RICH SOLAR

User Manual

MPPT
SOLAR CHARGE CONTROLLER

MODEL: **RS-MPPT50DC**

Dear users,
Thank you for choosing our product!

Safety Instructions

1. As this controller deals with voltages that exceed the top limit for human safety, do not operate it before carefully reading this manual and completing safety operation training.

2. The controller has no internal components that need maintenance or service, thus do not attempt to disassemble or repair it.

3. Install the controller indoors, and avoid component exposure and water intrusion.

4. During operation, the radiator may reach a very high temperature, therefore install the controller at a place with good ventilation conditions.

5. It's recommended that a fuse or breaker be installed outside the controller.

6. Before installing and wiring the controller, make sure to disconnect the photovoltaic array and the fuse or breaker close to the battery terminals.

7. After installation, check if all connections are solid and reliable so as to avoid loose connections that may give rise to dangers caused by heat accumulation.

Warning: indicates that the relevant operation is dangerous, and you must get properly prepared before proceeding.

Note: indicates that the relevant operation may cause damage.

Tips: provides advice or instructions for the operator.

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1. Product Profile

1.1 Product Overview

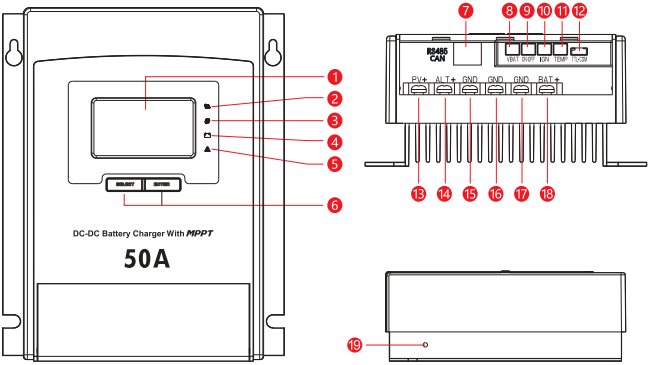
MD Series DC/DC&MPPT solar charging controller is based on multi-phase synchronous rectifier technology and advanced MPPT control algorithm, adopting all-digital intelligent, which has fast response, high reliability and high industrialized standard. Polyphase synchronous rectifier technology can ensure high conversion efficiency under any charging power, and greatly improve system energy utilization; The industry-leading PowerCatcher MPPT technology realizes the maximum energy tracking of solar panels, quickly and accurately track the maximum power point of solar panels in any environment and obtain the maximum energy in real time.

This Product is a DC/DC intelligent charger for vehicle or ship system. Applied in the dual-battery system, the system integrates the respective merits of alternator (automobile) and photovoltaic power generation, and a variety of charging methods are ingeniously designed and combined to effectively ensure that the power of the dual-battery system is sufficient all the time. Solar energy and alternator (automobile) can charge the backup battery simultaneously or independently. In addition, solar energy can also charge the starting battery under specific conditions.

1.2 Product Features

- PowerCatcher MPPT technology is still available for tracking the maximum power point of solar cells in a complex environment; and compared with conventional MPPT technology, PowerCatcher has faster response and higher tracking efficiency, which can reach 99.9%.
- The design of polyphase synchronous rectifier Buck-Boost circuit ensures high DC/DC conversion efficiency of up to 98% both in high and low power ranges.
- The backup battery supports a wide range of batteries such as sealed, gel, flooded, lithium and custom battery.
- Support a wide range of alternators (automobile) such as intelligent and conventional alternators (automobile), and automatically identify alternator (automobile) types through ignition signals.
- With a variety of charging modes, such as photovoltaic charging for backup battery, alternator (automobile) charging for backup battery, simultaneous photovoltaic and alternator (automobile) charging, photovoltaic charging for battery startup, and more.
- With the function of line loss compensation for backup battery charging voltage, ensuring more accurate control of the battery charging voltage.
- With a backup battery temperature sampling function. For lead-acid battery, it supports temperature compensation, effectively prolonging battery life.
- With an automatic derating function for high-temperature charging.
- Support Bluetooth communication, and you can view the product running status/real-time data and fault status through the mobile APP.
- Supports CAN communication with RV-C protocol.
- Built-in Bluetooth module can monitor and set parameters through mobile APP.
- High-quality aluminum radiator and high-temperature derating processing ensure reliable and efficient operation in each work environment.

1.3 Interface Description



SN	Designation	SN	Designation
①	Display Screen (with backlight)	⑪	Backup battery temperature sampling interface
②	PV indicator	⑫	TTL Communication Interface
③	Alternator (automobile) indicator	⑬	Positive interface of solar cell
④	Backup battery indicator	⑭	Positive interface of alternator (starting battery)
⑤	Alarm indicator	⑮	Negative interface of solar cell
⑥	Operation key	⑯	Negative interface of alternator (starting battery)
⑦	CAN、RS485	⑰	Backup battery negative interface
⑧	Backup battery voltage compensation interface	⑱	Backup battery positive interface
⑨	Remote switch interface	⑲	Grounding port
⑩	Ignition signal interface		

1. The solar cell, alternator (starting battery), and backup battery share a common negative electrode design;
2. See above for indicator definition, interface definition, key function and interface description.

