EPEVER XTRA4210N-G3

EPEVER XTRA4210N-G3 MPPT Solar Charge Controller User Manual

Model: XTRA4210N-G3

1. INTRODUCTION

The EPEVER XTRA4210N-G3 MPPT Solar Charge Controller is an advanced maximum power point tracking (MPPT) device designed for off-grid photovoltaic systems. It efficiently manages power from solar panels to charge various battery types, including Sealed, Gel (AGM), Flooded, LiFePO4, and Li(NiCoMn)O2 batteries. This controller features a common negative grounding design, ensuring compatibility with diverse applications such as communication base stations, household systems, street lighting, and RV solar setups.

Key features include high tracking efficiency up to 99.5%, peak conversion efficiency of 98%, and an ultra-quiet design. The G3 version introduces independent voltage regulation, allowing direct load connection even without a battery, and enhanced protection mechanisms for system integrity.
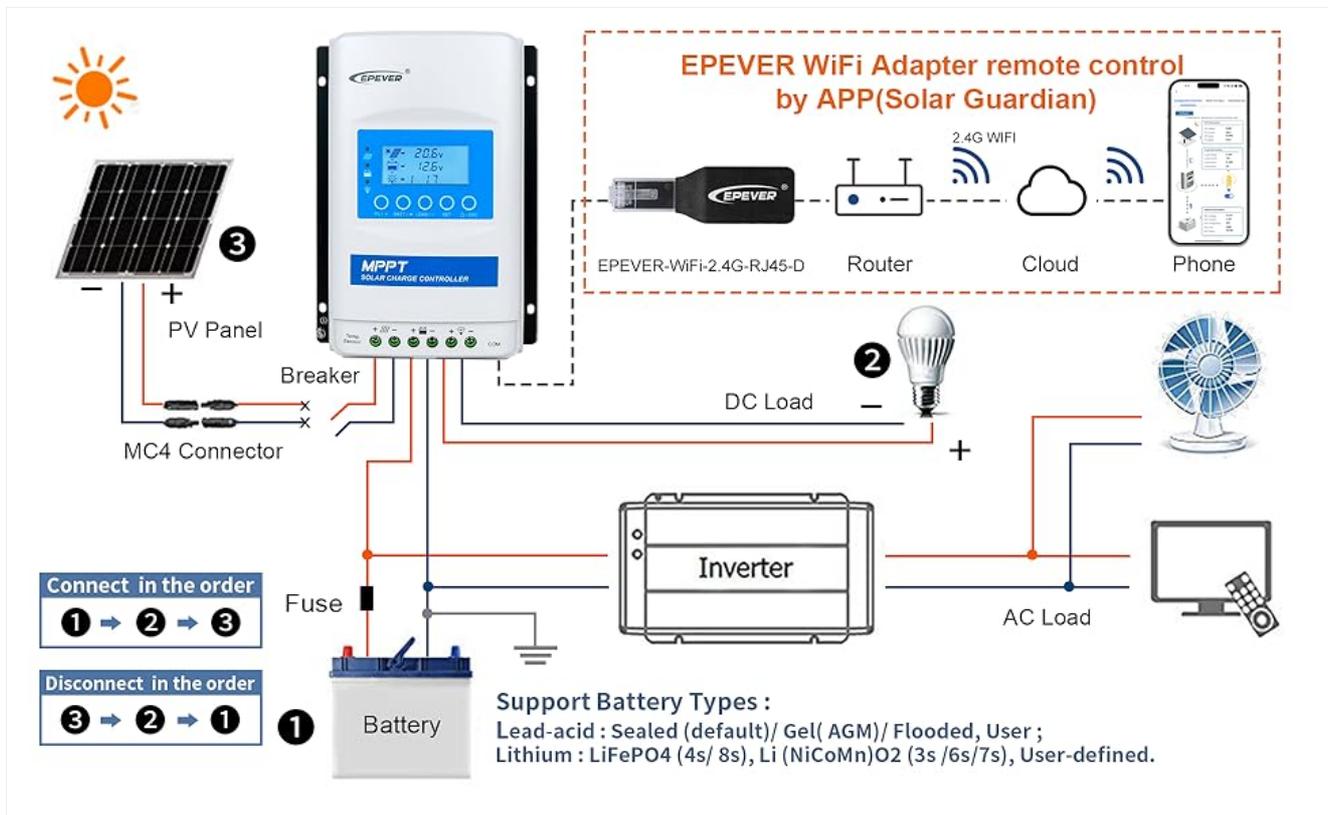
Figure 1: Overview of EPEVER XTRA-N-G3 MPPT Solar Charge Controller features.

