

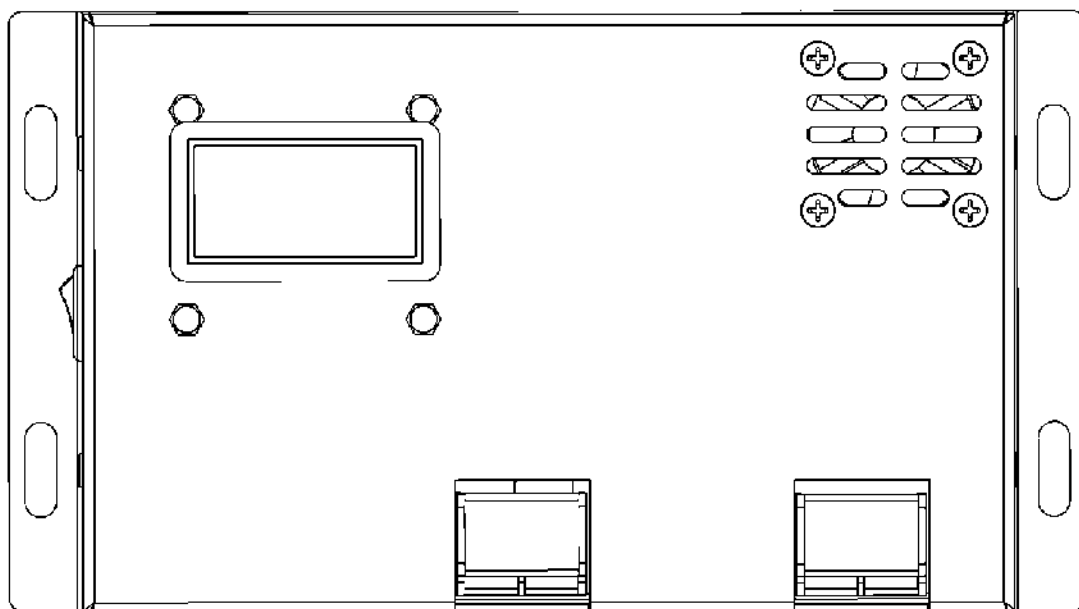
# MPPT Solar Charge Controller Manual

## Model H20TB (Boost Type)

Supports battery voltage range: 36V~90V, suitable for various photovoltaic charging solutions for electric vehicles on the market

Supports ternary, lead-acid, lithium iron, colloidal, and customized batteries

Supports customized batches



Manual Version: V1.1 Subject to change without prior notice. Please contact sales for the latest electronic documentation.

Thank you very much for choosing our products!



## Safety Instructions



1、 Since this controller operates at voltages that exceed safe levels for humans, please read the manual thoroughly and complete safety operation training before operating this controller.

Only then can this controller be operated.



2、 The controller has no parts that require maintenance or repair; users should not disassemble or repair the controller themselves.



3、 Please install the controller indoors to prevent components from exposure and to avoid water entering the interior of the controller.



4、 Please install the controller in a well-ventilated area, as the temperature of the heat sink can be very high during operation.



5、 It is recommended to install a suitable fuse or circuit breaker on the exterior of the controller.



6、 Before installing and adjusting the wiring of the controller, be sure to disconnect the photovoltaic array and remove the fuse or circuit breaker near the battery terminals.



7、 After installation, check that all wiring connections are secure to avoid the danger of overheating due to loose connections.



**Warning:** Indicates that this operation is dangerous; ensure safety



reparations are made before proceeding.

**Note:** Indicates that this operation is destructive.



**Tip:** Indicates advice and suggestions for the operator.



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## 1. Product Introduction

### 1.1 Product Overview

The H20TB controller uses industry-leading MPPT (Maximum Power Point Tracking) technology to achieve maximum energy tracking of solar panels, making it

Under various conditions, quickly and accurately track the maximum power point of the solar cell, and obtain the maximum energy of the solar panel in real time, significantly improving the solar energy performance.

Energy utilization efficiency of solar systems. Widely used in off-grid photovoltaic systems, managing the operation of solar panels, batteries, and loads.

The core control component of the off-grid photovoltaic system. The controller has comprehensive software and hardware fault detection and protection functions, which can maximize the prevention of Damage to product components caused by installation errors and system failures.

### 1.2 Product Features

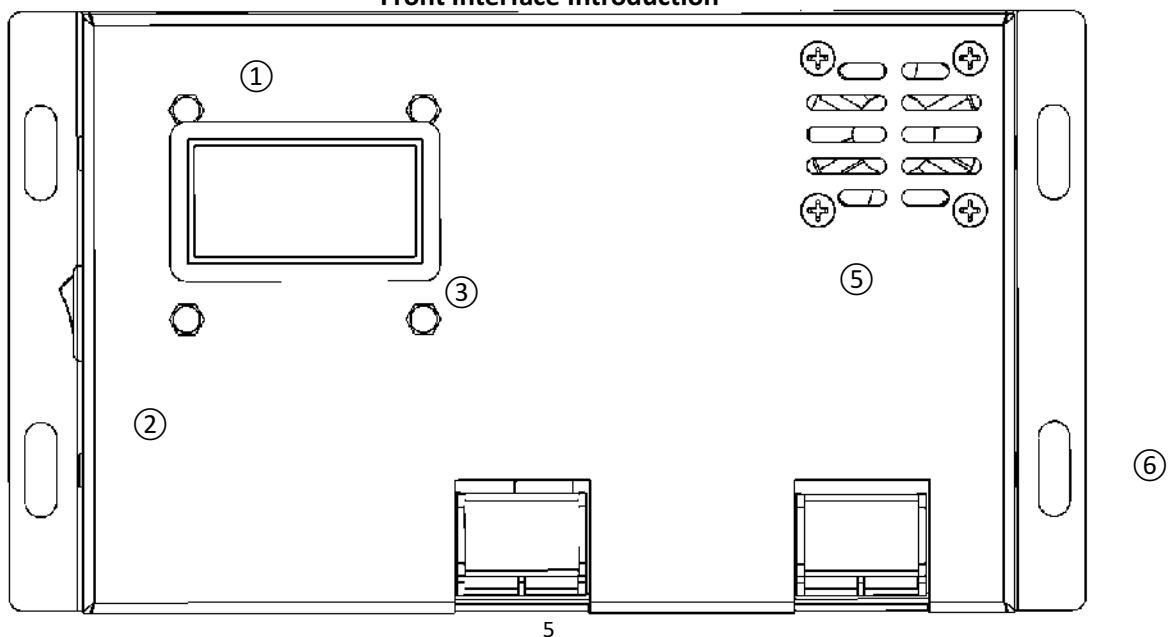
- Utilizing MPPT (Maximum Power Point Tracking) technology, the MPPT tracking efficiency can reach up to 99.9%.
- Supports simultaneous full power charging and discharging.
- Supports various battery types including sealed, gel, open, lithium-ion, and custom types.

