V 1.4

SDH Series

SDH-12100-40W SDH-12100-60W

SDH-24100-40W SDH-24100-60W SDH-24100-100W

SDH-P-12100-10A SDH-P-12100-15A

SDH-P-24100-10A SDH-P-24100-15A

Grid Solar Hybrid Controller with built in LED Driver
Grid Solar Hybrid Charge Controller

USER MANUAL

Contents

1.0 SDH Series Introduction

1.1 Product Description

SDH Series Grid solar hybrid controller with built in LED driver,with all functions in one,including grid(public power AC power)charger,solar charger,LED constant current source output,smart digital control etc.When the battery power is insufficient to supply load, Grid charger will start automatically.Has the function of BMS(battery management system),intelligent development of grid and solar energy,make priority use of solar energy and grid energy as back up,the same time,grid energy can supply the load for any emergency to continuing working.on the other hand, due to solar energy is not stable from solar panel,grid power can effectively compensate for the solar energy. On PCB board,with built in LED driver, can be directly to the LED panel light.Therefore. Widely used in street light,garden Lights and express high way lighting system.

Grid solar hybrid charge controller,can be applied to use different loads as the same as battery voltage,like DC motor,LED driver etc.

1.2 Main Features

1.2.1.-35~55℃ wide temperature range full power working, high accuracy, high efficiency, low power consumption.

1.2.2. Can replace the solar controller and LED driver separate system,make all together to make the whole system more efficiency and easy to set up,fast installation and easy maintain.

1.2.3 parameters of programmable,lighting time and power is adjustable by user with remote as requested.

1.2.4 perfect protection function, the controller itself and the peripheral has comprehensive protection function,like battery over charge and discharged protection,over voltage protection etc.

1.2.5 high efficiency power supply technology, compact design, compact size, high performance price ratio, can be installed in a small space, the full waterproof design, protection grade reaches IP67.

1.2.6 battery charging and discharging intelligent management function. Maximum protection to extend battery life.

1.2.7, Infrared human body induction voice, Doppler microwave induction and remote RS485 communication function(Optional).

2.0 Installation & Operation

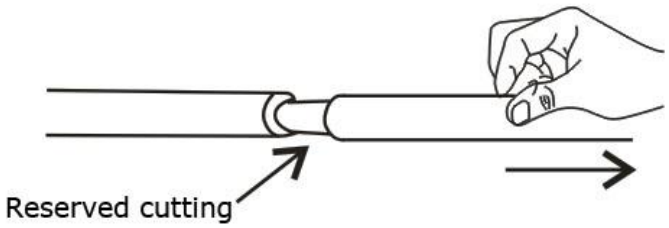
2.1 Mounting

The controller is mounted to avoid direct sunlight, high temperature and easy to be immersed in the position. Pay attention to the bottom of the device, the radiator in the full power operation of the radiator to reduce the role of temperature. Should avoid blocking, to ensure that natural convection heat. When installed in the narrow pole position, the best will be installed on the radiating rib along the airflow direction.

2.2 connected load

For the installation of safety, we recommend the installation of the order of the battery, the battery, the ground wire and the power of the battery.

2.2.1. from the junction reservation opening the insulating peel off lead.



2.2.2.Connected the controller and the load of the lead wire cross each other, and then clinging to each other's lead in the second

half of the cut, and forced to tighten(see picture in following). This kind of connection mode current contact area is bigger, the connection force is also relatively strong. Can ensure reliable connection. The connecting point and the corrosion of the imaginary line may cause great heat to melt the wire insulation layer, burning around the material, and even cause fire, so to ensure that the connecting head is tightened, the wire is best to use the tie bar are fixed, to avoid the use of wire and cable when the application is caused by loose connection.

2.2.3 Use waterproof insulation tape to wrap the lead exposed part of good. In order to ensure its reliability, can be the first to use rubber self-adhesive tape wrapped in layers, and the outer package of electrical tape. To avoid long-term in a humid environment, electrical tape aging off. Cause short circuit accident.