2. SETUP AND INSTALLATION

Proper installation is crucial for the safe and efficient operation of your EPEVER XTRA4210N-G3 controller. Follow the connection sequence carefully.

2.1 Connection Sequence

1. Connect the battery to the controller.
2. Connect the load to the controller.
3. Connect the PV array (solar panels) to the controller.

Disconnection Sequence: To disconnect the system, reverse the connection order: first disconnect the PV array, then the load, and finally the battery.
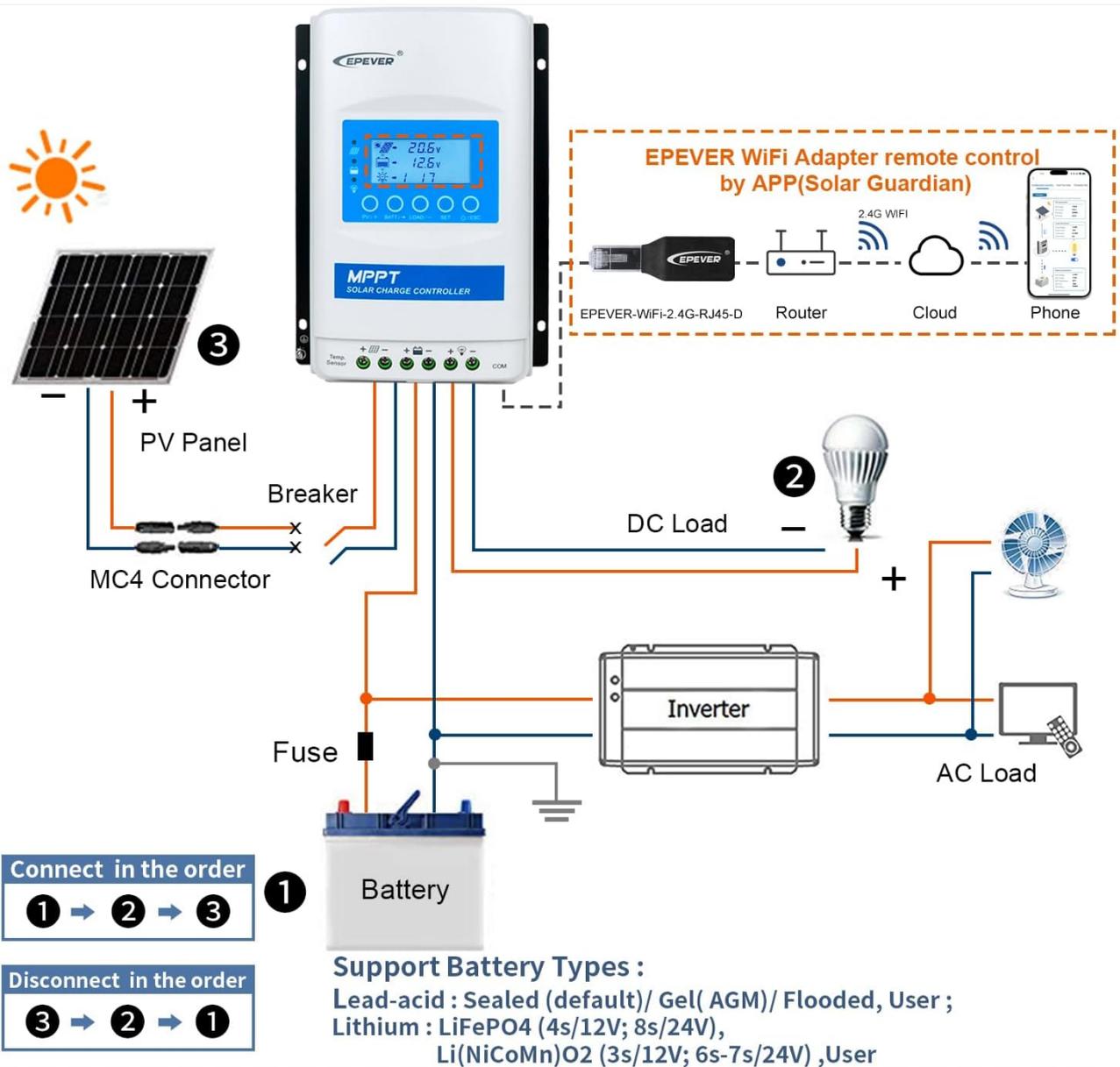
Figure 2: Recommended connection and disconnection order for the solar system components.

