

DUAL BATTERY SOLAR CHARGE CONTROLLER 12V/24V

DB1024 (10A) and DB2024 (20A) series

INSTRUCTION MANUAL



----- Application: motorhomes, caravans, RVs, campervans, boats,
and other systems with one or two 12V/24V batteries -----

For use with solar panels only

Dear Customer,

Thank you very much for choosing our product. This manual contains important information about the installation and operations of the charge controller. Please read this manual carefully before installing the product.

Note: working with electricity and batteries can be dangerous. Make sure that any work follows all appropriate safety standards and precautions.

Overview

This dual battery solar charge controller is designed to charge and protect two independent 12V or 24V batteries or battery banks (e.g. engine and leisure battery) using energy from solar panel(s). Both batteries should have the same voltage, but they can have different capacity.

Note: independent charging assumes that batteries should be electrically isolated from each other, i.e. they should not be connected to the same system. Several batteries connected in the same battery bank should be treated as 1 battery when using this solar controller.

The controller allows setting charging priority for batteries (0%/100%, 10%/90%, 20%/80% ...), splitting the energy from solar panel(s) between batteries according to this priority. When one of the batteries is fully charged the controller will divert all power to the other battery automatically.

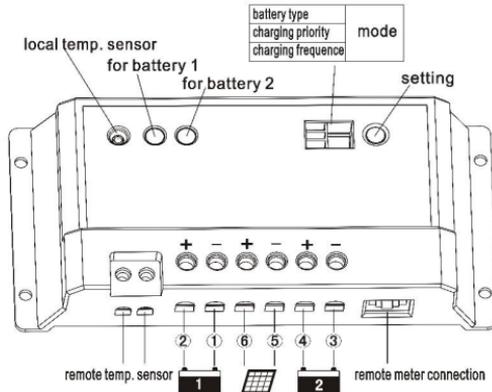
The unit can work with a single battery too. If only one battery is connected, the controller will automatically charge it at full power regardless of the charging priority setting.

Installation

When installing the solar charge controller, please remember:

- Batteries should always be connected to the controller first before connecting a solar panel (disconnection in the reverse order). Follow the connection order shown in the diagram below.
- In order to start the controller, batteries should not be fully discharged. If batteries are fully discharged, you should charge them by other means first.
- Operating voltage of the solar panel(s) must be higher than the charging voltage for batteries.
- Two batteries or battery banks connected to the controller should have the same voltage and type. It's not possible to charge 12V and 24V batteries at the same time.

Connection diagram



System components should be connected in the above (1) – (6) order:

- 1) Connect “-” of the first battery / battery bank to Battery 1 “-“ terminal
- 2) Connect “+” of the first battery / battery bank to Battery 1 “+” terminal. *Battery 1 LED* should start flashing slowly which means that the controller detected the battery.
- 3) Connect “-” of the second battery / battery bank to Battery 2 “-“ terminal
- 4) Connect “+” of the second battery / battery bank to Battery 2 “+” terminal. *Battery 2 LED* should start flashing slowly meaning that the controller detected the battery.
- 5) Connect “-“ of the solar panel / solar array to “-“ solar terminal of the controller
- 6) Connect “+” of the solar panel / solar array to “+” solar terminal of the controller. If the solar panel is exposed to some light, battery LEDs should switch to constant ON mode – it means that the controller started charging your batteries.

Note: although the solar controller has built-in electronic protection, for safety and added protection please install inline fuses into the circuits between each battery and the controller, on the negative wire, as close to the batteries as possible. Current rating of fuses should be chosen according to the maximum power current / short circuit current of your solar panel.

The controller has a built-in temperature sensor for adjusting the charging parameters according to the ambient temperature, and a connection point for a remote temperature sensor (not included) if required.

There's also a socket for connecting a remote LCD meter (optional) which

can display battery status and main charging parameters (current, voltage). For more information on a remote LCD meter and where to buy it please see the Appendix "Remote LCD meter" at the end of this document.

Settings

There are 3 settings LEDs and a digital display next to the settings button in the top right corner of the solar controller. Each LED shows a different setting:

- 1st LED (top): battery type selection
- 2nd LED (middle): charging priority setting
- 3rd LED (bottom): charging frequency selection

Using the settings button choose one of the 3 settings LED, and then press this button and hold it for 5 seconds until the digital display starts flashing. Choose the required number for setting by pressing the button again, and leave it until it switches off in a few seconds (the setting will be saved).

The following setting options are available:

1. 1st LED (top): battery type selection

Display number	Battery type
1	Sealed battery
2	Gel battery
3	Flooded battery

If you are not sure which battery you have, please refer to the battery manual for battery type or the charging voltage it requires (voltage settings for each battery type are provided in Specifications section at the end of this document).

2. 2nd LED (middle): charging priority setting

This setting is for the percentage of power to go to battery 1 (the rest will go to battery 2).

Display number	Battery 1 charging power	Battery 2 charging power
0	0%	100%
1	10%	90%
2	20%	80%
3	30%	70%
4	40%	60%
5	50%	50%
6	60%	40%
7	70%	30%
8	80%	20%
9	90%(pre-set)	10%

When one of the batteries is fully charged, the solar controller will start charging the other battery at full power automatically.

Note: you don't need to adjust this setting if only one battery is connected to the controller as it will always be charged at full power.

