POWLAND GES48120M220-500P

POWLAND 12000W Solar Hybrid Inverter Charger

Model: GES48120M220-500P

1. Introduction

This manual provides essential instructions for the safe and efficient operation of your POWLAND 12000W Solar Hybrid Inverter Charger, model GES48120M220-500P. This device is designed to convert 48V DC power from batteries or solar panels into 120V-240V AC power, suitable for various household and off-grid applications. It features a built-in 200A MPPT charge controller for optimized solar energy harvesting and supports both lead-acid and LiFePO4 battery types.

Please read this manual thoroughly before installation and operation to ensure proper use and to prevent damage to the unit or connected equipment.



Figure 1: Front view of the POWLAND 12000W Solar Hybrid Inverter Charger.

2. Important Safety Instructions

Failure to follow these safety instructions may result in electric shock, fire, or serious injury. Keep this manual for future reference.

- Installation must be performed by qualified personnel in accordance with all local and national electrical codes.
- Do not disassemble the inverter. There are no user-serviceable parts inside.
- Ensure proper grounding of the unit.
- Do not operate the inverter in wet environments or near flammable materials.
- Disconnect all power sources (AC, DC, PV) before performing any maintenance or wiring.
- Wear appropriate personal protective equipment (PPE), including insulated gloves and eye protection.
- The inverter is equipped with multiple protection features including overload, short-circuit, reverse polarity, over-voltage, under-voltage, over-temperature, and overcharge protection. However, these should not replace

safe installation practices.



Figure 2: Illustration of the inverter's comprehensive protection features, including short circuit, overcurrent, overvoltage, undervoltage, overload, reverse charging, and over-temperature protection.

3. Product Overview

3.1 Key Features

- 12000W Pure Sine Wave AC Output (120V±5%).
- Integrated 200A MPPT Solar Charge Controller with 99.9% efficiency.
- Supports 48V DC battery systems (Lead-Acid, LiFePO4).
- Battery-free operation mode for direct PV-to-AC conversion.
- Ultra-wide PV input range (90-500VDC).
- Parallel connection capability for up to 6 units (72,000W total output).
- IP65-rated casing for environmental protection.
- LCD display and tri-color LED indicators for real-time monitoring.

- Dual intelligent cooling fans for efficient heat dissipation.



Figure 3: The 12000W pure sine wave output supports a wide range of household appliances.

3.2 Display and Indicators

The inverter features an LCD display panel and three LED indicators to provide operational status and programming functions. The LCD allows customization of over 20 parameters, including input/output voltage ranges, battery type selection, and charging/discharging priority settings.

- **AC OUT LED:** Indicates AC output status.
- **CHARGE LED:** Indicates battery charging status.
- **FAULT LED:** Indicates system errors or warnings.

