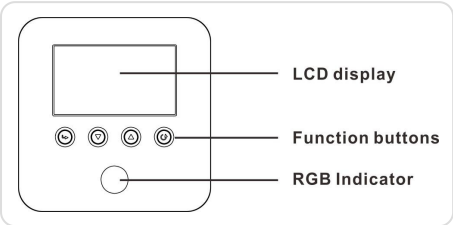
SETUP MANUAL · ENGLISH

Hybrid inverter Aninerel 4.2 kW 24 V

ANL-4200T-24L-W-PRO · two outputs, RGB indicator, Wi-Fi · per the manufacturer's manual "Hybrid Solar Inverter/Charger 4.2KVA/5.0KVA" (371-00201-03)



Control panel (figure from the manual, p. 11): display, buttons, RGB indicator.

Control panel

The front panel has a display, four buttons and a round RGB indicator.

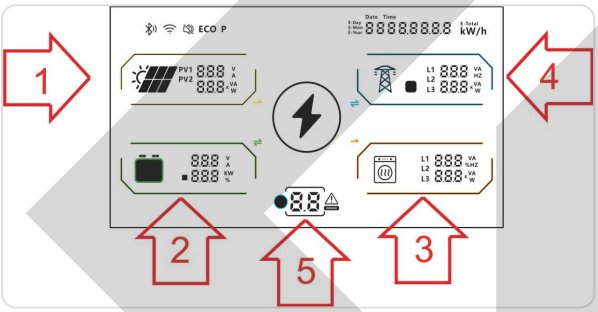
ESC	UP	DOWN	ENTER
exit settings	previous item	next item	enter and confirm

How to change settings

1. Press and hold **ENTER** 3 seconds: the inverter enters settings mode.

2. Select the program with **UP / DOWN**.
3. Press **ENTER,** choose the value with **UP / DOWN** and confirm with **ENTER.**

4. **ESC** button: exit.



Display zones (manual, p. 12): **1** — solar panels (voltage, current, power); **2** — battery (voltage, current, power, SOC); **3** — output (voltage, current, power, %, frequency); **4** — grid input; **5** — program code, Eco, buzzer, fault, warning.
UP / DOWN scroll the data of all zones together, ESC goes back. ENTER selects a single zone (its icon blinks), then UP / DOWN scroll only that zone.
In settings mode: zone 5 — program number, zone 2 — item, zone 3 — current value, zones 1 and 4 — minimum and maximum (if any).



Most important: battery type — program 05, main output cut-off — program 31.

For a lithium battery with RS485 link select **LI2** (Pylon US2000) or **LI4** (manufacturer protocol) ; LIb is lithium without link. Program 29 in this model cuts off the **second** output.

RGB indicator

Mode	Colour	Steady	Blinking (2 s on, 1 s off)
From inverter	green	Output powered by battery or PV; battery fully charged or not charging	Battery charging
From grid	blue	Output powered by grid or PV; battery charged or not charging	Battery charging
Standby	light blue	Battery charged or not charging	Battery charging
Fault	red	Inverter fault	—
Bypass	purple	Grid operation without charging	—
Charging (switch off)	yellow	Battery fully charged	Battery charging

Indicator behaviour can be changed in program 49.

