**Victron Energy NH-447**

# Victron Energy SmartSolar MPPT 250V 70A Solar Charge Controller User Manual

Model: NH-447

Introduction Safety Overview Setup Operation Maintenance Troubleshooting Specifications Support

## 1. Introduction

This manual provides essential information for the safe and efficient installation, operation, and maintenance of your Victron Energy SmartSolar MPPT 250V 70A Solar Charge Controller. This device is designed to maximize energy harvest from your solar panels and optimize battery longevity through advanced Maximum Power Point Tracking (MPPT) technology and intelligent charging algorithms.

## 2. Safety Information

**WARNING: Improper installation or operation can lead to serious injury or damage to the equipment. Always follow these safety guidelines:**

- Read all instructions before installation and operation.
- Ensure all wiring is correctly sized and protected with appropriate fuses or circuit breakers.
- Disconnect all power sources (solar panels and battery) before installing or servicing the controller.
- Wear appropriate personal protective equipment, including eye protection and insulated gloves.
- Install the controller in a well-ventilated area, away from flammable materials and moisture.
- This device is designed for use with 12V, 24V, 36V, or 48V battery systems. Ensure your battery voltage matches the controller's settings.
- Do not disassemble or attempt to repair the controller yourself. Refer to qualified service personnel.

## 3. Product Overview

The Victron Energy SmartSolar MPPT 250V 70A is a high-performance solar charge controller featuring Bluetooth connectivity for easy monitoring and configuration. It efficiently converts solar energy to charge your battery bank, even under challenging conditions like partial shading.

## Key Features:

- **Smart Solar Charging:** Optimizes energy conversion from solar panels and extends battery life.
- **Maximum Power Output:** Utilizes lightning-fast Maximum Power Point Tracking (MPPT) and intelligent charge algorithms to ensure peak power output, even when solar panels are partially shaded.
- **Synchronized Charging:** Multiple SmartSolar MPPT controllers can operate in sync, transitioning through charge stages simultaneously for enhanced battery longevity and system-wide energy management.
- **VictronConnect App Connectivity:** Access real-time data, 30-day performance history, configure settings, update firmware, and set alarms via Bluetooth.
- **Intelligent Load Output:** Directly power devices from the solar charger with configurable voltage thresholds for automatic load disconnection to protect batteries from over-discharge.

## Physical Description:

The SmartSolar MPPT 250V 70A controller is housed in a durable blue plastic casing with integrated heat sinks for efficient cooling. It features clearly labeled terminals for battery and PV connections, along with status indicator LEDs.


Figure 1: Front view of the Victron Energy SmartSolar MPPT 250V 70A Solar Charge Controller. The image shows the blue casing, Victron Energy logo, SmartSolar charge controller branding, MPPT 250 | 70 - Tr model designation, and connection terminals for battery and PV.


Figure 2: Dimensions of the Victron Energy SmartSolar MPPT 250V 70A Solar Charge Controller. The image indicates a length of 250 mm (9.8"), a width of 185 mm (7.3"), and a height of 95 mm (3.7"). The weight is listed as 3 kg (6.6 lbs).

## 4. Setup and Installation

Proper installation is crucial for the performance and safety of your solar charging system. Follow these steps carefully:

### 4.1 Mounting the Controller

- Choose a mounting location that is dry, well-ventilated, and protected from direct sunlight and extreme temperatures.
- Ensure there is sufficient clearance around the controller for airflow, especially around the heat sink fins.
- Mount the controller vertically on a non-flammable surface using appropriate fasteners.

### 4.2 Wiring Connections

**IMPORTANT: Always connect the battery first, then the solar panels. Disconnect in reverse order: solar panels first, then the battery.**

1. **Battery Connection:** Connect the battery cables to the BATTERY terminals (+ and -) on the charge

controller. Ensure correct polarity.

2. **Solar Panel Connection:** Connect the solar panel cables to the PV terminals (+ and -) on the charge controller. Ensure correct polarity.
3. **Load Connection (Optional):** If using the intelligent load output, connect your DC loads to the LOAD terminals (+ and -).


Figure 3: Close-up view of the connection terminals on the Victron Energy SmartSolar MPPT 250V 70A. The image highlights the BATTERY and PV input terminals, as well as the VE.Direct port and relay/remote terminals.

## 4.3 Initial Configuration with VictronConnect App

After physical installation, use the VictronConnect app for initial setup and monitoring. The app is available for smartphones, tablets, and computers.

- Download the VictronConnect app from your device's app store.
- Enable Bluetooth on your device.
- Open the app and select your SmartSolar controller from the device list.
- Follow the on-screen prompts to configure battery type, voltage, and other charging parameters.


