

AllSpark

POWERING YOU OFFROAD

24V 5000W Hybrid Inverter

User Manual

SKU: AS-HYBRIDINVSCC245000



Manufactured by Offroad Living

Unit 2/29 Prestige Parade, Wangara WA 6065, Australia
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Important Information

Thank you for choosing the AllSpark 24V 5000W Hybrid Inverter. Please read this manual carefully before installation and operation, and keep it for future reference.

Manufacturer

Brand	AllSpark
Manufactured by	Offroad Living (Apex Overland Group Pty Ltd), ABN 71 690 901 314
Address	Unit 2/29 Prestige Parade, Wangara WA 6065, Australia
Phone	(08) 6205 6868
Email	sales@offroadliving.com.au
Website	offroadliving.com.au
SKU	AS-HYBRIDINVSCC245000
Product	24V 5000W Hybrid Inverter (MPPT solar charge controller + pure sine wave inverter + 160A AC-DC charger + UPS)

CAUTION This product must be installed and serviced by a suitably qualified and licensed person, in accordance with AS/NZS 3000 (Wiring Rules) and all applicable Australian electrical safety standards and local regulations.

Compliance: This product is supplied for the Australian market. Electrical installation must comply with AS/NZS 3000 and any other applicable AS/NZS standards. If the unit is installed in a recreational vehicle, AS/NZS 3001 also applies. Where the unit is connected to grid supply or used to feed in to the grid, installation and connection must be carried out only by a licensed electrician and in accordance with the requirements of the local Distributed Network Service Provider (DNSP).

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1. Information on this Manual

1.1 Validity

This manual is valid for the AllSpark 24V 5000W Hybrid Inverter (SKU AS-HYBRIDINVSCC245000).

1.2 Scope

This manual describes the assembly, installation, operation and maintenance of this unit. Please read this manual carefully before installation and operation.

1.3 Target Group

This document is intended for qualified persons and end users. Tasks that do not require any particular qualification may also be performed by end users. Qualified persons must have the following skills:

- Knowledge of how an inverter works and is operated.
- Training in dealing with the dangers and risks associated with installing and using electrical devices and installations.
- Training in the installation and commissioning of electrical devices and installations.
- Knowledge of the applicable standards and directives.
- Knowledge of, and compliance with, this document and all safety information.

1.4 Label Description

To ensure personal safety when using this product, the inverter and this manual use the following symbols to alert the user. Please read the list of symbols carefully.

Labels on the inverter

- CAUTION – Do not disconnect under load.
- Danger: High voltage.
- Danger: Electrical hazard.
- Wait at least 5 minutes after the inverter is disconnected from all external power supplies before starting maintenance.
- Read the instructions carefully before performing any operation on the inverter.
- Grounding: The system must be firmly grounded for operator safety.

Labels used in this documentation

WARNING A high level of potential danger which, if not avoided, could result in death or serious injury.

CAUTION A moderate or low level of potential danger which, if not avoided, could result in moderate or minor injury. In some situations it could also result in death or serious injury.

1.5 Safety Instructions

WARNING This chapter contains important safety and operating instructions. Read and keep this manual for future reference.

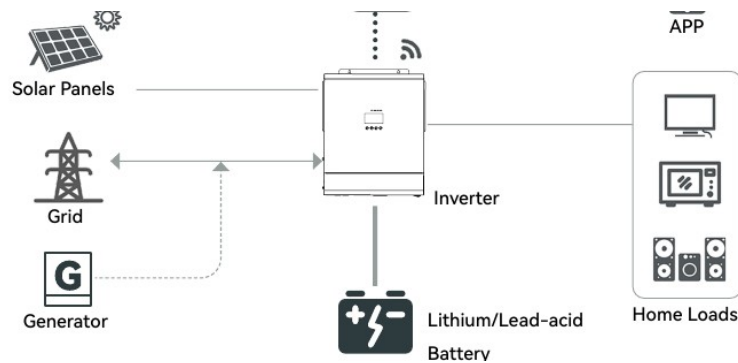
1. Be clear about which battery system you intend to use – lithium or lead-acid. If the wrong system is selected, the energy storage system will not work correctly.

2. Before using the unit, read all instructions and cautionary markings on the unit, the batteries and all relevant sections of this manual. Warranty does not apply to equipment damage caused by installation that does not follow this manual.
3. All operations and connections must be performed by a qualified electrical or mechanical professional.
4. All electrical installations must comply with the local electrical safety standards.
5. When installing PV modules during the day, cover the modules with opaque material. PV modules in sunlight can produce dangerously high voltage.
6. CAUTION – To reduce the risk of injury, charge only deep-cycle lead-acid type rechargeable batteries or lithium batteries. Other types of battery may burst, causing personal injury and damage.
7. Do not disassemble the unit. Take it to a qualified AllSpark service centre when service or repair is required. Incorrect re-assembly may result in a risk of electric shock or fire.
8. To reduce the risk of electric shock, disconnect all wiring before attempting any maintenance or cleaning. Turning off the unit will not reduce this risk.
9. NEVER charge a frozen battery.
10. For optimum operation, follow the required specification to select the appropriate cable size. Correct cable sizing is essential for safe operation.
11. Be very cautious when working with metal tools on or around batteries. Dropping a tool may spark or short-circuit the batteries or other electrical parts and could cause an explosion.
12. Strictly follow the installation procedure when disconnecting AC or DC terminals. Refer to the Installation section of this manual for details.
13. GROUNDING INSTRUCTIONS – This inverter must be connected to a permanent grounded wiring system. Be sure to comply with local requirements and regulations.
14. NEVER short-circuit the AC input or output or DC input. Do NOT connect to the mains when the DC input is short-circuited.
15. Make sure the inverter is completely assembled before operation.

