USER MANUAL · ENGLISH

Inverter ECGSOLAX HVM 1.2kW 12

Hybrid solar inverter 1.2 kW / 12 V: mounting, breakers and cables, wiring, first start, settings for LiFePO4 12.8 V, BMS, error codes



This manual was prepared by the seller based on the manufacturer's manual. Values on the inverter label and in the manufacturer's manual take precedence. The full list of programs 01–61, codes and drawings is in the "Original manufacturer's manual" file on the product page.

1. What this device is

Hybrid (off-grid) 1.2 kW inverter for a 12 V system: pure sine wave inverter, MPPT solar controller and mains charger in one case. Works as a UPS and as a small solar plant.

- Grid / generator input (AC IN)
- Solar panel input (PV IN), MPPT
- 12 V battery: lead-acid (AGM, FLD) or lithium (LIB, FEL, CUS)
- 230 V output to loads (AC OUT)
- COM port for Wi-Fi module (option); on some versions a BMS port (RJ45)

2. Mounting and clearances

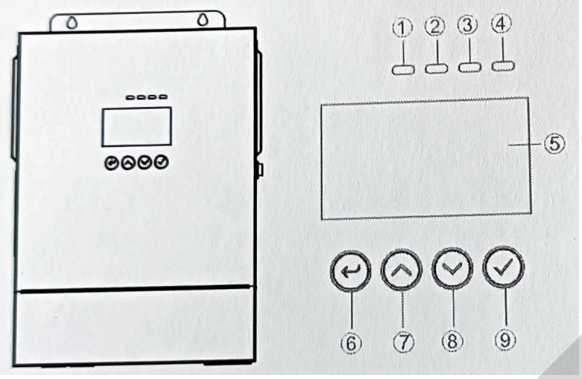
- Only **vertically** on a concrete or other **non-combustible** solid wall, in a dry room, at eye level, out of direct sun.
- Free space of **30 cm on all sides** (top, bottom, left, right) for cooling and cables; do not cover the vents.
- Away from strong magnetic fields. Radio transmitters and comms devices below 30 MHz: no closer than **30 m.**
- Two holes with a ϕ8 drill, **120 mm** apart, **M6** expansion screws; hang the inverter by its top holes on the screws.
- Before wiring remove the bottom cover (**2 screws),** refit it after wiring.

3. Technical specifications

Rated power	**1200 W** (1.2 kVA, PF 1)
Peak power	2.4 kVA
Battery voltage	**12 V DC**
Output	208 / 220 / 230 / 240 V AC, 50 / 60 Hz, pure sine wave
Grid input	90–280 V AC (APP / GEN), 170–264 V AC (UPS), 50 / 60 Hz
Transfer time	10 ms
Overload (on battery)	60 s at 102–110 %, 10 s at 120–200 %
Max. efficiency (battery)	90 %
Solar panels (PV)	up to 800 W, up to 18 A; MPPT 17–115 V; start 20 V; **Voc no more than 115 V**
Charging current	from PV up to 50 A, from grid up to 50 A, total up to 100 A
Ambient temperature	−10...60 °C
Interface / monitoring	LCD; RS232; Wi-Fi (option)

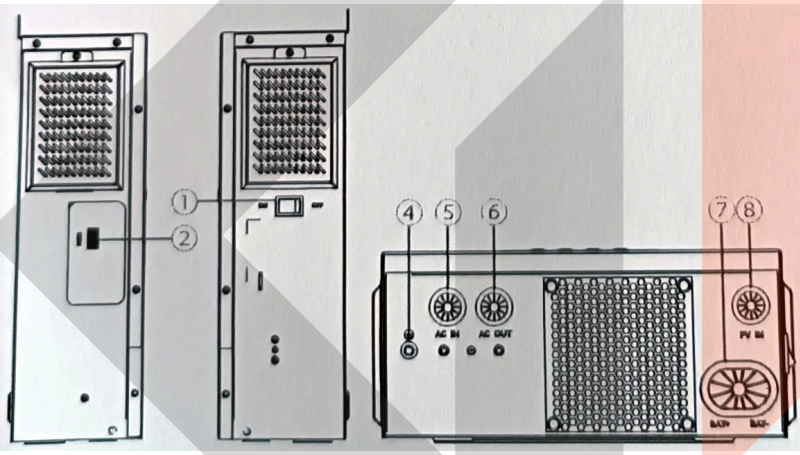
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4. Front panel, LEDs and terminals



