



Technical Bulletin #100216

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Affected Products: All Non ETL Listed Solar Boost 3024i charge controllers
P/N's; SB3024i, SB3024Di

Purpose: 40A 12V Upgrade

Background:

ETL/cETL Listed Solar Boost 3024i's (p/n SB3024iL & SB3024DiL) operate at 40A output rating while charging 12V batteries from nominal 12V PV modules. Non listed Solar Boost 3024i's (p/n SB3024i & SB3024Di) may be upgraded to provide this 40A/12V capability. This upgrade does not include full modification to a listed unit. Cost for this upgrade as of this writing is US\$129.00 plus shipping and must be performed at the factory. Consult the factory for latest pricing information.

This upgrade requires both hardware and software modifications including installation of software version V2.20 or later. Installing this software into non modified units will not enable 40A/12V operation as the software will examine the hardware for the required changes prior to allowing 40A/12V operation.

Obtaining The Upgrade:

1. Confirm that the unit is not part number SB3024iL or SB3024DiL as shown on the ETL rating label, and has not been previously upgraded with 40A/12V capability. A previously upgraded unit will have an identifying sticker on black heat sink visible inside the unit.
2. The upgrade does not include repair of defective units and the unit will be tested prior to being modified. If found to be defective and not covered by warranty, standard repair charges apply, and of this writing are \$80/hr. labor plus parts with a \$40 minimum. You will be contacted if non warranty repair is necessary.
3. Contact the factory to obtain a Return Goods Authorization (RGA) number. Mark the RGA number on the outside of the package and send postage prepaid and insured to the address below.
4. Blue Sky Energy will install the upgrade, restore factory default settings (unless directed otherwise), and perform complete production test.
5. When the unit is complete Blue Sky Energy will contact you regarding final charges and shipping if payment arrangements have not already been made.

Operation With The Upgrade:

Basic operation of the product with the upgrade installed is the same as before except that output current rating and output current limit become 40A if the unit is charging a 12V battery from nominal 12V PV modules. Operation with PV modules greater than nominal 12V will be detected in which case output current rating and output current limit become 30A. The unit makes this determination by examining PV module open circuit voltage (V_{OC}). If V_{OC} ever exceeds 30V which will occur with greater than 12V nominal PV modules the unit's output current rating and output current limit automatically revert to 30A and remain there until the unit is rebooted by removing and reapplying power.



➤ **WARNING:** This unit must be installed and wired in accordance with National Electrical Code, ANSI/NFPA 70. Over current protection must be provided externally. To reduce the risk of fire, connect to a circuit provided with 40A maximum branch-circuit over current protection (50A maximum with 12V/40A operation) in accordance with National Electrical Code, ANSI/NFPA 70. Do not connect a PV array capable of delivering greater than 24A of short circuit current I_{SC} at STC (32A with 12V/40A operation). Do not connect BAT- and PV- together external to the unit. To reduce risk of electric shock, remove all sources of power before installing or servicing. These instructions and warnings are not intended to identify all wiring, circuit protection and safety requirements for a photovoltaic electrical system.

Selecting PV Modules:

Voltage, current and power produced by Photovoltaic (PV) modules fluctuate widely with operating conditions. To account for this a set of test conditions referred to as **Standard Test Conditions (STC)** is used to rate modules in a meaningful manner and accurately predict real world performance. Conditions can be present where V_{OC} and I_{SC} approach 1.25 times STC ratings which is why National Electrical Code and our recommendations call for 1.25 derating of both V_{OC} and I_{SC} . STC ratings are not maximum or optimal ratings. While voltage and current can spike to nearly 1.25 times STC ratings, in typical real world conditions I_{MP} is commonly only about 75 – 80% of I_{MP} at STC.

Key PV module specifications:

- P_{MAX} Maximum power in watts ($P_{MAX} = V_{MP} \times I_{MP}$)
- V_{OC} Voltage with module open circuit (typically $\approx 20 - 22V$ for 12V modules)
- V_{MP} Voltage where module produces Maximum Power (typically $\approx 17 - 18V$ for 12V modules)
- I_{MP} Current where module produces Maximum Power
- I_{SC} Current with module Short Circuit

The 3024i will provide the best MPPT current boost performance if all PV modules are identical. If module types are mixed, do not put dissimilar modules in series. Dissimilar modules in parallel should have V_{MP} values within $\approx 0.5V$ or better for 12V modules, and be of the same basic cell technology so their V_{MP} will tend to track as operating conditions change. If module types are very different consider using a separate charge controller for each module type to obtain the best MPPT current boost performance.

Select PV modules that do not exceed the maximum ratings shown below, and preferably produce at least 3A of I_{MP} per 100 amp-hours of battery capacity.

| Nominal Battery Voltage | Nominal PV Voltage | Automatic Current Limit | Maximum PV Power @ STC | Maximum PV I_{SC} @ STC | Maximum PV V_{OC} @ STC | Recommended range of V_{MP} at STC | | |
|-------------------------|--------------------|-------------------------|------------------------|---------------------------|---------------------------|--------------------------------------|----------------|----------------|
| | | | | | | Nominal 12V PV | Nominal 18V PV | Nominal 24V PV |
| 12V | 12V | 40A* | 540W | 32A* | 24.0V* | 16.5 – 18.5V | X | X |
| 12V | 18V | 30A | 400W | 16A | 45.6V | X | 24.8 – 27.8V | X |
| 12V | 24V | 30A | 400W | 24A | 45.6V | X | X | 33.0 – 37.0V |
| 24V | 24V | 30A | 800W | 24A | 45.6V | X | X | 33.0 – 37.0V |

*Current rating and current limit are 40A when charging a 12V battery from nominal 12V PV modules. If PV V_{oc} ever exceeds 30V (>12V nominal PV voltage) current rating and current limit become 30A.