JN-K、JN-R Series PWM Solar Charge Controller

Product manual

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Catalog

1.Safety instructions

1.1 Security identity

The following safety symbols may appear in this manual with the following meanings

Safety symbols	meaning
dangerous	ignoring safety warnings,it can lead to serious accidents that could result in personal injury.
warning	Indicates that if safety warnings are ignored, there is a risk of serious injury accident, serious damage to equipment or interruption of major business
attention	Indicates the risk of moderate injury accident, moderate equipment damage or partial business interruption if safety warnings are ignored.
nstructions	Indicates that the content is additional information to the body.

For electrical and electronic equipment, safety involves the whole process of installation, commissioning, operation and maintenance。So，Improper use or improper operation will endanger the life and personal safety of operators or third parties as well as the safety of equipment。In order to avoid casualties and equipment damage, the operation and maintenance process must strictly comply with the following dangerous, warning and attention to the safety information tips.

1.2 Safety instructions

Warning！

All installation of the controller must be performed by a professional technician。The professional technical personnel must go through the special training, read the manual completely and master the operation related safety matters.

The company shall not be liable for any injury caused by non-professional installation operation.

Failure to install and operate the controller according to the instructions in this manual will not be covered by our warranty.

① Before installation

Attention！

When receiving the product, please check whether controller is damaged in the process of transportation. If there is any problem, please contact the company or the transportation company immediately.

② During installation

Before installing the controller, make sure that the controller is not electrically connected or energized.

Warning！

The controller damage caused by the following circumstances or other losses will not be covered by our warranty.

When the photovoltaic array is configured, ensure that the maximum short-circuit current of the dc side is within the allowable range of the controller, otherwise the controller may be damaged irrecoverable.

When the photovoltaic array is configured, it is important to ensure that the open circuit voltage of each photovoltaic cluster string does not exceed the maximum input range of the controller, otherwise it will cause non-recoverable damage to the controller.。

The charging current of the selected controller should not be greater than 0.3 times the battery capacity. If it is greater than 0.3 times the battery capacity, the battery will be damaged or the battery life will be reduced.

Improper installation environment of controller will affect machine performance and may cause machine damage.

Do not install the controller in flammable or explosive places or storage places for flammable or explosive materials.

Do not install the controller where there is explosive danger.

Do not install the controller where lightning may strike.

Do not install the controller where there is a lot of salt spray.

When controller is running, it is necessary to ensure the normal air convection around it.

The controller shall be installed in an upright position and shall ensure that the air duct is free from obstruction.

 Warning!

Before all devices are fully connected, be sure to disconnect the photovoltaic array end, battery end, load end and other open (circuit breaker) or fuse.

Prevent water from entering controller.

 Attention!

All electrical installations must comply with local and national electrical installation standards.

To ensure safe operation, proper grounding, proper conductor size and necessary short circuit protection are required.

The connection cable must choose suitable specification, the connection is firm and the insulation is good.

Check all wiring connections are tight after installation to avoid the risk of heat accumulation due to virtual connections.

③ During operation

 Dangerous!

Do not open the machine cover when the controller is live!

④ Maintenance

 Dangerous!

Maintenance work shall be carried out by professional maintenance technicians.

The controller needs power off before maintenance. After power off, it can be removed after 5 minutes.

2.Product features

2.1 Overview

First of all, thank you for buying and using our JN-K and JN-R PWM mode solar controllers, in order to better understand and use our products.Please read the manual carefully before installing and using this product and keep it properly.The installation and debugging of the product shall be conducted in accordance with this manual.Improper installation and operation may cause personal injury, equipment damage and property damage.

This series of controller adopts the most advanced CNC technology design, LCD display, automatic operation。Using pulse width modulation (PWM) type battery charging mode and unique control technology will greatly improve the battery life.

2.2 Product features

This controller is applicable to solar off-grid system and can automatically control the charging and discharging process。Its comprehensive self-test function and electronic protection function can avoid controller damage caused by installation error and system failure.

◆ Using CPU processor with high speed and superior performance, the high precision A/D sampling ensures the accuracy of sampling；

◆ Intelligent temperature control descending current charging

◆ 12V/24V battery system voltage automatic identification, 48V separate battery system

◆ Efficient PWM charging method prolongs the battery life and improves the system performance

◆ Adopt imported power MOSFET as electronic switch, low loss, high reliability

◆ LCD and button interface are adopted to facilitate the display and operation

◆ With temperature compensation control algorithm, the system automatically adjusts charging and discharging parameters to improve the service life of battery

◆ Using RS485 communication bus, communication speed is fast, communication protocol compatibility is good, realize PC background direct connection monitoring

◆ The controller can connect to upper computer through RS485 and support expansion of WIFI module and GPRS module to realize APP cloud monitoring (optional)

