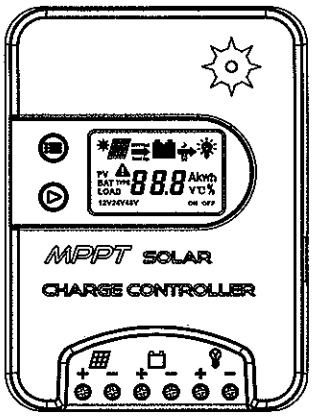
# User's Manual




## MPPT Max PV input Voltage 75V

## SOLAR CHARGE CONTROLLER

### 12V/24V 15A 20A 30A 40A

Your battery guard

**Dear users,**

**Thank you for choosing our product !**

**Important Safety Instructions**

**Please keep this manual for future review.**

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

## 1. General Information

### 1.1 Overview

This controller is based on advanced MPPT control algorithm, with LCD displaying running status. The MPPT control algorithm 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.

Limiting the charging power and reducing charging power functions ensure the system stable with over PV modules in high temperature environment.

With comprehensive electronic fault self-detecting functions and powerful electronic protection functions built inside the controller, component damage caused by installation errors or system failures can be avoided to the greatest extent possible.

**Features:**

- With the advanced dual-peak or multi-peak tracking technology, when the solar panel is shadowed or part of the panel fails resulting in multiple peaks on the I-V curve, the controller is still able to accurately track the maximum power point.
- 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
- Advanced MPPT control algorithm to minimize the MPP loss rate and loss time
- Wide MPP operating voltage range
- Limit charging power & current over rated range.When the solar panel power exceeds a certain level and the charging current is larger than the rated current, the controller will automatically lower the charging power and bring the charging current to the rated level.
- Support the lead-acid,gel,flooded with the needed Temp. compensation and

support lithium batteries start from solar panel
- Real-time working record function
- Power reduction automatically over temperature range
- Multiple load work modes
- TVS lighting protection.
- Monitor and set the parameters via App(optional)

### 1.2 Characteristics

❶ Menu Button
❷ Operation Button
❸ Charging Indicator
❹ LCD
❺ Temperature Sensor
❻ USB Port
❼ Load Terminals
❽ Battery Terminals
❾ PV Terminals

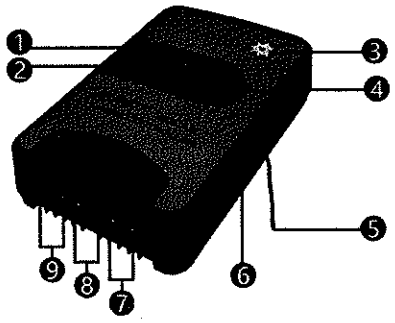


**Figure 1-1 Product Characteristics**

★If the temperature sensor is short-circuited or damaged, the controller will charge or discharge at the default temperature setting of 25℃.

### 1.3 Maximum Power Point Tracking Technology

Due to the nonlinear characteristics of solar array, there is a maximum energy output point (Max Power Point) on its curve. Traditional controllers, with switch charging technology and PWM charging technology, can't charge the battery at the maximum power point, so can't harvest the maximum energy available from PV array, but the solar charge controller with Maximum Power Point Tracking (MPPT) Technology can lock on the point to harvest the maximum energy and deliver it to the battery.

The MPPT algorithm of our company continuously compares and adjusts the operating points to attempt to locate the maximum power point of the array. The tracking process is fully automatic and does not need user adjustment.

As the Figure 1-2, the curve is also the characteristic curve of the array, the MPPT technology will 'boost' the battery charge current through tracking the MPP. Assuming 100% conversion efficiency of the solar system, in that way, the following formula is established:

Input power (Ppv)= Output power ($P_{Bat}$)

Input voltage ($V_{Mpp}$) *Input current ($I_{PV}$) =Battery voltage ($V_{Bat}$) *battery current ($I_{Bat}$)

Normally, the $V_{Mpp}$ is always higher than $V_{Bat}$, Due to the principle of conservation of energy, the $I_{Bat}$ is always higher than $I_{PV}$. The greater the discrepancy between $V_{Mpp}$ &$V_{Bat}$, the greater the discrepancy between $I_{PV}$& $I_{Bat}$. The greater the discrepancy between array and battery, the bigger reduction of the conversion efficiency of the system, thus the controller's conversion efficiency is particularly important in the PV system.