- Support for charging current settings.
- Support full settings.
- Support parallel charging.
- Support saving historical data.
- Support RS485 communication with standard Modbus protocol, with a fixed baud rate.
- Support TTL communication with standard Modbus protocol, with a fixed baud rate.
- Support Bluetooth, WIFI, 4G, and Ethernet communication functions (optional).
- Equipped with comprehensive overpressure, overcurrent, overload, overtemperature, short circuit, and other charging and discharging protection mechanisms.
- Utilizes high-quality aluminum heat sinks, air cooling, and high-temperature derating to ensure reliable and efficient operation in various working environments.



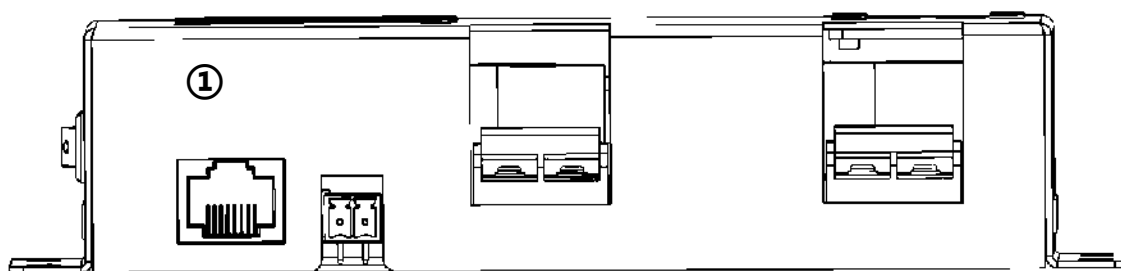
### 1.3 Appearance and

#### Front Interface Introduction



| Serial Number | Function Description                                                                                | Remarks                                   |
|---------------|-----------------------------------------------------------------------------------------------------|-------------------------------------------|
| ①             | Battery type selection, language switch between Chinese and English, interface change toggle switch | See the toggle switch section for details |
| ②             | Start button                                                                                        | Side boat-shaped switch                   |
| ③             | Display screen interface                                                                            |                                           |
| ④             | Battery interface; photovoltaic input interface                                                     |                                           |
| ⑤             | Fan air outlet                                                                                      | Do not block                              |
| ⑥             | Ground Screw Hole Position                                                                          |                                           |

#### Introduction to Side Interface



| Serial Number | Function Description          | Remarks                                                          |
|---------------|-------------------------------|------------------------------------------------------------------|
| ①             | RS485 communication interface | The definition of interface pins can be found in other chapters. |



#### 1.4 Introduction to

H20TB series Maximum Power Point Tracking (MPPT) system is a type of system that achieves

An advanced charging technology that adjusts the operating status of the electrical module, enabling the solar cells to output more electrical energy. Due to the solar energy

The nonlinear characteristics of the array mean that there exists a maximum power point on its curve, which traditional controller PWM charging technology cannot maintain.

Charging the battery at this point will not allow the maximum energy from the solar panel to be obtained, but the solar system with MPPT control technology will

The controller can continuously track the maximum power point of the array to obtain the maximum energy for charging the battery, using a 12V system.

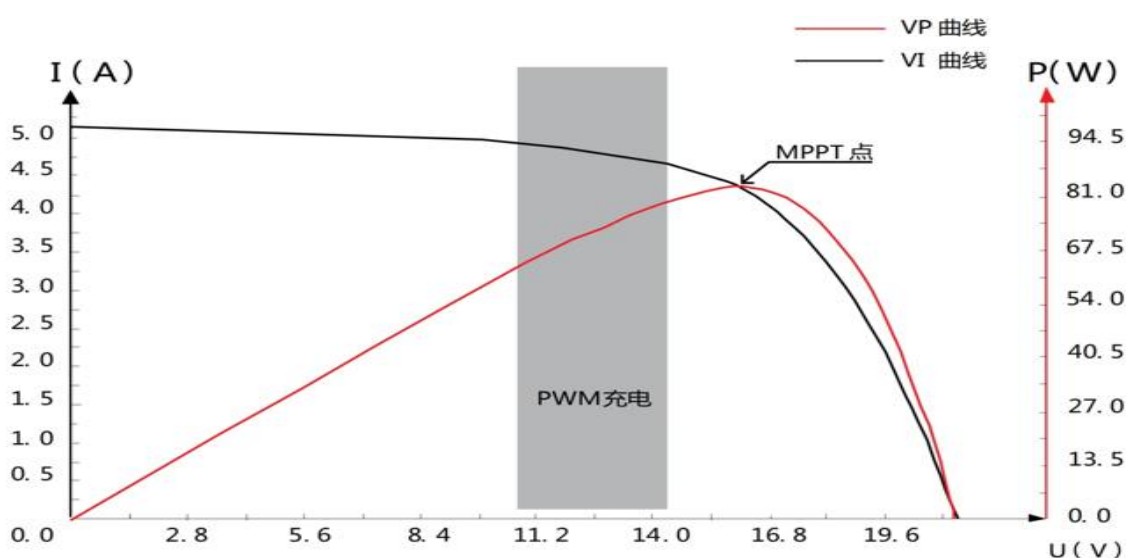
For example, the peak voltage ( $V_{pp}$ ) of a solar cell is around 18V, while the battery voltage is approximately 12V, generally.

