ALLPOWERS FBA_AP-OT-002-BBLU

ALLPOWERS 20A Solar Charger Controller User Manual

Intelligent Regulator with USB Port Display 12V/24V

1. Introduction

The ALLPOWERS 20A Solar Charger Controller is an intelligent regulator designed to manage the charging and discharging process of solar panels and batteries in a solar system. It features dual USB ports for charging devices and an LCD display for clear status indication and data monitoring. This controller is suitable for various applications including home, industrial, and commercial solar energy systems.
Key features include:

- Rated Discharge Current: 20A
- USB Output Voltage: 5V/3A
- Battery Voltage: 12V/24V auto-detection
- Adjustable power rate with dual USB ports
- 3-Stage (Bulk, ABS, Float) charge management and 4-Stage PWM charge
- Industrial-grade STM 8 microprocessor for charge and discharge process control
- Multiple electrical protections: Over-current, short-circuit, inverse connection, low voltage, and overcharge protection
- Good heat dissipation design with dual MOSFET reverse current protection
- Easy-to-use LCD display for status, data, mode switching, and parameter configuration

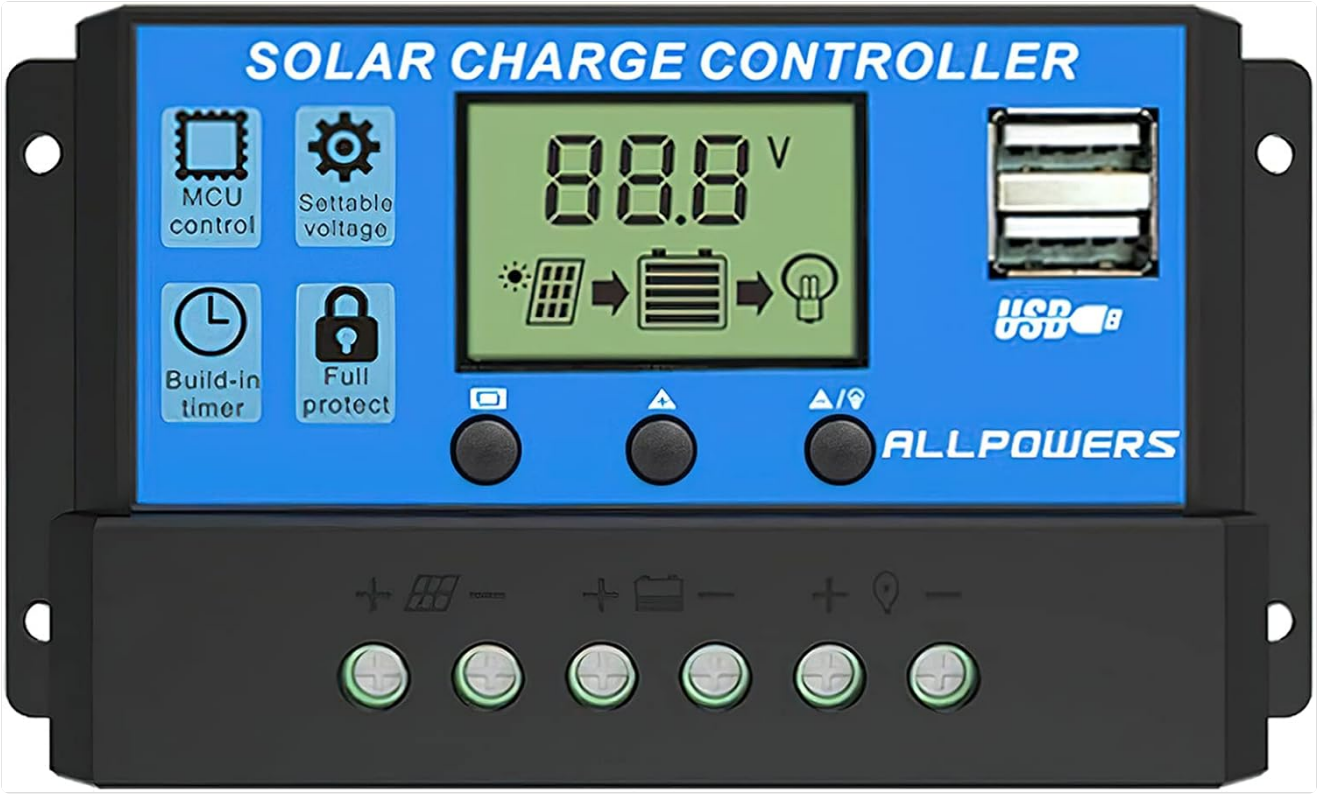

Figure 1: Front view of the ALLPOWERS 20A Solar Charger Controller, showing the LCD display, control buttons, and dual USB ports.

2. Safety Information

Please read all instructions carefully before installation and operation. Failure to follow these instructions may result in damage to the controller, battery, or other components, and may cause personal injury.

- Ensure the battery voltage is at least 11V for initial use to allow the controller to register the battery type.
- The controller is only suitable for lead-acid batteries (OPEN, AGM, GEL types). It is not compatible with nickel-hydride, lithium, ions, or other battery types.
