MPPT Solar Charge Controller

User Manual

Models:

TRIRON1206N/TRIRON1210N

TRIRON2206N/TRIRON2210N

TRIRON3210N/TRIRON3215N

TRIRON4210N/TRIRON4215N

EN

Important Safety Instructions

Please save this manual for future review.

This manual contains safety, installation and operation for Maximum Power Point Tracking (MPPT) TRIRON series controller ("the controller" as referred to in this manual).

General Safety Information

- Read carefully all the instructions and warnings in the manual before installation.
- No user serviceable components inside the controller. DO NOT disassemble or attempt to repair the controller.
- Mount the controller indoors. Prevent exposure to the elements 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 fuses/breakers.
- Make sure to switch off all PV array connections and the battery fuse/breakers before controller installation and adjustment.
- Power connections must remain tight to avoid excessive heating from loose connection.

CONTENTS

1 General Information

1.1 Overview

The TRIRON series controllers are modular-designed products based on six MPPT solar controller models. The main unit(Power Module)(TRIRON****N) is a solar controller which can be integrated with different display and interface modules to meet a variety of functional requirements. The TRIRON series controllers can automatically identify and load the drivers of various modules. There are three display modules (Basic 1(DB1), Standard1(DS1) and Stardard2(DS2)) and four interface modules (USB COM Slave(UCS), Relay COM Slave(RCS), Relay COM Master(RCM) and Dual USB1(USB1)). Users can choose any combination of these modules according to their needs.

With the advanced MPPT control algorithm, TRIRON series controllers can minimize the maximum power point loss rate and loss time, quickly track the maximum power point of the PV array and obtain the maximum energy from solar modules under any conditions; and can increase the ratio of energy utilization in the solar system by 20%-30% compared with a PWM charging method. With the adaptive three-stage charging mode based on a digital control circuit, TRIRON series controllers can effectively prolong the lifecycle of batteries, significantly improve the system performance and support all-around electronic protection functions, including overcharging and over-discharging protection to minimize damages to components of the system caused by incorrect installation or system failure at the utmost, and effectively ensure safer and more reliable operation of the solar power supply system for a longer service time. This modular solar controller can be widely used for different applications, e.g., communication base stations, household systems, street lighting systems and field monitoring, etc.

Features：

- Identify and load the drivers of various modules automatically
- Modular design for easy combination and replacement
- Advanced MPPT control algorithm to minimize the MPP loss rate and loss time
- Advanced MPPT technology, with efficiency no less than 99.5%.
- Maximum DC/DC conversion efficiency of 98%
- Ultra-fast tracking speed and guaranteed tracking efficiency.
- Automatic limitation of the charging power and current
- Wide MPP operating voltage range.
- Multiple load work modes
- Support the lead-acid and lithium batteries; voltage parameters can be set on the controller①

- Programmable temperature compensation
- Real-time energy statistics function.
- Overheating power reduction function
- LCD and indicators to display operating data and status of the system
- User-friendly buttons for comfortable and convenient operation
- Master and slave RS485 communication modules design, reading the load or inverter operating data
- Control the inverter switch through the relay interface
- Provide 5VDC power through the dual USB output interface to charge electronic devices

① For the BCV, FCV, LVD, and LVR, users can modify them on the local controller when the battery type is "USE."

1.2 Characteristics

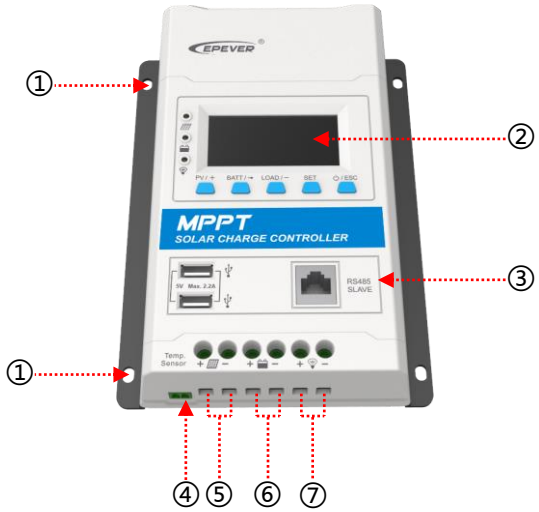


Figure 1 Product Characteristics

①	Mounting Hole Φ5mm	⑤	PV Terminals
②	Display Module	⑥	Battery Terminals
③	Interface Module	⑦	Load Terminals
④	RTS※ Interface		
※ If the temperature sensor is short-circuited or damaged, the controller will charge or discharge at the default temperature setting of 25 ºC.			

1.3 Module Types

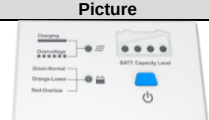
➢ **1-Power Modules**

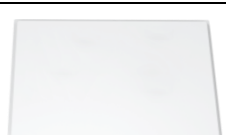
The Power Modules control PV battery charging & load discharging without any without any display or interface modules installed –they can operate on their own. If a display or interface module is installed, it will be powered by the Power module and the appropriate module driver will be loaded.

NOTE: The power module can be operated independently without any other modules.

Model	System voltage	Max. PV open circuit voltage	Rated charge/discharge current	Picture
TRIRON1206N	12/24VDC	60V	10A	
TRIRON2206N	12/24VDC	60V	20A	
TRIRON1210N	12/24VDC	100V	10A	
TRIRON2210N	12/24VDC	100V	20A	
TRIRON3210N	12/24VDC	100V	30A	
TRIRON4210N	12/24VDC	100V	40A	
TRIRON3215N	12/24VDC	150V	30A	
TRIRON4215N	12/24VDC	150V	40A	

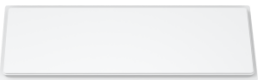
➢ **2-Display Modules**

Module		Description	Picture
Display Basic1	DB1	**LED Indicators:** PV & battery working status **Button:** When the working mode is Manual Control, the load is ON/OFF via the button.	

Display Standard 1	DS1	**LED Indicators:** PV & load working status **Buttons:** View or set the parameters **LCD：** *PV display:* voltage/current /generated energy ***Battery display:*** voltage/current/temperature ***Load:*** • Display current/*load working mode* when the controller communicates with the **PC or APP.** • Display voltage/current/ *power consumption* when the controller communicates with **the inverter**.	
Display Standard 2	DS2	**Indicators:** PV & battery & load working status **Buttons:** View or set the parameters **LCD:** *PV display* voltage/current /generated energy/Power *Battery display* voltage/ current/temperature/capacity **Load:** • Display voltage/ current/ power/ load working mode when the controller communicates with the **PC or APP**. • Display voltage/current/power power consumption when the controller communicates with **the inverter**.	
No Display Cover	DCV	No indicator or display	

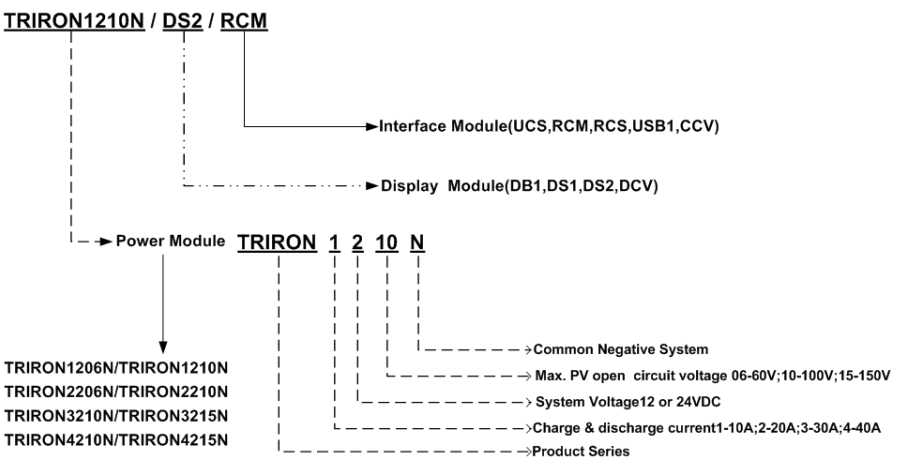
➢ **Interface Modules**

Module		Function	Picture
USB COM Slave	UCS	**RS485 interface：** Connect to PC or phone. View or change the controller parameters. **USB interface：** Supplies 5VDC for electronic equipment. **NOTE: USB interface is output when the load is ON.**	
Relay COM Master	RCM	**RS485 interface：** Connect to inverter. View the inverter parameters via the LCD. **Relay interface：** Remotely control the inverter ON/OFF. **NOTE: The module can't connect the accessories.**	 **Accessory: 3.81-2P terminal**
Relay COM Slave	RCS	**RS485 interface：** Connect to PC or phone. View or change the controller parameters. **Relay interface：** Remotely control the inverter ON/OFF. **NOTE: The module can connect the accessories.**	 **Accessory: 3.81-2P terminal**
Double USB	USB1	**USB interface：** Supplies 5VDC for electronic equipment. **NOTE: USB interface is output when the load is ON.**	

No COM Cover	CCV	No interface	

CAUTION	The controller must be powered off for 1 minute when user replace the display modules or interface modules.

1.4 Naming rules



2 Installation

2.1 Attentions

- Please read the entire installation instructions to get familiar with the installation steps before installation.
- Be very careful when installing the batteries, especially flooded lead-acid battery. Please wear eye protection, and have fresh water available to wash and clean any contact with battery acid.
- Keep the battery away from any metal objects, which may cause short circuit of the battery.
- Explosive battery gases may come out from the battery during charging, so make sure ventilation condition is good.
- Ventilation is highly recommended if mounted in an enclosure. Never install the controller in a sealed enclosure with flooded batteries! Battery fumes from vented batteries will corrode and destroy the controller circuits.
- Loose power connections and corroded wires may result in high heat that can melt wire insulation, burn surrounding materials, or even cause fire. Ensure tight connections and use cable clamps to secure cables and prevent them from swaying in mobile applications.
- Lead-acid battery and lithium battery are recommended, other kinds please refer to the battery manufacturer.
- Battery connection may be wired to one battery or a bank of batteries. The following instructions refer to a singular battery, but it is implied that the battery connection can be made to either one battery or a group of batteries in a battery bank.
- Multiple same models of controllers can be installed in parallel on the same battery bank to achieve higher charging current. Each controller must have its own solar module(s).
- Select the system cables according to 5A/mm^2 or less current density in accordance with Article 690 of the National Electrical Code, NFPA 70.