2.2 Wiring Recommendations

- The cable length for the battery should not exceed 3 meters.
- The recommended cable length for the PV array should not exceed 3 meters. If the PV array cable length is less than 3 meters, the system meets EN/IEC61000-6-3 requirements. If it exceeds 3 meters, the system may not meet these requirements.
- Controller Terminals: #6AWG (16mm²).
- Recommended Wire Cable: #8AWG (10mm²).
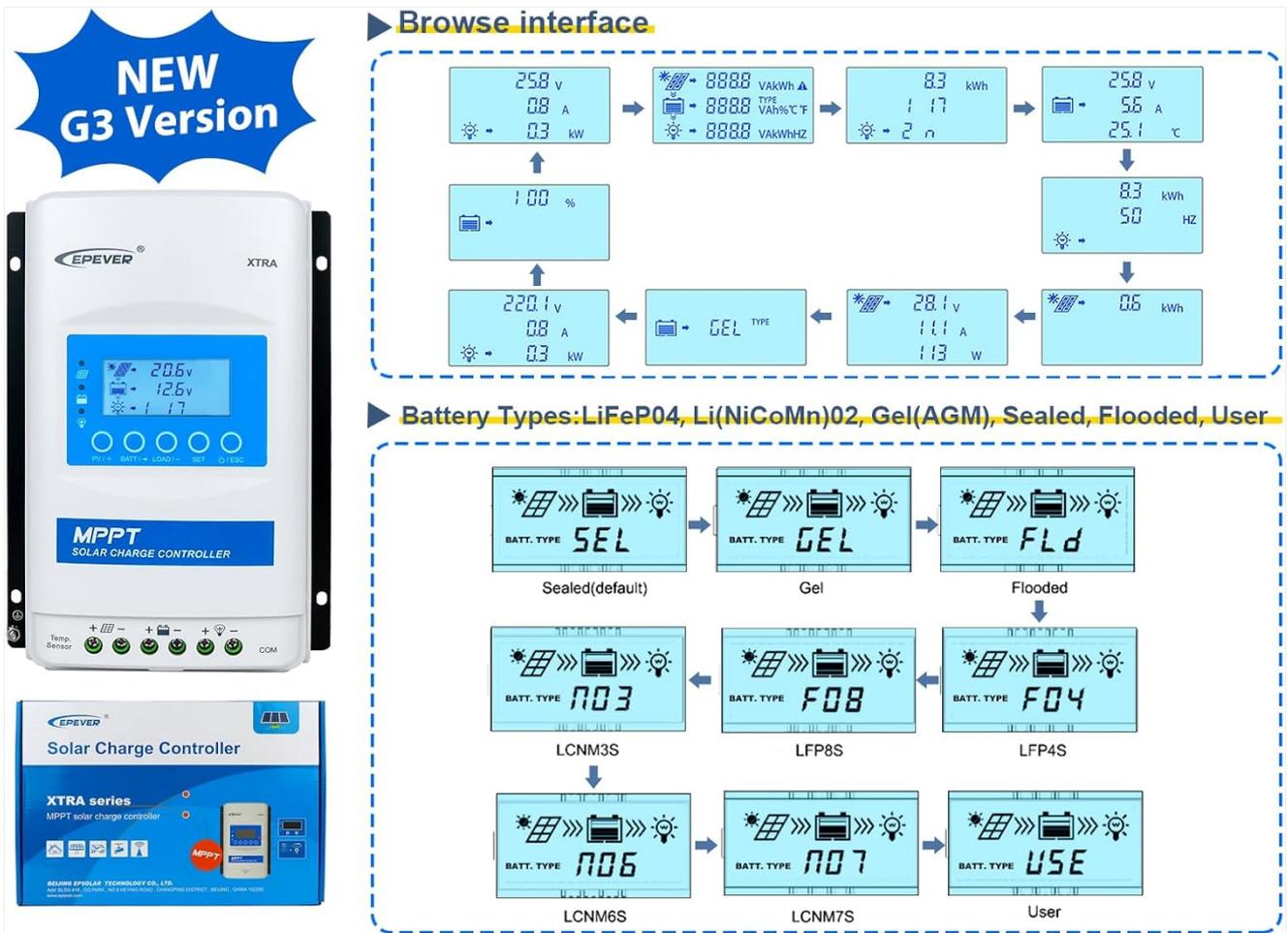
Figure 3: Connection diagrams for both No-battery Mode and Battery Mode configurations.

