EPEVER®

MPPT Solar Charge Controller

User Manual

XTRA1206N/XTRA2206N
XTRA1210N/XTRA2210N
XTRA3210N/XTRA4210N
XTRA3215N/XTRA4215N
XTRA3415N/XTRA4415N

EN

CONTENTS

Important Safety Instructions

Please keep this manual for future reference.

This manual contains the safety, installation, and operation instructions for XTRA-N series MPPT solar charge controller (hereinafter referred to as "the controller").

➢ Read all the instructions and warnings carefully in the manual before installation.

➢ No user-serviceable components exist inside the controller. Do not disassemble or attempt to repair the controller.

➢ Mount the controller indoors. Avoid exposure to the components and do not allow water to enter the controller.

➢ Install the controller in a well-ventilated -place. The controller's heat sink may become very hot during operation.

➢ It is suggested to install appropriate external fast-acting fuses/breakers.

➢ Disconnect all PV array connections and the battery's fast-acting fuses/breakers before controller installation and adjustment.

➢ Power connections must remain tight to avoid excessive heating from a loose connection.

⚠ **WARNING**	Do not install the controller in humid, salt spray, corrosion, greasy, flammable, explosive, dust accumulative, or other severe environments.

Disclaimers

The warranty does not apply to the following conditions:

➢ Damage caused by improper use or inappropriate environment (such as the humid, high salt spray, corrosion, greasy, flammable, explosive, dust accumulative, or other severe environments).

➢ The actual current/voltage/power exceeds the limit value of the controller.

➢ Damage caused by working temperature exceeding the rated range.

➢ Arc, fire, explosion, and other accidents caused by failure to follow the controller stickers or manual instructions.

➢ Unauthorized dismantling or attempted repair.

➢ Damage caused by force majeure.

➢ Damage occurred during transportation or handling.

1 General Information

1.1 Overview

XTRA N series controller, which can carry different display units (XDB1/XDS1/XDS2), adopts the advanced MPPT control algorithm. It can minimize the maximum power point (MPP) loss rate and time and quickly track the MPP to obtain the maximum energy under any conditions. It can also increase the solar system's energy utilization ratio

Limiting the charging power & current and reducing charging power functions ensure the system is stable with over PV modules in a high-temperature environment. IP33 Ingress protection and isolated RS485 design improve the controller's reliability and meet the different application requirements.

XTRA N series controller owns a three-stage charging mode, which can effectively prolong the battery's lifespan and significantly improve the system performance. Comprehensive electronic protection of overcharge, over-discharge, PV & battery reverse polarity, etc., ensures the solar system is more reliable and durable. The controller can be widely used for RV, household systems, field monitoring, and many other applications.

Features：

- CE certification(LVD EN/IEC62109,EMC EN61000-6-1/3)

- 100% charging and discharging in the working environment temperature range

- Optional LCD units (XDB1/XDS1/XDS2)

- High quality and low failure rate components of ST or IR to ensure the service life

- Advanced MPPT technology & ultra-fast tracking speed guarantee the tracking efficiency of up to 99.5%

- Maximum DC/DC conversion efficiency of 98.5%★; full load efficiency up to 97.2%★

- Advanced MPPT control algorithm to minimize the MPP lost rate and lost time

- Accurate recognizing and tracking of multi-peaks maximum power point

- Wide MPP operating voltage range

- Support the lead-acid and lithium batteries; voltage parameters can be set on the controller◆

- Programmable temperature compensation

- Limit charging power & current over the rated value

- Real-time energy statistics function

- Power reduction automatically over-temperature value

- Multiple load work modes

- Comprehensive electronic protection

- Isolated RS485 with 5V/200mA protected output for no electric devices, with Modbus protocol

- Support monitoring and setting the parameters via the APP or PC software

- IP33▲ Ingress protection

★ **XTRA4415N @ 48V system**

◆ **For the BCV, FCV, LVD, and LVR, users can modify them on the local controller when the battery type is "USE".**

▲ **3-protection against solid objects: protected against solid objects over 2.5mm.**
  3-protected against sprays to 60° from the vertical.

1.2 Characteristics
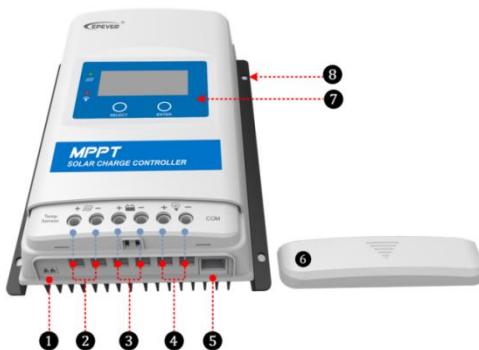
Figure 1 Product Characteristics

❶	RTS★ port	❺	RS485 communication port◆
❷	PV Terminals	❻	Terminal protection cover
❸	Battery Terminals	❼	Display units

❹	Load Terminals	❽	Mounting Hole Φ5mm

★**Suppose the remote temperature sensor is not connected to the controller or damaged. In that case, the controller will charge or discharge the battery at the default temperature setting of 25º C (no temperature compensation).**
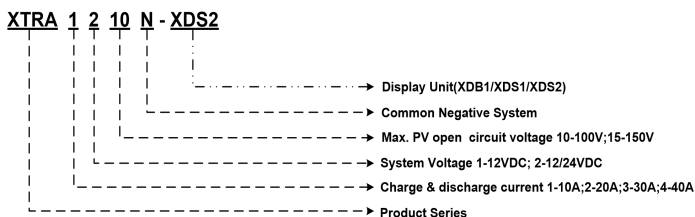
♦ **RS485 communication port**
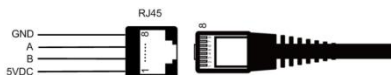
RJ45 Pin Definition:

Pin	Definition	Instruction	Pin	Definition	Instruction
1	+5VDC	5V/200 mA	5	RS485-A	RS485-A
2	+5VDC		6	RS485-A	
3	RS485-B	RS485-B	7	GND	Power GND
4	RS485-B		8	GND	

1.3 Naming rules

XTRA 1 2 10 N - XDS2

→ Display Unit(XDB1/XDS1/XDS2)
→ Common Negative System
→ Max. PV open circuit voltage 10-100V;15-150V
→ System Voltage 1-12VDC; 2-12/24VDC
→ Charge & discharge current 1-10A;2-20A;3-30A;4-40A
→ Product Series

1.4 Product classification

Classify	Model	Picture	Display
Basics	XTRA****N-XDB1		**Indicators:** PV & battery working status **Button:** 1) In manual mode, it switches ON/OFF the load by pressing the button. 2) Clear faults.
Standard	XTRA****N-XDS1		**Indicators:** PV & load working status **Buttons:** View or set the parameters; clear faults. **LCD：** PV： Voltage/current/generated energy Battery： Voltage/current/temperature Load： Current/generated energy/load mode
Advanced	XTRA****N-XDS2		**Indicators:** PV & battery & load working status **Buttons:** View or set the parameters; clear faults. **LCD:** PV：Voltage/current/generated energy/power Battery：Voltage/current/ temperature/capacity Load：Voltage/current/power / generated energy/load mode

2 Installation Instructions

2.1 Installation precautions

- Please read the instructions to familiarize yourself with the installation steps before installation.

- Be careful when installing the batteries. Please wear eye protection when installing the flooded lead-acid battery and rinse with clean water in time for battery acid contact.

- Keep the battery away from any metal objects, which may cause a short circuit of the battery.

- Acid gas may be generated when the battery is charged. Confirm that the surrounding environment is well ventilated.

- The controller is for indoor installation only. Do not install the controller in humid, high salt spray, corrosion, greasy, flammable, explosive, dust accumulative, or other severe environments

- Loose power connections and corroded wires may produce high heat that can melt wire insulation, burn surrounding materials, or even cause a fire. Ensure tight connections and secure cables with cable clamps to prevent them from swaying in moving applications.

- Only charge the lead-acid and lithium-ion batteries within the control range of the controller.

- Select the system cables according to 5A/mm^2 or less current density.

2.2 Requirements for the PV array

Serial connection (string) of PV modules

As the core component of the solar system, the controller needs to be suitable for various types of PV modules and maximize converting solar energy into electrical energy. According to the open-circuit voltage (V_{oc}) and the maximum power point voltage (V_{Mpp}) of the MPPT controller, the series number of different types of PV modules can be calculated. The below table is for reference only.

XTRA1206N/2206N:

System voltage	36cell Voc < 23V		48cell Voc < 31V		54cell Voc < 34V		60cell Voc < 38V	
	Max.	Best	Max.	Best	Max.	Best	Max.	Best
12V	2	2	1	1	1	1	1	1
24V	2	2	-	-	-	-	-	-

System voltage	72cell Voc < 46V		96cell Voc < 62V		Thin-Film Module Voc > 80V
	Max.	Best	Max.	Best	
12V	1	1	-	-	-
24V	1	1	-	-	-

❗ **IMPORTANT**	The above parameter values are calculated under the STC (Standard Test Condition)--module temperature 25ºC, air mass 1.5, irradiance 1,000W/m2.)

XTRA1210/2210/3210/4210N:

System voltage	36cell Voc < 23V		48cell Voc < 31V		54cell Voc < 34V		60cell Voc < 38V	
	Max.	Best	Max.	Best	Max.	Best	Max.	Best
12V	4	2	2	1	2	1	2	1
24V	4	3	2	2	2	2	2	2

System voltage	72cell Voc < 46V		96cell Voc < 62V		Thin-Film Module Voc > 80V
	Max.	Best	Max.	Best	
12V	2	1	1	1	1
24V	2	1	1	1	1

❗ **IMPORTANT**	The above parameter values are calculated under the STC (Standard Test Condition)--module temperature 25ºC, air mass 1.5, irradiance 1,000W/m2.)

XTRA3215/4215N:

System voltage	36cell Voc < 23V		48cell Voc < 31V		54cell Voc < 34V		60cell Voc < 38V	
	Max.	Best	Max.	Best	Max.	Best	Max.	Best
12V	4	2	2	1	2	1	2	1
24V	6	3	4	2	4	2	3	2

System voltage	72cell Voc < 46V		96cell Voc < 62V		Thin-Film Module Voc > 80V
	Max.	Best	Max.	Best	
12V	2	1	1	1	1
24V	3	2	2	1	1

IMPORTANT	The above parameter values are calculated under the STC (Standard Test Condition)--module temperature 25ºC, air mass 1.5, irradiance 1,000W/m2.

XTRA3415/4415N:

System voltage	36cell Voc < 23V		48cell Voc < 31V		54cell Voc < 34V		60cell Voc < 38V	
	Max.	Best	Max.	Best	Max.	Best	Max.	Best
12V	4	2	2	1	2	1	2	1
24V	6	3	4	2	4	2	3	2
48V	6	5	4	3	4	3	3	3

System voltage	72cell Voc < 46V		96cell Voc < 62V		Thin-Film Module Voc > 80V
	Max.	Best	Max.	Best	
12V	2	1	1	1	1
24V	3	2	2	1	1
48V	3	2	2	2	1

IMPORTANT	The above parameter values are calculated under the STC (Standard Test Condition)--module temperature 25ºC, air mass 1.5, irradiance 1,000W/m2.

2.3 Wire Size

The wiring and installation methods must conform to the national and local electrical code requirements.