◆ The controller has automatic protection functions of over temperature, over discharge, over charge and short circuit

◆ Photovoltaic array and battery reverse connection automatic protection function

◆ 5V dc output, can be used to power mobile phones or digital products

2.3 Product appearance

JN-K JN-R

Figure 2-1 JN-K, JN-R Product Appearance Dimensions

2-1：Product dimension

Name	Weight/Dimension		Note
Model	JN-K	JN-R	
Weight(kg)	0.41	1.4	As reference only
Dimensions L*D*H(mm)	166*98*47	207*134*70	

3.2 Interface definition

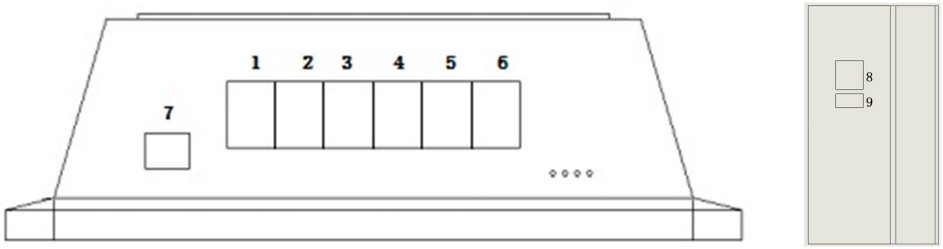

Figure 2-2 Product Interface Definition Diagram

2-2 Product interface definition

NO.	Name	Function	Explain
1	PV+	PV array positive pole	PV array input terminal
2	PV-	PV array negative pole	
3	BAT+	Battery positive pole	Battery terminal
4	BAT-	Battery negative pole	
5	LOAD+	DC load positive pole	Battery load output terminal
6	LOAD-	DC load negative pole	
7	Temp sensor	External temperature test terminal	Measure external battery temperature
8	RS485	Communication port	Realize upper computer, WIFI, GPRS communication monitoring
9	USB	DC5V output	5V-USB output 0.5A

3.Installation instructions

3.1 Installation precautions

(1) Read the entire installation section and familiarize yourself with the installation steps before installing

(2) Be very careful when installing battery, for installation of open lead-acid battery should wear a protective lens once in contact with the battery acid, please rinse in time with clean water.

(3) Avoid placing metal objects near the battery to prevent short circuit of the battery.

(4) Battery charging may produce acid gas, ensure good ventilation around the environment

(5) Please install indoors and outdoors to avoid direct sunlight and rain infiltration.

(6) The connection point of virtual connection and the corroded wire may cause great heat to melt the insulation layer of the wire, ignite the surrounding materials, and even cause fire. Therefore, it is necessary to ensure that the connecting head is tightened, and the wire is better fixed with the tie belt, so as to avoid the loose connecting head caused by the shaking of the wire during mobile application.

(7) The installed battery should match the charging voltage of the controller and the recommended charging current range.

Danger！

Explosion danger！Never install controller and battery in the same confined space！Do not install in a confined space where battery gas may accumulate

3.2 Installation instructions

Step 1：Select installation site

Avoid installing controller in direct sunlight, high temperature and water easily, and ensure good ventilation around the controller.

Step 2：Unpacking and inspection

(1) Check outer packing for breakage or distortion;
(2) Open box inspection: one controller, one manual, one attachment, etc;
(3) Check whether appearance and accessories of the main machine are in good condition;
Please contact us for any of the above exceptions.

Step 3：Fixed controller

Fix controller to the installation platform or installation bracket of the space plane through mounting holes on both sides of controller with screws, and reserve enough natural convection heat dissipation space around installation

