CONNECTING THE BATTERY TO THE INVERTER

POWLAND SMS-12KW 12kW 48V WiFi + MFUZOP 51.2V 314Ah 16.07kWh

Connecting the MFUZOP 51.2V 314Ah 16.07kWh battery to the POWLAND SMS-12KW 12kW 48V WiFi inverter



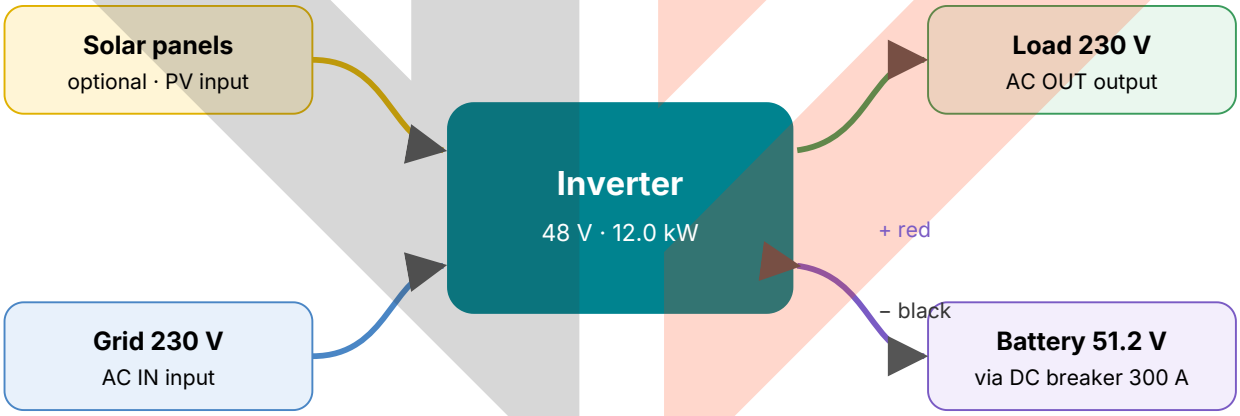
What is included in the system

- **Inverter POWLAND SMS-12KW 12kW 48V WiFi**
- **Battery MFUZOP 51.2V 314Ah 16.07kWh**

What else you will need

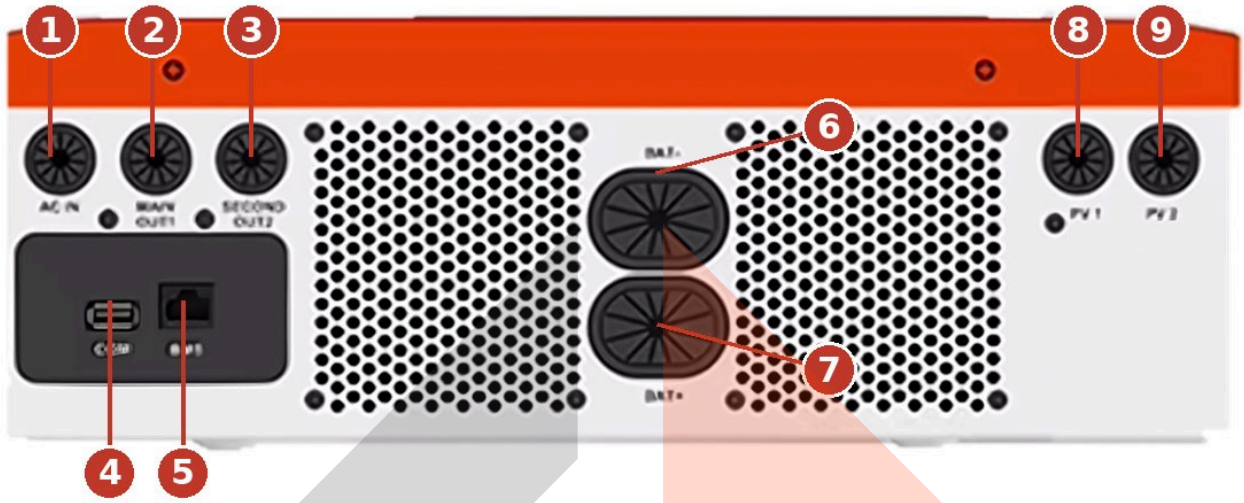
- Battery–inverter power cables 70 mm² (or 2×35 mm²), M8 lugs
- RS485 communication cable (RJ45), e.g. “Communication cable 1.3 m”
- DC breaker / fuse 300 A
- 80 A breaker, 16 mm² cable to the grid input
- Screwdriver, 13 mm wrench, multimeter

Wiring diagram



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Inverter connectors: bottom panel