(all the cables connection should be done obey this way)

2.2.4 Grid Solar Hybrid Controller with built in LED driver:

LED chips panel light source can be directly rated voltage and rated current in the range of operating parameters. Before connecting, please first make sure that the parameters of the lamp within the scope of the lamp cap, otherwise may cause protection controller and even burning of the LED lamp.

2.2.5 Grid Solar Hybrid Charge Controller

The load terminal can be connected to the same DC power equipment, the controller takes the battery voltage to the load.

2.2.6 After the battery is connected to the 10S, the controller will be the minimum current output. To verify whether the load is connected correctly.

2.2.7 Connect Battery

Before connecting the battery, make sure that the battery voltage is higher than the 9V(for 12v system) to start the controller. If the system is 24V, to ensure that the battery voltage is not less than 18V. After the battery is connected, the controller starts to work.

2.2.8 Connect PV panels

Controller can be applied to the 12V, 24V of the off grid solar module, also can use the open circuit voltage does not exceed the specified maximum input voltage of grid components. The solar module voltage in the system is not less than the system voltage.

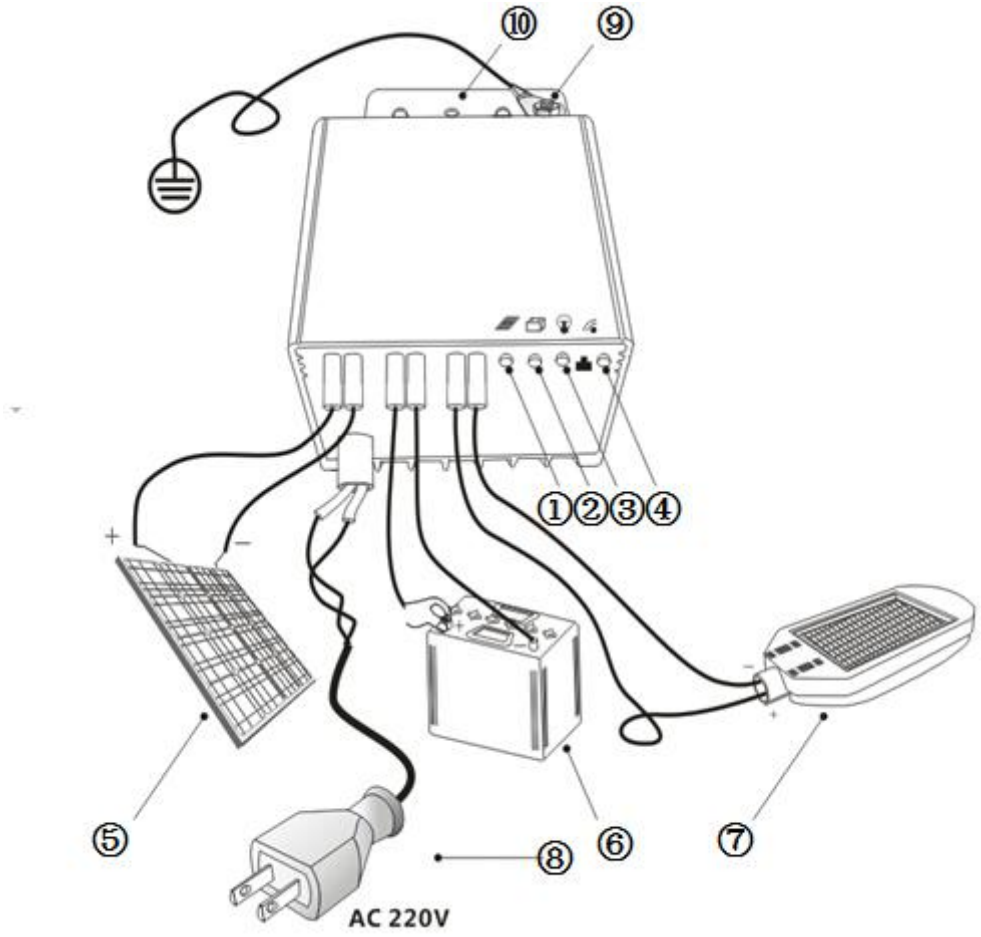
2.2.9 Connect Ground Cable

Connect the ground cable terminal A to the controller body of the installation hole,ground cable terminal B to the ground or the street lights pole,attention to prevent electric shock caused by insulation damage.

