ECGSOLAX

HVM · 1.2 kW · 12 V

ECGSOLAX HVM 1.2kW 12V inverter

User manual

Installation, operation, settings, troubleshooting



Manufacturer’s original manual, English translation. Structure, tables and illustrations are kept as in the original.

SUPPORT. If you have technical questions not answered in this manual, contact the seller.

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Appendix A. 1200W inverter datasheet

Sections 1–8 are the maker's full user manual. Appendix A is the printed datasheet supplied with the inverter: features, product overview, package contents and specifications.

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1. About this manual

1.1 Scope

This manual applies to the following devices:

- solar inverter

1.2 Manual contents

The manual describes assembly, installation, operation and troubleshooting of this unit. Read it carefully before installation and use.

1.3 Intended audience

The document is intended for qualified persons and end users. Tasks that need no special qualification may also be done by end users. A qualified person must have the following skills:

- Knowledge of how an inverter works and is operated.
- Training in dealing with hazards and risks when installing and using electrical devices and installations.

- Training in installing and commissioning electrical devices and installations.
- Knowledge of applicable standards and directives.
- Knowledge of this document and observance of all safety instructions.

1.4 Symbols used

To ensure the user's personal safety, the inverter and the manual carry markings and symbols that warn of hazards. Read the list of symbols below carefully.

Markings on the inverter

Symbol	Value
	**CAUTION!** Do not disconnect under load!
	**Danger: high voltage! Electric shock hazard!**
	Start servicing the inverter at least 5 minutes after disconnecting it from all external power sources.
	Read the manual carefully before any work on the inverter.
	Grounding: for operator safety the system must be securely grounded.

Markings in the documentation

Symbol	Value
 **WARNING!**	High level of potential hazard which, if not avoided, could result in death or serious injury.

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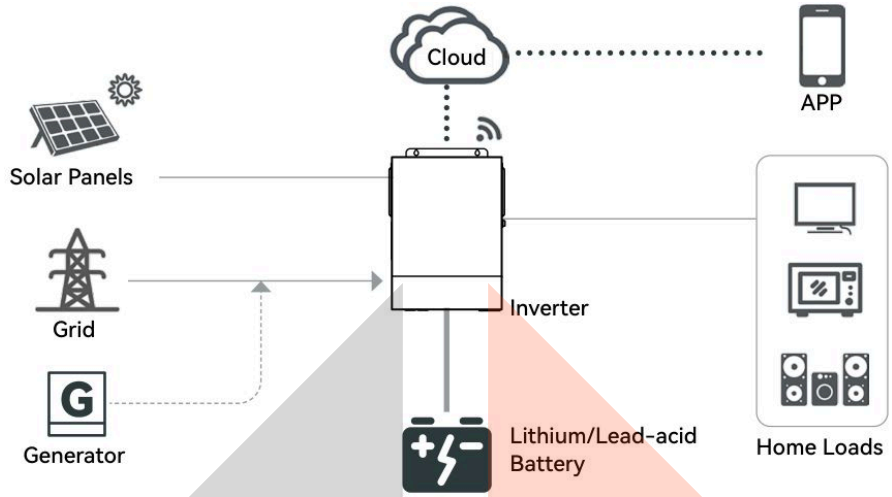
Symbol	Value
⚠ CAUTION!	Medium or low level of potential hazard which, if not avoided, could result in moderate or minor injury. In adverse circumstances it may result in death or serious injury.

1.5 Safety instructions

WARNING
This section contains important safety and operating instructions. Read the manual and keep it for future reference.

1. Be clear which system you are building: with a lithium or a lead-acid battery. If you choose the wrong system, the energy storage system will not work properly.
2. Before use, read all instructions and warning labels on the unit, the batteries and in the relevant sections of this manual. If the unit is not installed per this manual and is damaged as a result, the manufacturer may refuse warranty.
3. All installation and connection work must be done by a professional electrical or mechanical engineer.
4. All wiring must comply with local electrical safety codes.
5. If you mount PV modules in daylight, cover them with an opaque material: in the sun their terminals carry high voltage, which is dangerous.
6. CAUTION: to reduce the risk of injury, charge only deep-cycle lead-acid and lithium batteries. Other battery types may burst and cause injury and damage.
7. Do not disassemble the unit. For service or repair, go to a qualified service centre. Incorrect reassembly may cause electric shock or fire.
8. To reduce the risk of electric shock, disconnect all wiring before any maintenance or cleaning. Switching the unit off does not remove this risk.
9. NEVER charge a frozen battery.
10. For optimal inverter operation, choose cable sizes as required. This is very important for correct inverter operation.
11. Be very careful when working with metal tools on or near batteries: a tool may fall, spark or short the battery or other electrical parts and cause an explosion.
12. When disconnecting AC or DC terminals, strictly follow the installation order. See the “Installation” section of this manual for details.
13. GROUNDING INSTRUCTIONS: the inverter must be connected to a permanent grounded wiring system. Follow local requirements and codes when installing the inverter.
14. NEVER short-circuit the AC output and DC input. Do NOT connect the grid if the DC input is shorted.
15. Before operation, make sure the inverter is fully assembled.

2. Introduction



Solar energy storage system. Solar Panels · Grid · Generator · Cloud · APP · Inverter · Lithium/Lead-acid Battery · Home Loads

This is a multifunction solar inverter: one case combines an MPPT solar charge controller, a high-frequency pure sine wave inverter and a UPS module. It is ideal for off-grid backup power and solar self-consumption.

A complete system also needs other devices: PV modules, a generator or the grid. For other possible system layouts for your needs, consult a system designer.

The WiFi module is a plug-and-play monitoring device that fits on the inverter, or a built-in module. With it you can monitor the PV system anytime, anywhere from a mobile phone or website.

3. Installation

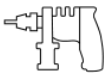
3.1 Unpacking and inspection

3.1.1 Inspection on opening the box

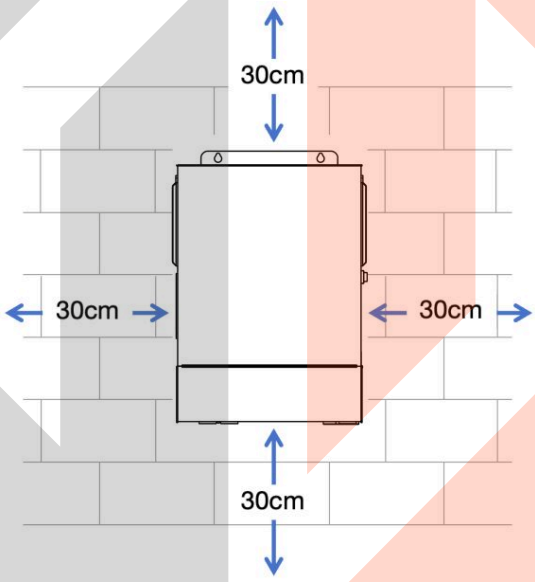
Products are carefully checked before shipment. Sign for delivery only after inspection. If the product is damaged, contact the seller. Open the box and check that the outer packaging is intact and the equipment inside is not damaged.

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3.1.2 Installation tools

 Multimeter	 Protective gloves	 Insulated safety-toe shoes
 Safety goggles	 Antistatic wrist strap	 Hammer drill
 Electric screwdriver	 Phillips screwdriver	 Rubber mallet
 Spirit level	 Cutters / wire stripper	 Lug crimper

3.2 Mounting



Clearance to nearby objects: 30 cm above, below, left and right

Before choosing where to install, consider:

- Do not mount the inverter on flammable building materials.
- Mount on a solid surface.
- Install the inverter at eye level so the LCD is always easy to read.
- For optimal operation, ambient temperature should be between −10 °C and 60 °C.
- Recommended position: vertical on a wall.
- Keep the distances to other objects and surfaces shown in the figure above for adequate cooling and room for wiring.