2.3 System Overview

The controller supports 12V/24V DC auto-work for lead-acid batteries and manual selection for lithium battery systems. It can handle a maximum PV input power of 520W for a 12V battery system or 1040W for a 24V battery system, with a maximum PV open circuit voltage of 100V (at minimum operating environment temperature) or 92V (at 25°C environment temperature).
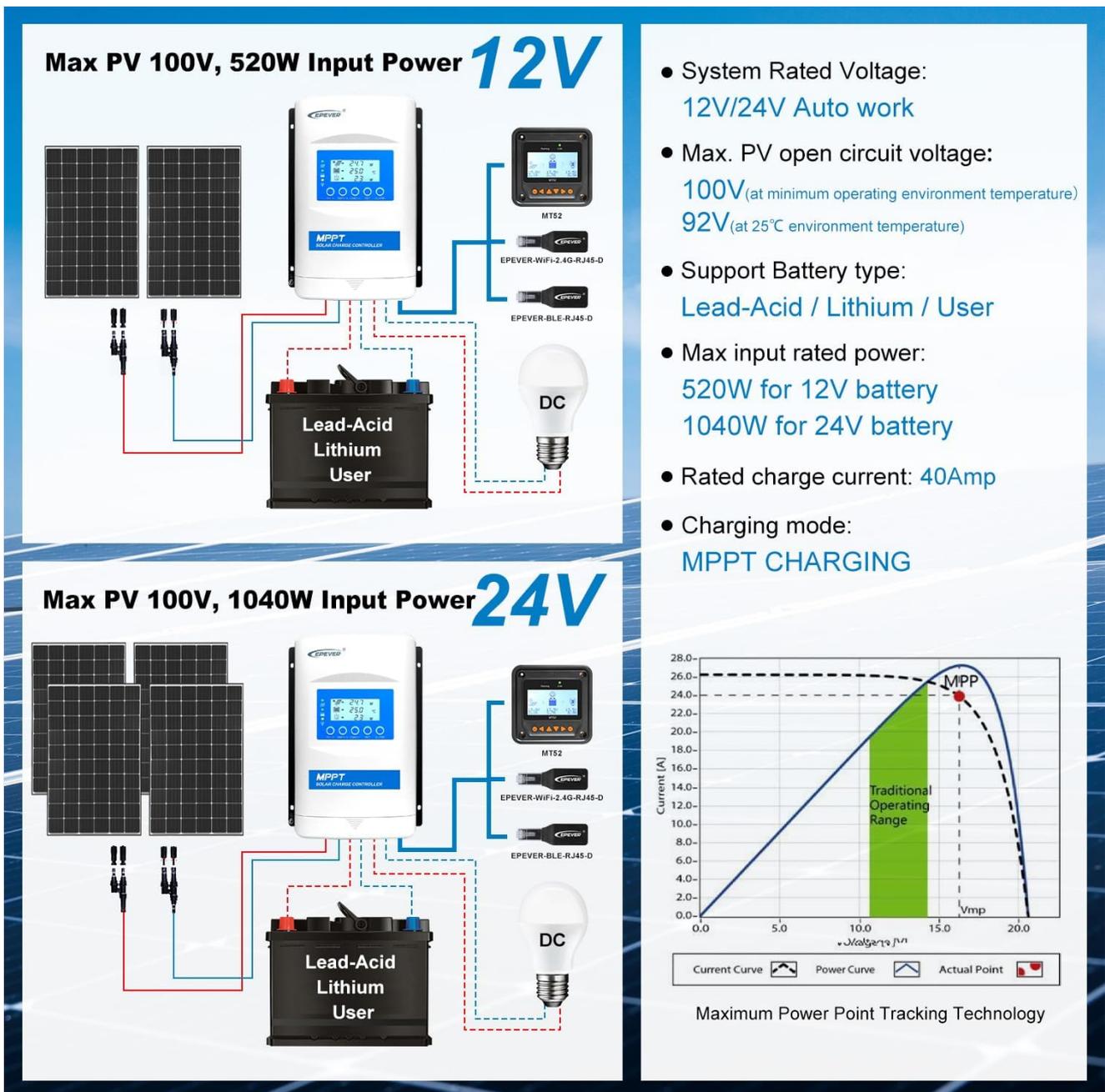
Figure 4: System capabilities including PV input power, supported battery types, and MPPT charging characteristics.

