

# **GS-Star-100W**

## **Connection Guide**

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## Series vs. Parallel Connections

Grape Solar 100W panels can be connected in parallel or series when used in conjunction with an appropriately sized charge controller.

Connecting panels in series will result in a higher input voltage to a charge controller while a parallel connection will result in a higher input current. Since an MPPT charge controller works as a transformer, and increases the output current up as it reduces the voltage, the power fed to the battery will be the same in both configurations.

It is a popular misconception that two panels in series are for charging a 24V battery bank and two panels in parallel are for charging a 12V battery bank. In reality a 12V battery bank can be charged with an array voltage of anything greater than 16V. That means a 1000V could charge a 12V battery as long as an MPPT charge controller is used. But, in order to charge a 24V battery bank one would need at least 32V.

Panels should always be connected in parallel when using a PWM style charge controller.

### Advantages of a series connection:

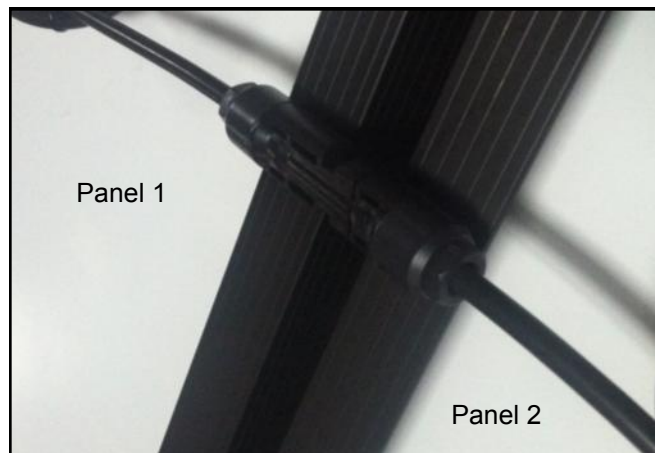
Since a series connection results in a higher voltage, that means that current is lower and there will be less line losses. Less line losses means that smaller, less expensive wire can be used to connect the panels to the charge controller on long runs. Also, money can be saved by not having to purchase MC4 T Branch connectors.

### Advantages of a parallel connection:

Many charge controllers have an input voltage limit of 25V. If the charge controller in your system has this limitation a series connection would overload your charge controller. Parallel connections should always be used with PWM style charge controllers.

## Connecting Panels in Series

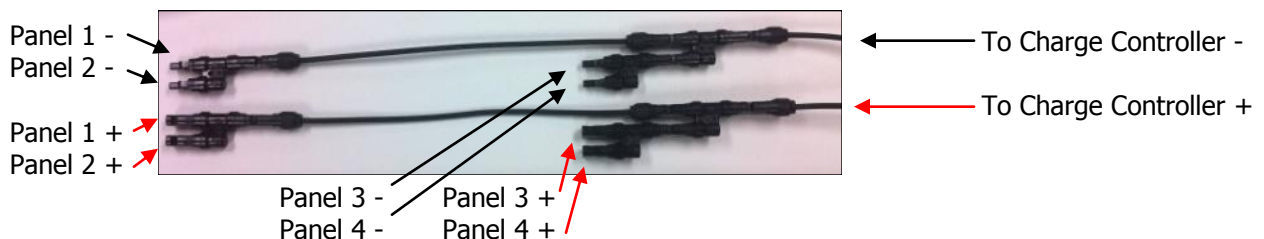
The Grape Solar 100W panels come with two 900mm MC4 leads, one for positive + and the other for negative -. A connector from one panel can plug into the connector on another panel to form a series connection.