➢ **PV wire size**

The PV array's output current varies with size, connection method, and sunlight angle. Its ISC (short circuit current) can calculate the minimum wire size. Please refer to the ISC value in the PV module's specifications. When the PV modules are connected in series, the total ISC equals any PV module's ISC. When the PV modules are connected in parallel, the total ISC equals the sum of the PV module's ISC. The PV array's ISC must not exceed the controller's maximum PV input current. For max. PV input current and max. PV wire size, please refer to the table below:

Model	Max. PV input current	Max. PV wire size
XTRA1206N XTRA1210N	10A	4mm^2/12AWG
XTRA2206N XTRA2210N	20A	6mm^2/10AWG
XTRA3210N XTRA3215N XTRA3415N	30A	10mm^2/8AWG
XTRA4210N XTRA4215N XTRA4415N	40A	16mm^2/6AWG

⚠ CAUTION	When the PV modules are connected in series, the maximum PV input open-circuit voltage must not exceed 46V (XTRA**06N), 92V (XTRA**10N), 138V (XTRA**15N) at 25°C environment temperature.

➢ **Battery and load wire size**

The battery and load wire size must conform to the rated current. The reference size is as below:

Model	Rated charging current	Rated discharging current	Battery wire size	Load wire size
XTRA1206N XTRA1210N	10A	10A	4mm^2/12AWG	4mm^2/12AWG
XTRA2206N XTRA2210N	20A	20A	6mm^2/10AWG	6mm^2/10AWG

XTRA3210N XTRA3215N XTRA3415N	30A	30A	10mm^2/8AWG	10mm^2/8AWG
XTRA4210N XTRA4215N XTRA4415N	40A	40A	16mm^2/6AWG	16mm^2/6AWG

⚠️ CAUTION	• The wire size is only for reference. Suppose there is a long distance among the PV array, the controller, and the battery. In that case, larger wires can be used to reduce the voltage drop and improve performance. • The recommended battery wire is selected when the battery terminals are not connected to any additional inverter.

2.4 Mounting

⚡ WARNING	• Explosion hazard! Never install the controller in a sealed enclosure with FLD batteries! Do not install in a confined area where battery gas can accumulate. • Electric shock hazard! The PV array may generate a high open-circuit voltage when wiring the PV modules. Disconnect the breaker or fast-acting fuse first, and be careful when wiring.
⚠️ CAUTION	The controller requires at least 150mm of clearance above and below for proper airflow. Ventilation is highly recommended if mounted in an enclosure.

Installation steps:

Figure 2-1 Mounting

Step 1: Determination of the installation location and heat-dissipation space

The controller shall be installed in a place with sufficient airflow through the controller radiators and a minimum clearance of 150mm from the upper and lower edges of the controller to ensure natural thermal convection. See Figure 2-1: Mounting.

⚠️ **CAUTION**	Suppose the controller is to be installed in an enclosed box. In that case, ensuring reliable heat dissipation through the box is important.
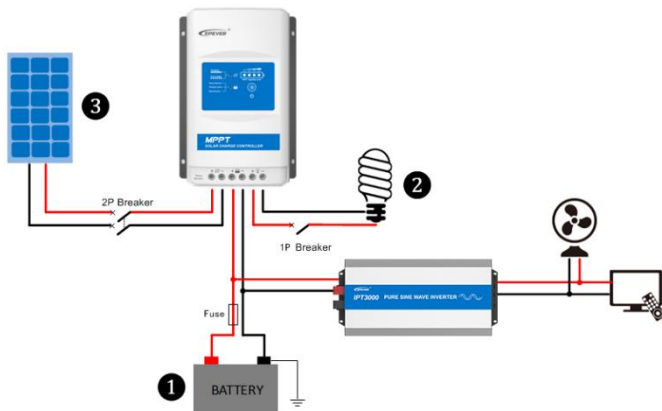
Figure 2-2 Schematic Wiring Diagram

Step 2：Connect the system in the order of ❶ battery ➔❷ load➔ ❸ PV array by Figure 2-2 "Schematic Wiring Diagram" and disconnect the system in the reverse order ❸❷❶.

⚠️ **CAUTION**	• Please do not close the circuit breaker or fast-acting fuse during wiring and ensure that the electrode polarity is correctly connected. • A fast-acting fuse whose current is 1.25 to 2 times the rated current of the controller must be installed on the battery side with a distance from the battery not greater than 150mm. • Suppose the controller is to be used in an area with frequent lightning strikes or an unattended area. In that case, it must install an external surge arrester. • Suppose an inverter is to be connected to the system. In that case, you must connect the inverter directly to the battery, not to the load side of the controller.

Step 3：Grounding

XTRA N series controller is a common-negative controller. The negative terminals of the PV array, the battery, and the load can be grounded simultaneously, or any negative terminal is grounded. However, according to the practical application, the negative terminals of the PV array, the battery, and the load can also be ungrounded. The grounding terminal on its shell must be grounded. It shields electromagnetic interference and avoids electric shock to the human body.

⚠ **CAUTION**	It is recommended to use a common-negative controller for common-negative systems, such as the RV system. The controller may be damaged if a common-positive controller is used and the positive electrode is grounded in the common-negative system.

Step 4：Connect optional accessories

• Connect the remote temperature sensor

Included Accessory	Connect the temperature sensor	Model: RT-MF58R47K3.81A	
Optional Accessory	Remote temperature sensor	Model: RTS300R47K3.81A	

Connect one end of the remote temperature sensor cable to the interface ③ and place the other end close to the battery.

⚠ **CAUTION**	Suppose the remote temperature sensor is not connected to the controller. In that case, the controller will charge or discharge the battery at the default 25°C (no temperature compensation).

• **Connect the optional accessories for RS485 communication**

Refer to Section **3.2 "Setting".**

Step 5：Power on the controller

Connect the battery fast-acting fuse to power the controller. Check the battery indicator status (the controller operates normally when the indicator is solid green). Connect the fast-acting fuse and circuit breaker of the load and PV array. Then the system will be operating in preprogrammed mode.

⚠ **CAUTION**	If the controller is not operating properly or the battery indicator on the controller shows an abnormality, please refer to Section 5.2 "Troubleshooting."

3 Display Units

3.1 Basic Display unit (XDB1)
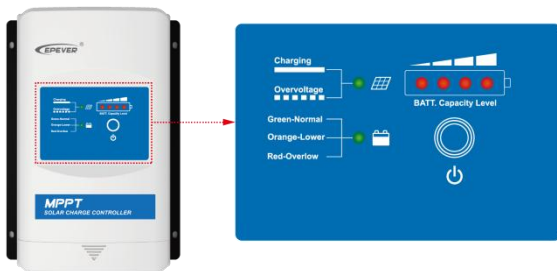
(1) Charging and battery LED indicator

Indicator	Color	Status	Information
	Green	Solid On	PV charges the battery with a low current
	Green	OFF	1. No sunlight 2. Connection error 3. Low PV voltage
	Green	Slowly flashing (1 Hz)	Normal charging
	Green	Fast flashing (4 Hz)	PV overvoltage
	Green	Solid On	Normal
	Green	Slowly flashing (1 Hz)	Full charged
	Green	Fast flashing (4 Hz)	Overvoltage
	Orange	Solid On	Undervoltage
	Red	Solid On	Over discharged
	Red	Slowly Flashing (1 Hz)	Battery over-heating Lithium battery low temperature[1]
All LED indicators fast flashing at the same time			Controller over-heating

①When a lead-acid battery is used, the controller does not have low-temperature protection.

(2) Battery Capacity Level Indicator

BATT. Capacity Level

- **Battery Capacity Level (BCL)**

Indicator	Color	Status	Information
☆○○○	Red	25% indicators are slowly flashing	0 < BCL < 25%
●☆○○	Red	50% indicators are slowly flashing 25% Indicators are Solid On	25% ≤ BCL < 50%
●●☆○	Red	75% indicators are slowly flashing 25% and 50% indicators are Solid On	50% ≤ BCL < 75%
●●●☆	Red	100% indicators are slowly flashing 25%, 50%, and 75% indicators are Solid On	75% ≤ BCL < 100%
●●●●	Red	25%, 50%, 75%, and 100% indicators are Solid On	100%

"○" Indicator is OFF; "●" Indicator is Solid On; "☆" Indicator is slowly flashing.

- **Load status**

Battery Capacity Level	Green	Solid On	The load is ON
	Green	OFF	The load is OFF

(3) Button

In the manual load mode, it can control the On/Off of the load via the ⏻ button.

3.2 Standard Display unit (XDS1)

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(1) LED indicator

Indicator	Color	Status	Instruction
	Green	Solid On	PV charges the battery with a low current
	Green	OFF	1. No sunlight 2. Connection error 3. Low PV voltage
	Green	Slowly Flashing (1 Hz)	Normal charging
	Green	Fast Flashing (4 Hz)	PV overvoltage
	Red	Solid On	Load ON
	Red	OFF	Load OFF

(2) Button

Mode	Note
Load ON/OFF	It can turn the load On/off in manual load mode via the ENTER button.
Clear Fault	Press the ENTER button
Browsing Mode	Press the SELECT button
Setting Mode	Press the ENTER button and hold on 5s to enter the setting mode Press the SELECT button to set the parameters, Press the ENTER button to confirm the setting parameters or exit the setting mode automatically after 10s.

(3) Interface

	The display screen can be viewed clearly when the angle between the end-user's horizontal sight and the display screen is within 90°. If the angle exceeds 90°, the information on the display screen cannot be viewed clearly.
IMPORTANT	

1) Status Description

Item	Icon	Status
PV	☀️📇	Day
	🌙	Night
	☀️📇　🔋	No charging
	☀️📇》🔋	Charging
	PV	PV Voltage, Current, Generated energy
BATT.	🔋	Battery capacity, In Charging
	BATT.	Battery Voltage, Current, Temperature
	BATT. TYPE	Battery Type
LOAD	🔆	Load ON
	💡	Load OFF
	LOAD	Current/Consumed energy/Load mode

2) Browse interface

Press the ⭕SELECT button to display the following interfaces in cycle.
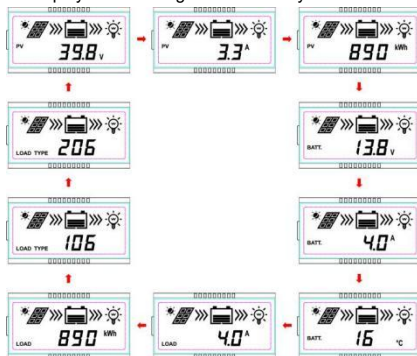
3) Load parameter display

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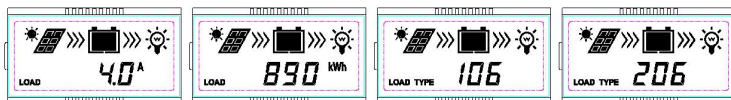
Display: Current/Consumed energy/Load mode-Timer 1/Load mode-Timer 2

4) Setting

①Clear the generated energy

Step 1: Press the **ENTER** button and hold 5s under the PV-generated energy interface, and the value will flash.

Step 2: Press the **ENTER** button to clear the generated energy.

②Switch the battery temperature unit

Press the [ENTER] button and hold for 5s under the battery temperature interface to switch the temperature unit.