2.2.10 Connect Grid AC power

This is the last step to connect all cables,then power on the controller with AC power,Attention that the voltage is much higher than the human body can withstand the safety voltage, please do a good job to prevent electric shock!

3.0 LED Indicators



3.1 PV&Grid Indicator(①)

Color	Indication	Working State
Green	On Solid	PV Voltage higher than L-Ctrl voltage.
Green	Flash Fast	Battery is over voltage
Green	OFF	PV Voltage higher lower L-Ctrl voltage.
Red	On Solid	Grid AC is Charging
Red	OFF	Grid AC is NOT Charging
Red	Flash Slow	Grid Ac Connection is fault,recheck.

3.2 Battery Indicator(②)

Color	Indication	Working State
Green	On Solid	Battery is Normal
Green	Flash	Battery is full
Yellow	On Solid	Battery is under voltage
Red	On Solid	Battery is over-discharged, turn off Load auto

3.3 Load Indicator(③)

Color	Indication	Working State
Yellow	On Solid	Load is ON
--	OFF	Load is off
Yellow	Flash Fast	Load short circuit or open circuit 4HZ
Yellow	Flast Slow	Load string number is too low Or overload limited power output

3.4 Indication

No.	**Indication**
④	The infrared communication port
⑤	Solar panel
⑥	Battery
⑦	LED lamp or LED driver
⑧	Grid Ac Power connection cable
⑨	Ground Cable connection
⑩	Installation parts

4.0 Work Mode

4.1 Charge(Lead-acid,Gel Battery are divided into four stages)

4.1.1 Fast Charge Stage

When battery voltage has not yet reached full voltage setting value, will be a fast charge, the controller will provide 100% of the available solar energy for the battery charge.

4.1.2 Boost Charge Stage

When the battery has recharged to the Boost voltage setpoint, constant-voltage regulation is used to prevent heating and excessive battery gassing. The Boost stage remains 60 minutes and then goes to Float Charge. Every time when the controller is powered on, if it detects neither over discharged nor overvoltage, the charging will enter into boost charging stage.

4.1.3 Direct Charge Stage

Keep the battery in the direct charging stage of the accumulative time of 120 minutes, and then transferred to the floating charge stage. Automatically enter the charge stage of each battery when the system detects.

4.1.4 Float Charge Stage

After the Boost voltage stage,SDN-M will reduce the battery voltage to Float voltage set point. charging with a smaller voltage and current,to keep battery full to avoid the battery itself loss and small power load. It will reduce the temperature of battery and prevent the gassing, also charging the battery slightly at the same time. The purpose of Float stage is to off set the power consumption caused by self consumption and small loads in the whole system, while maintaining full battery storage capacity.

In Float stage, loads can continue to draw power from the battery. In the event that the system load(s) exceed the solar charge current, the controller will no longer be able to maintain the battery at the Float set point. If the battery voltage remains below the boost charge reconnecting voltage, SDN-M will stop float charge stage and return to direct charge stage.

4.1.5 Grid AC Power Charge

Both Grid and PV charge charge battery,it is solar charge as priority,but when the battery is over discharged and solar is not available,AC charger starts,until the battery is charged full,so that battery can offer complete energy for the load,when battery is full,AC charge stops,to make full use of solar energy in daytime.

4.2 Discharge

4.2.1 Light control (L-Ctrl)mode

When there is no sunlight, light intensity is reduced to a starting point, after setting the optical delay time, the controller determined that the starting signal, the opening of the load, load to work; when there is sunshine, the light intensity increase to start above and delay controller 2 minutes confirmed after the closing of the output signal turns off the output and the load stops working.

4.2.2 Auto (Light control+timer) mode

When there is no sunlight, light intensity is reduced to a starting point, delay controller after setting the optical delay time, confirm the start signal, the opening of the load and for a period of time from the start time until the load work full set one to five times the total work time after it is closed. If the setting time of the six time is not 0, the controller will open the load in the morning, and continue to work with the six time period.

