CONNECTING THE BATTERY TO THE INVERTER

# POWGROW SMS-6.5KP 6500W 48V + 51.2V 100Ah 5.12kWh rack with display




Connecting the 51.2V 100Ah 5.12kWh rack battery with display to the POWGROW SMS-6.5KP 6500W 48V inverter

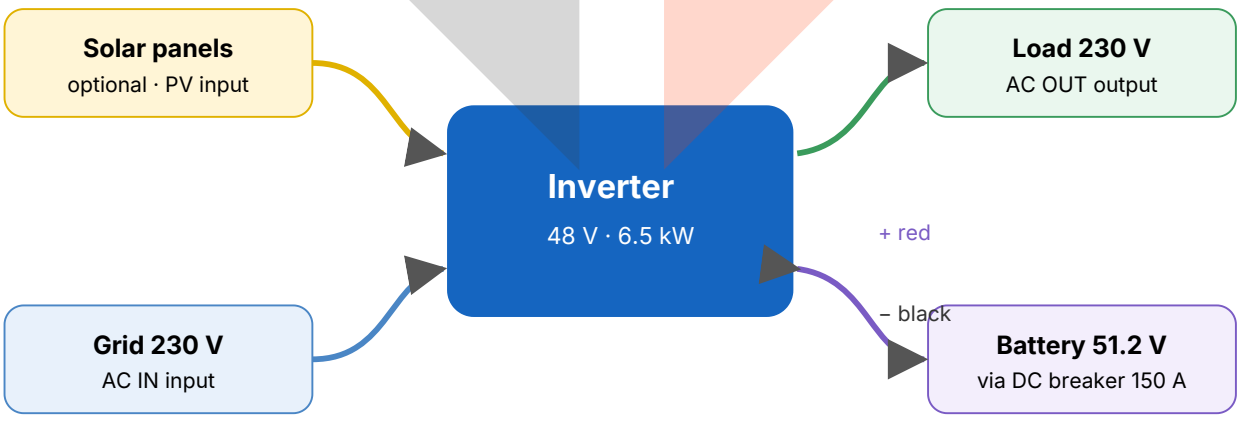
## What is included in the system

- **Inverter POWGROW SMS-6.5KP 6500W 48V**
- **Battery 51.2V 100Ah 5.12kWh rack with display**

## What else you will need

- Battery–inverter power cables 35 mm² , M8 lugs
- RS485 communication cable (RJ45), e.g. “Communication cable 1.3 m”
- DC breaker / fuse 150 A
- 32 A breaker on the grid input, cable 3×4 mm²
- Screwdriver, 13 mm wrench, multimeter

## Wiring diagram

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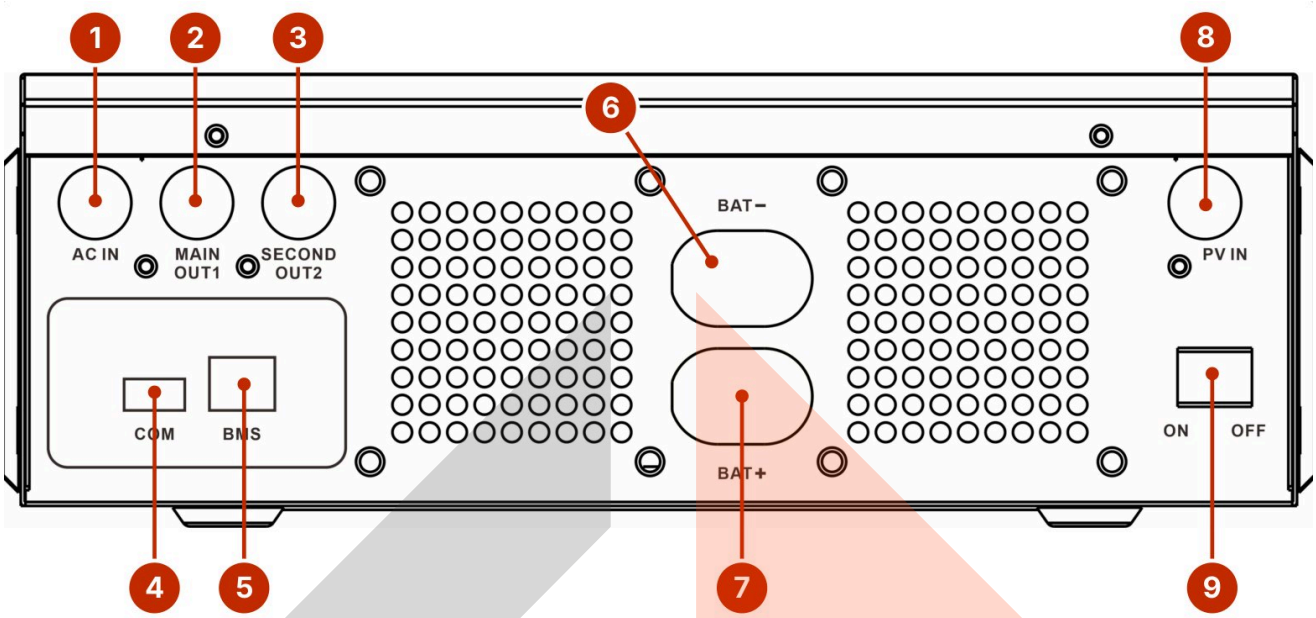
## Inverter connectors: bottom panel