③Battery type

Sealed(default)	Gel	Flooded
LFP15S	LFP8S	LFP4S
LFP16S	LCNM3S	LCNM6S
LCNM14S	LCNM13S	LCNM7S
User		

IMPORTANT	If the controller supports 48V system voltage, the battery type will display LiFePO4 F15/F16 and Li(NiCoMn)O2 N13/N14.

Operation:

Step1: Press the button to jump to the battery voltage interface.

Step2: Press the button and hold for 5s until the battery-type interface flashes.

Step3: Press the button to change the battery type.

Step4: Press the button to confirm.

CAUTION	Please refer to Section 4.1 for the battery parameters setting when the battery type is User.

④ **Load mode**

Set the load when there is the following load setting interface in the browse interface.
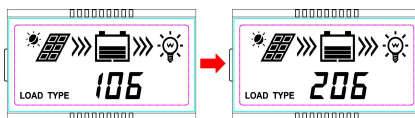
Operation:

Step1: Press the button to jump to the load type interface and press the button and hold for 5s until the Timer 1 or Timer 2 interface flashes.

Step2: Press the button to set load mode.

Step3: Press the button to confirm.

IMPORTANT	Please refer to Section 4.2 for the load modes.

3.3 Advanced Display unit (XDS2)

(1) Indicator

Indicator	Color	Status	Instruction
	Green	Solid On	PV charges the battery with a low current
	Green	OFF	1. No sunlight 2. Connection error 3. Low PV voltage
	Green	Slowly Flashing (1 Hz)	Normal charging
	Green	Fast Flashing (4 Hz)	PV overvoltage
	Green	Solid On	Normal
	Green	Slowly Flashing (1 Hz)	Full charged
	Green	Fast Flashing (4 Hz)	Overvoltage
	Orange	Solid On	Undervoltage
	Red	Solid On	Over discharged
	Red	Slowly Flashing (1 Hz)	Battery over-heating Lithium battery low temperature[1]
	Yellow	Solid On	Load ON
	Yellow	OFF	Load OFF
PV&BATT LED fast flashing			Controller over-heating

[1] When a lead-acid battery is used, the controller does not have low-temperature protection.

(2) Button

	Press the button	PV browse interface
		Increase value
	Press the button and hold for 5s	Setting the LCD cycle time
	Press the button	BATT browse interface
		Cursor displacement during setting

	Press the button and hold for 5s	Setting the battery type, battery capacity level, and temperature unit.
LOAD / —	Press the button	Controller load browse interface
		Setting data
	Press the button and hold for 5s	Setting the load mode
SET	Press the button	Enter into setting interface
		Switch the setting interface to the browse interface
		Confirm the setting parameter
⏻ / ESC	Press the button	Exit the setting interface

(3) Display

! **IMPORTANT**	The display screen can be viewed clearly when the angle between the end-user's horizontal sight and the display screen is within 90°. If the angle exceeds 90°, the information on the display screen cannot be viewed clearly.

Icon	Information	Icon	Information	Icon	Information
❄📶	Day	❄📶 📑	Not charging	🔋 ◌	Not discharging
🌙	Night	❄📶 📑	Charging	🔋 ❄	Discharging

1) PV parameters

Display: Voltage/Current/Power/Generated Energy

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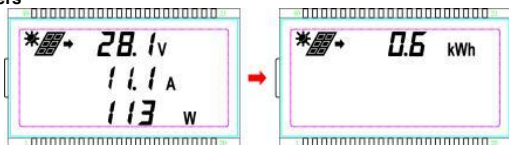
2) Battery parameters
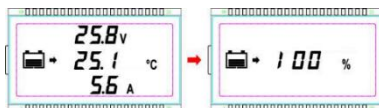
Display: Voltage/Current/Temperature/Battery capacity level

3) Load parameters
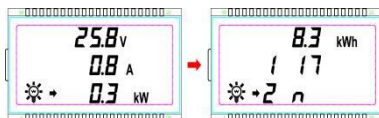
Display: Voltage/Current/Power/Consumed energy/Load mode-Timer 1/Load mode-Timer 2

(4) Setting parameters

1) Battery type
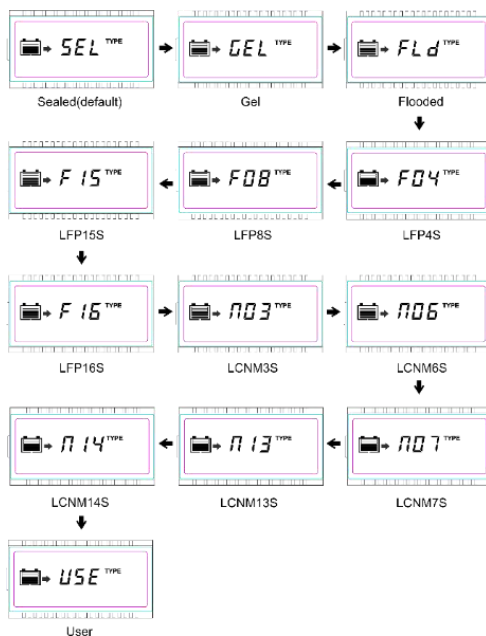
Sealed(default)	Gel	Flooded
LFP15S	LFP8S	LFP4S
LFP16S	LCNM3S	LCNM6S
LCNM14S	LCNM13S	LCNM7S
User		

⚠ **IMPORTANT**	If the controller supports 48V system voltage, the battery type will display LiFePO4 F15/F16 and Li(NiCoMn)O2 N13/N14.

Operation:

Step 1: On the initial interface, press the button to browse the battery parameters. Then, press the button to enter the battery parameters setting interface.

Step 2: Press the button and hold for 5s to enter the battery type setting interface.

Step 3: Press the or button to select the battery type.

Step 4: Press the button to confirm the parameters.

It exists automatically from the battery parameters setting interface after no operation of more than 10s.

⚠ CAUTION	Please refer to Section 4.1 for the battery control voltage setting when the battery type is User.

2) Battery capacity

Operation:

Step 1: On the initial interface, press the button to browse the battery parameters. Then, press the button to enter the battery parameters setting interface.

Step 2: Press the button and hold for 5s to enter the battery type setting interface.

Step 3: Press the button to jump to the battery capacity interface.

Step 4: Press the or button to set the battery capacity.

Step 5: Press the button to confirm.

3) Temperature units
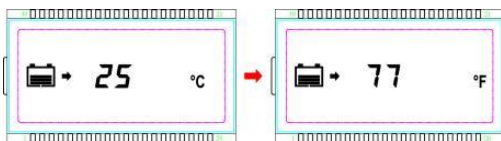
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Operation:

Step 1: On the initial interface, press the ⬤ button to browse the battery parameters. Then, press the ⬤ button to enter the battery parameters setting interface.

Step 2: Press the ⬤ button and hold for 5s to enter the battery type setting interface.

Step 3: Press the ⬤ button twice to jump to the temperature unit interface.

Step 4: Press the ⬤ or ⬤ button to set the temperature units.

Step 5: Press the ⬤ button to confirm.

4) LCD cycle time

```
LCd
02
```
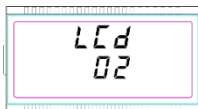
⚠ IMPORTANT	The LCD cycle default time is 2s, and the setting time range is 0s to 20s.

Operation:

Step 1: On the initial interface , press the ⬤ button to browse the PV parameters. Then, press the ⬤ button to enter the PV parameters setting interface.
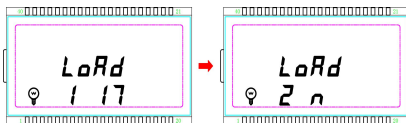
Step 2: Press the ⬤ button and hold for 5s to enter the LCD cycle time interface.

Step 3: Press the ⬤ or ⬤ button to set the LCD cycle time.

Step 4: Press the ⬤ button to confirm.

5) Clear the generated energy

Operation:

Step 1: On the initial interface, press the ⬤ button to browse the PV parameters. Then, press the ⬤ button to enter the PV parameters setting interface.

Step 2: Press the ⬤ button and hold for 5s to enter the LCD cycle time interface, and the cycle time flashes.

Step 3: Press the ⬤ button and the ⬤ button and hold for 5s to clear the generated energy.

Return to the PV parameters interface to confirm whether the generated energy (kWH) is zero.

6) Load type

Set the load when there is the following load setting interface in the browse interface.

Operation:

Step 1: Press the button to browse the load parameters on the initial interface. Then, press

the button to enter the load parameters setting interface.

Step 2: Press the button and hold for 5s to enter the load type interface.

Step 3: Press the or button to change the load type.

Step 4: Press the button to confirm.

!	
IMPORTANT	Please refer to Section 4.2 for the load mode.

4 Parameters Setting

4.1 Battery parameters

4.1.1 Supported battery types

1	**Battery**	Sealed (default)
		GEL
		FLD
2	**Lithium battery**	LiFePO4 (4S/8S/15S/16S)
		Li(NiCoMn)O2 (3S/6S/7S/13S/14S)
3	**User**	

![IMPORTANT] **IMPORTANT**	If the controller supports 48V system voltage, the battery type will display LiFePO4 F15/F16 and Li(NiCoMn)O2 N13/N14.

4.1.2 Local setting

⚠️ **CAUTION**	When the default battery type is selected, the battery voltage parameters cannot be modified. To change these parameters, select the "USE".

Step 1：Enter the "USE" battery type. Detailed operations of entering the "USE" battery type are

shown in the following table.

Content	XDS1 module operation	XDS2 module operation
Enter the "USE" battery type	1) On the initial interface, press the button to jump to the battery voltage interface, and press the button and hold for 5s to enter the battery-type interface. 2) Press the button to select the battery type, such as select the battery type as F04. And then, press the button to confirm and go	1) On the initial interface, press the button to browse the battery parameters. Press the button to enter the battery parameters setting interface, and press the button and hold for 5s to enter the battery-type interface. 2) Press the or button to select the battery type, such as select the battery type as F04. And then press the

26

| | back to the battery voltage interface automatically.

3) On the battery voltage interface, press the ⏎ENTER button and hold for 5s to enter the battery-type interface again.

4) Press the ⦿SELECT button to select the battery type as "USE". | ⦿SET button to confirm. Continue to press the ⦿SET button twice or wait for 10s of no-operation to automatically go back to the battery parameters setting interface.

3) Press the ⦿BATT/→ button and hold for 5s to enter the battery-type interface again on the battery parameters setting interface.