2. Introduction

This is a multifunctional hybrid solar inverter charger that integrates an MPPT solar charge controller, a high-frequency pure sine wave inverter, high current AC to DC charger and a UPS function module in one unit. It is ideal for off-grid backup power and self-consumption applications, and can work with or without batteries (energy source dependant).

To form a complete system, other devices are also required – such as PV modules, a generator or the utility grid. Please consult your system integrator for other possible system architectures depending on your requirements. The WiFi module is a plug-and-play monitoring device. With it, users can monitor the status of the PV system from a mobile phone or website at any time, though it is a complex device and needs more than basic mobile device skills to setup and operate.

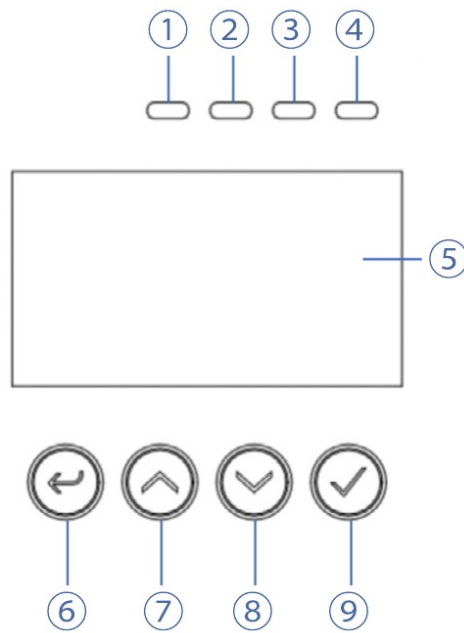


Typical solar energy storage system

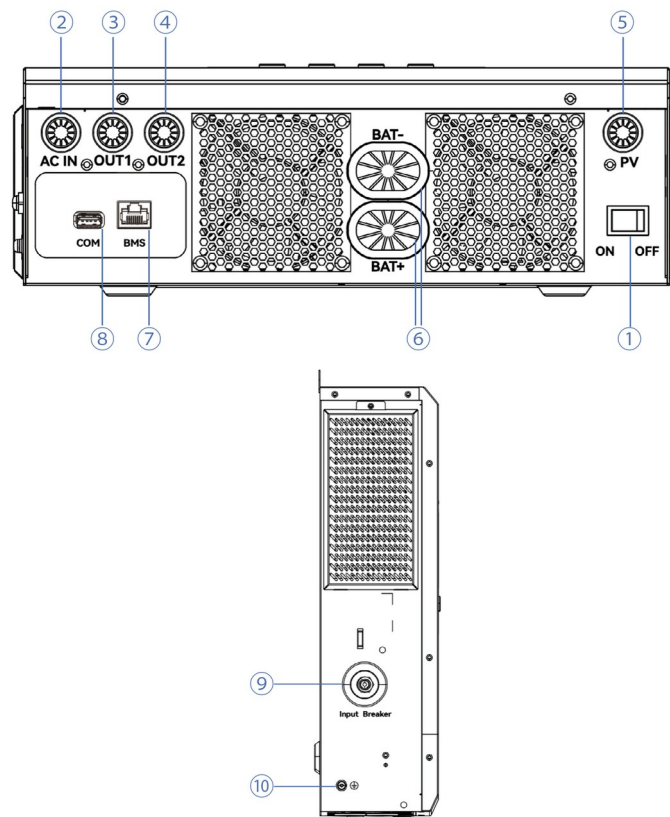
2.1 Features

- Rated power 5kW / 5kVA, power factor 1.
- MPPT range 60V–450V, 500Voc.
- High frequency design – small size and light weight.
- Pure sine wave AC output.
- Solar and grid can power loads at the same time.
- CAN / RS485 for BMS communication.
- Able to work without a battery.
- WiFi remote monitoring (optional).
- Dual AC output.
- Feed-in to grid (not used).

2.2 Product Overview



Front panel: (1) AC indicator (2) Inverter indicator (3) Charging indicator (4) Fault indicator (5) LCD display (6) ESC button (7) Up button (8) Down button (9) Enter button



Connections: (1) Power On/Off switch (2) AC Input (3) AC Output 1 (4) AC Output 2 (5) PV Input (6) Battery Input (7) BMS Port (8) COM Port (9) AC Input Breaker (10) PE (earth)

3. Installation

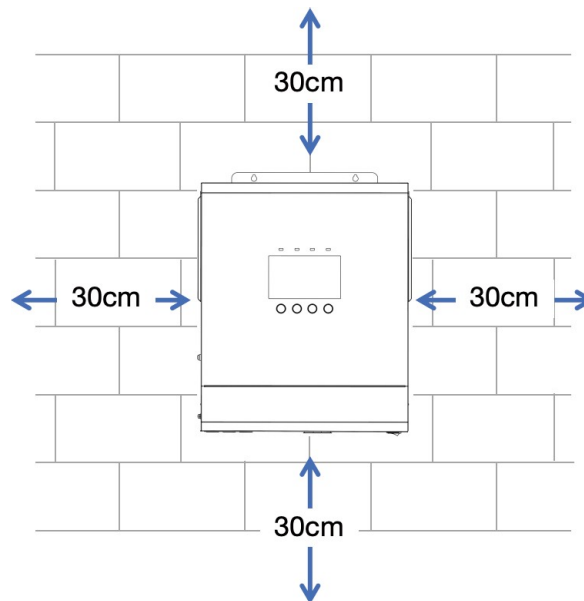
3.1 Unpacking and Inspection

3.1.1 Open-box Inspection

Products are strictly tested before leaving the factory. Please inspect the unit before signing for it. If the product is damaged, contact Offroad Living. Open the box and check whether the outer packaging is intact and whether the internal equipment is damaged.