1.4 Introduction to MPPT Technology

Maximum Power Point Tracking (MPPT) System is an advanced charging technology which can output more energy by adjusting the work state of electrical module. Due to the nonlinear characteristic of solar array, there is a maximum energy output point (MPP) on its curve. Conventional controllers (switch charging technology and PWM charging technology) can not keep charging the battery at this point, so they can not obtain the maximum energy of solar array. However, solar controllers with MPPT control technology can track the MPP of the array all the time to obtain the maximum energy for charging the battery. Taking the 12V system as an example: since the peak voltage (Vpp) of solar cell is about 17V and the battery voltage is about 12V, when an ordinary charging controller is charging, the voltage of solar cell is about 12V, and the maximum power has not been fully exerted.

Take a 12V system as an example. As the solar panel's peak voltage (Vpp) is approximately 17V while the battery voltage is around 12V, when charging with a conventional charge controller, the solar panel's voltage will stay at around 12V, failing to deliver the maximum power. However, the MPPT controller can solve the problem by adjusting the solar panel's input voltage and current in real time, realizing maximum input power.
Compared with conventional PWM controllers, the MPPT controller can make the most of the solar panel's power output and therefore provide a larger charging current. Generally, the MPPT controller can raise the energy utilization rate by 15% to 20% in contrast with the PWM controller.

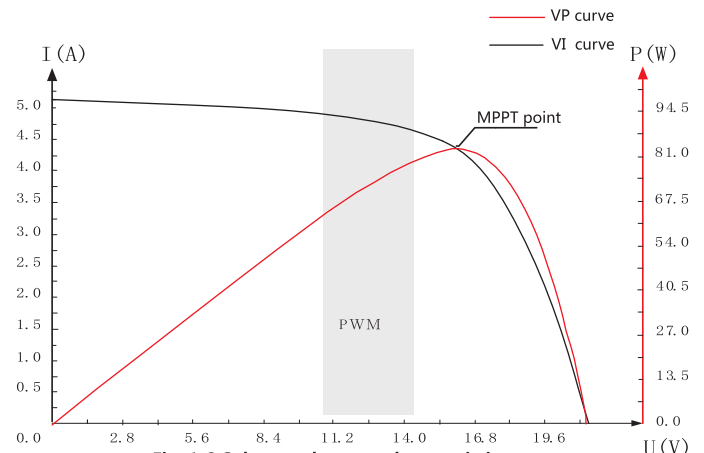


Fig. 1-2 Solar panel output characteristic curve

Due to the different ambient temperature and illumination conditions, the MPP often changes. Our MPPT controllers can adjust the parameters from time to time according to different conditions, so that the system is always near the maximum working point. The full process is completely automatic and requires no user adjustment.

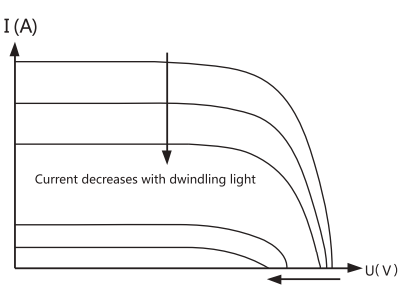


Fig. 1-3 Relation between solar panel output characteristics and illumination

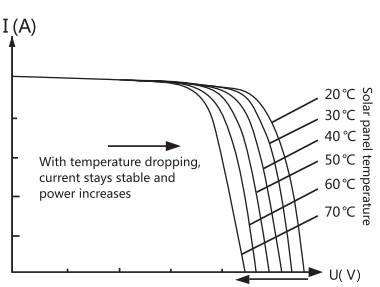


Fig. 1-4 Relation between solar panel output characteristics and temperature

1.5 Introduction to Charging Phase

1.5.1 Lead-acid battery charging

The Controller will adopt three-stage charging for lead-acid backup battery, and a full charging process includes: bulk charge (BULK), Equalization/Boost Charge (EQUALIZE/BOOST) and floating charge (FLOAT). The charging curve is as follows:

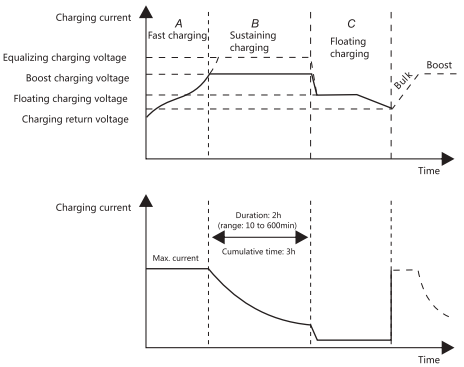


Fig. 1-5 Charging Curve of Lead-acid Battery

➢ **Bulk Charge(BULK)**

In the bulk charging stage, when the battery voltage has not reached the set value of full voltage (i.e., equalization/boost voltage), the Controller will perform MPPT charging to provide the maximum solar energy to charge the battery. Once the battery voltage has reached the preset value, constant voltage charging will be performed.