| № | Connector | What it is | What connects where |
|---|---|---|---|
| 1 | **AC IN** | Entry for the grid or generator cable | to the AC IN L, N terminals under the cover; PE (yellow-green) to the earthing screw on the side of the case |
| 2 | **MAIN OUT1** | Entry for the main output cable | to the AC OUT1 L, N terminals → main load panel |
| 3 | **SECOND OUT2** | Entry for the second output cable | to the AC OUT2 L, N terminals → secondary loads; the output switches off by voltage, time or battery SOC (items 38– 40). Only on the model with two outputs |
| 4 | **COM** | Communication port | the Wi-Fi module plugs in here if the model has an external Wi-Fi module (section 3.7 of the manual) |
| 5 | **BMS** | RJ45 port for BMS communication | cable from the lithium battery communication port (RS485 or CAN); protocol in item 44. Inverter port pinout: 1 — RS485B, 2 — RS485A, 4 — CANH, 5 — CANL; “pin to pin” cable. |
| 6 | **BAT−** | Entry for the battery “minus” cable | to the BAT− terminal, 35 mm² cable with a DT lug |
| 7 | **BAT+** | Entry for the battery “plus” cable | to the BAT+ terminal, via a 150 A fuse / breaker |
| 8 | **PV IN** | Entry for the solar panel cables | to the PV+ (red) and PV− (black) terminals, via a separate DC breaker |
| 9 | **ON / OFF** | Power switch | switches the inverter on and off |

AC IN, AC OUT1 and AC OUT2 terminals are on the left under the cover (4 screws), BAT+/BAT− in the middle, PV+/PV− on the right; AC OUT2 is only on the model with two outputs.

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## Key values for this pair

| | | |
|---|---|---|
| **56.8 V**<br>charge voltage (20) | **54.4 V**<br>float voltage (21) | **48.0 V**<br>cut-off (19) |
| **PYL**<br>BMS protocol (44) | **50 A**<br>max. charge current (07) | **30 A**<br>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 switched off: inverter button OFF, battery switch/button OFF, DC breaker off, 230 V grid not connected.
3. Install a **150 A** DC breaker or fuse between the battery and the inverter in the positive (red) wire.
4. Connect the power cables (cross-section at least **35 mm², M8 lugs): red from the "+"** of the battery to the inverter "+ BAT", **black** from the battery "–" to "– BAT". Check the polarity twice: swapping "+" and "–" is guaranteed to damage the inverter.
5. Tighten the terminal bolts firmly (without stripping the thread) and fit the protective caps. A loose contact heats up and melts the terminals.
6. Connect the battery and the inverter with the **communication cable** (RJ45): **RS485** port on the battery → **BMS / RS485** port on the inverter. Do not plug the cable into the CAN or WiFi port. For protocol settings, see "Battery communication".
7. Switch on the battery (button or switch on the case, if any), 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 32 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.