3.1.2 Installation Tools

The following tools are recommended for installation: multimeter, protective gloves, steel toe safety shoes/boots, safety glasses, ESD wrist strap, hammer drill, electric screwdriver, phillips screwdrivers, rubber mallet, spirit level, wire cutter / stripper, and a terminal crimping tool.



Mounting clearances and wall fixing

3.1.3 Packing List

No.	Item	Qty	Description / Remarks
1	Inverter	1	—
2	User manual	1	English

3.2 Mounting the Unit

Consider the following before selecting where to install the unit:

- Do not mount the inverter on flammable construction materials.
- Mount on a solid surface.
- Install at eye level so the LCD display can be read at all times.
- Ambient temperature should be between -10°C and 60°C for optimal operation.
- Mount the inverter vertically against the wall.

WARNING The inverter should be mounted on a non-combustible surface only.

Follow these installation steps:

1. Secure the unit to a fixed surface using a suitable M6 fixing. The supplied fixings are for mounting on a masonry surface only. All other surfaces will require the user to supply appropriate fixings.
2. Lift the inverter vertically and align the holes at the top of the inverter with fixing points. Fix the inverter to the surface with suitable fixings.
3. Before connecting any wiring, remove the bottom cover by removing the four screws.
 - Keep clear space around the unit as shown in the installation diagram to ensure sufficient heat dissipation and room for wiring.

3.3 AC Input / Output Connection

CAUTION Before connecting to the AC input power source, install a separate AC circuit breaker between the inverter and the AC input source. This ensures the inverter can be safely disconnected during maintenance and protected from over-current. The recommended AC breaker rating is 32A.

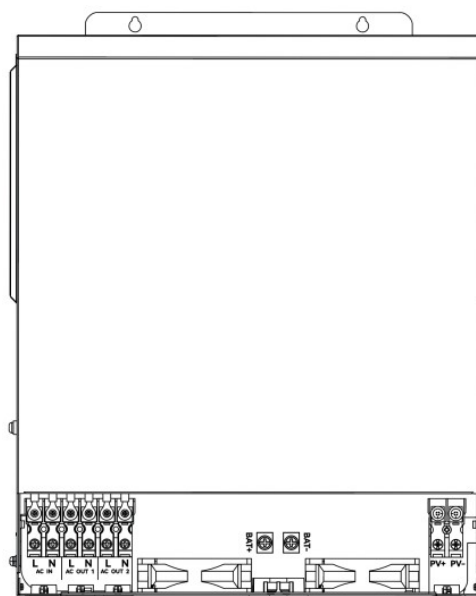
CAUTION There are three terminal blocks marked 'AC IN', 'AC OUT1' and 'AC OUT2'. Do NOT misconnect the input and output connectors.

CAUTION Connect AC cables with correct polarity. If the L and N wires are reversed, it may cause a utility short-circuit when inverters are operated in parallel.

WARNING All wiring must be performed by licenced and qualified personnel.

WARNING Use the correct cable size for safe and efficient operation. Recommended AC input cable: 10 AWG / 5.26 mm². Recommended AC output (1/2) cable: 12 AWG / 4 mm².

WARNING Make sure AC power is disconnected before connecting AC power to the unit. All cables and components used must comply with local laws and regulations. The cable colours below are for typical reference only.



AC IN / AC OUT1 / AC OUT2 terminal blocks

To make the AC input (AC IN) connection:

1. Before making the AC connection, open the AC circuit breaker first.
2. Remove 12mm of insulation from the end of the cable and shorten the conductor to 10mm. Insert the cable into the tubular bootlace terminal, then use the crimping tool to crimp the terminal and cable tightly together.
3. Insert the AC input cables according to the polarity indicated on the terminal blocks and tighten the terminal screws. Connect the PE protective cable on the inverter side first.
PE → Protective Earth (yellow & green) | L → Line (brown or red) | N → Neutral (blue or black)
4. Make sure the cables are securely connected.

To make the AC output (OUT1 / OUT2) connection, follow the same steps as the AC input for the L (Line) and N (Neutral) cables. Start all termination processes with circuit breakers open circuit/isolated.

CAUTION Appliances such as air conditioners require 2–3 minutes to restart, as they need time to balance the refrigerant gas inside their circuits. If a power outage occurs and recovers quickly, it may damage the connected appliance. Check with the appliance manufacturer whether a time-delay function is fitted before installation. Otherwise the inverter may trigger an overload fault and cut off output to protect the appliance, though internal damage to the air conditioner may still occur.

Using a Generator

A generator can be connected to the AC input (AC IN). Set the input mode to GEN in Program 04, which applies a wider transfer window (typically 20ms) suited to generator supply. For generator-priority operation, set the output source priority to MKS in Program 03 – the generator then powers the loads first, with PV and battery managed around it.

CAUTION This model does NOT have generator start/stop (dry) contacts. The inverter cannot start or stop a generator automatically based on load, voltage or state of charge. Automatic starting requires a generator fitted with its own auto-start controller.

Size the generator to the connected load, and note the 40A maximum AC input current. For correct operation the generator should provide a stable 230V AC pure sine wave output.

3.4 PV Connection

CAUTION Before connecting to the PV modules, install a separate DC circuit breaker between the inverter and the PV modules.

WARNING Do not ground the positive or negative terminals of the PV modules – this can severely damage the inverter.

WARNING Exposure to sunlight can generate lethal high voltages in photovoltaic strings. Strictly follow the safety precautions in the PV string and related documents.