4) Press the ⦿PV/+ or ⦿LOAD/− button to select the battery type as "USE." |

Step 2: Local setting. Under the "USE" interface, the battery parameters and operation that can be locally set are shown in the table below:

Parameters	Default	Range	XDS1 module operation	XDS2 module operation
System voltage level (SYS)★	12VDC	12/24/36/48 VDC	1) Under the "USE" battery type, press the ⏎ENTER button to enter the "SYS" interface. 2) Press the ⏎ENTER button again to display the current "SYS" value. 3) Press the ⦿SELECT button to modify the parameter. 4) Press the ⏎ENTER button to confirm and enter the next parameter.	1) Under the "USE" battery type, press the ⦿SET button to enter the "SYS" interface. 2) Press the ⦿SET button again to display the current "SYS" value. 3) Press the ⦿PV/+ or ⦿LOAD/− button to modify the parameter. 4) Press the ⦿SET button to confirm and enter the next parameter.
Boost charging voltage (BCV)	14.4V	9–17V	5) Press the ⏎ENTER button again to display the current voltage value. 6) Press the ⦿SELECT button to modify the parameter (press to	5) Press the ⦿SET button again to display the current voltage value. 6) Press the ⦿PV/+ or ⦿LOAD/− button to
Float charging	13.8V	9–17V		

voltage (FCV)			increase 0.1V, press and hold to decrease 0.1V). 7) Press the button to confirm and enter the next parameter.	modify the parameter (press the button to increase 0.1V, press the button to
Low voltage reconnect voltage (LVR)	12.6V	9－17V		decrease 0.1V).
Low voltage disconnect voltage (LVD)	11.1V	9－17V		7) Press the button to confirm and enter the next parameter.
Lithium battery protection enable (LEN)	NO	YES/NO	Press the button to modify the switch status. **It exists automatically from the current interface after no operation of more than 10s.**	Press the or button to modify the switch status. **It exists automatically from the current interface after no operation of more than 10s.**

★**The SYS value can only be modified under the non-lithium "USER" type. The SYS value can be modified if the battery type is Sealed, GEL, or FLD before entering the "USER" type. The SYS value cannot be modified if it is a lithium battery type before entering the "USER" type.**

Only the above battery parameters can be set on the local controller. The remaining battery parameters follow the following logic (the voltage level of the 12V system is 1, the voltage level of the 24V system is 2, and the voltage level of the 48V system is 4).

Battery type Battery parameters	Sealed/GEL/FLD User	LiFePO4 User	Li(NiCoMn)O2 User
Overvoltage disconnect voltage	BCV + 1.4V * voltage level	BCV + 0.3V * voltage level	BCV + 0.3V * voltage level
Charging limit voltage	BCV + 0.6V * voltage level	BCV + 0.1V * voltage level	BCV + 0.1V * voltage level
Overvoltage reconnect voltage	BCV + 0.6V * voltage level	BCV + 0.1V * voltage level	Boost charging voltage

Equalize charging voltage	BCV + 0.2V * voltage level	Boost charging voltage	Boost charging voltage
Boost reconnect charging voltage	FCV - 0.6V * voltage level	FCV - 0.6V * voltage level	FCV - 0.1V * voltage level
Undervoltage warning reconnect voltage	UVW + 0.2V * voltage level	UVW + 0.2V * voltage level	UVW + 1.7V * voltage level
Undervoltage warning voltage	LVD + 0.9V * voltage level	LVD + 0.9V * voltage level	LVD + 1.2V * voltage level
Discharging limit voltage	LVD - 0.5V * voltage level	LVD - 0.1V * voltage level	LVD - 0.1V * voltage level

4.1.3 Remote Setting

1)   Setting the battery parameters by PC software

Connect the controller's RJ45 port to the PC's USB port via a USB to RS485 cable. When selecting

the battery type as "USE", set the voltage parameters by the PC software.
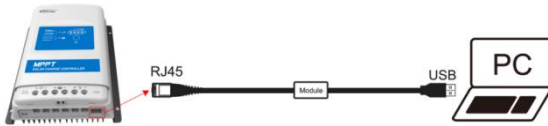
2)   Setting the battery parameters by APP

- **Via an external WiFi module**

Connect the controller to an external WiFi module by the RS485 communication port. End-users

can set the voltage parameters by the APP after selecting the battery type as "USE". Refer to the

cloud APP manual for details.

- **Via an external Bluetooth module**

Connect the controller to an external Bluetooth module by the RS485 communication port.

End-users can set the voltage parameters by the APP after selecting the battery type as "USE".

Refer to the cloud APP manual for details.

3) Setting the battery parameters by MT50

Connect the controller to the remote meter (MT50) through a standard network cable. After selecting the battery type as "USE", set the voltage parameters by the MT50. Refer to the MT50 manual or aftersales engineer for details.

4) Controller parameters

✧ **Battery voltage parameters**

Measure the parameters in the condition of 12V/25° C. Please double the values in the 24V system and multiplies the values by 4 in the 48V system.

Battery parameters / Battery type	Sealed	GEL	FLD	User
Overvoltage disconnect voltage	16.0V	16.0V	16.0V	9 to 17V
Charging limit voltage	15.0V	15.0V	15.0V	9 to 17V
Overvoltage reconnect voltage	15.0V	15.0V	15.0V	9 to 17V
Equalize charging voltage	14.6V	--	14.8V	9 to 17V
Boost charging voltage	14.4V	14.2V	14.6V	9 to 17V
Float charging voltage	13.8V	13.8V	13.8V	9 to 17V
Boost reconnect charging voltage	13.2V	13.2V	13.2V	9 to 17V
Low voltage reconnect voltage	12.6V	12.6V	12.6V	9 to 17V
Undervoltage warning reconnect voltage	12.2V	12.2V	12.2V	9 to 17V
Undervoltage warning voltage	12.0V	12.0V	12.0V	9 to 17V
Low voltage disconnect voltage	11.1V	11.1V	11.1V	9 to 17V
Discharging limit voltage	10.6V	10.6V	10.6V	9 to 17V

Equalize Duration	120 minutes	--	120 minutes	0 to 180 minutes
Boost Duration	120 minutes	120 minutes	120 minutes	10 to 180 minutes

• When the battery type is set as lithium battery, the lithium battery protection is enabled automatically, and the default value of "Equalize Duration" and "Boost Duration" is changed to 10 minutes.

• When the battery type is set as Sealed, GEL, or FLD, the lithium battery protection is disabled, and the default value of "Equalize Duration" and "Boost Duration" is changed to 120 minutes.

• When the battery type is set as User, the lithium battery protection, "Equalize Duration" and "Boost Duration" maintain the parameter values of the previous battery type.

⚠️ CAUTION	When the default battery type is selected, the battery voltage parameters cannot be modified. To change these parameters, select the "USE".

• **When the battery type is "USER", the battery voltage parameters follow the following logic:**

   A. Overvoltage Disconnect Voltage > Charging Limit Voltage ≥ Equalize Charging Voltage ≥ Boost Charging Voltage ≥ Float Charging Voltage > Boost Reconnect Charging Voltage.

   B. Overvoltage Disconnect Voltage > Overvoltage Reconnect Voltage

   C. Low Voltage Reconnect Voltage > Low Voltage Disconnect Voltage ≥ Discharging Limit Voltage.

   D. Undervoltage Warning Reconnect Voltage > Undervoltage Warning Voltage ≥ Discharging Limit Voltage;

   E. Boost Reconnect Charging voltage > Low Voltage Reconnect Voltage.

✧ **Lithium Battery voltage parameters**

Battery type / Battery parameters	LFP			
	LFP4S	User	LFP8S	User
Overvoltage disconnect voltage	14.5V	9 to 17V	29.0V	18 to 34V
Charging limit voltage	14.3V	9 to 15.5V	28.6V	18 to 31V
Overvoltage reconnect voltage	14.3V	9 to 15.5V	28.6V	18 to 31V
Equalize charging voltage	14.2V	9 to 15.5V	28.4V	18 to 31V
Boost charging voltage	14.2V	9 to 15.5V	28.4V	18 to 31V

Float charging voltage	13.3V	9 to 15.5V	26.6V	18 to 31V
Boost reconnect charging voltage	13.0V	9 to 15.5V	26.0V	18 to 31V
Low voltage reconnect voltage	12.8V	9 to 15.5V	25.6V	18 to 31V
Undervoltage warning reconnect voltage	12.2V	9 to 15.5V	24.4V	18 to 31V
Undervoltage warning voltage	12.0V	9 to 15.5V	24.0V	18 to 31V
Low voltage disconnect voltage	11.3V	9 to 15.5V	22.6V	18 to 31V
Discharging limit voltage	11.0V	9 to 15.5V	22.0V	18 to 31V

LFP4S is for the 12V system, and LFP8S is for the 24V system.

Battery type / Battery parameters	LNCM				
	LNCM3S	User	LNCM6S	LNCM7S	User
Overvoltage disconnect voltage	12.8V	9 to 17V	25.6V	29.8V	18 to 34V
Charging limit voltage	12.6V	9 to 15.5V	25.2V	29.4V	18 to 31V
Overvoltage reconnect voltage	12.5V	9 to 15.5V	25.0V	29.1V	18 to 31V
Equalize charging voltage	12.5V	9 to 15.5V	25.0V	29.1V	18 to 31V
Boost charging voltage	12.5V	9 to 15.5V	25.0V	29.1V	18 to 31V
Float charging voltage	12.2V	9 to 15.5V	24.4V	28.4V	18 to 31V
Boost reconnect charging voltage	12.1V	9 to 15.5V	24.2V	28.2V	18 to 31V

Low voltage reconnect voltage	10.5V	9 to 15.5V	21.0V	24.5V	18 to 31V
Undervoltage warning reconnect voltage	12.2V	9 to 15.5V	24.4V	28.4V	18 to 31V
Undervoltage warning voltage	10.5V	9 to 15.5V	21.0V	24.5V	18 to 31V
Low voltage disconnect voltage	9.3V	9 to 15.5V	18.6V	21.7V	18 to 31V
Discharging limit voltage	9.3V	9 to 15.5V	18.6V	21.7V	18 to 31V

LNCM3S is for the 12V system, LNCM6S and LNCM7S are for the 24V system.

When the battery type is "USER", the Lithium battery voltage parameters follow the following logic:

A. Overvoltage Disconnect Voltage > Over Charging Protection Voltage (Protection Circuit Modules(BMS)) plus 0.2V;

B. Overvoltage Disconnect Voltage > Overvoltage Reconnect Voltage ＝ Charging Limit Voltage ≥ Equalize Charging Voltage ＝ Boost Charging Voltage ≥ Float Charging Voltage > Boost Reconnect Charging Voltage;

C. Low Voltage Reconnect Voltage > Low Voltage Disconnect Voltage ≥ Discharging Limit Voltage;

D. Undervoltage Warning Reconnect Voltage > Undervoltage Warning Voltage ≥ Discharging Limit Voltage;

E. Boost Reconnect Charging voltage > Low Voltage Reconnect Voltage;

F. Low Voltage Disconnect Voltage ≥ Over Discharging Protection Voltage (BMS) plus 0.2V.
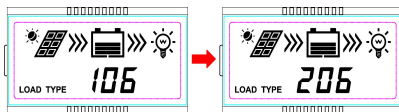
⚠ **CAUTION**	The required accuracy of BMS is no higher than 0.2V. We will not assume responsibility for the abnormal when the accuracy of BMS is higher than 0.2V.

4.2 Load modes

4.2.1 LCD setting

1) XDS1 display and operation

Set the load when there is the following load setting interface in the browse interface.

Operation:

Step 1: Press the [SELECT] button to jump to the load type interface.
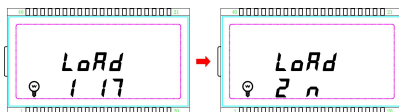
Step 2: Press the [ENTER] button and hold for 5s until the Timer 1 or Timer 2 interface flashes.

Step 3: Press the [SELECT] button to select the load type.

Step 4: Press the [ENTER] button to confirm.

2) XDS2 display and operation

Set the load when there is the following load setting interface in the browse interface.

Operation:

Step 1: On the initial interface, press the [LOAD/−] button to browse the load parameters, and then press the [SET] button to enter the load parameters setting interface.

Step 2: Pess the [LOAD/−] button and hold for 5s to enter the load type interface.

Step 3: Press the [PV/+] or [LOAD/−] button to change the load type.