➢ **Equalization/Boost Charge (EQUALIZE/BOOST)**

When the battery voltage has reached the set value of the sustaining voltage, the Controller will charge the battery at a constant voltage, in this process, MPPT charging will not continue, and the charging current will gradually decrease over time. Equalization/Boost Charge consists of equalization charge and boost charge, and these 2 charging processes are not repeated, and equalization charging is started once every 30 days.

➢ **Equalization charge(EQUALIZE)**

Some battery types require regular equalization charging to balance the electrolyte, stabilize battery voltage and complete chemical reaction. Equalization charging will increase the charging voltage above the standard voltage, causing electrolyte gassing. Equalization charging time is 120 min (by default). Equalization and boost charging will not be repeated in a single full charge cycle to avoid excessive gas overflow or overheating of the battery.

➢ Equalization Charge

Warning: Explosion Risk!

Gas may be generated during equalization charging and the battery compartment must be well ventilated without foreign matters.

Notice: Equipment Breakdown!

Excessive charging or gas evolution may damage the battery plate, resulting in shedding of active substance. If the equalization charging voltage is too high or the duration is too long, the battery may be damaged. Please strictly follow the technical specifications of battery.

➢ Boost Charge(BOOST)

Generally, the default duration of the boost charging stage is 2h. Customers can adjust the hold time and preset boost voltage according to their needs. When the duration has reached the set value, the system will switch to floating charge.

➢ Floating Charge(FLOAT)

Floating charge can keep the battery voltage near the floating charging voltage. During this stage, the battery will be charged with very low current to keep it in the full-charged state.

In the stages of equalization charge, boost charge and floating charge, when the battery voltage is as low as "the boost recovery voltage", the System will exit the current charging stage and re-enter the BULK charging stage. As the charging proceeds, the battery voltage will slowly rise and the current will drop and then return to the constant voltage stage.

1.5.2 Lithium Battery Charging

The Controller will adopt two-stage charging for lithium backup battery: the first stage is bulk charging (BULK), i.e. under the condition of limiting the maximum charging current, solar and alternator (automobile) are maximized, and the battery voltage is rapidly increased to the set charging voltage; then the charging will enter the constant voltage stage till the battery is fully charged, and the charging current will gradually decrease in the constant voltage charging stage.

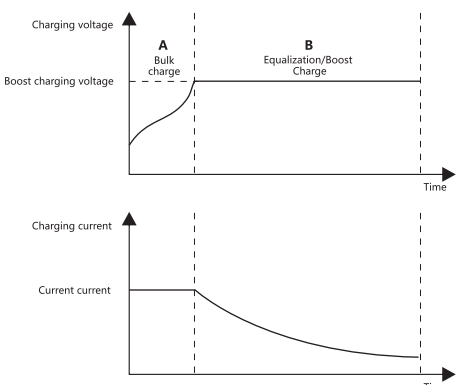


Fig. 1-6 Schematic Diagram of Lithium Battery Charging Stage

2. Product Application

2.1 Spec Chart

Parameter		Value
Model		RS-MPPT50DC
Backup Battery System Voltage		12V
Backup Battery Voltage Range		9~16V DC
Backup Battery Type		Sealed Battery, Gel Battery, Vented Battery, Lithium Iron Phosphate Battery, Custom-defined Battery
Rated Charging Current		50A
Maximum PV Input Voltage		55V DC
Max. Power Point Voltage Range		17~36V
Maximum PV Input Current		50A
Solar Panel Charging Mode		Buck MPPT
MPPT Efficiency		> 99%
PV input power is recommended		700W
Generator (Starter Battery) System Voltage		12/24V
Starter Battery Type		Lead-acid Battery
Maximum Generator Input Voltage		32V DC
Maximum Generator Input Current		65A
Generator Voltage Range	Conventional Generator	13.2 ~ 16V/26.4~32V DC
	Intelligent (Euro 6 Standard) Generator	12 ~ 16V/24~32V DC
Generator charging mode		Buck , Boost
Generator output power is recommended	12V Backup Battery	700W
PV charges the starter battery	Charging Voltage	Generator startup charging voltage-0.2V
	Charging Current	≤10A(12V); ≤5A(24V)
No-load loss		<1.1W
Maximum Charging Conversion Efficiency		96%
Temperature compensation factor		-3mV/ ℃/2V (Default value, the value of lead-acid battery can be set) ; No temperature compensation function for lithium battery
Communication method		TTL、RS485、CAN、BLE
Protection Function		Overcharging Protection, Overcurrent Protection, Overtemperature Protection, Generator Reverse Connection Protection, Solar Panel Reverse Connection Protection, Backup battery Reverse connection protection, Anti-reverse Charging Protection at night
Operating temperature		- 35℃ ~ 65℃
Altitude		≤3000m
Waterproof level		IP32
Product dimensions		221*175.8*92.4mm
Net weight		2.34kg