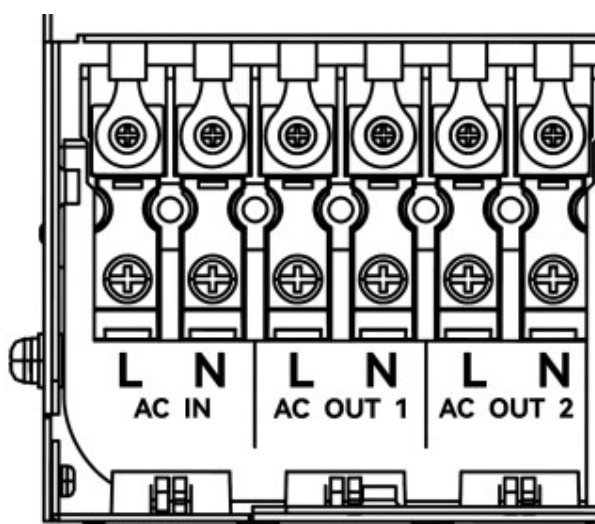
WARNING Connect the PV terminals to the correct ports on the inverter. Reversing the polarity can damage the inverter.

WARNING All wiring must be performed by qualified personnel. Recommended PV cable size: 10 AWG / 5.26 mm². Cable colours are for typical reference only.

PV module selection – when selecting PV modules, be sure to consider the following:

1. The open-circuit voltage (Voc) of the PV array must not exceed the maximum PV array open-circuit voltage of the inverter.
2. The open-circuit voltage (Voc) of the PV array should be higher than the start-up voltage.

Parameter	Value
Max. PV array open-circuit voltage	500 Vdc
Start-up voltage	80 Vdc
PV array MPPT voltage range	60 Vdc – 450 Vdc



Cable connection at the underside terminals

WARNING Do not reset any DC switches or AC/DC circuit breakers before completing the electrical connections.

To make the PV module connection:

1. Before making the PV connection, open the DC circuit breaker and solar PV isolator first.
 2. Remove 12mm of insulation from the cable end and shorten the conductor to 10mm. Insert the cable into the tubular bootlace terminal and crimp tightly.
 3. Use a multimeter to confirm the polarities are correct.
 4. Insert the PV cables according to the polarity indicated on the terminal block and tighten the terminal screws.
- + → PV+ (red) | - → PV- (black)
5. Make sure the cables are securely connected.

3.5 Battery Connection

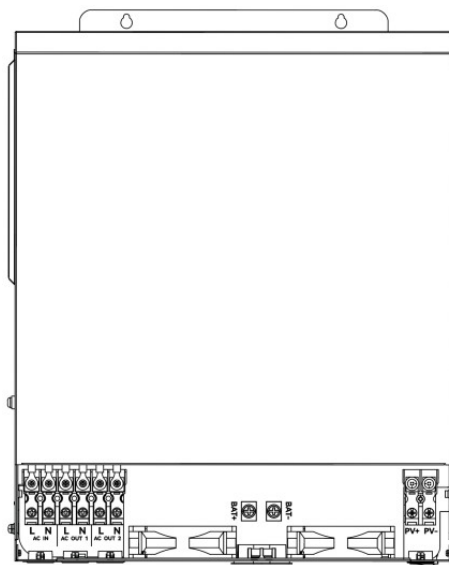
3.5.1 Lead-acid Battery Connection

You may choose a suitable-capacity lead-acid battery with a nominal voltage of 24V. Also select the battery type as 'AGM' or 'FLD' (flooded).

CAUTION For safe operation and regulatory compliance, install a separate DC over-current protector or disconnect device between the battery and the inverter. A disconnect device may not be required in some applications, but over-current protection is always required. The recommended rating of the protector / disconnect is 250A.

WARNING All wiring must be performed by qualified personnel. Recommended battery cable size: 00B&S / 64 mm². Cable colours are for typical reference only.

Note: For lead-acid batteries, the recommended charge current is 0.3C (where C ≤ battery capacity).



Battery terminal connection

To make the battery connection:

1. Unscrew the pre-fitted screws on the battery poles. Prepare two 70mm² terminals (suitable for 00B&S cable).
2. Remove the insulation from the cable end to suit the crimp connector. Insert the cable into the terminal and crimp tightly.
3. Pass the battery cable through the battery installation hole on the bottom shell and tighten the terminal screws. Make sure polarity is correct at both the battery and the inverter, and that the DT terminals are tightly screwed to the battery terminals.
4. Connect all battery packs as required. A minimum capacity of 200Ah is recommended.

WARNING Shock hazard. Installation must be performed with care due to high battery voltage in series.

3.5.2 Lithium Battery Connection

If using a lithium battery and wanting to use communications between the battery and the inverter, first check the compatibility of the communication protocol. The lithium battery has two connectors: an RJ45 BMS port and a power cable. It is not mandatory to communicate with the lithium battery BMS.

1. Follow section 3.5.1 to make the power cable connection.
2. If required, connect the RJ45 terminal of the battery communication cable to the BMS communication port of the inverter. The protocol must be RS485 or CAN.
3. Insert the other end of the RJ45 cable into the battery communication port of the lithium battery.

Note: When using a lithium battery, make sure the BMS communication cable is connected between the battery and the inverter.

CAUTION Do not place anything between the flat part of the inverter DC terminal and the cable crimp terminal, otherwise overheating may occur.

CAUTION Do not apply anti-oxidant substance to the terminals before they are tightly connected.

CAUTION Before making the final DC connections or closing the DC or PV breakers / disconnectors, make sure positive (+) is connected to positive (+) and negative (-) is connected to negative (-).