Step 4: Press the [SET] button to confirm.

3) Load mode

1**	Timer 1	2**	Timer 2
100	Light ON/OFF	2 n	Disabled
101	The load will be on for 1 hour after sunset	201	The load will be on for 1 hour before sunrise
102	The load will be on for 2 hours after sunset	202	The load will be on for 2 hours before sunrise
103 — 113	The load will be on for 3-13 hours after sunset	203 — 213	The load will be on for 3-13 hours before sunrise

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114	The load will be on for 14 hours after sunset	214	The load will be on for 14 hours before sunrise
115	The load will be on for 15 hours after sunset	215	The load will be on for 15 hours before sunrise
116	Test mode	2 n	Disabled
117	Manual mode (Default load ON)	2 n	Disabled

⚠️ CAUTION	When selecting the load mode as the Light ON/OFF mode, Test mode, and Manual mode, only the Timer 1 can be set, and the Timer 2 is disabled and display "2 n".

4.2.2 RS485 communication setting

1) Load mode

• **Manual Control (default)**

Control ON/OFF of the load via the button or remote commands (e.g., APP or PC software).

• **Light ON/OFF**
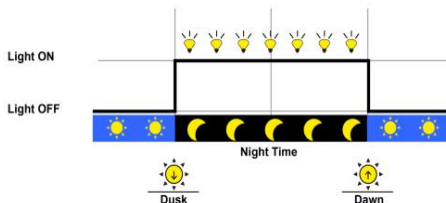
• **Light ON+ Timer**
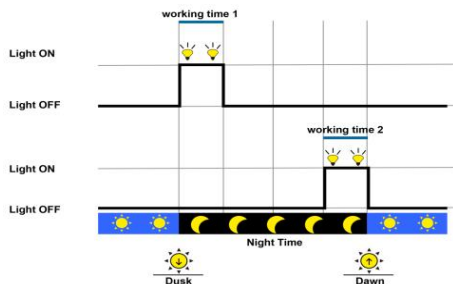
- **Time Control**

Control the load ON/OFF time by setting the real-time clock.

2) Load mode settings

Set the load modes by PC software, APP, or remote meter (MT50). For detailed connection diagrams and settings, refer to Subsection 4.1.3 Remote Setting.
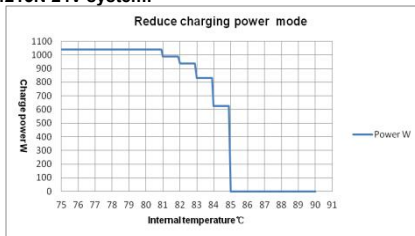
5 Others

5.1 Protection

PV current/power limit	When the charging current or power of the PV array exceeds its rated current or power, it will be charged at the rated current or power. ⚠ **CAUTION:** When the charging current of the PV array exceeds the rated current, its open-circuit voltage cannot exceed the "maximum PV open-circuit voltage." Otherwise, the controller may be damaged.
PV short circuit protection	When not in the PV charging state, the controller will not be damaged in case of short-circuiting in the PV array. ⚠ **WARNING:** It is forbidden to short-circuit the PV array during charging. Otherwise, the controller may be damaged.
PV reverse polarity protection	When the polarity of the PV array is reversed, the controller may not be damaged and resume work after the polarity is corrected. ⚠ **CAUTION:** If the polarity of the PV array is reversed and its actual power is 1.5 times the controller's rated power, the controller may be damaged.
Night reverse charging protection	Prevent the battery from discharging to the PV module as its voltage is higher than that of PV module at night.
Battery reverse polarity protection	When the polarity of the battery is reversed, the controller may not be damaged and resume work after the polarity is corrected. ⚠ **CAUTION:** Limited to the characteristic of lithium battery, when the PV array connection is correct and the battery connection is reversed, the controller will be damaged.
Battery overvoltage protection	When the battery voltage reaches the overvoltage disconnect voltage, the PV array will automatically stop battery charging to avoid battery damage caused by over-charging.
Battery over-discharge protection	When the battery voltage reaches the low voltage disconnect voltage, the PV array will automatically stop battery discharging to avoid battery damage caused by over-discharging.
Battery overheating	The controller detects the battery temperature through an external temperature sensor. The controller stops working when its temperature exceeds 65 °C and

protection	resumes work when its temperature is below 55 °C.
Lithium battery low temperature	When the temperature detected by the optional temperature sensor is lower than the Low-Temperature Protection Threshold (LTPT), the controller will stop charging and discharging automatically. When the detected temperature is higher than the LTPT, the controller will start charging and discharging automatically (The LTPT is 0 °C by default and can be set within -40°C to 10°C).
Load short circuit protection	When a short circuit occurs on the load side (The short circuit current is ≥ 4 times the rated controller load current), the controller automatically cuts off the output. After resuming output five times automatically (delay 5s, 10s, 15s, 20s, 25s), if you want the controller to restart the auto-recovery process, you need to press the Load button, restart the controller, or experience a night-to-day change (night time > 3 hours).
Load overload protection	If the load current exceeds 1.05 times the rated current of the controller, the controller will cut off the output after a delay. After failure to resume output five times automatically (delay 5s, 10s, 15s, 20s, 25s) when the overload occurs, if you want to reduce electric devices on the load end, you need to press the Load button, restart the controller, or experience a night-to-day change (night time > 3 hours).
Controller overheating protection★	The controller can detect its internal temperature by an internal temperature sensor. The controller stops working when its internal temperature is higher than 85° Cand resumes work when its internal temperature is below 75°C.
TVS high voltage transient protection	The controller's internal circuitry is designed with Transient Voltage Suppressors (TVS), which can only protect against high-voltage surge pulses with less energy. If the controller is to be used in an area with frequent lightning strike, it is recommended to install an external surge arrester.

★When the controller's internal temperature reaches 81° C, the charging power automatic reduction function is enabled. If the temperature increases by 1° C, the charging power is reduced by 5%, 10%, 20%, and 40%, respectively. If the internal temperature exceeds 85° C, the controller stops charging the battery. When the internal temperature is lower than or equal to 75° C, the controller resumes charging per the rated charging power.

For example: XTRA4215N 24V system:

Reduce charging power mode

5.2 Troubleshooting

Possible reasons	Faults	Troubleshooting
PV array open-circuit	When there is plenty of direct sunlight on the PV array, the LCD shows	Confirm that the PV connection is correct and tight.
Battery voltage is lower than 8V	The wiring is correct, but the controller is not working.	Please check the battery voltage (at least 8V to activate the controller).
Battery overvoltage	XDB1: The battery indicator is flashing green quickly. XDS1: Battery frame and fault icon blink simultaneously. XDS2: The battery indicator is flashing green quickly. Battery frame and fault icon blink simultaneously.	Check whether the battery voltage is higher than OVD (overvoltage disconnect voltage), and disconnect the PV.
Battery over-discharged	XDB1: The battery indicator is solid red. XDS1: Battery frame and fault icon blink simultaneously. XDS2: The battery indicator is solid red. Battery frame and fault icon blink simultaneously.	① When the battery is fully charged, the load output is automatically restored. ② Other ways to replenish electrical energy.
Battery over high temperature	XDB1: The battery indicator is flashing red slowly. XDS1: Battery frame and fault icon blink simultaneously.	When the temperature declines to be below 55°C, normal charging and discharging controls will be

	XDS2: The battery indicator is flashing red slowly. Battery frame and fault icon blink simultaneously.	resumed.
	XDS2: Battery frame and fault icon blink simultaneously.	
Lithium battery over low temperature	XDB1: The battery indicator is flashing red slowly. XDS1: Battery frame and fault icon blink simultaneously. XDS2: The battery indicator is flashing red slowly. Battery frame and fault icon blink simultaneously.	Once the environment temperature of the lithium battery has risen to 2 $^\circ$ C above the low-temperature limit for charging and 2 $^\circ$ C above the low-temperature limit for discharging, normal charging and discharging controls will be resumed.
Controller over-heating	XDB1: PV, BATT(orange), and Battery capacity level indicator (four) fast flashing. XDS1: Battery frame and fault icon blink simultaneously. XDS2: PV and BATT (orange) indicators fast flashing. Battery frame and fault icon blink simultaneously.	When the heat sink of the controller exceeds 85° C, the controller will automatically cut off the input and output input. When the temperature is below 75° C, the controller will resume work.
Load short circuit	1. No load output. 2. LCD displays "E001." 3. XDS1/XDS2: The load and fault icons blink simultaneously. The load indicator turns off. 	① Carefully check the load connection, and clear short circuit faults. ② Restart the controller or press the button to clear fault load recovery output. ③Wait for one night-day cycle (night time > 3 hours).

Overload[①]	1. No load output. 2. LCD displays "E002." 3. XDS1/XDS2: The load and fault icons blink simultaneously. The load indicator turns off.	① Reduce the number of electric devices. ② Restart the controller or press the button to clear fault load recovery output. ③Wait for one night-day cycle (night time > 3 hours).

①   When the load current goes higher than 1.02-1.05 times, 1.05-1.25 times, 1.25-1.35 times, and 1.35-1.5 times the rated value, the controller may automatically turn off loads in 50s, 30s, 10s, and 2s, respectively.

5.3 Maintenance

The following inspections and maintenance tasks are recommended at least twice a year for best performance.

- Make sure no block on airflow around the controller. Clear up any dirt and fragments on the radiator.

- Check all the naked wires to ensure insulation is not damaged by sun exposure, frictional wear, dryness, insects or rats, etc. Repair or replace some wires if necessary.

- Verify the indicator display is consistent with the actual operation. Pay attention to any troubleshooting or error conditions. Take necessary corrective action.

- Confirm that terminals have no corrosion, insulation damaged, high temperature, burnt/discolored sign, and tighten terminal screws to the suggested torque.

- Clear up dirt, nesting insects, and corrosion in time.

- Check and confirm that the lightning arrester is in good condition. Replace a new one in time to avoid damaging the controller and other devices.

WARNING	Risk of electric shock! Ensure that the power turns off before the above operations, and then follow the corresponding inspections and operations.

6 Technical Specifications

Electrical Parameters

Parameter	XTRA 1206N	XTRA 2206N	XTRA 1210N	XTRA 2210N	XTRA 3210N	XTRA 4210N	XTRA 3215N	XTRA 4215N	XTRA 3415N	XTRA 4415N
System Rated Voltage	12/24VDC★ Auto-recognition								12/24/36/48VDC★ Auto-recognition	
Rated Charging Current	10A	20A	10A	20A	30A	40A	30A	40A	30A	40A
Rated Discharging Current	10A	20A	10A	20A	30A	40A	30A	40A	30A	40A
Controller Work Voltage Range	8V to 32V								8V to 32V	
Max. PV Open-circuit Voltage	60V (lowest environment temperature) 46V (environment temperature at 25°C)		100V (lowest environment temperature) 92V (environment temperature at 25°C)				150V (lowest environment temperature) 138V (environment temperature at 25°C)			
MPP Work Voltage Range	(Battery voltage + 2V) to 36V		(Battery voltage + 2V) to 72V				(Battery voltage + 2V) to 108V			

Rated Charging Power	130W/12V 260W/24V	260W/12V 520W/24V	130W/12V 260W/24V	260W/12V 520W/24V	390W/12V 780W/24V	520W/12V 1,040W/24V	390W/12V 780W/24V	520W/12V 1,040W/24V	390W/12V 780W/24V 1,170W/36V 1,560W/48V	520W/12V 1,040W/24V 1,560W/36V 2,080W/48V
Maximum Conversion Efficiency	97.9%	98.3%	98.2%	98.3%	98.6%	98.6%	97.6%	97.9%	98.1%	98.5%
Full Load Efficiency	97%	96.7%	96.2%	96.4%	96.6%	96.5%	95.1%	95.4%	96.9%	97.2%
Static Losses	≤ 14 mA (12V) ≤ 15 mA (24V)		≤ 30 mA (12V) ≤ 16 mA (24V)						≤ 30 mA (12V) ≤ 16 mA (24V) ≤ 13 mA (36V) ≤ 13 mA (48V)	
Discharge Circuit Voltage Drop	≤ 0.23V									
Temperature Compensation ◆	-3 mV/℃/2V (Default)									
Grounding Port	Common-negative									
RS485 Communication Port	5VDC/200 mA (RJ45)									

LCD Backlight Time	Default: 60s, Range: 0s to 999s (0s: the backlight is ON all the time)

★ When a lithium battery is used, the system voltage cannot be identified automatically. Please confirm the system voltage before use.

