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› GCSOAR 60A MPPT Charge Controller User Manual

GCSOAR 6024

GCSOAR 60A MPPT Charge Controller User Manual

Model: 6024

1. INTRODUCTION

This manual provides detailed instructions for the installation, operation, and maintenance of your GCSOAR 60A MPPT Solar Charge Controller. This device is designed to efficiently manage power flow from your solar panels to your battery bank, ensuring optimal charging and extending battery life. It is suitable for 12V/24V DC battery systems with a maximum PV input voltage of 100V.

The controller features a touch glass screen interface for easy parameter setting and monitoring, and supports various battery types including Lead-acid (Sealed, GEL/AGM, Flooded) and Lithium (LiFePO₄, Li[NiCoMn]O₂).

2. SAFETY INFORMATION

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

- Ensure all connections are tight and secure to prevent loose connections that can cause excessive heating.
- Always connect the battery to the charge controller first, then the solar panels, and finally the load. Disconnect in the reverse order: load, then solar panels, then battery.
- Install appropriate fuses or circuit breakers for the solar panel, battery, and load circuits to protect against overcurrent.
- Do not disassemble or attempt to repair the controller. Refer to qualified personnel for service.
- Ensure proper ventilation around the controller to dissipate heat.
- Wear appropriate personal protective equipment (PPE) when working with electrical systems, including insulated gloves and eye protection.
- The controller is common negative grounded. Ensure your system's grounding aligns with this configuration.

3. PRODUCT FEATURES

- **60A MPPT Solar Charge Controller:** Suitable for 12V/24Vdc battery systems.
- **Max PV Input:** 100V. Max PV input power: 780W for 12V battery system, 1560W for 24V battery system.
- **Common Negative Grounded:** Designed for common negative grounding systems.
- **Touch Glass Screen Interface:** IP43 protection level, splash-proof, with a backlit screen for easy parameter setting and monitoring.
- **Battery Types:** Auto-recognizes 12V/24V Lead-acid (Sealed /GEL(AGM)/Flooded). For Lithium (LiFePO4/Li[NiCoMn]O2) batteries, users must select the type manually. User-defined mode is available for customized battery settings.
- **Four Load Control Modes:** Manual mode, light control mode, dual time control mode, and light control fixed time control mode.
- **Multiple Protections:** Includes PV over-voltage, PV reverse polarity, PV short-circuit, battery over-voltage, battery under-voltage, battery reverse connection, load over current, controller over-temp, and low-temp charging protection (LTCP).
- **High Efficiency:** 99% tracking efficiency and 96% peak conversion efficiency.

4. PACKAGE CONTENTS

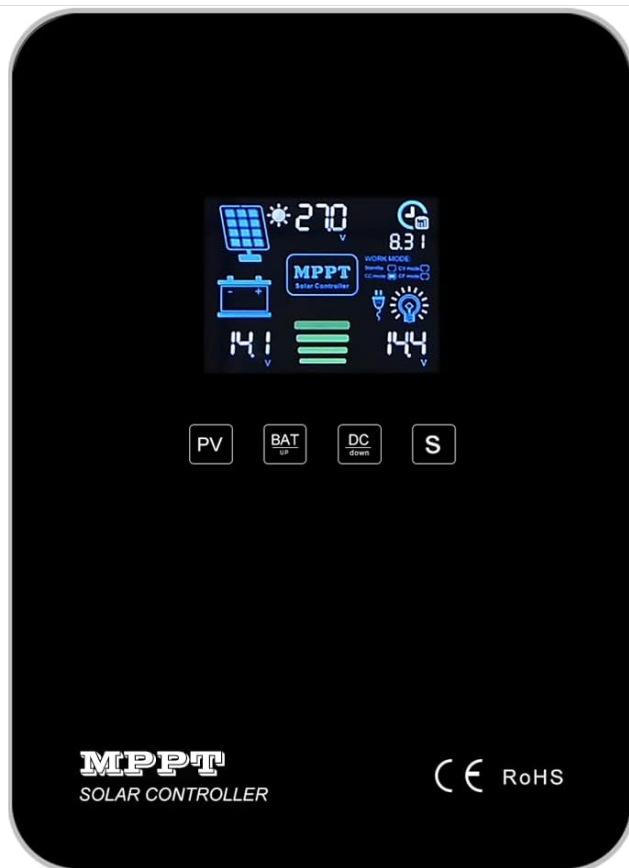
The package includes the following items:

- GCSOAR 60A Touch Screen MPPT Charge Controller
- RTS (Remote Temperature Sensor) Cable
- Mounting hardware (screws, brackets)



Figure 4.1: The GCSOAR 60A MPPT Charge Controller shown with its included accessories, which typically include the controller unit, a remote temperature sensor cable, and mounting hardware.

