KC5

PV CHARGE CONTROLLER

Instruction Manual

Ningbo Komaes Solar Technology Co., Ltd.

1. Characteristics

1.1 PWM to prevent power loss.

1.2 Reasonable management for Batteries Charge & Discharge.

1.3 Working Options: Lighting Control or Normal Control.

1.4 LED Lights clearly indicate Working Status.

1.5 Protection/Alarm

Protection for Overcharge & Overdischarge(Low volt)

Protection for Overload & Short Circuit

Protection for Reverse Polarity of solar modules

Protection for Reverse Polarity & Reverse Charging (during night time) of batteries

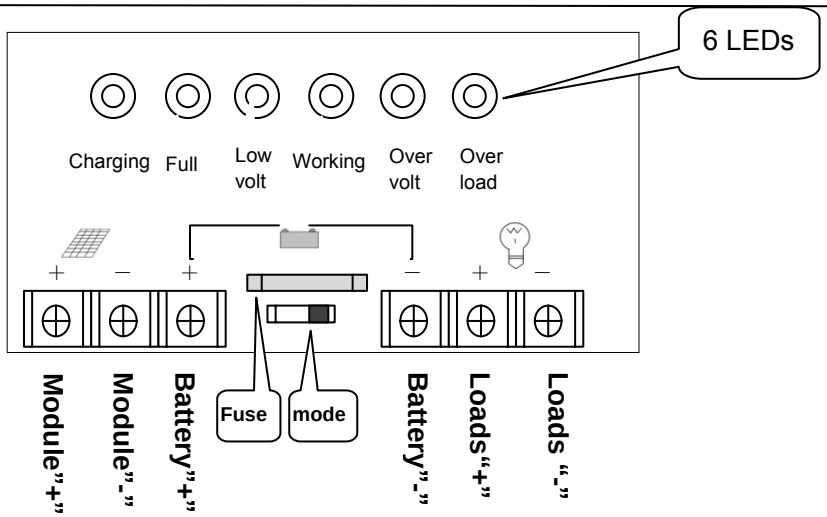
The function of Voltage Recovery from Charging Voltage Monitor to keep Switch from vibration

1.6 6 LEDs: Charging - green, Full - green, Low volt (Overdischarge) - red,

Operate (Working) - green, Over Volt - red, Over Load - red

1.7 Powerful TVS used for thunder-arresting

2. Layout



3. Installation

Terminals from left to right to connect:

Anode of modules; cathode of modules; anode of batteries; cathode of batteries; anode of loads; cathode of loads.

Cable selection according to Current of Loads;

Selected cables to connect batteries are better shorter& thicker to prevent power loss.

Note: KC5 is designed for lead-acid battery, it may affect if use other types.

Installation & Notices

① Enough room is needed for heat elimination.
Installation & operation Temperature: -20℃～+50℃.

② Terminal is set in the back of KC5 (Metal backing) for thunder-arresting by TVS when well grounded.

③ Shall connect orderly as: a. Batteries b. Modules c. Loads.

Note: Singlechip of KC5 is powered by Batteries, so need connect to the Battery first.
Attention to Anode & Cathode with connection.
Metal backing Must be well grounded.

④ Temperature Sensor is fixed in KC5 with down-lead.
Temperature Sensor can be moved and fixed on batteries by down-lead if too much Temperature difference between KC5 and Batteries.

⑤ Rated Voltage of batteries needs to match Working Voltage of modules.

4. Functions

4.1 Electro-management

2 Control modes are optional:

- **Lighting Mode (Default Mode)**

  Under this mode, if the voltage reaches the one that Lighting Mode requires when Light gets lower enough, and KC5 will automatically switch on the loads after 3 minutes time delay

- **Normal Mode**

  Under this mode, users need to turn on/off the loads manually.

  The Loads will keep being charged unless Protection Status is activated.

  See details in **5.**

4.2 Battery Charging Management

Management proceeds Precharge, Voltage Limit, Float Charge according to different Initial Status of Batteries

Pre-charge works after deep Discharge, in case of a shock to the batteries from initial impact current.

Efficient PWM begins to charge after a certain charge from the battery, and turns to Voltage Limit Charge when goes into the limited line.

Float charge begins and keeps its status at the end of the process. “Full” LED turns on.

Float charge will keep working to recover the loss from self-discharge of the batteries.