1. AC grid LED (green)
2. inverter run LED (yellow)
3. charge LED (yellow)
4. fault LED (red)
5. LCD display
6. ESC button (exit)
7. “Up” button
8. “Down” button
9. ENTER button (enter / confirm)

Indicator	Steady	Flashing
AC (green)	grid OK, inverter running on grid	grid OK, but not switched to it yet; off: no grid
Inverter (yellow)	output supplied from battery or PV	—
Charging (yellow)	float charging	constant voltage charging (CV)
Fault (red)	fault (code on screen)	warning (ALA and code)



Sides and bottom:
① ON/OFF switch ② COM port (Wi-Fi module) ④ PE (earth) ⑤ **AC IN** (grid) ⑥ **AC OUT** (load) ⑦ **BAT+ / BAT–** (battery) ⑧ **PV IN** (panels)

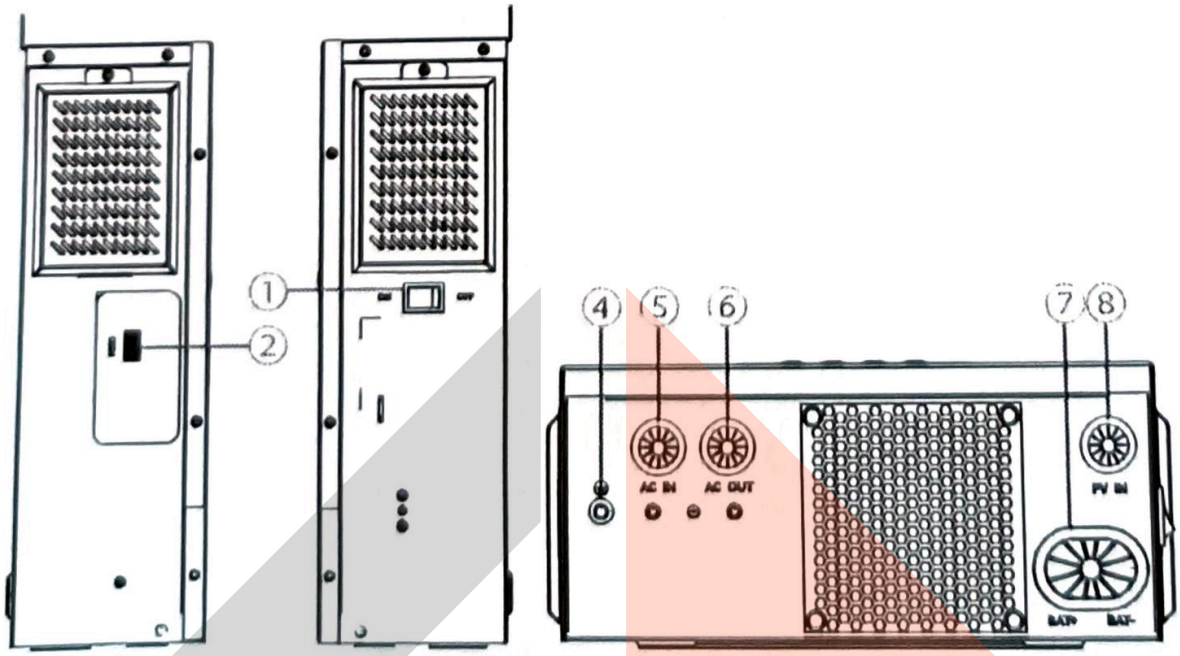
5. Breakers, fuses and cables

Line	Protection	Cable (manufacturer)	End preparation
Battery BAT+ / BAT–	**150 A** DC fuse or DC breaker in the positive wire, near the battery	35 mm²	strip 18 mm, ferrule lug, crimp
Grid AC IN (L, N)	separate **16 A** AC breaker	1.5 mm²	strip 9 mm, cut to 7 mm, ferrule lug
Load AC OUT (L, N)	—	1.5 mm²	same as AC IN
Panels PV+ / PV–	separate **16 A** DC breaker rated above **115 V DC**	2.5 mm²	strip 9 mm, cut to 7 mm, ferrule lug
Earth PE	—	yellow-green wire	OT ring lug for M4 screw

For lead-acid batteries the manufacturer recommends 200 Ah or more and 0.3C charge current. For LiFePO4 the charge current is limited by the BMS: see section 8.

