EPEVER TRIRON4210N

EPEVER TRIRON 4210N MPPT Solar Charge Controller User Manual

Model: TRIRON 4210N

1. Introduction

The EPEVER TRIRON 4210N is an advanced Maximum Power Point Tracking (MPPT) solar charge controller designed for efficient and reliable management of solar power systems. This modular-designed regulator is an updated version of the Tracer A/AN series, offering enhanced features and improved performance. It is suitable for various applications, including communication base stations, household solar systems, street lighting, and RV solar setups.

The controller utilizes a sophisticated MPPT control algorithm to minimize power loss and quickly track the maximum power point of the photovoltaic (PV) array, ensuring maximum energy harvest from solar modules under diverse conditions. Its adaptive three-stage charging mode, based on a digital control circuit, helps prolong battery life and significantly improves overall system performance.

Figure 1: EPEVER TRIRON 4210N MPPT Solar Charge Controller with included accessories.

2. Product Features

- **Advanced MPPT Technology:** Features an efficiency of no less than 99.5%, ensuring optimal power conversion from solar panels.
- **Modular Design:** Allows for easy combination and replacement of different display and interface modules, enhancing versatility and serviceability.
- **Negative Ground Design:** Suitable for a wide range of applications, providing flexibility in system grounding.
- **Battery Compatibility:** Supports 7 battery types, including Sealed (AGM), Gel, Flooded, Lead-acid User, LiFePO4 Lithium, Li(NiCoMn)O2 Lithium, and Lithium User (9~34V).
- **Dual USB Output:** Provides two 5V DC USB output interfaces (Max 2.2A) for direct charging of electronic devices.
- **RS485 Communication:** Master and slave RS485 communication modules enable reading of load or inverter operating data and control of inverter switches via a relay interface.
- **Intuitive Interface:** Equipped with three indicator lights for PV, Battery, and Load status, and five buttons for easy adjustment

and browsing of system parameters.