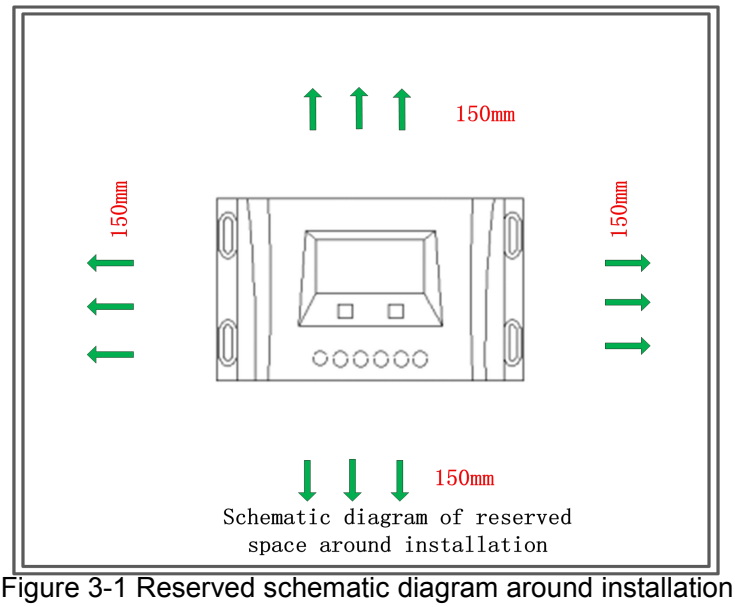

Figure 3-1 Reserved schematic diagram around installation

3.3 Wiring

Attention：For installation safety, we recommend a wiring sequence； Attention：Controller is designed with common positive poles；
Warning：Do not connect load end to electrical equipment that exceeds surge power of controller to prevent damage to controller！
Warning：When moving, make sure all connections are secured. Virtual connections can lead to heat accumulation and fire in severe cases；

Step 1：Connect battery, photovoltaic module, load, temperature sensor, monitoring background；

Connect the battery, load, photovoltaic module, temperature sensor, monitoring background (upper computer, WIFI module or GPRS module) in turn, disconnect all switches in the wiring process, pay attention to distinguish between positive and negative terminal cable access;

Before connecting battery, make sure battery is in a normal state to ensure the normal operation of system.

Warning：Do not connect photovoltaic panel to battery end of controller, or it will burn out controller.
Battery positive and negative terminal and the wire connected to the positive and negative terminal (such as the exposed metal part of the cable terminal) if short circuit will cause fire or explosion risk, please be careful to operate.

Step 2: wiring

Lock cable to the terminal through hole on the lower side of housing,

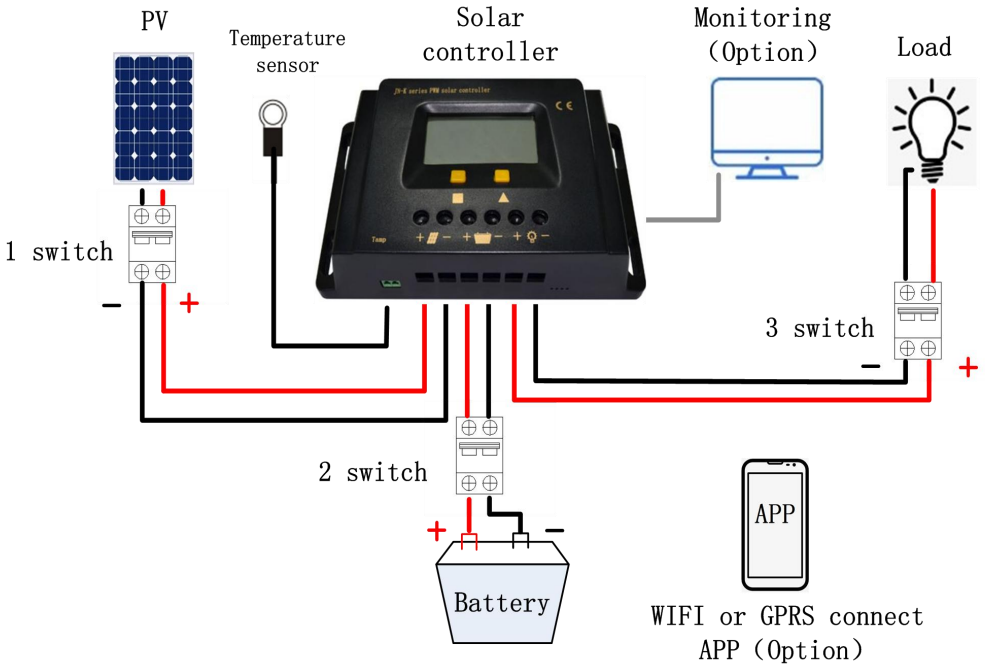

Figure 3-2 Controller connections

Explain：monitoring background supports PC upper computer, supports WIFI module and GPRS module to expand and realize APP cloud monitoring (optional). For details, please refer to operating manual of PC upper computer and APP;


Warning！

1.Electric shock risk！ Do not touch live parts of high voltage pv module with bare hands；

2.Please ensure that solar array voltage in the system does not exceed the maximum input voltage range of controller；

3.The system needs to connect inverter, please connect inverter directly to battery, do not connect to load end of controller;

Step 3: checking connection

Check whether polarity of all wiring is correct and whether terminals are locked;

Step 4: Boot sequence

Recommended turn on, turn off sequence：close battery switch, photovoltaic switch or load switch in turn；shut down photovoltaic and load switch, and then turn off battery switch.