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Inverter bottom panel

Bottom panel and side wall: what connects where

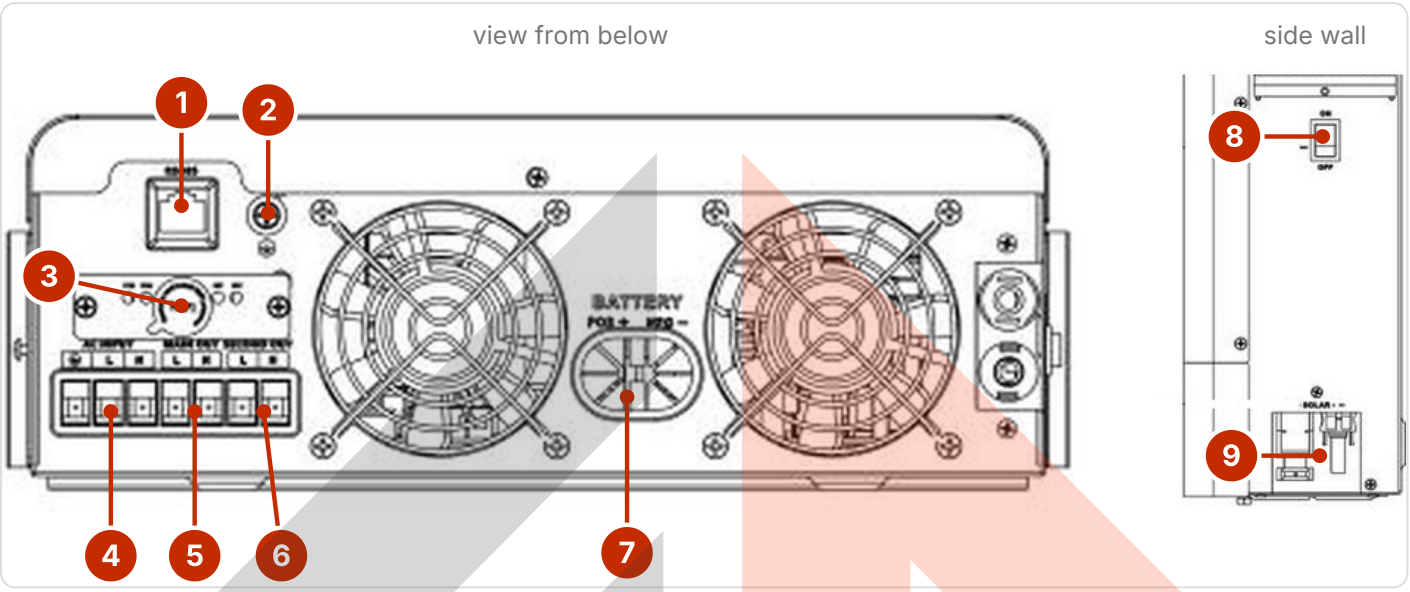
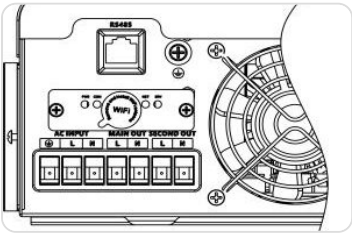


Figure from the manufacturer's manual (p. 2, "Product overview", model 4.2KVA/5.0KVA). There is no photo of this model's bottom panel. Numbers in the figure match those in the table. The two round elements on the right of the bottom panel are not described in the manual.

№	Port	What and why	What connects where
1	**RS485 (BMS)**	RJ45 port for RS485 communication with the lithium battery BMS.	Battery comm cable "pin to pin": pin 1 — RS485-B, 2 — RS485-A, 7 — RS485-A, 8 — RS485-B. Then select LI2 or LI4 in program 05.
2	**Grounding**	Case earthing screw.	Protective PE wire (yellow-green). The inverter must be connected to a permanent earth.
3	**Wi-Fi antenna port**	Built-in Wi-Fi Plug Pro module for monitoring via the app.	Screw on the Wi-Fi antenna from the kit (see Wi-Fi page).
4	**AC INPUT (⏚ · L · N)**	Grid or generator input.	Via a separate 50 A breaker. Cable 6 mm². First PE, then L (brown/black) and N (blue).
5	**MAIN OUT (L · N)**	Main output (OP1).	Panel for essential loads. 6 mm² cable. Disconnection from the battery: program 31.
6	**SECOND OUT (L · N)**	Second output (OP2).	Less important loads. Switches off before the main output (program 29); enabled by program 43; overload warning threshold: program 47.
7	**BATTERY (POS + · NEG −)**	Battery terminals 24 V (cable entry in the middle).	Cable 50 mm² with lugs, 4–6 N·m; separate DC protection. **There is no reverse polarity protection:** check with a tester.
8	**ON / OFF**	Power switch (on the side wall in the manual's figure).	Switch on after all cables are connected and the battery is attached.
9	**PV (SOLAR + · −)**	Solar panel input (on the side wall), sockets for PV connectors; 2 connectors included.	Via a separate DC breaker. 6 mm² cable. Open-circuit voltage no more than 500 V.



Terminals under the bottom cover (manual figure, p. 6). Left to right: **AC INPUT** (⏚, L, N), **MAIN OUT** (L, N), **SECOND OUT** (L, N). Above the terminals is the Wi-Fi module with antenna, higher up the RS485 port and earth screw. Do not mix up the "IN" and "OUT" blocks.