5. PRODUCT DIAGRAM AND COMPONENTS



- Auto identifying 12V/24VDC system voltage, Rated Charge Current 60A, Max. PV voltage 100V
- MPPT technology tracking efficiency $\cong$ 99.5%, conversion efficiency >98%
- Support PC software / WiFi module cloud APP monitoring (Android/iOS APP: SolarMate)
- Compatible with **Lead-acid(Sealed/Flooded/Gel)** and **Lithium(LiFePO4, Li-NiCoMn)** and **User Battery**
- Auto charging power&charging current limitation and temperature compensation function prolong battery life
- Real-Time charge and discharge energy statistics function

Solar Controller



Figure 5.1: Detailed diagram of the GCSOAR 60A MPPT Charge Controller, highlighting its key components and connection points.

1. **Display:** Touch screen interface for monitoring and setting parameters.
2. **Touch Switch & Working Status Indicator:** Buttons for navigation and status lights.
3. **GND Connector:** Grounding terminal.
4. **Battery Temperature Sensing Port:** For connecting the RTS cable.
5. **RS485 Communication Port:** For external communication modules (e.g., Bluetooth).
6. **PV+/- BAT+/- LOAD+/- Terminals:** Connection points for solar panels, battery, and DC load.
7. **Shell and Heat Sink:** The main body and heat dissipation fins.
8. **Glass Panel:** The front touch screen.
9. **Rear Cover of Connection Box:** Protects wiring terminals.

6. SETUP AND INSTALLATION

6.1 Mounting Location

Choose a dry, well-ventilated location away from direct sunlight, high temperatures, and moisture. Ensure sufficient space around the controller for air circulation, especially around the heat sink. The glass screen is prone to scratches; place it on a soft tabletop during installation if necessary.



Figure 6.1: Illustration of the heat dissipation mechanism, showing cool air entering from below and warm air exiting from above the heat sink. Proper airflow is crucial for optimal performance and longevity.

6.2 Wiring Sequence

Follow the wiring sequence strictly to prevent damage to the controller or other components:

1. **Connect the Battery:** First, connect the battery to the BAT+/- terminals. Ensure correct polarity. The controller will power on.
2. **Connect the Solar Panels:** Next, connect the solar panels to the PV+/- terminals. Ensure correct polarity.
3. **Connect the DC Load:** Finally, connect your DC load to the LOAD+/- terminals.

To disconnect the system, follow the reverse order: disconnect the load, then solar panels, then the battery.

6.3 Recommended Cable Size and Fuse

Proper wire gauge and fusing are essential for safety and performance. Refer to the table below for recommendations:

MULTIPLE PROTECTIONS

-  PV Over-voltage Protection
-  PV Reverse Polarity Protection
-  PV Short-circuit Protection
-  Battery Over-voltage Protection
-  Battery Under-voltage Protection



-  Battery Reverse Connection Protection
-  Load Over Current Protection
-  Controller Over-temp Protection
-  Low-temp Charging Protection(LTCP)

Figure 6.2: Recommended wire gauge and fuse sizes for the GCSDAR 60A MPPT Charge Controller. For a 60A controller, 4 AWG wire is recommended for both solar panel/battery and load connections, with fuses rated at 100A or greater.

