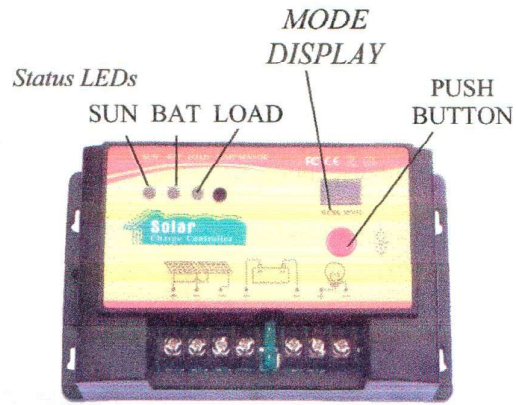


Indicator lights

“SUN” indicator light Green means the panel is charging the battery. Green flashing rapidly means there is excessive voltage coming from the battery and indicates a fault. This shuts down the controller’s outputs.

“BAT” indicator light Green means the battery is well charged. Green slowly flashing means the battery is fully charged. Orange means the battery is low. Red means the battery is discharged and the controller will turn off the “load” output until the battery recovers.

“LOAD” indicator light Yellow means the “load” output is on. Yellow slowly flashing means the output is overloaded – i.e. over 20A. Yellow rapidly flashing indicates short circuit in the load.



Setting the mode and optional “night timer”

Press the button and hold until the display starts flashing. Subsequent presses advance the number on the display. Leaving the button unpressed for 30 seconds sets the mode to the last number on the display. **Output mode 16 turns the night timer function off. Subsequent presses of the button, once the mode is set, switches the “load” output to being permanently on or permanently off.** The following table shows how the controller behaves in different modes.

0	Load output on from 10 minutes after panel stops producing electricity (night fall) until 10 minutes after panel starts producing electricity (sun rise)	9	Load output on from 10 minutes after night falls for 9 hours or until sun rises
1	Load output on from 10 minutes after night falls for 1 hour or until 10 minutes after sun rises	10	Load output on from 10 minutes after night falls for 10 hours or until sun rises
2	Load output on from 10 minutes after night falls for 2 hours or until sun rises	11	Load output on from 10 minutes after night falls for 11 hours or until sun rises
3	Load output on from 10 minutes after night falls for 3 hours or until sun rises	12	Load output on from 10 minutes after night falls for 12 hours or until sun rises
4	Load output on from 10 minutes after night falls for 4 hours or until sun rises	13	Load output on from 10 minutes after night falls for 13 hours or until sun rises
5	Load output on from 10 minutes after night falls for 5 hours or until sun rises	14	Load output on from 10 minutes after night falls for 14 hours or until sun rises
6	Load output on from 10 minutes after night falls for 6 hours or until sun rises	15	Load output on from 10 minutes after night falls for 15 hours or until sun rises
7	Load output on from 10 minutes after night falls for 7 hours or until sun rises	16	Load output will be on or off permanently (pressing the button once quickly turns between on and off)
8	Load output on from 10 minutes after night falls for 8 hours or until sun rises	17	Test – Load output will be on with no power from the panel and off with power from the panel. As mode 0 without delays

Designing your system

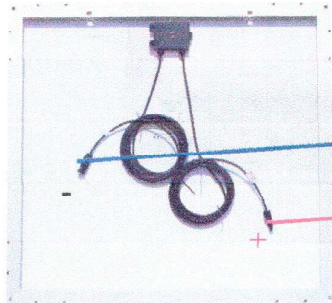
Adding to an existing system In many cases where you simply add your panel and controller to an existing system (e.g. in a caravan or canal boat) all loads will be already wired to the battery and there is no need to change this. In this case just connect the panel and controller to your battery and leave the original system in place.

Making a new system or adding to an existing system For a new system you may also wish to wire loads to the “load” output and use **mode 16 for permanent use or modes 0-15 if you want the output only to be on at night.** This output will turn off when the battery is discharged in order to protect the life of the battery (over-discharging reduces the life of lead acid batteries). Because this cuts out when the battery is discharged, essential loads like emergency lighting and fire alarms should be run directly from the battery. Also, loads of over 20A should be run from the battery as the “load” output is limited to giving 20A.

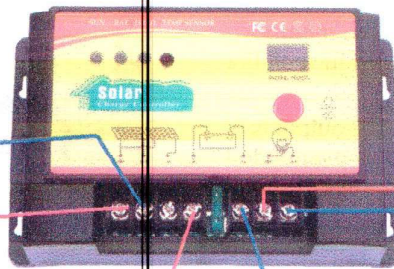
It is essential to connect the panel and the “load” (if using the “load” output) to the controller terminals shown in the diagram In particular, some existing circuits may use a common -ve for the battery connected circuits. This should not be connected in any way to the panel -ve input, nor to the “load” -ve output.

Solar Charge Controller NV-12V020

- * Suitable for 12V and 24V systems (automatic 12/24 Volt battery detection)
- * 20 Amp charging and load capacity (suitable for panels up to 260W at 12V or 520 at 24V)
- * "Load" output has manual on/off mode and 15 "night timer" settings for night lighting
- * Load disconnect prevents over discharge



Use solar cable to attach to the battery and keep the length of cable from the battery to controller less than 2m.



"Load" output: Can run your appliances (if under 20A). Can use controller's **optional** night timer facility. In all modes this has over-discharge prevention which cuts out to prevent damaging your battery through over-discharging

You can also run appliances directly from the battery. This enables you to use this for loads of over 20A. It also enables you to use the controller's night-timer facility for one load and the battery for loads that you want to be on during the day.



How to connect the controller

Pay careful attention to the polarity of connections. Always attach + to + and - to -

Step 1 Connect the battery to the controller via the two central connections on the controller (+ve to +ve, -ve to -ve). Once you have done this you can use the "push button" on the right of the controller to change the mode and the "BAT" light will light up to show the controller is correctly connected to the battery.

Step 2 Connect the solar panel to the controller, (again connect +ve to +ve and -ve to -ve – and you can use either -ve terminal on the controller). The "SUN" LED will now light if the panel is in sunlight.

Step 3 If necessary, connect your 12V appliance either directly to the battery (if the load is over 20A) or to the right hand terminals (the "load" output) if the load is under 20A. If you connect to the "load" output then the controller will protect your battery from over-discharging by cutting out when the battery nears zero charge. Using these terminals you can also use the optional "night timer" function on the controller. The optional "night timer" function means your appliances (such as lighting) only turn on at night.

Step 4 Finally, if you are using the "load" output on the controller, set the mode of the output on the controller to the desired number (16 for normal use or 0-15 for various night timer settings). See below for how to set the mode of the controller.

For best performance

Keep all wiring as short as possible. In particular, **keep the wires from the controller to the battery less than 2m** and use solar cable here to minimise electrical losses.

Position the controller in a place at a similar temperature to the battery – i.e. in or close to the battery compartment.

Mode

Battery output The controller will always charge the battery whenever there is electricity going in from the solar panel.

Load output For the "load" output, the controller also has an optional "night timer" function. If you want, you can set this to have the "load" output from the controller on only at night. This "load" output also has over-discharge protection which means the controller will shut off this output if the battery is over-discharged to prevent damaging your battery.