- Keep children away from the storage battery and the controller.
- Install the controller in a cool and well-ventilated place to ensure good heat dissipation. Avoid direct sunlight exposure or damp environments. The working temperature range is -35°C to +60°C.
- Wire Range: 26-12 AWG. Ensure wires are securely connected to prevent loose connections and potential damage.
- Always connect the battery to the charge regulator's positive (+) and negative (-) terminals first, then the solar panels, and finally the DC load. When disconnecting, reverse this order: disconnect the DC load, then the solar panels, and finally the battery.
- Do not connect an inverter directly to the solar controller's output terminals, as the controller has output limits. The inverter must be wired directly to your battery.

3. Setup and Installation

Follow these steps for proper installation of your ALLPOWERS Solar Charger Controller:

1. **Connect the Battery:** Connect the battery to the charge regulator's positive (+) and negative (-) terminals first.

Ensure correct polarity. The controller will power on once the battery is connected.

2. **Connect the Solar Panel:** Connect the photovoltaic module (solar panel) to the charge regulator's positive (+) and negative (-) terminals.
3. **Connect the DC Load (Optional):** Connect your DC load (e.g., lights) to the charge regulator's positive (+) and negative (-) load terminals.
4. **Connect Inverter (Optional):** If using an inverter, connect it directly to the battery terminals, not to the solar controller's load terminals.

Important Wiring Note: The controller must be wired as close to the battery as possible to minimize voltage drop over long wires. Use appropriate wire gauge (26-12 AWG) for your system.