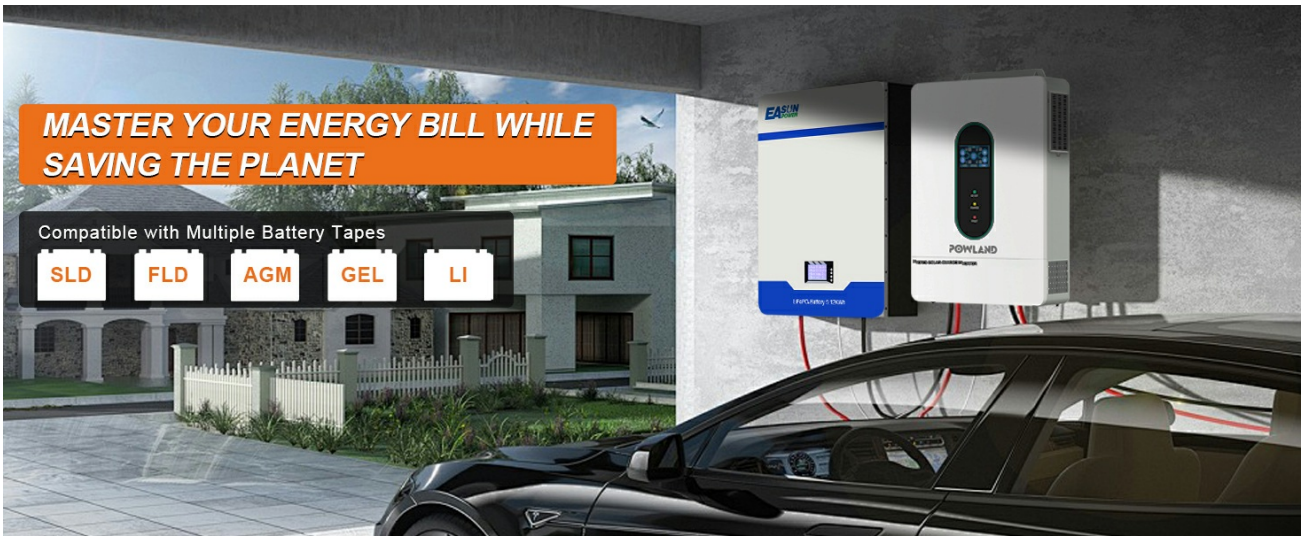


Figure 4: The LCD display and LED indicators provide real-time operational data and access to system settings.

3.3 Cooling System

The inverter is equipped with dual intelligent cooling fans designed to optimize heat dissipation and maintain operational effectiveness. This system helps keep the inverter running at optimal temperatures, contributing to its longevity and stable performance.

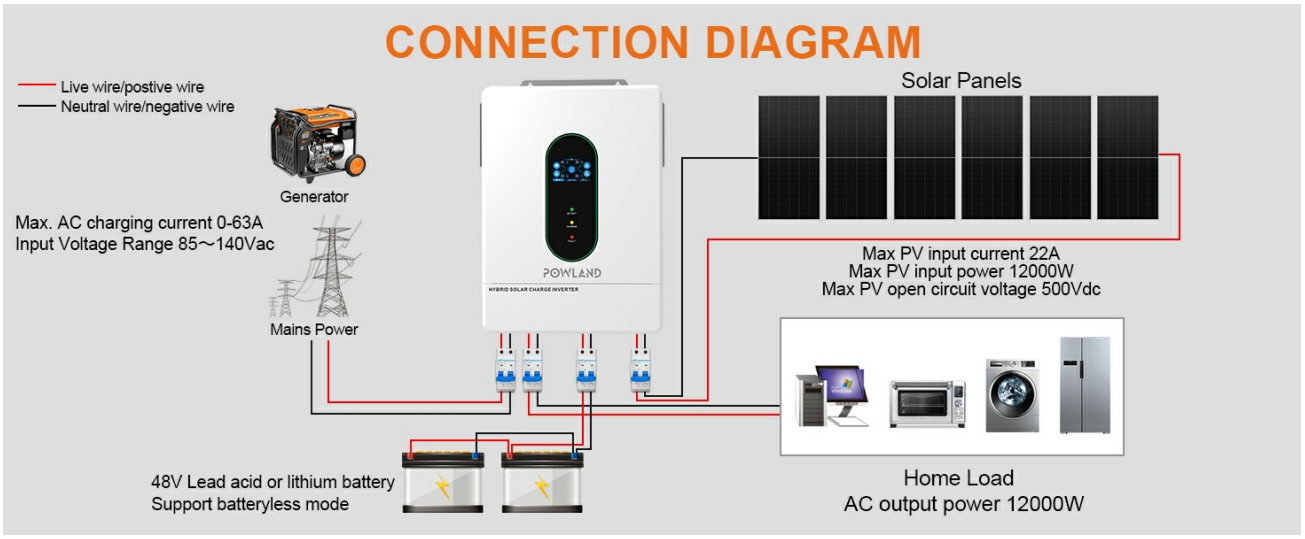


Figure 5: Illustration highlighting the dual intelligent cooling fans for efficient heat management.

