CONNECTION AND SETUP GUIDE

Kit POWGROW SMS-5kW 24V + 2× Cheapig 12.8V 100Ah

Inverter POWGROW SMS-5kW 24V + 2 Cheapig 12.8V 100Ah batteries in series: 25.6 V 100Ah 2560Wh



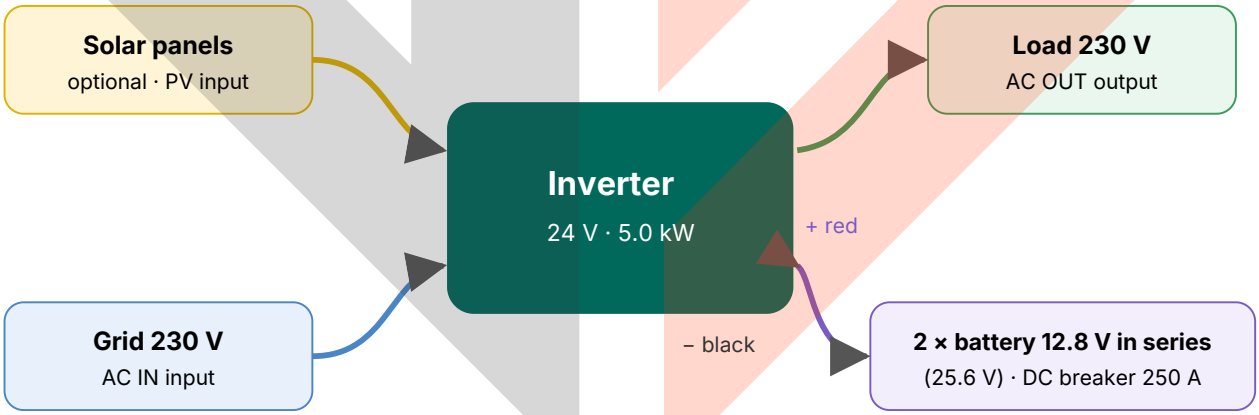
Kit contents

- **Inverter POWGROW SMS-5kW 24V**
- **Battery Cheapig 12.8V 100Ah 1280Wh ×** 2

What else you will need

- Battery–inverter power cables 50 mm², M8 lugs
- DC breaker / fuse 250 A
- 40 A breaker on the grid input
- Jumper between batteries: 50 mm² cable, M8 lugs
- LiFePO4 12.8 V charger, to charge each battery separately before connecting them
- Screwdriver, 13 mm wrench, multimeter

Wiring diagram



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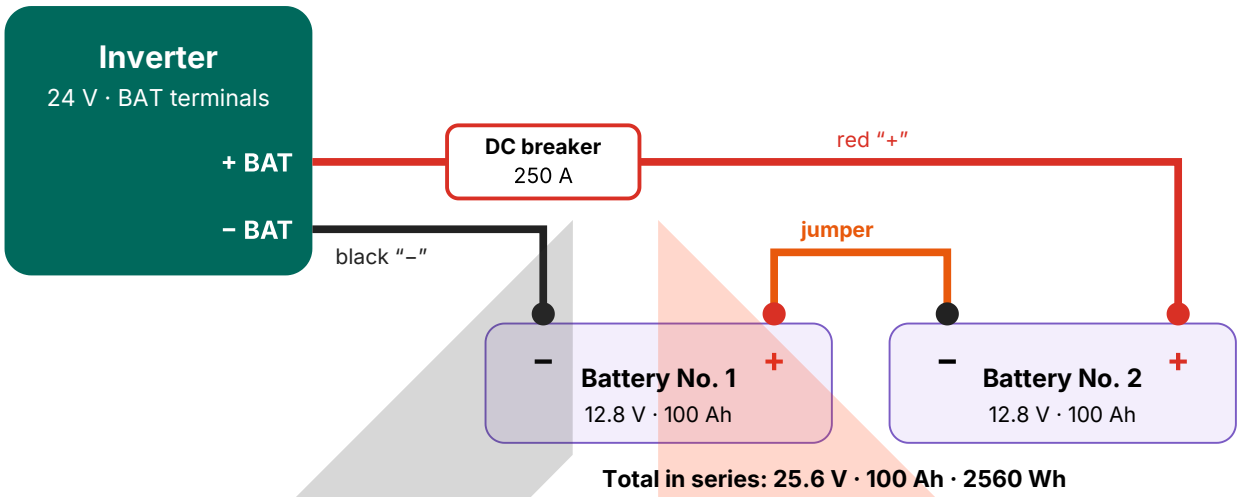
Two 12.8 V batteries in series = 25.6 V