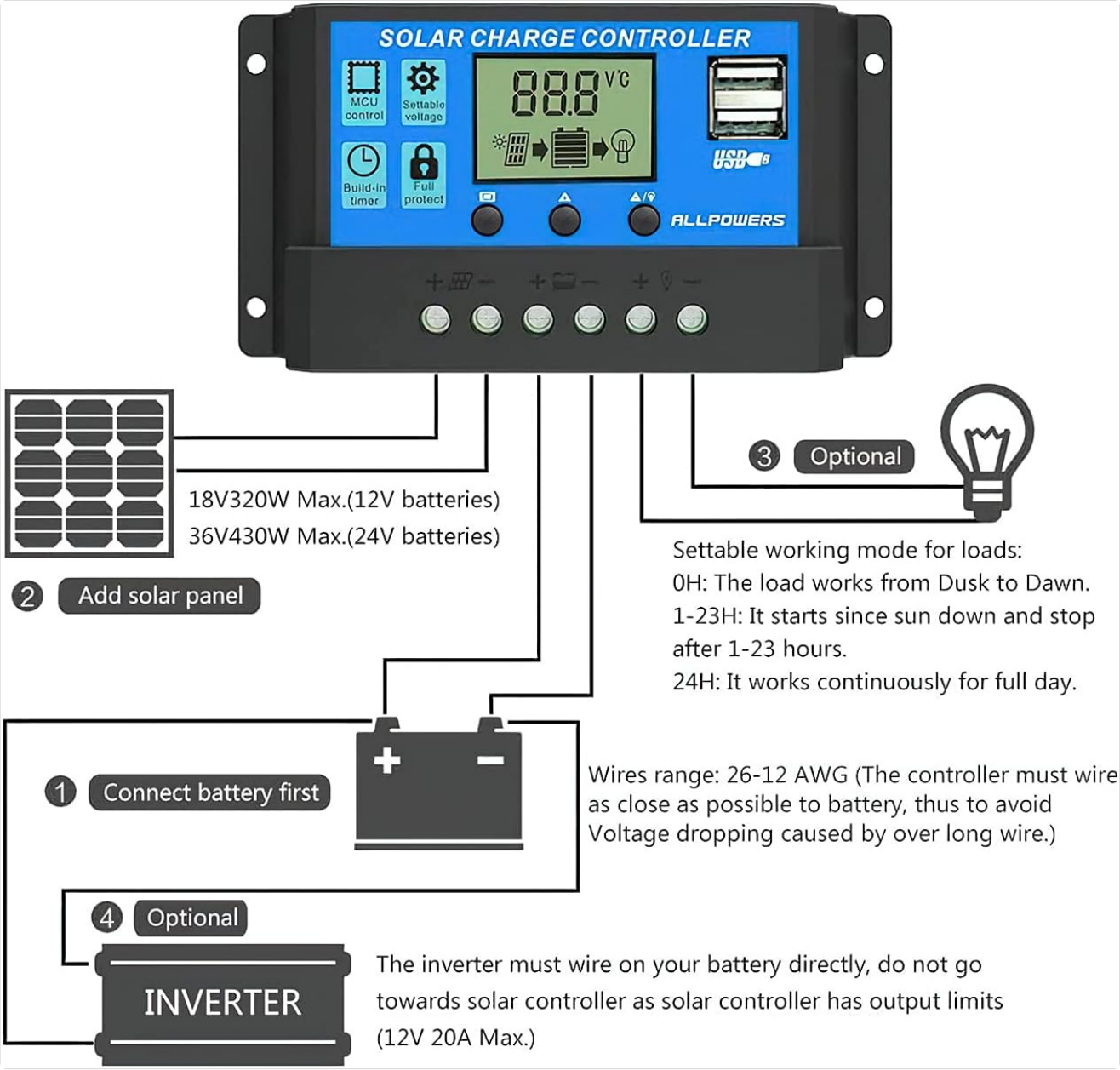

Figure 2: System connection diagram illustrating the proper wiring order for the battery, solar panel, and optional DC load/inverter.

Installation Demonstration Video

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Video 1: Official ALLPOWERS demonstration of the 20A Solar Charger Controller, including unboxing and installation steps. This video provides a visual guide to connecting the controller to your solar system.

4. Operating Instructions

The controller features an LCD display and three control buttons for easy operation and parameter setting.

LCD Display and Buttons

- **MENU Button:** Short press to switch between different interfaces. Long press to enter/exit setting mode.
- **UP Button (▲):** Short press to increase the value in setting mode.
- **DOWN Button (▼):** Short press to decrease the value in setting mode.
- **Load Control Button (Lightbulb icon):** In 24H work mode for loads, double press to activate/deactivate the load immediately.