When charging, the voltage of the solar panel is around 12V, and it does not fully reach its maximum power output.

The MPPT controller can overcome this issue by adjusting the input voltage and current of the solar panels in real-time to maximize the input power.

The purpose of the value. Compared to traditional PWM controllers, MPPT controllers can maximize the power output of solar panels, allowing for improved efficiency.

To provide a larger charging current, generally speaking, MPPT controllers can improve energy utilization by 20% to 30% compared to PWM controllers.

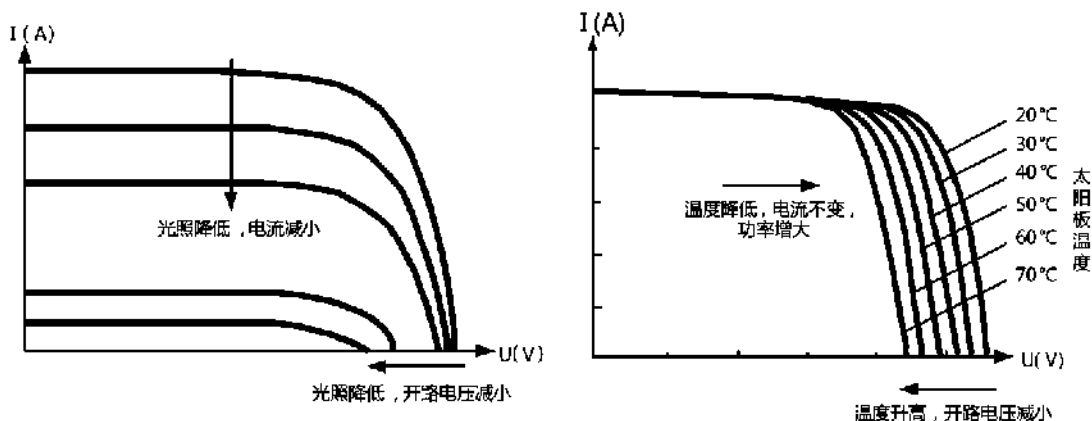


**Figure 1-2 Battery Panel Output Characteristic Curve**

Due to variations in environmental temperature and light conditions, the maximum power point often changes. Our company's MPPT controller can adjust according to

Parameters are adjusted according to different conditions to keep the system close to its maximum operating point at all times. The entire process is fully automated, requiring no user intervention.

What adjustments.



**Figure 1-3 The Relationship Between Solar Panel Output Characteristics and**

**Illumination**

**Figure 1-4 The Relationship Between Solar Panel Output Characteristics and**



## 2. Technical Parameters

|                                              |                                                                                                                                                                                                                                                                                                                                   |
|----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Product Model                                | <b>H20TB</b>                                                                                                                                                                                                                                                                                                                      |
| Static Power Consumption                     | ≤30mA                                                                                                                                                                                                                                                                                                                             |
| Battery Type                                 | Li-NCM/LiFePO4/Lead Acid/Colloid/Other batteries (users can configure independently based on the upper computer)                                                                                                                                                                                                                  |
| Battery Voltage                              | (LiFePO4, Lead Acid, Li-NCM, Other)                                                                                                                                                                                                                                                                                               |
| System Mode                                  | Boost                                                                                                                                                                                                                                                                                                                             |
| Rated battery charging current               | 15A                                                                                                                                                                                                                                                                                                                               |
| Maximum PV Input Current                     | 20A                                                                                                                                                                                                                                                                                                                               |
| Maximum Solar Panel Power                    | 800W                                                                                                                                                                                                                                                                                                                              |
| Max: PV Open Circuit Voltage (Voc)           | 16V~60V                                                                                                                                                                                                                                                                                                                           |
| Recommended PV Power Point Voltage (Vmp)     | 16V~52V (recommended)                                                                                                                                                                                                                                                                                                             |
| System Maximum Voltage Rating                | Overvoltage of 100V (±2%) will damage the system                                                                                                                                                                                                                                                                                  |
| MPPT tracking efficiency                     | >99.9%                                                                                                                                                                                                                                                                                                                            |
| MPPT tracking rate                           | <1ms                                                                                                                                                                                                                                                                                                                              |
| Charging conversion efficiency               | 94%~99%                                                                                                                                                                                                                                                                                                                           |
| Charging working mode                        | Trickle/Constant current/Constant voltage/Floating/full automatic cut-off/Backflow automatic recharge (fully automatic management)                                                                                                                                                                                                |
| Temperature protection                       | √                                                                                                                                                                                                                                                                                                                                 |
| Short Circuit Protection                     | √                                                                                                                                                                                                                                                                                                                                 |
| TTL Communication                            | √                                                                                                                                                                                                                                                                                                                                 |
| RS485 Communication                          | √                                                                                                                                                                                                                                                                                                                                 |
| <b>External 12V Power Supply (&lt;150mA)</b> | √                                                                                                                                                                                                                                                                                                                                 |
| Display Screen                               | √                                                                                                                                                                                                                                                                                                                                 |
| Supports SOC Display                         | √                                                                                                                                                                                                                                                                                                                                 |
| Configurable Charging Power                  | √                                                                                                                                                                                                                                                                                                                                 |
| Configurable Battery Model Series            | √                                                                                                                                                                                                                                                                                                                                 |
| Supports Bluetooth (Optional Expansion)      | √                                                                                                                                                                                                                                                                                                                                 |
| Supports Ethernet (Optional Expansion)       | √                                                                                                                                                                                                                                                                                                                                 |
| Set Auto Save                                | √                                                                                                                                                                                                                                                                                                                                 |
| Supported Baud Rate Types                    | 4800/9600/14400/19200/38400/56000/57600 Default 9600 (change requires upper computer configuration)                                                                                                                                                                                                                               |
| Backlight Function                           | Default backlight always on (backlight time adjustable; set to 0 for always on)                                                                                                                                                                                                                                                   |
| Protection Function                          | PV Over-voltage Protection, PV Reverse Polarity Protection, PV Short Circuit Protection, Night Reverse Charge Protection, Input Power Limit Protection, Over Temperature Protection, Load Short Circuit Protection, Load Overload Protection, Battery Over-voltage/Over-discharge Protection, Battery Reverse Polarity Protection |
| Working Environment Temperature              | -35°C~65°C (within 45°C under good ventilation, no derating)                                                                                                                                                                                                                                                                      |