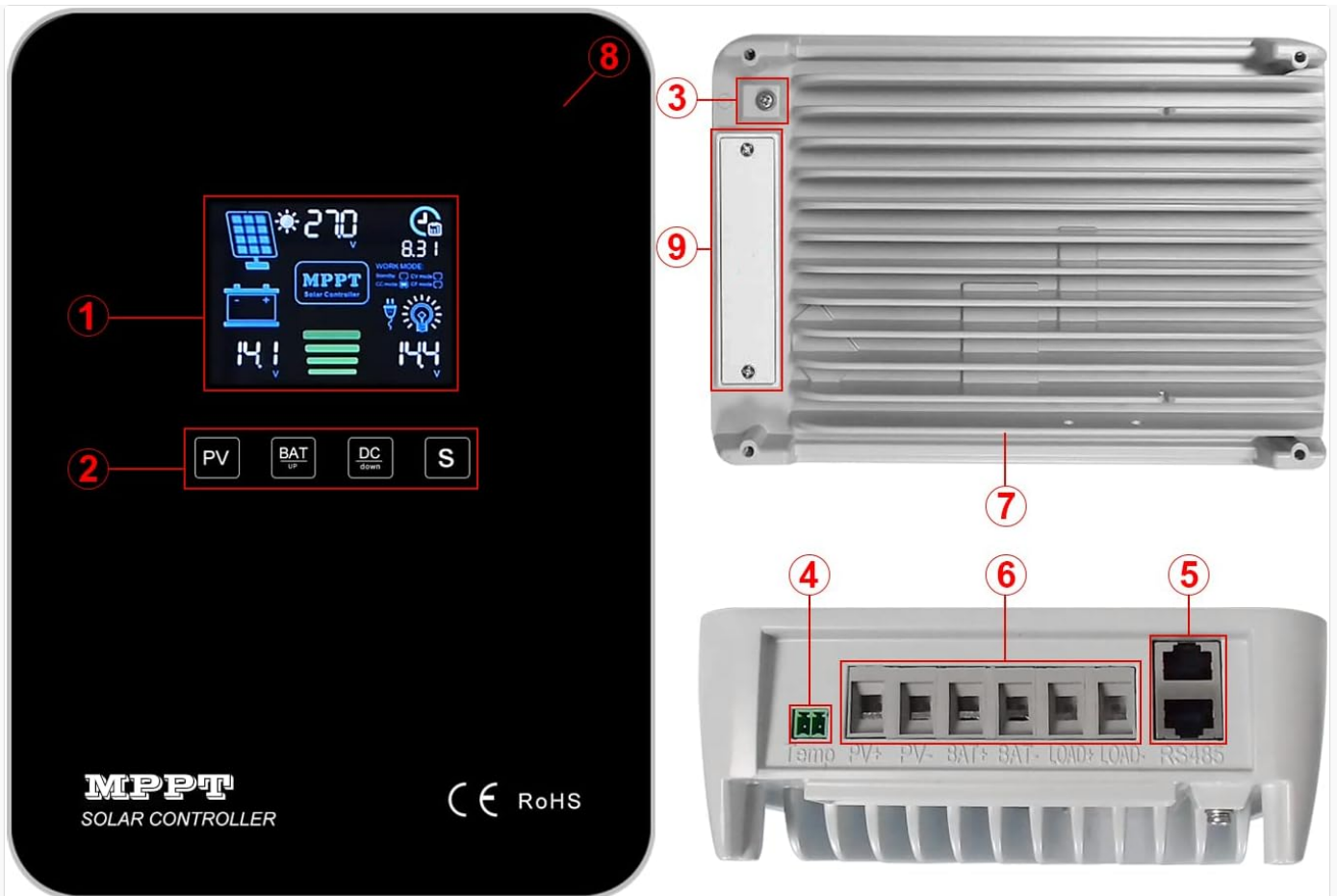
Table 6.1: Recommended Cable Size & Fuse

Connection	Wire Gauge Recommendation	Fuse Recommendation
Solar Panel / Battery	4 AWG	≥ 100A
Load	4 AWG	≥ 100A

7. OPERATION

7.1 Display Interface

The touch screen display provides real-time information about your solar system. Tap the screen to wake it up.



1. Display
2. Touch switch & Working status indicator
3. GND connector
4. Battery temperature sensing port
5. RS485 communication port
6. PV+/- BAT+/- LOAD+/- terminals
7. Shell and heat sink
8. Glass panel
9. Rear cover of connection box

Figure 7.1: The controller's display interface, showing various real-time data points for PV, battery, load, and overall system status.

- **PV Information:** PV voltage, PV current, PV power, PV total energy.
- **BAT Information:** Battery voltage, battery current, battery power, battery temperature, battery type, device address.
- **DC Load Information:** Load voltage, load current, load power, load total energy, load working mode.
- **System Information:** Realtime, date, system voltage, S01-S14 (setup parameters).

7.2 Button Operation

The controller features four touch buttons: PV, BAT, DC, and S (Set).



Figure 7.2: Explanation of button functions for accessing information and entering setup mode.