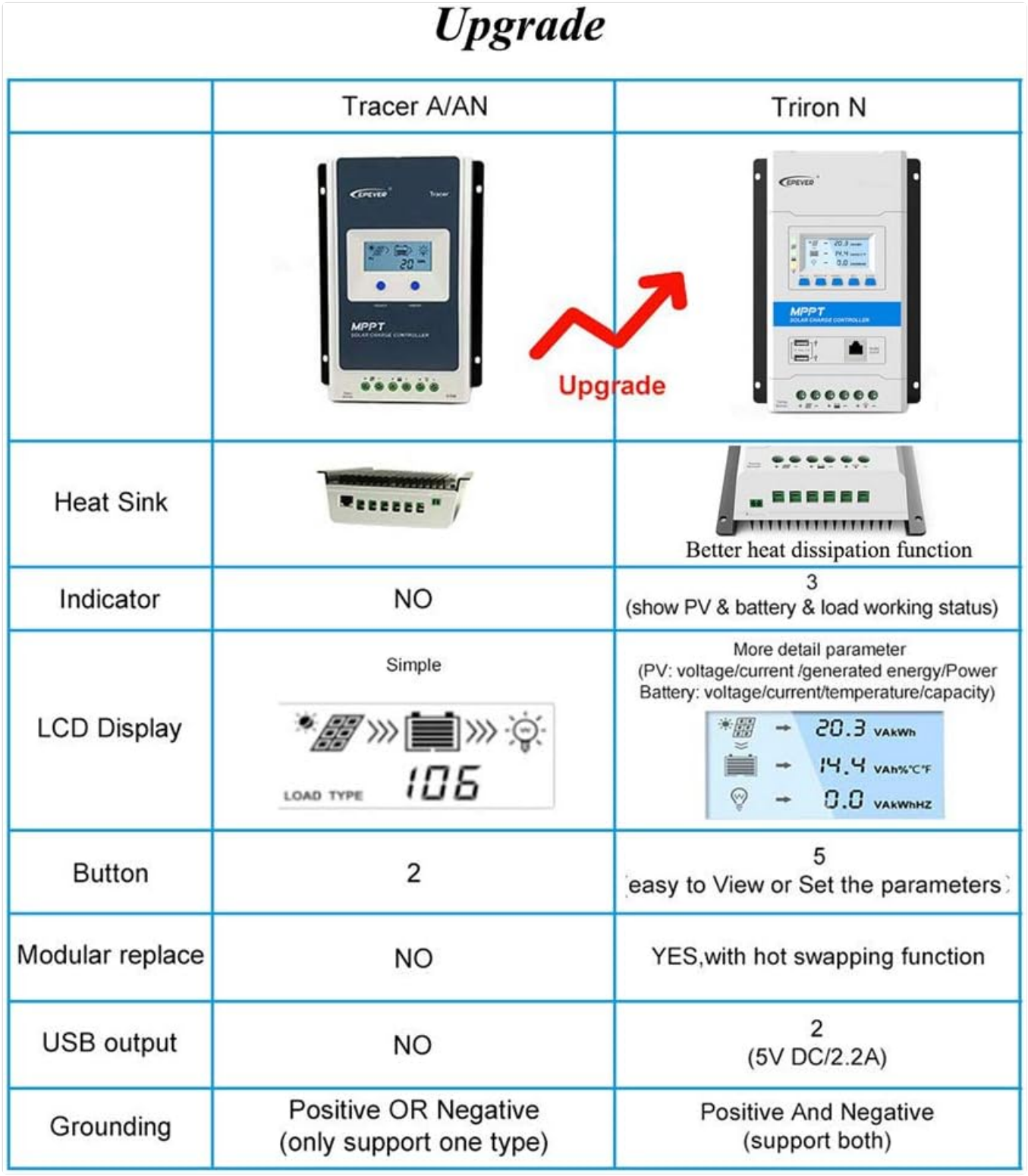

Figure 2: Comparison highlighting key upgrades of the TRIRON N series over the Tracer A/AN series.

3. Components and Modular Design

The TRIRON 4210N controller features a modular design, allowing for flexible configuration and easy maintenance. The main unit integrates the core MPPT charging circuitry and power terminals. Various modules can be attached to expand functionality:

- **Display Module (MT50):** Provides a clear LCD screen for real-time monitoring of system parameters and allows for parameter adjustment.
- **Communication Modules (RS485):** Enables data communication with external devices like PCs or other monitoring systems.

- **Remote Temperature Sensor (RTS):** Improves charging accuracy by providing precise battery temperature data.
- **USB Output Module:** Integrated dual USB ports for charging small electronic devices.

Figure 3: The TRIRON N series controller demonstrating its removable and interchangeable modules.