◆ When a lithium battery is used, the temperature compensation must be 0 and cannot be changed.

Environmental Parameters

Parameter	XTRA 1206N	XTRA 2206N	XTRA 1210N	XTRA 2210N	XTRA 3210N	XTRA 4210N	XTRA 3215N	XTRA 4215N	XTRA 3415N	XTRA 4415N
Work Temperature Range※ (Full load working)	- 25°C to + 5 0℃ (LCD) - 30°C to + 50°C (No LCD)						- 25°C to + 45°C (LCD) - 30°C to + 45°C (No LCD)			
Storage Temperature Range	- 20°C to + 70°C									
Relative Humidity	≤ 95%, N.C.									
Enclosure	IP33 (3-protection against solid objects: protected against solid objects over 2.5mm. 3-protected against sprays to 60°from the vertical.)									
Pollution Degree	PD2									

※ The controller can be fully load working in the operating temperature range. When the internal temperature reaches 81° C, the charging automatic power reduction mode will turn on. Refer to Section 5.1 Protection.

Mechanical Parameters

Parameter	XTRA1206N XTRA1210N	XTRA2206N XTRA2210N	XTRA3210N	XTRA3215N XTRA4210N	XTRA3415N XTRA4215N	XTRA4415N
Dimension (L × W × H)	175 × 143 × 48mm	217 × 158 × 56.5mm	230 × 165 × 63mm	255 × 185 × 67.8mm	255 × 187 × 75.7mm	255 × 189 × 83.2mm
Mounting size (L × W)	120 × 134mm	160 × 149mm	173 × 156mm	200 × 176mm	200 × 178mm	200 × 180mm
Mounting hole size	Φ 5mm					
Terminal	12AWG (4mm^2)	6AWG (16mm^2)	6AWG (16mm^2)	6AWG (16mm^2)	6AWG (16mm^2)	6AWG (16mm^2)
Recommended cable	12AWG (4mm^2)	10AWG (6mm^2)	8AWG (10mm^2)	8AWG (10mm^2) **XTRA3215N** 6AWG (16mm^2) **XTRA4210N**	8AWG (10mm^2) **XTRA3415N** 6AWG (16mm^2) **XTRA4215N**	6AWG (16mm^2)
Net Weight	0.57kg	0.96kg	1.31kg	1.70kg	2.07kg	2.47kg

Appendix I Conversion Efficiency Curves

Illumination Intensity: 1,000W/m² Temperature: 25°C

Model: XTRA1206N

1. **PV Array MPP Voltage (17V, 34V)/System Voltage (12V)**
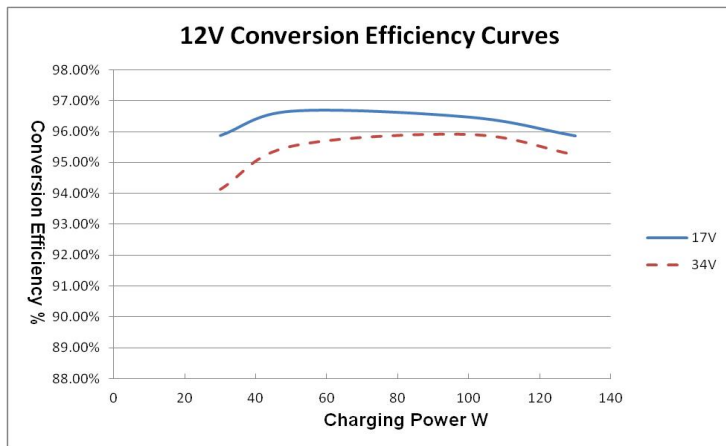
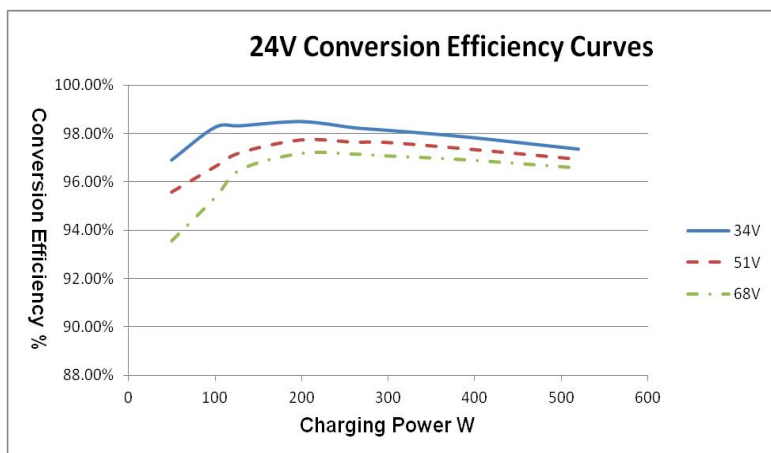2. **PV Array MPP Voltage (34V, 45V)/System Voltage (24V)**
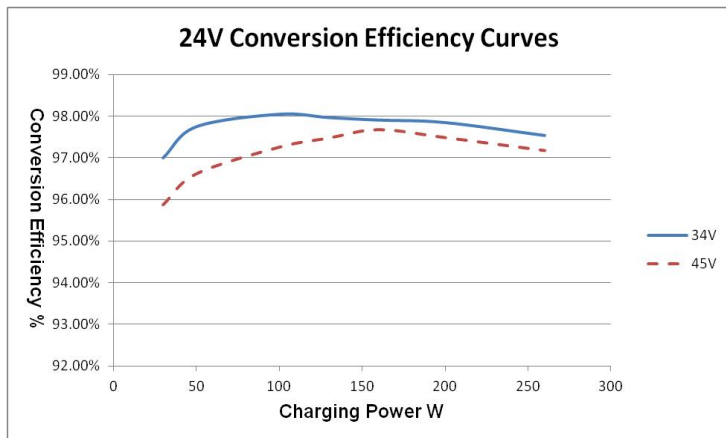
Model: XTRA1210N