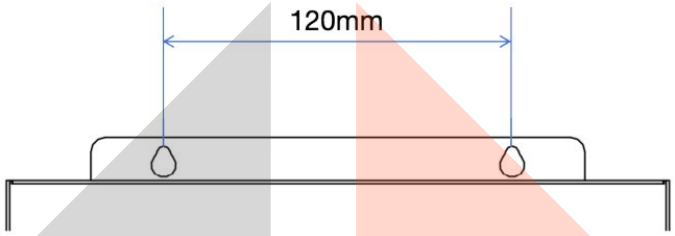
WARNING
The inverter may only be mounted on concrete or another non-combustible surface.

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WARNING
Keep the inverter away from strong magnetic fields and avoid electromagnetic interference. If there is a radio station or wireless device below 30 MHz near the installation site, the distance between the inverter and this interference source must exceed 30 m.

Installation procedure:

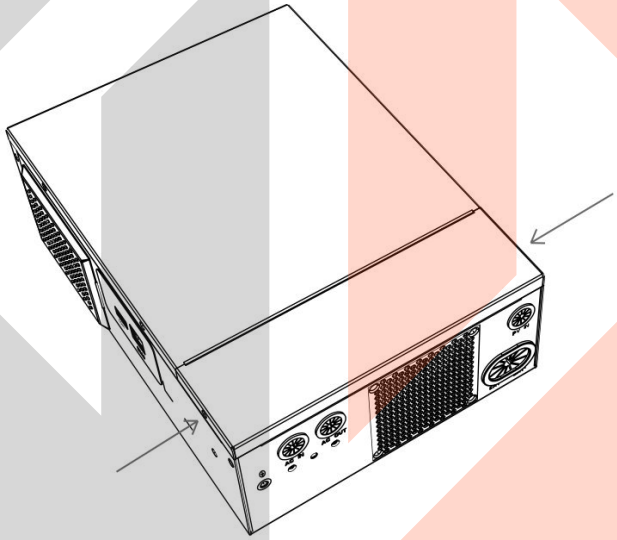
1. Using a ϕ8 drill bit, drill two holes 120 mm apart in the mounting surface. Insert the expansion screws (M6 recommended).



Hole spacing 120 mm

2. Lift the inverter upright and line up its upper mounting holes with the screws already in the wall. Hang the inverter on the screws.

Before wiring, remove the bottom cover by undoing two screws as shown below:



Arrows show the bottom cover screws

3.3 External protective earth

DANGER
Make sure the grounding wire is securely connected to prevent electric shock.

WARNING
- The external protective earth point provides reliable grounding. Do not use unsuitable grounding conductors: this may damage the product or cause injury.
- If you are not sure about the grounding connection, consult a professional.

The external grounding cable and OT lug (for an M4 screw) are supplied by the customer. The cable must be yellow-green.

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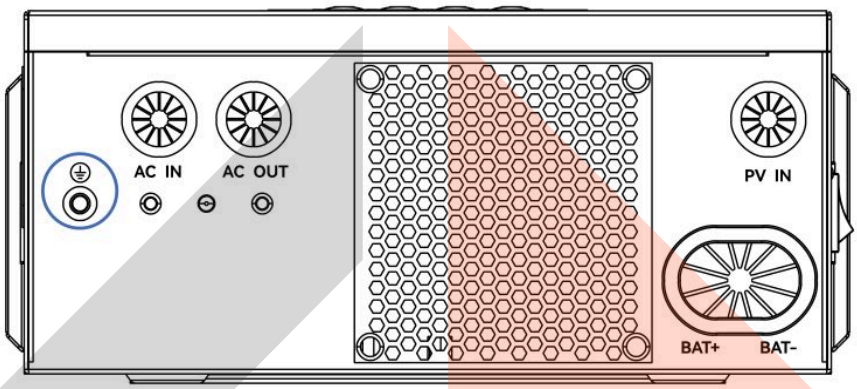
1. Strip the required length of insulation from the cable end.



2. Crimp the lug firmly onto the cable with an OT lug crimper.



3. Attach the grounding cable with an M4 screw.



The ground point is circled on the left. AC IN: AC input · AC OUT: AC output · PV IN: PV input · BAT+, BAT−: terminals of the battery

3.4 AC input and output connection

CAUTION
Before connecting to the AC supply, install a separate AC circuit breaker between the inverter and the supply. This lets you safely disconnect the inverter for service and fully protects it from overcurrent on the AC input. Recommended AC breaker rating: **16 A.**

CAUTION
There are two terminal blocks marked “AC IN” and “AC OUT”. Do NOT mix up input and output connections.

CAUTION
Connect the AC cables with correct polarity. Swapping L and N may damage the inverter. The input and output neutrals (N) must not be connected together: this may damage the inverter.

WARNING
All wiring must be done by qualified personnel.

WARNING
For system safety and efficient operation, using a suitable AC input cable is very important. To reduce the risk of injury, use the recommended cable size below.

Recommended AC input cable

Gauge	Section, mm²
16 AWG	1.31

Recommended AC output cable

Gauge	Section, mm²
16 AWG	1.31

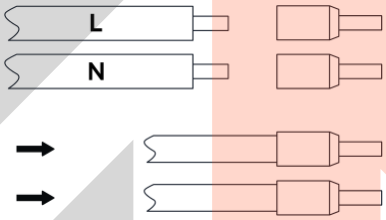
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WARNING
For system safety and efficient operation, using a suitable AC output cable is also very important. To reduce the risk of injury, use the recommended cable size above.

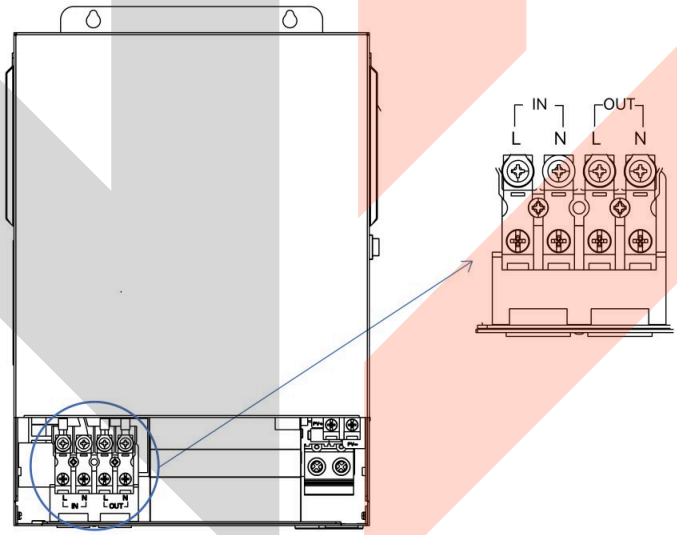
WARNING
Before connecting the AC cable to the unit, make sure AC power is off. All electrical connection work and cable and component specs must comply with local laws and codes. Cable colours below are examples.

AC input and output connection procedure:

1. Before AC connection, be sure to switch off the AC circuit breaker.
2. Strip 9 mm of insulation from the cable ends and trim the bare part to 7 mm. Insert the cable into a ferrule and crimp it firmly.



3. Insert the AC input and output cables according to the polarity marked on the terminal block and tighten the terminal screws.
   - L → line (brown or black) N → neutral (blue)
   -



AC terminal block (circled): IN — AC input (L, N), OUT — AC output (L, N)

4. Make sure the cables are secure.

CAUTION
Appliances such as air conditioners need at least 2–3 minutes to restart so that refrigerant pressure can equalise. If power drops and returns quickly, connected appliances may be damaged. To avoid this, check with the air conditioner maker before installation whether it has a start delay function. Otherwise this off-grid solar inverter will detect an overload and cut the output to protect the appliance, but this can still cause internal damage to the air conditioner.

3.5 PV connection

CAUTION
Before connecting to the PV modules, install a separate DC circuit breaker between the inverter and the PV modules.
Recommended DC breaker: **16 A,** with max. operating voltage above **115 V DC.**

WARNING
Do not ground the positive or negative terminals of the PV modules: this can seriously damage the inverter.