3. OPERATING INSTRUCTIONS

3.1 MPPT Algorithm and Adaptive Charging

The XTRA4210N-G3 utilizes a revolutionary MPPT algorithm that enhances tracking and response speeds, reduces losses, and minimizes downtime. It improves efficiency across various power segments and optimizes energy extraction in all scenarios. The adaptive charging features stages like bulk, boost, equalize, and float, which optimize battery health, lifespan, and overall performance.

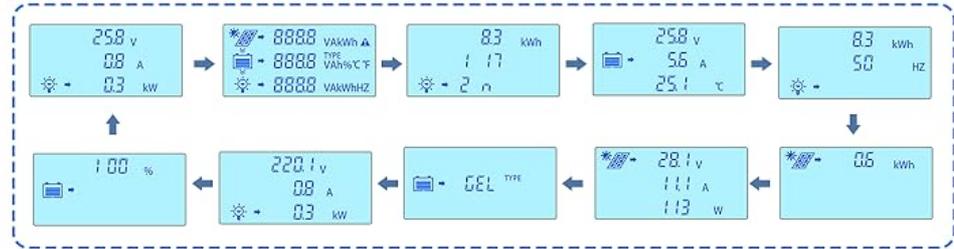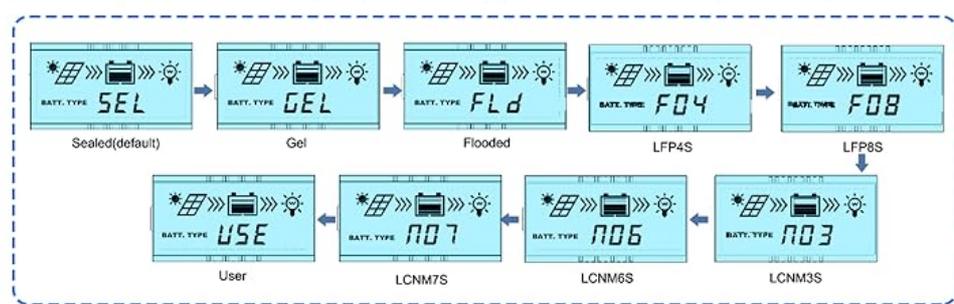Figure 5: MPPT algorithm and adaptive charging stages for optimal battery charging.

