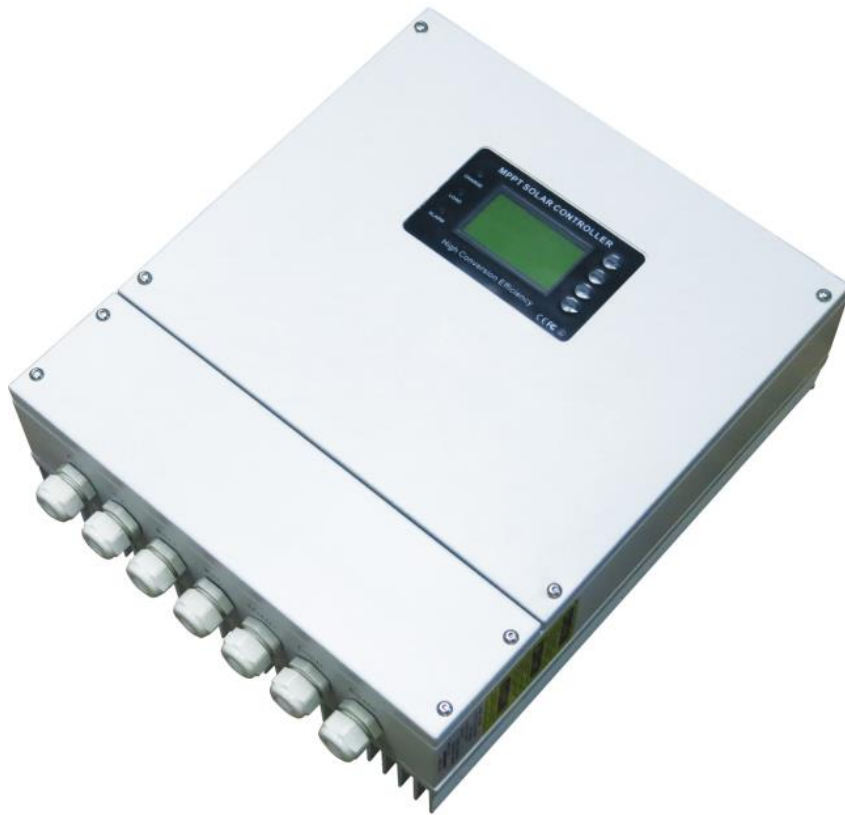


User Manual of MPPT Solar Charge Controller



System voltage: 12V/ 24V/ 36V/ 48V/ 96V



Important safety instructions (Please keep this handbook for future reference. Please read all instructions and precautions in the manual carefully before installation.)

This manual contains all the safety, installation and operation instructions of this series solar charge controller (hereinafter referred to as "controller"):

- Install the controller in a well ventilated place. The controller's case temperature may be very high during operation. Please don't touch the metal shell directly to prevent burns.
- It is recommended to connect fuse or circuit breakers to the input, load and battery terminals to prevent electric shock hazard during use.
- After installation, check all wiring connections are secure, so as to avoid the danger of heat build-up caused by virtual connection.
- If the controller does not display properly when first use, please cut off the fuse or circuit breaker immediately and check whether the wiring connection is correct or not.
- If the solar system needs to connect the inverter, please connect the inverter directly to the battery, instead of the load terminal of the controller.
- Don't disconnect the battery when the controller is charging. Otherwise, it may damage the DC load.

System Voltage and Battery Types

1)The controller identifies the system voltage according to the battery voltage at start-up. And the controller will re-identify the system voltage after power-off and restart. Please confirm the system voltage displayed in controller is consistent with the actual voltage. Otherwise, need to recheck the battery pack voltage.

Note: Please refer to [Table 9](#) for the battery system detailed system identification voltage.