3.4 Photovoltaic array requirements

	Parameter					
Model	JN-K			JN-R		
System rated voltage	12V	24V	48V	12V	24V	48V
PV Max VOC	22V	44V	88V	22V	44V	88V

3.5 Cable type selection requirements

The following table is conversion of copper wire diameter size according to current level. The actual diameter size of wire cable metal should be greater than or equal to the data in the table

	Parameter						
Model	JN-K			JN-R			
Current/A	10	20	30	30	40	50	60
Wire dia/mm2	2	4	6	6	8	10	12
AWG	14	11	9	9	8	7	6

4. Instructions for operation

4.1 LCD display

The display of controller adopts segment code screen, and layout of display screen is shown below:

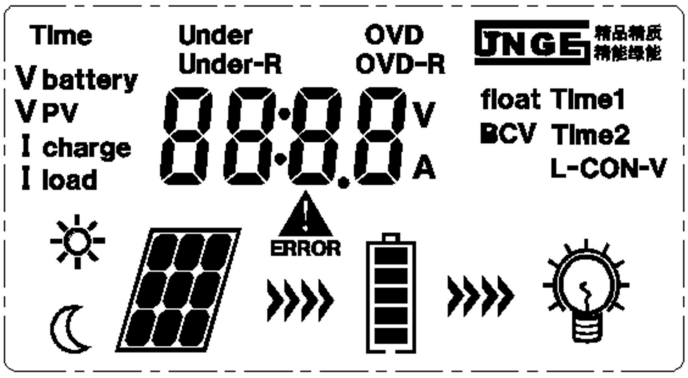

Figure 4-1 Display layout

4-1 Introduction to icon functions

Name	Define	Functional specifications
☼	day	icon lights up to indicate daytime
☾	night	icon lights up to indicate night
	PV	icon is highlighted to check access to pv array
	battery	icon is highlighted to indicate battery access, inside indicates battery power
	load	load lights up to indicate that the load has output
	state	icon lights up and scrolls to indicate charging state and discharging state respectively
ERROR	error	icon flashes to indicate that system is in trouble

4-2 Field function introduction

Name	Define	Functional specifications
V battery	Battery voltage	field lights up to display current battery voltage in data display area
V PV	PV voltage	field lights up to display current pv panel voltage in data display area
I charge	Charging current	field lights up to display current battery charging current in data display area
I load	Discharging current	field lights up to display current battery discharge current in data display area
Under	under voltage	field to set battery overdischarge voltage, when battery undervoltage, field flashing
Under-R	Under recover voltage	field lights up to set battery overdischarge return voltage
OVD	Over charging voltage	field lights up, battery overcharge pressure can be set, when battery overcharge field flashing
OVD-R	Over charging recover	field lights up, can set battery overcharge return voltage
Float	Float voltage	field lights up to set floating charging pressure of the battery, and in floating

		charging stage, field flashes
BCV	Boost charging voltage	When field lights up, battery charging voltage can be set to rise, and in stage of rising charging, field flashes
Time	Time 1 set	When field lights up, you can set first time period of time control (first light of the light control). When setting 24, controller is in user mode.The default value is 24.
Time1	Time 2 set	field lights up. In street lamp mode, second time period of time control can be set (light control time of lights on and off).。
Time2	Time 3 set	field lights up, in street lamp mode, can be set time control third period (light control the second light。
L-CON-V	Light-control voltage set	field lights up, first display area shows 1, can set light on (light on) voltage;After light control on setting is completed, first display 2 can set light control off (light control off) voltage。
ERROR	Alarm indication	field lights up when there is a failure

4.2 Key

4-3 Key function

Key	Function	Model
■	SET，function 一：main menu，function 二：parameter set save key；	JN-K/JN-R
▲	UP，function 一：turn page on display parameters，function 二：parameter setting plus；	JN-K/JN-R
▼	DOWN，function 一：turn page on display parameters，function 二：parameter setting minus；	JN-R
●	Set exit ESC key；	JN-R

UP and DOWM（JN-K does not have a "DOWN" button）function switch：

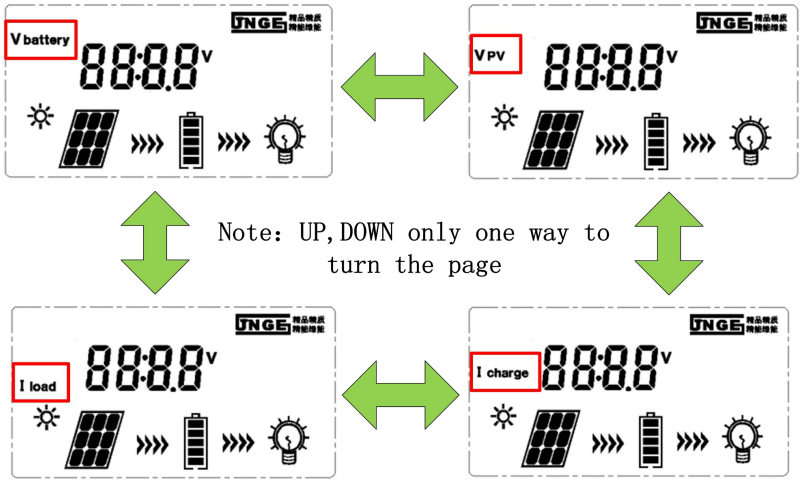

Figure 4-2 UP, DOWM switching interface

4.3 Setting operation

4.4.1、General parameter setting：

Press SET button in standby mode to enter undervoltage setting interface，continue to press SET key to enter other Settings interface，press ESC button in any interface to exit setting interface（JN-K no ESC，stop in Settings interface for 5 seconds to exit the Settings interface），back to standby screen, other general parameter Settings are similar to undervoltage Settings;

