

## Solbian Allin1 User's Manual

The purpose of this document is to give installation information specific to the Allin1 series. Much of the information in the General Solbian User's Manual still applies, so please see that document for more information. Prior to installation, refer to the General Solbian User's Manual for all safety information. THE FOLLOWING INSTRUCTIONS ARE EXCLUSIVELY GENERAL ADVICE. WE RECOMMEND THAT YOU HAVE THE MODULES INSTALLED BY QUALIFIED TECHNICIANS, RESPECTING STANDARDS IEC 62548, 62257 AND APPLICABLE ABYC RECOMMENDATIONS. PLEASE CONTACT US DIRECTLY FOR TECHNICAL ASSISTANCE.

### ELECTRICAL INSTALLATION

The PV modules of the ALLinONE series include an on-board high-efficiency MPPT charge controller. Thanks to this advanced controller, the panels can directly charge lead (Pb) and lithium (Li) batteries with 12V (standard) or 24V (special ordered) nominal voltage.

**WARNING: THE CHARGE CONTROLLER IS ONLY PROTECTED AGAINST ACCIDENTAL REVERSE POLARITY CONNECTION IF THE FUSE (INCLUDED IN THE PACKAGE) IS INSTALLED.**

ALLinONE modules are supplied with a flexible cable resistant to weathering that can be directly connected to the positive and negative poles of your battery and to the supplied holder for the external fuse. The electronics are configured at the factory so be sure to order the model suited to your battery type. Take care to maintain the proper polarity when installing the panels (**See below**).

The length and section of supplied cable are defined as to prevent too large voltage drop between charge controller and battery. If extension is needed it must be realized with 4 mm<sup>2</sup> (12AWG) copper section cables. In any case a total cable length larger than 8 meters is not advised. Each ALLinONE, thanks to the integrated electronics, behaves like an independent charger, thus more ALLinONE panels can be used to charge the same battery by simply connecting them in parallel on the battery leads.

### CABLE TERMINATIONS

Negative (blue from panel):

There usually should be general neg. bus bar or post that the battery neg. connects to, and the solar neg. needs to connect to that also. And of course the solar neg. needs to be on the load side of any monitor or ammeter shunt (the side of the shunt away from the battery).

Positive (brown from panel):

Here also there is usually a positive post or bus bar where the positive lead from the battery is connected. Sometimes this is simply the battery side of the main battery switch, and often the engine alternator positive (red) cable is connected there as well. Going direct to the battery positive post is certainly possible, but in any case the goal is to avoid too many connections piled on each other in any one spot.

Terminals:

We highly suggest using properly crimped wire terminals with heat shrink over the crimp, and with the proper sized ring terminal or plug for wherever it is connected.

### POSSIBLE FAILURE MODES

Fractured cells: Fracturing can be caused by excessive bending of the module during installation or use, or by impact or mechanical stress. Fractured photovoltaic cells do not normally cause a total loss of performance in a module, but more usually a drop in efficiency.

Defects with the charge regulator: Charge regulators, like all electronic devices, can fail.

ALLinONE modules need to be connected to a battery to properly operate. Measuring voltage and current output from the disconnected leads can be misleading. To measure the values of current, voltage and power, we advise to use a suitable measurement device, like the Wattmeter supplied by Solbian.

Note: measuring the output voltage from the leads, without any load connected and under sun light, can give some hints about product status. If voltage measured is not close to 14 V and 28 V (for 12 and 24 Volt lead batteries charger) that means the system can be defective.

In any case, first of all, check the state of the electrical connections between the modules and batteries with particular focus on polarity (brown cable means positive while blue means negative).

### PROTECTIVE FILM ON FRONT OF MODULE

The modules are shipped with a protective film on the front surface. We recommend that you remove this after the installation has been completed. In any case, the protective film must be removed before using the module for the first time.

### CONTROLLER SPECIFICATION

Solbian Charger is a DC-DC boost converter designed to maximize the power generated by photovoltaic panels for any external condition of temperature and solar radiation intensity. Optimization of power conversion is obtained with embedded logic performing a Maximum Power Point Tracking (MPPT) algorithm on the PV module connected to the converter. To maximize the efficiency and reduce the size, Solbian Charger uses Power MOSFETs for active switching and synchronous rectification, minimizing the number of external devices.

The controller, being a high efficiency, monolithic, boost converter with 4-phase interleaved topology implementing MPPT avoids the use of electrolytic capacitors which can severely limit the system lifetime.

The controller operates at fixed frequency in PWM mode, where the duty cycle is controlled by embedded logic running a "Perturb & Observe" MPPT algorithm. The embedded charge controller prevents battery overvoltage and overcurrent. The controller implements a fast and efficient CC-CV (constant current-constant voltage) IC architecture and logic that is the result of Solbian's experience of hundreds of design and installations of PV in boats. The set up of the system takes into account the natural "off" cycles during the nights.

Safety of the application is guaranteed by automatic halt of the driver in case of output overvoltage or over-temperature.

SP ALLinONE	SP23	SP47 L/Q	SP72
Power	23 W	47 W	72 W
Battery voltage	12/24 V	12/24 V	12/24 V
Max output current	2/1 A	4/2 A	6/3 A
Number of cells	7	15	23
MPPT Algorithm	BOOST MPPT 4-phase interleaved topology		
Charge algorithm	CC-CV charger		
Peak efficiency	98%		
Tracking efficiency	98%		
Night consumption	≈ 0		
Operating temperature	-40°C - 105 °C		
Protections	Battery reverse polarity (with external fuse), output short circuit, over temperature		
Cable length	3 meter		
Cable external diameter	8.5 mm	12 mm	12 mm
Wire gauge	1.5 mm <sup>2</sup> / AWG 15	2.5 mm <sup>2</sup> /AWG 13	2.5 mm <sup>2</sup> /AWG 13
Polarity color code	brown cable is + and blue cable is -		
Cable insulation	Neoprene™		

FOR WARRANTY INFORMATION, OR RECYCLING/DISPOSAL INFORMATION, SEE THE GENERAL SOLBIAN USER'S MANUAL