2)The controller has set 3 kinds of conventional battery charging parameters (**Table 1**) . To charge other types of batteries, please select "USE" , then set up by PC software or APP. To charge lithium battery , please select "Lit", then set up on the controller, APP or PC software.

| Battery type | Constant voltage = C*N (V) | Floating voltage = F*N (V) | 1. C = Cell's constant charging parameter.(9≤F<C≤15) 2. F = Cell's floating charging parameter.(9≤F<C≤15) 3. N = Series number of battery. [e.g. N=2,battery system is 24V] 4. Example: If battery system is 48V,then N=4;If the cell's voltage C=14.6V, then Constant voltage= 14.6*4=58.4V. |
|--------------|---|-------------------------------|---|
| Flooded(FLD) | 14.6 * N | 13.8 * N | |
| Sealed(SEL) | 14.4 * N | 13.8 * N | |
| Gel(GEL) | 14.2 * N | 13.8 * N | |
| User (USER) | C * N | F * N | |
| Li-ion(Lit) | Set the charging and protection parameters according to the specifications of the selected lithium batteries. | | <div style="display: flex; align-items: center;"> <div style="border: 1px solid black; border-radius: 10px; padding: 5px; width: 200px;"> <p style="text-align: center; color: blue; margin: 0;">Cell Specification</p> <p>Nominal Voltage:3.7V</p> <p>Charge Voltage:4.2V</p> <p>Cut-off Voltage:2.7V</p> </div> <div style="margin: 0 10px; text-align: center;"> <p style="color: blue; font-size: small;">6 cells in series</p> </div> <div style="border: 1px solid black; border-radius: 10px; padding: 5px; width: 200px;"> <p style="text-align: center; color: blue; margin: 0;">Reference Settings</p> <p>S06 : 22.2V</p> <p>Nominal Voltage</p> <p>S05 : 25.2V</p> <p>Charge Voltage</p> <p>S07 : 16.2V</p> <p>Under-volt protection</p> </div> </div> |

Table 1 (The MPPT controller can not wake up lithium ion battery.)

Strip Indicator Instruction

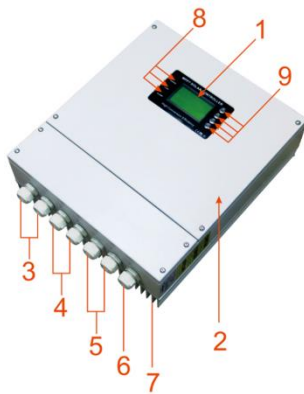
User can identify the controller current working status according to the flash rule of the light. (**Red - ALARM**,

Blue - Charging, Green - DC load)

| | Strip Indicator Light | Controller Status |
|-----------------|--------------------------|------------------------------------|
| Blue - Charging | Flash for every second | Constant current charging mode(CC) |
| | Flash for every 3 second | Constant voltage charging mode(CV) |
| | Keep on lighting | Floating charging mode(CF) |
| Green - DC load | Lighting | DC load turn on |
| | Go out | DC load closed |
| Red - ALARM | Lighting | Fault mode |
| | Go out | Normal mode |

Table 2

1.Characteristics



| Item | Name |
|------|-------------------------|
| 1 | LCD |
| 2 | Upper cover plate |
| 3 | PV terminals |
| 4 | Battery terminals |
| 5 | Load terminals |
| 6 | Communication interface |
| 7 | Heat sink |
| 8 | Signal lamp |
| 9 | Button |

Figure 1

2.Accessories Instruction

| | Description | Quantity |
|----------------------------------|------------------------------------|----------|
| Product | MPPT solar charge controller | 1 unit |
| Installation accessories package | Temperature sensing wire | 1 pcs |
| | RS485 to USB cable | 1 pcs |
| Information pack | User Manual | 1 unit |
| Optional | External WIFI communication module | 1 unit |
| | Bluetooth communication module | 1 unit |

Table 3 (If there is any part missing, please contact your dealer.)

3.Installation position of controller

According to the size of the controller shown in Figure 2, the installation position of the controller should be reasonably selected. The space around the controller should be kept above 30CM, and the installation environment should be ventilated so that the controller can have good heat dissipation.