|                                        |                                                                                               |
|----------------------------------------|-----------------------------------------------------------------------------------------------|
| Range                                  |                                                                                               |
| Protection Level                       | IP32                                                                                          |
| Cooling Method                         | Natural Cooling, Air Cooling                                                                  |
| Dimensions                             | Length × Width × Height 95x175x37mm                                                           |
| Weight                                 | 0.37kg                                                                                        |
| Lithium Iron Phosphate Battery Support | 36V~90V                                                                                       |
| Tri-Element Lithium Battery Support    | 36V~90V                                                                                       |
| Lead-acid/gel battery support          | 36V~90V                                                                                       |
| Other batteries                        | User-defined undervoltage and overvoltage points (set via the upper computer from 36V to 90V) |



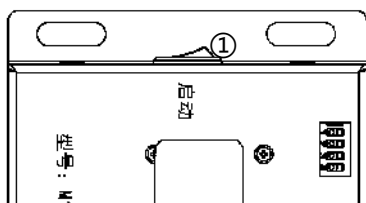
### 3. Dip switch and power on/off instructions

**3.1 Dip switch usage instructions (Please make sure to select the battery type correctly; dip switch up for 1, dip switch down for 0)**

| Battery Type | Dip switch 1 | Dip switch 2 | Dip switch 3 | Dip switch 4 | Dip switch 5 | Description                                                                                              | Full Charge Replenishment |
|--------------|--------------|--------------|--------------|--------------|--------------|----------------------------------------------------------------------------------------------------------|---------------------------|
| Iron Lithium | 1            | 0            | 0            | 0            | x            | Iron Lithium 48V, over-voltage protection point: 54.0V, under-voltage protection point: 42.0V, 15 series | 51.0V                     |
|              | 1            | 0            | 1            | 0            | x            | Iron Lithium 60V, over-voltage protection point: 72.0V, under-voltage protection point: 56.0V, 20 series | 68.0V                     |
|              | 1            | 0            | 0            | 1            | x            | Iron Lithium 72V, over-voltage protection point: 82.8V, under-voltage protection point: 64.4V, 23 series | 78.2V                     |
| Trinary      | 0            | 1            | 0            | 0            | x            | Trinary 48V, over-voltage protection point: 54.6V, under-voltage protection point: 39.0V, 13 series      | 53.3V                     |
|              | 0            | 1            | 1            | 0            | x            | Tri-cell 60V, over-voltage protection point: 71.4V, under-voltage protection point: 51.0V, 17 series     | 69.7V                     |
|              | 0            | 1            | 0            | 1            | x            | Tri-cell 72V, over-voltage protection point: 84.0V, under-voltage protection point: 60.0V, 20 series     | 82.0V                     |
| Lead-acid    | 1            | 1            | 0            | 0            | x            | Lead-acid 48V, over-voltage protection point: 57.6V, under-voltage protection point: 40.0V, 04 series    | 53.6V                     |
|              | 1            | 1            | 1            | 0            | x            | Lead-acid 60V, over-voltage protection point: 72.0V, under-voltage protection point: 50.0V, 05 series    | 66.0V                     |
|              | 1            | 1            | 0            | 1            | x            | Lead-acid 72V, over-voltage protection point: 86.4V, under-voltage protection point: 60.0V, 06 series    | 79.2V                     |
| Colloid      | 0            | 0            | 0            | 0            | x            | Colloid 48V, overvoltage protection point: 55.2V, undervoltage protection point: 40.0V, 04 series        | 52.0V                     |
|              | 0            | 0            | 1            | 0            | x            | Colloid 60V, overvoltage protection point: 69.0V, undervoltage protection point: 50.0V, 05 series        | 65.0V                     |

|                     |   |   |   |   |   |                                                                                                             |        |
|---------------------|---|---|---|---|---|-------------------------------------------------------------------------------------------------------------|--------|
|                     | 0 | 0 | 0 | 1 | x | Colloid 72V, overvoltage protection point: 82.8V, undervoltage protection point: 60.0V, 06 series           | 78.0V  |
| Custom              | 0 | 0 | 1 | 1 | x | Custom mode, overvoltage point, undervoltage point, recharge point, executed according to customer settings | Custom |
| Chinese and English | x | x | x | x | 0 | Represents Chinese display                                                                                  |        |
|                     | x | x | x | x | 1 | Represents English display                                                                                  |        |

### 3.2 Equipment Startup Switch Usage Instructions



① To start the device, switch left to enable charging,

## 4. TTL Communication, RS485 Communication, and External 12V Output Interface

|  | Serial Number | Definition |
|--|---------------|------------|
|  | ①             | 485-A      |
|  | ②             | 485-B      |
|  | ③             | 12V        |
|  | ④             | GND        |
|  | ⑤             | Not used   |
|  | ⑥             | Not used   |
|  | ⑦             | TTL-TXD    |
|  | ⑧             | TTL-RXD    |

Note: 12V can provide a maximum current of 300mA; exceeding this may damage the interface.