2.2 Battery Type Default Parameters

Default parameter table of each battery type

Parameters \ Battery type	Sealed lead acid battery SLD (default)	Colloidal lead -acid battery GEL	Open-type lead-acid battery FLD	Lithium iron phosphate battery LFP	Custom battery USER (default as SLD)
Overvoltage cutoff voltage	16.0V	16.0V	16.0V	16.0V	9.0 ~ 17.0V
Overvoltage return voltage	15.0V	15.0V	15.0V	15.4V	——
Equalization voltage	14.6V	——	14.8V	——	9.0 ~ 17.0V
Boost voltage	14.4V	14.2V	14.6V	14.4V	9.0 ~ 17.0V
Float charge voltage	13.8V	13.8V	13.8V	——	9.0 ~ 17.0V
Booster Return Voltage	13.2V	13.2V	13.2V	13.2V	9.0 ~ 17.0V
Low voltage reconnect	12.6V	12.6V	12.6V	12.6V	9.0 ~ 17.0V
Undervoltage recovery voltage	12.2V	12.2V	12.2V	12.3V	——
Undervoltage alarm voltage	12.0V	12.0V	12.0V	12.1V	9.0 ~ 17.0V
Low voltage disconnect	11.1V	11.1V	11.1V	11.1V	9.0 ~ 17.0V
Boost duration	120 min	120 min	120 min	——	10 ~ 600 min
Equalization duration	120 min	——	120 min	——	0 ~ 600 min
Equalization charging interval	30 d	——	30 d	——	0 ~ 250 d
Temperature compensation (mV/℃/2V)	-3	-3	-3	0	0、-3、-4、-5

Note: Please strictly follow the technical specifications and safety recommendations provided by the battery manufacturer to set relevant parameters.

2.3 Indicator Definitions and Description

2.3.1 Indicator Definitions

SN	Indicator Definitions
①	PV Charge Indicator
②	Alternator (automobile) indicator
③	Backup battery indicator
④	Alarm indicator

2.3.2 PV Charge Indicator

Indicator Color	Indication Mode	Description
Red	Normally ON	MPPT charging
	Slow flashing	Boost charging
	Single flashing	Floating charge
	Flashing	Equalization Charge
	Double flashing	Current-limit charging
	Extinction	Not charging

2.3.3 Generator (automobile) indicator

Indicator color	Indication mode	Description
Red	Normally ON	The generator (automobile) will charge the backup battery.
	Slow flashing	The solar energy will charge the starting battery.
	Flashing	Generator over-voltage
	Extinction	Not charging

2.3.4 Backup Battery Indicator

Indicator color	Indication mode	Description
Red	Normally ON	The battery voltage is normal.
	Slow flashing	Battery over-discharge
	Flashing	Battery over-voltage

2.3.5 Alarm Indicator

Indicator color	Indication mode	Description
Red	Extinction	The System is normal.
	Normally ON	System Alarm

2.4 Press Keys

Press Key 1-SELECT;
Press Key 2-ENTER

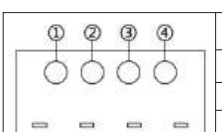
Under any menu, press and hold ENTER will enter the parameter setting menu, press ENTER will adjust the parameter value, press SELECT will switch different setups; press and hold ENTER again will save and exit the setting mode.

2.5 TTL Communication Interface

Users can use Modbus Protocol to monitor data and set parameters of the Controller through this Port.

1) Default Baud Rate of 9600bps; parity bit: no data bit: 8bit; stop bit: 1bit
2) Output specification of communication power: (12V±3V)/100mA

The interface is defined as follows:



TTL-COM

SN	DEFINITION
①	VCC Communication Power Output
②	RX Controller Data Receiver
③	TX Controller Data Transmitter
④	GND

2.6 RS485 & CAN communication

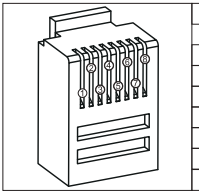
1) RS485 communication:

The default baud rate is 9600bps ; Parity: None; Data bit: 8bit ; Stop bit: 1bit

Interface type: RJ45, communication power output specification: 5V/200mA.

2) CAN communication: support RV-C protocol.

3) RJ45 interface communication line sequence definition:



No.	Definition
①	CAN_L
②	CAN_H
③	NC
④	NC
⑤	Ground/signal ground
⑥	B
⑦	A
⑧	Power supply positive

2.7 Backup Battery Temperature Sampling Interface

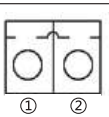
By connecting the temperature probe to Interface⑪, the real-time temperature of the battery can be sampled, and the default is 25°C if the temperature probe is not connected; if connected, the battery temperature will be sampled for high and low temperature protection or temperature compensation of charging voltage for lead-acid battery.

Connection Method: connect the temperature sensor terminal to Interface⑪, and fix the sensor on the battery surface.