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SAFETY · CABLES · BREAKERS

What you need before connecting

Safety instructions and Installation sections of the manual (pp. 1–9)

Cables and protection (per the manual, model 4.2KVA)

Section	Cable	Protection	Torque and notes
Battery	50 mm²	separate DC fuse or breaker rated **175 A**	4–6 N·m. Lug: L 37, W 15.3, D 6.4 mm. Recommended battery capacity: 200 Ah.
AC input (grid / generator)	6 mm²	separate breaker **50 A**	1.4–1.6 N·m. Strip 10 mm, L and N 3 mm shorter.
MAIN OUT / SECOND OUT outputs	6 mm²	—	1.4–1.6 N·m. Do not mix up the “IN” and “OUT” blocks.
Solar panels	6 mm²	separate DC breaker	1.4–1.6 N·m. Typical current 27 A. Strip 6 mm; the PV connector figure shows 4–6 mm² cross-section.

Safety rules

- All connections and servicing by a qualified specialist only. Do not disassemble the inverter.
- Before servicing or cleaning, disconnect all cables: switching the inverter off with the button does not remove the danger.
- Always install overcurrent protection (fuse or breaker) between the battery and the inverter.
- **There is no battery reverse polarity protection.** Before the final DC connection make sure: “plus” to “plus”, “minus” to “minus”.
- Put nothing between the flat part of the terminal and the lug: it may overheat. Do not apply antioxidant to the terminals until they are tightened.
- Be careful with metal tools near the battery: a spark or short circuit can cause an explosion. Never charge a frozen battery.

- Never short the AC output to the DC input. Do not connect the grid if the DC input is shorted.
- Before connecting AC cables, switch off the DC protection and disconnect the grid. Swapped L and N can short the grid in parallel operation.
- Air conditioners need 2–3 min to restart; without a power-on delay a short grid outage may damage them.

- Mount only on concrete or another non-combustible surface, vertically, at eye level; ambient temperature 0–55 °C; clearances per the manual figure: 20 cm at the sides, 50 cm above and below. Fixing: two M4 or M5 screws (hole spacing in the figure: 200 mm).

Battery voltage thresholds for AGM and flooded (per the manual)

Load	“Low battery” warning	Warning cleared	Cut-off (Low DC cut-off)
under 20 %	22.0 V	23.0 V	21.0 V
20–50 %	21.4 V	22.4 V	20.4 V
50 % and above	20.2 V	21.2 V	19.2 V

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Technical specifications

Output (battery mode)		AC input (grid)	
Rated power	**4.2 kVA / 4.2 kW**	Rated voltage	**230 V**
Two outputs (MAIN / SECOND)	**yes**	Range (Appliances / UPS)	**90–280 / 170–280 V**
Waveform	**pure sine wave**	Max. input voltage	**300 V**
Voltage / frequency	**230 V ±5 %, 50 or 60 Hz**	Frequency	**50 / 60 Hz (auto)**
Peak efficiency	**94 %**	Efficiency in grid mode	**>95 %**
Overload capacity	**2× rated 5 s**	Transfer time	**10 ms (UPS), 20 ms (Appliances)**
Battery and charging		**Solar panels (PV)**	
Rated voltage	**24 V**	Rated power	**5000 W**
Cold start voltage	**23.0 V**	Max. open-circuit voltage	**500 V**
Max. charge current (PV + AC)	**100 A**	MPPT range	**60–500 V**
Max. grid charge current	**80 A**	Max. input current	**27 A**
Bulk: flooded / AGM, gel	**29.2 / 28.2 V**	Max. PV charge current	**100 A***
Float voltage	**27 V**	**General**	
Overcharge protection	**32 V**	Operating temperature	**−10...+55 °C**
Battery reverse polarity protection	**none**	Humidity	**5–95 % non-condensing**
Charging algorithm	**3 stages**	Dimensions (D×W×H), weight	**368×312×105 mm, 6.7 kg**

Data from the manual's Specifications tables (pp. 29–31), 4.2KVA column. * The manufacturer's product page says "MPPT 120 A", the manual gives a maximum PV charge current of **100 A.** The manual value is shown here: **check the label** on your inverter.

Step-by-step connection

Step 1 Overview and mounting

The box should contain: inverter, manual, 2 PV connectors, Wi-Fi antenna. Fix the inverter vertically on a non-combustible wall with two M4/M5 screws, with 20 cm clearance at the sides and 50 cm above and below.