Figure 1-3 is the maximum power point curve, the shaded area is charging range of traditional solar charge controller (PWM Charging Mode), it can obviously diagnose that the MPPT mode can improve the usage of the solar energy resource. According to our test, the MPPT controller can raise 20%-30% efficiency compared to the PWM controller. (Value may be fluctuant due to the influence of the ambient circumstance and energy loss.)

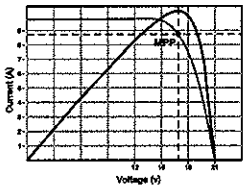



**Figure 1-3 Maximum Power Point Curve**

In actual application, as shading from cloud, tree and snow, the panel maybe appear Multi-MPP, but in actually there is only one real Maximum Power Point. As the below Figure 1-3 shows:

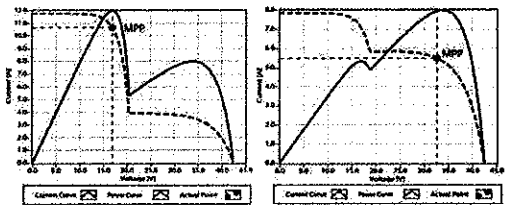



**Figure 1-4 Mutil-MPP Curve**



If the program works improperly after appearing Multi-MPP, the system will not work on the real max power point, which may waste most solar energy resources and seriously affect the normal operation of the system. The typical MPPT algorithm, designed by our company, can track the real MPP quickly and accurately, improve the utilization rate of the array and avoid the waste of resources.

### 1.4 Battery Charging Stage

The controller has a 3 stages battery charging algorithm (Bulk Charging, Boost Charging and Float Charging) for rapid, efficient, and safe battery charging.

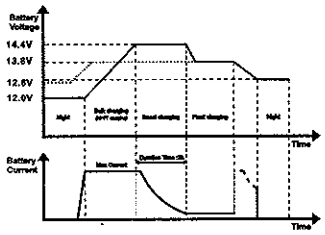



**Figure 1-5 Lead acid Battery charging stage Curve**

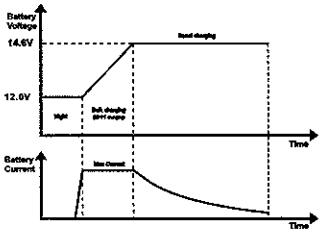



**Figure 1-6 Li Battery charging stage curve**

**(1) Bulk Charging**

In this stage, the battery voltage has not yet reached boost voltage, the controller operates in constant current mode, delivering its maximum current to the batteries (MPPT Charging).

**(2) Boost Charging**

When the battery voltage reaches the boost voltage set point, the controller will start to operate in constant charging mode, this process is no longer MPPT charging, and in the meantime the charging current will drop gradually, the process is not the MPPT charging. The Boost stage maintain 2 hours in default. When the accumulate time reach to 2hours, the charging mode will turn to Float charging.

**(3) Float Charging**

After the boost voltage stage, the controller will reduce charging current to Float Voltage set point. This stage will have no more chemical reactions and all the charge current transforms into heat and gas at this time. Then the controller reduces the voltage to the floating stage, charging with a smaller voltage and current. It will reduce the temperature of the battery and prevent the gassing and charging the battery slightly at the same time. The purpose of Float stage is to offset the power consumption caused by self consumption and small loads in the whole system, while maintaining full battery storage capacity.

In Float charging stage, loads are able to obtain almost all power from solar panel. If loads exceed the power, the controller will no longer be able to maintain battery voltage in Float charging stage. If the battery voltage remains below the Recharge Voltage, the system will leave Float charging stage and return to Bulk charging stage.

## 2 Installation Instructions

### 2.1 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 (Voc) and the maximum power point voltage (VMpp) of the MPPT controller, the series number of different types PV modules can be calculated. The below table is for reference only.