Total in series: 25.6 V · 100 Ah · 2560 Wh

- The inverter is rated for 24 V, and each battery has 12.8 V. So the two batteries are connected **in series**: the voltages add up (12.8 + 12.8 = **25.6 V**), the capacity stays **100 Ah**, and the bank energy is 2 × 1280 = **2560 Wh**.
- **Jumper**: a cable of the same cross-section as the one to the inverter (**50 mm²**), with M8 lugs, as short as possible. It connects the "+" of **battery No. 1** to the "–" of **battery No. 2**.
- **Inverter "–"** (– BAT, black cable) → "–" of **battery No. 1**. **Inverter "+"** (+ BAT, red cable) via the DC breaker **250 A → "+" of battery No. 2**.
- Before connecting to the inverter, measure the voltage between the "–" of battery No. 1 and the "+" of battery No. 2 with a multimeter: it should be ≈ **26–27 V**. If it is ≈ 13 V, the jumper is in the wrong place; 0 V means a break or a battery that is switched off.

Never connect these batteries in parallel ("+" to "+", "–" to "–") for a 24 V inverter: you would get only 12.8 V, and the inverter will not start or will show a low-voltage error. Do not connect the "+" and "–" of the same battery: that is a short circuit.

Before connecting the batteries

- Both batteries must be **the same model and the same capacity**, preferably from the same batch. Do not connect a new battery with an old one: the weaker one will be overcharged and discharged more deeply than the other.
- **Charge each battery separately to 100%** with a LiFePO4 12.8 V charger (charge voltage 14.2–14.6 V).
- 1–2 hours after charging, measure the voltage of each battery: the difference should be **no more than 0.05 V**. If it is larger, top up the one with the lower voltage. Only then connect the batteries to each other.
- Bank charging current: **no more than 50 A** in total (solar + grid), from the grid **30 A**. Discharge is limited by each battery's BMS: **100 A**, which is ≈ 2.3 kW of continuous load from the bank.

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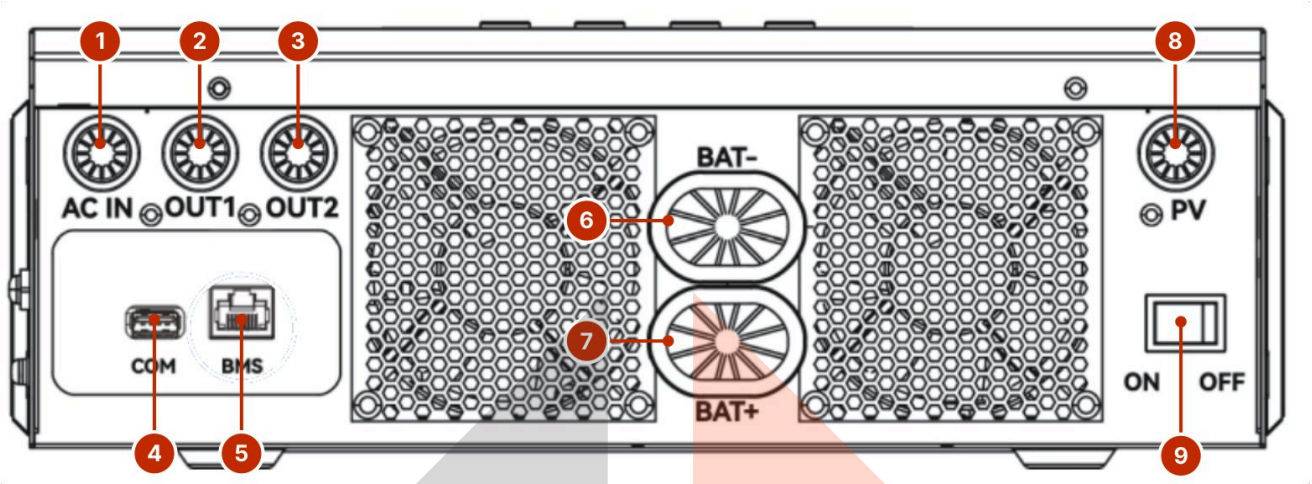
Inverter connectors: bottom panel