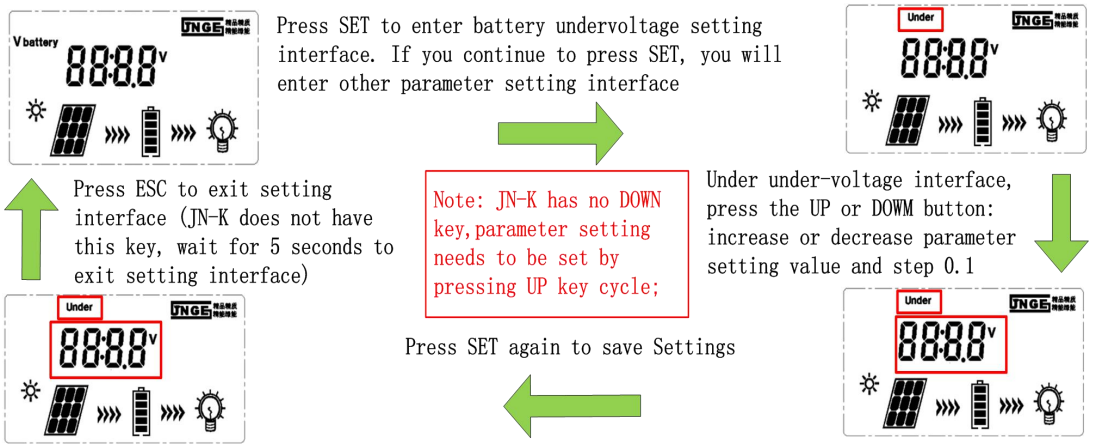

Figure 4-3 General parameter setting -- flowchart of battery undervoltage point setting