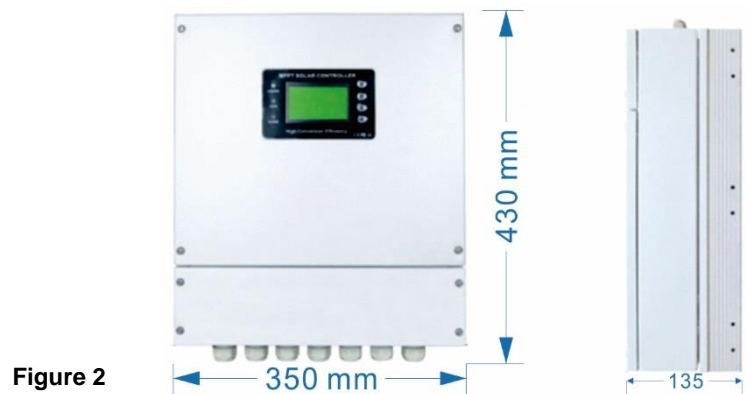


Figure 2

4.Serial connection (string) of PV modules

The **Table 4** is the quantity(N) of PV modules in series, for reference only.

| Voc * N = PV _{input} < DC150V | | | | | | | | | | | | |
|--|---------|-------|---------|------|---------|------|---------|------|---------|------|---------|------|
| System Voltage | Voc<23V | | Voc<31V | | Voc<34V | | Voc<38V | | Voc<46V | | Voc<62V | |
| | Max. | Best | Max. | Best | Max. | Best | Max. | Best | Max. | Best | Max. | Best |
| 12V | 6 | 2~3 | 4 | 2 | 4 | 2 | 3 | 1 | 3 | 1 | 2 | 1 |
| 24V | 6 | 3 | 4 | 2 | 4 | 2 | 3 | 2 | 3 | 2 | 2 | 1 |
| 36V | 6 | 4 | 4 | 3 | 4 | 3 | 3 | 2~3 | 3 | 2 | 2 | 1 |
| 48V | 6 | 5 | 4 | 4 | 4 | 4 | 3 | 3 | 3 | 3 | 2 | 2 |
| Voc * N = PV _{input} < DC300V | | | | | | | | | | | | |
| System Voltage | Voc<23V | | Voc<31V | | Voc<34V | | Voc<38V | | Voc<46V | | Voc<62V | |
| | Max. | Best | Max. | Best | Max. | Best | Max. | Best | Max. | Best | Max. | Best |
| 48V | 13 | 5~8 | 9 | 4~6 | 8 | 4~6 | 7 | 3~5 | 6 | 3~4 | 4 | 2~3 |
| 96V | 13 | 10~12 | 9 | 7~8 | 8 | 6~8 | 7 | 6~7 | 6 | 5~6 | 4 | 4 |

Table 4

5.DC Load Output Voltage and Max. Discharge Current

The controller has DC LOAD output function, and its output voltage range is the same as battery pack. For example, if the battery's voltage is 48.6V, the instant DC output voltage is 48.6V, too.

It can supply power to DC LOAD continuously if the DC LOAD's current in within the rated range.

When the DC LOAD's working current is 100%-120% of rated current for **5 minutes**, DC LOAD will be OFF.

As soon as DC LOAD's working current is over 120% of rated current, the DC LOAD will be OFF **immediately**.

To restart DC LOAD, user should set Load Type to "ON" or "USE" manually through controller/APP/PC.

6. Steps of Switch on and off

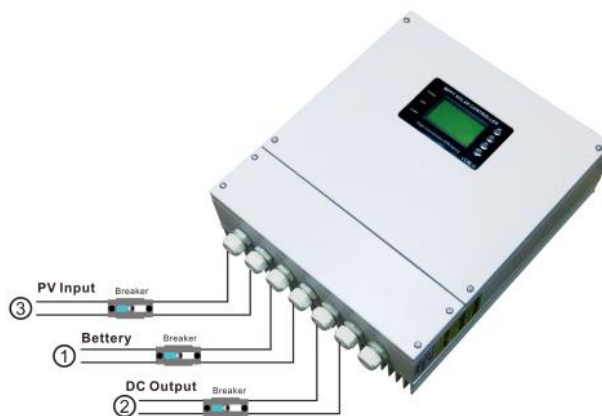


Figure 3

Make sure that the controller is installed and connected as above

Opening process:


Step 1: open the circuit breaker on the battery side(breaker①), make sure that the controller is connected with the battery (the LCD of the controller will display the content), and set the battery type.