WARNING
In sunlight, PV strings can generate lethal high voltage, so strictly follow the safety measures in the PV string documentation and related documents.

WARNING
Connect the PV terminals to the matching inverter terminals: reversed polarity may damage the inverter.

WARNING
All wiring must be done by qualified personnel.

WARNING
For system safety and efficient operation, using a suitable PV module cable is very important. To reduce the risk of injury, use the recommended cable size below. Cable colours are examples.

Gauge	Section, mm²
14 AWG	2.075

Choosing PV modules

When choosing PV modules, be sure to consider these parameters:

1. The open-circuit voltage (Voc) of the PV modules must not exceed the inverter's maximum PV array open-circuit voltage.
2. The open-circuit voltage (Voc) of the PV modules must be higher than the start voltage.

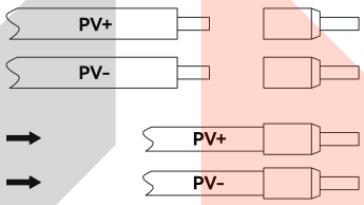
Parameter	Value
Max. PV array open-circuit voltage	115 V DC
Start voltage	20 V DC

Parameter	Value
PV array MPPT voltage range	17–115 V DC

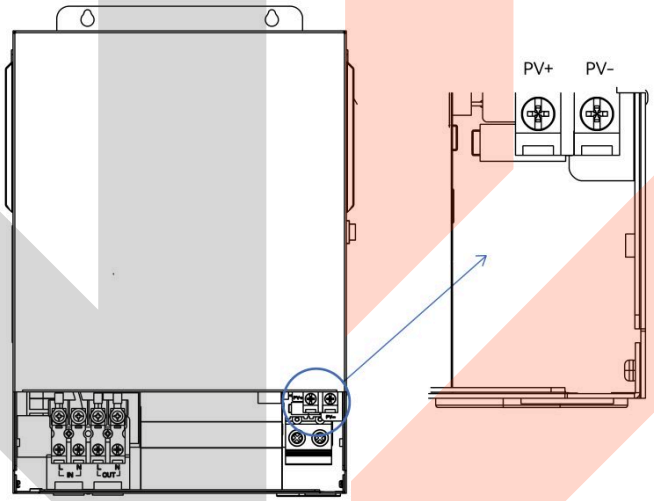
WARNING
Do not switch on any DC switches or AC/DC breakers until all electrical connections are complete.

PV module connection procedure:

1. Before PV connection, be sure to switch off the DC circuit breaker.
2. Strip 9 mm of insulation from the cable ends and trim the bare part to 7 mm. Insert the cable into a ferrule and crimp it firmly.



3. Check polarity with a multimeter.
4. Insert the PV cables according to the polarity marked on the terminal block and tighten the terminal screws.
   - + → PV+ (red) – →
   - PV– (black)



PV+ and PV– terminals (circled)

5. Make sure the cables are secure.

3.6 Battery connection

3.6.1 Connecting a lead-acid battery

A lead-acid battery of suitable capacity with 12 V rated voltage can be used. The battery type must be set to “AGM” or “FLD” (flooded).

CAUTION
For safe operation and compliance, install a separate DC overcurrent protector or disconnect between the battery and inverter. In some applications a disconnect may not be needed, but overcurrent protection is mandatory. Recommended protector or disconnect rating:

150 A.

WARNING
All wiring must be done by a qualified person.

WARNING
For system safety and efficient operation, using a suitable battery cable is very important. To reduce the risk of injury, use the recommended cable and lugs below. Cable colours are examples.

WARNING
Before connecting, make sure AC power is off.
All electrical connection work and cable and component specs must comply with local laws and codes. Cable colours are examples.

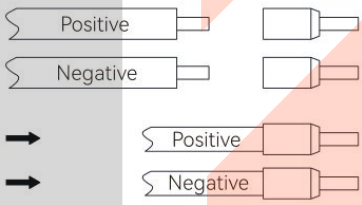
Recommended battery cable and lugs

Gauge	Section, mm²
2 AWG	35

Note: for a lead-acid battery the recommended charge current is 0.3C (C is battery capacity).

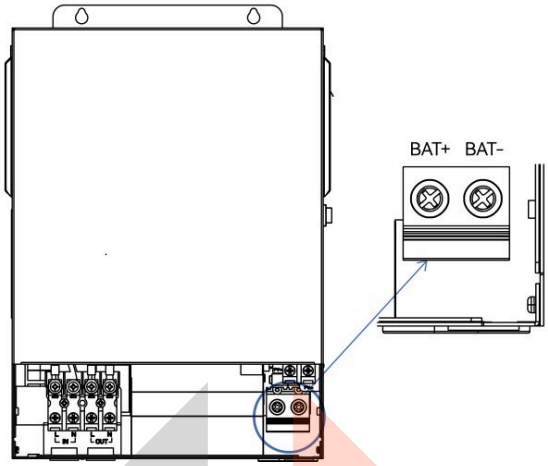
Battery connection procedure:

1. Strip 18 mm of insulation from the positive and negative conductors. Insert the cable into a ferrule and crimp it firmly.



Positive: positive conductor · Negative: negative conductor

2. Route the battery cable through the battery cable hole in the bottom of the case and tighten the terminal screws. Make sure polarity is correct on both the battery and the inverter and the lugs are screwed tightly to the terminals.



Battery terminals BAT+ and BAT– (circled)

3. Connect all battery packs as the unit requires. A battery of at least 200 Ah is recommended.

WARNING · Electric shock hazard
Work carefully: series-connected batteries carry high voltage.

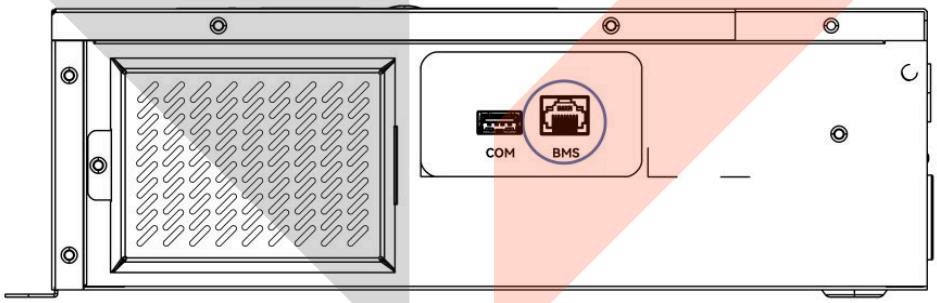
CAUTION
Do not apply anti-oxidant to the terminals until they are tightened firmly.

CAUTION
Before the final DC connection or switching on the DC breaker / disconnect, make sure positive (+) goes to positive (+) and negative (–) to negative (–).

3.6.2 Connecting a lithium battery

Lithium battery connection procedure:

1. Connect the power cable as described in section 3.6.1.
2. If the inverter supports BMS comms, plug the RJ45 connector of the battery comms cable into the inverter's BMS port. The comms protocol must be RS485 or CAN. Plug the other end of the comms cable (RJ45) into the lithium battery's comms port.



COM: comms module port · BMS: RJ45 BMS comms port (circled)

NOTE
Some inverter models do not support BMS and have no BMS interface. Check the inverter you received.

Note: if the battery supports BMS comms, first check protocol compatibility.