## 5. Fan Temperature Control

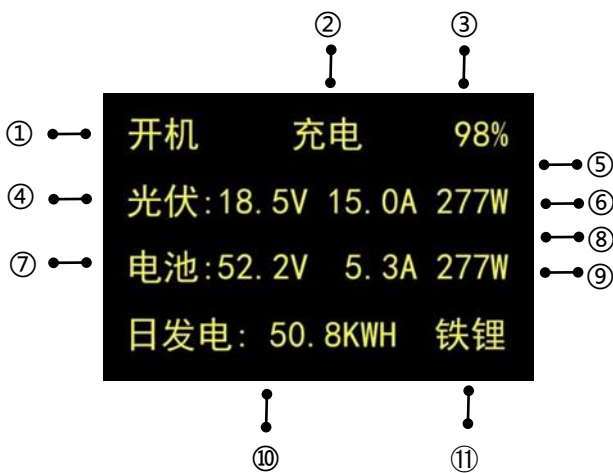
| Serial Number      | Fan Startup Logic Diagram |
|--------------------|---------------------------|
| During PV Charging |                           |

## 6. Common Problems and Solutions

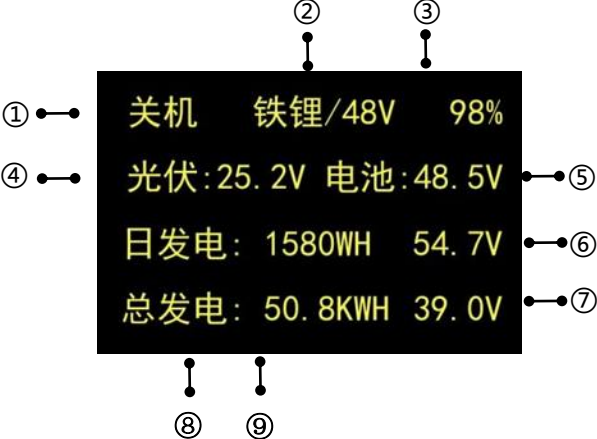
| Phenomenon                                                                             | Processing Method                                                                                                                                                                                                                                                               |
|----------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Indicator light and LCD screen do not light up                                         | Check if the connections of the battery and solar panel are correct                                                                                                                                                                                                             |
| There is voltage from the solar panel, but no voltage output from the battery terminal | Disconnect the battery to check if it has voltage                                                                                                                                                                                                                               |
| Battery type and series cannot be modified while MPPT is in operation                  | Changing battery type will alter the over-voltage and under-voltage protection points!                                                                                                                                                                                          |
| Charging power does not meet the rated value                                           | The system adopts current limiting and constant temperature control;<br>Check if the system has reset the charging power;<br>Whether the voltage difference between the PV model and the battery model is too large.                                                            |
| Photovoltaic voltage flickering; battery voltage flickering                            | Under-voltage or high voltage                                                                                                                                                                                                                                                   |
| Other issues or difficult-to-solve anomalies                                           | Go to the settings interface to initiate a factory reset. After setting the factory settings, reconfigure the related parameters according to the system configuration. Proceed with caution!                                                                                   |
| No response from battery connection                                                    | Check if the battery's positive and negative terminals are reversed                                                                                                                                                                                                             |
| No response from photovoltaic connection                                               | Check if the photovoltaic's positive and negative terminals are reversed                                                                                                                                                                                                        |
| The fan does not rotate                                                                | 1、 Check if there are foreign objects blocking the fan and clean the air duct regularly.<br>2、 If the fan still does not rotate after cleaning the foreign objects, please contact customer service for fan replacement.<br>3、 Is the system itself in a low-temperature state? |

## 7. Display Interface Introduction

### 7.1 Start System Display Interface

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  <p>The diagram shows a black rectangular display with yellow text. It is surrounded by 11 numbered callouts (① to ⑪) pointing to specific elements on the screen. The text on the screen is as follows:</p> <ul style="list-style-type: none"> <li>Top line: 开机 (Power-on), 充电 (Charging), 98%</li> <li>Second line: 光伏:18.5V (Photovoltaic voltage), 15.0A (Photovoltaic current), 277W (Photovoltaic power)</li> <li>Third line: 电池:52.2V (Battery voltage), 5.3A (Battery current), 277W (Battery power)</li> <li>Bottom line: 日发电: 50.8KWH (Daily power generation), 铁锂 (Lithium iron)</li> </ul> | <ul style="list-style-type: none"> <li>① Power-on status display</li> <li>② System is in charging state (charging, discharging, protection)</li> <li>③ Battery SOC Display</li> <li>④ Display photovoltaic voltage value</li> <li>⑤ Display photovoltaic charging current size</li> <li>⑥ Display photovoltaic charging power size</li> <li>⑦ Battery voltage value</li> <li>⑧ Battery charging current value</li> <li>⑨ Battery charging power value</li> <li>⑩ Power generation statistics</li> <li>⑪ Display battery selection type (ternary, lithium iron, lead-acid, others)</li> </ul> |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### 7.2 Close system display interface

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  <p>The diagram shows a black rectangular display with yellow text. It is surrounded by 9 numbered callouts (① to ⑨) pointing to specific elements on the screen. The text on the screen is as follows:</p> <ul style="list-style-type: none"> <li>Top line: 关机 (Shutdown), 铁锂/48V (Lithium iron/48V), 98%</li> <li>Second line: 光伏:25.2V (Photovoltaic voltage), 电池:48.5V (Battery voltage)</li> <li>Third line: 日发电: 1580WH (Daily power generation), 54.7V (Battery voltage)</li> <li>Bottom line: 总发电: 50.8KWH (Total power generation), 39.0V (Battery voltage)</li> </ul> | <ul style="list-style-type: none"> <li>① Represents the current shutdown status</li> <li>② Represents that the current battery selection is of the ternary type</li> <li>③ Displays the battery charge state (SOC)</li> <li>④ Displays the value of photovoltaic voltage</li> <li>⑤ Displays the value of battery voltage</li> <li>⑥ Current battery over-voltage protection set point</li> <li>⑦ Current battery under-voltage protection set point</li> <li>⑧ Displays the power generation for the day</li> <li>⑨ Displays historical power generation</li> </ul> |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## 8. Product Installation