Figure 4: Screenshot of the VictronConnect app interface on a smartphone, displaying real-time solar and battery data, including power, voltage, and current. The app provides local Bluetooth connection, 30-day performance history, hassle-free configuration, and instant solar insights.

## 5. Operating Instructions

Once installed and configured, the SmartSolar MPPT controller operates automatically to manage your solar charging. The VictronConnect app provides detailed insights and control.

### 5.1 Charging Stages

The controller employs an intelligent multi-stage charging algorithm to ensure optimal battery health and longevity:

- **Bulk:** Maximum current is delivered to rapidly charge the battery.
- **Absorption:** When the battery voltage reaches a set level, the controller switches to constant voltage charging to fully charge the battery.
- **Float:** Once the battery is fully charged, the voltage is reduced to a lower level to maintain the battery without overcharging.

### 5.2 Monitoring with VictronConnect

The VictronConnect app allows you to monitor your system's performance in real-time and review historical data.

You can view:

- Solar panel power, voltage, and current.
- Battery voltage and charging current.
- Current charging stage.
- 30-day historical data for energy yield.

## 5.3 Intelligent Load Output

The intelligent load output feature allows direct connection of DC loads. The controller can be configured to automatically disconnect loads if the battery voltage drops below a user-defined threshold, preventing deep discharge and extending battery life.

## 5.4 Synchronized Charging

For systems with multiple SmartSolar MPPT controllers, the synchronized charging feature allows them to communicate and coordinate their charging stages. This ensures all batteries in the bank are charged uniformly, enhancing overall system efficiency and battery lifespan.


Figure 5: Illustration showing two Victron Energy SmartSolar controllers synchronizing to behave as one, maximizing charging efficiency and battery longevity.

## 6. Maintenance

The Victron Energy SmartSolar MPPT controller is designed for minimal maintenance. However, periodic checks are recommended to ensure optimal performance and longevity:

- **Visual Inspection:** Regularly inspect the controller for any signs of damage, corrosion, or loose connections.
- **Cleanliness:** Keep the controller and its ventilation openings free from dust and debris. Use a dry cloth for cleaning. Do not use liquids.
- **Wiring Checks:** Periodically check all wiring connections to ensure they are secure and free from wear or damage.
- **Firmware Updates:** Check for and apply firmware updates via the VictronConnect app to ensure your controller has the latest features and improvements.

## 7. Troubleshooting

If you encounter issues with your SmartSolar MPPT controller, refer to the following common troubleshooting steps:

- **No Power/No Display:** Check all battery and solar panel connections. Ensure the battery is sufficiently charged to power the controller. Verify fuses or circuit breakers are not tripped.
- **Low Charging Current:** Check solar panel connections and ensure panels are clean and not shaded. Verify battery voltage and health. Review settings in the VictronConnect app to ensure they match your battery type.
- **Error Codes:** If an error code is displayed (via LEDs or VictronConnect app), consult the detailed error code explanations available in the VictronConnect app or the comprehensive manual on the Victron Energy website.
- **Bluetooth Connectivity Issues:** Ensure Bluetooth is enabled on your device and the controller is within range. Restart both the app and your device.

For persistent issues, contact Victron Energy support or an authorized dealer.


Figure 6: Diagram illustrating the SafetyShield+ protection features of the Victron Energy SmartSolar MPPT controller, including temperature compensated charging, overtemperature protection, PV short-circuit protection, PV reverse polarity protection, PV reverse current protection, and pro-active alarm notifications.

## 8. Specifications

| Feature | Specification |
|---|---|
| Brand | Victron Energy |
| Model Number | NH-447 |
| Voltage | 250 Volts |
| Current Rating | 70 Amps |
| Battery Voltage Compatibility | 12/24/36/48-Volt (auto-sensing) |
| Product Dimensions (L x W x H) | 9.84 x 7.28 x 3.74 inches (250 x 185 x 95 mm) |
| Item Weight | 7.04 pounds (3.2 Kilograms) |
| Material | Plastic |

| Feature | Specification |
|---|---|
| Color | Blue |
| Connectivity | Bluetooth (VictronConnect App), VE.Direct |
| Included Components | Victron Energy Solar Charge Controller |

## 9. Warranty and Support

Victron Energy products are known for their reliability and quality. For warranty information, please refer to the official Victron Energy website or your purchase documentation. Victron Energy maintains a global network of dealers and service partners to provide support.

### Contacting Support:

- Visit the official Victron Energy website for comprehensive documentation, FAQs, and support resources.
- Locate an authorized Victron Energy dealer or service center near you using the dealer locator tool on their website.

Figure 7: The Victron Remote Management (VRM) system, showing monitoring capabilities across a smartphone app, laptop interface, and dedicated display. This system allows users to monitor and analyze system performance remotely.