3.2 Battery Type Selection

The controller supports multiple battery types. For Lead-acid batteries (Sealed, Gel, Flooded), you can select the type directly. For Lithium batteries (LiFePO4, Li(NiCoMn)O2), or custom user settings, parameters need to be configured via accessories like MT50 (remote meter), BLE/WiFi Adapter (APP), eLOG01, or PC software via the RS485 interface.

Support battery types

Item	Lead-acid battery	Lithium battery
1	Sealed(default)	LiFePO4(4S/12V;8S/24V;16S/48V)
2	Gel	Li(NiCoMn)O$_2$ (3S/12V;6S/24V;12S/48V
3	Flooded	User
4	User	——

⚠ CAUTION: When the default battery type is selected, the battery voltage control parameters will be set by default and can't be changed. To change these parameters, select "User" battery type.

SLD GEL FLD

LI (LiFePO4) LI (Li(NiCoMn)O2) User

Lithium Battery Parameters need setting by EPEVER accessories:

❶MT50(remote meter);

❷WiFi Adapter or Bluetooth Adapter via APP(Solar Guardian);

❸CC-USB-RS485-150U via PC Software (Controller don't include accessories).

Figure 6: Supported battery types and methods for setting lithium battery parameters.

3.3 Display and Control Interface

The controller features a three-color LED indicator and an LCD display to show PV, Battery, and Load working status intuitively. Five buttons allow for easy adjustment and browsing of system parameters.

CONNECTION DIAGRAM

No-battery Mode
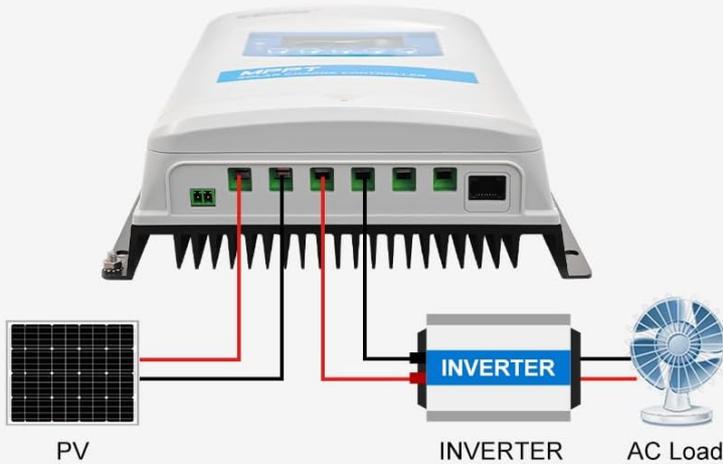
When there is no battery, the XTRA-N G3/XTRA-N G3 BLE series can bedirectly connected to the inverter. The inverter shall be connected to the battery terminals of the controller and meets the following conditions:

1) For high-frequency inverter: PV input power > (load output power ÷ inverter conversion efficiency ÷ controller conversion efficiency)

2) For power frequency inverter: PV input power > (load output power ÷ inverter conversion efficiency ÷ controller conversion efficiency ÷ 2)

PV   INVERTER   AC Load

Battery Mode

- The cable length of the battery should not exceed 3 meters.

- The recommended cable length of the PV array should not exceed 3 meters(Note:If the cable length of the PV array is less than 3 meters, the system meets EN/IEC61000-6-3 requirements. If more than 3 meters, the system may not meet EN/IEC61000-6-3 requirements).

PV   BAT   DC Load

Figure 7: Controller display interface and battery type selection options.

3.4 Load Working Modes

The controller offers various load control modes, including Manual, Light ON/OFF, Light ON plus Timer, and User-defined settings. These modes allow for flexible management of connected loads based on user requirements and environmental conditions.