**Table 2-1 TD2107/TD2207/TD2307/TD2407**

| 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 | 3 | 2 | 2 | 1 | 2 | 1 | 2 | 1 |
| 24V | 3 | 2 | 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 | 1 | 1 | 1 | 1 | - |
| 24V | 1 | 1 | 1 | 1 | - |

**NOTE:** The above parameter values are calculated under standard test conditions (STC (Standard Test Condition) : Irradiance 1000W/m2, 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 is not greater than the rated charging power, but the maximum open-circuit voltage of PV array is more than 75V(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 75V(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 be not 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 make 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:

**Table 2-2 maximum power of PV array for this controller**

| Model | Rated Charge Current | Rated Charge Power | Max. PV Array Power | Max. PV open circuit voltage |
|---|---|---|---|---|
| TD2107 | 15A | 190W/12V<br>380W/24V | 285W/12V<br>570W/24V | 70V①<br>75V② |
| TD2207 | 20A | 260W/12V<br>520W/24V | 390W/12V<br>780W/24V | |
| TD2307 | 30A | 390W/12V<br>780W/24V | 580W/12V<br>1170W/24V | |
| TD2407 | 40A | 520W/12V<br>1040W/24V | 780W/12V<br>1560W/24V | |

①At 25℃ environment temperature ②At minimum operating environment temperature

## 2.2 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.

**Table 2-3 PV array must not exceed the controller's maximum**

| Model | Max.battery wire size | Max. PV wire size * |
|---|---|---|
| TD2107 | 10mm2/8AWG | 10mm2/8AWG |
| TD2207 | 10mm2/8AWG | 10mm2/8AWG |
| TD2307 | 16mm2/6AWG | 16mm2/6AWG |
| TD2407 | 16mm2/6AWG | 16mm2/6AWG |

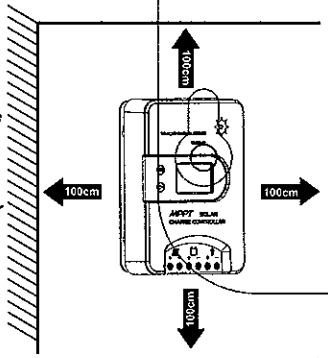
* These are the maximum wire sizes that will fit the controller terminal

## 2.3 Mounting

⚠**Warning**: risk of explosion! Never install the controller and an open battery in the same enclosed space! Nor shall the controller be installed in an enclosed space where battery gas may accumulate.

⚠**Warning**: danger of high voltage! Photovoltaic arrays may produce a very high open-circuit voltage. Open the breaker or fuse before wiring, and be very careful during the wiring process.

**Note:** when installing the controller, make sure that enough air flows through the controller's radiator, and leave at least 100mm of space both above and below the controller so as to ensure natural convection for heat dissipation. If the controller is installed in an enclosed box, make sure the box delivers reliable heat dissipation effect.






## 2.4 Installation Procedure

**Step 1: choose the installation site**

Do not install the controller at a place that is subject to direct sunlight, high temperature or water intrusion, and make sure the ambient environment is well ventilated.

**Step 2:** first place the installation guide plate at a proper position, use a screw driver to mark the mounting points, then drill 4 mounting holes at the 4 marked points, and fit screws in.

**Step 3: fix the controller**

Aim the controller's fixing holes at the screws fit in Step 2 and mount the controller on.

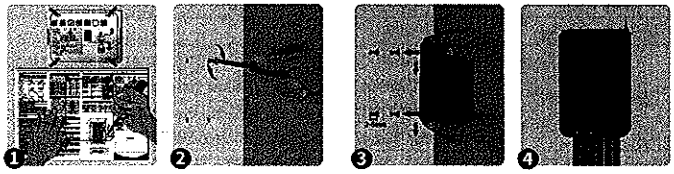



**Figure 2-2 Installation Guide**

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

**Step 4: wire**

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

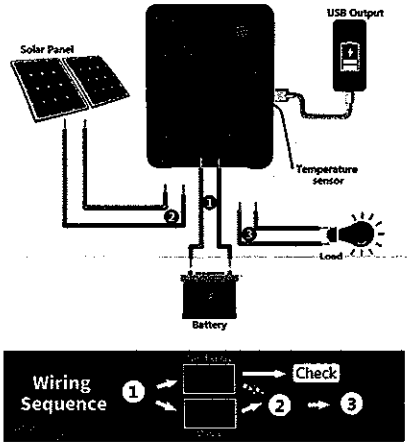



**Figure 2-3 Schematic of wiring diagram**

⚠**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.

⚠**CAUTION:** 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.