Step 2: if you need to use the DC load output, then set the output control mode first, and then open the

DC output circuit breaker(breaker②).

Step 3: open the circuit breaker on the input side of the solar panel PV(breaker③), if the PV input voltage is in the charge range of the controller, then the controller will enter the charging state.

Closing process: turn off the circuit breaker in turn: ③②①



Warning:

- If the system needs to connect the inverter, please connect the inverter directly to the battery, and do not connect with the load end of the controller.
- When the controller is in the normal charge state, do not disconnect the battery connection, otherwise the DC load may be damaged. Therefore, the damage to the controller will not be within the warranty.

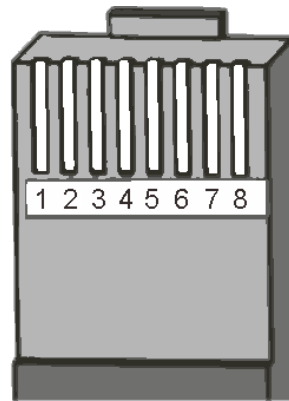
7.Communication port description

The communication port of the controller is compatible with RS485-USB communication cable for real-time monitoring by PC software and Wi-Fi module to have remote cloud monitoring by APP.

The communication port is a standard 8 pin RJ45 interface, and the pins are defined as follows(**Table 5**):

| PIN | Function |
|-----|----------------|
| 1 | RS485-A |
| 2 | RS485-B |
| 3 | Dry contact |
| 4 | Dry contact |
| 5 | GND(isolation) |
| 6 | GND(isolation) |
| 7 | +5V(isolation) |
| 8 | +5V(isolation) |

Table 5



(Figure 4)

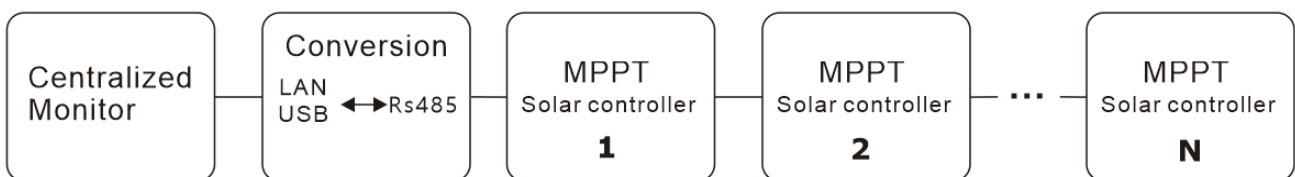
(Note:The pin definition is applicable to our related products **ONLY!**)

When the Load output is off due to the triggering protection mechanism, the **dry contact** output interface is ON (**low impedance**). Otherwise, it is OFF (**high impedance**). Dry contact access voltage **5V~12V**.

The controller has dual RS485 communication ports. It can be used for parallel connection.

If need to monitor multiple controllers centrally, please set the device address order (1~254) of the controllers accordingly. For example, 5 controllers in parallel connection and monitor centrally, set controllers' address order as 1, 2, 3, 4, 5. (**Figure 5**)

If want to monitor the multiple controllers in Master-Slave communication, set the host device address to 255. For example, 5 controllers in parallel connection, just need to set the MASTER controller address order as 255.