2.8 Ignition Signal Interface

The starting charging voltage of intelligent alternator(automobile) different from conventional alternator. If it is an intelligent generator, it is necessary to connect the ignition signal line to⑩. The starting charging voltage of conventional alternator is 13.2V, while that of intelligent generator is 12.0V. It is also allowed to connect only one positive wire here.

The interface is defined as follows:



IGN

SN	DEFINITION
①	+
②	–

2.9 Remote Switch Interface

The external switch can be used to control whether the controller is charged. If the switch is short-circuited, it will stop charging, and if the switch is open, it can be charged.

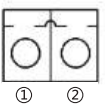
ON/OFF

SN	DEFINITION	Remarks
①	+	Charging is prohibited in case of a short circuit, but allowed when the connection is open.
②	–	

2.10 Backup Battery Voltage Compensation Interface

Due to configuration, the charging power is high and the wire diameter from the battery to the Controller is slightly smaller, causing the battery voltage collected by the Controller higher than the actual voltage at the battery end, resulting in the battery not fully charged; to a certain extent, through the battery voltage sampling wire, the battery terminal voltage can be collected more accurately and the differential voltage compensation can be output in time, so that the battery terminal can get a more reasonable charging voltage. Connect the positive and negative poles of the battery to the interface ⑧. Pay attention to the voltage compensation port of the backup battery. Ensure that the positive to the left and the negative to the right.

The interface is defined as follows:

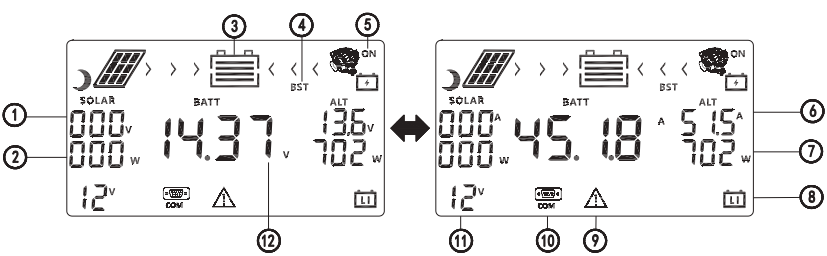


SN	DEFINITION
①	+
②	–

3. Product Operation and Display

3.1 Main Page

The main interface of LCD screen dynamically displays real-time operation data (voltage/current/power), charging status, system information, etc., and automatically switches between real-time voltage and current every 10s.

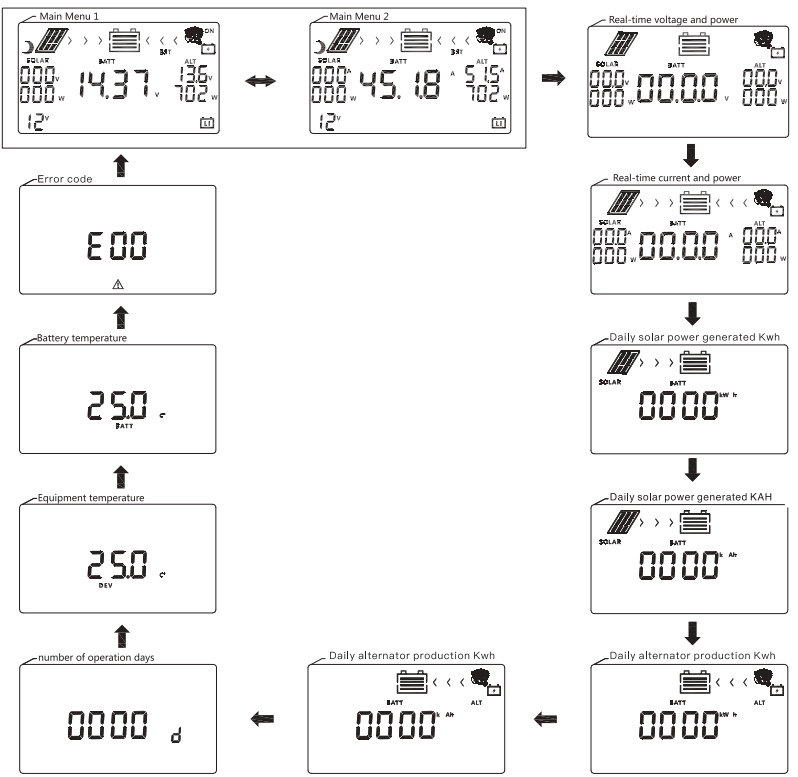


No	Description	No	Description
①	Photovoltaic module voltage/current	⑦	Real-time charging power of alternator
②	Real-time charging power of photovoltaic module	⑧	Backup battery type
③	Back-up battery charge	⑨	System alarm prompt
④	Charging mode	⑩	Communication connected prompt
⑤	Alternator(automobile)start-up/shut-down prompt	⑪	System voltage
⑥	Alternator (automobile) charging current/voltage	⑫	Backup battery voltage/current

3.2 Menu Browsing

Press the [SELECT] button to enter the menu for browsing, and check the real-time voltage, real-time current, photovoltaic power generation watt-hours, photovoltaic power generation ampere-hours, alternator power generation watt-hours, alternator power generation ampere-hours, number of equipment (automobile) operation days, equipment temperature, backup battery temperature and alarm code in turn.