2.2 PV Array Requirements

(1) **Serial connection (string) of PV modules**

As the core component of PV system, controller could 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 PV modules can be calculated. The below table is for reference only.

TRIRON1206N/2206N:

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

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

NOTE: The above parameter values are calculated under standard test conditions (STC (Standard Test Condition)：Irradiance 1000W/m^2，Module Temperature 25℃，Air Mass1.5.)

TRIRON1210N/2210N/3210N/4210N:

System voltage	36 cell Voc＜23V		48 cell Voc＜31V		54 cell Voc＜34V		60 cell 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	72 cell Voc＜46V		96 cell Voc＜62V		Thin-Film Module Voc＞80V
	Max.	Best	Max.	Best	
12V	2	1	1	1	1
24V	2	1	1	1	1

NOTE: The above parameter values are calculated under standard test conditions (STC (Standard Test Condition)：Irradiance 1000W/m^2，Module Temperature 25℃，Air Mass1.5.)

TRIRON3215/4215N:

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

NOTE: The above parameter values are calculated under standard test conditions (STC (Standard Test Condition)：Irradiance 1000W/m^2，Module Temperature 25℃，Air Mass1.5.)

(2) Maximum PV array power

The MPPT controller has the function of current/power-limiting, that is, during the charging process, when the charging current or power exceeds the rated charging current or power, the controller will automatically limit the charging current or power to the rated charging current or power, which can effectively protect the charging parts of controller, and prevent damages to the controller due to the connection of some over-specification PV modules. The actual operation of PV array is as follows:

Condition 1:

Actual charging power of PV array ≤ Rated charging power of controller

Condition 2:

Actual charging current of PV array ≤ Rated charging current of controller

When the controller operates under "**Condition 1**"or"**Condition 2**", it will carry out the charging as per the actual current or power; at this time, the controller can work at the maximum power point of PV array.

WARNING	When the power of PV module is greater than the rated charging power, and the maximum open-circuit voltage of PV array is more than 60V(TRIRON**06N)/100V(TRIRON**10N)/150V(TRIRON**15N) (at the lowest environmental temperature), the controller may be damaged.

Condition 3:

Actual charging power of PV array＞Rated charging power of controller

Condition 4:

Actual charging current of PV array＞Rated charging current of controller

When the controller operates under "**Condition 3**"or"**Condition 4**"，it will carry out the charging as per the rated current or power.

WARNING	When the power of PV module is greater than the rated charging power, and the maximum open-circuit voltage of PV array is more than 60V(TRIRON**06N)/100V(TRIRON**10N)/150V(TRIRON**15N) (at the lowest environmental temperature), the controller may be damaged.

According to “Peak Sun Hours diagram”, if the power of PV array exceeds the rated charging power of controller, then the charging time as per the rated power will be prolonged, so that more energy can be obtained for charging the battery. However, in the practical application, the maximum power of PV array shall not be greater than 1.5 x the rated charging power of controller. If the maximum power of PV array exceeds the rated charging power of controller too much, it will not only cause the waste of PV modules, but also increase the open-circuit voltage of PV array due to the influence of environmental temperature, which may increase the probability of damage to the controller rise. Therefore, it is very important to configure the system reasonably. For the recommended maximum power of PV array for this controller, please refer to the table below:

Model	Rated Charge Current	Rated Charge Power	Max. PV Array Power	Max. PV open circuit voltage
TRIRON1206N	10A	130W/12V 260W/24V	195W/12V 390W/24V	46V① 60V②
TRIRON2206N	20A	260W/12V 520W/24V	390W/12V 780W/24V	
TRIRON1210N	10A	130W/12V 260W/24V	195W/12V 390W/24V	92V① 100V②
TRIRON2210N	20A	260W/12V 520W/24V	390W/12V 780W/24V	
TRIRON3210N	30A	390W/12V 780W/24V	585W/12V 1170W/24V	
TRIRON4210N	40A	520W/12V 1040W/24V	780W/12V 1560W/24V	
TRIRON3215N	30A	390W/12V 780W/24V	585W/12V 1170W/24V	138V① 150V②
TRIRON4215N	40A	520W/12V 1040W/24V	780W/12V 1560W/24V	

① At 25℃ environment temperature

② At minimum operating environment temperature

WARNING	The controller may be damaged when the maximum PV open circuit voltage(Voc) exceeds 60V(TRIRON**06N), 100V(TRIRON**10N) or 150V (TRIRON**15N) at minimum operating environment temperature.

2.3 Wire Size

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

- **PV Wire Size**

Since PV array output can vary due to the PV module size, connection method or sunlight angle, the minimum wire size can be calculated by the Isc* of PV array. Please refer to the value of Isc in the PV module specification. When PV modules connect in series, the Isc is equal to a PV modules Isc. When PV modules connect in parallel, the Isc is equal to the sum of the PV module's Isc. The Isc of the PV array must not exceed the controller's maximum PV input current. Please refer to the table as below:

NOTE: All PV modules in a given array are assumed to be identical.

***Isc=short circuit current(amps) Voc=open circuit voltage.**

Model	Max. PV input current	Max. PV wire size*
TRIRON1206N TRIRON1210N	10A	4mm^2/12AWG
TRIRON2206N TRIRON2210N	20A	6mm^2/10AWG
TRIRON3210N TRIRON3215N	30A	10mm^2/8AWG
TRIRON4210N TRIRON4215N	40A	16mm^2/6AWG

***These are the maximum wire sizes that will fit the controller terminals.**

CAUTION	When the PV modules connect in series, the open circuit voltage of the PV array must not exceed 46V (TRIRON**06N), 92V (TRIRON**10N) or 92V (TRIRON**15N) at 25℃ environment temperature.

- **Battery and Load Wire Size**

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

Model	Rated charge current	Rated discharge current	Battery wire size	Load wire size
TRIRON1206N TRIRON1210N	10A	10A	4mm^2/12AWG	4mm^2/12AWG

TRIRON2206N TRIRON2210N	20A	20A	6mm^2/10AWG	6mm^2/10AWG
TRIRON3210N TRIRON3215N	30A	30A	10mm^2/8AWG	10mm^2/8AWG
TRIRON4210N TRIRON4215N	40A	40A	16mm^2/6AWG	16mm^2/6AWG

CAUTION	The wire size is only for reference. If there is a long distance between the PV array and the controller or between the controller and the battery, larger wires can be used to reduce the voltage drop and improve performance.

2.4 Mounting

WARNING	• Risk of explosion! Never install the controller in a sealed enclose with flooded batteries! Do not install in a confined area where battery gas can accumulate. • Risk of electric shock! When wiring the solar modules, the PV array can produce open circuit voltages in excess of 100V when in sunlight.
CAUTION	The controller requires at least 150mm of clearance above and below for proper air flow. Ventilation is highly recommended if mounted in an enclosure.

Installation Procedure:

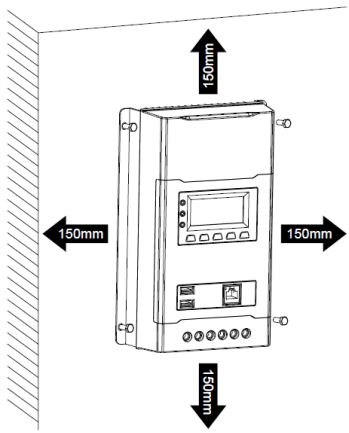


Figure2-1 Mounting

Step 1: Determination of Installation Location and Heat-dissipation Space

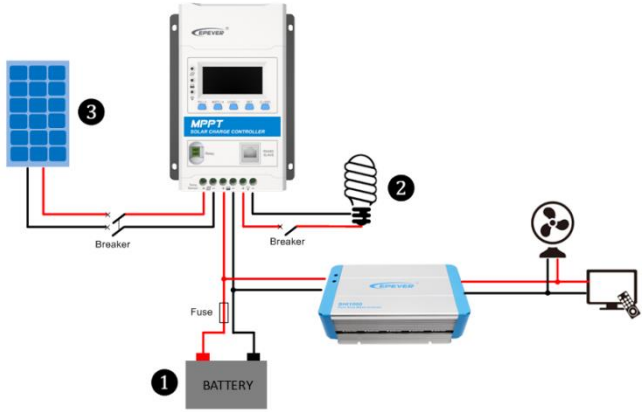


Figure 2-2 Schematic of wiring diagram

Determination of installation location: The controller shall be installed in a place with sufficient air flow through the radiators of the controller and a minimum clearance of 150 mm from the upper and lower edges of the controller to ensure natural thermal convection. Please see Figure 2-1: Mounting.

CAUTION	If the controller is to be installed in an enclosed box, it is important to ensure reliable heat dissipation through the box.

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

CAUTION	• While wiring the controller do not close the circuit breaker or fuse and make sure that the leads of "+" and "-" poles are connected correctly. • A fuse which 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 150 mm. • If an inverter is to be connected to the system, connect the inverter directly to the battery, not to the load side of the controller.

Step 3：**Grounding**

As the TRIRON series is a common negative controller, the negative poles of the PV array, battery and load can be grounded together.

CAUTION	The controller can also be used in a common positive system. In this case, the negative poles of the controller, PV and load can't be grounded together, but only one of them can be grounded.

Step 4：Connect accessories

- **Connect the remote temperature sensor cable (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	If the remote temperature sensor is not connected to the controller,, the default setting for battery charging or discharging temperature is 25 °C without temperature compensation.

- **Connect the accessories for RS485 communication**

Refer to **3.2 "Setting and Operation of Controller"** .

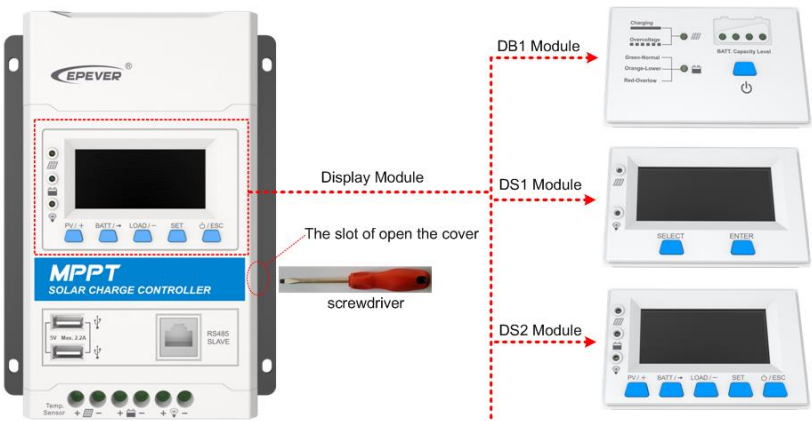
CAUTION	The RS-485 port is not SELV circuit, it must have isolation between the port and the place where the end user can access directly.