№	Connector	What it is	What connects where
1	**AC IN**	Grid or generator input (L, N, PE).	Cable from the grid through a separate 40 A breaker. A generator also connects here, item 04 = GEN.
2	**OUT1**	Main AC output 230 V.	Cable to the load panel (L, N).
3	**OUT2**	Second AC output. It can be switched off automatically by battery voltage, discharge time or SOC (items 38– 40).	Cable to less important loads (L, N).
4	**COM**	Communication port (USB connector).	The Wi-Fi module (dongle) plugs in here directly.
5	**BMS**	RJ45 port for communication with the lithium battery BMS, RS485 or CAN.	Communication cable from the battery BMS. Protocol: item 44. Inverter port pinout: 1 = RS485B, 2 = RS485A, 4 = CANH, 5 = CANL; straight-through cable.
6	**BAT–**	Battery “minus” cable entry.	Battery negative, 50 mm² cable.
7	**BAT+**	Battery “plus” cable entry.	Battery plus via a 250 A fuse / isolator.
8	**PV**	Solar panel cable entry to the PV+ and PV– terminals.	Panels via a separate DC breaker.
9	**ON / OFF**	Inverter power switch.	Switch on after all connections are complete.

The grid PE protective wire is connected first, on the inverter side (side wall figure in section 3.3 of the manufacturer’s manual).

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Key values for this kit

28.4 V charge voltage (20)	**27.2 V** float voltage (21)	**24.0 V** cut-off (19)
FEL battery type (17)	**50 A** max. charge current (07)	**30 A** grid charging (06)

Connection procedure

1. Mount the inverter vertically on a non-combustible wall in a dry place. Leave at least 20 cm of free space above and below for cooling.
2. Make sure everything is off: inverter button OFF, switches/buttons on **both** batteries OFF, DC breaker off, 230 V grid not connected.
3. Place the batteries side by side and connect them **in series** with the jumper: “+” of battery No. 1 → “−” of battery No. 2 (see “Two 12.8 V batteries in series”). A multimeter between the “−” of battery No. 1 and the “+” of battery No. 2 should read ≈ 26–27 V.
4. Install a DC breaker or fuse rated **250 A** in the positive (red) wire between the “+” of battery No. 2 and the inverter “+ BAT”.
5. Connect the power cables (cross-section at least **50 mm²**, M8 lugs): **red** from the “+” of battery No. 2 (via the DC breaker) to the inverter “+ BAT”, **black** from the “−” of battery No. 1 to “− BAT”. Check the polarity twice: swapping “+” and “−” is guaranteed to damage the inverter.
6. Tighten the terminal bolts firmly (without stripping the thread), together with the jumper lugs, and fit the protective caps. A loose contact heats up and melts the terminals.
7. Switch on both batteries (buttons or switches on the cases, if present), then the DC breaker.
8. Switch on the inverter with the ON button. The battery voltage should appear on the display. Enter the settings from the table below.
9. Switch off the inverter and connect the 230 V grid to the **AC IN** terminals (L, N, PE) through a separate 40 A breaker.
10. Connect the load (your socket/distribution board) to the **AC OUT** terminals (L, N, PE). Never mix up AC IN and AC OUT: feeding grid power into the output damages the inverter.
11. If you have solar panels, connect them to the **PV** input last, observing polarity. The open-circuit voltage of the panels (Voc) rises in frosty weather: do not exceed the PV maximum on the inverter label.
12. Switch on the inverter and check: 230 V at the output, the battery charges from the grid (charging icon on the display), the lights stay on when the grid is off.

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Important: power from the battery. The BMS of each 12.8 V battery is rated for 100 A continuous current (the exact value is on the label). In a series connection the same current flows through both batteries, so the limit for the 25.6 V bank is also 100 A. That is ≈ **2.3 kW** of continuous load from the battery. The inverter delivers its full 5.0 kW when grid or solar power is available. If the battery "trips" during a power cut, reduce the number of powerful appliances switched on at the same time.