Lithium battery communication and setting:

To communicate with the battery BMS, set the battery type to 'Lib' or 'FEL' in Program 17 (see section 4.2.2). Make sure the lithium battery BMS port connects to the inverter pin-to-pin. The inverter BMS port pin assignment is shown below.

Pin	BMS Port	Pin	BMS Port
1	RS485B	5	CANL
2	RS485A	6	–
3	–	7	–
4	CANH	8	–

Communicating with the battery BMS in a parallel system: connect the BMS communication cable between the battery and one inverter of the parallel system.

3.6 Final Assembly

After connecting all wiring, replace the bottom cover and secure it with the four screws removed in section 3.2.

3.7 Smart Communication Stick (Optional)

The smart communication stick (WiFi) connects the inverter to the cloud platform. Insert the stick directly into the COM port. Some models support a built-in WiFi monitoring function – refer to the solar app quick configuration guide.

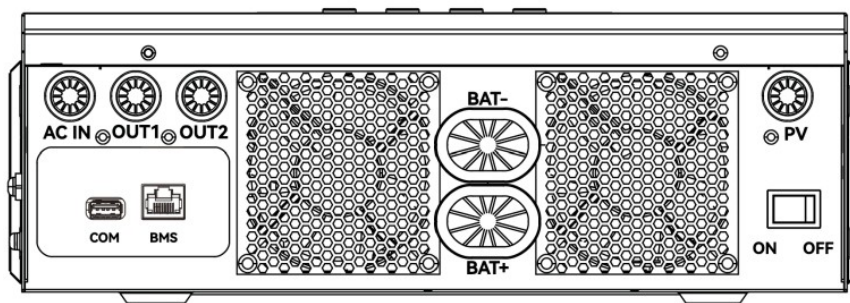
4. Operation

4.1 Power ON / OFF

Once the unit has been properly installed and the batteries are connected, press the ON/OFF switch (located on the bottom of the case) to turn on the unit.

4.2 Operation and Display Panel

The operation and display panel on the front of the inverter includes four indicators, four function keys and an LCD display, showing the operating status and input/output power information.



Operation and display panel

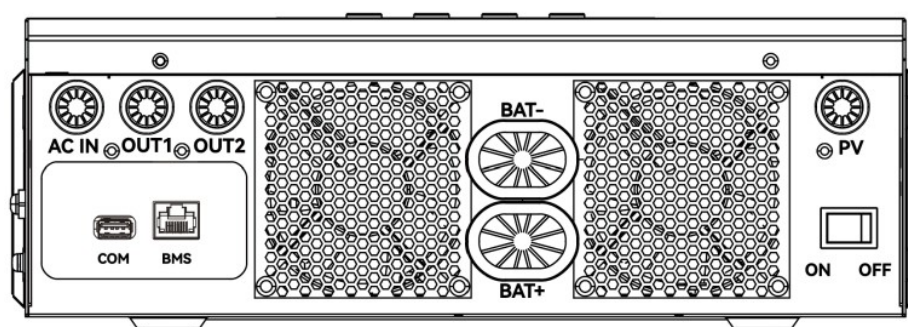
LED Indicator Messages

Indicator	State	Meaning
AC (green)	Solid on	Mains power is normal and the unit is in mains operation.
AC (green)	Flashing	Mains power is normal but the unit has not entered mains operation.
AC (green)	Off	Mains power is abnormal.
Inverter (yellow)	Solid on	Output is powered by battery or PV in battery mode.
Inverter (yellow)	Off	Other states.
Charging (yellow)	Solid on	Battery is in float charging.
Charging (yellow)	Flashing	Battery is in constant-voltage charging.
Charging (yellow)	Off	Other states.
Fault (red)	Solid on	A fault has occurred in the inverter.
Fault (red)	Flashing	A warning condition has occurred in the inverter.
Fault (red)	Off	The inverter is working properly.

Function Buttons

Button	Description
ESC	Exit setting mode.
UP	Go to the previous selection.
DOWN	Go to the next selection.
ENTER	Confirm the selection, or enter setting mode.

4.2.1 LCD Display Icons



LCD display icons (dual output: output 1 and output 2). For lead-acid batteries, the voltage shown on the battery icon is for one battery cell; for a battery group, multiply by 2.

4.2.2 LCD Setting

Press and hold the ENTER button for 2 seconds to enter setting mode. Press UP or DOWN to select a setting program, then press ENTER to confirm or ESC to exit.

Prog.	Description	Setting options
01	Output voltage	230V (default). Settable: 208 / 220 / 230 / 240V.
02	Output frequency	50Hz (default). Settable: 50Hz, 60Hz.
03	Output source priority	Grid first (default), Solar first, PBG (PV-battery-grid) priority, or MKS (generator first). Determines whether grid, solar or battery powers the loads first.
04	Input mode	APP: Appliance (default, ~10ms switch). UPS: computers and sensitive devices (~10ms). GEN: generator on AC IN (~20ms).
05	Charger source priority	PNG: PV and Grid (default). OPV: PV only. PVF: PV first.
06	Grid charging current	Default 80A. Options: 2/10/20/30/40/50/60/70/80/90/100/110/120/130/140/150/160A.
07	Maximum charging current	Total solar + grid charging current. Default 120A. Options: 2A to 160A.
08	Menu default	ON: returns to the first page after 1 minute of inactivity. OFF: stays on the current page.
09	Auto restart on overload	ON (default).
10	Auto restart on over-temperature	ON (default).
11	Main input cut warning	Enable/disable grid or PV loss alarm. Default ON (buzzer sounds 5s on input loss).
12	Energy-saving mode	Default OFF. When ON in battery mode, output stops and resumes if load is below 25W; resumes continuous output above 35W.
13	Overload transfer to bypass	Default OFF. When ON, in PBG or MKS mode, an overload transfers the system to bypass (grid) mode.
14	Silent mode	Enable/disable buzzer. Default OFF. When ON, the buzzer is silent in all alarm/fault situations (button sound unaffected).
15	Battery return-to-grid voltage	AGM/FLD: 23V (range 22–26V). LIB: 23.8V (20–25V). FEL: 24.8V (20–25V). CUS: 23.8V (20–25V).
16	Switch back to battery voltage	AGM/FLD: 26V (24–29V). LIB: 27.2V (23–29V). FEL: 26.6V (23–29V). CUS: 27.2V (23–29V).
17	Battery type	AGM (default), Flooded, LIB (ternary lithium), FEL (lithium iron / LiFePO ₄), or User-Defined (CUS).
18	Battery low-voltage alarm point	LIB: 23.8V (20.6–25V). FEL: 24V (20.6–25V). AGM/FLD: fixed 22V. CUS as per LIB.