Step 5：Powered on the controller

Closing the battery fuse will switch on the controller. Then check the status of the battery indicator (the controller is operating normally when the indicator is lit in green). Close the fuse and circuit breaker of the load and PV array. Then the system will be operating in the preprogrammed mode.

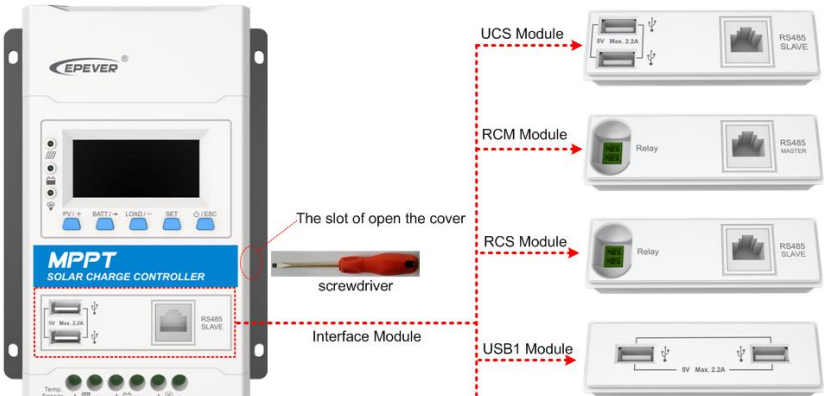
CAUTION	If the controller is not operating properly or the battery indicator on the controller shows an abnormality, please refer to 4.2 "Troubleshooting".

3 Modules installation



Operation:

1. Powered off the controller for 1 minute.
2. Pry the cover of controller off using the screwdriver.
3. Install the modules.
4. Replace the cover.
5. Power on the controller.



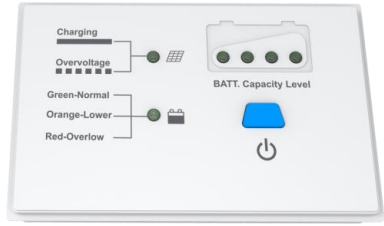
Operation:

1. Powered off the controller for 1 minute.
2. Pry the cover of controller off using the screwdriver.
3. Install the modules.
4. Replace the cover.
5. Power on the controller.

4 Module Introduction

4.1 Display Module

4.1.1 Display Basic1 (DB1)



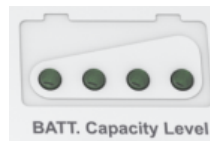
（1）Charging and battery LED indicator

Indicator	Color	Status	Information
	Green	On Solid	PV charges the battery with a low current
	Green	OFF	1. No sunlight 2. Connection error 3. Low PV voltage
	Green	Slowly Flashing(1Hz)	Normal charging
	Green	Fast Flashing(4Hz)	PV Over voltage
	Green	On Solid	Normal
	Green	Slowly Flashing(1Hz)	Full
	Green	Fast Flashing(4Hz)	Over voltage
	Orange	On Solid	Under voltage
	Red	On Solid	Over discharged
	Red	Slowly Flashing(1Hz)	Battery Overheating Low temperature①
All LED indicators fast flashing at the same time			System voltage error②
			Controller Overheating

① When a lead-acid battery is used, the controller hasn't the low temperature protection.

② When a lithium-ion battery is used, the system voltage can't be identified automatically.

（2）Battery Capacity Level Indicator



- **Battery Capacity Level (BCL)**

Indicator	Color	Status	Information
☆ ○○○	Green	25% Indicator slowly flashing	0%to <25%
●☆ ○○	Green	50% Indicator slowly flashing 25% Indicator on solid	25%to <50%
●●☆ ○	Green	75% Indicator slowly flashing 25%,50% Indicators on solid	50%to <75%
●●●☆	Green	100% Indicator slowly flashing 25%,50%,75% Indicators on solid	75% to 100%
●●●●	Green	25%,50%,75%,100%Indicators on solid	100%

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

- **Load status**

Battery Capacity Level	Green	on solid	The load is ON
	Green	OFF	The load is OFF

（3）Button

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

4.1.2 Display Standard1 (DS1)

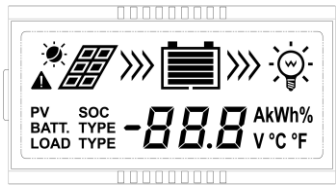
（1）Charging and load LED indicator

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

（2）Button

Mode	Note
Load ON/OFF	In load manual mode, it can turn the load On/Off of the load 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



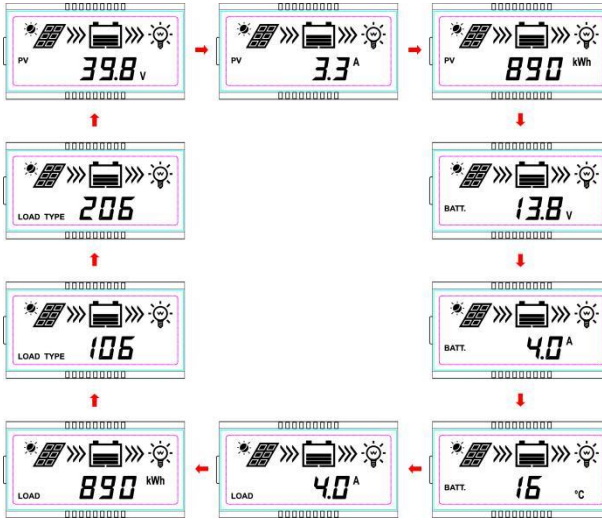
1） Icon

Item	Icon	Status
PV array		Day
		Night
		No charging
		Charging
	PV	PV Voltage, Current, Power
Battery		Battery capacity, In Charging
	BATT.	Battery Voltage, Current, Temperature
	BATT. TYPE	Battery Type
Load		Load ON
		Load OFF

	LOAD	Load Voltage, Current, Load mode

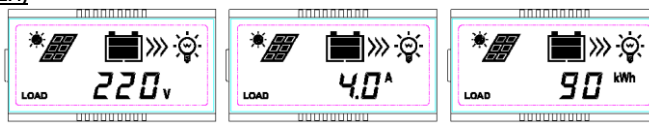
2） Browse interface

Press the SELECT button to cycle display the following interfaces.



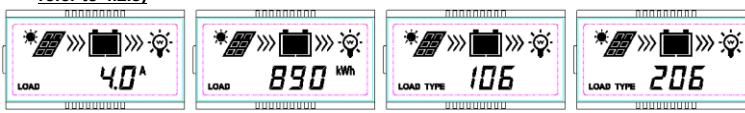
3） Load parameters

- **Combination of the DS1 and RCM modules (To connect the system with the inverter, refer to 4.2.4)**



Display：Voltage/Current/Consumed power

- **Combination of the DS2 and UCS modules with the LCD display (connect a LED load: refer to 4.2.5)**



Display：Current/Consumed power/Load working mode-Timer1/ Load working mode-Timer2

4） Setting

① Clear the generated energy

Operating:

Step 1: Press the ENTER button and hold 5s under the PV power interface and the value is flashing.

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

② Switch the battery temperature unit

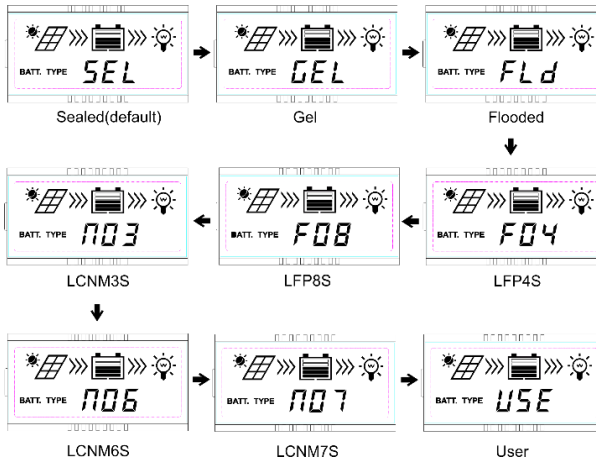
Press the ENTER button and hold 5s under the battery temperature interface.

③ Battery type

Step1: Press the SELECT button to browse the battery voltage interface.

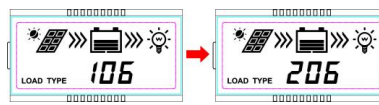
Step2: Press and hold the ENTER button until the battery-type interface flashes.

Step3: Press the SELECT button to change the battery type, shown as below:



Step4: Press and hold the ENTER button to confirm.

④ Local load mode



Operating:

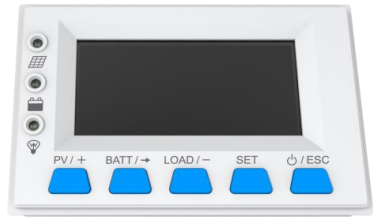
Step1: Press the ENTER button and hold 5s under the load mode interface.

Step2: Press the SELECT button when the load mode interface is flashing.

Step3: Press the ENTER button to the load mode.

NOTE：Please refer to 5.2 for the load working modes.

4.1.3 Display Standard 2 (DS2)



（1）Indicator

Indicator	Color	Status	Instruction
	Green	On Solid	PV charges the battery with a low current
	Green	OFF	1. No sunlight 2. Connection error 3. Low PV voltage
	Green	Slowly Flashing(1Hz)	Normal charging
	Green	Fast Flashing(4Hz)	PV Over voltage
	Green	On Solid	Normal
	Green	Slowly Flashing(1Hz)	Full
	Green	Fast Flashing(4Hz)	Over voltage
	Orange	On Solid	Under voltage
	Red	On Solid	Over discharged
	Red	Slowly Flashing(1Hz)	Battery Overheating Low temperature①
	Yellow	On Solid	Load ON
	Yellow	OFF	Load OFF
PV&BATTLED fast flashing			Controller Overheating System voltage error②

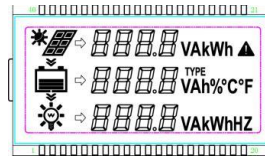
① When a lead-acid battery is used, the controller hasn't the low temperature protection.

② When a lithium-ion battery is used, the system voltage can't be identified automatically.