BMS comms and setup. For the inverter to exchange data with the battery BMS, in section 4.2.2, program 17, set battery type "LIb" or "FEL". Make sure the BMS port of the

lithium battery is connected to the inverter pin to pin. Inverter BMS port pin assignment:

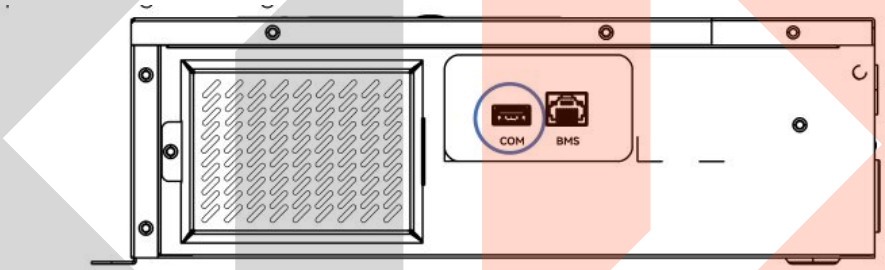
Pin	BMS port
1	RS485B
2	RS485A
3	—
4	CANH
5	CANL
6	—
7	—
8	—

3.7 Final assembly

After all wiring is connected, refit the bottom cover with the two screws mentioned in section 3.2.

3.8 Connecting the comms module (option)

The comms module (WIFI) connects to the cloud platform. If the inverter supports WIFI monitoring, plug the module directly into the COM port and use the solar app quick setup guide.



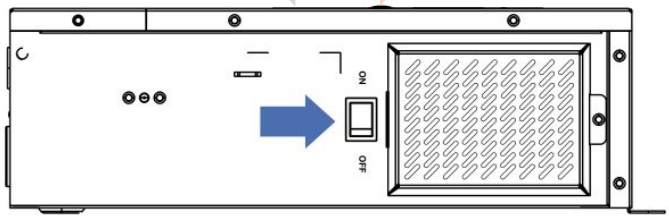
COM port (circled)

NOTE
Some inverter models do not support WIFI monitoring and have no COM interface. Check the interfaces of the inverter you received.

4. Operation

4.1 Power on and off

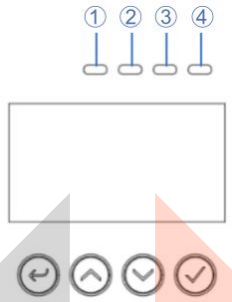
Once the unit is properly installed and the batteries are securely connected, simply press the ON/OFF switch on the case to switch the unit on.



ON/OFF switch (arrow)

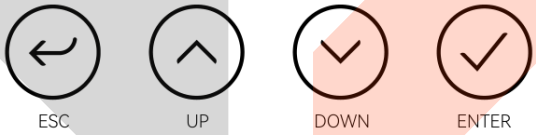
4.2 Control and display panel

The control and display panel shown below is on the front of the inverter. It has four indicators, four function keys and an LCD showing the operating status and input/output power data.



①–④ indicators · LCD · ESC, UP, DOWN, ENTER keys

Indicator		State	Value
① AC	Status indicator (green)	Steady	Grid normal, inverter running on grid.
		Flashing	Grid normal, but inverter has not yet switched to grid.
		Off	Grid abnormal.
② Inverter	Inverting indicator (yellow)	Steady	In battery mode, output fed from battery or PV.
		Off	Other states.
③ Charging	Charge indicator (yellow)	Steady	Battery in float charge.
		Flashing	Battery charging at constant voltage.
		Off	Other states.
④ Fault	Fault indicator (red)	Steady	A fault has occurred in the inverter.
		Flashing	A warning has occurred in the inverter.
		Off	Inverter working normally.

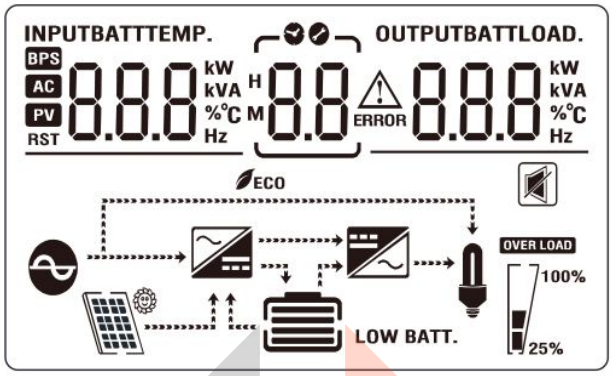


Function keys

Button	Purpose
ESC	Exit settings mode
UP	Go to previous item
DOWN	Go to next item
ENTER	Confirm a selection in settings mode or enter settings mode

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4.2.1 LCD icons



Icon	Description
	AC input info
	AC input icon.
	AC input power, voltage, frequency and current.
	PV input info
	PV input icon.
	PV power, voltage, current, etc.
	Output info
	Inverter icon.
	Output voltage, current, frequency, inverter temperature.
	Load info
	Load icon.
	Load power, load percentage.
OVER LOAD	Overload occurred.
	Battery info
	Battery level 0–24 %, 25–49 %, 50–74 % and 75–100 % in battery mode, and charge status in grid mode.
	Battery voltage, charge percentage, battery current.
	Other info
	Warning code or fault code.
ERROR	A fault has occurred.
	Warning beep muted.
ECO	Power saving mode.

For a lead-acid battery, the battery icon depends on the set low battery voltage point and float voltage. For factory settings

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the icon shows the following:

Battery voltage	Icon
< 11.3 V	
11.3–12.0 V	
12.0–12.7 V	
> 12.7 V	

4.2.2 LCD settings

Press and hold ENTER for 2 seconds to enter settings mode. Use UP or DOWN to choose a setting program. Then press ENTER to confirm, or ESC to exit.

Program	Description	Setting option	LCD display
01	Output voltage	230 V (default). Options: 208 V, 220 V, 230 V, 240 V.	OPU 01 230V
02	Output frequency	50 Hz (default). Options: 50 Hz, 60 Hz.	OPF 02 50Hz
03	Output source priority	**Grid first (default)** The load is powered first from the grid. If the grid fails, the battery powers the load. Solar panels only charge the battery in any case. If grid and battery power are not enough for the load, the inverter goes to standby and charges the battery.	OPP 03 GPb
03		**/** Same as GPb (grid first).	OPP 03 PGb
03		**Battery first** The load is powered first from the battery. If battery energy is not enough, the grid powers the load. Solar panels only charge the battery in any case. If grid and battery power are not enough for the load, the inverter goes to standby and charges the battery.	OPP 03 PbG
03		**Combined priority (MKP)** With PV present, the battery has priority; without PV, the grid has priority.	OPP 03 ntP
04	Output mode	**APP: appliances (default)** For household appliances.	nOd 04 APP
04		**UPS** For computers and other devices. Typical transfer time 10 ms.	nOd 04 UPS
04		**GEN** For a generator connected via the grid input.	nOd 04 GEN
05	Charging source priority	**PNG: PV and grid (default)** PV and grid charge at the same time.	CHP 05 PNG

Program	Description	Setting option	LCD display
05		**OPV: PV only** Charging from PV only.	CHP 05 OPV
05		**PV: PV first** With both PV and grid, only PV charges. With PV only, PV charges. With grid only, the grid charges.	CHP 05 PVF
06	Grid charging current	30 A (default). Options: 2 / 10 / 20 / 30 / 40 / 50 A.	tCC 06 30A
07	Max. charge current	Total charge current from the solar and grid chargers. Default 40 A. Options: 2 / 10 / 20 / 30 / 40 / 50 / 60 / 70 / 80 / 90 / 100 A.	nCC 07 40A
08	Return to main screen	ON: if a page other than the first is open and nothing is pressed for 1 minute, the display returns to the first page. OFF: if a page other than the first is open and nothing is pressed for 1 minute, the display stays on the current page.	ndF 08 ON
09	Auto restart after overload	**ON (default)**	LtS 09 ON
10	Auto restart after overheating	**ON (default)**	ttS 10 ON
11	Input grid loss warning	Turns the grid or PV loss alarm on/off. Default ON: when input grid is lost, the buzzer sounds for 3 seconds. OFF: the buzzer stays silent after grid loss.	nIP 11 ON
12	Power saving mode	Default OFF. ON: on battery, if the load is below 25 W, the system stops output for a while, then resumes. If the load stays below 25 W, the “stop — resume” cycle repeats. If the load exceeds 35 W, the system resumes normal continuous operation.	PuS 12 OFF
13	Switch to bypass on overload	Default OFF. ON: in PbG priority mode, on overload the system immediately switches to bypass (load fed from the grid).	OLG 13 OFF
14	Silent mode	Turns the buzzer sound on/off. Default OFF. ON: the buzzer never sounds in any situation, including warnings and faults. Applies in all modes.	nUE 14 OFF
15	Battery voltage for switching to grid	Battery type AGM (lead-acid) or FLD (flooded): default 11.5 V, range [11; 13 V]. Type LIB (lithium NMC) or FEL (lithium iron phosphate): default 11.9 V, range [10; 12.5 V]. Type CUS (user-defined): default 11.7 V, range [10; 12.5 V].	btG 15 11.5V