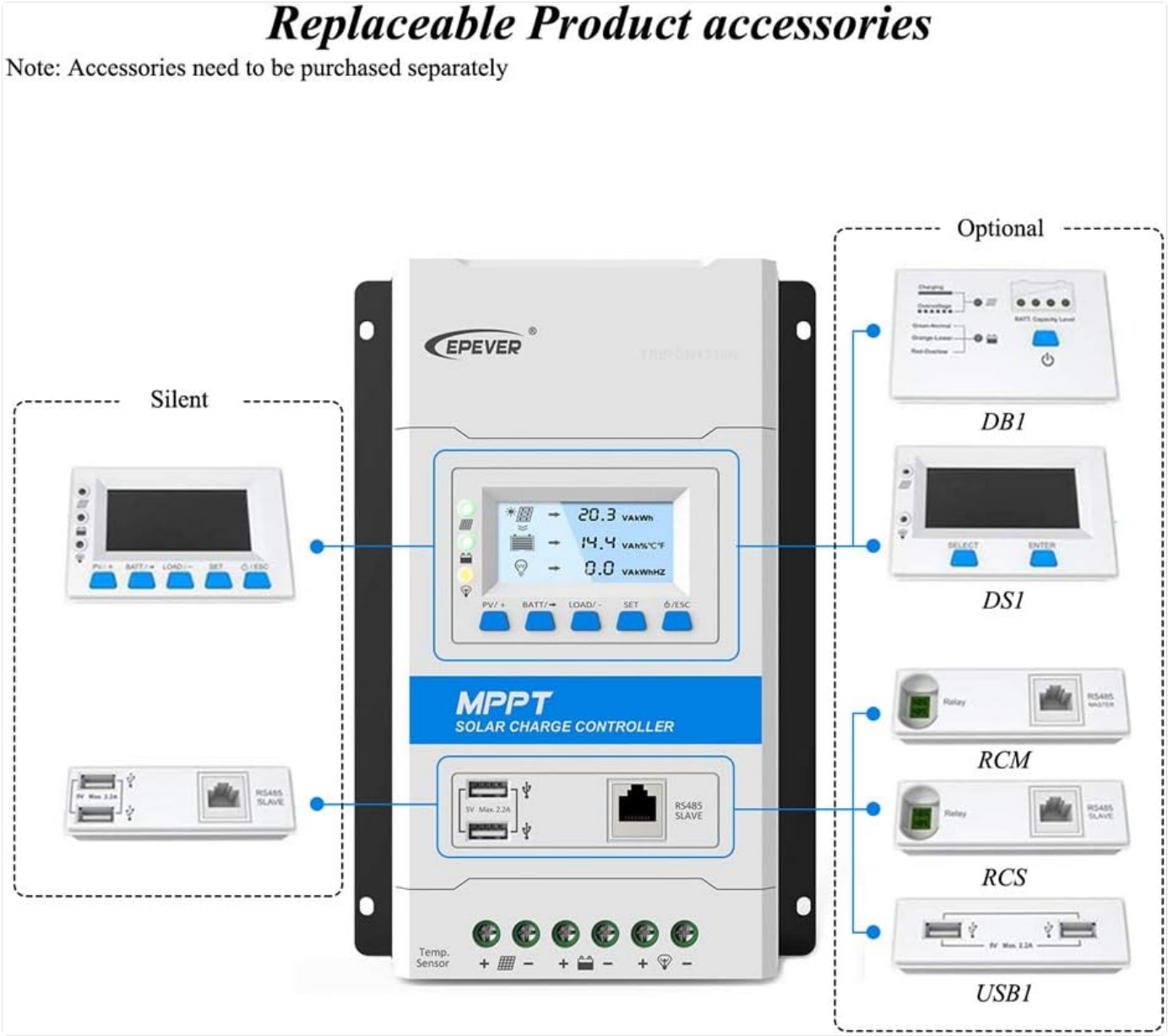

Figure 4: Overview of the TRIRON 4210N main unit and its compatible optional accessories.

4. Installation Guide

Proper installation is crucial for the safe and efficient operation of your solar charge controller. Please follow these guidelines carefully:

4.1 Safety Precautions

- Ensure all power sources are disconnected before wiring.
- Do not close the circuit breaker or fuse until all wiring is complete and verified.
- Verify that the leads of the "+" and "-" poles are connected correctly to prevent damage.
- Install a fuse on the battery side with a current rating of 1.25 to 2 times the rated current of the controller. The fuse should be located no greater than 150 mm from the battery.
- If an inverter is part of your system, connect it directly to the battery, not to the load side of the controller.

4.2 Wiring Sequence

Connect the components in the following order:

1. **Connect the Battery:** Connect the battery to the controller's battery terminals. Ensure correct polarity.
2. **Connect the Solar Panels:** Connect the solar panels to the controller's PV terminals. Ensure correct polarity.
3. **Connect the Load (Optional):** If using the controller's load output, connect your DC load to the load terminals.

Figure 5: System connection diagram for the EPEVER TRIRON 4210N controller.

5. Operation and Display

The TRIRON 4210N controller provides comprehensive system status information through its LCD display and indicator lights. Parameters can be easily adjusted using the five control buttons.