4. Technical Specifications

Feature	Specification
Brand	POWLAND
Model	GES48120M220-500P
Input Voltage (DC)	48 Volts
Output Power	12000 Watts
Output Voltage (AC)	120 Volts (AC)

Feature	Specification
Peak Output Power	12000 Watts
Electrical Output Waveform	Pure Sine Wave
Efficiency	99.9% (MPPT)
Max PV Input Current	22A x 2
Max PV Input Power	6000W x 2
Max PV Open Circuit Voltage	500Vdc
Max AC Charging Current	0-63A
Input Voltage Range (AC)	85-140Vac
Recommended Uses	RV, Off-grid homes, Solar Home Systems
Parcel Dimensions	76.8 x 57.4 x 22.4 cm
Weight	24 kg



Figure 6: Key technical specifications of the POWLAND 12000W Solar Inverter.

5. Installation

Proper installation is crucial for the safe and efficient operation of the inverter. Refer to the connection diagrams below and consult a qualified electrician if you are unsure about any steps.

5.1 Basic Connection Diagram

The diagram illustrates the typical connections for mains power, generator, solar panels, 48V battery bank (lead-acid or lithium), and home loads. Ensure all wiring adheres to local electrical codes and the specified current ratings.

- **Live Wire/Positive Wire:** Typically red or black.
- **Neutral Wire/Negative Wire:** Typically white or blue.
- Connect solar panels to the PV inputs (PV1, PV2).
- Connect the 48V battery bank to the battery terminals. The inverter supports battery-less mode for direct PV-to-AC conversion.

- Connect mains power or a generator to the AC input.
- Connect household loads to the AC output.