4.4.2、Light control parameter setting

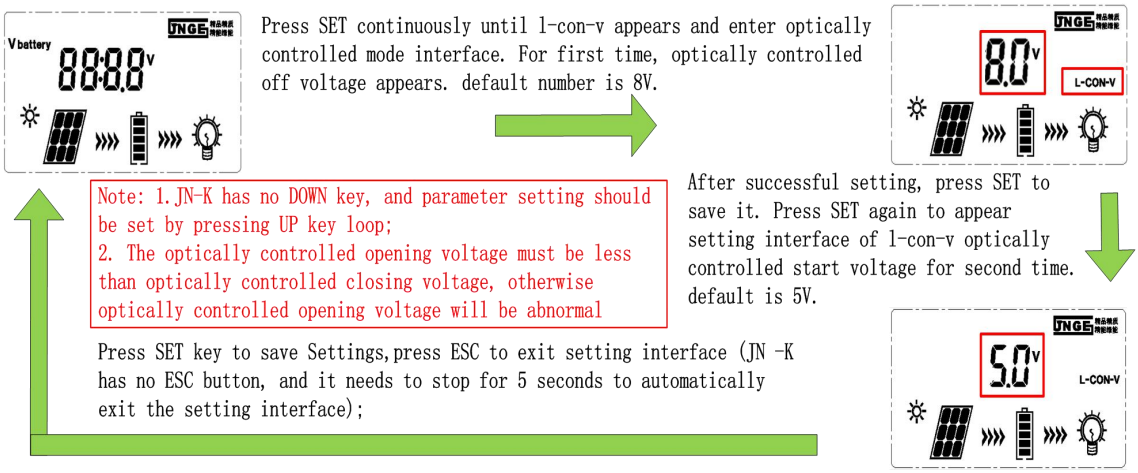

Figure 4-4 Light-control parameter set

4.4.3、 Time control parameter setting

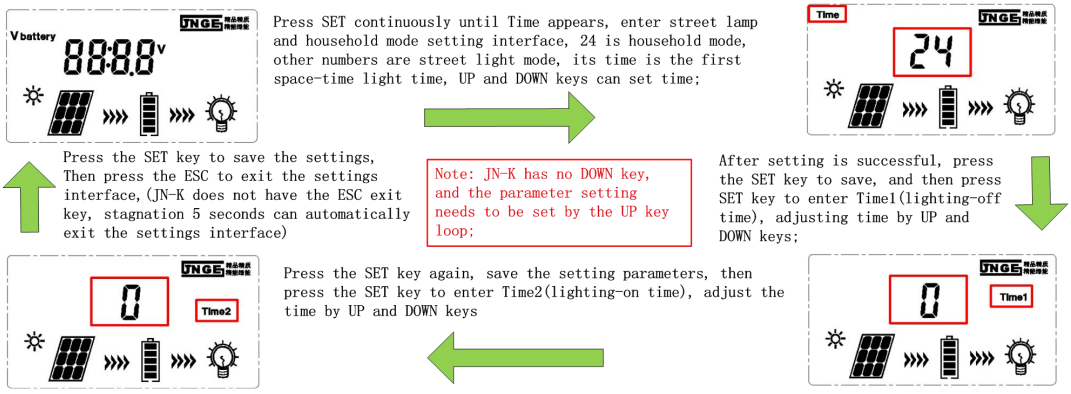

Figure 4-5 Time control parameter setting diagram

4.4.4、 Device connection to PC upper computer or APP (WIFI or GPRS mode), please refer to corresponding upper computer user manual and APP user manual respectively；

explain	PC upper computer or APP (WIFI or GPRS mode) are optional accessories, equipment single communication can only take one way, can not use several communication modes at the same time！

5.Equipment parameters

5.1 Protection function

5-1 Protection function reference table：

Protection function	Explain
Photovoltaic array short circuit	Short circuit at input end of photovoltaic array, controller does not charge. The display shows that photovoltaic input voltage is 0V. When short circuit is cleared, charging will continue automatically
PV module polarity reversal	When polarity of pv module is reversed, controller will not charge. display screen shows pv input voltage is 0V, controller will not be damaged. After correcting wiring error,controller will return to normal operation.
PV Under voltage protection	When charging voltage of photovoltaic array is lower than rated input voltage range of controller, PV undervoltage alarm can be checked through upper computer or APP, charging of battery group can be stopped.
PV Over voltage protection	When charging voltage of photovoltaic array exceeds rated input voltage range of controller,red alarm light flashes, PV over-voltage alarm can be detected through upper computer or APP, controller stops charging battery.
Reverse polarity of battery	When battery polarity is reversed, controller will not work and will not be damaged. After correcting wiring error, switch will continue to work normally
Battery undervoltage protection	When battery voltage is lower than set undervoltage value, it will automatically stop load output to prevent the battery from excessive discharge and damage.
Battery overload protection	When battery voltage is lower than set undervoltage value, display screen displays Under and ERROR alarm and automatically stops load output to prevent battery from being damaged due to excessive discharge.
Battery overvoltage protection	When battery voltage reaches overvoltage protection set value, it will automatically stop charging battery to prevent battery from overcharging and damage.
Night protection	Because battery voltage is larger than photovoltaic module voltage at night, automatic protection prevents battery voltage from discharging through photovoltaic module;
Equipment overheating protection	Controller is equipped with a temperature sensor inside. When temperature is higher than set value, charging work will be stopped.
High voltage surge	This controller can only protect high voltage surge with small energy. It is recommended to install external lightning arrester in area with frequent lightning.

5.2 Troubleshooting

If following failure occurs, please follow method below to check and troubleshoot：

5-2 Troubleshooting table

Error	Alarm icon	Possible reasons	Methods
Array overvoltage	**V PV and** ERROR showing & flashing	number of pv array series is more or some pv modules are abnormal	Disconnect pv array, reduce number of pv array groups in series or detect voltage value of each pv module to ensure that open circuit voltage of pv array does not exceed value set in the "pv electrical parameters" table；
Battery overvoltage	**OVD and** ERROR showing & flashing	1.overvoltage protection point of controller is lower than highest value of charging range; 2. Aging or over discharge of battery; 3. Overdischarge of battery; 4.Large dynamic change of load;	1.Reset battery overvoltage protection point through device button or PC upper computer or APP; 2.The aging battery needs to replace battery; 3.Overdischarge requires manual setting of battery voltage level; 4.Reduce large dynamic changes of load;
Battery undervoltage	**Under and** ERROR showing & flashing	battery voltage is lower than undervoltage protection set	1. Reduce or disconnect load. If alarm is lifted and battery voltage returns to normal, it means load power is too large or battery voltage and capacity are too low, overload may easily lead to under-voltage protection;2. Disconnected load controller still gives an alarm, battery voltage has not recovered to over-discharge recovery set value. It is necessary to charge battery group through photovoltaic or other ways to make battery group voltage reach set value of recovery point before fault can be relieved
	Indicator light is not on, display screen is not displayed	battery voltage is lower than device starting voltage	Use multimeter to test whether voltage at both ends of battery is lower than 7V; It is necessary to charge battery pack by other ways to make battery pack voltage reach more than 8V;
Radiator overheating	ERROR showing & flashing	1. ambient temperature is too high, heat dissipation of equipment is poor, and air convection is not smooth	1.Check installation environment of equipment, remove sundries around equipment, and ensure smooth natural ventilation;
Charging flow	**I charge and** ERROR showing & flashing	Overcurrent protection check current detection abnormal, false action	Restart several times if not solved, need to return to factory for maintenance;
Loading flow	**I load and** ERROR showing & flashing	load power is too high	1. Reduce load power; 2. Restart and remove fault; 3. Without excessive perceptual and capacitive load;
Note：In addition to failure of battery to start up due to low voltage, other failures can refer to the failure information through background of PC or mobile APP			