Step 2 Remove the bottom cover

Undo the screws (two or three) and remove the bottom cover.

Step 3 Connect the battery

1. Fit a fuse or breaker between the battery and the inverter (typical current 175 A); it must be off.
2. Crimp lugs onto the 50 mm² cables.
3. Fit the lugs squarely on the **BATTERY POS + / NEG –** terminals and tighten to 4–6 N·m. Check polarity with a tester: there is no reverse protection.
4. For a lithium battery with BMS also connect the comm cable to the **RS485** port.

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Step 4 Connect the grid input (AC INPUT)

1. Make sure the battery DC protection is off and the grid is disconnected.
2. Fit a separate 50 A breaker between the grid and the inverter.
3. Strip the 6 mm² wires by 10 mm, shorten L and N by 3 mm.
4. First connect PE (⏚, green-yellow), then L (brown or black) and N (blue) to the **AC INPUT** block; tighten to 1.4–1.6 N·m.

Step 5 Connect the outputs (MAIN OUT and SECOND OUT)

In the same way connect the essential loads panel to **MAIN OUT** and less important loads to **SECOND OUT:** first PE, then L and N. Make sure the wires are firmly fixed. The second output switches off before the main one (programs 29, 31, 43).

Step 6 Connect the solar panels (SOLAR)

1. Fit a separate DC breaker between the panels and the inverter.
2. The string open-circuit voltage (Voc) must not exceed 500 V and must be above the minimum battery voltage; MPPT operating range 60–500 V, input current up to 27 A.
3. Strip the cables by 6 mm, fit the PV connectors from the kit, check polarity and connect to the **SOLAR + / –** sockets on the side wall.

Manual example: 450 W panels (Voc 41.25 V): 3 to 11 in series (up to 4950 W); 550 W panels (Voc 50.32 V): 3 to 9 in series or 2 strings of 4 (4400 W).

Step 7 Refit the cover and switch on

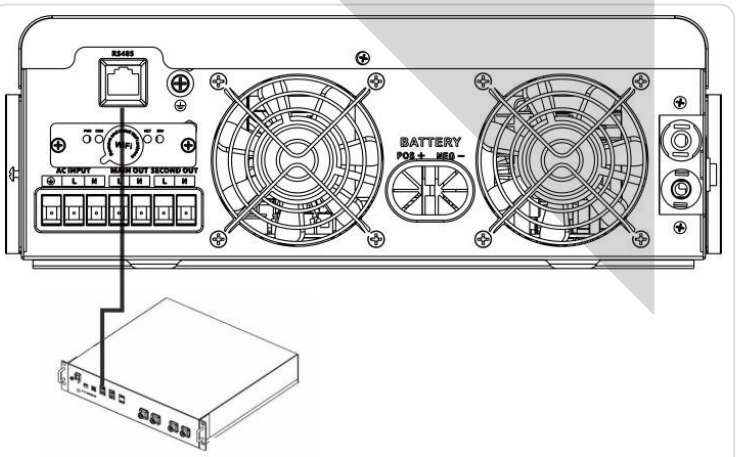
Refit the bottom cover. Screw on the Wi-Fi antenna. Switch on the battery DC protection, then the **ON/OFF** switch. Then select the battery type in program 05 and the other settings.

LITHIUM BATTERY

Settings for a lithium battery

Setting for lithium battery section of the manual (pp. 23–26)

The manufacturer states: use only lithium batteries compatible with the inverter. A lithium battery has two connections: the power cable (as for lead-acid) and the RS485 comm cable from the BMS.



Manual figure: comm cable from the battery BMS port to the inverter RS485 port.

RJ45 pin	RS485 port
1	RS485-B
2	RS485-A
7	RS485-A
8	RS485-B

Cable: “pin to pin”.

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Battery with link (BMS)

1. Connect the power cable and the RS485 cable.
2. In program **05** select **LI2** (Pylon US2000, protocol 3.5) or **LI4** (manufacturer protocol) .
3. With a working link, programs 12, 13, 29, 31 are set in SOC percent (12: 50 %, 13: 95 %, 29: 20 %, 31: 22 % by default).