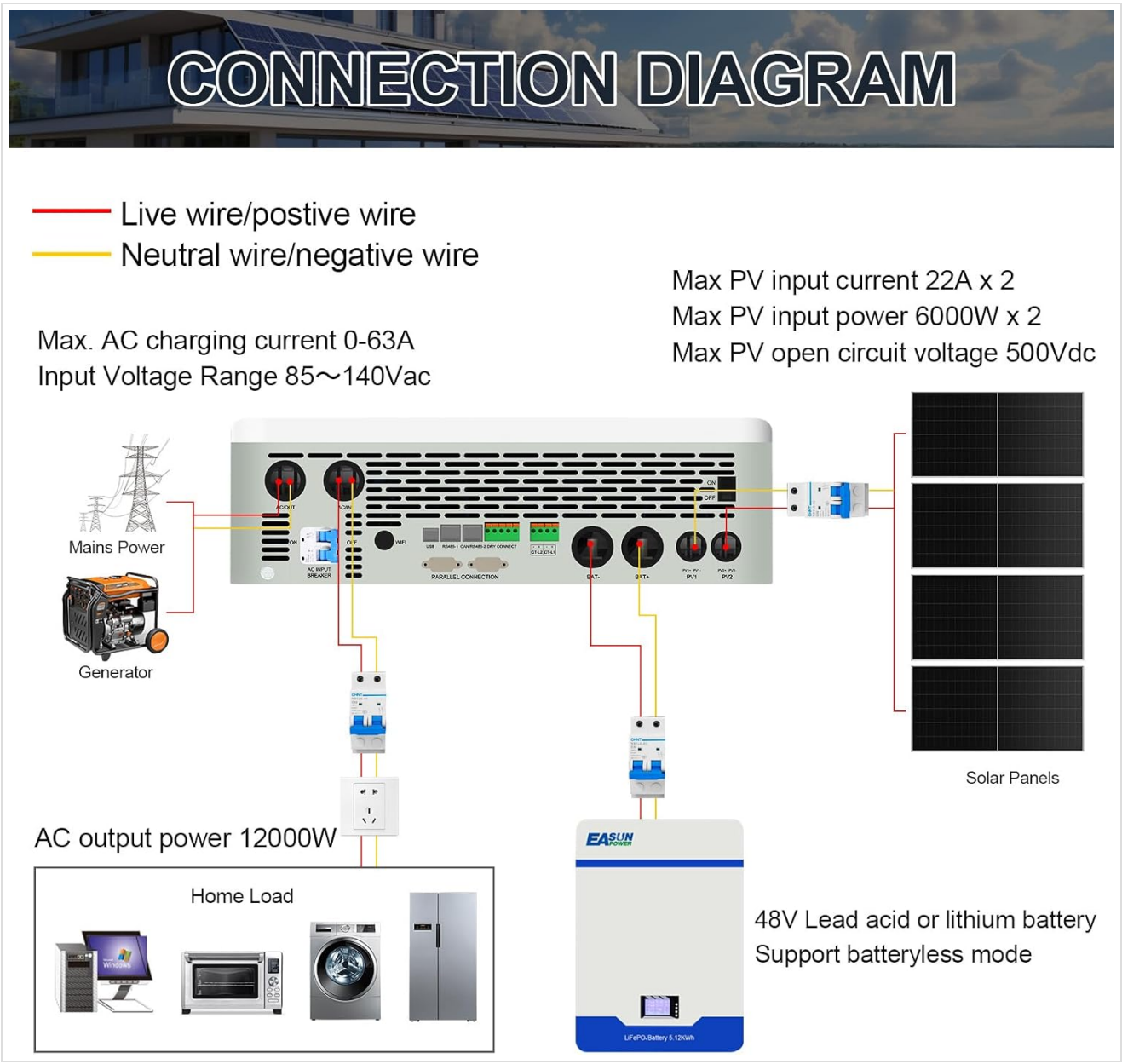


Figure 7: Detailed connection diagram showing inputs from solar panels, mains, generator, battery, and output to home loads.

5.2 Parallel Connection

The POWLAND inverter supports parallel connection of up to 6 units to achieve higher power output. This allows for scalable power solutions, reaching up to 72,000W (72kW) total output in a single-phase configuration.

- Ensure all inverters are of the same model and firmware version.
- Follow the specific wiring diagrams for parallel operation provided in the full technical manual.
- Proper synchronization and load balancing are critical for stable parallel operation.