### 8.1 Installation

- When installing batteries, extreme caution is required. Protective goggles should be worn when installing vented lead-acid batteries. If contact is made with the battery acid, rinse it off immediately with clean water.
- Avoid placing metal objects near the battery to prevent short circuits.
- When charging the battery, acidic gases may be released; ensure that the surrounding environment is well-ventilated.
- The battery may release flammable gases; please stay away from sparks.
- When installing outdoors, avoid direct sunlight and rainwater intrusion.
- Loose connections and corroded wires can cause significant heat, melting the insulation of the wires, burning surrounding materials, and even causing fires. Therefore, ensure that all connections are tight and the wires are secured with zip ties to prevent movement and loosening of connections during use.
- When connecting the system, the voltage at the component output terminals may exceed safe human levels; when operating, be sure to use insulated tools and ensure that your hands are dry.
- The battery terminals on the controller can connect to a single battery or a set of batteries. The later instructions in the manual apply to the use of a single battery, but are also applicable to a system with a set of batteries.
- Please follow the safety recommendations from the battery manufacturer.
- Ground the controller's grounding terminal
- During installation, reverse connection of the battery is prohibited, as it can cause irreversible damage.

### 8.2 Installation Steps

Wiring and installation methods must comply with national and local electrical code requirements. Wiring specifications must be selected according to the rated current, generally using 5A/mm<sup>2</sup> as a reference.

#### Step 1: Choose the Installation Location

Avoid installing the controller in direct sunlight, high temperatures, or areas prone to water ingress, and ensure good ventilation around the controller.

#### Step 2: Secure the Suspension Screws

Mark the installation position according to the controller's installation dimensions, drill two appropriately sized installation holes at the two marked points, and secure the screws in both installation holes.

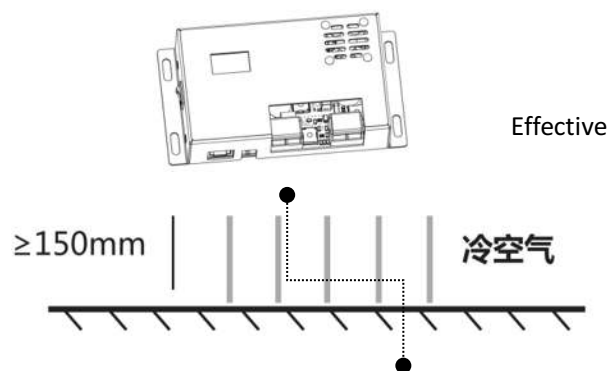
#### Step 3: Secure the Controller

Align the controller's mounting holes with the two previously secured screws, hang it up, and then secure the two screws at the bottom.

#### Step 4: Fix the Ground Line

Lock a wire on the side screw of the controller, and effectively connect the other end of the wire to the ground (it can be tied to a metal block for burial), allowing leakage, static electricity, and lightning current to be directed into the ground.





## 9. Protection Functions

- **Overtemperature Protection of the Device**  
When the internal temperature of the controller exceeds the set value, it will automatically reduce the charging power or even shut down while charging, thereby further slowing down the rise in internal temperature of the controller.
- **Overtemperature Protection of the Battery**  
The battery overtemperature protection requires an external temperature sampling sensor for the storage battery. When the battery temperature is detected to be too high, charging will stop. When the battery temperature drops to 5 degrees lower than the set value for 2 seconds, charging will automatically resume.
- **Input Overpower Protection**  
When the power of the solar panel exceeds the rated power, the controller will limit the charging power within the rated power range to prevent excessive current from damaging the controller.  
The device enters current-limiting charging.
- **The voltage at the photovoltaic input terminal is too high.**  
If the voltage at the photovoltaic array input terminal is too high, the controller will automatically disconnect the photovoltaic input.
- **Photovoltaic input reverse connection protection.**  
When the photovoltaic array is connected with reversed polarity, the controller will not be damaged and will continue to operate normally after correcting the wiring error.
- **Nighttime reverse charge protection.**  
Prevents the battery from discharging through the solar panel at night. Special note: There is no reverse connection protection function for the battery.

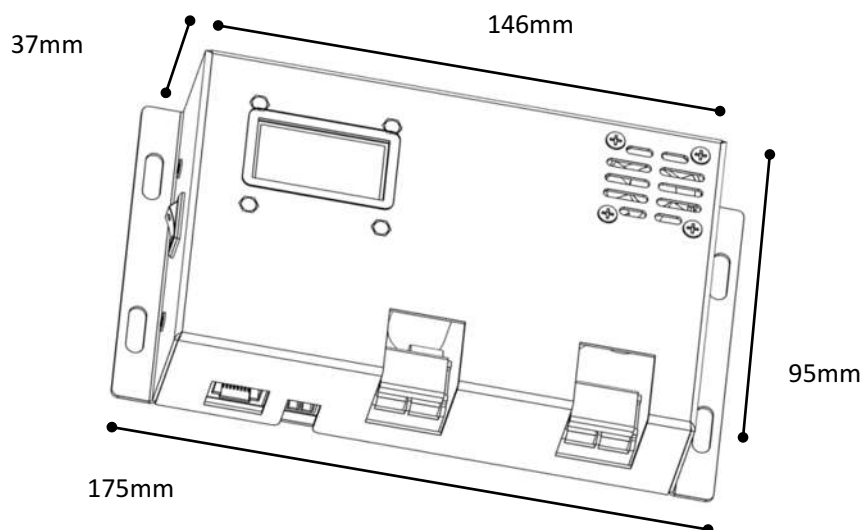
## 10. System Maintenance

To ensure the controller maintains optimal performance over time, it is recommended to regularly check the following items.