4.2.3 Testing Mode

For system testing,the same as light control mode.the only difference is that canceling judgement of light signal to control the output(cancel 2 minutes delay), retain all other functions. When there is no light signal,the load will be on immediately,and when there is light signal comes,the load will be off immediately,this

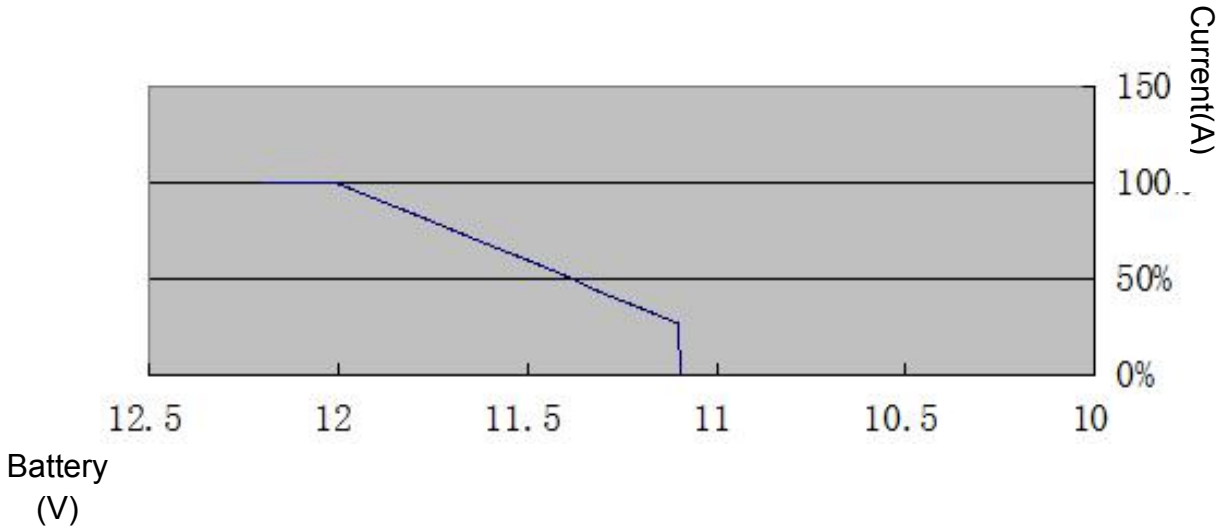
function is used for solar system testing when first installation,to check whether all the connections is correct or not.

4.2.4 Manual ON/OFF mode

This manual mode is for turning ON or OFF the load by manual. press the remote control function with ON/OFF button(F1).

4.2.5 Smart Mode (Optional)

Mode 1: According to the battery charge and discharge status ,Output Power(Current) will automatically optimize automatically to extend the LED lamp working hours.
① When the battery capacity is low, the controller will follow the diagram of "1.1 Load Current Output Curve", reduce power output current to extent the LED lamp working hours.
②In winter, when weak sunlight makes the charging less, equipment will enter into half-power mode automatically.



Load Current Output Curve

Mode 2: Rely on external infrared and sound sensors to control load power
This mode need to connect an external IR sensor or sound sensor to sense whether someone pass.When nobody passes, Output Power will reduce to the lowest power working to save energy.

5.0 Protection

5.1 Battery over charge & discharge protection

In charge charge process,when the battery is charged full and enter into float charge,SDH will protect the battery from over charged to prevent explosion or damaged.

In the discharge process,the battery exceeds the discharge voltage points ,if continue to discharge,may cause the battery internal damaged,positive and negative electrode active material will be damaged also, resulted the battery capacity reduced. When the battery reaches the protective voltage points, the controller enters the protection state and turn off the load. Only when the battery voltage is higher than the charge return voltage,controller will exit from protection.

5.2 Over voltage protection

When the battery terminal voltage is raised to over voltage protection voltage, the controller enters the over voltage protection state and turn off the load output to protect the load without damage. When the battery terminal voltage is lower than the over voltage protection, the controller exits the over voltage protection,load will be turned on automatically.