Program	Description	Setting option	LCD display
16	Battery voltage for returning to battery mode	After a low-voltage shutdown, the battery must reach a certain voltage for the inverter to return to battery mode. Set FUL or a battery voltage. FUL: return to battery mode only after a full charge. Type AGM or FLD: default 13 V, range [12; 14.5 V]. Type LIB, FEL or CUS: default 13.6 V, range [11.5; 14.5 V].	`btb 16 13.0V`
17	Battery type	**AGM (default)**	`bAt 17 AGn`
17		**Flooded lead-acid**	`bAt 17 FLd`
17		**Lithium (NMC lithium)**	`bAt 17 LIb`
17		**User-defined**	`bAt 17 CUS`
17		**Lithium iron phosphate**	`bAt 17 FEL`
18	Low charge warning voltage	Low battery voltage warning threshold. Not adjustable for AGM and FLD, default 11 V. Type LIB, FEL: default 11 V, range [10.3; 12.5 V]. Type CUS: default 11 V, range [10.5; 13.5 V].	`bAL 18 11.0V`
19	Battery cut-off voltage	For AGM and FLD the low-voltage cut-off is not adjustable, default 10.5 V. Type LIB, FEL or CUS: adjustable, default 10.5 V, range [10; 12 V].	`bAU 19 10.5V`
20	Constant voltage (CV) mode voltage	Not adjustable for AGM and FLD; default AGM 14.1 V, FLD 14.5 V. Type LIB, FEL or CUS: default 14.1 V, range [12; 15 V]. The constant voltage (CV) must be higher than the float voltage.	`bCV 20 14.1V`
21	Float charge voltage (Float)	Type AGM or FLD: not adjustable, default 13.5 V. Type LIB or FEL: default 13.8 V, range [12.5; 14.5 V]. Type CUS: default 13.8 V, range [12; 15 V]. The constant voltage (CV) must always be higher than the float voltage.	`bFL 21 13.5V`
22	Grid voltage lower limit	APP / GEN output mode: range 90 V to 154 V, default 154 V. UPS output mode: range 170 V to 200 V, default 185 V.	`LLV 22 154V`
23	Grid voltage upper limit	APP / GEN output mode: range 264 V to 280 V, default 264 V. UPS mode: 264 V, fixed.	`LHV 23 264V`
24	Screen auto-off	Default OFF. If enabled, the backlight turns off after 10 minutes without key presses.	`Atb 24 OFF`

Program	Description	Setting option	LCD display
25	Inverter soft start	Default OFF. ON: inverter output voltage ramps smoothly from 0 to the set value. OFF: output voltage jumps from 0 to the set value at once. Condition: set in single-inverter mode.	StE 25 OFF
26	Reset to factory settings	Restores all settings to factory values. Before setting, the screen shows OFF. If ON is selected, the system restores factory settings and the screen shows OFF again. Applies at once in grid and standby modes; not adjustable in battery mode.	Std 26 OFF
29	Battery disconnect warning	Turns the battery disconnect warning on/off. Default OFF. If OFF, with the battery disconnected there are no disconnect, low voltage or battery undervoltage warnings.	SbA 29 OFF
31	Equalization charge voltage	Default 14.6 V, range [12; 15 V].	EqV 31 14.6V
32	Equalization charge time	In the equalisation stage the controller charges the battery as much as possible until voltage rises to the equalisation voltage. It then holds this voltage in constant voltage mode. The battery stays in equalisation until the set equalisation time has passed. Default off (OFF), range [OFF, 5–900], step 5 minutes.	EqT 32 OFF
33	Equalization charge delay	If in the equalisation stage the equalisation time has passed but the battery has not reached the equalisation voltage, the controller extends equalisation until it does. If the delay has passed and voltage is still lower, the controller stops equalisation and returns to float charge. Default 120 minutes, range [5; 900], step 5 minutes.	EqO 33 120
34	Equalization charge interval	If equalisation is enabled and a connected battery is detected in the float stage, the controller enters equalisation when the set interval has passed. Default 30 days, range [1; 90], step 1 day.	EqI 34 30
35	Start equalisation now	Default OFF, function disabled. ON: in the float stage, if equalisation is enabled and a connected battery is detected, equalisation charge starts immediately and the controller enters the equalisation stage.	EqN 35 OFF
44	BMS communication	Turns lithium battery–inverter comms on/off. Default OFF. Choose the option for your battery pack type. If comms fail, warning 56 appears. Supported protocols: CVT 485, PYL 485/CAN, GRO 485/CAN, VOL 485, IRF 485, PAC 485.	bnS 44 OFF

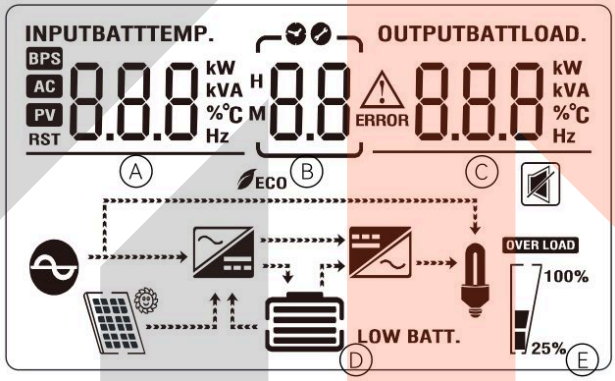
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Program	Description	Setting option	LCD display
45	ID BMS	ID number of the BMS to talk to. Default automatic (AtO), range [0; 15]. In AtO mode the system polls BMS IDs from lowest to highest; on the first correct answer it locks that ID and then polls only that BMS.	`bnI 45 AtO`
46	Low-SOC cut-off	The inverter shuts down when battery state of charge (SOC) is low. Default 20, range [5; 50]. When on battery the lithium battery SOC reaches the set value, the inverter shuts down and raises warning 68. Warning 68 clears when SOC returns to the set value + 5 %. In standby the inverter can switch to battery only when SOC reaches the set value + 10 %; otherwise warning 69 is raised. With the function on, warning 69 appears when SOC reaches the set value + 5 % and clears when SOC returns to the set value + 10 %. OFF can be selected: the inverter then does not shut down, start or warn based on SOC. If the function is on and comms fail, the inverter stops acting on SOC and clears related warnings.	`bSU 46 20%`
47	High SOC to switch to battery	SOC at which the inverter switches to battery mode. Default 90, range [10; 100]. In PbG priority, when on grid the lithium battery SOC reaches the set value, the inverter switches to battery mode. With the function on, the inverter switches to battery only when SOC is above the set value and battery voltage is above the return-to-battery voltage. OFF can be selected: the inverter then does not switch from grid to battery based on SOC. If the function is on and comms fail, the inverter stops acting on SOC and clears related warnings.	`StB 47 90%`
48	Low SOC to switch to grid	SOC at which the inverter switches to grid mode. Default 50, range [10; 90]. In PbG priority, when on battery the lithium battery SOC reaches the set value, the inverter switches to grid mode. With the function on, the inverter switches to grid if SOC is below the set value or battery voltage is below the switch-to-grid voltage. OFF can be selected: the inverter then does not switch from battery to grid based on SOC. If the function is on and comms fail, the inverter stops acting on SOC and clears related warnings. If this value is above StB, StB and StG no longer apply after the next power-on.	`StG 48 50%`