(Figure 5)

8.Operation

8.1 Function key

| Buttons | Instruction |
|---------|-----------------------------------|
| UP | Page up and numerical increase |
| DOWN | Page down and numerical reduction |
| ENTER | Enter in |
| ESC | Exit and save data |

Table 6

8.2 Menu introduction(Table 7)

| Main menu | Display contents | Introduction | |
|--------------------|------------------|--|--|
| Work Status | Fault: | Normal work will display No Fault. Abnormal work will display relevant Faults: Bat OVP: battery overcharge protection PV OVP: PV input over voltage protection Chg OCP: over Charge current protection Load OCP: load output over current protection Bat OTP: battery over temperature protection CHG OTP: MPPT internal over temperature protection PV UVP: PV input low voltage protection Stop Charge: Communication command control stops charging Unidentified: Battery system identification error (for lead acid batteries) | |
| | Charging mode: | CC or CV or CF | |
| | PV Volt: | PV input voltage | |
| | Bat Temp: | After accessing the battery temperature line, the real-time temperature of the battery pack will be displayed. | |
| | HS Temp: | Temperature of heat sink | |
| | Load Current: | DC load output current | |
| | Charge Current: | Charging current | |
| | Charge Power: | Charging power | |
| | Charge Volt: | Charging voltage | |
| Setting | Load Set | Load: ON Mode BatLoadOff: BatLoadOn: | DC Load control mode: ON/OFF mode. Under voltage turn off DC load. Recovery voltage turn on DC load. |
| | | Load: Light Ctrl PV Load On: Delay Time: | DC Load control mode: Light Ctrl mode. If PV is less than this voltage, the dc load can be turned on. Delay time of turning on DC load. |
| | | Load: FT1-LigCtr-X PV Load On: Ctr2: FT1-LigCtr-X PV Load Off: | DC Load control mode: Time&Light(PV) control mode: FT1-LigCtr-X :Shut down after X hours in the dark. Defines the PV voltage at which the sky turns dark. FT2-LigCt-X :Turn on X hours before daylight. Defines the PV voltage at which the sky brightens. |
| | | Load: D-Time Ctrl --NO--OFF-- am 05:10 06:30 pm 18:30 21:30 | DC Load control mode: Dual period control mode. Turn on time and turn off time of the dc load in the morning. Turn on time and turn off time of the dc load in the evening. |
| | Time&Addr Set | Time: | System clock setting. |

| | | | |
|---|------------------|--|---|
| | | Date: | System date setting. |
| | | Addr | Controller device address number setting |
| | Bat Set | Type:USER 12V:Auto Bulk Volt : Float Volt : MaxChgCurr : Over Volt : (Recovery) : Under Volt : (Recovery) : | Lead-acid battery type(GEL,SEL,FLD,USER). Quantity of batteries in series. Cell's constant charging voltage setting. Cell's float charging voltage setting. Max.Charging Current setting. Cell's over-voltage protection voltage setting. Cell's over-voltage recovery voltage setting. Cell's under-voltage protection voltage setting. Cell's under-voltage recovery voltage setting. |
| Type:Li-ion Full Volt : NormalVolt : MaxChgCurr : Over Volt : (Recovery) : Under Volt : (Recovery) : | | Lithium ion battery type. Full charging voltage setting. Nominal voltage setting. Max.Charging Current setting. Over-voltage protection voltage setting. Over-voltage recovery voltage setting. Under-voltage protection voltage setting. Under-voltage recovery voltage setting. | |
| Information | 12/24/36/48V100A | | Controller type |
| | Li BAT CHG SYS | | System voltage |
| | Load : | | DC load output control mode after user set |
| | TOTAL : | | Total energy from this machine |
| | Firmware : | | Firmware Ver. |
| | Bat : | | Battery Type display |

9.Common fault and trouble shooting.

| Common Problems | Possible Reasons | Solution |
|--|---|--|
| Controller cannot start up, screen can not be on | Battery positive and negative reverse connected | Check the wiring sequence of power line connector plug and reconnect in the right order |
| Controller not charging, PV voltage undetectable | PV Input positive and negative reverse connected | Check the wiring sequence of power line connector plug and reconnect in the right order |
| Charging and standby keeps circulating | Number of solar panels is too less in series and PV voltage is low | PV Vmpp voltage must be greater than Vbat. Please refer to the proposed series-parallel scheme(Table 4) |
| | It may occur in cloudy weather or in early morning and at dusk | Normal phenomenon |
| | Unreasonable configuration of solar panels | Based on sufficient power, please refer to the proposed series-parallel scheme(Table 4) |
| Controller is on and PV voltage is normal, but not charging | The controller can not recognize battery system voltage (The "System" in LCD flashes) | Check whether battery voltage in LCD is in the range of controller system recognition |
| The battery is in a low energy state or emptying for a long time | Solar panels number are too less to generate enough energy | Increase solar panels quantity |
| | Battery capacity is too small to Store enough energy | Increase battery capacity |