5.3 Over Power and current protection

When the load power exceeds the rated power 5%, 1.25 times rated current for 60s,will enter the limited power protection mode, to avoid controller damage.

5.4 Load fault protection

If there is a short circuit or open circuit, the controller will automatically protect the load,indicator will flash, and each time controller automatically detects whether the fault has been solved; if problem not been solved for more than 7 minutes, the controller will turn off the load, until the second day after the failure solved.

5.5 Over temperature protection

When the controller itself is too high. To avoid damage, the controller will cut off the load output and charge and stop working.

5.6 Temperature sensor fault protection

When the temperature sensor is short or damaged, the controller will work at 25 degrees centigrade to avoid the wrong temperature compensation for the storage battery.

5.7 Battery polarity reverse connection protection

When the battery polarity is reversed, the controller will not be damaged, and the correct connection error will continue to work.

5.8 The solar panel of reverse protection

The controller will not be damaged when the polarity of the solar panel positive and negative is reversed.

6.0 Trouble shooting

Phenomenon	Analysis	Solutions
·In daytime,PV indicator is dark ·In daytime,Load is on ·Load work for the whole night	·solar panel cables connection mistake。	·check solar panel cables connection is correct or not。 ·cut off the solar panel cables connection with solarcontroller,check the volage of VOC,then reconnect.
·Load Indicator flash fast & LED lamp not work.	·LED lamp cable is open circuit or short circuit. ·LED lamp is broken or LED chips connection not meet driver range.	·recheck the LED lamp cables connection is correct or not. ·cut off LED lamp connection cables,then reconnect.
·Load Indicator flash fast & LED lamp flash also.	·after LED lamp power on,work for few seconds,then off,LED lamp flash fast.	·LED chips series connection over the controller output range.LED chips series connection is too much or less,pls refer to parameter table to adjust the LED chips connection.
·Load Indicator flash slowly	·Output power over the controller rated power	·Low down the output current
·Battery indicator is red ·LED turn on for a short time。	·Battery voltage is low。 ·Cables resistance is too big or the battery is damaged	·If this occurs often,then need to check PV charging is normal or not,solar panel is blocked or not,or other reasons caused PV not charge normally. ·Battery quality is good or not. ·Check the battery cables is too long or if there is any connection not good to battery.