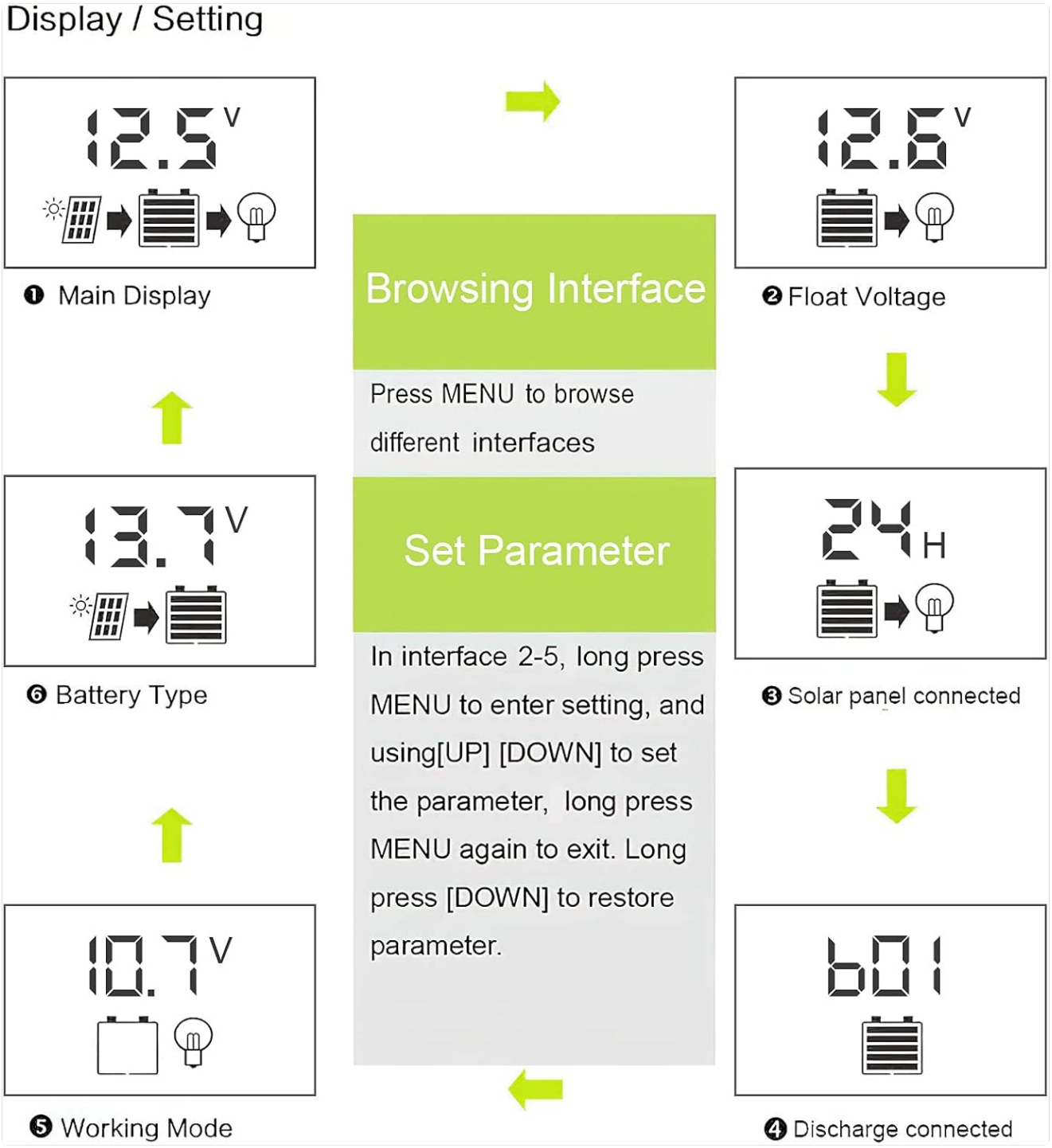

Figure 3: Detailed view of the LCD display and button functions, showing various browsing and setting interfaces such as main display, float voltage, discharge reconnect, discharge stop, battery type, and work mode.

Charging Stages (PWM)

The controller utilizes a 4-stage PWM (Pulse Width Modulation) charging process to optimize battery life and performance:

- **Bulk Charge:** Rapidly charges the battery to its maximum voltage.
- **Boost Charge:** Continues charging at a higher voltage to ensure full charge.
- **Float Charge:** Maintains the battery at a constant voltage to prevent self-discharge. Default float voltage is 13.7V.
- **Equalization:** Periodically overcharges the battery to balance cell voltages and prevent sulfation (for certain battery types).