（2）Button

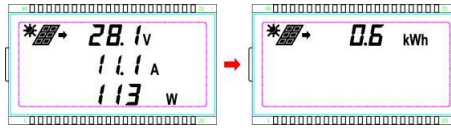
	Press the button	PV browsing interface
		Setting data +
	Press the button and hold 5s	Setting the LCD cycle time
	Press the button	BATT browsing interface
		Cursor displacement during setting
	Press the button and hold 5s	Setting the battery type, battery capacity level and temperature unit.
	Press the button	1.Inverter load browsing interface with RCM module 2.Controller load browsing interface with RCS module.
		Setting data -
	Press the button and hold 5s	Setting the load working mode with RCS module.
	Press the button	Setting interface
		Setting interface switch to the browsing interface
		Setting parameter to enter button
	Press the button	Turn ON/OFF the inverter with RCS module
		Exit the setting interface

(3)Display



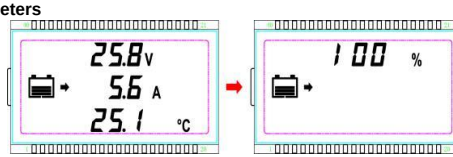
Icon	Information	Icon	Information	Icon	Information
	Day		Not charging		Not discharging
	Night		Charging		Discharging

1）PV parameters



Display：Voltage/Current/Power/Generated Energy

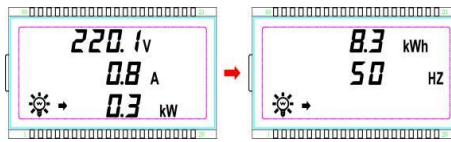
2）Battery parameters



Display：Voltage/Current/Temperature/Battery capacity level

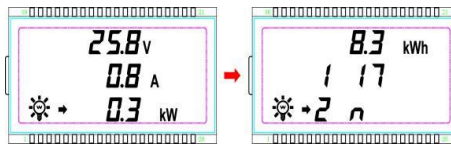
3）Load parameters

- Combination of the DS2 and RCM modules (To connect the system with the inverter, refer to 4.2.4)



Display：Voltage/Current/Power/ Consumed energy/Frequency

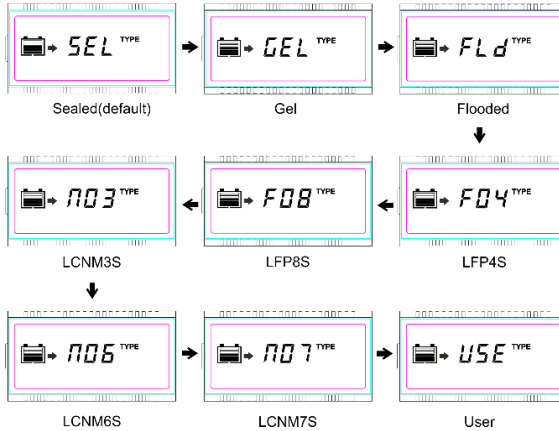
- Combination of the DS2 and UCS modules with the LCD display (connect a LED load: refer to 4.2.5)



Display：Voltage/Current/Power/ Consumed energy/Load working mode-Timer1/ Load working mode-Timer2

（4）Setting parameters

1）Battery type



Operation:

Step 1: Press the SET button for the setting interface.

Step 2: Press the BATT / → button and hold 5s for the battery type interface.

Step 3: Press the PV / + or LOAD / − button to set the battery type.

Step 4: Press the SET button to confirm the parameters.

2）Battery capacity

Operation:

Step 1: Press the SET button for the setting interface.

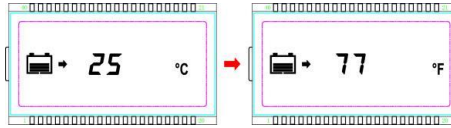
Step 2: Press the BATT / → button and hold 5s for the battery type interface.

Step 3: Press the SET button for the battery capacity interface.

Step 4: Press the PV / + or LOAD / − button to set the battery capacity.

Step 5: Press the SET button to confirm the parameters.

3）Temperature unit



Operation:

Step 1: Press the SET button for the setting interface.

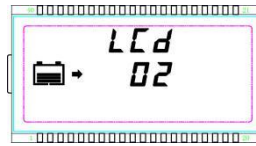
Step 2: Press the BATT / → button and hold 5s for the battery type interface.

Step 3: Press the SET button twice for the temperature units interface.

Step 4: Press the PV / + or LOAD / − button to set the temperature units.

Step 5: Press the SET button to confirm the parameters.

4）LCD cycle time



NOTE: The LCD cycle default time is 2s,the setting time range is 0～20s.

Operation:

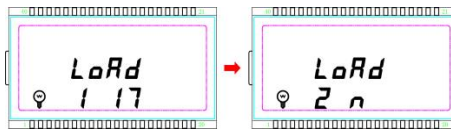
Step 1: Press the SET button for the setting interface.

Step 2: Press the PV / + button and hold 5s for the LCD cycle time interface.

Step 3: Press the PV / + or LOAD / − button to set the LCD cycle time.

Step 4: Press the SET button to confirm the parameters.

5） Local load working mode with the RCS module



Operation:

Step 1: Press the SET button for the setting interface.

Step 2: Press the 

button and hold 5s for the load working mode interface.

Step 3: Press the 

or 

button to set the working mode..

Step 4: Press the 

button to confirm the parameters.

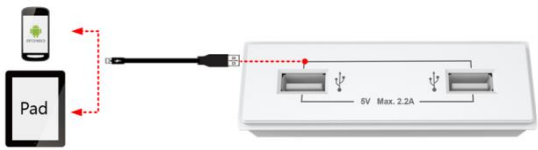
NOTE：Please refer to chapter 5.2 for the load working mode.

4.2 Interface Modules

4.2.1 Interface type

Interface	Interface type	Output voltage/current	Short circuit protection
USB output interface	Standard USB	5VDC/2.2A(Total)	Yes
RS485 com. interface	RJ45	5VDC/200mA	Yes
Relay interface	3.81-2P	30VDC/1A	NO

4.2.2 Double USB (USB1)



USB output interface：

Charging for phone, pad and so on. Max. charging current is 2.2A(total).

NOTE：USB interface output voltage/current available when the load is ON.

4.2.3 USB COM Slave (UCS)

***USB output interface*：** Charging for phone, pad and so on. Max. charging current is 2.2A(total).

NOTE：USB interface output voltage/current available when the load is ON.

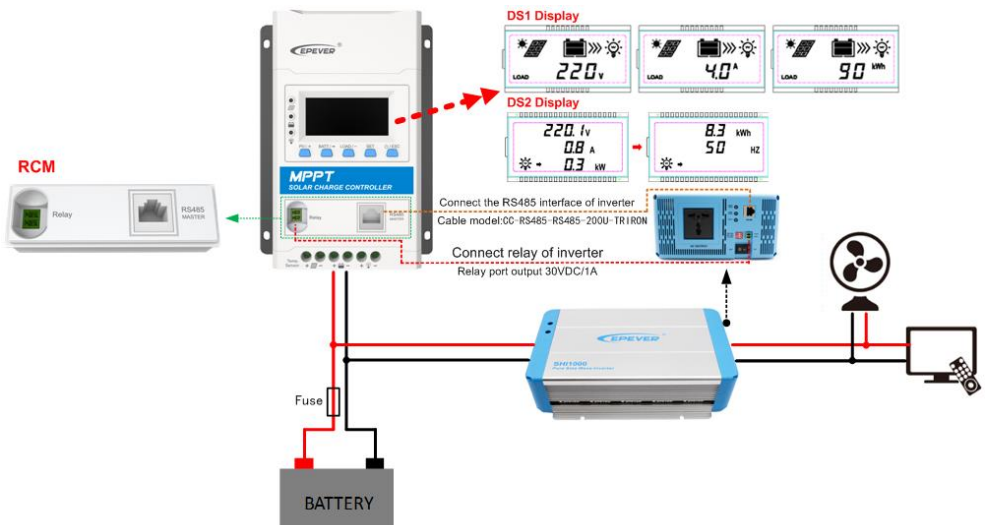
RS485 interface: View working status and view/modify working parameters via APP or PC software.

4.2.4 Relay COM Master (RCM connect the our company of inverter only)

Note：RCM can only be connected with the EPEVER inverters, not with optional accessories.

RS485 interface: When the master is set in RS485 communication mode, i.e., with a combination of the RCM and DS1/DS2 modules, the information of the inverter (to be supplied by our company) can be displayed by the DS1/DS2 module. See the following figure:

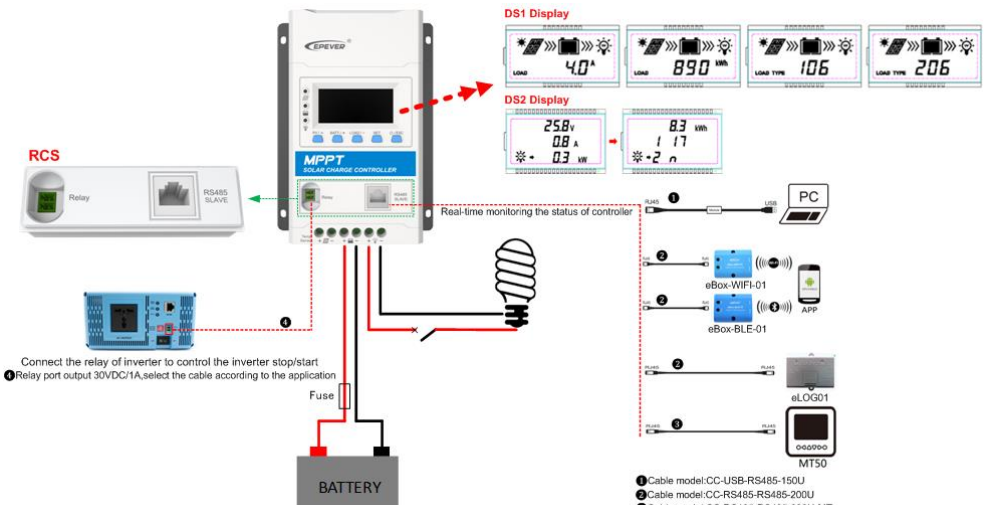
Relay interface: It shall connect the controller's relay in parallel with the inverter start switch, so it can turn ON/OFF the inverter by operating the button.



4.2.5 Relay COM Slave (RCS connect the accessories)

RS485 interface: When the slave is set in RS485 communication mode, i.e., with a combination of the RCS and DS1/DS2 modules, the information of the controller can be displayed by the DS1/DS2 module.