With a working link the **Li** icon blinks on the display, and the BMS max. charge voltage, max. charge current and SOC are shown. Li blinking once every 1 s: battery discharge forbidden; once every 2 s: charging forbidden. No link: warning **19.**

Pylontech US2000: DIP switch 1 ON (baud rate 9600), switches 2–4: group address (on the first battery). Order: RS485 cable → switch the battery on → hold the battery button over 3 s → switch the inverter on → program 05 = **LI2.**

Lithium battery without link (LIb)

Method 1 (recommended by the manual): in program 05 just select **LIb. Method 2:** find the BMS max. charge voltage, max. charge current and discharge protection voltage in its specifications, and set:

Program	What to set
05	**LIb**
26	C.V voltage = BMS max. charge voltage − 0.5 V
27	float voltage = value of program 26
29	cut-off voltage ≥ BMS discharge protection voltage (as in the manual; but in this model 29 cuts off the second output, and the main one is program **31:** check both)
02	max. charge current below the BMS max. charge current
12	(for SbU) ≥ cut-off voltage + 2 V, otherwise a low battery voltage warning appears

Configure while the inverter gives no output (only the display is lit), and restart the inverter after configuring.

SETTINGS MENU

All menu programs

Values for the 24 V model. The display image shows the default symbol as drawn in the manual. Grey “888”: the manual has no display figure for this program. Programs 04, 14, 15, 17, 21, 22, 24, 28, 30, 38, 40, 44, 45, 48 are not in the manual.

Priorities and operating mode



01 Load supply source priority

- **Utl — grid first** (default). The grid powers the load; solar and battery power it only when there is no grid.
- **SOL — solar first.** Solar powers the load; if it is not enough, the battery is added at the same time. The grid powers the load only when there is no sun or the battery voltage has fallen to the warning level or to the value of program 12.
- **SbU — solar, battery, grid.** Solar powers the load, together with the battery when short. The grid powers the load only when the battery voltage has fallen to the warning level or to the value of program 12.
- **SUb — solar, grid, battery.** Solar first charges the battery, then powers the load; if it is not enough, the grid is added at the same time.
- **SUF.** If solar is enough for the load and battery charging, the surplus may be exported to the grid. If solar is short, the grid powers the load at the same time.

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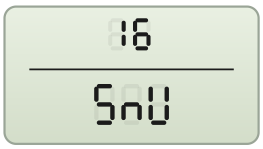
03 AC input voltage range

- **APL — household appliances** (default): 90–280 V.
- **UPS:** 170–280 V.
- **Gnt — generator:** 170–280 V, compatible with generators. Because the generator is unstable, the inverter output may also be unstable.



16 Battery charging source priority

Applies when the inverter is in grid, standby or fault mode:

- **CSO — solar first:** solar charges, the grid only when there is no sun.
- **SnU — solar and grid** (default): both charge at once.
- **OSO — solar only:** only solar charges, even if the grid is present.

In battery mode only solar can charge (if there is enough).



10 Automatic bypass

nnL — manual (default) or **AtO — auto.** In “auto”, if the grid is normal the inverter switches to bypass automatically, even with the switch off.



23 Bypass on overload

byE — on (default): on overload in battery mode the inverter switches to grid mode. **byd:** off.

Output



08 Output voltage

230 V by default. 220, 230 or 240 V can be selected.



09 Output frequency

50 Hz default or 60 Hz.



06 Auto restart after overload

LtE — on (default). **Ltd:** off.



07 Auto restart after overheating

ttE — on (default). **ttd:** off.

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Charging and battery type



05 Battery type

- **AGn — AGM,** lead-acid (default).
- **FLd:** flooded.
- **USE — user settings:** charge and cut-off voltages are set in programs 26, 27, 29.

- **LI2:** lithium battery with PYLON US2000 protocol version 3.5 (RS485 link).
- **LI4:** lithium battery with the standard comm protocol of the inverter manufacturer.
- **LIb:** lithium battery **without link:** factory values suit such a battery; charge and cut-off voltages are set in programs 26, 27, 29.



02 Maximum charge current (solar + grid)

60 A by default. Range: from the grid charge current (program 11) to the max. charge current per specification (100 A). The value cannot be below program 11.



11 Maximum grid charging current

30 A by default. Range 5 A up to the max. per specification (80 A).



26 Constant voltage charge voltage (C.V, bulk)

Adjustable if USE or LIb is selected in program 05. Default **28.2 V.** Range: not LIb — from program 27 to 31 V; LIb — from program 27 to 29 V.