⚠ **CAUTION:** 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 5: Power on the controller**

After connecting all power wires solidly and reliably, check again whether wiring is correct and if the positive and negative poles are reversely connected. After confirming that no faults exist, first close the fuse or breaker of the battery, then see whether the LED indicators light up and the LCD screen displays information. If the LCD screen fails to display information, open the fuse or breaker immediately and recheck if all connections are correctly done.

If the battery functions normally, connect the solar panel. If sunlight is intense enough, the controller's charging indicator will light up or flash and begin to charge the battery.

After successfully connecting the battery and photovoltaic array, finally close the fuse or breaker of the load, and then you can manually test whether the load can be normally turned on and off. For details, refer to information about load working modes and operations.

⚠**Warning**: when the controller is in normal charging state, disconnecting the battery will have some negative effect on the DC loads, and in extreme cases, the loads may get damaged.

⚠ **Warning**: within 10 minutes after the controllers stops charging, if the battery's poles are reversely connected, internal components of the controller may get damaged.

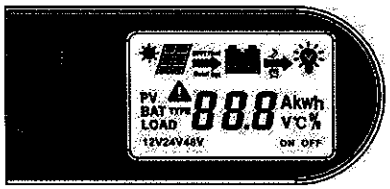
**Note:**

1) If no remote temperature sensor is connected to the controller, the battery temperature value will stay at 25 °C.

2) If an inverter is deployed in the system, directly connect the inverter to

the battery, and do not connect it to the controller's load terminals.

## 3. Operation



### 3.1 Button

| Mode | Note |
|---|---|
| Load ON/OFF | In load manual mode, it can turn the load On/Off via the "OPERATION" button(●) |
| Clear Fault | Press the "OPERATION" button(●) |
| Browsing Mode | Press the "MENU" button(≡). |
| Setting Mode | Press the "MENU" button. and hold on 5s to enter the setting mode<br>Press the "OPERATION" button. to set the parameters,<br>Press the "MENU" button. to confirm the setting parameters or no operation for 10s, it will exit the setting interface automatically. |

### 3.2 Interface

**(1) Status Description**

| Item | Icon | Status |
|---|---|---|
| PV array | | In daytime and PV connected correctly |
| | | At night or no PV connect or reverse connect |
| | | No Charging |
| | | Charging In MPPT |
| | | In Float Charging Mode |
| | | In Boost Charging Mode |
| | PV | PV Voltage, Current and Power |
| Battery | | Battery Capacity Indicating |
| | 12V24V48V | Current System Voltage |
| | BAT | Battery Voltage and Current |
| | BAT TYPE | Battery Type |
| Load | | Load ON |
| | | Load OFF |
| | | Light and Time Control Mode |
| | | Light Control Mode |
| | LOAD TYPE | Load Working Mode |
| | LOAD | Discharging Current and Work Status |

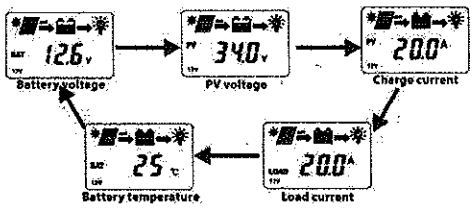
**(2) Fault Indication**

| Status | Icon | Description |
|---|---|---|
| Battery over discharged | ⚠ | Battery level shows empty, battery frame blink, fault icon blink |
| Battery over voltage | ⚠ | Battery level shows full, battery frame blink, fault icon blink |
| Controller over temperature | ⚠ ℃ | Temp.icon shows Temp.inside controller is higher than 75℃, temperature icon blink, fault icon blink |
| Load failure | ⚠ | Load overload① ,Load short circuit |
| PV over voltage | ⚠ | It shows PV voltage is higher than rated PV open voltage.PV icon blink,fault icon blink |

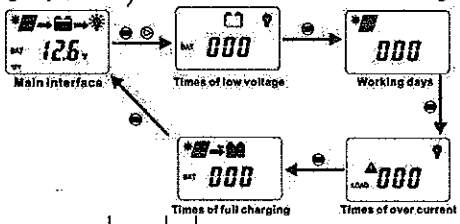
**(3) Browse interface**

①If there is no operation within 20s in any interface or after powered on within 10s, The main interface will cycle to display the battery voltage,PV voltage,charging current,discharging current and battery temperature every 3s.Long press the "OPERATION " button (●) can speed up the cycle display time.