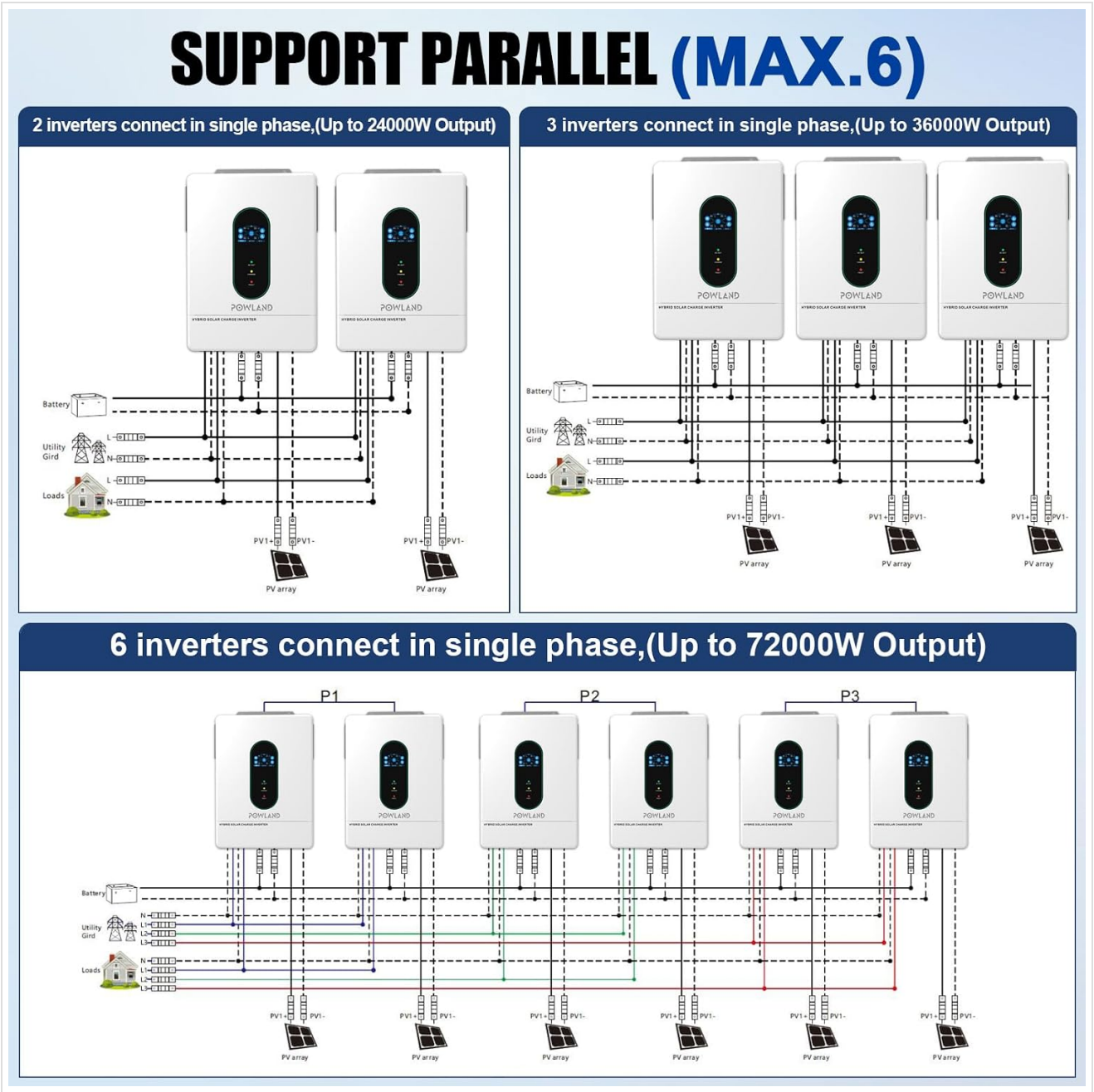


Figure 8: Diagrams illustrating parallel connections for 2, 3, and up to 6 inverters to increase total output power.

5.3 Battery Compatibility

The inverter is universally compatible with various 48V battery types, including Sealed Lead Acid (SLD), Flooded Lead Acid (FLD), Absorbed Glass Mat (AGM), Gel, and Lithium (LI) batteries. It also features an activation function for dormant lithium batteries and supports battery-less operation.



Figure 9: Visual representation of the inverter's compatibility with various 48V battery chemistries.

6. Operating Modes

The inverter offers flexible charging and output modes to adapt to different energy management strategies.

6.1 Charging Modes

The intelligent hybrid charging system supports four distinct modes:

- **Mains First:** Prioritizes charging from the utility grid. Solar power is used if grid power is unavailable.
- **Solar First:** Prioritizes charging from solar panels. Grid power is used only if solar power is insufficient.
- **Hybrid Charge:** Utilizes both solar and grid power for charging, balancing sources based on availability and settings.
- **Only Solar:** Charges exclusively from solar panels. Grid power is not used for charging.

6.2 Output Modes

The inverter also provides four output priority modes to manage power delivery to loads:

- **Solar First:** Prioritizes power from solar panels to loads. If solar is insufficient, it draws from batteries, then the grid.
- **Mains First:** Prioritizes power from the utility grid to loads. If the grid is unavailable, it draws from batteries, then solar.
- **Inverter First:** Prioritizes power from the inverter (battery/solar) to loads. If inverter power is insufficient, it switches to the grid.
- **Hybrid Output:** Dynamically manages power sources (solar, battery, grid) to supply loads based on programmed settings and availability.