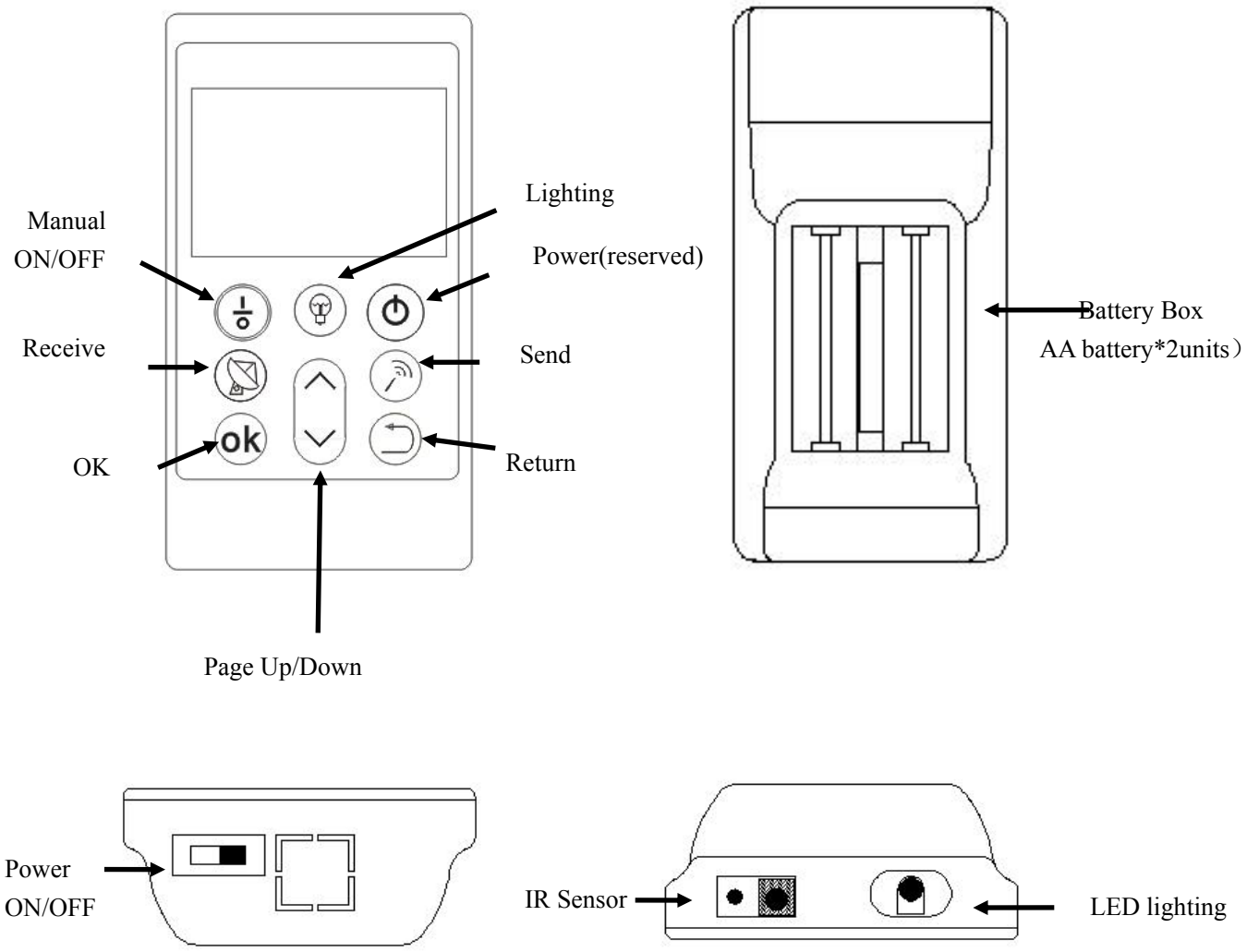
7.0 Technical Data

Product Name		Waterproof Grid Solar Hybrid Controller with built in LED Drvier/Hybrid Controller	
Model		SDH-12100-40W SDH-12100-60W SDH-P-12100-10A SDH-P-12100-15A	SDH-24100-40W SDH-24100-60W SDH-24100-100W SDH-P-24100-10A SDH-P-24100-15A
Grid Specification	Input Voltage	220AC±20%	
	Output Power	≤100W	
	Output Voltage	14.5V/12V	29V/24V
	Output Current	7A/12V	3.5A/24V
Battery Specification	System Voltage	12V	24V
PV Specification	Max.Voltage	55V	
	Max. Current	10A/15A	
Output (SDH with Driver)	Max.Output Power	40W;60W/12V;　40W;60W;100W/24V	
	Output Voltage	15～55V	
	Output Current	150mA~3.3A （Optional up to 5A）	
	Ripple	≤600mV	
	Current Accuracy	±3%	
	Efficiency	92～96%	
	Work Mode	L-ctrl+Timer+constant current+6 periods+dimmer	
Output (SDH-P controller)	Output Current	10A/15A	
	Output Voltage	Same as battery voltage	
Dimension(L* W *H)		130*83.5*49.5mm	
Weight		0.8kg/unit	

8.0 IR Remote Control

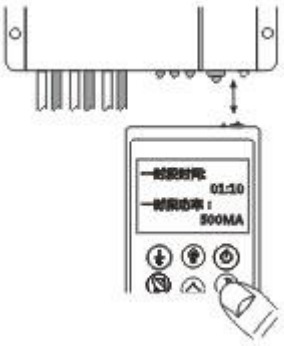
8.1 Diagram

SDH Series need IR Remote(RC-DER2 and Mini-RC)to change parameters.