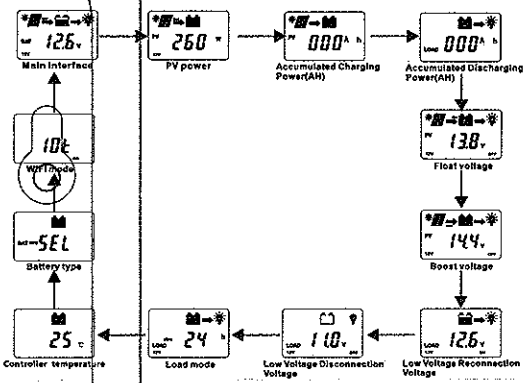





②At main interface(cycle display),long press **menu** and **operation** button at same time to enter working record status,it can show times of low voltage,working days,times of over current and times of full charging




③At main interface(cycle display),Press the **"MENU"** button(≡) and enter menu interface




### 3.3 Setting

**(1) Clear the charging power and discharging power(AH)**

**Operation:**

**Step 1:** Press the **"OPERATION"** button and hold for 5s under the PV generated charging power interface and the value will be cleared.

**Step 2:** Press the **"OPERATION"** button and hold for 5s under the PV generated discharging power interface and the value will be cleared

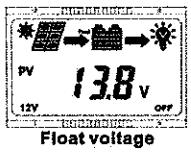
**(2) Float Voltage Setting**

**Operation:**

**Step 1:** At main interface(cycle display),Press the **"MENU"** button to enter float voltage interface

**Step 2:** Long press the **"MENU"** button(≥5S ) until the value is flashing,then it enters the setting state.

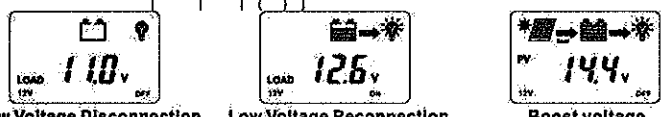
**Step 3:** Press the **"MENU"** and **"OPERATION"** button to change the value




**Float voltage**

**Step 4:** After setting,Long press the **"MENU"** button(≥5S ) to save the new setting.If there is no operation within 20S,the controller will enter the main interface and cycle to display automatically.

**(3) Setting of boost voltage, low voltage reconnect voltage and low voltage disconnect voltage**




**Low Voltage Disconnection Voltage** | **Low Voltage Reconnection Voltage** | **Boost voltage**

Operation:At main interface(cycle display),Press the **"MENU"** button to enter the relevant interface below:

The operation method of setting is the same as float voltage setting,Please refer to the above "(2)".

- **The following rules must be observed when modifying the parameter values in User**

Ⅰ.Charging Limit Voltage >Boost Charging Voltage >Float Charging Voltage > Boost Reconnect Charging Voltage.

Ⅱ.Low Voltage Reconnect Voltage > Low Voltage Disconnect Voltage(BMS+0.2V)

Ⅲ. Boost Reconnect Charging voltage > Low Voltage Reconnect Voltage> Low Voltage Disconnect Voltage(BMS+0.2V)

- **Battery Voltage Control Parameters**

Below parameters are in 12V system at 25 °C, please double the values in 24V system

| Battery Type | SEL 24V*2 | GEL 24V*2 | FLD 24V*2 | LF4(LiFePO44S/12V) LF8 (LiFePO4 8S/24V*2) | LI3 (LI(NiCoMn)O 2 3S/12V) | LI7 (LI(NiCoMn)O 2 7S/24V) |
|---|---|---|---|---|---|---|
| Over Voltage Disconnect | 16.0V | 16.0 V | 16.0 V | 16.0V | 17.0 V | 32.0V |
| Charging Limited Voltage | 15.0 V | 15.0 V | 15.0 V | 14.8V | 17.0 V | 30.0V |
| Over Voltage Reconnect | 15.0 V | 15.0 V | 15.0 V | 14.8V | 17.0 V | 30.0V |
| Boost charge | 14.4 V | 14.2 V | 14.6 V | 14.6V | 12.6V | 29.4V |
| Float charge | 13.8 V | 13.8 V | 13.8 V | 14.4V | 12.4V | 29.0V |
| Boost Restart Voltage | 12.6V | 12.6V | 12.6V | 13.0V | 11.5V | 26.0V |
| Low voltage reconnect | 12.6V | 12.6V | 12.6V | 12.6V | 11.0V | 25.2V |
| Low voltage disconnect | 11.0V | 11.0V | 11.0V | 10.5V | 9.0V | 21.0V |

**(4) Load Working Mode**

The default working mode of the controller is 24 hours,which means that as long as the battery has enough energy, the controller can supply power to the load continuously.