27 Float voltage

Adjustable with USE or LIb. Default: not LIb — **27.0 V,** LIb — **28.2 V.** Range from 24.0 V to the value of program 26.



32 Constant voltage charge time (C.V)

Auto (default): the inverter sets the time itself. Or 5–900 min in 5 min steps. Adjustable with USE or LIb.

Output cut-off and switching to grid



31 MAIN output (OP1) cut-off: Low DC cut-off

> In this model the main output cut-off voltage is set by program **31,** not 29.

Adjustable with USE or LIb; cut-off happens at this voltage regardless of load. Default: not LIb — **22.0 V;** LIb — **25.9 V;** range from program 29 to Min[program 12 – 0.1 V; 27 V]. With a linked lithium battery (LI2/LI4): **22 %** SOC, range from SOC of program 29 to Min[30 %; program 12 – 1 %].



29 SECOND output (OP2) cut-off

Voltage or SOC at which the second output switches off. Adjustable with USE or LIb. Default: not LIb — **21.0 V;** LIb — **25.0 V;** range from 20 V to Min[program 31; 27 V], below program 31. With linked LI2/LI4: **20 %,** range from 3 % to SOC of program 31.

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12 Switch to grid (SbU and SOL modes)

Not LIb: **23.0 V;** LIb: **26.0 V;** range Max[22 V; program 31 + 0.1 V] … Min[program 13 – 0.1 V; 28.6 V]. With linked LI2/LI4: **50 %** SOC, range from (program 31 + 1 %) to 50 %.



13 Return to battery operation (SbU and SOL modes)

After full charge (default, also for LIb); range Max[24 V; program 12 + 0.1 V] … Min[program 26 – 0.5 V or "full"]. With linked LI2/LI4: **95 %** SOC, range 60–100 %.



43 Second output (OP2) enable

On — enabled (default), **OFF:** second output disabled.



47 OP2 overload warning threshold

If the second output load exceeds the setting, warning **22** appears. Default **50 %,** range 10–100 %.



46 Max. discharge current protection

OFF by default (function off) or 20–500 A. Single inverter only. If the discharge current exceeds the setting: with grid present the inverter switches to grid and battery discharge stops; without grid a warning appears and discharge continues.

Lithium battery activation



41 Automatic lithium battery activation

nnL — off (default). **AtO:** if USE, LIb or a linked lithium battery is selected in program 05 and no battery is detected, the inverter activates it automatically once. To enable auto-activation the inverter must be restarted.



42 Manual lithium battery activation

nOP — off (default). **ACt:** if the battery (USE, LIb or linked) is not detected, you can activate it manually once.



50 Lithium battery activation time

When activation is available: default **6 s,** range 6–300 s.

Equalization charge

For flooded batteries, USE and LIb (program 33). Once enabled, equalization starts at the interval (program 37) or immediately (program 39) during float: the inverter charges to the equalization voltage (34) and holds it for the set time (35). If the voltage is not reached, the time is extended up to the limit (36), after which the inverter returns to float.



33 Equalization charge

EdS — off (default), **EEn:** on. Adjustable with FLd, USE or LIb.

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34 Equalising voltage

Default **29.2 V,** range from the float voltage to 31 V.



35 Equalization time

Default **60 min,** range 0–900 min.



36 Equalization time limit

Default **120 min,** range 0–900 min.



37 Equalising interval

Default **30 days,** range 1–90 days.



39 Start equalising now

AdS — off (default). **AEn:** equalization starts at once, the main screen shows “E9”. Available if equalization is enabled in program 33.

Display, sound, indicator, communication



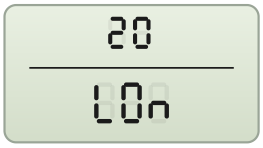
18 Buzzer mode

- **nd1:** buzzer off.
- **nd2:** sound when the input source changes or on certain warnings and faults.
- **nd3:** sound on certain warnings and faults.
- **nd4** (default): sound on faults only.



19 Return to main screen

ESP (default): after 1 min without key presses the display returns to the main screen. The other option is to stay on the last screen.



20 Backlight

LOn — on (default), **LOF:** off.



49 RGB indicator mode

- **nd1** (default): the indicator works normally.
- **nd2:** lit only in fault mode.
- **nd3:** always off.
- **nd4:** like mode 1, but never blinks (regardless of battery charging).
- **nd5:** like mode 1, blinks (regardless of battery charging).