5.1 LCD Display

The LCD displays various real-time data, including:

- PV array voltage and current
- Battery voltage and charging current
- Load voltage and current
- Generated energy (kWh)
- Battery state of charge (SOC)
- System temperature
- Error codes and warnings

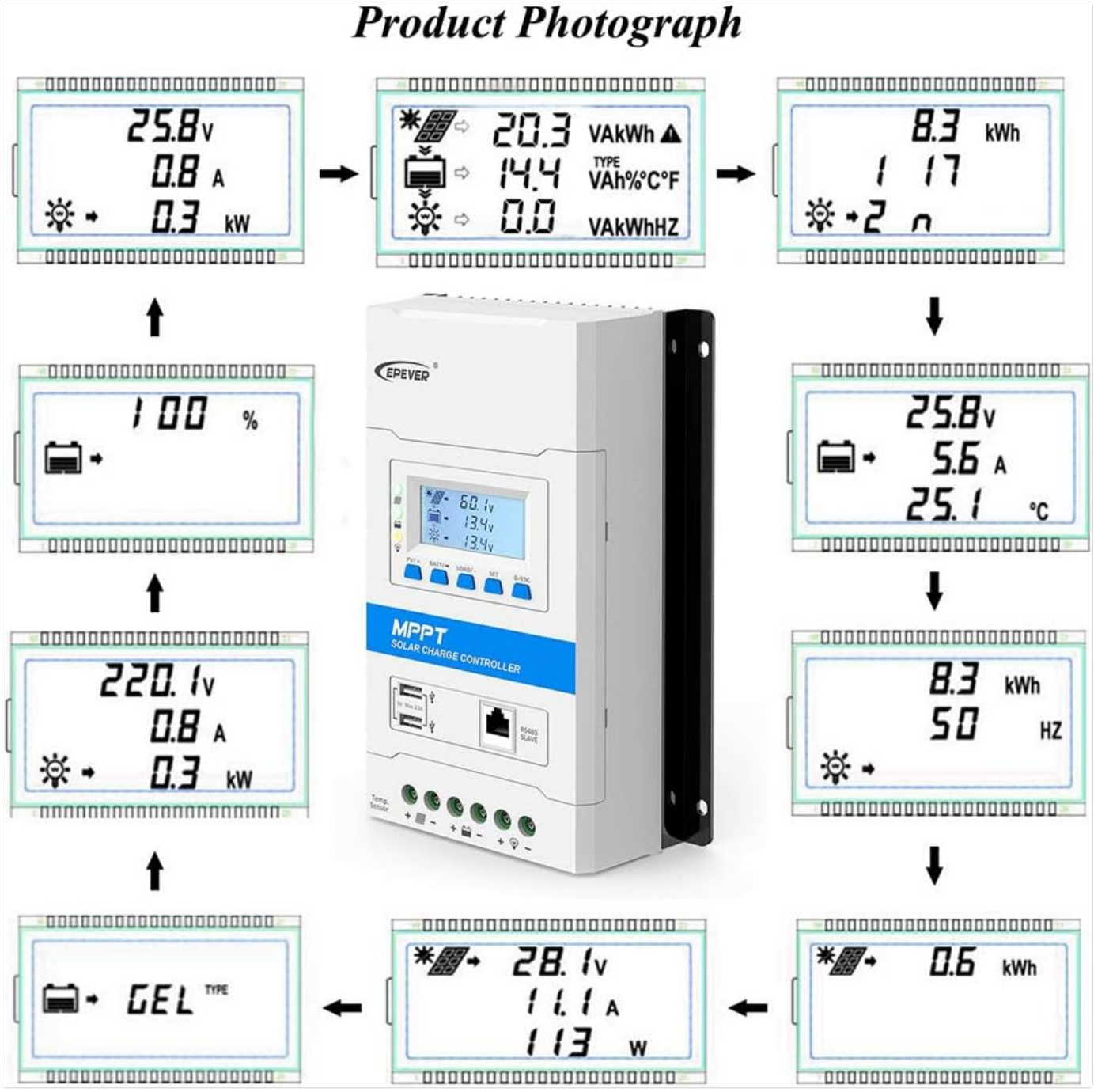

Figure 6: Examples of information displayed on the controller's LCD screen.