## Battery communication: Pylontech protocol (RS485)

This battery has an RS485 port and "talks" to the inverter: the inverter sees the state of charge in percent (SOC) and takes the correct charge voltages and currents from the BMS by itself.

**On the battery:**

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1. On this battery the protocol is selected on its touchscreen: open the protocol settings in the screen menu ( **PROTOCOL)** and check that **PYLON (** Pylontech) is selected for communication with the inverter. If a different protocol is set, select PYLON and confirm.
2. Plug the communication cable to the inverter into the battery's **RS485 CAN** port. The pair of **RS485** ports on the right is only for linking batteries together.
3. For a single battery, do not change the address or the other BMS settings.

**On the inverter:**

1. Program **17** (battery type) = **FEL,** program **44 (**BMS communication) = **PYL.**
2. Cable from the inverter **BMS / RS485** port to the battery **RS485** port.
3. Switch the inverter off and on. After 10–30 seconds the battery charge should appear on the display in **%.** If only the voltage or a communication error (alarm 56) appears instead of percent, check the cable, port and protocol.
4. Once communication is established, the inverter takes the charge (20, 21) and cut-off (19) voltages from the battery. The values in the table below are a fallback if communication is lost.
5. SOC thresholds with BMS communication (PBG mode): program **48 —** switch to grid, **47 —** return to battery, **46 —** shutdown at low SOC; recommended: **20%** switch to grid, **80%** return to battery.

**Important: power from the battery.** The battery BMS is usually rated for 100 A continuous current (the exact value is on the battery label). That is ≈ **4.6 kW** of continuous load from the battery. The inverter delivers its full 6.5 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 | **GPB** (without panels) or **PBG** (with panels) | GPB: from the grid, battery kept full for outages. PBG: solar and battery first, 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. |

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| | | | |
|---|---|---|---|
| 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 | **FEL** (LiFePO4) | Lithium iron phosphate. AGM / FLD are for lead-acid only. |
| 44 | BMS communication (protocol) | **PYL** | Battery protocol; see “Battery communication”. |
| 20 | Charge voltage (CV) | **56.8 V** | Standard for LiFePO4 16S (51.2 V). |
| 21 | Float voltage | **54.4 V** | The battery is not overcharged when it stays on the grid for a long time. |
| 19 | Cut-off voltage | **48.0 V** | The inverter cuts the output before the battery reaches BMS protection. |
| 15 | Switch to grid | **50.0 V** | When discharged to this voltage, the load switches to the grid. |
| 16 | Return to battery | **54.0 V** | After recharging to this voltage, the inverter runs from the battery again. |
| 32 | Equalization charge | **OFF** | Not used for LiFePO4. |

Program numbers as in the POWGROW SMS-6.5KP menu according to the manufacturer’s manual. After entering the settings, switch the inverter off and on again.

## Which mode to choose

- **Backup during outages only (no panels):** 03 = GPB, 05 = PNG. The inverter runs from the grid, the battery is always full; during a power outage 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 50.0 V.
- **Running on a generator:** 04 = GEN, 06 = 30 A or less, so as not to overload the generator.

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## How long it runs on battery

| Load | Example | Runtime |
|---|---|---|
| 100 W | router, lights, chargers | **≈ 41.5 h** |
| 200 W | fridge + lights | **≈ 20.7 h** |
| 300 W | fridge + lights + TV | **≈ 13.8 h** |
| 500 W | fridge, laptop, pump | **≈ 8.3 h** |
| 1000 W | boiler, kettle briefly, several appliances | **≈ 4.1 h** |
| 2000 W | air conditioner, water heater, electric stove | **≈ 2.1 h** |
| 4000 W | whole house, pump, power tools | **≈ 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: ≈ 54.4–56.8 V when full, ≈ 50.0 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 46.4 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.

## Shutdown and maintenance

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

- Every 3 months, check that the terminals are tight and the ventilation openings are clean.
- 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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