Table 8

10.Parameters(Table 9)

| | | MS48L80 | MS48L100 | MS48H80 | MS96H50 | |
|------------------------------------|---|---|----------|---------------------|---------------------|---|
| Product category | MPPT efficiency | ≥ 99.5% | | | | |
| | Standby power | < 3‰ Rated power | | | | |
| | Battery system voltage | Automatic recognition | | 48V | 96V | |
| | Heat-dissipating method | Natural-cooling | | | | |
| | Battery system voltage range(Lead acid) | 9~15Vdc(12V sys) \ 18~30Vdc(24V sys) \ 32~40Vdc(36V sys) \ 42~60Vdc(48V sys) | | 36~60Vdc | 72~120Vdc | |
| | Li-ion battery system | 9~60Vdc | | 36~60Vdc | 72~120Vdc | |
| Input Characteristics | Max.PV input voltage(Voc) | DC150V | | DC300V | | |
| | Start the charge voltage point | Battery volt. + 3V | | Battery volt. + 10V | Battery volt. + 20V | |
| | Low input voltage protection point | Battery volt. + 2V | | Battery volt. + 5V | Battery volt. + 10V | |
| | Over voltage protection point | DC150V | | DC300V | | |
| | Over voltage recovery point | DC145V | | DC295V | | |
| | Rated PV power | 12V system | 1040W | 1300W | — | — |
| | | 24V system | 2080W | 2600W | — | — |
| | | 36V system | 3120W | 3900W | — | — |
| 48V system | | 4160W | 5200W | 4160W | — | |
| 96V system | | — | — | — | 5200W | |
| Charge Characteristics | Battery types (Default Gel battery) | Sealed(SEL), Gel(GEL), Flooded(FLD), User-defined(USE), Li-ion(Lit) | | | | |
| | Charge rated current | 80A | 100A | 80A | 50A | |
| | Output voltage stability precision | ≤ ±0.2V | | | | |
| | Charge method | 3-Stage: CC(Constant current fast charging),CV(constant voltage charging),CF(float charging) | | | | |
| LOAD Characteristics | Load voltage | The same as the battery voltage | | | | |
| | Load rated current | 80A | 100A | 80A | 50A | |
| | Load control mode | On, Off , PV voltage control, Dual-time control, PV + Time control | | | | |
| | Low voltage protection | The default protection point is 10.5V, and it is restored to 11V (can be set) | | | | |
| | Setup method | PC software / APP / controller display | | | | |
| Display & Communication | Display mode | LCD (128*64 dots) &backlight | | | | |
| | Dry contact access voltage | 5V~12V | | | | |
| | Communication mode | Dual RJ45 port / RS485 protocol / Centralized monitoring / Support Modbus communication protocol / PC (via RS485-USB Cable) & APP (via Wi-Fi module or Bluetooth module) support WiFi module for APP cloud monitoring | | | | |
| Other Parameters | Protect function | Input-output over \ under voltage protection,Prevention of connection reverse protection etc. | | | | |
| | Operation ambient temperature | -20℃~+50℃ | | | | |
| | Storage temperature | -40℃~+75℃ | | | | |
| | IP(Ingress protection) | IP65 | | | | |
| | Max. connection size | 50mm ² | | | | |
| | Recommended breaker | ≥ 120A | ≥ 150A | ≥ 120A | ≥ 80A | |
| | Net weight (kg) | 13.2 | | | | |
| | Gross weight (kg) | 14 | | | | |
| | Product size(mm) | 420*350*135 | | | | |
| | Packing size(mm) | 610*440*300 | | | | |