5.2 Control Buttons

The five buttons allow you to navigate through menus, view parameters, and adjust settings. Refer to the detailed user manual for specific button functions and menu navigation.

5.3 Indicator Lights

Three indicator lights provide quick visual feedback on the status of the PV array, battery, and load.

6. Battery Type Configuration

The TRIRON 4210N supports various battery types, and it is essential to select the correct type for optimal charging and battery longevity. The controller supports:

- Sealed (AGM)
- Gel
- Flooded
- Lead-acid User-defined
- LiFePO4 Lithium
- Li(NiCoMn)O2 Lithium
- Lithium User-defined (9~34V)

To configure the battery type, navigate through the controller's menu using the control buttons and select the option that matches your battery. For user-defined types, you can set specific voltage parameters for charging stages.

7. Maintenance

Regular maintenance ensures the long-term performance and reliability of your EPEVER TRIRON 4210N solar charge controller:

- **Visual Inspection:** Periodically check all wiring connections for tightness and signs of corrosion. Ensure no cables are frayed or damaged.
- **Cleaning:** Keep the controller clean and free from dust and debris. Use a dry cloth to wipe the surface. Do not use liquid cleaners.
- **Ventilation:** Ensure adequate airflow around the controller to prevent overheating. Keep ventilation openings clear.
- **Firmware Updates:** Check the manufacturer's website for any available firmware updates. Updates can improve performance and add new features.
- **Battery Health:** Monitor your battery's health and voltage regularly. Ensure it is within the recommended operating range for your battery type.

8. Troubleshooting

This section provides solutions to common issues you might encounter with your TRIRON 4210N controller. For more complex problems, refer to the full user manual or contact support.

Problem	Possible Cause	Solution
Controller not powering on	Battery not connected or low voltage; reverse polarity; blown fuse.	Check battery connections and voltage; verify polarity; inspect and replace fuse if necessary.

Problem	Possible Cause	Solution
No charging from PV	PV panels not connected; low sunlight; PV voltage too low/high; PV reverse polarity.	Check PV connections; ensure sufficient sunlight; verify PV voltage is within range; correct polarity.
Load not working	Load disconnected; overload; short circuit; low battery voltage.	Check load connections; reduce load; check for short circuits; charge battery.
Inaccurate readings	Loose connections; faulty sensor (RTS).	Tighten all connections; check RTS connection or replace if faulty.

9. Technical Specifications

Below are the detailed technical specifications for the EPEVER TRIRON 4210N MPPT Solar Charge Controller:

Parameter	Value
Model	TRIRON 4210N
Nominal System Voltage	12V/24VDC Auto Work
Rated Charge Current	40A
Rated Discharge Current	40A
Battery Input Voltage Range	8~32V
Max. PV Open Circuit Voltage	TRIRON**06N: 60V TRIRON**10N: 100V TRIRON**15N: 150V
MPP Voltage Range	(Vbat+2V)~72V (TRIRON**10N) (Vbat+2V)~92V (TRIRON**15N)
Max. PV Input Power	12V: 520W 24V: 1040W
Battery Type	Sealed / Gel / Flooded / LiFePO4 / Li-NiCoMn / User
Equalize Charge Voltage (Lead-acid)	Sealed: 14.6V, Flooded: 14.8V, User-defined: 9~17V
Boost Charge Voltage (Lead-acid)	Gel: 14.2V, Sealed: 14.4V, Flooded: 14.6V, User-defined: 9~17V
Float Charge Voltage (Lead-acid)	Gel/Sealed/Flooded: 13.8V, User-defined: 9~17V
Low Voltage Reconnect Voltage (Lead-acid)	Gel/Sealed/Flooded: 12.6V, User-defined: 9~17V
Low Voltage Disconnect Voltage (Lead-acid)	Gel/Sealed/Flooded: 11.1V, User-defined: 9~17V
Boost Charge Voltage (Li-battery)	LiFePO4: 14.4V, Li-NiCoMn: 12.4V, User: 9~17V
Float Charge Voltage (Li-battery)	LiFePO4: 13.6V, Li-NiCoMn: 11.8V, User: 9~17V