Prog.	Description	Setting options
19	Battery shutdown voltage point	AGM/FLD: fixed 21V. LIB: 23V (20–24V). FEL: 21V (20–24V). CUS as per LIB.
20	Constant-voltage (CV) set point	AGM: 28.2V, FLD: 29V (fixed). LIB: 28.2V (24–30V). FEL: 27.6V (24–30V). CUS: 28.2V (24–30V). Must be higher than float set point.
21	Float-charge set point	AGM/FLD: fixed 27V. LIB: 27.6V (25–29V). FEL: 27.2V (25–29V). CUS: 27.6V (24–30V). Must be lower than CV set point.
22	Grid low-voltage point	APP/GEN: 90–154V (default 154V). UPS: 170–200V (default 185V).
23	Grid high-voltage point	APP/GEN: 264–280V (default 264V). UPS: fixed 264V.
24	Auto turn off backlight	Default ON. Backlight turns off after 1 minute of inactivity.
25	Inverter soft start	Default OFF. When ON, output ramps gradually from 0 to target voltage. Single-machine operation only.
26	Reset to factory settings	Set ON to restore defaults. Available in mains and standby modes; not in battery mode.
29	Battery disconnection alarm	Enable/disable. Default OFF.
31	Equalization voltage point	FEL: 28V (24–30V). AGM/FLD/LIB/CUS: 29.2V (24–30V).
32	Equalization charging time	OFF or active. Range 5–900 minutes (5-minute steps). Default OFF.
33	Equalization delay time	OFF or active. Default 120 minutes. Range 5–900 minutes (5-minute steps).
34	Equalization interval	Default 30 days. Range 1–90 days (1-day steps).
35	Enable equalization immediately	Default OFF. When ON, equalization starts immediately during float charging.
36	Grid-tie (feed-in) function	Set whether the inverter can feed to grid. 'INT' enables feed-in according to the output source priority. No feed-in in MKS mode.
37	Max grid-tie power	Default 5.0kW. Range 0–5.0kW (0.5kW steps).
38	Dual output low-voltage shutdown	In battery mode, the secondary output turns off below this point. Default 24V (22–30V).
39	Dual output duration	In battery mode, the secondary output turns off after this time. Default OFF. Range 5–900 minutes. FUL = unlimited.
40	Dual output cut-off SOC	In battery mode, secondary output turns off below this SOC. Default 20. Range 5–90, or OFF.
44	BMS communication protocol	Default OFF. Options: CVT (CVTE 485), PYL (PYLON 485/CAN), GRO (Growatt 485/CAN), VOL (Voltronic 485), IRF (China Tower 485), PAC (PACE RTU 485).
45	BMS ID	Default AtO (auto). Or numeric value 0–15 (A–F represent 10–15).
46	Low SOC shutdown	Default 20 (range 5–50), or OFF. Inverter shuts down at this SOC in battery mode (alarm 68).
47	High SOC to battery	Default 90 (range 10–100), or OFF. In PBG mode, switches to battery mode at this SOC.
48	Low SOC to grid	Default 50 (range 10–90), or OFF. In PBG mode, switches to grid mode at this SOC.
61	Battery max. discharge current	Default 190A (range 10–190A, 5A steps), or OFF. Alarm 60 if exceeded; fault 14 after 5s continuous over-current.

4.3 Display Information

Press UP or DOWN to cycle through the displayed information in the following order: AC input voltage / output voltage, AC input frequency / output frequency, battery voltage / charge current, PV voltage / PV charging current, PV voltage / PV power, output voltage / active power, output voltage / apparent power, output voltage / load percentage, software version, total power generation, daily power generation, and parallel operation status.

After BMS communication is enabled, additional pages display battery information reported by the BMS: battery voltage, current, temperature, SOC, rated capacity, current capacity, BMS constant-voltage charging point, and BMS alarm/fault information. If BMS communication fails, the affected fields flash 'ERR'.

5. Fault Reference Code

If an alarm occurs, the fault indicator flashes and the buzzer sounds once per second for 1 minute, then stops. If a fault occurs, the fault indicator stays on and the buzzer sounds for 10 seconds, then stops; the system will attempt to restart automatically. If the unit does not recover after six restarts, the machine and LCD remain in the fault state. To clear it, power off completely (screen off) or wait 30 minutes, then restart. Contact Offroad Living if the fault persists.