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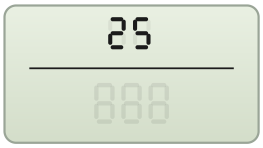


25 **Modbus address**

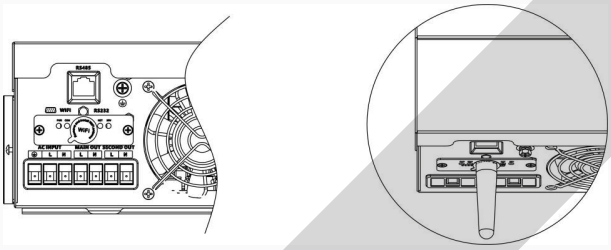
Default **001,** range 001–247.

WI-FI · WI-FI PLUG PRO

Connecting the inverter to Wi-Fi

Per the manual section “Wi-Fi Plug Pro Quick Installation Guideline”

Step 1 Fit the antenna



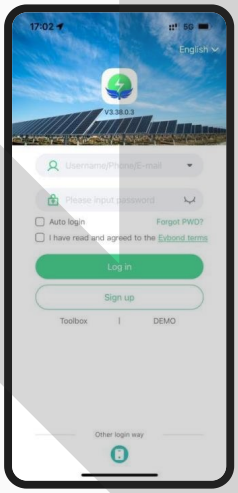
Screw the Wi-Fi antenna from the kit onto the antenna port on the bottom panel (manual figure, p. 33).

Step 2 Install the app and register

1. Scan the QR code and install the app (App Store or Android). The QR code image in the manual leads to the app **SmartESS**.
2. Open the app, tap register and choose registration by phone number or by e-mail.
3. Turn on Bluetooth or Wi-Fi on the phone, depending on the setup method.



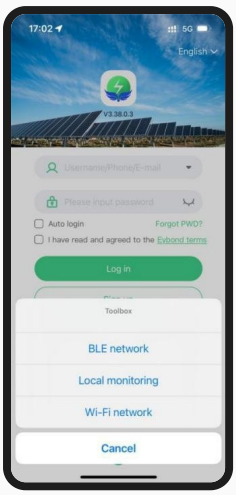
Download QR code



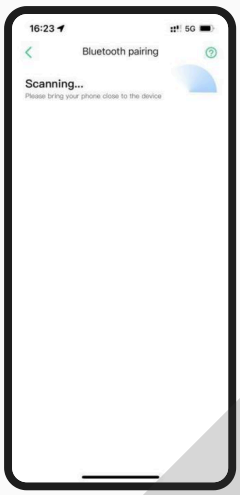
Login and registration

Step 3 Connect to the datalogger via Bluetooth

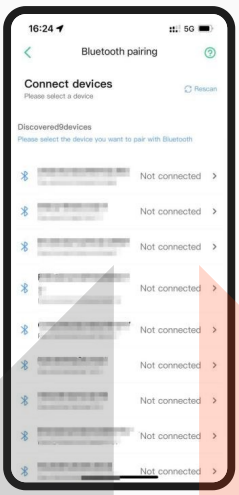
Tap **Toolbox** and choose **BLE network** (Bluetooth) or **Wi-Fi network.** With Bluetooth the phone finds nearby devices itself: on the **Bluetooth pairing** page find your datalogger PN and tap **Connect.**



Toolbox → BLE network



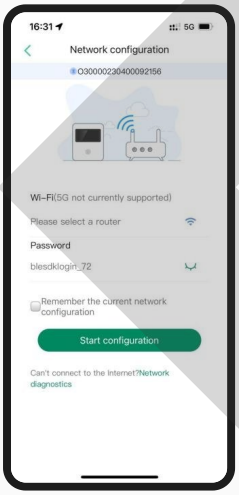
Device search



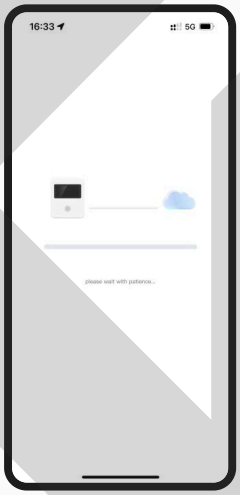
Your PN → Connect

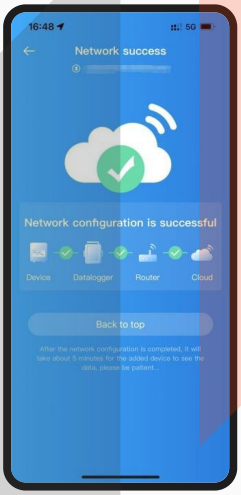
Step 4 Connect to 2.4 GHz Wi-Fi

Choose your **2.4 GHz** network (5 GHz is not supported), enter the password and start the setup (**Start configuration).** Wait for the success message; Wi-Fi tips are on the **Wi-Fi pairing** page in the app.