EPEVER-WiFi-2.4G-RJ45-D

4. MAINTENANCE

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

4.1 Battery Health

The controller's adaptive charging stages (bulk, absorption, float, equalization) are designed to prolong the lifecycle of batteries. Ensure correct battery type selection and parameter settings, especially for lithium batteries, to maintain optimal charging conditions.

4.2 System Protection

The controller includes all-around electronic protection against reverse polarity, overcharging, over-discharging, overload, short-circuiting, and reverse current. These features protect the battery from being over-charged by solar modules and over-discharged by loads. Periodically inspect all connections for tightness and corrosion.

4.3 Environmental Considerations

The controller has a dustproof and waterproof design with IP33 enclosure, making it suitable for various environments. However, ensure it is installed in a well-ventilated area, away from direct sunlight and excessive moisture, to prevent overheating and ensure optimal performance.

5. TROUBLESHOOTING

This section provides guidance on common issues and protective measures.

5.1 Output Overcurrent Protection

The XTRA4210N-G3 controller features intelligent overcurrent detection and dynamic load management. It quickly detects and responds to excessive current, adjusting output in milliseconds to prevent system overload and ensure continuous operation. This protects the solar system from damage due to overcurrent events.

Figure 9: Comparison of overcurrent protection in a typical system versus the XTRA-N G3 controller.

5.2 Battery Management System (BMS) Disconnection

The G3 version's constant voltage output and limited current features ensure the system runs smoothly even if the

BMS disconnects the battery. This protects connected equipment and loads from interruption and potential damage.

5.3 Communication Issues

If experiencing issues with remote monitoring or parameter adjustment, ensure that communication accessories (e.g., BLE/WiFi Adapter, RS485 cable) are correctly connected and configured. Check the respective mobile app or PC software for error messages or connection status.

6. SPECIFICATIONS

6.1 Mechanical Parameters

Item	XTRA3210N	XTRA3215N XTRA4210N	XTRA3415N XTRA4215N	XTRA4415N
Dimension	230×165×63mm	255×185×67.8mm	255×187×75.7mm	255×189×83.2mm
Mounting dimension	173×156mm	200×176mm	200×178mm	200×180mm
Mounting hole size	Φ5mm			
Terminal	6AWG (16mm²)			
Recommended cable	8AWG (10mm²)			
Weight	1.31kg	1.70kg	2.07kg	2.47kg
Certification	EN/IEC62109-1, EN61000-6-3/EN61000-6-1, 47 CFR Part 15, Subpart B, IEC62509, IEC62321-3-1			

RS485 to RS485

MT50

EPEVER-WiFi-2.4G-RJ45-D

EPEVER-BLE-RJ45-D

Mobile phone
(Android and IOS)

RS485 to RS485

eLOG01

USB

PC

RS485 to RS485

MT50

RS485 to USB

PC

RTS300R47K3.81A

CC-USB-RS485-150U

PC (Windows)

Mechanical Parameters

Item	XTRA3210N	XTRA3215N XTRA4210N	XTRA3415N XTRA4215N	XTRA4415N
Diemension	230×165×63mm	255×185×67.8mm	255×187×75.7mm	255×189×83.2mm
Mounting dimension	173×156mm	200×176mm	200×178mm	200×180mm
Mounting hole size	Φ5mm			
Terminal	6AWG(16mm²)	6AWG(16mm²)	6AWG(16mm²)	6AWG(16mm²)
Recommended cable	8AWG(10mm²)	6AWG(16mm²)	8AWG(10mm²)	6AWG(16mm²)
Weight	1.31kg	1.70kg	2.07kg	2.47kg
Certification	EN/IEC62109-1 、 EN61000-6-3/EN61000-6-1 、 47 CFR Part 15, Subpart B 、 IEC62509 、 IEC62321-3-1			

Figure 10: Mechanical parameters and available accessories for the XTRA series.