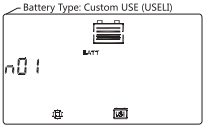
Note: The recording rule of equipment operation days is that when the photovoltaic voltage drops below 5V and the generation (automobile) has failed to work for 2h, the recorded number will be increased by one day.



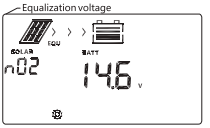
3.3 Parameter Settings

① In the main interface, press and hold the [ENTER] key to enter the parameter setting interface;
② After entering the interface, press [SELECT] briefly to browse parameters n01~n16;
③ If you need to modify the parameter, press [ENTER] briefly, then the parameter will flash;
④ Press [SELECT] briefly to adjust the parameter;
⑤ Press [ENTER] briefly to confirm the parameter;
⑥ Press and hold [ENTER] or return to the main interface if no operation for 10s.

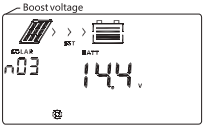
Battery Type: Custom USE (USELI)



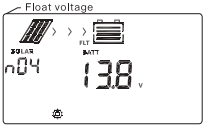
Equalization voltage



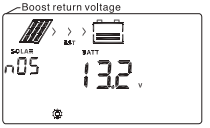
Boost voltage



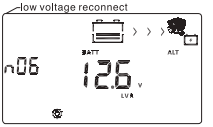
Float voltage



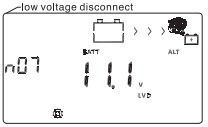
Boost return voltage



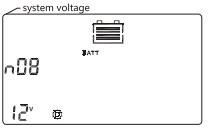
low voltage reconnect



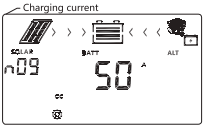
low voltage disconnect



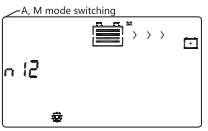
system voltage



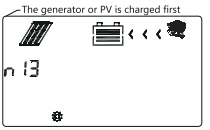
Charging current



A, M mode switching

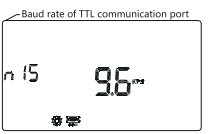


The generator or PV is charged first



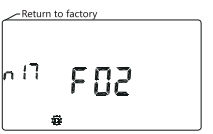
Temperature unit

Baud rate of TTL communication port



System restart

Return to factory



Clear historical data

Parameters	Setting Instructions
n01	Backup battery type selection, can be set to FLD, SLD, GEL, LI, USE, USELI.
n02	Equalization charging voltage, USE battery type can be set, ranging from 9V to 17V
n03	Boost charging voltage, USE and USELI battery types can be set, ranging from 9V to 17V
n04	Float charging voltage, USE battery type can be set, ranging from 9V to 17V
n05	Charging return voltage, USE, USELI battery type can be set, ranging from 9V to 17V
n06	Over-discharge return voltage, USE and USELI battery type can be set, ranging from 9V to 17V
n07	Over-discharge voltage, USE and USELI battery type can be set, ranging from 9V to 17V
n08	System voltage
n09	Charging current to be set from 0A to rated charging current
n12	Start the battery charging mode, where A stands for automatic mode; M stands for manual mode.
n13	Backup battery charging mode, photovoltaic priority or generator priority
n14	Temperature unit, optional ℃ or ℉
n15	TTL communication baud rate to be set from 4,800 to 115,200kps
n16	System Reboot
n17	Restore factory settings
n18	Clear up history

Remarks:
1. Items n02~n07 can only be adjusted when the battery type is set to USE or USE LI mode, and other battery types are displayed as fixed values.
2. N12 can select the charging method for starting the battery. Among them, mode A is an automatic mode, which requires the participation of photovoltaic to charge the starting battery. The M mode is a manual mode. After switching to the M mode, the backup battery can be forced to charge the starting battery for 60 seconds within 90s after the M mode takes effect, and it will automatically switch back to the A mode after overtime.

