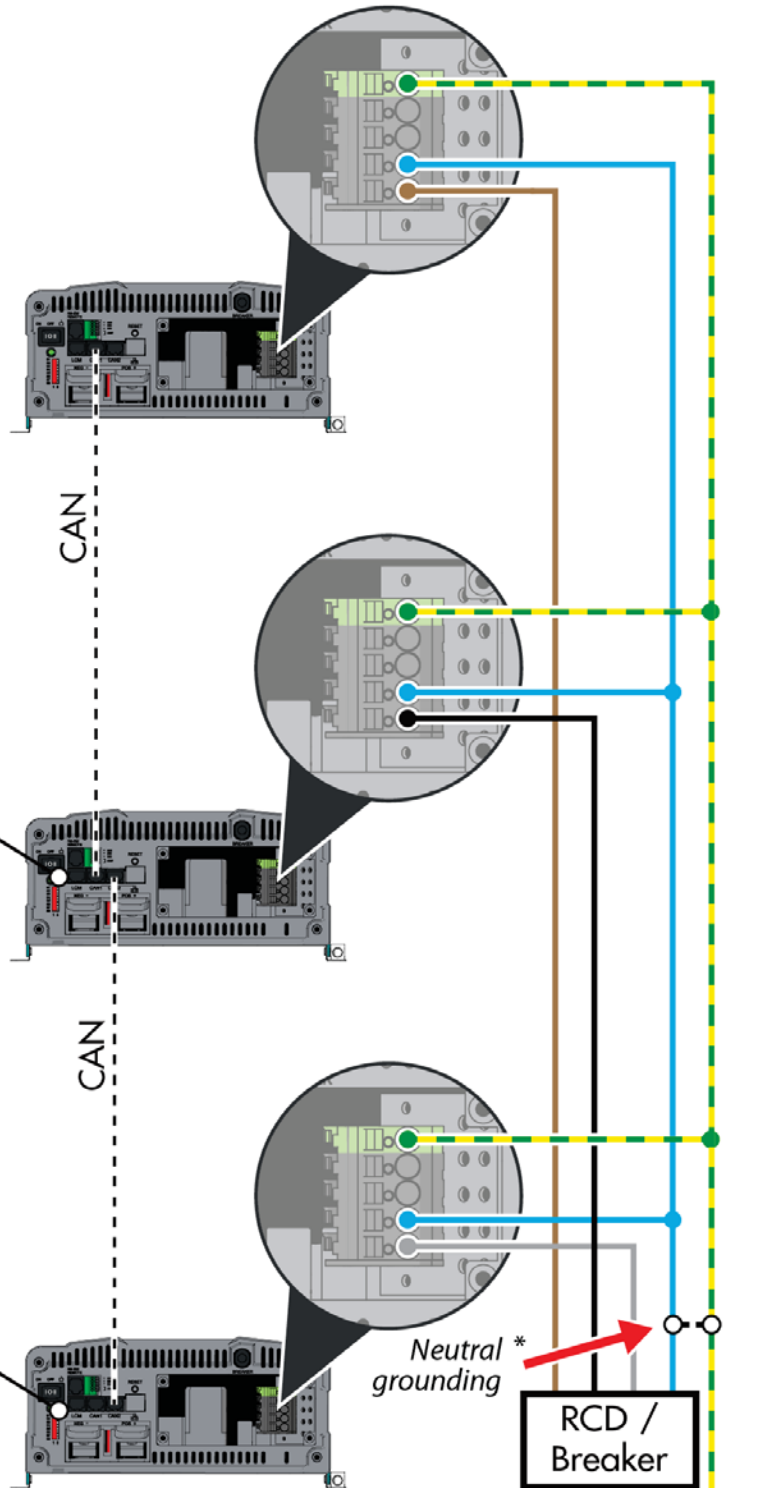
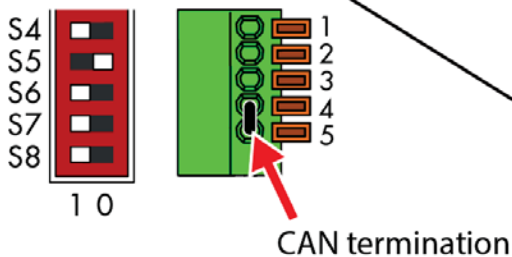
L1 0° MASTER



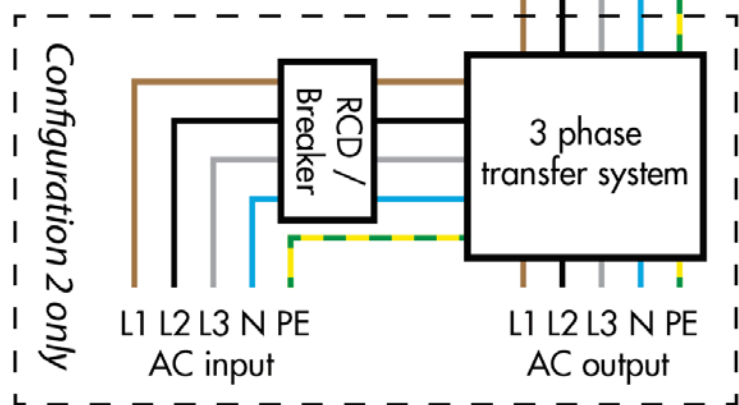
L2 -120° SLAVE



L3 +120° SLAVE



* Refer to locally applicable regulations regarding grounding of autonomous power systems.