Relay interface: It shall connect the controller's relay in parallel with the inverter start switch, so it can turn ON/OFF the inverter by operating the button.



5 Parameters Setting

5.1 Battery parameters

5.1.1 Supported battery types

1	**Battery**	Sealed(default)
		Gel
		Flooded
2	**Lithium battery**	LiFePO4(4S/ 8S)
		Li(NiCoMn)O2 (3S/6S/7S)
3	**User**	

5.1.2 Local setting

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

Step1: Enter the “USE” battery type. For DS1 module, detail operations of entering the “USE” battery type refer to the chapter 3.1.2. For DS2 module, detail operations of entering the “USE” battery type refer to the chapter 3.1.3.

Step2: Under the "USE" battery type, the battery parameters that can be local set are shown in the table below:

Parameters	Default	Range	Settings on DS1 module	Settings on DS2 module
SYS★	12VDC	12/24VDC	1) Under the "USE" battery type, press the ENTER button to enter the “SYS” interface.	1) Under the "USE" battery type, press the SET button to enter

			2) Press the  button again to display the current “SYS” value. 3) Press the  button to modify the parameter. 4) Press the  button to confirm and enter the next parameter.	the “SYS” interface. 2) Press the  button again to display the current “SYS” value. 3) Press the  or  button to modify the parameter. 4) Press the  button to confirm and enter the next parameter.
BCV	14.4V	9—17	5) Press the  button again to display the current voltage value. 6) Press the  button to modify the parameter(short press to increase 0.1V, long press to decrease 0.1V). 7) Press the  button to confirm and enter the next parameter.	5) Press the  button again to display the current voltage value. 6) Press the  or  button to modify the parameter(press  button to increase 0.1V, press  button to decrease 0.1V). 7) Press the  button to confirm and enter the next parameter.
FCV	13.8V	9—17		
LVR	12.6V	9—17		
LVD	11.1V	9—17		
LEN	NO	YES/NO	Press the  button to modify the switch status. Note: It exists automatically from the current interface after no operation of more than 10S.	Press the  or  button to modify the switch status. Note: It exists automatically from the

				current interface after no operation of more than 10S.

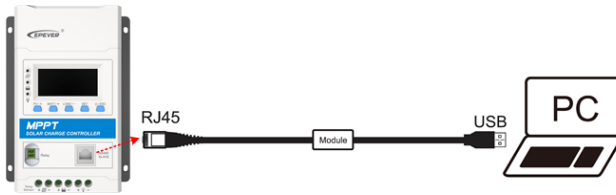
★The SYS value can only be modified under the non-lithium "USE" type. That is, the battery type is Sealed, Gel, or Flooded before entering the "USE" type, the SYS value can be modified; if it is lithium battery type before entering the "USE" type, the SYS value cannot be modified. Only the above battery parameters can be set on the local controller, and the remaining battery parameters follow the following logic (the voltage level of 12V system is 1, the voltage level of 24V system is 2).

Battery type / Battery parameters	Sealed/Gel/Flooded User	LiFePO4 User	Li(NiCoMn)O2 User
Over voltage 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
Over voltage 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
Under voltage warning reconnect voltage(UVWR)	UVW+0.2V*voltage level	UVW+0.2V*voltage level	UVW+1.7V*voltage level
Under voltage warning voltage(UVW)	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

5.1.3 Remote Setting

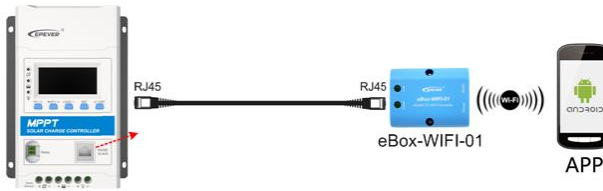
1） Setting the battery parameters by PC software

Connect the controller's RJ45 interface to the PC's USB interface via a USB to RS485 cable (model: CC-USB-RS485-150U). When selecting the battery type as "USE," set the voltage parameters by the PC software. Refer to the cloud platform manual for detail.



2） Setting the battery parameters by APP

Connect the controller to the WIFI module through a standard network cable or connect to the Bluetooth module by Bluetooth signal. When selecting the battery type as "USE," set the voltage parameters by the APP. Refer to the cloud APP manual for details.



3） Controller parameters

✧ **Battery voltage parameters**

Measure the parameters in the condition of 12V/25ºC. Please double the values in the 24V system.

Battery type / Battery parameters	Sealed	GEL	FLD	User
Over voltage disconnect voltage	16.0V	16.0V	16.0V	9~17V
Charging limit voltage	15.0V	15.0V	15.0V	9~17V
Over voltage reconnect voltage	15.0V	15.0V	15.0V	9~17V
Equalize charging voltage	14.6V	——	14.8V	9~17V
Boost charging voltage	14.4V	14.2V	14.6V	9~17V
Float charging voltage	13.8V	13.8V	13.8V	9~17V
Boost reconnect charging	13.2V	13.2V	13.2V	9~17V

voltage				
Low voltage reconnect voltage	12.6V	12.6V	12.6V	9~17V
Under voltage warning reconnect voltage	12.2V	12.2V	12.2V	9~17V
Under voltage warning voltage	12.0V	12.0V	12.0V	9~17V
Low voltage disconnect voltage	11.1V	11.1V	11.1V	9~17V
Discharging limit voltage	10.6V	10.6V	10.6V	9~17V
Equalize Duration	120 minutes	--	120 minutes	0～180 minutes
Boost Duration	120 minutes	120 minutes	120 minutes	10～180 minutes

- **When the battery type is "USE," the battery voltage parameters follow the following logic:**

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

B. Over Voltage Disconnect Voltage > Over Voltage Reconnect Voltage

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

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

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

✧ **Lithium Battery voltage parameters**

Battery type / Battery parameters	LFP		LNCM			User ③
	LFP4S	LFP8S	LCNM3S	LCNM6S	LCNM7S	
Over voltage disconnect voltage	14.8V	29.6 V	12.8 V	25.6 V	29.8 V	9~17 V
Charging limit voltage	14.6 V	29.2 V	12.6 V	25.2 V	29.4 V	9~17 V
Over voltage reconnect voltage	14.6 V	29.2 V	12.5 V	25.0 V	29.1 V	9~17 V
Equalize charging voltage	14.5 V	29 .0 V	12.5 V	25.0 V	29.1 V	9~17 V
Boost charging voltage	14.5 V	29.0 V	12.5 V	25.0 V	29.1 V	9~17 V
Float charging voltage	13.8 V	27.6 V	12.2 V	24.4 V	28.4 V	9~17

						V
Boost reconnect charging voltage	13.2 V	26.4 V	12.1 V	24.2 V	28.2 V	9~17 V
Low voltage reconnect voltage	12.8 V	25.6 V	10.5 V	21.0 V	24.5 V	9~17 V
Under voltage warning reconnect voltage	12.2 V	24.4 V	12.2 V	24.4 V	28.4 V	9~17 V
Under voltage warning voltage	12.0 V	24.0 V	10.5 V	21.0 V	24.5 V	9~17 V
Low voltage disconnect voltage	11.1 V	22.2 V	9.3 V	18.6 V	21.7 V	9~17 V
Discharging limit voltage	11.0 V	22.0 V	9.3 V	18.6 V	21.7 V	9~17 V

① For LFP4S, the battery parameters under the "User" battery type is 9-17V; these parameters should x2 for LFP8S.

- **When the battery type is "USE," the Lithium battery voltage parameters follow the following logic:**

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

B. Over Voltage Disconnect Voltage>Over Voltage 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. Under Voltage Warning Reconnect Voltage>Under Voltage Warning Voltage≥ Discharging Limit Voltage;

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

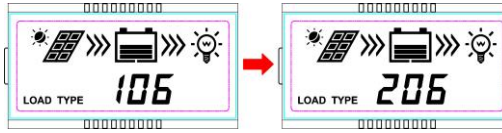
F. Low Voltage Disconnect Voltage ≥ Over Discharging Protection Voltage (BMS)+0.2V

WARNING	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 0.2 v.

5.2 Load working modes

5.2.1 LCD setting

1） DS1 module display and operation



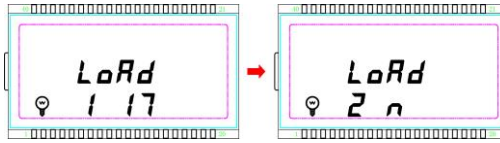
Operation:

Step1: Press the ENTER button and hold 5s for the load mode interface.

Step2: Press the SELECT button when the load mode interface is flashing.

Step3: Press the ENTER button to confirm the load working modes.

2） DS2 module display and operation



Operation:

Step1: Press the SET button for the setting interface.

Step2: Press the LOAD/− button and hold 5s for the load working mode interface.

Step3: Press the PV/+ or LOAD/− button to set the load working modes.

Step4: Press the SET button to confirm the parameters.

3） Load working mode

1**	Timer 1	2**	Timer 2
100	Light ON/OFF	2 n	Disabled
101	Load will be on for 1 hour since sunset	201	Load will be on for 1 hour before sunrise
102	Load will be on for 2 hours since sunset	202	Load will be on for 2 hours before sunrise
103 ～ 113	Load will be on for 3～13 hours since sunset	203 ～ 213	Load will be on for 3～13 hours before sunrise

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

WARNING	Please set Light ON/OFF, Test mode and Manual mode via Timer1. Timer2 will be disabled and display "2 n ".

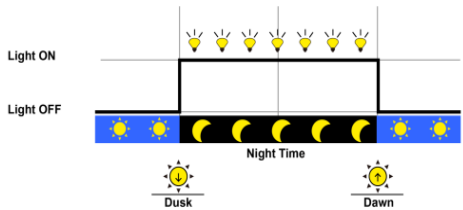
5.2.2 RS485 communication setting

1) Load working mode

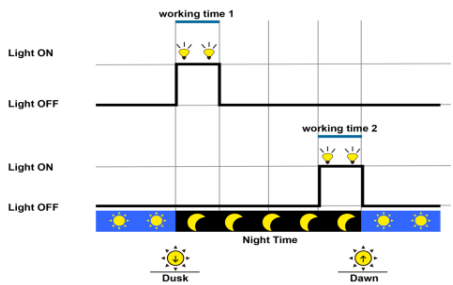
- **Manual Control (default)**

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

- **Light ON/OFF**



- **Light ON+ Timer**



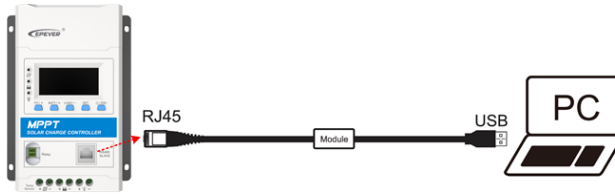
- **Time Control**

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

2) Load working mode settings

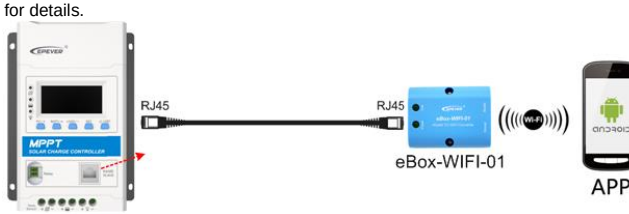
(1) PC setting

Connect the controller's RJ45 interface to the PC's USB interface via a USB to RS485 cable (model: CC-USB-RS485-150U). Set the load mode by the PC software. Refer to the cloud platform manual for detail.