3.4 System Alarms

System Alarm	Meaning	Description
E0	No fault	N/A
E1	Backup battery over-discharge	Indicator prompt
E2	Backup battery over-voltage	Charging stopped
E3	Backup battery under-voltage	The indicator shows normal charging
E6	Equipment over-temperature	Derating charging according to over-temperature strategy
E7	Battery over-temperature	Charging stopped
E8	Excessive solar panel power	Limited charging
E10	Solar panel over-voltage	Charging stopped
E15	Battery disconnected or lithium battery feed protection	
E19	Battery low-temperature	Charging stopped
E22	Alternator over-voltage	Battery not charging
E23	Excessive alternator power	Limited charging

3.5 Common Problems and Solutions

Phenomenon	Possible Problems	Solution
After the backup battery is connected for energizing, there is no response and the indicator lamp is not ON	A. Wrong or loose connection of backup battery B. Lithium battery protection is activated	A1. Please check whether the connection of backup battery is correct and tight; B1. Connect a solar panel or an alternator (automobile) to charge and an activate the the lithium battery.
The Controller cannot charge the backup battery through the solar panel during the daytime.	A. Wrong or loose wiring with the solar panel B. The solar panel being blocked C. Error in Setting Backup Battery System Voltage Level	A1. Please check whether the connection of solar panel is correct and tight; B1. Ensure that the solar panel is not blocked; C1. The system voltage level set by the Controller is identical with the actual battery voltage level.
The backup battery cannot be charged by the alternator(automobile) while the vehicle is running.	A. Wrong or loose wiring of alternator (automobile) B. Error in Setting Backup Battery System Voltage Level	A1. Please check whether the connection of alternator (automobile) is correct and tight; B1. The system voltage level set by the Controller is identical with the actual battery voltage level.

4. Product Installation

4.1 Installation Precautions

- Be very careful when installing the battery. Wear protective glasses when installing the open-type lead-acid battery. Once contacting with battery acid, please rinse with clear water in time.
- Avoid placing any metal object near the battery to prevent short-circuiting.
- Acid gas may be generated when the battery is charged so as to ensure good ventilation of surroundings.
- The battery may produce flammable gas, please stay away from sparks.
- Direct sunlight and rainwater infiltration should be avoided during outdoor installation.

- Virtual junctions and corroded wires may cause great heat, melt wire insulation, burn surrounding materials, and even cause fires. Therefore, it is necessary to ensure all connectors are tightened, and wires are preferably fixed with ties to avoid loose connections from vibrations during mobile applications.
- Once the System is connected, the output voltage may exceed the safe levels for human body. During operation, using insulating tools and ensure your hands are dry to avoid accidents.
- The battery terminals on the Controller can be connected to either a single battery or a group of batteries. Subsequent instructions are for a single battery but applicable to systems with a group of batteries as well.
- Please follow the safety recommendations of battery manufacturers.
- The System's connection wire shall be selected according to the current density no more than 4A/mm2.
- Ground the controller's earth terminal.
- Never connect the battery in reverse, as this can cause irreversible damage during installation.

4.2 Reference for Wire and Fuse Type Selection

The wiring and installation must comply with national and local electrical specifications.

PV, alternator(automobile) and battery wiring must be selected according to rated current.

Please refer to the following table for wire and fuse specifications:

Model	PV terminal Maximum input current/A	PV terminal wire gauge	PV terminal Fuse Spec/A	Altemator terminal maximum input current /A	Alternator terminal wire gauge	Alternator terminal fuse spec/A	Backup battery terminal current	Backup battery terminal wire gauge	Backup Battery Terminal Fuse Spec/A
RS-MPPT50DC	50A	13mm²/ 6AWG	60~70A	65A	18mm²/ 4AWG	80~90A	50A	13mm²/ 6AWG	60~70A

4.3 Installation and Wiring

Warning: Danger of Explosion! NEVER install the Controller and open the battery in the same enclosed space! Do not install it in areas where battery gases may accumulate.

Warning: Danger of High Voltage! Photovoltaic arrays may produce high open-circuit voltage, so please be sure to disconnect the circuit breaker or fuse before wiring and be careful in the process of wiring.

Warning: Danger of electric shock! We strongly recommend to install fuses or open circuits on the PV array side, alternator(automobile) side and battery side.

Notice: When installing the Controller, ensure enough air flowing through the heat sink, and reserve at least 150mm space above and below the Controller for natural convection. If the controller is installed in an enclosed box, ensure adequate ventilation for heat dissipation.

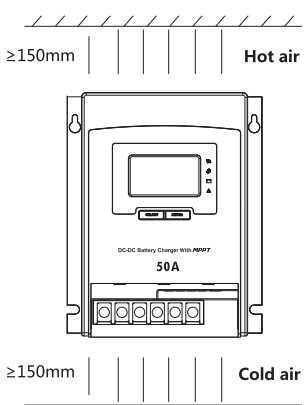


Fig. 4-1 Installation and Heat Dissipation

Step 1: Select the installation position

Avoid installing the Controller in a place with direct sunlight, high temperature and easy to water flooding, and ensure good ventilation around the Controller.

Step 2: Fix the suspension screws

Mark the installation position according to the mounting size of the Controller, bore 2 holes with appropriate size for mounting at the 2 marks, and fix the screws on such 2 holes.

Step 3: Fix the Controller

Align the Controller fixing hole with 2 screws fixed in advance, then hang them up, and then fix 2 screws below.