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Inverter connectors: side walls and bottom panel



№	Connector	What it is	What connects where
1	**ON / OFF**	Inverter power switch (on the side panel)	Switch on after connecting the battery and its fuse
2	**COM**	Wi-Fi communication module port (optional)	The Wi-Fi module plugs directly into the port
4	**PE**	Case grounding point	Yellow-green wire with an OT lug for an M4 screw
5	**AC IN**	Entry for the grid / generator cable to the IN terminals (L, N)	1.5 mm² cable via a separate 16 A breaker; do not confuse with the output
6	**AC OUT**	Entry for the 230 V output cable to the OUT terminals (L, N)	1.5 mm² cable to the loads; do not connect the input and output N together
7	**BAT+ / BAT−**	Entry for the 12 V battery power cables	35 mm² cable with tubular lugs; DC fuse or 150 A DC breaker in the “+” near the battery
8	**PV IN**	Solar panel cable entry to the PV+ / PV− terminals	2.5 mm² cable via a separate 16 A DC breaker rated above 115 V DC; Voc up to 115 V, MPPT 17–115 V, up to 800 W

There is no number ③ in the manufacturer’s figure. On some versions there is a BMS port next to the COM port (RJ45, RS485 or CAN): 1 — RS485B, 2 — RS485A, 4 — CANH, 5 — CANL.

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6. Wiring sequence

1. Make sure everything is off: inverter switch OFF, battery DC fuse, grid breaker and panel DC breaker open. In daylight cover the panels with opaque material. **Do not switch on any breaker until all connections are done.**
2. **Earth:** yellow-green wire to the PE point (④) with an M4 screw.
3. **Grid** to **AC IN** (L, N) via a 16 A breaker. **Load** to **AC OUT** (L, N). L is brown or black, N is blue. **Never mix up AC IN and AC OUT** and never join the input and output neutrals: this damages the inverter.
4. **Panels** to **PV IN** via a DC breaker: "+" to PV+ (red), "−" to PV− (black). Check polarity with a multimeter. String Voc rises in frost and must be **below 115 V;** operating voltage 17– 115 V, power up to 800 W. Do not earth PV+ or PV−.
5. **Battery** last: 150 A DC fuse in the positive, 35 mm² cable. Red from battery "+" to **BAT+,** black from "−" to **BAT−.** Check polarity twice: reversed "+" and "−" damage the inverter. Tighten the terminals firmly; anti-oxidant grease only after tightening. Connect only a **12 V** battery: any other voltage damages the inverter.
6. Lithium battery with BMS: RJ45 comms cable into the BMS port (section 10). Refit the bottom cover.
7. **Switching on:** battery DC fuse → inverter switch ON (battery voltage on screen) → settings from section 8 → grid breaker → panel DC breaker.

Safety. Make all connections only with battery, inverter, grid and panels off. Do not short the battery terminals: the short-circuit current is very high. Service no sooner than 5 minutes after disconnecting all sources. If unsure, have an electrician install it.

7. First start and buttons

1. Enter settings: hold **ENTER** for 2 seconds. Choose the program number with ▲ / ▼, **ENTER:** confirm, **ESC:** exit.
2. Set the values from section 8, then switch on grid and panels.
3. Check: 230 V at the output; charging from the grid (charge LED); if you switch off the grid breaker, the load keeps running on battery.
4. Outside the menu ▲ / ▼ switch display pages: P1 grid / output voltage, P2 frequencies, P3 battery voltage and charge current, P4–P5 PV voltage, current and power, P6–P8 power and load, P9 firmware version, P10 energy produced.

Starting on battery needs at least 11.5 V (otherwise ALA 72). Everything can be reset to factory settings with program 26 (Std = ON), but only in grid or standby mode, not while running on battery.

8. Settings for LiFePO4 12.8 V (no BMS link)

These values match our kit guide with a 12.8 V 100Ah battery and are within the manufacturer's ranges. For a battery of another capacity, set charge currents (p.06, p.07) no higher than its BMS allows. Program 44 (BMS link) without a comms cable: OFF. After entering, switch the inverter off and on.