- If abnormal faults or error messages are detected, corrective measures should be taken promptly.
- Check if the terminal connections have corrosion, insulation damage, signs of high temperature or burning/discoloration, deformation of the casing, etc., and carry out repairs or replacements in a timely manner.
- Wires that are exposed, damaged, or have deteriorating insulation should be repaired or replaced in a timely manner.
- If there is dirt, nesting insects, or signs of corrosion, they should be cleaned promptly.

**Warning: Risk of electric shock! Ensure that all power supplies to the controller are disconnected before performing the above checks or operations! Non-professionals, please do not operate without permission.**

## 11. Product Size Diagram



## 12. Communication Protocol

### 12.1

### Basic

|                                        |                              |                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                 |                         |
|----------------------------------------|------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|
| Transmission Mode                      | RTU                          | Protocol Standard / Function Code                                                                                                                                                                      | 0x02 Read one or more input statuses                                                                                                                                                                                                                            | Bitwise Read            |
| Baud Rate                              | Default is 9600 bps          | This communication protocol is based on <Standard MODBUS Protocol>, where the master continuously requests data from the slave, and the slave receives the request instruction and responds with data. | 0x03 Read Holding Register                                                                                                                                                                                                                                      | Read in 16-bit words    |
| Parity Bit                             | No Parity                    |                                                                                                                                                                                                        | 0x04 Read a Register                                                                                                                                                                                                                                            | Read in 16-bit words    |
| Data Bit                               | 8bit                         |                                                                                                                                                                                                        | 0x05 Write a Coil Status                                                                                                                                                                                                                                        | Bit Write               |
| Stop Bit                               | 1bit                         |                                                                                                                                                                                                        | 0x06 Write a Holding Register                                                                                                                                                                                                                                   | Written in 16-bit words |
| Frame interval                         | Not less than 3.5 byte times |                                                                                                                                                                                                        | 0x10 Write multiple hold registers                                                                                                                                                                                                                              | Written in 16-bit words |
| Frame length                           | 200 bytes                    |                                                                                                                                                                                                        | When the communication module detects errors other than CRC errors, it must send information back to the host, with the highest bit of the function code set to 1; 01 illegal function code, 02 illegal data address, 03 illegal data value, 04 service failure |                         |
| Minimum value of host polling interval | 400 bytes time               |                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                 |                         |

### 12.2 Information address

Register address table, read corresponding function code 0x03, set corresponding function code 0x06. The addresses in the table below are the same as the addresses in the actual information frame, no offset or other conversion is needed.

| Address (Decimal) | Meaning | Byte | Read/Write | Example | Explanation |
|-------------------|---------|------|------------|---------|-------------|
|-------------------|---------|------|------------|---------|-------------|

|                                                                                     |                                             |   |     |                   |                                                    |
|-------------------------------------------------------------------------------------|---------------------------------------------|---|-----|-------------------|----------------------------------------------------|
| 40000                                                                               | Device Model                                | 2 | R   | 32022             | H20TB                                              |
| 40001                                                                               | Software Version                            | 2 | R   | 10                | V1.0                                               |
| 40002                                                                               | Hardware Version                            | 2 | R   | 10                | V1.0                                               |
| 40003                                                                               | Maximum Power Support                       | 2 | R   | 450               | 800W                                               |
| 40004                                                                               | Maximum Input and Output Current            | 2 | R   | 1210              | PV:20A, BAT:15A                                    |
| 40005                                                                               | Photovoltaic Radiator Temperature           | 2 | R   | 25                | Current System Temperature 25 Degrees Celsius      |
| 40006                                                                               | PV NTC Status                               | 2 | R   | 0                 | 0~7                                                |
| 40007                                                                               | Reserved                                    | 2 | R   | Not used          | Reserved                                           |
| 40008                                                                               | Reserved                                    | 2 | R   | Not used          | Reserved                                           |
| 40009                                                                               | Reserved                                    | 2 | R   | Not used          | Reserved                                           |
| 40010                                                                               | Charging Stage                              | 2 | R   | 3                 | 1: Trickle 2: Constant Current 3: Constant Voltage |
| 40011                                                                               | Charging Status                             | 2 | R   | 1                 | 0: Not Charging, 1: Charging                       |
| 40012                                                                               | Full Charge Status                          | 2 | R   | 1                 | 0: Not Fully Charged, 1: Fully Charged             |
| 40013                                                                               | Current Load Status                         | 2 | R   | 1                 | 1: Starting, 0: Shutting Down                      |
| 40014                                                                               | BOOST Heat Sink Temperature                 | 2 | R   | 50                | 50℃(accuracy 1℃)                                   |
| 40015                                                                               | Reserved                                    | 2 | R   | Not used          | Reserved                                           |
| 40016                                                                               | Reserved                                    | 2 | R   | Not used          | Reserved                                           |
| 40017                                                                               | Reserved                                    | 2 | R   | Not used          | Reserved                                           |
| 40018                                                                               | Reserved                                    | 2 | R   | Not used          | Reserved                                           |
| 40019                                                                               | Reserved                                    | 2 | R   | Not used          | Reserved                                           |
| 40020                                                                               | Photovoltaic input voltage                  | 2 | R   | 2498              | 24.98V(accuracy 0.01V)                             |
| 40021                                                                               | Photovoltaic input current                  | 2 | R   | 275               | 2.75A(accuracy 0.01A)                              |
| 40022                                                                               | Photovoltaic input power                    | 2 | R   | 100               | 100W(accuracy 1W)                                  |
| 40023                                                                               | Photovoltaic Radiator Temperature           | 2 | R   | 20                | 20(accuracy 1℃)                                    |
| 40024                                                                               | Photovoltaic fault code                     | 2 | R   | 0                 | See fault table 1                                  |
| 40025                                                                               | Battery output voltage                      | 2 | R   | 5556              | 55.56V (accuracy 0.01V)                            |
|  | Battery output current                      | 2 | R   | 12                | None                                               |
|                                                                                     | Battery output power                        | 2 | R   | 100               | None                                               |
| 40028                                                                               | Battery radiator temperature                | 2 | R   | 25                | 25℃ (accuracy 1℃)                                  |
| 40029                                                                               | Battery fault code                          | 2 | R   | See fault table 2 | See fault table 2                                  |
| 40030                                                                               | Reserved                                    | 2 | R   | Not used          | Reserved                                           |
| 40031                                                                               | Reserved                                    | 2 | R   | Not used          | Reserved                                           |
| 40032                                                                               | Fan startup status                          | 2 | R   | 0                 | 0: Off 1: On                                       |
| 40033                                                                               | Historical system charging WH count high    | 2 | R   | H+L (unit WH)     | Total historical generation WH                     |
| 40034                                                                               | Historical system charging WH count low     | 2 | R   |                   |                                                    |
| 40035                                                                               | Current SOC value                           | 2 | R   | 982               | 98.2%                                              |
| 40036                                                                               | Reserved                                    | 2 | R   | Not used          | Reserved                                           |
| 40037                                                                               | Today's generation                          | 2 | R   | 855               | 855 WH                                             |
| 40038                                                                               | MPPT working mode                           | 2 | R   | 0                 | 0 (mppt mode)                                      |
| 40039                                                                               | Reserved                                    | 2 | R/W | Not used          | Reserved                                           |
| 40040                                                                               | Maximum voltage for photovoltaic connection | 2 | R   | 300               | 60.0V                                              |
| 40041                                                                               | Minimum voltage for photovoltaic connection | 2 | R   | 130               | 16.0V                                              |