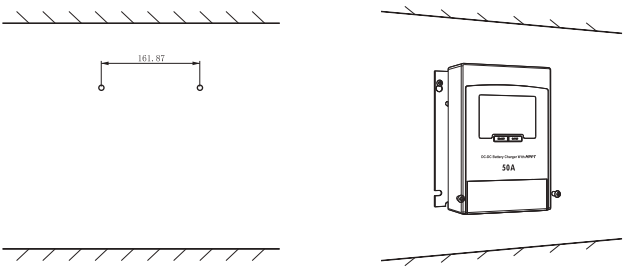


Fig. 4-2 Fixing the Controller

Step 4: Connect the Wire

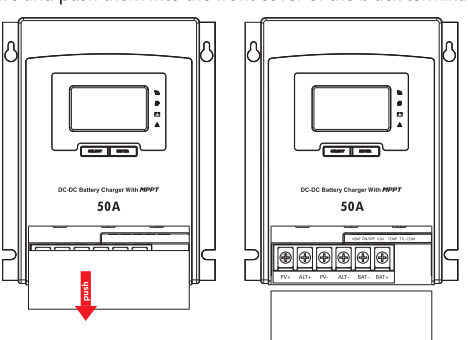
4.1 Crimping: select wire with appropriate specification according to the system configuration, and press one end of the wire to the standard copper terminal;

4.2 Wiring: Connect the wiring hole of copper terminal into the corresponding wiring port on the Controller.

Step 1: Push open the black terminal cover in the direction of [push] arrow in the following left picture;

Step 2: Access the corresponding interface according to the screen mark of each terminal, and pay attention not to connect the positive and negative in reverse;

Step 3: Finish the wire and push them into the front cover of the black terminal.



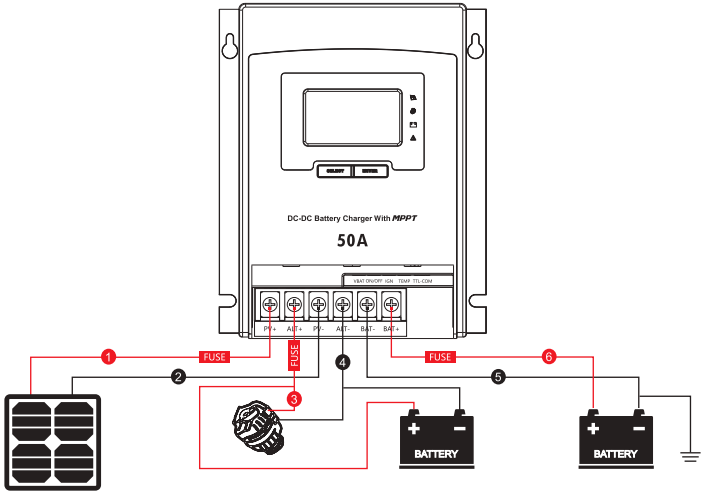


Fig. 4-3 Wiring Sequence

Warning: Danger of electric shock! We strongly recommend connecting fuses or circuit breakers at the photovoltaic array, load and battery end to prevent electric shock hazard in the process of wiring or due to misoperation, and ensure that the fuses or circuit breakers are disconnected before wiring.

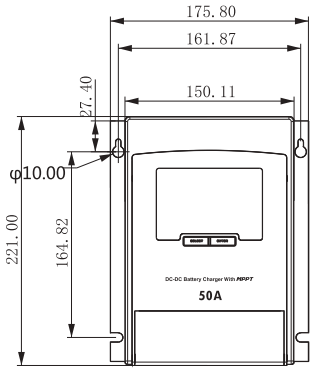
Warning: Danger of High Voltage! Photovoltaic arrays may produce high open-circuit voltage. Always disconnect the circuit breaker or fuse before wiring and be careful in the process of wiring.

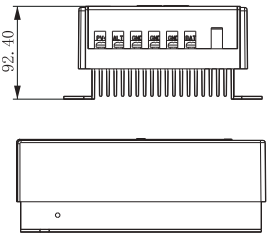
Warning: Danger of Explosion! Short-circuiting the battery's positive and negative terminals, or wires connected to them, can cause a fire or explosion.
Please connect the battery first, then the battery panel, and finally the load and connect "+" first and then "-" in the process of wiring.

When all power wires are securely connected, double check the wiring is correct and the positive and negative are correctly connected. Once confirmed and found no error, connect the battery fuse or circuit breaker first, and check whether the LED indicator light is lit. If not lit, please cut off the fuse or circuit breaker immediately and then check the wire is connect.
If the battery power is energized normally, connect the battery panel again. If the sunshine is sufficient, the charging indicator on the Controller will be normally on or flashing and the charging has begun.

Note that the installation position of battery fuse should be as close to the Controller as possible, and the recommended installation distance should not exceed 150mm.

5. Product Size





Product Size: 221*175.8*92.4mm
Installation Size: 161.9*164.8mm
Mounting Hole Position: φ10mm

6. Bluetooth Information

RS-MPPT50DC has a built-in Bluetooth module, which can realize wireless monitoring, parameter setting and data browsing through mobile APP

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