(2)APP software setting

Connect the controller to the WIFI module through a standard network cable or connect to the Bluetooth module by Bluetooth signal. Set the load mode by the APP. Refer to the cloud APP manual for details.



(3)MT50 Setting

WARNING	For detailed setting methods, please refer to the instructions or contact after-sales support.

6 Others

6.1 Protection

PV Over Current	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. **WARNING: When the PV's charging current is greater than the rated current, the PV's open circuit voltage cannot greater than the "maximum PV open-circuit voltage", otherwise the controller may be damaged.**
PV Short Circuit	When not in PV charging state, the controller will not be damaged in case of a 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	When the polarity of the PV array is reversed, the controller may not be damaged and can continue to operate normally after the polarity is corrected. **WARNING: When the PV array is connected reversely to the controller, and the PV array's actual operating power is greater than 1.5 times the rated charging power of the controller, the controller will be damaged.**
Night Reverse Charging	Prevents the battery from discharging through the PV module at night.
Battery Reverse Polarity	Fully protected against battery reverse polarity; no damage to the controller will result. Correct the miswire to resume normal operation. **WARNING: Limited to the characteristic of lithium battery, when the PV connection is correct and battery connection reversed, the controller will be damaged.**
Battery Over Voltage	When the battery voltage reaches the over voltage disconnect voltage, it will automatically stop battery charging to prevent battery damage caused by over-charging.
Battery Over Discharge	When the battery voltage reaches the low voltage disconnect voltage, it will automatically stop battery discharging to prevent battery damage caused by over-discharging. (Any controller connected loads will be disconnected. Loads directly connected to the battery will not be affected and may continue to discharge the battery.)
Battery Overheating	The controller can detect the battery temperature through an external temperature sensor. The controller stops working when its

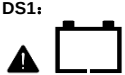
	temperature exceeds 65 °C and begins working when its temperature is below 55 °C.
Lithium Battery Low Temperature	When the temperature detected by the optional temperature sensor is lower than the Low Temperature Protection Threshold(LTPT), the controller will stop charging and discharging automatically. When the detected temperature is higher than the LTPT, the controller will be working automatically (The LTPT is 0 °C by default and can be set within the range of 10 ~ -40 °C).
Load Short Circuit	When the load is short circuited (The short circuit current is ≥ 4 times the rated controller load current), the controller will automatically cut off the output. If the load reconnects the output automatically five times (delay of 5s, 10s, 15s, 20s, 25s), it needs to be cleared by pressing the Load button, restarting the controller or switching from Night to the Day (nighttime > 3 hours).
Load Overload	When the load is overloading (The overload current is ≥ 1.05 times the rated load current), the controller will automatically cut off the output. If the load reconnects automatically five times (delay of 5s, 10s, 15s, 20s, 25s), it needs to be cleared by pressing the Load button restarting the controller, switching from Night to Day (nighttime > 3 hours).
Controller Overheating★	The controller is able to detect the temperature inside the battery through an optional remote sensor. The controller stops working when its temperature exceeds 85 °C and begins to working when its temperature is below 75 °C.
TVS High Voltage Transients	The internal circuitry of the controller 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 strikes, it is recommended to install an external surge arrester.

★When the internal temperature is 81℃, the reducing power charging mode which reduce the charging power of 5%,10%,20%,40% every increase 1 ℃is turned on. If the internal temperature is greater than 85℃, the controller will stop charging. But while the temperature decline to be below 75 ºC, the controller will resume.

6.2 Troubleshooting

- **Controller Faults**

Faults	Possible reasons	Troubleshooting
Charging LED indicator off during daytime when sunshine falls on PV modules properly	PV array disconnection	Confirm that PV and battery wire connections are correct and tight
Wire connection is correct, the controller is not working.	Battery voltage is lower than 9V	Please check the voltage of battery. At least 9V voltage to activate the controller.

DB1： Charging indicator Green fast flashing **DS1：**  Battery level shows full, battery frame and fault icon blink. **DS2：** Charging indicator Green fast flashing  Battery level shows full, battery frame and fault icon blink.	Battery over voltage	Check if battery voltage is higher than OVD(over voltage disconnect voltage), and disconnect the PV.
DB1： Battery indicator Red on solid **DS1：**  Battery level shows empty, battery frame and fault icon blink. **DS2：** Battery indicator Red on solid  Battery level shows empty, battery frame and fault icon blink.	Battery over discharged	When the battery voltage is restored to or above LVR(low voltage reconnect voltage), the load will recover
DB1： Battery indicator Red slowly flashing **DS1：**  battery frame and fault icon blink. **DS2：** Battery indicator Red slowly flashing  battery frame and fault icon blink.	Battery Overheating	The controller will automatically turn the system off. But while the temperature decline to be below 55 ºC, the controller will resume.

DB1 PV/BATT(orange)/Battery capacity lever(four) indicator fast flashing **DS2：** PV/BATT(orange)indicator fast flashing	Controller Overheating	When heat sink of controller exceeds 85℃, the controller will automatically cut input and output circuit. When the temperature below 75℃,the controller will resume to work.
	System voltage error	①Check whether the battery voltage match with the controller working voltage. ②Please change to a suitable battery or reset the working voltage.
The load is no output DS1/DS2：  Load and fault icon blink	Load Overload **Fault code E002(only DS2)**	①Please reduce the number of electric equipments. ②Restart the controller. ③wait for one night-day cycle (night time>3 hours).
	Load Short Circuit **Fault code E001(only DS2)**	①Check carefully loads connection, clear the fault. ②Restart the controller. ③wait for one night-day cycle (night time>3 hours).

- **Inverter fault**

Inverter fault	Fault code	LCD	Indicator
Output short circuit	E001	Fault icon blink (1S)	Load indicator blink
Output overload	E002		
Output voltage abnormal	E003		
Input over voltage	E005		
Input low voltage	E006		
Input over current	E007		
Overheating	E008		
Communication timeout	E099★		

WARNING	• The controller connects our company's inverter only, when it connects the purchased inverter, the LCD shows E099. • With combination of the RCM and DS1/DS2 modules, the information of the inverter (to be supplied by our company) can be displayed by the DS1/DS2 module.

6.3 Maintenance

The following inspections and maintenance tasks are recommended at least two times per year for best performance.

- Make sure controller firmly installed in a clean and dry ambient.
- Make sure no block on air-flow around the controller. Clear up any dirt and fragments on radiator.
- Check all the naked wires to make sure insulation is not damaged for serious solarization, frictional wear, dryness, insects or rats etc. Repair or replace some wires if necessary.
- Tighten all the terminals. Inspect for loose, broken, or burnt wire connections.
- Check and confirm that LED is consistent with required. Pay attention to any troubleshooting or error indication .Take corrective action if necessary.
- Confirm that all the system components are ground connected tightly and correctly.
- Confirm that all the terminals have no corrosion, insulation damaged, high temperature or burnt/discolored sign, tighten terminal screws to the suggested torque.
- Check for dirt, nesting insects and corrosion. If so, clear up in time.
- Check and confirm that lightning arrester is in good condition. Replace a new one in time to avoid damaging of the controller and even other equipments.

 **WARNING**	Risk of electric shock! Make sure that all the power is turned off before above operations, and then follow the corresponding inspections and operations.

7 Technical Specifications

Electrical Parameters

Item	TRIRON 1206N	TRIRON 2206N	TRIRON 1210N	TRIRON 2210N	TRIRON 3210N	TRIRON 4210N	TRIRON 3215N	TRIRON 4215N
System nominal voltage	12/24VDC Auto④							
Rated charge current	10A	20A	10A	20A	30A	40A	30A	40A
Rated discharge current	10A	20A	10A	20A	30A	40A	30A	40A
Battery voltage range	8～32V							
Max. PV open circuit voltage	60V② 46V⑤		100V② 92V⑤				150V② 138V⑤	
MPP voltage range	(Battery voltage +2V) ～36V		(Battery voltage +2V)～72V				(Battery voltage +2V)～108V	
Rated charge 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	390W/12V 780W/24V	520W/12V 1040W/24V
Self-consumption	≤14mA(12V)；≤15mA(24V)						≤15mA(12V)；≤10mA(24V)	
Discharge circuit voltage drop	≤0.18V							
Temperature compensate coefficient④	-3mV/℃/2V (Default)							
Grounding	Common negative							
RS485 interface	5VDC/200mA							
USB interface	5VDC/2.2A(Total)							
Relay interface	30VDC/1A							
Backlight time	Default:60S,Range:0~999S(0S:the backlight is ON all the time)							

①When a lithium battery is used, the system voltage can't be identified automatically.

②At minimum operating environment temperature

③At 25℃ environment temperature

④When a lithium battery is used, the temperature compensate coefficient will be 0,and can't be changed.

Environmental Parameters

Environment temperature※	-25℃～+55℃(LCD) -30℃～+55℃（No LCD）	-25℃～+50℃(LCD) -30℃～+50℃（No LCD）
Storage temperature range	-20℃～+70℃	
Relative humidity	≤95%, N.C	
Enclosure	IP30	

※The controller can full load working in the working environment temperature, When the internal temperature is 81℃, the reducing power charging mode is turned on. Refer to P37.