Parameter	Value
Low Voltage Reconnect Voltage (Li-battery)	LiFePO4: 12.4V, Li-NiCoMn: 10.40V, User: 9~17V
Low Voltage Disconnect Voltage (Li-battery)	LiFePO4: 11.0V, Li-NiCoMn: 9.20V, User: 9~17V
Charging Port Type	USB
Display Type	LCD
Item Weight	6.45 pounds
Package Dimensions	15.87 x 10.39 x 5.91 inches

Note: Specifications are subject to change without prior notice. Refer to the product label for the most accurate information.

Electrical paramete

Electrical parameters		TRIRON 1206N	TRIRON 2206N	TRIRON 1210N	TRIRON 2210/15N	TRIRON 3210/15N	TRIRON 4210/15N
Nominal system voltage		12/24VDC auto work					
Rated charge current		10A	20A	10A	20A	30A	40A
Rated discharge current		10A	20A	10A	20A	30A	40A
Battery input voltage range		8～32V					
Max. PV open circuit voltage		TRIRON**06N : 60Vat Min operating environment temp; 46Vat 25℃environment temp TRIRON**10N :100Vat Min operating environment temp; 92Vat 25℃environment temp TRIRON**15N :150Vat Min operating environment temp;138Vat 25℃environment temp					
MPP voltage range		(Vbat+2V)～36V		TRIRON**10N : (Vbat+2V)～72V TRIRON**15N : (Vbat+2V)～92V			
Max.PV input power		130W/12V 260W/24V	260W/12V 520W/24V	130W/12V 260W/24V	260W/12V 520W/24V	390W/12V 780W/24V	520W/12V 1040W/24V
Battery type		Sealed / Gel / Flooded;LiFePO4 / Li-NiCoMn / User					
		Lithium battery(LiFePO4 /Li-NiCoMn/User)					
◆ Lead-acid batteries	Equalize charging voltage	Sealed: 14.6V, Flooded: 14.8V, User-defined: 9~17V					
	Boost charging voltage	Gel: 14.2V, Sealed: 14.4V, Flooded: 14.6V, User-defined: 9~17V					
	Float charging voltage	Gel /Sealed /Flooded: 13.8V, User-defined: 9~17V					
	Low voltage reconnect voltage	Gel /Sealed /Flooded: 12.6V, User-defined: 9~17V					
	Low voltage disconnect voltage	Gel /Sealed /Flooded: 11.1V, User-defined: 9~17V					
◆ Li-battery	Boost charging voltage	LiFePO4:14.4V；Li-NiCoMn：12.4V；User:9-17V					
	Float charging voltage	LiFePO4: 13.6V；Li-NiCoMn：11.8V；User:9-17V					
	Low voltage reconnect voltage	LiFePO4:12.4V；Li-NiCoMn：10.40V；User:9-17V					
	Low voltage disconnect voltage	LiFePO4:11.0V；Li-NiCoMn：9.20V；User:9-17V					

Figure 7: Detailed electrical parameters for the TRIRON N series controllers.

10. Warranty and Support

EPEVER products are manufactured to high-quality standards and come with a manufacturer's warranty. For specific warranty terms and conditions, please refer to the warranty card included with your product or contact the seller directly.
For technical support, troubleshooting assistance, or warranty claims, please contact your point of purchase or the authorized distributor. If purchased from Amazon, you may contact the seller, **SolaMr**, for assistance.
For general information about EPEVER products, you can visit the official EPEVER website.