**Operation:**

**Step 1:** At main interface(cycle display),Press the **"MENU"** button to enter load mode interface.

**Step 2:** Long press the **"MENU"** button(≥5S ) until the 24H is flashing,then it enters the setting state.

**Step 3:** Press the **"MENU"** and **"OPERATION"** button to change the value

**Step 4:** After setting,Long press the **"MENU"** button(≥5S ) to save the new setting.If there is no operation within 20s,the controller will enter the main interface and cycle to display automatically.

| Hours | Light and Timer Control |
|---|---|
| 24H | Load will always be on |
| 1H | Load will be on for 1 hour after sunset |
| 2H | Load will be on for 2 hours after sunset |
| 3H~14H | Load will be on for 3 ~ 14hours after sunset |
| 14H~23H | Load will be on after sunset and be off before sunrise. |

**(5) Battery type**

**①support battery types**

| | |
|---|---|
| Lead-acid battery | Sealed(default)/Gel/Flooded/User |
| Lithium battery | LiFePO4 LF4/12V;LF8/24V; |
| | Li(NiCoMn)O2 LI3/12V;LI7/24V; |

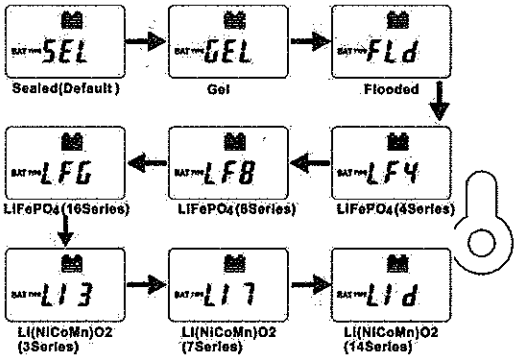
**②Setting the battery type via LCD**

**Step 1:** At main interface(cycle display),Press the **"MENU"** button to enter battery type mode interface.

**Step 2:** Long press the **"MENU"** button(≥5S ) until the "SEL" is flashing,then it enters the setting state.

**Step 3:** Press the **"MENU"** and **"OPERATION"** button to confirm the battery type below:

**Step 4:** Long press the **"MENU"** button(≥5S ) to save the new setting.If there is no operation within 20S,the controller will enter the main interface and cycle to display automatically.




### 3.4 Accessories (optional)

**(1) Built-in WiFi module**

After the controller is equipped with the built-in WiFi module, the operation and related parameters of the controller can be monitored by the mobile iConnect App through WiFi signal.

**(2) Built-in Bluetooth module**

After the controller is equipped with the built-in Bluetooth module, the operation and related parameters of the controller can be monitored by the mobile iConnect App

**NOTE:** For more setting and operation of the module, please refer to iConnect App user manual.

## 4. Protections, Troubleshooting and Maintenance

### 4.1 Protection

| | |
|---|---|
| PV Over Current/power | When the charging current or power of the PV array exceeds the controller's rated current or power, it will be charged at the rated current or power. **NOTE: When the PV modules are in series, ensure that the open-circuit voltage of the PV array does not exceed the "maximum PV open-circuit voltage" rating. 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. |
| 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. |
| 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 will occur for the battery. Correct the wrong wiring to resume normal operation. **NOTE: 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.) |
| Load Short Circuit | When the load is short circuited (The short circuit current is ≥ 2 times the rated controller load current), the controller will automatically cut off the output. The controller will reconnect the output automatically every 30s to judge whether the short circuit is relieved , it needs to be cleared by pressing the operation button or restarting the controller. |
| Load Overload | When the load is overloading (The overload current is ≥ 1.1 times the rated load current), the controller will automatically cut off the output. If the load reconnects automatically every 30s, it needs to be cleared by pressing the Load button restarting the controller or restarting the controller. |
| Controller Overheating | The controller is able to detect the temperature inside the battery. The controller stops working when its temperature exceeds 85 °C and restart to work when its temperature is below 65 °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 75℃, the reducing power charging mode which reduce the charging power of 5% every increase 1℃ is turned on. If the internal temperature is greater than 85℃, the controller will stop charging. When the temperature declines to be below 65 °C, the controller will resume.