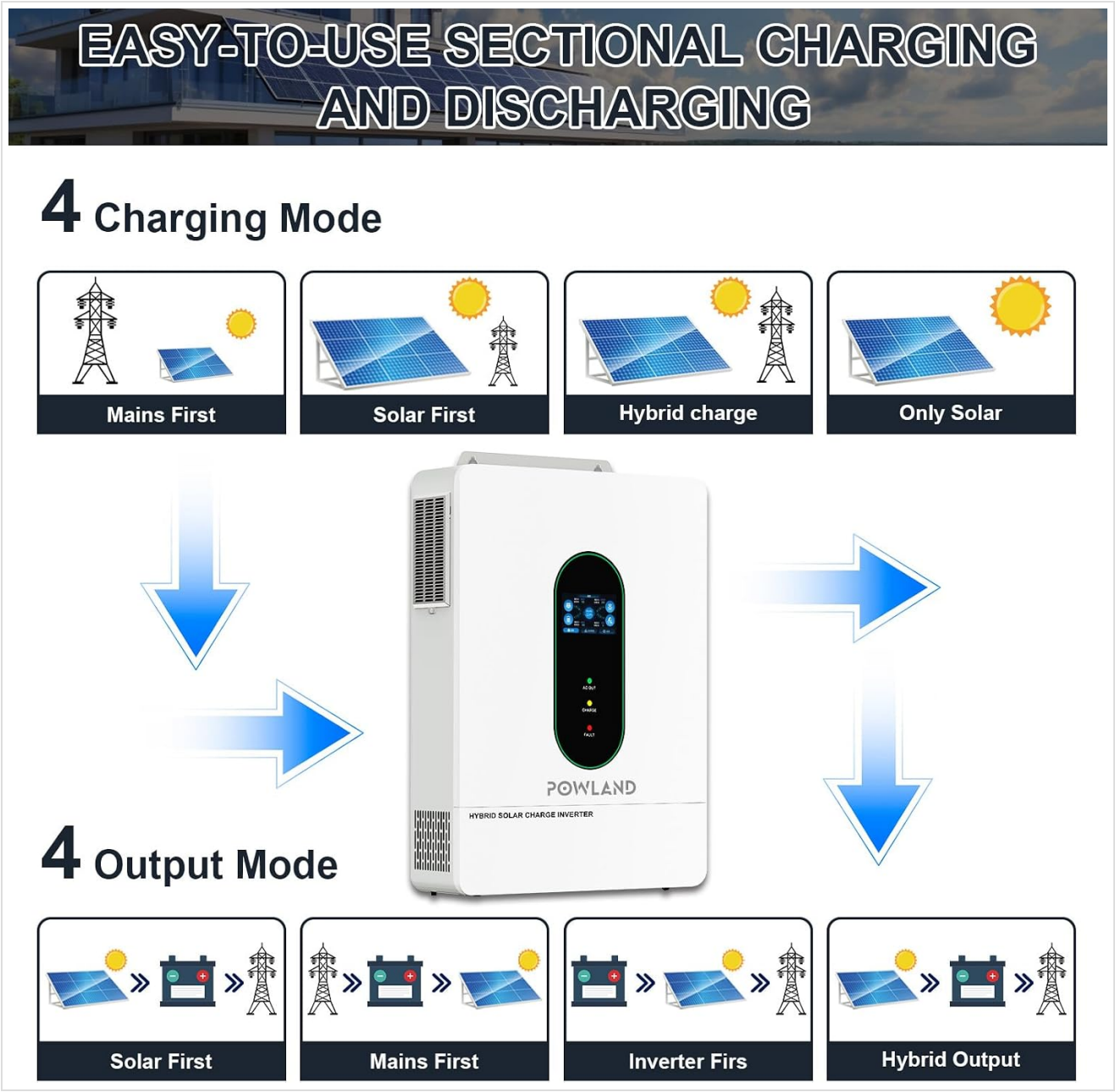


Figure 10: Visual representation of the various charging and output priority modes available for energy management.

7. Applications

The POWLAND 12000W Solar Hybrid Inverter Charger is versatile and suitable for a variety of power needs, including:

- **RV Systems:** Providing reliable power for recreational vehicles.
- **Trailers:** Powering essential systems in trailers.

- **Boats:** Supplying solar-powered electricity for marine applications.
- **Outdoor Camping:** Enabling unrestricted electricity usage in remote locations.
- **Solar Home Systems:** Serving as a core component for off-grid or grid-tied solar power systems for residential use.