Mechanical Parameters

Item	TRIRON1206N TRIRON1210N	TRIRON2206N TRIRON2210N	TRIRON3210N	TRIRON3215N TRIRON4210N/TRIRON4215N
Dimension	135×180.8×47.3mm	150×216×56.7mm	158×238.3×62.7mm	183×256.8×66.7mm
Mounting dimension	126×150mm	141×170mm	158×200mm	174×220mm
Mounting hole size	Φ5mm			
Terminal	12AWG(4mm^2)	6AWG(16mm^2)	6AWG(16mm^2)	6AWG(16mm^2)
Recommended cable	12AWG(4mm^2)	10AWG(6mm^2)	8AWG(10mm^2)	8AWG(10mm^2)(**TRIRON3215N**) 6AWG(16mm^2)
Weight	0.56kg	0.92kg	1.35kg	1.85kg

Module Parameters

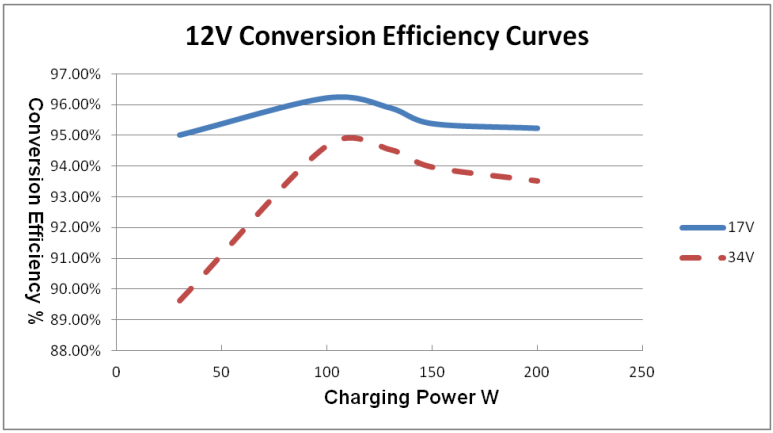
Item	DB1	DS1	DS2	UCS	RCM	RCS	USB1
Self-consumption	2mA	3mA	4mA	6.5mA	3.5mA	4mA	6.5mA
Dimension	88.5×56×23.1mm			88.5×28×19.2mm			
Weight	25g	55g	55g	30g	20g	20g	26g

Annex I Conversion Efficiency Curves

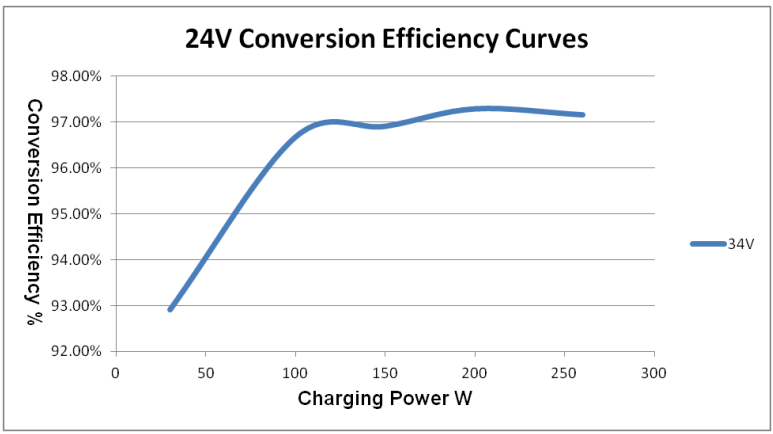
Illumination Intensity: 1000W/m^2 Temp: 25ºC