### 4.2 Troubleshooting

| Possible reasons | Faults | Troubleshooting |
|---|---|---|
| PV array disconnection | LCD display during daytime | Confirm that PV wire connections are correct and tight. |
| Battery voltage is lower than 8V | Wire connection is correct, the controller is not working. | Please check the voltage of battery. At least 8V voltage to activate the controller. |
| Battery over voltage | Battery level shows full, battery frame blink, fault icon blink | Check if battery voltage is higher than OVD(over voltage disconnect voltage), and disconnect the PV. |
| Battery over discharged | Battery level shows empty ,battery frame n blink | When the battery voltage is restored to or above LVR(low voltage reconnect voltage), the load will recover |
| Load Overload | 1. The load is no output 2.Load and fault icon blink | ①Please reduce the number of electric equipments. ②Restart the controller. |
| Load Short Circuit | | ①Check carefully loads connection, clear the fault. ②Restart the controller. |

### 4.3 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 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.

## 5. Technical Specifications

### 5.1 Electrical Parameters

| | | | | |
|---|---|---|---|---|
| Rated charge current | 15A | 20A | 30A | 40A |
| Rated discharge current | 15A | 20A | 30A | 40A |
| Battery voltage range | 8～32V | | | |
| System nominal voltage | 12/24VDC Auto ① | | | |
| Max. PV open circuit voltage | ②75V<br>③70V | | | |
| MPP voltage range | (Battery voltage +2V)～ 65V | | | |
| Battery Type | Sealed(Default)/Gel/Flooded/LiFePO4/ Li(NiCoMn)O2/ User | | | |
| Rated charge power | 190W/12V<br>380W/24V | 260W/12V<br>520W/24V | 390W/12V<br>780W/24V | 520W/12V<br>1040W/24V |
| LVD | 11.0V ADJ 9V...12V; ×2/24V; | | | |
| LVR | 12.6V ADJ 11V...13.5V; ×2/24V; | | | |
| Float voltage | 13.8V ADJ 13V...15V; ×2/24V; | | | |
| Boost voltage | 14.4V ; ADJ14V....17V; ×2/24; Battery Voltage less than Boost Restart Voltage Start Boost changing for 2hours | | | |
| Self-consumption | ≤28mA(12V) ≤19mA(24V) | | | |
| Discharge circuit voltage drop | ≤0.12V | | | |
| Temperature compensate Coefficient ④ | -4mV/℃/2V | | | |

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.

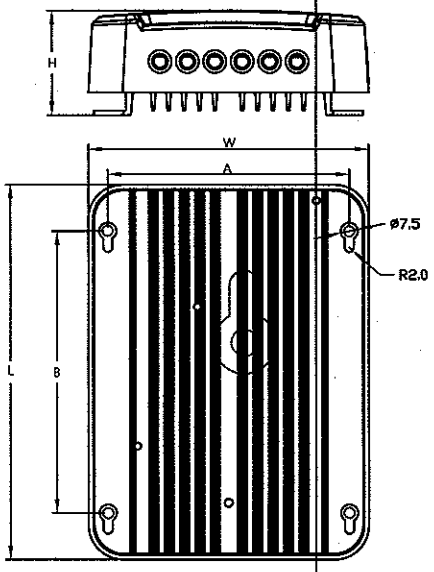
### 5.2 Environmental Parameters

| | |
|---|---|
| Working environment temperature◆ | -20℃～+50℃(100% input and output) |
| Storage temperature range | -20℃～+70℃ |
| Relative humidity | ≤95%, N.C. |
| Enclosure | IP30 |

◆The controller can work under full load in the working environment temperature, When the internal temperature is more than 80℃, the reducing power charging mode is turned on.

### 5.3 Mechanical Parameters

| Item | 15A | 20A | 30A | 40A |
|---|---|---|---|---|
| Dimension | 165×123×46 mm | 195×123×46 mm | 205×157×53 mm | 256×157×53 mm |
| Mounting Dimension(A*B) | 106×124mm | 106×124mm | 138×124mm | 138×155mm |
| Mounting hole size | Φ4mm | | | |
| Weight | 0.56KG | 0.73KG | 1.2KGS | 1.5KGS |




Any changes without prior notice
Version:TD75V V2.1