	AC Master 12/2500-230	AC Master 24/2500-230
<i>Product code</i>	28012500	28022500
General specifications		
Output voltage	230/240 Vac ($\pm 3\%$) – 50/60 Hz ($\pm 0,1\%$)	230/240 Vac ($\pm 3\%$) – 50/60 Hz ($\pm 0,1\%$)
Output waveform	True sine	True sine
Nom. battery voltage	12 V	24 V
Cont. power at 40 °C, cos phi 1	2500 W	2500 W
Peak load	3000 W (3 s) ; 4000 W (0,2 s)	3000 W (3 s) ; 4000 W (0,2 s)
AC connection	Hard wire / Continental European (SCHUKO)	Hard wire / Continental European (SCHUKO)
Parallel configuration	Up to 15 units	Up to 15 units
3-Phase configuration	Up to 3x1 (1 unit per phase)	Up to 3x1 (1 unit per phase)
Efficiency (Max)	88%	88%
Display/read-out	1 x LED	1 x LED
Dimensions, hwxwd	283 x 128 x 436 mm	283 x 128 x 436 mm
Weight	8 kg	8 kg
Approvals	CE, Safety: EN60950-1, E-mark: CISPR25, ISO7637-2, EMC: EN 55014-1, EN 55014-2, EN61000-3-2, - 3-3, EN61204-3, EN 61000-6-1, -6-2, - 6-3, -6-4, IEC 61000-4-2, 3, 4, 5, 6, 11	CE, Safety: EN60950-1, E-mark: CISPR25, ISO7637-2, EMC: EN 55014-1, EN 55014-2, EN61000-3-2, - 3-3, EN61204-3, EN 61000-6-1, -6-2, - 6-3, -6-4, IEC 61000-4-2, 3, 4, 5, 6, 11
Technical specifications		
Technology	High frequency	High frequency
Battery voltage range	10,0 V – 16,0 V	20,0 V – 32,0 V
Low battery voltage, switches off at	10,0 V	20,0 V
Low battery voltage, restart at	12,5 V	25,0 V
High battery voltage, switches off at	16,0 V	32,0 V
High battery voltage, restart at	15,0 V	30,0 V
Input current (nominal load)	250 A	125 A
No-load power consumption	ON mode: < 3,6 A @ 12 V Energy Saving mode: < 1,1 A @ 12 V	On mode: < 1,8 A @ 24 V Energy Saving mode: < 0,7 A @ 24 V
Min. DC fuse (slow blow)	300 A	160 A
Min. cable size	95 mm ²	50 mm ²
Harmonic distortion typical	< 3 %	< 3 %
Cos phi	All power factors allowed	All power factors allowed
Temperature range (ambient temp.)	-20 °C to 60 °C, derating > 40 °C	-20 °C to 60 °C, derating > 40 °C
Cooling	Fan	Fan
Protection degree	IP21 (if horizontally wall mounted)	IP21 (if horizontally wall mounted)
Protections	Over temperature, over load, short circuit, high/low battery voltage, AC overcurrent (breaker)	Over temperature, over load, short circuit, high/low battery voltage, AC overcurrent (breaker)
Technical transfer system		
AC input	20 A (circuit breaker)	20 A (circuit breaker)
Transfer time speed	Inverter to AC input: 8~10 ms AC input to Inverter: 16~50 ms	Inverter to AC input: 8~10 ms AC input to Inverter: 16~50 ms
Transfer voltage range	230/240 Vac ($\pm 12,5\%$)	230/240 Vac ($\pm 12,5\%$)
Transfer frequency range	47-57 Hz (50 Hz) / 53-63 Hz (60 Hz)	47-57 Hz (50 Hz) / 53-63 Hz (60 Hz)
Options		
Remote control	Yes	Yes

AC Master 12/3500-230

<i>Product code</i>	28013500
General specifications	
Output voltage	230/240 Vac ($\pm 3\%$) – 50/60 Hz ($\pm 0,1\%$)
Output waveform	True sine
Nom. battery voltage	12 V
Cont. power at 40 °C, cos phi 1	3500 W
Peak load	4500 W (3 s) ; 6000 W (0,2 s)
AC connection	Hard wire / Continental European (SCHUKO)
Parallel configuration	Up to 15 units
3-Phase configuration	Up to 3x1 (1 unit per phase)
Efficiency (Max)	90%
Display/read-out	1 x LED
Dimensions, hwxwd	283 x 128 x 496 mm
Weight	10 kg
Approvals	CE, Safety: EN60950-1, E-mark: CISPR25, ISO7637-2, EMC: EN 55014-1, EN 55014-2, EN61000-3-2, - 3-3, EN61204-3, EN 61000-6-1, -6-2, - 6-3, -6-4, IEC 61000-4-2, 3, 4, 5, 6, 11
Technical specifications	
Technology	High frequency
Battery voltage range	10,0 V – 16,0 V
Low battery voltage, switches off at	10,0 V
Low battery voltage, switches on at	12,5 V
High battery voltage, switches off at	16,0 V
High battery voltage, switches on at	15,0 V
Input current (nominal load)	350 A
No-load power consumption	On mode: < 3,6A @ 12 V Energy Saving mode: < 1,4 A @ 12 V
Min. DC fuse (slow blow)	400 A
Min. cable size	120 mm ²
Harmonic distortion typical	< 3 %
Cos phi	All power factors allowed
Temperature range (ambient temp.)	-20 °C to 60 °C, derating > 35 °C
Cooling	Fan
Protection degree	IP21 (if horizontally wall mounted)
Protections	Over temperature, over load, short circuit, high/low battery voltage, AC overcurrent (breaker)
Technical transfer system	
AC input	20 A (circuit breaker)
Transfer time speed	Inverter to AC input: 8~10 ms AC input to Inverter: 16~50 ms
Transfer voltage range	230/240 Vac ($\pm 12,5\%$)
Transfer frequency range	47-57 Hz (50 Hz) / 53-63 Hz (60 Hz)
Options	
Remote control	Yes



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