№	Parameter	Value	Why
01	Output voltage	**230V**	Standard for Ukraine and Europe.
02	Output frequency	**50Hz**	Standard for Ukraine and Europe.
03	Output source priority	**GPb (no panels) or PbG (with panels)**	GPb: from the grid, battery kept full for outages. PbG: battery first, grid when it is not enough.

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№	Parameter	Value	Why
04	Output mode (grid input)	**UPS (grid) / GEN (generator)**	UPS: fast switching for computers. GEN: power from a generator.
05	Charging source priority	**PNG (PV + grid)**	Charging from both solar and grid.
06	Grid charging current	**20–50 A**	Moderate charging, no overload of wiring or battery.
07	Maximum charging current (total)	**50 A**	Total solar and grid charge for LiFePO4 100Ah. Do not set higher.
09	Auto restart after overload	**ON**	The inverter resumes operation by itself.
10	Auto restart after overheating	**ON**	The inverter resumes operation by itself.
17	Battery type	**CUS (user-defined)**	The voltages are set manually below. AGM / FLD are for lead-acid batteries only.
20	Charge voltage (CV)	**14.2 V**	Standard for LiFePO4 4S (12.8 V).
21	Float voltage	**13.6 V**	No overcharging during long grid operation; lower than p.20.
19	Cut-off voltage	**12.0 V**	The output switches off so as not to discharge the battery down to BMS protection.
15	Switch to grid	**12.5 V**	When discharged to this voltage, the load switches to the grid.
16	Return to battery	**13.4 V**	After recharging to this voltage: back on battery.
32	Equalization charge time	**OFF**	OFF disables equalising; not used for LiFePO4.

9. What the modes mean

Code	How it works
Load source priority (p.03)	
GPb	Grid first (factory). If the grid fails, the battery supplies. Panels only charge the battery. PGb works the same.
PbG	Battery first; when its energy runs short, the grid supplies. Panels only charge the battery.
ntP	Combined: with sun, battery has priority; without sun, grid has priority.
Output mode (p.04)	
APP	Household appliances (factory); grid input 90–280 V.
UPS	Computers and sensitive equipment; switchover 10 ms; grid input 170–264 V.
GEN	Running from a generator connected to the grid input.
Charging source priority (p.05)	
PNG	Panels and grid charge at the same time (factory).
OPV	Charging from panels only, not from the grid.
PVF	Panels first: with both sun and grid, only the panels charge; with grid only, the grid charges.

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10. Lithium battery BMS link

The BMS port is an RJ45 socket on the side panel next to the COM port, RS485 or CAN link, cable wired pin to pin. **Not all inverter versions have a BMS port:** the printed description of this model shows only the COM port. If there is no BMS port, work without a link (p.44 = OFF) with the settings in section 8.

RJ45 pin	Signal
1	RS485B
2	RS485A
3	—
4	CANH
5	CANL
6, 7, 8	—

- Program **17 = FEL** (LiFePO4) or **LIb:** only with these types does the inverter exchange data with the BMS. Voltages 14.2 / 13.6 / 12.0 / 12.5 / 13.4 V from section 8 also fall within the FEL ranges.
- Program **44** (bnS): protocol, default OFF: **CVT 485, PYL 485/CAN, GRO 485/CAN, VOL 485, IRF 485, PAC 485.** Select the same protocol on the battery (DIP switches or BMS menu).
- Program **45** (bnI): BMS ID: AtO (automatic) or 0–15.
- No link: **warning 56,** ERR flashes on the BMS pages.

- SOC programs work only with a link: **46** cut-off at low SOC (20 %), **47** switch to battery (90 %), **48** switch to grid (50 %); 47 and 48 apply in PbG mode.
- Display pages 12–17: pack status, voltage and current, temperature and SOC, capacity, CV voltage, BMS codes.