3. 3rd LED (bottom): charging frequency selection

This setting is only required for advanced applications when there are some radio emitting devices powered by the same batteries and where the solar controller creates interference in the circuit. In such cases the charging frequency can be changed to stop interference.

In all other cases this parameter should be kept at pre-set 25Hz. Change of charging frequency has almost no impact on the efficiency of charging.

Display number	Charging frequency
0	25Hz(pre-set)
1	50Hz
2	100Hz

Operations and battery status

This solar controller charges batteries using *Pulse Width Modulation (PWM)* technology. This method ensures better charge acceptance by batteries and extends their lifespan. *PWM* technology can sometimes recover some lost battery capacity.

During the daytime when the solar panel is exposed to sunlight / daylight, the controller will be charging the batteries using all power from the solar panel until they are fully charged. Solar panel(s) doesn't need to be disconnected from the controller at night time, as the controller prevents any reverse current flow from the batteries to the solar panel.

Note: when the batteries get fully charged, the controller will reduce the charging voltage and current significantly and enter into a "float" charging mode when it only charges batteries slightly to compensate for self-discharge and maintain them at 100% level.

Battery status information is provided by battery LEDs located in the top left corner of the controller:

Battery LED	Battery status
Off	No battery connected / battery discharged / overvoltage
Flashing (approx. once per second)	Battery detected by the solar controller, no charging
Constantly ON	Battery is being charged
Slowly flashing	Battery is fully charged
Fast flashing (a few times per second)	Short circuit (see Troubleshooting)

Troubleshooting

Problem	Reason	Solution
Battery is connected to the controller but the battery LED is off	Battery is discharged	Charge the battery by other means first so that its voltage reaches at least 6V (for 12V battery) or 12V (for 24V battery)
	Incorrect polarity / loose connection	Check the battery connections. Make sure battery "+" is connected to Battery "+" terminal of the controller, and "-" connected to Battery "-" terminal
Battery and solar panel connected to the controller but the battery LED shows no charging	No power from the solar panel	Disconnect the solar panel, check its output, connections, make sure it's exposed to sufficient light and reconnect to the controller
	Low solar panel voltage	Make sure the operating voltage of the solar panel is higher than the battery charging voltage
	Incorrect polarity of solar panel cables	Check polarity of the solar panel connections to make sure that "+" from the solar panel is connected to "+" solar terminal of the controller, and "-" connected to "-"
Battery LED is flashing fast <i>(a few times per second)</i>	Short circuit	Disconnect the solar panel and batteries, check voltages and output, examine the cables for possible short circuits and reconnect in the recommended order
Battery LED is ON but the battery is not being charged	Powerful load or power leakage	If you have any load, appliances or other cables connected to your battery when the solar controller is charging it, they might be draining your battery. Disconnect them to allow the battery to get fully charged.

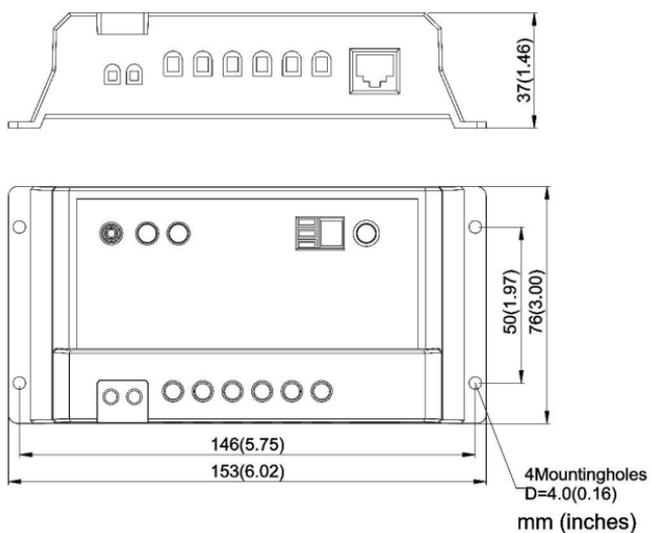
Specifications

Parameter	Sealed battery	Flooded battery	Gel battery
Equalize charging voltage*	14.4V	14.6V	14.8V
Boost charging voltage*	14.2V	14.4V	14.6V
Float charging voltage*	13.7V	13.7V	13.7V
Maximum solar panel input voltage	30V (12V batteries) 55V (24V batteries)		
Battery voltage range*	8-15V		

Boost time	30 minutes
Self-consumption	4mA at night, 10mA when charging
Remote meter connection	8-pin RJ-45
Temp. compensation	-30mV/°C/12V
Terminals	4mm ²
Temperature	-35°C to +55°C

****Note: The voltage is provided for 12V battery mode.
Please use values multiplied by 2 for 24V battery mode.***

Dimensions



Appendix: remote LCD meter (optional)

Your dual battery solar charge controller has a socket for connecting a remote LCD meter (purchased separately). This meter can display charging parameters such as battery and solar panel voltage, current, as well as the state of charge of each battery. It can also record accumulated battery capacity and min / max voltage for the period.

Remote LCD meter for dual battery controller (optional)



If you would like to buy this meter for your dual battery solar charge controller please visit our online shop

www.PhotonicUniverse.com

Or call 0203 150 1111 (int. +44 203 150 1111) for a phone order.

Please note that other remote meters that look similar (e.g. remote meter for MPPT Tracer controller) are not compatible with your dual battery solar charge controller. Always check that the description of the remote meter says it's designed for dual battery solar charge controller.

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