Inverter settings

Menu access: hold the **ENTER** button for 2 seconds. Use ▲/▼ to select the program number, ENTER, change the value, ENTER to save. Exit: **ESC.**

№	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	**"Grid first"** (no panels) or **PBG** (with panels)	"Grid first": from the grid, battery kept full for power cuts. PBG: solar and battery first, the grid when they are not enough.
04	Input mode	**UPS** (grid) / **GEN** (generator)	UPS: fast switching for computers. GEN: power from a generator.
05	Charging source priority	**PNG** (solar + grid)	Charging from both solar and grid.
06	Grid charging current	**30 A**	Moderate grid charging, without overloading the wiring or the battery.
07	Maximum charging current (total)	**50 A**	Total solar + grid charging, safe for LiFePO4 100Ah. Do not set higher.
17	Battery type	**FEL** (LiFePO4)	Lithium iron phosphate. AGM / FLD are for lead-acid only.
44	BMS communication	**OFF**	No communication cable to the inverter.
20	Charge voltage (CV)	**28.4 V**	Standard for LiFePO4 8S (25.6 V).
21	Float voltage	**27.2 V**	The battery is not overcharged when it stays on the grid for a long time.
19	Cut-off voltage	**24.0 V**	The inverter cuts the output before the battery reaches BMS protection.
15	Switch to grid	**25.0 V**	When discharged to this voltage, the load switches to the grid.
16	Return to battery	**27.0 V**	After recharging to this voltage, the inverter runs from the battery again.
32	Equalization charge	**OFF**	Not used for LiFePO4.

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Program numbers as in the POWGROW SMS-5kW menu according to the manufacturer's manual. After entering the settings, switch the inverter off and on again.

Which mode to choose

- **Backup during power cuts only (no panels):** 03 = "Grid first", 05 = PNG. The inverter runs from the grid and the battery is always full; when the power goes out it switches to the battery automatically.
- **You have solar panels and want to save:** 03 = PBG, 05 = PNG (or OPV for solar only). Solar by day, battery at night, grid only when the battery has dropped to 25.0 V.
- **Running on a generator:** 04 = GEN, 06 = 30 A or less, so as not to overload the generator.

How long it runs on battery

Load	Example	Runtime
100 W	router, lights, chargers	**≈ 20.7 h**
200 W	fridge + lights	**≈ 10.4 h**
300 W	fridge + lights + TV	**≈ 6.9 h**
500 W	fridge, laptop, pump	**≈ 4.1 h**
1000 W	boiler, kettle briefly, several appliances	**≈ 2.1 h**
2000 W	air conditioner, water heater, electric stove	**≈ 1.0 h**

Approximate: 90% of battery capacity and inverter efficiency ≈90%. A fridge runs in cycles, so the real runtime is longer.

Check after start-up

- Battery voltage on the display: ≈ 27.2–28.4 V when full, ≈ 25.0 V when discharged.
- Switch off the grid breaker: the load must keep running without interruption.
- After 10–15 min of operation, touch the terminals and cables: they must not be hot. If they heat up, a connection is loose or the cable is too thin.
- A battery below 23.2 V may have gone into BMS protection: charge it from the grid through the inverter.

Safety. Make all connections only with the battery, inverter and grid switched off. Do not short-circuit the battery terminals: the short-circuit current of LiFePO4 is very high. Do not install the inverter in a bathroom, outdoors in the rain or near flammable materials. If in doubt, contact an electrician.

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Shutdown and maintenance

- Switch off in reverse order: load → grid → panels → inverter → DC breaker → battery.

- Every 3 months, check that the terminals (and the jumper between the batteries) are tight and that the ventilation openings are clean.
- Every few months (every 3 months is convenient), check the voltage of **each battery separately** with a multimeter, at rest (≈1 h without charging or load). If the difference is more than **0.2 V**, switch the system off, remove the jumper, charge each battery separately to 100% and only then connect them again.
- If one battery fails, replace it with the same model and capacity and equalise the charge before connecting (see “Before connecting the batteries”).
- If you do not use the kit for a long time, charge the battery to 50–70% and switch it off.

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