Battery Temperature Compensation is functional at this same time

Voltage Valve’s Value of each reference point to be recovered by this function.

Batteries’ Valves’ Values falls down when temperature gets up.

Too high charging voltage will lead harmful gas and water missing of the batteries when temperature gets too high.

And it will be undercharge to the batteries when too low temperature.

Temperature Compensation will automatically adjust the Charging Voltage at that moment.

The range of Temperature Compensation is -20℃--50℃, it is not available when out of this range.

It keeps Final Charging Voltage never exceeds to the one required.

Efficient PWM mode keeps batteries working at the best status, which much extends their lives.

4.3 Working Indication

6 LEDs for indications

① Charging, green LED: Charging, charging current exists

② Full, green LED: Fully Charged

③ Low volt, red LED: Flashing for Alarm, keep red for protection’s activated.

④ Operate, green LED: Working normally

⑤ Over volt, red LED: Flashing for Alarm, keep red for protection's activated.

⑥ Over Load, red LED: Fuse blows out when output current bigger than rated current.

4.4 Protection& Alarm

- **Overcharge Protection**

  KC5 controls pv modules when the Charging Voltage of the batteries gets to the biggest but allowable one, it keeps batteries safe from too high charging voltage.

- **Overdischarge (Low volt) Protection**

  "Low volt" flashes when the batteries' voltage is too low, it will stop flashing to turn to red if voltage keeps down to the Protection Line, and loads will be disconnected at this same time to keep batteries safe from Overdischarge. Protection stops when batteries enough charged, and "Low volt" LED turns off.

- **Overvoltage Protection**

  "Over volt" flashes when Terminal Voltage exceeds the one required, it will stop flashing to turn to red if voltage keeps up to the Protection Line. And loads will be automatically disconnected at this same time to keep loads safe from Overvoltage.

  Protection stops when batteries get back to normal voltage, and "Over volt" LED turns off.

- **Batteries Reverse Polarity Protection**

  Fuse blows to protect batteries when Reverse Polarity of batteries.

  It can be back to work after user corrects the connections and renews the fuse.

- **Modules Reverse Polarity Protection**

  Modules can be back to work after connections corrected.

- **Overload Protection**

  Fuse blows and "Over Load" LED turns on when total current exceeds the rated one.

  It recovers and back to work after fuse renewed.

5. Operation instructions

Normal control and Lighting Control are 2 modes for selection.

Loads are powered under Normal Mode, unless Low Voltage or Over Voltage

Loads are powered under Lighting Mode, unless low voltage or over voltage, or the Modules' voltage is too low.

6. Warranty & After Service

One year warranty.

Guarantee is not working if the Damage caused by shipping, improper operation or any other man-made behavior.

Professional lightning protection is additionally needed if KC5 used under where lightning often happens, and no guarantee is available in this case.

Note: TVS lightning protection is the last necessary protection only.

7. Malfunction & Troubleshooting:

Malfunction	Troubleshooting
"Charging" not available but sun shines	Check the connections of modules, see if any reverse connections.
"Over volt" turns on, no output	Check the batteries, see if any wrong with fuse connection
"Low volt" turns on, no output	It will automatically back to work. When batteries are enough charged,
"Over Load" turns on, no output	Over Load protection or short circuit protection activated, need to renew fuse after protection.

8. Parameters sheet

Technical Parameters	KC5
Nominal System Voltage	DC12V / 24V
Max. PV Charging Current	20A
Non-load Current	≤60mA
Regulation Voltage	≤ 14.4V / 28.8V
Float Voltage	14.1V / 28.2V
Rated Load Current	20A
Overload, Short Circuit Protection	Fuse blowouts when over Rated Current
Low Voltage Alarm	≤ 11.4V / 22.8V

Low Voltage Disconnect (Protection Voltage)	≤ 10.8V / 21.6V
Low Voltage Disconnect Recovery Voltage	≥ 13.4V / 24.6V
Overvoltage Alarm	≥ 15.0V / 30.0V
Overvoltage Protection	≥ 15.5V / 31.0V
Overvoltage Recovery	≤ 14.4V / 28.8V
Working Temperature.	-20℃～+50℃
Temperature Compensation	-3.9mV/℃
Over Temperature Protection	≥75℃
Over Temperature Recovery	≤65℃