5.3 System maintenance

In order to maintain optimal long-term performance, it is recommended that following inspections be performed twice a year.

• Verify that controller is securely installed in a clean, dry environment.

• Make sure airflow around controller is not blocked and remove any dirt or debris from radiator.

• Inspect all exposed wires for insulation damage due to sun exposure, friction with surrounding objects, dry rot, insect or rodent damage.If necessary, repair or replace conductor.

• Tighten screws on all electrical connection terminals as recommended.

• Check grounding of all components of system to verify that all grounding wires are firmly and correctly grounded.

• Check all terminals for signs of corrosion, insulation damage, high temperature or burning, discoloration, and tighten terminal screws to recommended torque.

• Check for dirt, nesting insects and corrosion and clean as required.

• If arrester has failed, replace failed arrester in time to prevent lightning damage to controller or even other equipment of user.

Attention：electric shock risk!

Make sure that all power supply of controller is disconnected when above operation is carried out, and check or operate accordingly！

6.Warranty commitment

Controller is guaranteed free of charge for one year, starting from the date of sale.

• Maintenance procedures before requesting maintenance, check with the user's manual to determine if there is a problem with the controller。If this cannot be resolved, return controller in question to us, prepaid, and provide date and place information relevant to purchase。In order to enjoy quick repair guarantee service, returned products must be marked with model number, serial number and detailed reason for failure, as well as type and related parameters of components in system, battery and system load；This information is important to quickly address your maintenance needs.

If controller is damaged due to improper use or failure to follow this manual, company shall not be liable！Maintenance procedures refer to above procedure, only maintenance cost is charged.

Declaration：The company reserves right to change products without prior notice！

version number:V1.0

7.Equipment parameters

1. Parameters list

7-1 Parameters table

Parameters							
Model		JN-K			JN-R		
Rated voltage		12V	24V	48V	12V	24V	48V
Max PV VOC		22V	44V	88V	22V	44V	88V
Min PV VOC		>Vbat+1V	>Vbat+1V	>Vbat+1V	>Vbat+1V	>Vbat+1V	>Vbat+1V
Rated charging current		10A、20A、30A			30A、40A、50A、60A		
Charging drop		≤0.7V					
Discharging drop		≤0.2V					
Static loss		0.3W					
Communications		RJ45 interface/RS485 communication					
USB output		5V/0.5A					
Operating environment parameters							
Liquid crystal display temperature range		-20℃～75℃					
Ambient temperature		-20℃～50℃					
Storage temperature		-30℃～70℃					
Humidity（℃）		10% ～ 90%					
Protection grade		IP30					
Boost charge duration(min)		120					
Working state		default is 24H user mode					
Battery temperature compensation parameters							
Temperature compensation	Upper limit	0mV/℃/2V					
	Lower limit	-8mV/℃/2V					
	Default	-4mV／℃／2V					

7-2 Battery parameters refer to table:

Lead Acid Battery				
Rated voltage （v）	12V system（1 string）	24V system（2 string）	48V system（4 string）	12V default
Over voltage（v）	13～17V	26～34V	52～68V	15.5V
Overtvoltage recover （v）	13～17V	26～34V	52～68V	15V
Charging limit voltage（v）	9～15V	18～30V	36～60V	14.9V
Boost charging voltage（v）	9～15V	18～30V	36～60V	14.4V
Boost return voltage（v）	9～15V	18～30V	36～60V	13.9V
Floating voltage （v）	9～15V	18～30V	36～60V	13.8V
Over discharging voltage （v）	7～13V	14～26V	28～52V	10.8V
Over discharging return voltage（v）	9～15V	18～30V	36～60V	13.1V
Ternary lithium battery（single 3.7V）				
Rated voltage v	12V system（default 3 string）	24V system（default 6 string）	48V system（default 12 string）	3 string default
Over voltage（v）	10.5～15V	21～30V	42～60V	13.05V
Overtvoltage recover （v）	10.5～15V	21～30V	42～60V	12.6V
Charging limit voltage（v）	10.5～15V	21～30V	42～60V	12.6V
Boost charging voltage（v）	10.5～15V	21～30V	42～60V	12.4V
Boost return voltage（v）	10.5～15V	21～30V	42～60V	12V
Floating voltage（v）	10.5～15V	21～30V	42～60V	12.4V
Over discharging voltage （v）	6～13.5V	12～27V	24～54V	9.6V
Over discharging return voltage（v）	6～13.5V	12～27V	24～54V	11.4V
Lithium iron phosphate battery（single 3.2V）				
Rated voltage （v）	12V system（default 3 string）	24V system（default 6 string）	48V system（default 12 string）	3 string default
Over voltage（v）	9～12V	18～24V	36～48V	11.1V
Overtvoltage recover v	9～12V	18～24V	36～48V	10.5V
Charging limit voltage（v）	9～12V	18～24V	36～48V	11.1V
Boost charging voltage（v）	9～12V	18～24V	36～48V	10.6V
Boost return voltage（v）	9～12V	18～24V	36～48V	10.2V
Floating voltage （v）	9～12V	18～24V	36～48V	10.6V
Over discharging voltage （v）	6～12V	12～24V	24～48V	8.4V
Over discharging return voltage（v）	6～12V	12～24V	24～48V	9.9V

8.Installation dimension

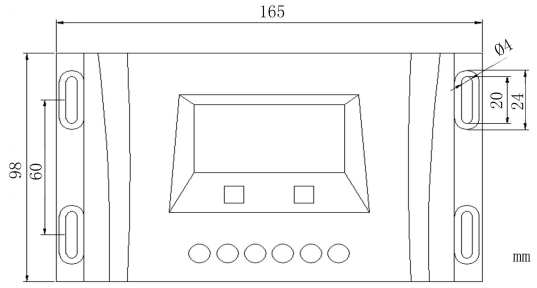

Figure 8-1 JN-K Installation structure diagram

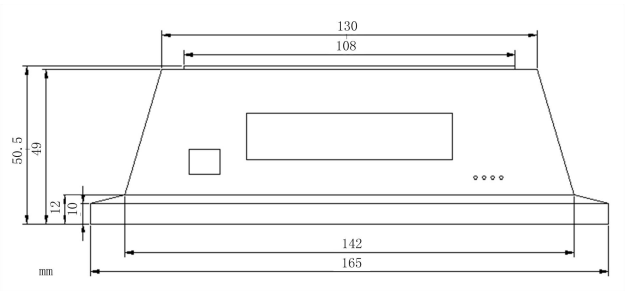

Figure 8-2 JN-K Schematic diagram of appearance structure

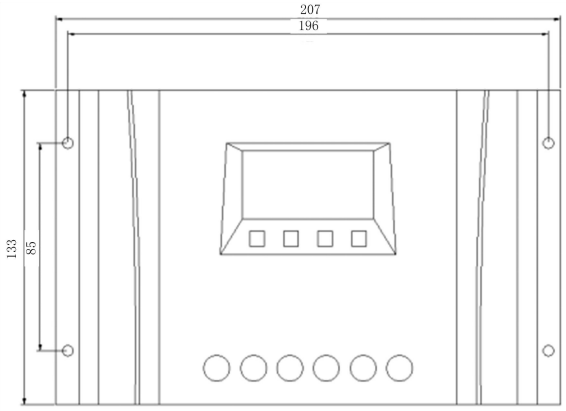

Figure 8-3 JN-R Installation structure diagram

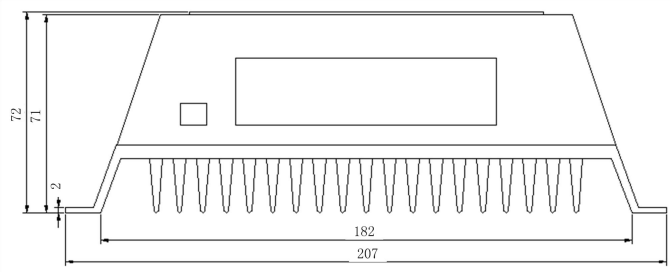

Figure 8-4 JN-R Schematic diagram of appearance structure

9. Packing list and communication module accessories

Table 9-1 Accessories reference list

NO.	Name	QTY	Note
1	JN-K（R）solar controller	1	
2	Product manual	1	
3	External battery temperature probe	1	
4	RJ45 To USB module	1	Communication function of upper computer (optional)
5	Cable	1	
6	Upper computer installation CD	1	
7	Host computer communication instructions	1	
8	RJ45 To GPRS communication module	1	APP,GPRS（optional）
9	0.2m Special network cable	1	
10	APP User manual	1	
11	RJ45 To WiFi communication module	1	APP,WiFi（optional）
12	0.2m Special network cable	1	
13	APP User manual	1	