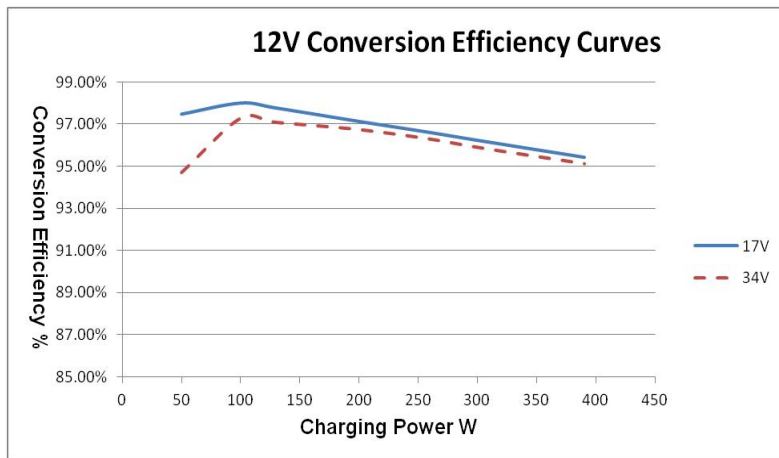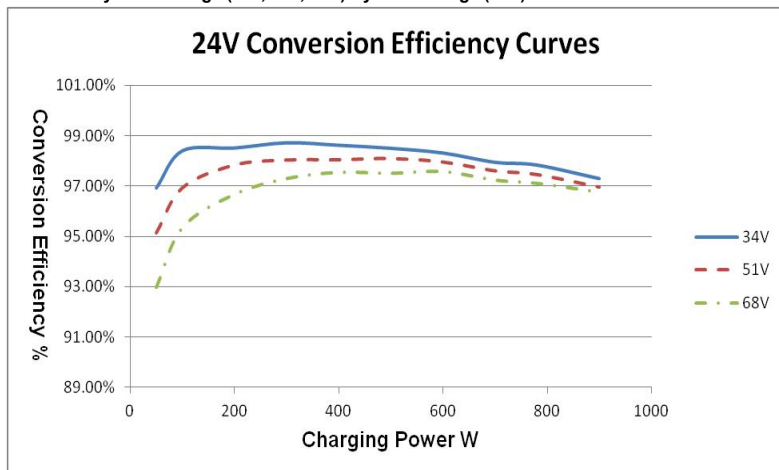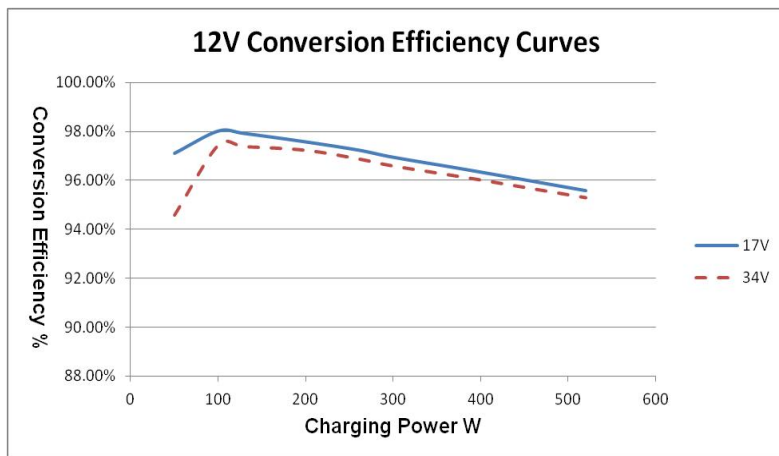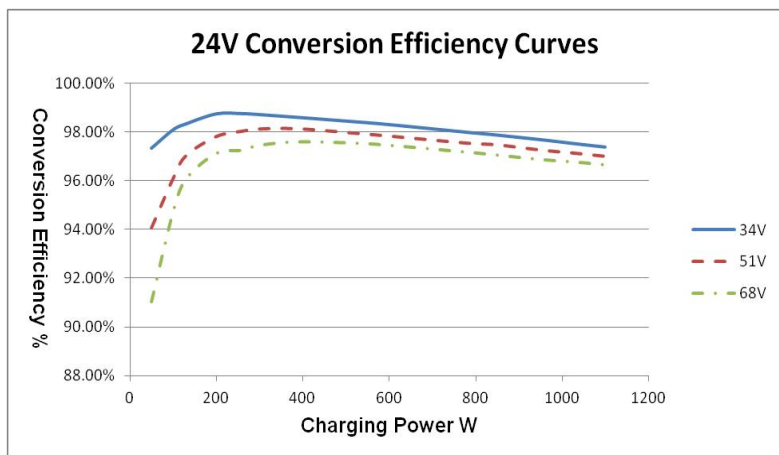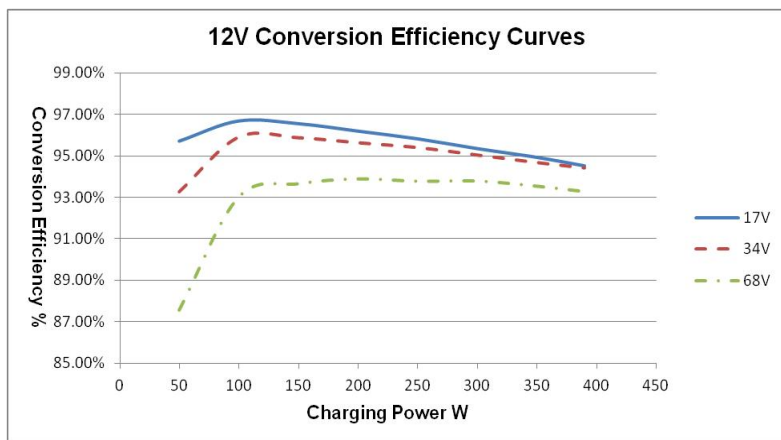1. **PV Array MPP Voltage (17V, 34V)/System Voltage (12V)**
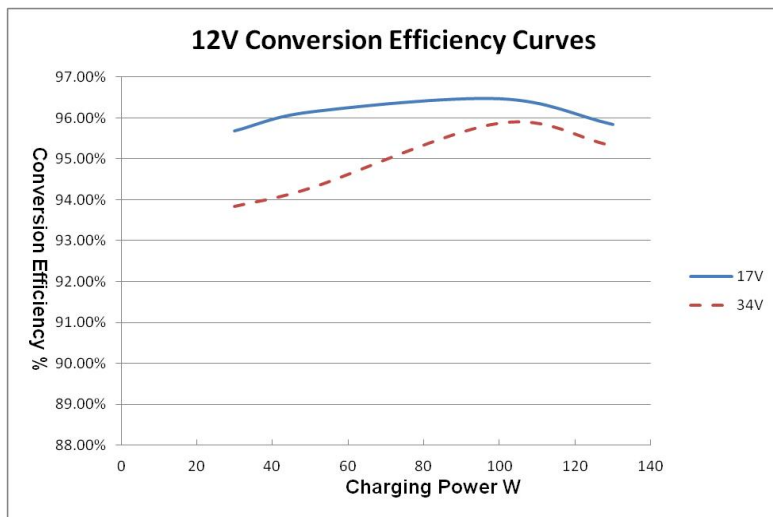
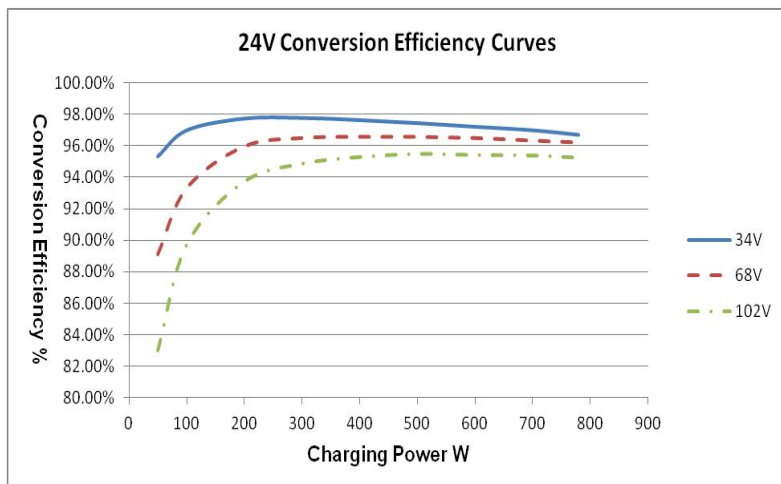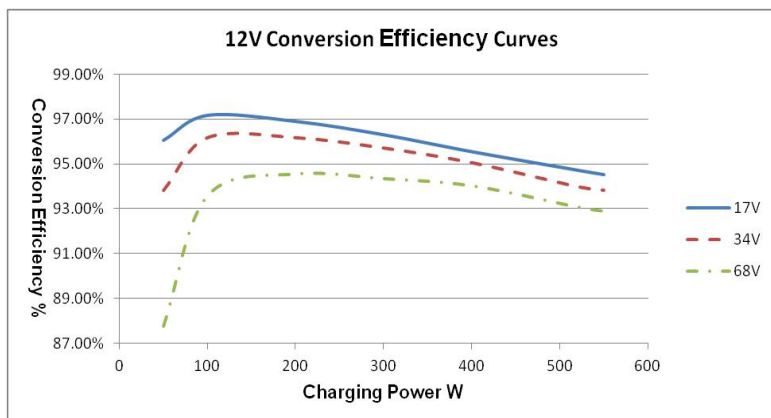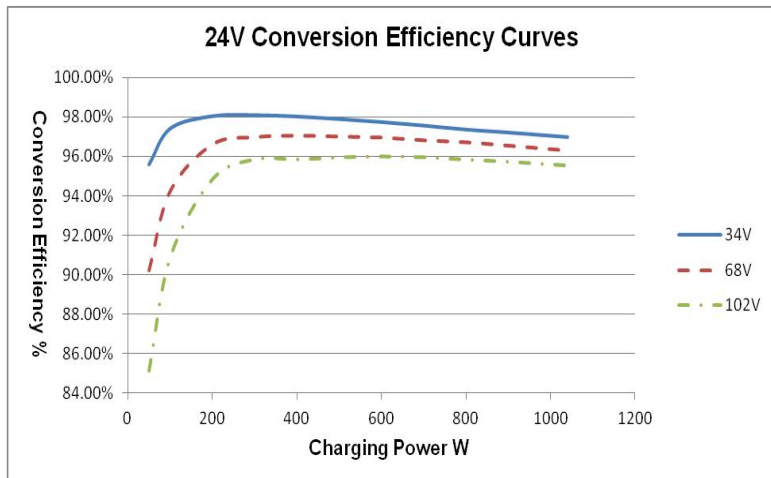2. **PV Array MPP Voltage (34V, 51V, 68V)/System Voltage (24V)**
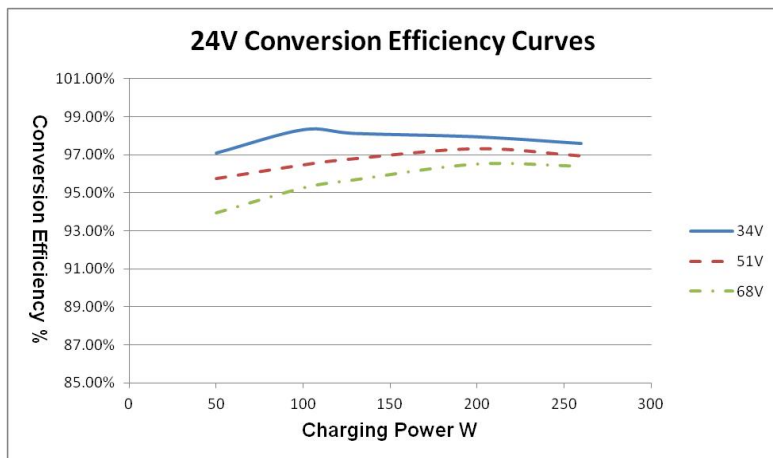
Model: XTRA2206N

1. **PV Array MPP Voltage (17V, 34V)/System Voltage (12V)**
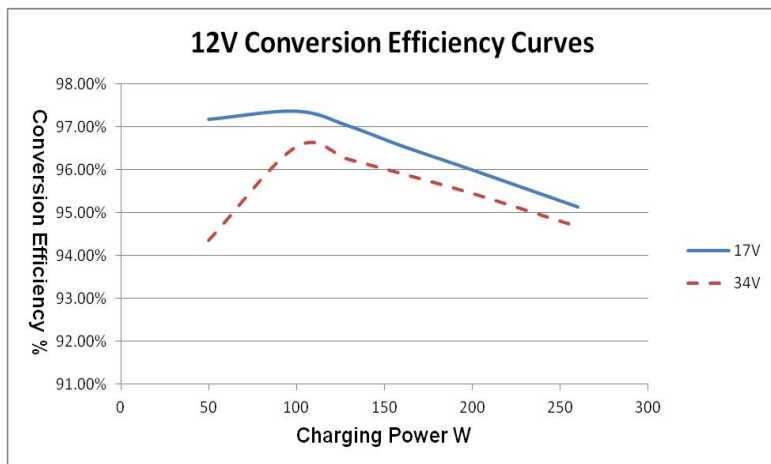
2. **PV Array MPP Voltage (34V, 45V)/System Voltage (24V)**
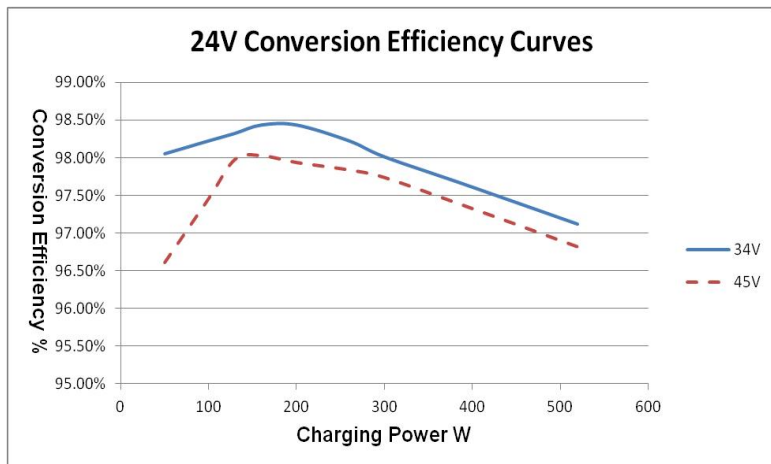
Model: XTRA2210N

1. **PV Array MPP Voltage (17V, 34V)/System Voltage (12V)**
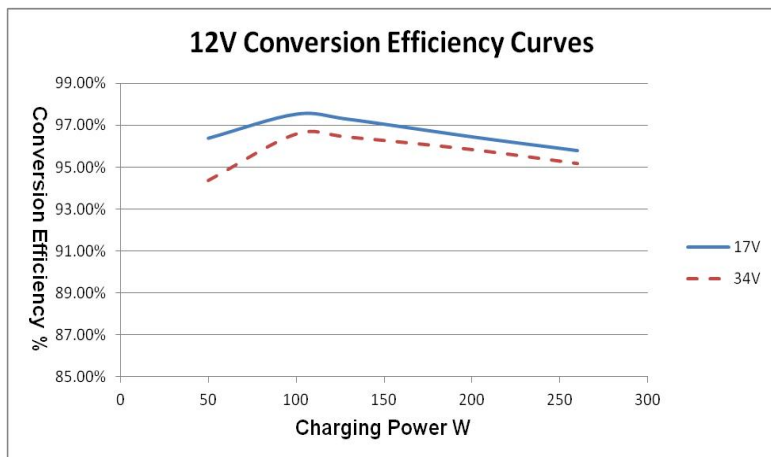
2. **PV Array MPP Voltage (34V, 51V, 68V)/System Voltage (24V)**