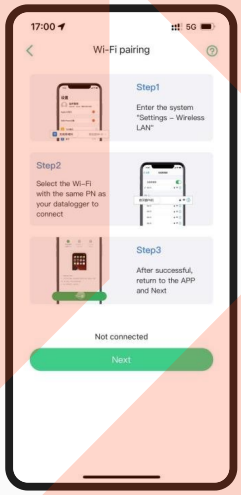


Network and password


Setup



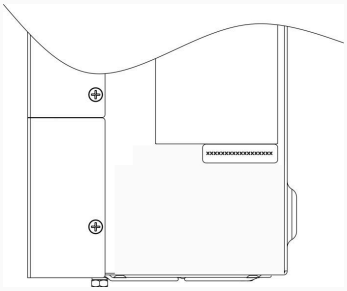
Success



Wi-Fi pairing tips

Step 5 Add the datalogger to your account

1. Log in to your account, open the **Datalogger** section and tap “+” in the top right corner.
2. Enter the data as prompted. The **PN** number is on the sticker next to the inverter rating plate (figure on the right).
3. Initial datalogger password: **12345678.**



Screens from the manufacturer’s manual (Wi-Fi Plug Pro Quick Installation Guideline section, pp. 33–37); your app version may look different.

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Faults and warnings

Fault codes (red indicator)

Code	Fault
01	Inverter module overheat
02	DC/DC module overheat
03	Battery voltage too high
04	PV module overheat
05	Output short circuit
06	Output voltage too high
07	Overload: allowed time used up
08	Bus voltage too high
09	Bus soft start failed
10	PV overcurrent
11	PV overvoltage
12	DC/DC overcurrent
13	Overcurrent or current surge
14	Bus voltage too low
15	Inverter fault (self-test)
18	Op current sensor offset too large
19	Inverter current sensor offset too large
20	DC/DC current sensor offset too large
21	PV current sensor offset too large
22	Output voltage too low
23	Negative inverter power
24	Second output (OP2) current sensor offset too large

Warning

Code	Warning	Beeper
02	Temperature too high	3 beeps every second
04	Low battery	1 beep every second
07	Overload	1 beep every 0.5 s
10	Output power derating	2 beeps every 3 s
14	Fan blocked	silent
15	Low PV energy	2 beeps every 3 s
19	No link with lithium battery (BMS)	1 beep every 0.5 s
21	Lithium battery overcurrent	silent
22	Load exceeds the program 47 threshold (OP2)	silent
E9	Equalization charge	silent
bP	Battery not connected	silent

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What to do if...

Problem	Possible cause	What to do
The inverter turns off during start-up: display, indicators and buzzer work for 3 s and go out	Battery voltage too low	Charge or replace the battery
Nothing lights up after switching on	Battery voltage too low or reversed polarity	Check the battery and connections; charge or replace the battery
Grid present, but the display shows input voltage 0, green indicator blinking	Input protection tripped	Check the breaker and AC wiring
Grid present, but the inverter runs on battery, green indicator blinking	Poor grid or generator quality; or “solar first” is selected	Check wire size and length, the generator, program 03 (UPS / Appliances); or select “grid first” in program 01
Relay keeps clicking at switch-on, display and indicators blink	Battery disconnected	Check the battery cables
Code 07	Overload 110 %, time used up	Reduce the load
Code 05	Output short circuit	Check the wiring, remove the faulty load
Code 02	Internal component temperature above 100 °C	Check that airflow is not blocked and the ambient temperature is not too high
Code 03	Battery overcharged or battery voltage too high	Check the battery type and number; otherwise service
Code 06 / 22	Output voltage below 190 V or above 260 V	Reduce the load; otherwise service
Code 08 / 09 / 15	Internal component fault	Service
Code 13 / 14	Overcurrent / low bus voltage	Restart; if it repeats, service
Other code	—	If the wiring is correct, service

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