Table 7.1: Button Functions

Button	Accessible Information	In Setup Mode Function
PV	PV voltage / PV current / PV power / PV total energy	Go up/increase
BAT	Battery voltage / Battery current / Battery power / Battery type / Device address	Go up/increase
DC	Load voltage / Load current / Load power / Load total energy / Load working mode	Go down/decrease
S (Set)	Long press 'S' for 3 seconds to enter or exit setup mode. Press 'S' to select settable parameters (S01-S14). Save parameters before exiting.	Select parameter / Confirm setting

7.3 Load Control Modes

The controller offers four load control modes, which can be configured via the display interface:

- **Manual Mode:** Load is controlled manually (on/off) via the controller.
- **Light Control Mode:** Load turns on automatically at dusk and off at dawn.
- **Dual Time Control Mode:** Load turns on at dusk and stays on for a set number of hours, then turns off. It can also be set to turn on again for a second period before dawn.
- **Light Control Fixed Time Control Mode:** Load turns on at dusk and stays on for a fixed number of hours.

7.4 Battery Compatibility and Settings

The controller automatically recognizes 12V/24V Lead-acid batteries (Sealed, GEL/AGM, Flooded). For Lithium batteries (LiFePO₄, Li[NiCoMn]O₂), you must manually select the correct battery type in the settings. A user-defined mode is available for custom battery parameters.



Button Operation

Button	Accessible information	In setup mode function
PV	PV voltage / PV current / PV power / PV total energy	
BAT UP	Bat voltage / Bat current / Bat power / Bat temp / Bat type / Device address	Go up/increase
DC down	Load voltage / Load current / Load power / Load total energy / Load working mode	Go down/decrease
Button	Operational instructions	Setup items
S	- Long press 3S to enter or exit setup mode - Press the button: ->Select settable parameters S01-S14 ->Save parameters before exit	S01 Bat-Type->USER/SEL/FLD/GEL/LIT/LF1/LF2/LF4/LC1/LC2/LC4 S02 Device address S03 Load mode->ON/OFF/USER S04 Bat-temp->°C/°F S05 (LIT)Charge-Volt->9-30V(USE)/CV Charge->9-15V S06 (LIT)Nominal-Volt->8-29V(USE)/CV Charge->8-29V S07 (LIT or USE)Low-volt protection voltage S08 (LIT or USE)Low-volt recovery voltage S09 (LIT or USE)Over-volt protection voltage S10 (LIT or USE)Over-volt recovery voltage 00 00-Realtime set 00 00-Date set Tip: LF1(12V LiFePO4)/LF2(24V LiFePO4) LC1(12V Ternary lithium)/LC2(24V Ternary lithium)

Figure 7.3: The GCSOAR charge controller is compatible with a wide range of battery types, including various lead-acid and lithium chemistries, with user-defined options for specialized batteries.

7.5 Low-Temperature Charging Protection (LTCP)

The controller supports low-temperature charging protection for lithium batteries. Charging will stop if the battery temperature falls below 0°C (32°F) and will resume when the temperature is ≥ 5°C (41°F).



LTCP FUNCTION

Support low-temperature charging protection (LTCP) for lithium batteries

Stop Charging: **<0°C/32°F** | Resume Charging: **≥5°C/41°F**

Figure 7.4: The LTCP function ensures safe charging of lithium batteries by preventing charging below 0°C (32°F) and resuming above 5°C (41°F).

8. MAINTENANCE

Regular maintenance ensures the longevity and optimal performance of your charge controller.

- **Cleanliness:** Keep the controller clean and free from dust and debris. Use a soft, dry cloth for cleaning. Do not use abrasive cleaners or solvents.
- **Connections:** Periodically check all wiring connections (PV, battery, load) to ensure they are tight and free from corrosion. Loose connections can cause overheating and damage.
- **Ventilation:** Ensure the heat sink and ventilation openings are not obstructed. Maintain adequate airflow around the unit.

- **Environmental Conditions:** Verify that the operating environment remains within the specified temperature and humidity ranges.
- **Firmware:** Check the manufacturer's website for any available firmware updates, though updates for this model may require specific tools or modules.

9. TROUBLESHOOTING

This section addresses common issues you might encounter with your GCSOAR MPPT Charge Controller.

- **Controller Not Powering On:**

- Check battery connections and polarity. Ensure the battery voltage is within the controller's operating range (12V/24V).
- Verify battery fuse is intact and properly connected.

- **No PV Charging:**

- Check solar panel connections and polarity.
- Ensure sufficient sunlight is reaching the panels.
- Verify PV input voltage is within the controller's acceptable range (Max 100V).
- Check for any shading on the solar panels.

- **Load Not Working:**

- Check load connections and polarity.
- Verify the load control mode settings (e.g., if in light control mode, it will only turn on at dusk).
- Check if the battery voltage is too low, triggering low voltage disconnect.
- Ensure the load current does not exceed the controller's rated capacity.