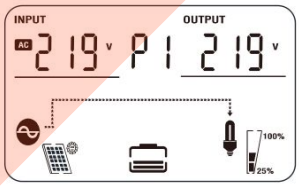
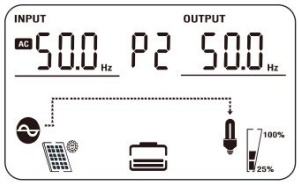
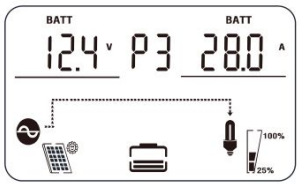
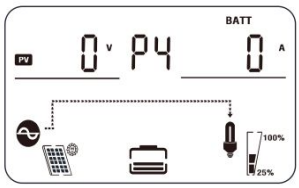
Program	Description	Setting option	LCD display
61	Max. discharge current	Default OFF. Options: OFF, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90, 95, 100, 105, 110. If on battery the battery current exceeds the set value, overload warning 60 appears, and after 5 seconds overload fault 14. If overload bypass is enabled in PbG mode, battery overcurrent also triggers bypass. OFF can be selected: the inverter then raises no faults or warnings based on battery current.	ndC 61 OFF

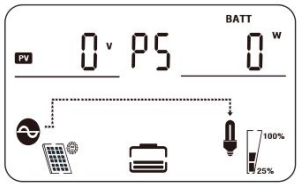
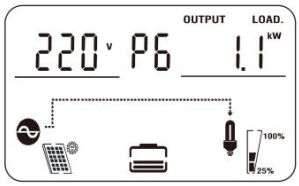
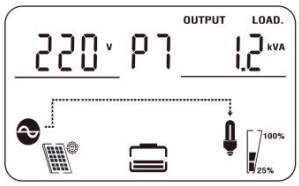
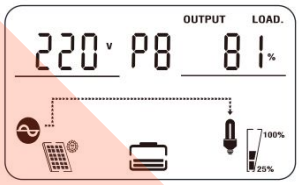
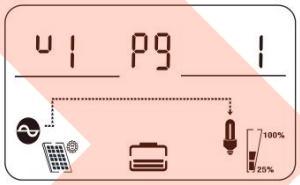
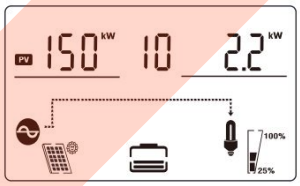
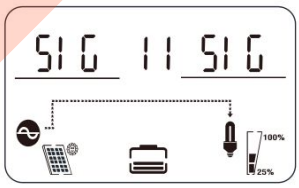
4.3 Display information

Information on the LCD cycles with UP or DOWN. Order: voltage, frequency, current, power, software version.

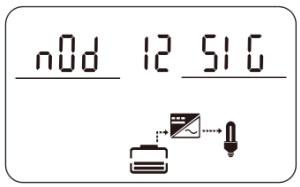


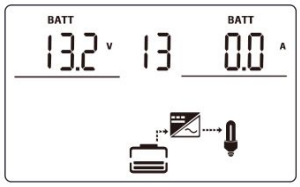
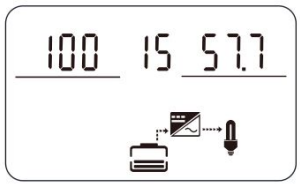
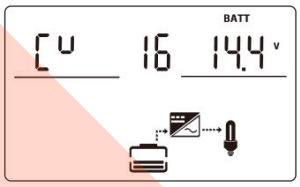
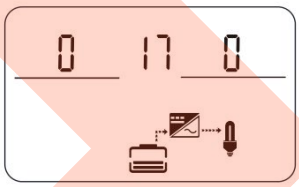
Display areas Ⓐ–Ⓔ

Information	LCD display
Ⓐ AC input voltage; Ⓑ page number; Ⓒ output voltage; Ⓓ battery level; Ⓔ load percentage	
Ⓐ AC input frequency; Ⓑ page number; Ⓒ output frequency; Ⓓ battery level; Ⓔ load percentage	
Ⓐ Battery voltage; Ⓑ page number; Ⓒ charge current; Ⓓ battery level; Ⓔ load percentage	
Ⓐ PV voltage; Ⓑ page number; Ⓒ PV charge current; Ⓓ battery level; Ⓔ load percentage	

Information	LCD display
Ⓐ PV voltage; Ⓑ page number; Ⓒ PV power; Ⓓ battery level; Ⓔ load percentage	
Ⓐ Output voltage; Ⓑ page number; Ⓒ active output power; Ⓓ battery level; Ⓔ load percentage	
Ⓐ Output voltage; Ⓑ page number; Ⓒ apparent output power; Ⓓ battery level; Ⓔ load percentage	
Ⓐ Output voltage; Ⓑ page number; Ⓒ load percentage; Ⓓ battery level; Ⓔ load percentage	
Software version	
Ⓐ Total energy generated; Ⓑ page number; Ⓒ energy generated per day; Ⓓ battery level; Ⓔ load percentage	
Parallel operation status	

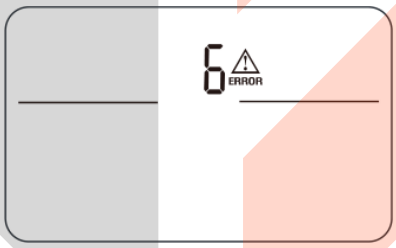
Once BMS comms are on, the following pages are available

Information	LCD display
Lithium battery network status. If SIG is shown steadily top right, the battery pack runs as one group; if PAR is shown steadily, the pack runs as several groups in series-parallel; if PAR flashes, the pack is setting up the series-parallel configuration.	

Information	LCD display
Lithium battery voltage and current. Top left: battery voltage from the BMS; top right: battery current from the BMS. If BMS comms fail, ERR flashes top left and top right.	
Lithium battery temperature and SOC. Top left: temperature from the BMS; top right: SOC from the BMS. If BMS comms fail, ERR flashes top left and top right.	
Lithium battery capacity. Top left: rated capacity; top right: current capacity. If BMS comms fail, ERR flashes top left and top right.	
Lithium battery constant voltage charge point. Top left: fixed letters CV; top right: CV charge voltage from the BMS. If BMS comms fail, ERR flashes top right.	
Lithium battery warnings and faults. Top left: BMS warning info; top right: BMS fault info. If BMS comms fail, ERR flashes top left and top right.	

5. Fault codes

Fault display:



Example: fault code 6 with the ERROR icon

How it works. On a warning, the fault LED flashes and the buzzer sounds every second for 1 minute, then stops. On a fault, the fault LED stays on, the buzzer sounds for 10 seconds and stops. The system automatically tries to restart. If the unit does not work after six restarts, the unit and LCD stay in fault state. Switch the power off completely (until the screen goes dark) or wait 30 minutes to restart the unit. The fault display is shown above. In fault mode the fault icon is lit; in warning state the warning icon flashes. To resolve the problem using the fault information, contact the seller.

Fault: the inverter enters fault mode, the red LED is steady on, and the LCD shows the fault code. Recoverable faults can

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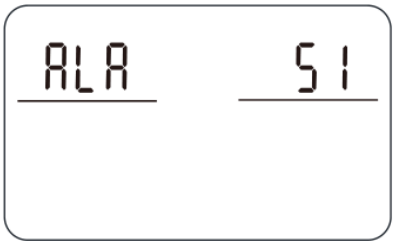
restart 6 times within 15 minutes. After 6 times a fault lockout is triggered, which clears after 15 minutes.