Code	Meaning	Trigger condition	Resume condition
1	Bus boost fail	Grid soft-start begins but bus voltage does not reach the set value.	Restores after reaching the set voltage for 15s.
2	Bus over-voltage	Bus voltage higher than the set value.	Restores after the set voltage for 15s.
3	Bus below voltage	Bus voltage lower than the set value.	Cannot restore automatically.
4	Battery over-current	Battery current higher than the set value.	Cannot restore automatically.
5	System over-temperature	PFC temperature too high or fan not connected.	Restores after temperature drops and fan connected for 15 min.
6	Battery over-voltage	Battery voltage higher than the set value.	Restores after the set voltage for 15s.
7	Bus soft-start failed	Battery soft-start begins but bus voltage not reached.	Restores after the set voltage for 15s.
8	Bus short circuit	Bus voltage lower than the set value.	Cannot restore automatically.
9	Inverter soft-start failed	Inverter soft-start begins but inverter voltage not reached.	Restores after the set voltage for 15s.
11	Inverter under-voltage	Inverter voltage lower than the set value in battery mode.	Restores after the set voltage for 15s.
12	Inverter short circuit	Inverter voltage below and current above the set values.	Restores after the set value for 15s.
13	Inverter negative power	Inverter power is negative and exceeds the set value for a period.	Restores after the set value for 15s.
14	Overload	Load current higher than the set value.	Restores after the set value for 15s.
17	Program updating	Inverter updating or OTA in progress.	Restores after updating.
18	PV reverse connection	PV connected with reversed polarity.	Restores after correct connection for 15s.
26	BMS fault	Error code in the BMS message.	Restores after the BMS fault is resolved.
29	Inverter load abnormal	Abnormal load causes abnormal voltage.	Restores after voltage returns to normal for 15s.

6. Alarm Reference Code

When an alarm occurs, the inverter does not enter fault mode; the red LED flashes and the LCD displays the alarm code.

Code	Meaning	Trigger condition	Resume condition
50	Battery open	Battery disconnected for no more than 10 minutes.	Restores after the battery is connected and charging for 2 min.
51	Battery under-voltage	Battery voltage lower than the BAU set value.	Restores after voltage exceeds BAU by 2V.
52	Battery low voltage	Battery voltage lower than the BAL set value.	Restores after voltage exceeds BAL by 2V.
53	Battery charge short circuit	Battery voltage below 12V while charging current exists.	Restores within 1 min after the short circuit is cleared.
56	BMS loss	Communication failure after BMS function is enabled.	Restores after BMS function disabled or communication succeeds.
58	Fan error	No fan-speed signal detected (fan runs at full speed).	Restores after a fan-speed signal is detected.
59	EEPROM error	EEPROM read/write exception.	Cannot restore automatically.
60	Overload	Mains current / battery discharge current / load power above rated value.	Restores when the value drops below rated.
62	PV energy weak	Battery not connected and bus voltage below set value.	Restores after battery or grid connected, or after 10 min.
68	Battery under-SOC shutdown	BMS reports SOC below the BSU set value.	Restores when SOC rises 5% above set value, or function disabled.
69	Battery below-SOC warning	Lithium SOC below set value +5% (grid/battery), or +10% (standby).	Restores when SOC rises 10% above set value, or function disabled.
72	Battery cannot start up	During standby, battery voltage below allowed start-up voltage.	Restores when battery voltage rises above start-up voltage.
77	Grid power unstable	Grid power lost three times within 5 minutes.	Restores after 5 minutes.

7. Battery Equalization

The charge controller includes an equalization function. Equalization reverses the build-up of negative chemical effects such as stratification (where acid concentration is greater at the bottom of the battery than the top) and helps remove sulfate crystals from the plates. Left unchecked, sulfation reduces overall battery capacity, so it is recommended to equalize lead acid batteries periodically.

WARNING Do NOT activate equalization mode when using lithium batteries.

How to apply the equalization function

Enable battery equalization in LCD Program 32 (by time) or choose immediate equalization in Program 35. The function is configured using the following programs:

1. Set the equalization voltage point – Program 31.
2. Set the equalization charging time – Program 32.
3. Set the equalization delay time – Program 33.
4. Set the equalization interval time – Program 34.
5. Set immediate equalization activation – Program 35.

When to equalize

In the float stage, when the set equalization interval is reached (or immediate equalization is active), the controller enters the equalize stage.

Equalize charging time and timeout

In the equalize stage, the controller charges the battery as much as possible until the voltage rises to the equalization voltage, then applies constant-voltage regulation to maintain it. The battery remains in the equalize stage until the set equalization time is reached. If the time expires before the voltage reaches the equalization point, the controller extends the time until the voltage is achieved. If the voltage is still too low when the timeout setting ends, the controller stops equalization and returns to the float stage.

8. Specifications

8.1 Line (AC Input) Specifications

Item	Value	Comments
Main topology	L + N + PE	
Nominal voltage	220 VAC	Settable: 208 / 220 / 230 / 240 Vac
Input voltage range	90–280 Vac	Settable
Input low loss	154 Vac (default)	Settable 90–154 (APP/GEN); 185V default, 170–200 (UPS)
Input low comeback	Low-loss voltage + 9V	
Input high loss	264 Vac (default)	Settable 264–280 (APP/GEN); 264V (UPS)
Input high comeback	High-loss voltage – 9V	
Nominal frequency	50 / 60 Hz	
Frequency range	40 / 70 Hz	
Max input current (RMS)	40A	Bypass current

Note: When the external circuit breaker rating is greater than 40A, the maximum input current is 40A. When the external breaker rating is less than 40A, the maximum input current depends on that breaker.