- **Inaccurate Readings:**

- Ensure the Remote Temperature Sensor (RTS) cable is properly connected and placed near the battery for accurate temperature compensation.
- Verify battery type settings match your installed battery.

- **WiFi/App Connectivity Issues:**

- Note that the Cloud-Box-M2 module is generally not available or supported for this model.
- If using an optional Bluetooth module, ensure it is correctly connected and within range. Bluetooth range is typically limited (e.g., ~25 feet).
- Check for the correct app (e.g., SolarMate) on your device's app store. Some users have reported issues with app availability or functionality for Android.

- **Over-voltage/Surge Issues (especially with Lithium batteries):**

- Ensure battery parameters (especially maximum charge voltage) are correctly set for your specific lithium battery type. Incorrect settings can lead to overcharging or voltage spikes that trip inverters.
- If issues persist, contact technical support.

10. SPECIFICATIONS

Table 10.1: Product Specifications

Feature	Specification
Brand	GCSOAR
Model Number	6024
Display Type	Touch screen
Operating Temperature	25 Degrees Celsius (typical, refer to manual for full range)
UPC	791555246653
Charging Port Type	MC4 (for PV input)
Product Dimensions (L x W x H)	9.65 x 6.69 x 2.5 inches (24.5 x 17 x 6.35 cm)
Item Weight	6.51 pounds (2.95 kg)
Voltage	100 Volts (Max PV Input)
Material	Metal
Included Components	60A Touch Screen MPPT Controller + RTS Temperature Sensor Cable

11. WARRANTY AND SUPPORT

GCSOAR provides technical support for its products. If you encounter any issues or require assistance, please contact GCSOAR customer service. While specific warranty terms are not detailed here, standard limited warranties typically cover manufacturing defects for a defined period from the date of purchase.

For technical inquiries or support, please refer to the contact information provided with your product packaging or visit the official GCSOAR website. Please note that the Cloud-Box-M2 module is not supported for this model; however, optional Bluetooth modules may be available for remote monitoring.

12. TYPICAL APPLICATIONS

The GCSOAR 60A MPPT Charge Controller is versatile and suitable for a variety of off-grid and grid-tied solar applications:

RECOMMENDED CABLE SIZE & FUSE

Wire Gauge Recommendation			Fuse Recommendation	
				
Solar Panel / Battery	Load	Max.Wire Gauge	Solar Panel / Battery	Load
4 AWG	4 AWG	4 AWG	≥ 100A	≥ 100A

Figure 12.1: Ideal for marine applications, providing reliable power management for yachts and boats.

COMPATIBLE WITH MOST BATTERY TYPES

- GEL • SEL • FLD • USER
- LiFePO4 • GELNCM

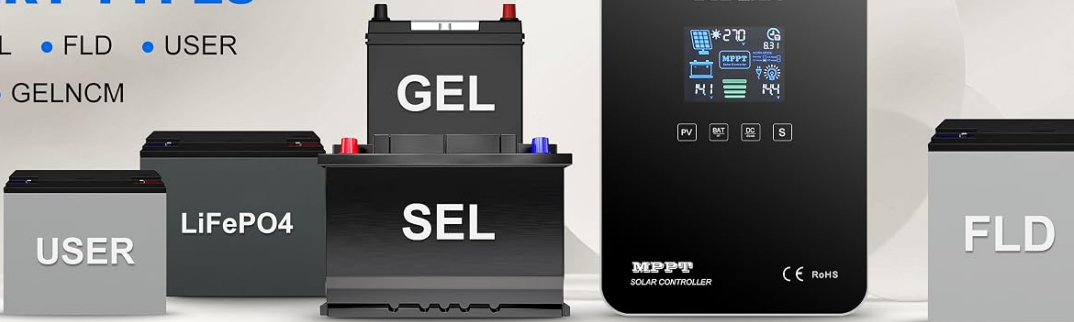


Figure 12.2: Perfect for off-grid cabins, ensuring consistent power supply from solar arrays.

GCIT 60A MPPT SOLAR CHARGE CONTROLLER

12V/24V Max.PV 100V

For Lithium/ Lead-Acid Batteries



Figure 12.3: Suitable for residential solar energy storage systems, optimizing battery charging.

EFFICIENT CHARGING

99% Tracking Efficiency Reaches
96% Peak Conversion Efficiency



Figure 12.4: An excellent choice for recreational vehicles (RVs), providing efficient solar power management on the go.

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