6.2 Electrical Parameters (XTRA4210N-G3)

Item	XTRA4210N
Nominal system voltage	12/24VDC auto work
Rated charge current	40A
Rated discharge current	40A
Battery input voltage range	8~32V
Max. PV open circuit voltage	100V (at min operating environment temp); 92V (at 25°C environment temp)
MPPT voltage range	V(BAT+2V)~72V
Max. PV input power	520W/12V; 1040W/24V
Battery type	Sealed / Gel / Flooded / LiFePO4 / Li-NiCoMn / User Lithium battery (LiFePO4 / Li-NiCoMn / User)
Dimension	255×185×67.8mm
Terminals	6AWG (16mm²)
Net weight	1.70kg

Electrical parameters

Model	XTRA 1210N	XTRA 2210N	XTRA 3210N	XTRA 4210N	XTRA 4415N
Nominal system voltage	12/24VDC auto work				12/24/36/48VDC auto work
Rated charge current	10A	20A	30A	40A	40A
Rated discharge current	10A	20A	30A	40A	40A
Battery input voltage range	8～32V				8~68V
Max. PV open circuit voltage	XTRA**10N :100Vat Min operating environment temop;92Vat 25°Cenvironment temp XTRA**15N :150Vat Min operating environment temop;138Vat 25°Cenvironment temp				
MPPT voltage range	XTRA**10N :(Battery voltage +2V) ~ 72V XTRA**15N:(Battery voltage +2V) ~ 108V				
Max.PV input power	130W/12V 260W/24V	260W/12V 520W/24V	390W/12V 780W/24V	520W/12V 1040W/24V	520W/12V;1040W/24V 1560W/36V;2080W/48V
Battery type	Sealed / Gel / Flooded;LiFePO4 / Li-NiCoMn / User Lithium battery(LiFePO4 /Li-NiCoMn/User)				
Dimension	175×143×48mm	217×158×56.5mm	230×165×63mm	255×185×67.8mm	255×185×83.2mm
Terminals	12AWG(4mm²)	6AWG(16mm²)	6AWG(16mm²)	6AWG(16mm²)	6AWG(16mm²)
Net weight	0.57kg	0.96kg	1.31kg	1.70kg	2.47kg

Figure 11: Electrical parameters for the XTRA series solar charge controllers.

7. WARRANTY AND SUPPORT

For warranty information, please refer to the documentation provided with your purchase or contact the authorized EPEVER seller, Goland Century. The product is CE certified (LVD EN/IEC62109, EMC EN61000-6-1/3).

EPEVER offers various accessories to enhance monitoring and control:

- **Remote Meter (MT50):** For remote monitoring and real-time parameter configuration.
- **USB to RS485 Cable (CC-USB-RS485-150U):** For monitoring and configuration via PC software.
- **WiFi 2.4G Adapter (EPEVER-WiFi-2.4G-RJ45-D):** Compatible with mobile app or cloud platform for wireless monitoring and parameter configuration via WiFi signal.
- **Bluetooth Adapter (EPEVER-BLE-RJ45-D):** Compatible with mobile app for wireless monitoring and parameter configuration via Bluetooth signal.
- **Serial Device Server (EPEVER TCP 306):** Compatible with mobile app or cloud platform via TCP network communication for remote wireless monitoring. LAN monitoring can be achieved using PC configuration tools

and PC software.

- **4G Wireless Data Transmission Terminal (EPEVER RTU 4G HC01):** Compatible with mobile app or cloud platform via a GSM or GPRS SIM card for remote wireless monitoring.
- **Remote Temperature Sensor (RT-MF58R47K3.81A):** For accurate control and protection of charging and discharging by collecting real-time battery temperature.

Your browser does not support the video tag.

Video 1: EPEVER MPPT Solar Charge Controller XTRAN G3 Version overview. This video provides a brief introduction to the features and advancements of the G3 series controller.

Your browser does not support the video tag.

Video 2: EPEVER MPPT Solar Charge Controller G3 Version XTRAN detailed features. This video offers a more in-depth look at the functionalities and benefits of the G3 series controller.