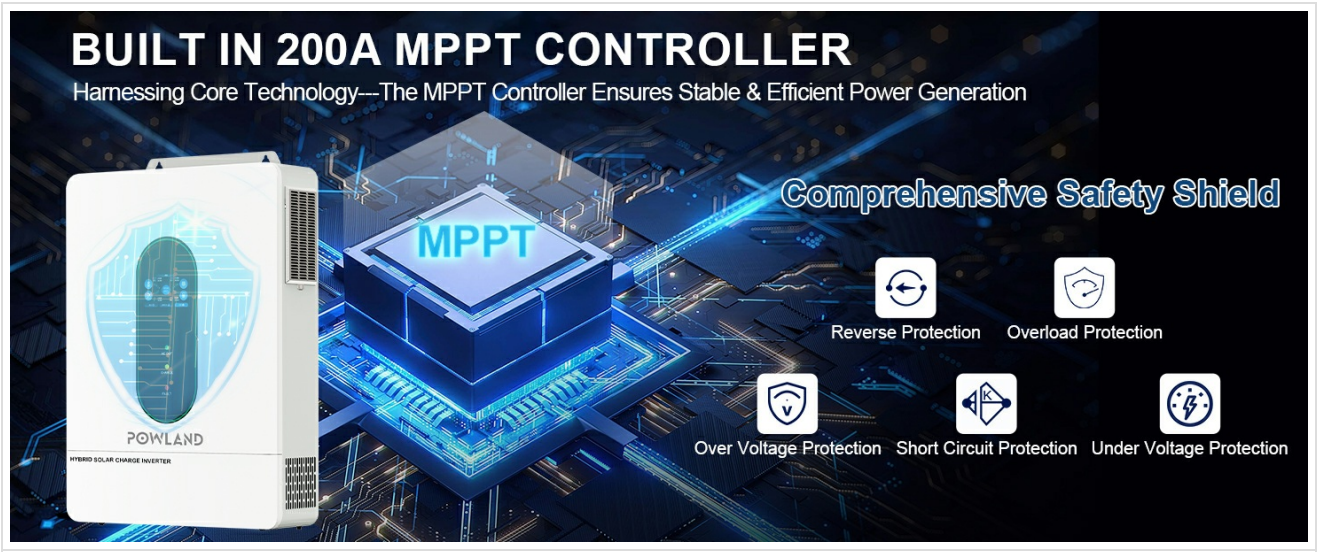


Figure 11: Examples of common applications for the hybrid solar inverter.

8. Maintenance

Regular maintenance ensures the longevity and optimal performance of your inverter.

- **Cleaning:** Periodically clean the exterior of the inverter with a dry, soft cloth. Ensure ventilation openings are free from dust and debris. Do not use liquid cleaners.
- **Connections:** Annually inspect all electrical connections for tightness and signs of corrosion. Loose connections can cause overheating and damage.
- **Environment:** Ensure the installation environment remains within the specified temperature and humidity ranges.
- **Battery Inspection:** If using lead-acid batteries, check electrolyte levels and terminal conditions as per battery manufacturer guidelines. For lithium batteries, monitor their state of charge and health via the inverter's display or monitoring software.

9. Troubleshooting

This section addresses common issues you might encounter. For problems not listed here, please contact customer support.

9.1 Common Error Codes

- **Error 48 (Communication Fault):** If the inverter displays "Error 48" or the "FAULT" LED remains illuminated, this often indicates a communication issue, particularly with monitoring software via USB.
  - Verify the USB cable connection between the inverter and the computer.
  - Ensure the correct drivers for the inverter's communication interface are installed on your operating system (e.g., Windows 11).
  - Try restarting both the inverter and the computer.
  - If the issue persists, the communication port or internal module may be faulty. Contact technical support.
- **No AC Output:**

- Check if the inverter is turned on.
- Verify battery voltage is within the operational range.
- Check AC output circuit breakers.
- Ensure no overload condition exists. Reduce connected loads.

- **No Charging from Solar:**
  - Check PV input voltage and current.
  - Ensure solar panels are clean and not shaded.
  - Verify PV array wiring and connections.
  - Check MPPT settings on the LCD display.

10. Warranty and Support

For warranty information, technical support, or service inquiries, please contact your point of purchase or the manufacturer directly. Ensure you have your product model number (GES48120M220-500P) and purchase date available when contacting support.

Manufacturer: Shenzhen Bentuo Electronic Technology Co., Ltd.