|       |                                               |   |     |          |                                                                               |
|-------|-----------------------------------------------|---|-----|----------|-------------------------------------------------------------------------------|
| 40042 | User-defined maximum charging power           | 2 | R/W | 100      | 100W (limit the maximum charging power setting for photovoltaic)              |
| 40043 | Reserved                                      | 2 | R/W | Not used | Reserved                                                                      |
| 40044 | Photovoltaic stop working temperature setting | 2 | R/W | 70       | 70℃                                                                           |
| 40045 | Current temperature to start photovoltaic fan | 2 | R   | 40       | 40℃ fan start                                                                 |
| 40046 | Device communication address                  | 2 | R/W | 01       | Communication address: 01H (01~255)                                           |
| 40047 | Maximum charging voltage setting for battery  | 2 | R   | 5400     | 54V (system automatically allocates based on DIP switch)                      |
| 40048 | Minimum discharge voltage setting for battery | 2 | R   | 4200     | 42V (system automatically allocates based on DIP switch)                      |
| 40049 | Reserved                                      | 2 | R/W | Not used | Reserved                                                                      |
| 40050 | Reserved                                      | 2 | R/W | Not used | Reserved                                                                      |
| 40051 | Reserved                                      | 2 | R/W | Not used | Reserved                                                                      |
| 40052 | Reserved                                      | 2 | R/W | Not used | Reserved                                                                      |
| 40053 | Reserved                                      | 2 | R/W | Not used | Reserved                                                                      |
| 40054 | Reserved                                      | 2 | R/W | Not used | Reserved                                                                      |
| 40055 | Set battery type                              | 2 | R   | 0        | 0: Ternary lithium, see function table 1                                      |
| 40056 | Set number of battery strings                 | 2 | R   | 13       | Ternary lithium 13 strings                                                    |
| 40057 | Power on                                      | 2 | R/W | 1        | 0: Prohibit electricity generation, 1: Start electricity generation (default) |
| 40058 | Reserved                                      | 2 | R   | 0        | Reserved                                                                      |
| 40059 | Baud Rate                                     | 2 | R/W | 0        | 1: 9600 (default) 0~7 (4800~115200)                                           |
| 40060 | Backlight duration                            | 2 | R/W | 60       | 200S (not supported for now)                                                  |
| 40061 | Reserved                                      | 2 | R/W | Not used | Reserved                                                                      |
| 40062 | Reserved                                      | 2 | R/W | Not used | Reserved                                                                      |
| 40063 | User-defined battery overvoltage value        | 2 | R/W | 800      | 80.0V                                                                         |
| 40064 | User-defined battery undervoltage value       | 2 | R/W | 450      | 45.0V                                                                         |
| 40065 | Reserved                                      | 2 | R/W | 100      | Reserved                                                                      |
| 40066 | Reserved                                      | 2 | R/W | Not used | Reserved                                                                      |
| 40067 | Reserved                                      | 2 | R/W | Not used | Reserved                                                                      |
| 40068 | Reserved                                      | 2 | R/W | Not used | Reserved                                                                      |
| 40069 | Reserved                                      | 2 | R/W | Not used | Reserved                                                                      |
| 40070 | Reserved                                      | 2 | R/W | Not used | Reserved                                                                      |



## 13. Detailed attachment table

Function Table

| Function Table One |                                |   |
|--------------------|--------------------------------|---|
| NMC                | Trivalent Lithium Battery      | 0 |
| LFP                | Lithium Iron Phosphate Battery | 1 |
| PAB                | Lead-Acid Battery              | 2 |

Fault Table

| Fault Table 1            |   |                                                 |     |
|--------------------------|---|-------------------------------------------------|-----|
| Solar Panel Overvoltage  | 1 | Solar Panel Short Circuit                       | 128 |
| Solar Panel Undervoltage | 2 | PV Voltage Too High Compared to Battery Voltage | 256 |
| System Over Temperature  | 4 |                                                 |     |
| Temperature Sensor Fault | 8 |                                                 |     |

| Fault Table 1        |   |                                        |     |
|----------------------|---|----------------------------------------|-----|
| Battery overvoltage  | 1 | Charging abnormal configuration switch | 128 |
| Battery undervoltage | 2 |                                        |     |
| Battery overcurrent  | 4 |                                        |     |
| Battery overload     | 8 |                                        |     |

## 14. Application Wiring Diagram