Fault code table

Code	Value	Action	Trigger condition	Recovery condition
1	Bus boost soft start failure	Enters fault mode	Bus voltage does not reach the set value.	Recoverable.
2	Bus high voltage	Enters fault mode	Bus voltage above the protection threshold.	Recoverable.
3	Bus low voltage	Enters fault mode	Bus voltage below the undervoltage protection threshold.	Recoverable.
4	Battery overcurrent	Enters fault mode	TZ interrupt triggered more than 2 times within 2 ms.	Not recoverable.
5	Overheating	Enters fault mode	Temperature above the protection threshold or fan locked.	Recoverable.
6	Battery high voltage	Enters fault mode	Battery voltage above the set value.	Recoverable.
7	Bus soft start failure	Enters fault mode	Soft start finished but bus voltage did not reach the set value.	Recoverable.
8	Bus short circuit	Enters fault mode	Bus voltage below the threshold when the inverter or PFC switches on.	Recoverable.
9	Inverter soft start failure	Enters fault mode	After soft start, the inverter cannot reach rated output voltage within a certain time.	Recoverable.
10	Inverter overvoltage	Enters fault mode	Inverter voltage above the set value.	Recoverable.
11	Inverter undervoltage	Enters fault mode	In battery mode, inverter voltage below the set value.	Recoverable.
12	Inverter short circuit	Enters fault mode	In battery or standby mode, inverter voltage is low and current above the set value.	Recoverable.
13	Reverse power protection	Enters fault mode	In battery mode, load power below the set value (negative power, e.g. –1200 W).	Recoverable.
14	Overload	Enters fault mode	Overload exceeds the limit (see specifications).	Recoverable.
26	BMS fault	Enters fault mode	Error code in the BMS message.	Disable BMS comms or wait until the BMS fault clears.
27	Microcontroller (MCU) fault	Enters fault mode	MCU error.	Not recoverable.
29	Inverter TZ fault (fast overcurrent)	Enters fault mode	For four half-waves in a row, each half-wave causes more than 10 fast overcurrent trips.	Recoverable.

6. Warning codes

Warning: the inverter does not enter fault mode, the red LED flashes, and the LCD shows the warning code.



Example: ALA 51

Warning code table

Code	Value	Action	Trigger condition	Recovery condition
50	Battery disconnected	Warning, battery not charging.	Battery voltage below 8 V.	Recovers when battery voltage is above 10 V.
51	Low battery voltage shutdown	Warning, low battery voltage shutdown or cannot switch on.	Battery voltage below the set value.	Recovers when battery voltage recovers.
52	Low battery voltage	Warning.	Battery voltage below the set value.	Recovers when battery voltage recovers.
53	Charger short circuit	Warning, battery not charging.	Battery voltage below 5 V and charge current above 4 A.	Not recoverable.
55	Battery overcharge	Warning, battery not charging.	Battery voltage above the set value.	Recovers when battery voltage is below the set value – 0.5 V.
56	BMS disconnected	Warning, locked in standby.	No correct BMS reply to the comms request.	Recovers when comms recover.
58	Fan failure	Warning: one fan has failed, the other runs at full speed.	Fan speed below the set value.	Recovers when the fan works again.
60	Overload	Warning, battery not charging.	Inverter not in grid mode, or PV normal and output priority not “grid first”, and load exceeds 102 %.	Recovers when the load returns to normal.
68	SOC below threshold	Warning, goes to standby.	Lithium battery SOC below the set value.	Recovers after the low-SOC shutdown or BMS comms function is disabled, or when SOC returns to the set value + 5 %.
69	Low SOC	Warning; if the inverter is in standby, it stays in standby and does not start.	Lithium battery SOC below the set value + 5 % (grid or battery mode), below the set value + 10 % (standby).	Recovers after the low-SOC shutdown or BMS comms function is disabled, or when SOC returns to the set value + 10 %.
71	Battery short circuit	Warning.	Battery short circuit detected.	Not recoverable.
72	Battery start lockout	Warning.	Battery voltage does not reach 11.5 V per battery (cell).	Recoverable.

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7. Battery equalisation charge

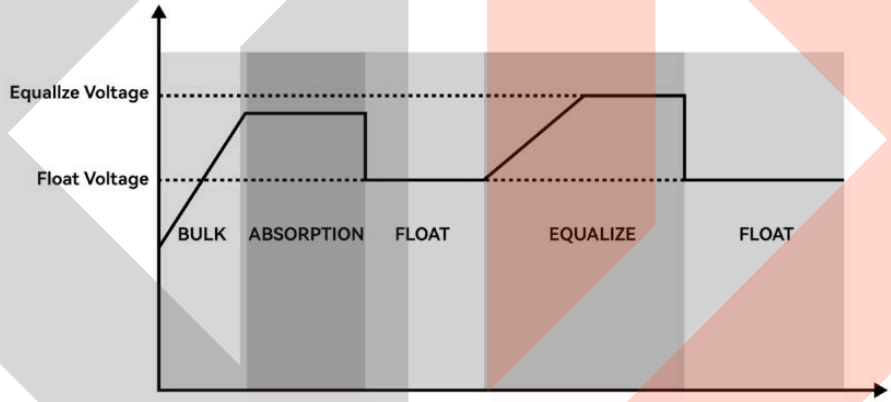
The charge controller has an equalisation charge function. It reverses the build-up of negative chemical effects such as stratification, where acid concentration is higher at the bottom of the battery than at the top. Equalisation also helps remove sulphate crystals that may have formed on the plates. Left unchecked, sulphation will reduce the overall battery capacity. Periodic equalisation is therefore recommended.

NOTE
Do not enable this mode if you use lithium batteries.

How to use equalisation. First enable equalisation charge: change the equalisation time (program 32) from OFF to another value. The function can then be set as follows:

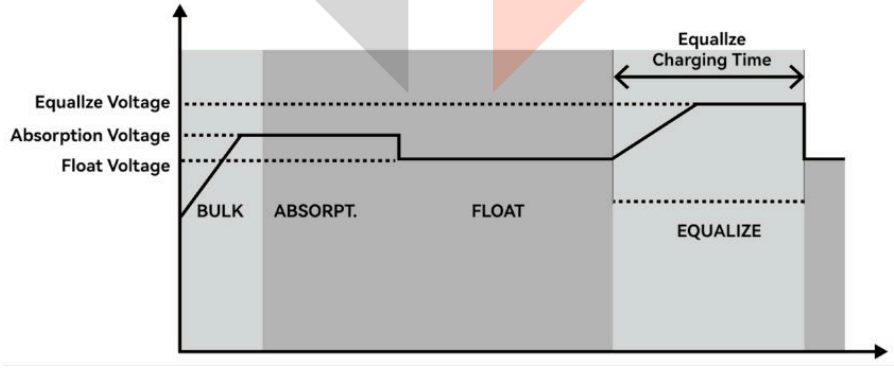
1. Equalisation voltage: program 31.
2. Equalisation delay: program 33.
3. Equalisation interval: program 34.
4. Start equalisation now: program 35.

When equalisation runs. In the float stage, when the set equalisation interval (battery equalisation cycle) arrives or equalisation is started immediately, the controller enters the equalisation stage.



Equalize Voltage: equalisation voltage · Float Voltage: float charge voltage · BULK: bulk charge · ABSORPTION: constant voltage charge · FLOAT: float charge · EQUALIZE: equalisation

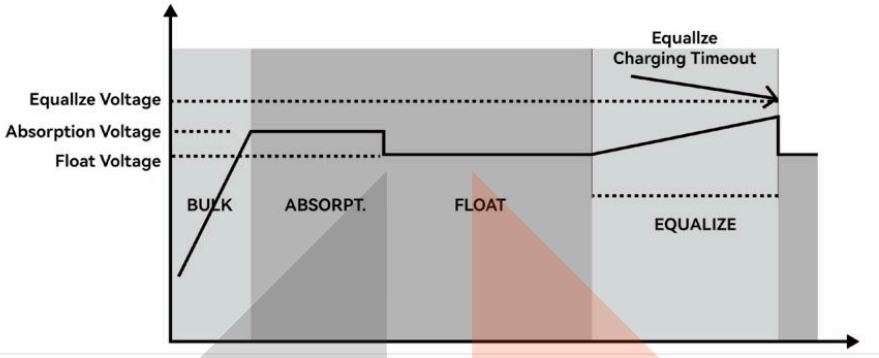
Equalisation time and timeout. In the equalisation stage, the controller charges the battery at the highest possible current until voltage rises to the equalisation voltage. Voltage is then held constant at that level. The battery stays in equalisation until the set equalisation time ends.