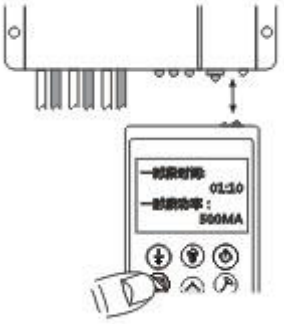


8.2 RC-DER-2 Instruction

1.Set all parameter well in remote

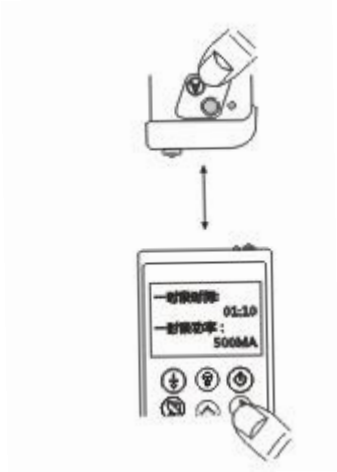


2..Press “send”button to send the Signal from remote to controller

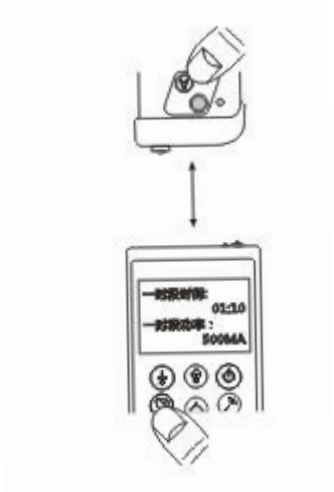


3. Press “Receive”button to recheck the specification set is correct or not.

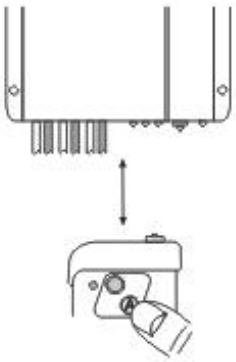
8.3 Mini RC Instruction



1.Press mini RC “A”button continuously,the same time,press RC-DER-2 button“send”to transfer signal and saved.



2.Press mini RC “A”button continuously,the same time,press RC-DER-2 button“receive” to check the specification saved.



3. Transfer the signal to the controller from mini RC.

8.4 IR Remote Instruction.

Name	Parameter(default)	Adjust Range	Step	Unit
1st period working time(Hours)	9	00:00-09:00	00:10	h
1st period working power(Current)	150	150-8000	50	mA
2nd period working Hour(Hours)	0	00:00-09:00	00:10	h
2nd period working power(current)	150	150-8000	50	mA
3rd period working time(Hours)	0	00:00-09:00	00:10	h
3rd period working power(current)	150	150-8000	50	mA
4th period working time(Hours)	0	00:00-09:00	00:10	h
4th period working power(current)	150	150-8000	50	mA
5th period working time(Hours)	0	00:00-09:00	00:10	h
5th period working power(current)	150	150-8000	50	mA
6th period working time	0	00:00-09:00	00:10	h
6th period working power (current)	150	150-8000	50	mA
Work Mode	Auto	Manual,auto, L-Ctrl,Test		
Smart mode		Mode 1,Mode 2,OFF		
Advanced set		ON/OFF		
L-ctrl time	10	2-60	1	min
L-ctrl Volt	5	3.5-9.9	0.1	V
Battery Type	Lead acid	Lead-acid, Gel,DIY		
Over voltage	17	15-18	1	V
O-Discharge voltage	11.1	10.5-13	0.1	V
O-Discharge voltage return	12.6	11-14	0.1	V
Float charge voltgge	13.6	13-15	0.1	V
Boost voltage	14.6	13-15	0.1	V
System Voltage	12V	12V/24V		
Charge voltage	14V	8-18	0.1	V
Charge Current	10A	0.1-10	0.1	A

9.0 Warranty

Warranty Card

Product Name_____

Product Model_____

Serial number_____

Date of purchase：____Date_____Month_____Year

Company Name:_____

Contact:_____

Address: _____

Tel:_____

1. The product warranty period is two years since factory.
2. During the warranty period, any problem caused by normal use under the user manual (determined by the controller factory), reparation is free of charge.