Model: TRIRON1206N

1. Solar Module MPP Voltage(17V, 34V) / Nominal System Voltage(12V)

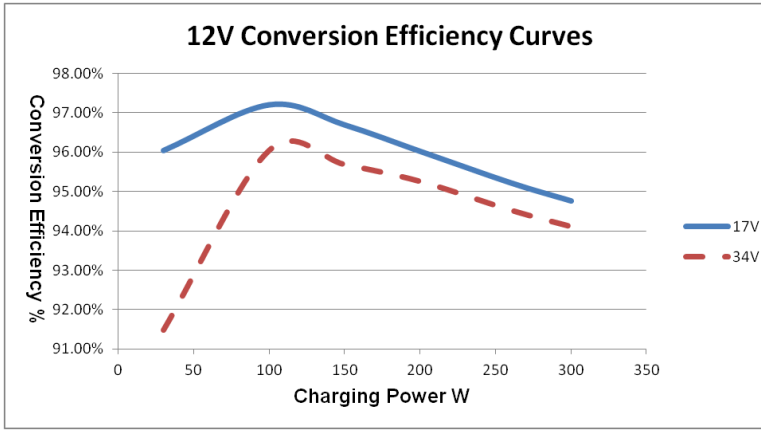


2. Solar Module MPP Voltage(34V) / Nominal System Voltage(24V)

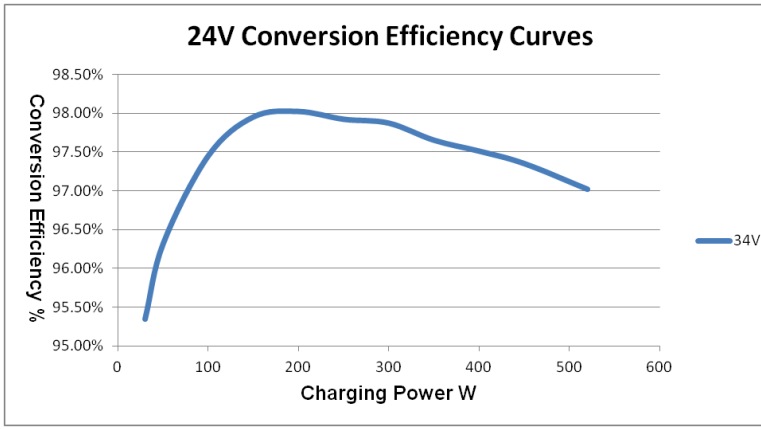


Model: TRIRON1210N

1. Solar Module MPP Voltage(17V, 34V) / Nominal System Voltage(12V)

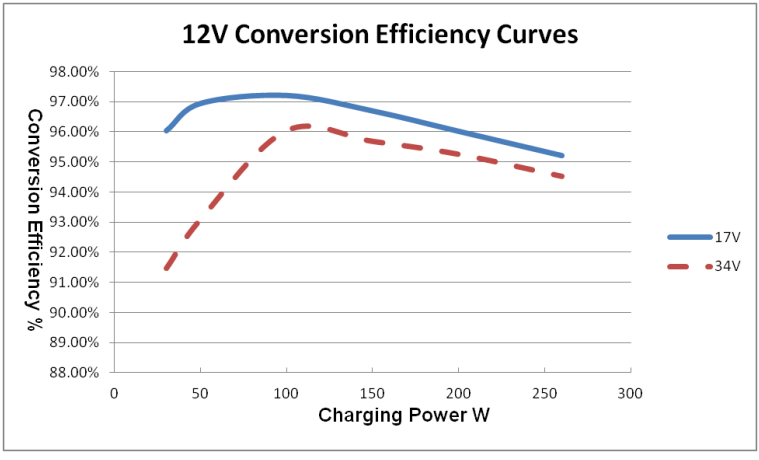


2. Solar Module MPP Voltage(34V) / Nominal System Voltage(24V)

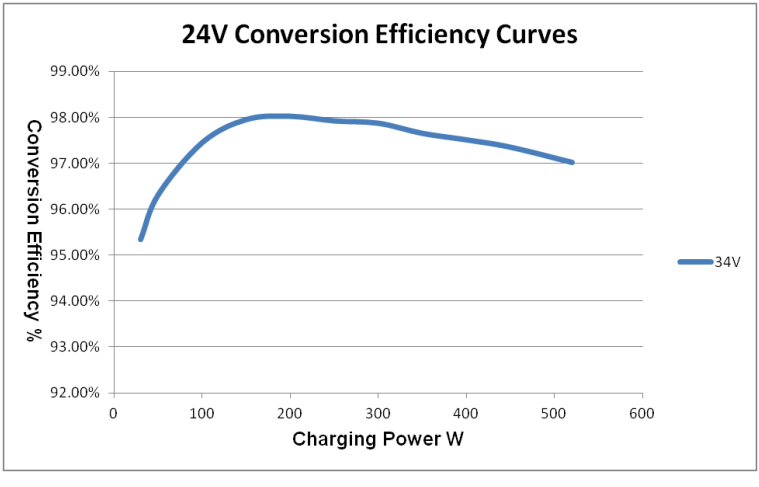


Model: TRIRON2206N

1. **Solar Module MPP Voltage (17V, 34V) / Nominal System Voltage(12V)**

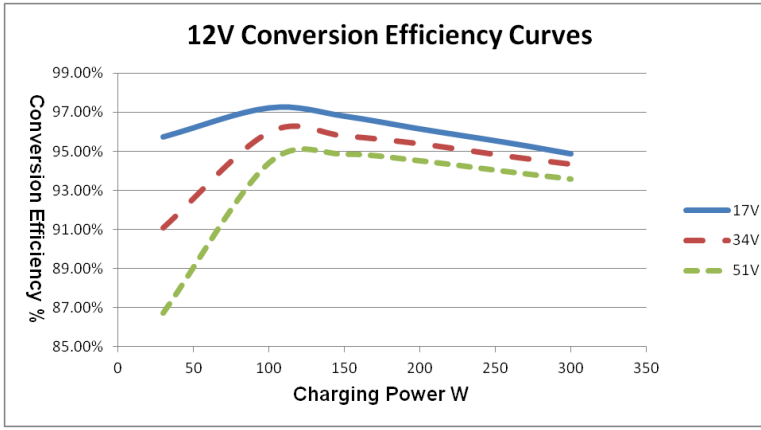


2. **Solar Module MPP Voltage (34V) / Nominal System Voltage(24V)**

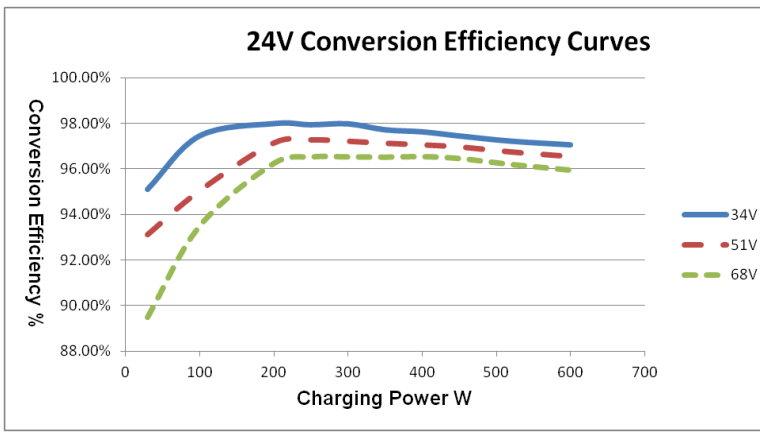


Model: TRIRON2210N

1. Solar Module MPP Voltage (17V, 34V,51V) / Nominal System Voltage(12V)

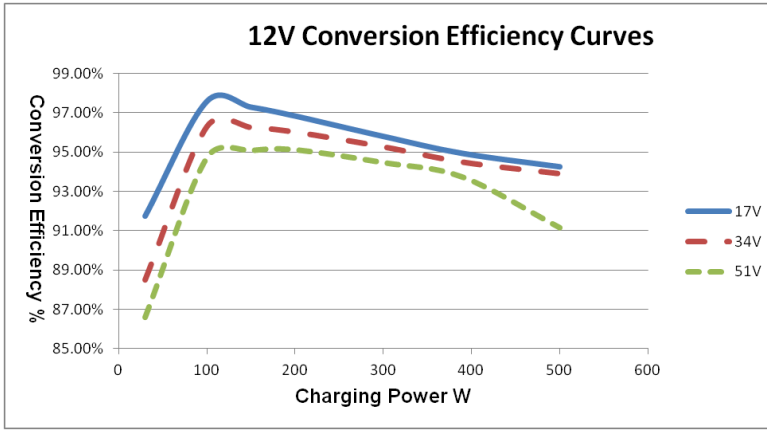


2. Solar Module MPP Voltage (34V,51V,68V) / Nominal System Voltage(24V)

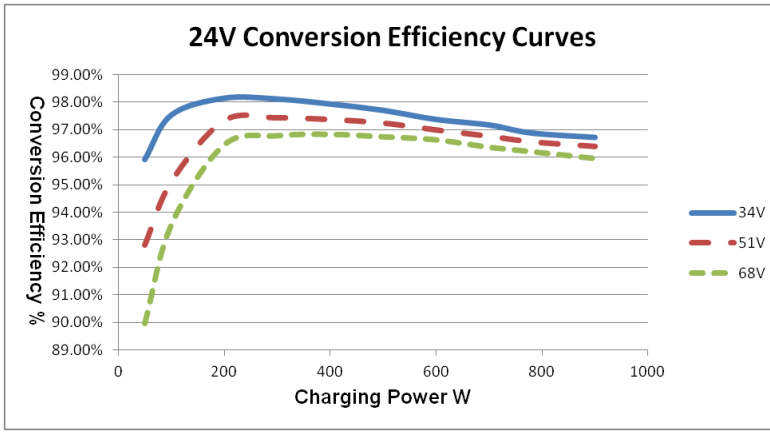


Model: TRIRON3210N

1. **Solar Module MPP Voltage (17V, 34V,51V) / Nominal System Voltage(12V)**

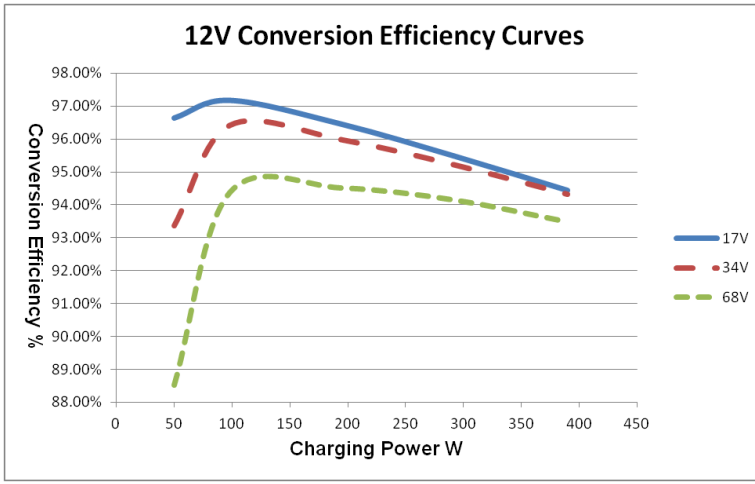


2. **Solar Module MPP Voltage (34V,51V,68V) / Nominal System Voltage(24V)**

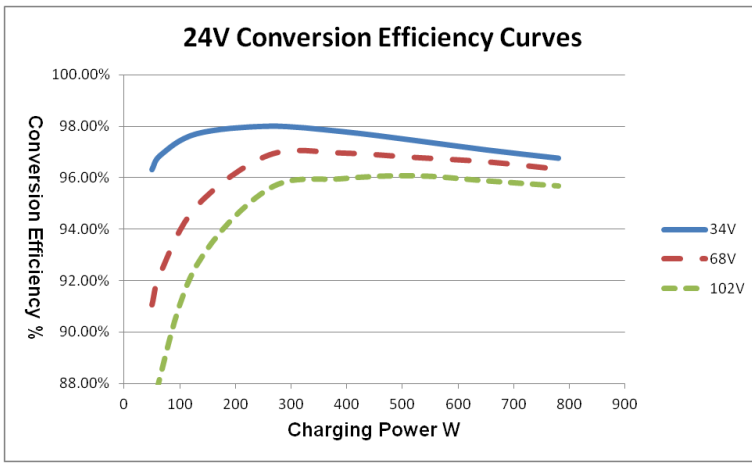


Model: TRIRON3215N

1. **Solar Module MPP Voltage (17V, 34V,68V) / Nominal System Voltage(12V)**

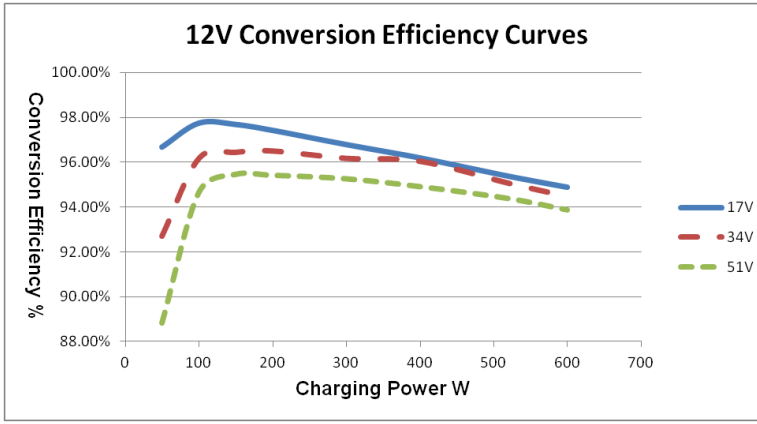


2. **Solar Module MPP Voltage (34V,68V,102V) / Nominal System Voltage(24V)**

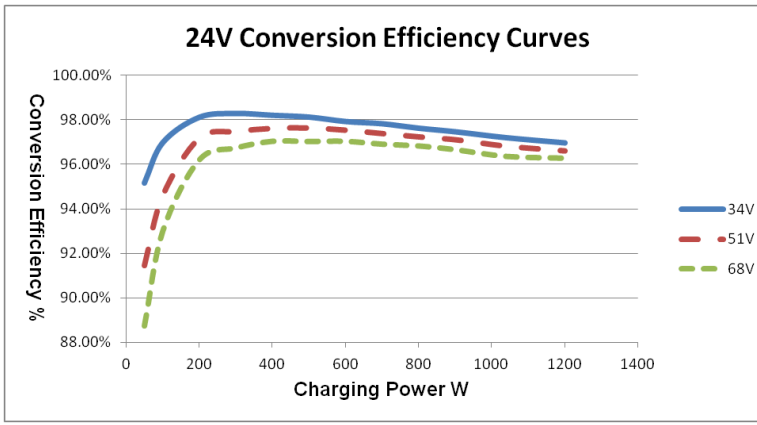


Model: TRIRON4210N

1. **Solar Module MPP Voltage (17V, 34V,51V) / Nominal System Voltage(12V)**

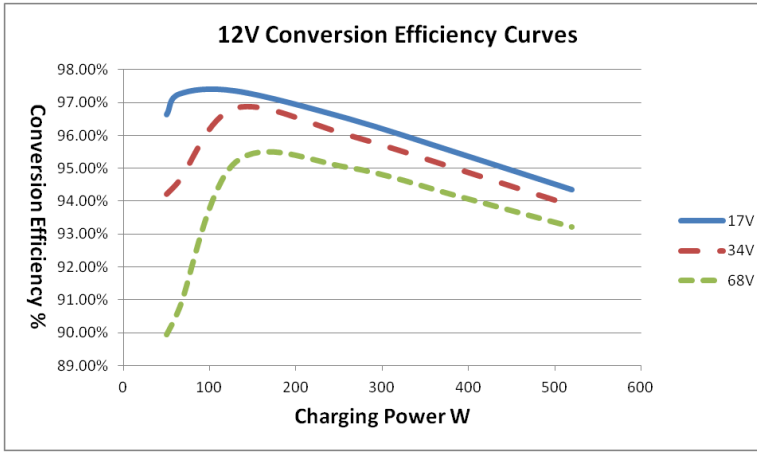


2. **Solar Module MPP Voltage (34V,51V,68V) / Nominal System Voltage(24V)**

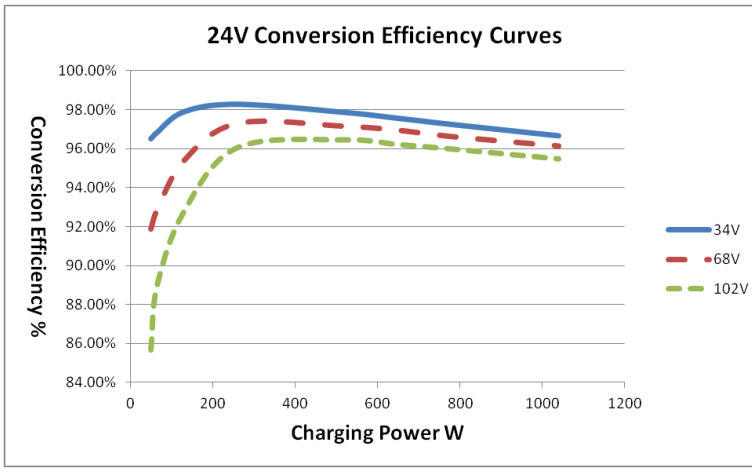


Model: TRIRON4215N

1. Solar Module MPP Voltage (17V, 34V,68V) / Nominal System Voltage(12V)



2. Solar Module MPP Voltage (34V,68V,102V) / Nominal System Voltage(24V)



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