Absorption Voltage: constant voltage charge voltage · Equalize Charging Time: equalisation time

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However, if in the equalisation stage the equalisation time has passed and the battery has not reached the equalisation voltage, the controller extends equalisation until it does. If after the equalisation timeout the battery voltage is still below the equalisation voltage, the controller stops equalisation and returns to float charge.



Equalize Charging Timeout: equalisation timeout

8. Troubleshooting

Problem	Event	Trigger condition	What to do
Fault code 5 on display	Overheating	Fan locked for more than 10 seconds.	Check whether the fan is disconnected or has loose connections. If the fan is not connected for more than 10 seconds, the unit shows fault code 5.
Fault code 12 on display	Inverter short circuit	In battery or standby mode, inverter voltage below 80 V and inverter current above 5 A; protection must trip within 80–100 ms.	1. Check for a short circuit at the output terminals (e.g. a screw has pierced the clamp terminal and shorted L and N). 2. Check whether inverter voltage and current meet the trip conditions.
Fault code 15 on display	Model error	The detected model number matches no model.	Check that the control board is assembled correctly and the firmware is written correctly.
Fault code 16 on display	No boot program	The third digit in the data exchange is not 1.	Send the command: TIDA1911000000000000.
Fault code 58 on display	Fan failure	Any fan makes fewer than 10 revolutions in 5 seconds.	1. Check that the fan is connected correctly and has no loose connections. 2. If the fan is connected correctly: a) check the fan control circuit (usually excess solder under the control board socket); b) check whether the fan itself is damaged.
Will not turn on	Battery	Starting in battery mode needs ≥ 11.5 V per battery; common causes of failure are wrong calibration or insufficient battery voltage.	1. Check that battery voltage is measured correctly and calibrated. 2. Measure the voltage at the battery terminals with a multimeter (from a DC supply or a real battery) and check that it reaches the minimum 11.5 V per battery for start-up. Note: it is very important to connect a battery whose voltage matches the inverter model. 3. Check the BSU setting (program 46). **Connecting a battery with the wrong voltage may make the capacitors explode.**

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Problem	Event	Trigger condition	What to do
	Grid	—	1. Check for a short circuit at the grid terminals (e.g. a screw has pierced the terminal and shorted line and neutral). 2. Check for wiring errors, e.g. the grid connected to the output terminals by mistake.
	PV	—	Check whether the PV input voltage is too close to the limit.
PV not charging	—	—	Connecting a battery with the wrong voltage may damage the PV-side auxiliary supply: it loses power and cannot communicate with the main control board.

NOTE
Updates to the content and version of this manual are not announced separately.

Appendix A. 1200W inverter datasheet

Printed datasheet supplied with the inverter.

1. Information

This datasheet applies to the following device:

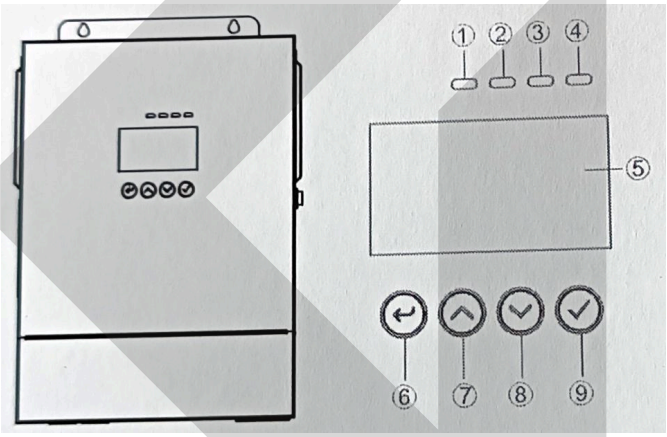
- 1200 W inverter

2. Introduction

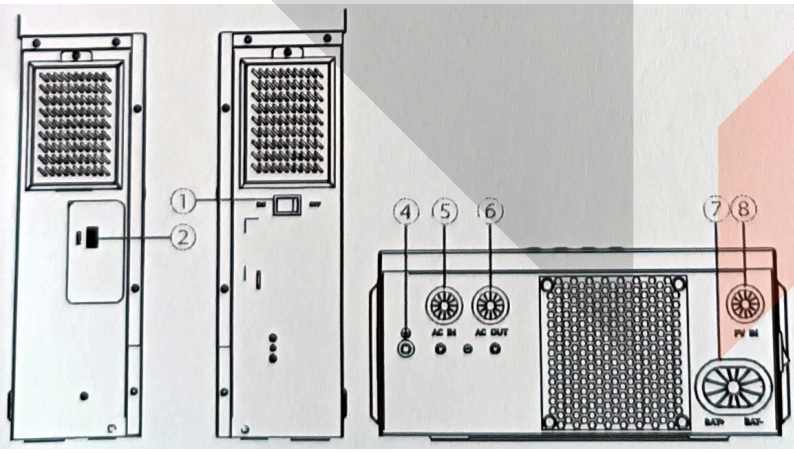
2.1 Features

- Rated power 1.2 kW / kVA, power factor 1
- MPPT range 17–115 V, Voc 115 V
- High-frequency design: small size and weight
- Pure sine wave AC output
- Remote monitoring via Wi-Fi (option)
- Battery types AGM, FLD, LIB, FEL selectable in LCD settings

2.2 Product overview



№	Front panel
①	Grid (AC) indicator
②	Inverter running indicator
③	Charge indicator
④	Fault indicator
⑤	LCD display
⑥	ESC button
⑦	UP button
⑧	DOWN button
⑨	ENTER button



№	Sides and bottom panel
①	Power switch (ON/OFF)
②	COM port
④	PE (ground)
⑤	AC input (AC IN)
⑥	AC output (AC OUT)
⑦	Battery input (BAT+ / BAT−)
⑧	PV input (PV IN)

Sides and bottom panel with terminals

Item ③ is missing in the original. Bottom panel labels: AC IN, AC OUT, PV IN, BAT+, BAT−.

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3. Package contents

№	Item	Qty	Description	Note
1	Inverter	1		
2	Datasheet	1	in English	
3	User manual	1	in English	

4. Technical specifications

Parameter	Value
AC input	
Rated input voltage (V AC)	208 / 220 / 230 / 240; L + N + PE
Voltage range (V AC)	90–280 (APP / GEN mode); 170–264 (UPS mode)
Frequency (Hz)	50 / 60 (auto-detect)
AC output	
Rated power (kVA / kW)	1.2 (at 208 V output voltage, output power drops to 90 %)
Peak power (kVA)	2.4
Voltage (V AC)	208 / 220 / 230 / 240
Power factor (PF)	1
Frequency (Hz)	50 / 60 ±0.1 %
Transfer time (ms)	10 (APP / UPS / GEN mode)
Waveform	pure sine wave
Overload capacity (battery mode)	60 s at 102–110 % load; 10 s at 120–200 % load
Max. efficiency (battery mode)	90 % at 12 V DC
Charger (PV / AC)	
Solar controller type	MPPT
Max. PV input current (A) / power (W)	18 / 800
MPPT range, operating voltage (V DC)	17–115
PV start voltage (V DC)	20
Max. PV open-circuit voltage (V DC)	115
Max. PV charge current (A)	50
Max. AC charge current (A)	50
Max. charge current (PV + AC) (A)	100
Battery	
Rated voltage (V DC)	12
Battery type	lithium / lead-acid
General data	
User interface (HMI)	LCD
Interface	RS232
Monitoring	Wi-Fi (option)

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