Figure 4: Diagram illustrating the four stages of PWM charging: Bulk, Boost, Float, and Equalization, designed to keep the battery from over-charging or over-discharging.

Battery Type Settings

The controller supports different lead-acid battery types. You can set the battery type via the LCD display:

- **B01 = OPEN:** Open lead-acid battery

- **B02 = AGM:** Absorbed Glass Mat battery
- **B03 = GEL:** Gel battery

To change the battery type, long press the MENU button to enter setting mode, use UP/DOWN to select the battery type, and long press MENU again to exit.

Figure 5: Image showing the controller's compatibility with OPEN, AGM, and GEL battery types, highlighting its adjustable current and voltage output.

Load Working Modes

The controller offers settable working modes for connected DC loads:

- **0H:** The load works from Dusk to Dawn.
- **1-23H:** The load starts since sundown and stops after 1-23 hours.
- **24H:** The load works continuously for the full day.

5. Maintenance

To ensure optimal performance and longevity of your solar charger controller, consider the following maintenance tips:

- **Heat Dissipation:** The controller generates heat during operation. Ensure it is installed in a cool and well-ventilated area to maintain good heat dissipation. Avoid enclosing it in unventilated spaces or exposing it to direct sunlight, especially during hot days when temperatures can exceed 60-75°C.
- **Wire Connections:** Periodically check all wire connections to ensure they are tight and secure. Loose connections can lead to poor performance or damage.
- **Battery Health:** Old batteries may degrade in capacity over time, leading to voltage drops below the controller's operational threshold (e.g., 8V). If the LCD screen becomes blank, it may indicate a very low battery voltage.

- **Indoor Use:** This controller is designed for indoor use. Avoid using it in high humidity or outdoor environments unless properly protected.

6. Troubleshooting

This section addresses common issues you might encounter with your solar charger controller.

Common Q&A

- **Q: How to install it?**
  A: (1) Battery ---> (2) Solar panels ---> (3) DC load. Always connect in this order.
- **Q: Why does the LCD screen become blank?**
  A: When the battery voltage is too low (≤ 8V), the controller will stop output and turn itself off, resulting in a blank LCD. If the battery voltage is ≤ 10.7V, 12V output ports are not available. After the solar panels charge the battery, it will re-output when the battery returns to 12.6V.
- **Q: What battery type is this controller supported?**
  A: B01= OPEN, B02= AGM, B03= GEL. The regulator is only suitable for lead-acid batteries.

Error Indications and Solutions

Situation	Probable Cause	Solution
Charge not on or load not on when sunny	Solar panel shorted or reversed	Check wiring, correct
Load not working	Mode setting wrong	Reset mode
Load not working (low voltage)	Battery low	Recharge battery
Load not working (overload)	Load short circuit protection	Reduce load, check wiring
Power off	Battery low, controller turns off	Charge battery to 12.6V to restart

Figure 6: Visual representation of security protections including high temperature anomaly, low voltage anomaly, and over-current or short-circuit protection.

7. Specifications

Feature	Specification
Rated Discharge Current	20A
USB Output Voltage	5V/3A
Battery Voltage	12V/24V auto
Max. PV Voltage	50V
Max. PV Input Power (12V)	390W
Max. PV Input Power (24V)	780W

Feature	Specification
Display Type	LCD
Product Dimensions	5.91 x 3.07 x 1.38 inches
Item Weight	5.6 ounces (0.16 Kilograms)
Manufacturer	ALLPOWERS
Model Number	FBA_AP-OT-002-BBLU

8. Warranty and Support

For warranty information and technical support, please refer to the official ALLPOWERS website or contact their customer service directly. You may also find additional resources and an updated user manual (PDF) at the following link: ALLPOWERS User Manual (PDF).
For common questions and troubleshooting, please refer to theTroubleshooting section of this manual.