8.2 Battery Specifications

Item	Value	Comments
Battery pieces	2 pcs for lead acid, 1 for LFP	12V each for Lead acid or 24v for LFP
Auto restart function	Yes	
Battery test function	No	
Battery type	AGM / FLD / LIB / FEL / CUS	
Nominal battery voltage	$N \times 12V @ 25^{\circ}C$	N = number of battery pieces
Battery management	Yes	
Battery over-voltage	30V	
Battery under-voltage	$10.5V \times N$	Settable $10 \times N - 11 \times N$
Battery low-voltage alarm	$10.8V \times N$	Settable $10.3 \times N - 11.3 \times N$
Over-current protection	AllSpark Manual reset circuit breaker or Mega Fuse	Fast acting

8.3 Charger Specifications

Item	Value	Comments
Charging voltage (Float)	27V	Settable 26.6–27.8V
Charging voltage (CV)	28.2V	Settable 28–29V
Temperature compensation	No	
Charging current (line)	2–160A	Settable; default 80A
Charging mode	Two / Auto	CC/CV/Float or CC/Float
Charge voltage accuracy	±5%	Calibrated by RS232

Item	Value	Comments
PV charging method	MPPT	
PV maximum input power	9000W	Supports full AC output and DC battery charging simultaneously
MPPT voltage range	60–450 Vdc	
Minimum activation voltage	80V	
Max PV (open-circuit) voltage	500 Vdc	
Max PV charge current	160A	Default 120A; settable
Max efficiency (PV)	99.5%	

8.4 Output Specifications

Item	Value	Comments
Output topology	L + N + PE	
Output power	5 kW	At 208V output, rating reduces to 90%
Nominal voltage	208 / 220 / 230 / 240 VAC	Default 230V; set by RS232 or LCD
Waveform	Pure sine wave	
Voltage regulation	±5%	
DC offset	±100 mV (battery mode)	No-load and linear-load mode
Nominal frequency	50 / 60 Hz	Auto selection (default on)
Frequency regulation	0.1%	
Overload capacity (battery)	1 min @ 102–120%; 10s @ >120%	
Short-circuit protection	Current limit (battery) / 40A breaker (line)	

8.5 Switch Time

Mode	Switch time (typical)
Line to battery (UPS mode)	10 ms
Line to battery (Appliance mode)	10 ms
Line to battery (Generator mode)	20 ms

8.6 Efficiency

Mode	Value	Comments
Line mode	> 99.5%	Full resistive load, no battery connected
Battery mode	93.5% (max)	Full resistive load
Standby power	< 35W	No load / battery mode

9. Troubleshooting

Symptom	Cause	What to do
Fault code 5	Over-temperature: PFC temperature exceeds the threshold for >20s, or alarm 58 lasts 5s.	Check that the fan is connected and there are no loose connections. If the fan is disconnected for more than 5 minutes, the unit reports fault code 5.
Fault code 12	Inverter short circuit: in battery/standby mode, inverter voltage <80V and current >30A (responds within 100–120ms).	Check for a short circuit at the output terminals (e.g. a screw piercing the terminal causing an L–N short). Verify the inverter voltage and current against the trigger conditions.
Fault code 58	Fan malfunction: any fan rotates fewer than 8 times within 2 seconds.	Check the fan connection. If correctly connected, check the fan-detection circuit (often caused by excess solder under the control-board socket) and whether the fan itself is damaged.
Will not start – battery	Battery mode needs $\geq 11.5\text{V/cell}$ to start. Common causes: incorrect calibration or insufficient battery voltage.	Check that battery voltage sampling works and is calibrated. Measure the battery terminal voltage with a multimeter to confirm it reaches the minimum 11.5V per cell. IMPORTANT: configure the battery voltage to match the model – the wrong voltage can cause a capacitor explosion.
Will not start – utility	Mains short circuit or wiring error.	Check for short circuits at the mains terminals (e.g. a screw causing an L–N short). Check for wiring errors such as connecting the mains input to the output terminals.
Will not start – PV	PV input near threshold, or software incompatibility.	Check whether the PV input voltage is too close to the critical threshold. For low-voltage versions, confirm the main-control software versions are compatible.
PV not charging	Wrong battery voltage damaged the PV-side auxiliary power supply.	Connecting the wrong battery voltage can damage the PV-side auxiliary supply, causing loss of power and loss of communication with the main control. Contact Offroad Living for service.

10. Warranty

Warranty statement

Offroad Living warrants the AllSpark 24V 5000W Hybrid Inverter to be free from defects in materials and workmanship under normal use for a period of 3 years from the date of purchase. If a defect arises during the warranty period, Offroad Living will, at its option, repair or replace the product (or the defective part) free of charge. Proof of purchase is required for all warranty claims. The customer is responsible for any and all costs related to getting the product back to Offroad Living until such time as a warranty claim is approved.

What is not covered

- Damage caused by installation that does not comply with this manual, AS/NZS 3000, or applicable standards.
- Damage from incorrect battery voltage configuration, reverse polarity, or connection of an incompatible battery system.
- Damage from misuse, accident, water ingress, lightning, power surges, or unauthorised modification or repair.
- Normal wear, consumable parts, and cosmetic damage that does not affect operation.

How to make a claim

To make a warranty claim, contact Offroad Living with your proof of purchase, the product SKU (AS-HYBRIDINVSCC245000), and a description of the fault:

**Offroad Living – Unit 2/29 Prestige Parade, Wangara WA 6065 | (08) 6205 6868 |
sales@offroadliving.com.au | offroadliving.com.au**

Australian Consumer Law

Our goods come with guarantees that cannot be excluded under the Australian Consumer Law. You are entitled to a replacement or refund for a major failure and to compensation for any other reasonably foreseeable loss or damage. You are also entitled to have the goods repaired or replaced if the goods fail to be of acceptable quality and the failure does not amount to a major failure. This warranty is in addition to, and does not limit, your rights under the Australian Consumer Law.