Model: XTRA3210N

1.　**PV Array MPP Voltage (17V, 34V)/System Voltage (12V)**

2.　**PV Array MPP Voltage (34V, 51V, 68V)/System Voltage (24V)**

Model: XTRA4210N

1. **PV Array MPP Voltage (17V, 34V)/System Voltage (12V)**

2. **PV Array MPP Voltage (34V, 51V, 68V)/System Voltage (24V)**

Model: XTRA3215N

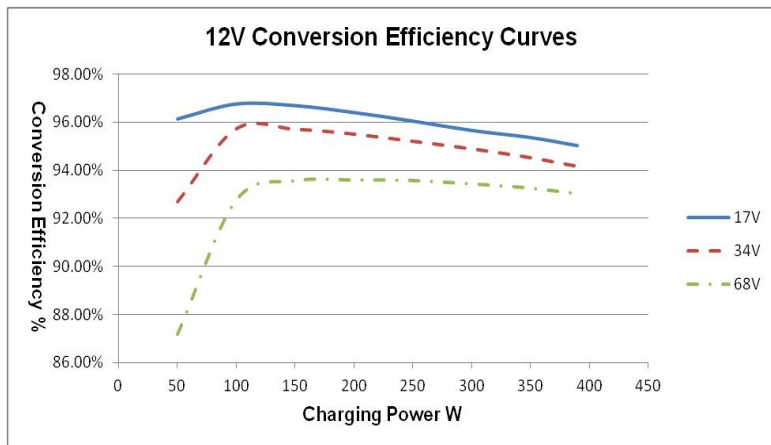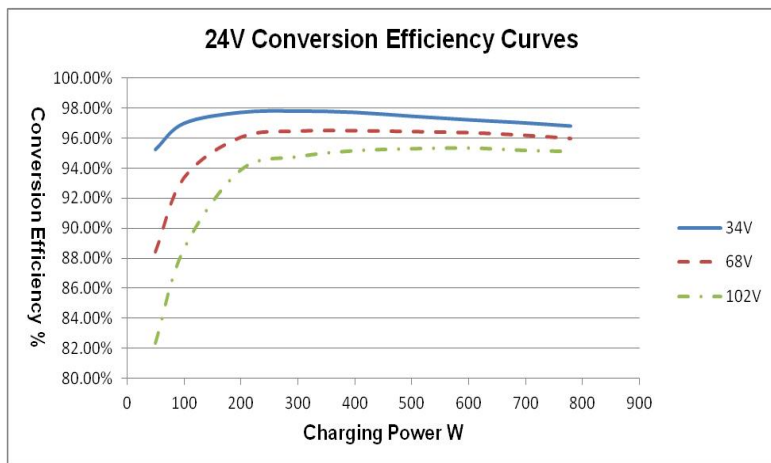1. **PV Array MPP Voltage (17V, 34V, 68V)/System Voltage (12V)**

2. **PV Array MPP Voltage (34V, 68V, 102V)/System Voltage (24V)**

Model: XTRA4215N

1.   PV Array MPP Voltage (17V, 34V, 68V)/System Voltage (12V)

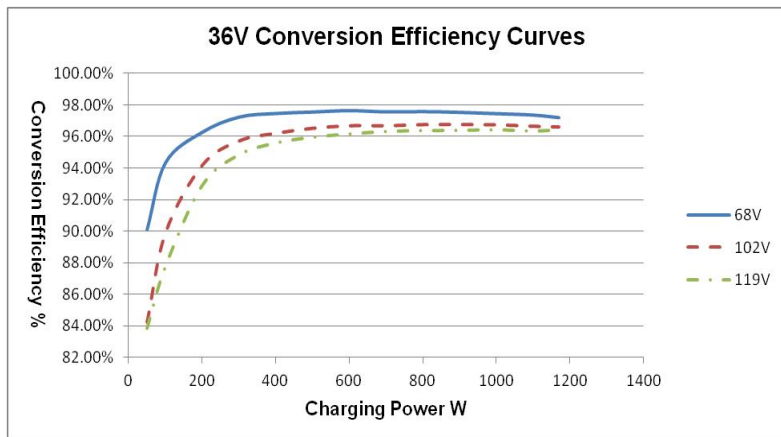**2.   PV Array MPP Voltage (34V, 68V, 102V)/System Voltage (24V)**

Model: XTRA3415N

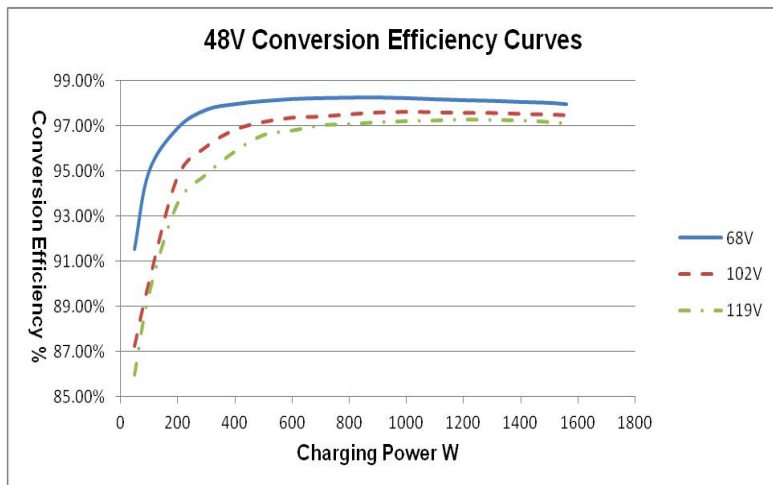1. **PV Array MPP Voltage (17V, 34V, 68V)/System Voltage (12V)**

2. **PV Array MPP Voltage (34V, 68V, 102V)/System Voltage (24V)**

3. **PV Array MPP Voltage (68V, 102V, 119V)/System Voltage (36V)**
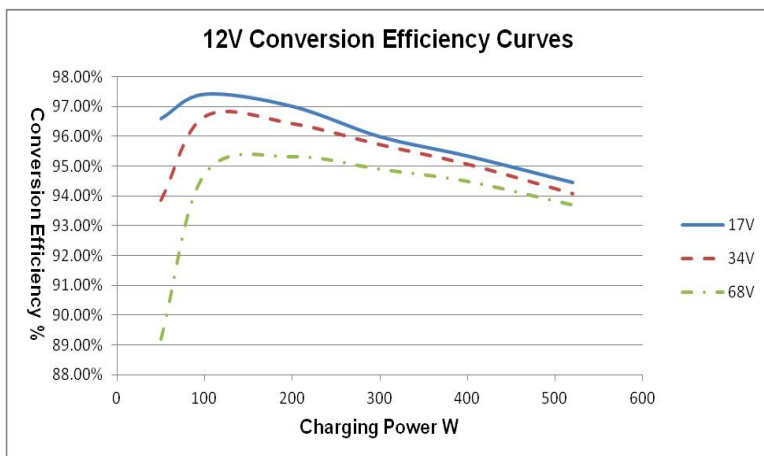

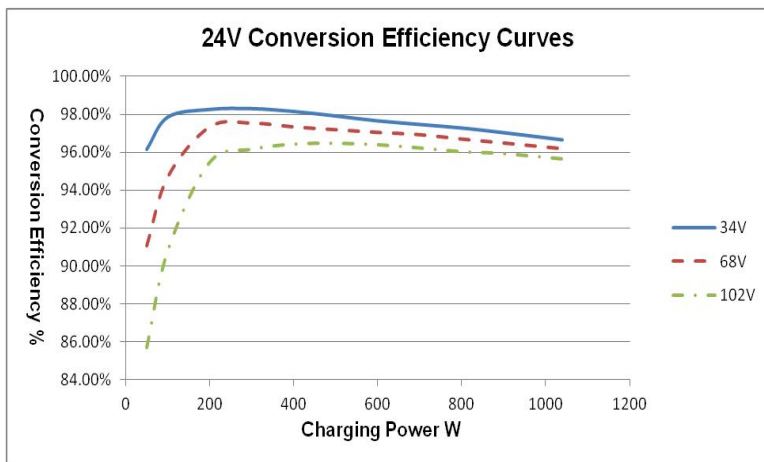**4.** **PV Array MPP Voltage (68V, 102V, 119V)/System Voltage (48V)**
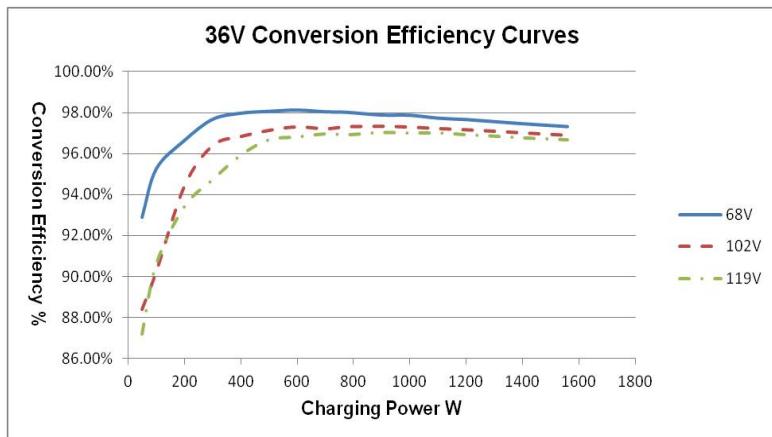
Model: XTRA4415N

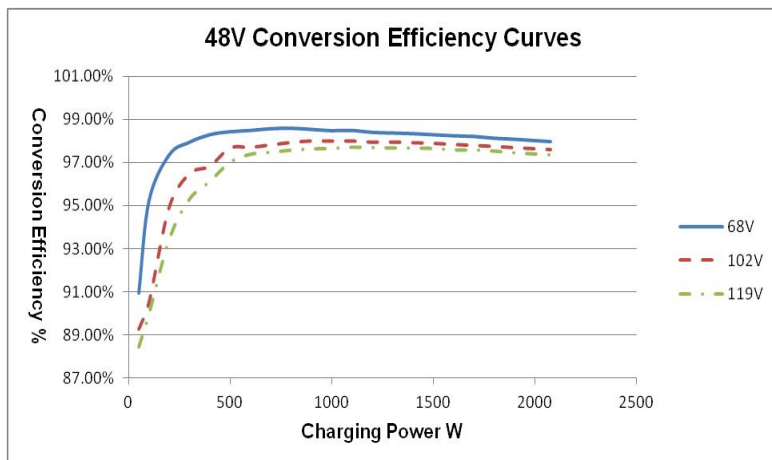1. **PV Array MPP Voltage (17V, 34V, 68V)/System Voltage (12V)**

2. **PV Array MPP Voltage (34V, 68V, 102V)/System Voltage (24V)**

3. **PV Array MPP Voltage (68V, 102V, 119V)/System Voltage (36V)**

36V Conversion Efficiency Curves

4. **PV Array MPP Voltage (68V, 102V, 119V)/System Voltage (48V)**

48V Conversion Efficiency Curves

Any changes without prior notice!   Version number: 4.8

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