11. Fault and warning codes

Code	Meaning	What to do
Faults (red LED on, code with ERROR icon on screen)		
1, 7, 9	Bus or inverter soft-start failure	Switch the inverter off, wait for the screen to go dark, switch on again. If it recurs, contact the seller.
2 / 3	High / low bus voltage	Disconnect the load and restart. Check the battery voltage and that panel Voc is below 115 V.
4	Battery overcurrent (not self-recovering)	Switch off all power. Check the load, battery cables and terminals.
5	Overheating or fan blocked	Clear 30 cm around it, remove dust, check the fan turns. Once cool it restarts by itself (p.10 = ON).
6	Battery high voltage	Check p.17, p.20, p.21 and that the battery connected is 12 V.
8 / 12	Bus / output short circuit	Disconnect the load. Check AC OUT for an L–N short (e.g. a screw through a terminal) and that the grid is not fed to the output.
10 / 11	High / low output voltage	Restart. If it recurs, contact the seller.
13	Reverse power at output	Check that grid or generator is not fed to AC OUT.
14	Overload	Reduce the load (to 1200 W). If p.61 is set, discharge current exceeded its value.
26	BMS fault	Look up the error in the battery BMS; without a link set p.44 = OFF.
27	Microcontroller failure (not self-recovering)	Contact the seller.

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Code	Meaning	What to do
29	Fast inverter overcurrent	Reduce loads with high inrush current and restart.
Warnings (red LED flashes, ALA and code on screen)		
50	Battery not connected (below 8 V)	Check the fuse / DC breaker and battery cables. Clears above 10 V.
51 / 52	Battery cut-off / low voltage	Charge the battery from grid or panels; check p.18 and p.19.
53	Charger short circuit (not self-recovering)	Switch everything off, check the battery cables for shorts.
55	Battery overcharge	Check p.17, p.20, p.21. Clears when voltage drops 0.5 V below the threshold.
56	No BMS link	Check the cable, port, protocol (p.44) and battery DIP switches. Without a cable: p.44 = OFF.
58	Fan fault	Check the fans turn; contact the seller.
60	Overload above 102 % or discharge current above p.61	Reduce the load: after 5 s, exceeding p.61 becomes fault 14.
68 / 69	Low SOC (p.46)	Charge the battery. 68 clears at SOC “p.46 + 5 %”, 69 at “p.46 + 10 %”.
71	Battery short circuit (not self-recovering)	Switch everything off, check cables; contact the seller.
72	Start blocked: battery voltage below 11.5 V	Charge the battery, check terminal voltage with a multimeter.

The inverter restarts after recoverable faults up to 6 times; after that it locks out (per the manufacturer’s manual, for 15–30 minutes). To reset sooner, switch off all power until the screen goes dark.

12. If something is wrong

What you see	Cause	What to do
Will not start on battery	Voltage below 11.5 V (ALA 72), poor contact, fuse blown	Measure the voltage at the inverter terminals; charge the battery; check the fuse and terminal tightness
Not working on grid	Short on AC IN terminals, AC IN and AC OUT swapped, voltage outside p.22 / p.23	Check terminals and wiring; for a generator or weak grid set p.04 = APP or GEN
No solar charging	PV voltage below 20 V, outside 17–115 V or near the limit; wrong p.05	Check string voltage and PV polarity, DC breaker, p.05
Output shuts down on overload	Load above 1200 W (2.4 kVA briefly) or current above p.61	Switch off some appliances; with p.09 = ON the inverter restarts by itself
Air conditioner or fridge trips the output	High inrush current, compressor restarted sooner than 2–3 min	Appliances with restart delay; do not switch on several heavy appliances at once
Shut down from overheating	Blocked vents, dust, heat, fan	Clear 30 cm around it, remove dust; with p.10 = ON it restarts by itself

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What you see	Cause	What to do
Output drops out at light load	Power-saving mode (p.12 = ON), load under 25 W	Set p.12 = OFF
Buzzer 3 s when grid is lost	Signal p.11	This is normal; turn off with p.11 = OFF, all sounds with p.14 = ON

If a fault cannot be cleared, contact the seller.

13. Maintenance

- Every 3 months check terminal tightness, clean vents and fan operation.
- After 10–15 min under load touch the cables and terminals: they must not be hot. If they heat up, they are loose or the cable is too thin.
- Switch off in reverse order: load → grid → panels → inverter → DC fuse → battery.
- If the system is unused for long, charge the battery to 50–70 % and switch it off. Never charge a frozen battery.
- Equalising charge (p.31–35): lead-acid batteries only, do not enable for lithium.
- Do not open the inverter: dangerous voltage inside.