№	Connector	What it is	What connects where
1	**AC IN**	Grid / generator cable entry to the AC IN terminals (L, N, PE)	Via a 80 A breaker, 16 mm² cable (grid bypass current up to 70 A according to the label); do not confuse with the outputs
2	**MAIN OUT1**	Main output 230 V (terminals L, N, PE)	Main loads: boiler, pumps, fridge, lighting. Rated output current 52 A: 63 A breaker, 10 mm² cable
3	**SECOND OUT2**	Second output 230 V (terminals L, N, PE)	Secondary loads (water heater, air conditioner). The inverter can switch this output off when the battery is low, to save charge for OUT1
4	**WIFI**	USB connector for the Wi-Fi module (may be labelled COM in promotional photos)	Wi-Fi module for monitoring from a phone
5	**BMS**	RJ45 port for communication with the lithium battery BMS	Battery communication cable (RS485 / CAN), the protocol is selected in the menu
6	**BAT−**	Entry for the 48 V battery “minus” power cable	Black cable from the battery “−”
7	**BAT+**	Entry for the 48 V battery “plus” power cable	Red cable from the battery “+” via a 300 A DC breaker; 70 mm² cables (or 2×35 mm²)
8	**PV1**	Solar panel input, group 1 (MPPT 1)	Via a separate PV DC breaker. String Voc up to 500 V, MPPT operating voltage 60–450 V, current up to 22.5 A (if only one input is used, up to 27 A)
9	**PV2**	Solar panel input, group 2 (MPPT 2)	Second group of panels (another roof slope), separate PV DC breaker; same limits: up to 500 V, up to 22.5 A

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№	Connector	What it is	What connects where
—	**ON / OFF**	Power switch (on the side wall)	Switch on after connecting the battery and its DC breaker

Ratings from the inverter label: 12 000 W, output 230 V 52 A, grid bypass up to 70 A, battery 48 V (40–60 V), PV up to 500 V. Cable cross-sections and breakers are the seller's calculation for 12 kW / 48 V (up to ~250 A from the battery).

Key values for this pair

56.8 V charge voltage (20)	**54.4 V** float voltage (21)	**48.0 V** cut-off (19)
PYL BMS protocol (44)	**100 A** max. charge current (07)	**40 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 switched off: inverter button OFF, battery switch/button OFF, DC breaker off, 230 V grid not connected.
3. Install a **300 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 **70 mm² (or 2×35 mm²)**, M8 lugs): **red** from the battery "+" to the inverter "+ BAT", **black** from the battery "−" to "− BAT". Check the polarity twice: swapped "+" and "−" will 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 80 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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Battery communication: Pylon 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:

1. The protocol is selected on the battery display: tab **protocol setting,** line **RS485-PCS,** use the ◀ ▶ buttons to choose **Pylon** and press **Set (** manufacturer’s manual, section 5.6). The **Read** button shows what has been saved.
2. The address of a single battery is **1:** DIP switch **ADS No.** 1 ON, No. 2–4 OFF (5 and 6 are not used).
3. The communication cable to the inverter goes into the battery’s **RS485** port. The RS485-1 / RS485-2 ports are only for linking batteries together.

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.

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** (no panels) or **PbG** (with panels)	GPb: from the grid, battery kept full in case of a power cut. PbG: solar and battery first, the grid when they are not enough.
04	Input mode	**UPS (**grid) / **GEn** (generator)	UPS: fast switchover for computers. GEn: running on a generator.
05	Charging source priority	**PnG** (solar + grid)	Charging from both solar and grid.
06	Grid charging current	**40 A**	Moderate grid charging, without overloading the wiring or the battery.

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07	Maximum charging current (total)	**100 A**	Total solar + grid charging, safe for LiFePO4 314Ah. 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	**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 are the same for the whole POWLAND SMS inverter series (same screen and buttons). After entering the settings, switch the inverter off and on again.

Which mode to choose

- **Backup during power cuts only (no panels):** 03 = GPb, 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 OPu — solar only). Solar power by day, battery at night, the grid only when the battery has dropped to 50.0 V.
- **Running on a generator:** 04 = GEn, 06 = 40 A or less, so as not to overload the generator.

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How long it runs on battery

Load	Example	Runtime
200 W	fridge + lights	**≈ 65.1 h**
300 W	fridge + lights + TV	**≈ 43.4 h**
500 W	fridge, laptop, pump	**≈ 26.0 h**
1000 W	boiler, kettle briefly, several appliances	**≈ 13.0 h**
2000 W	air conditioner, water heater, electric stove	**≈ 6.5 h**
4000 W	whole house, pump, power tools	**≈ 3.3 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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