## Connecting Panels in Parallel

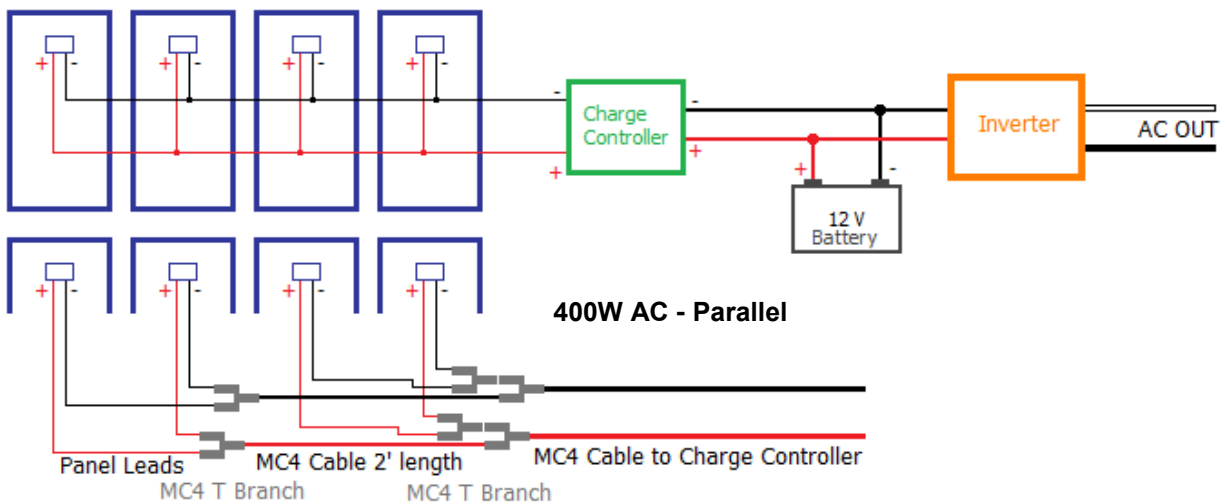
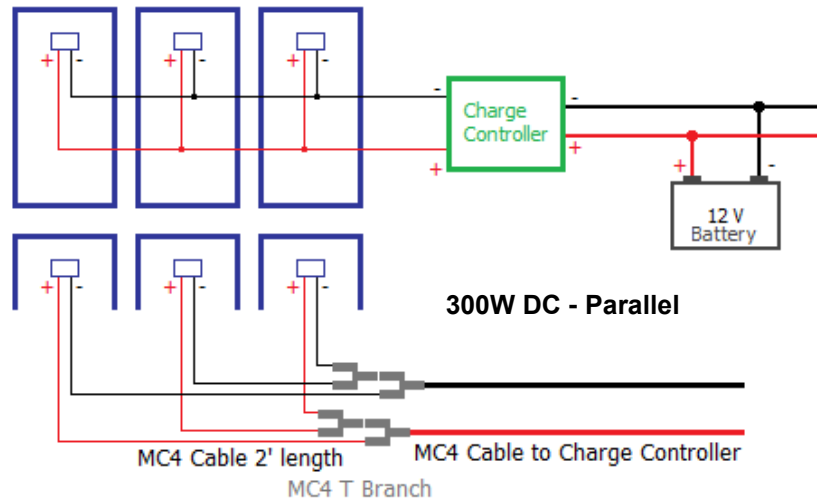
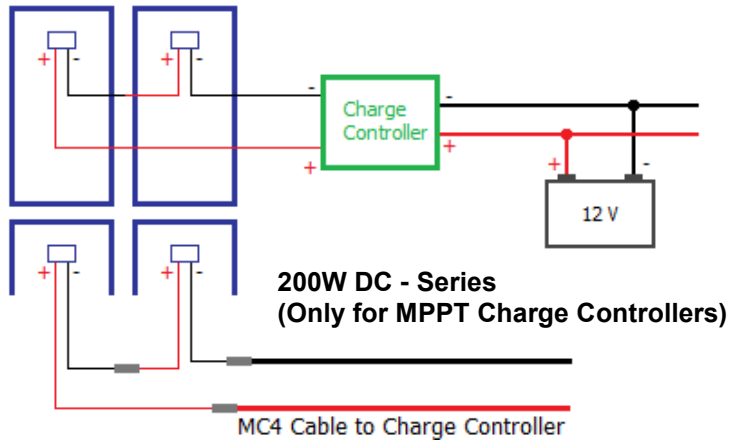
For parallel connections, the MC4 connectors plug into MC4 T Branch connectors.

MC4 cables and connectors can be found in well stocked electrical supply warehouses or on Amazon.com using the keyword "MC4".



## Example Schematics

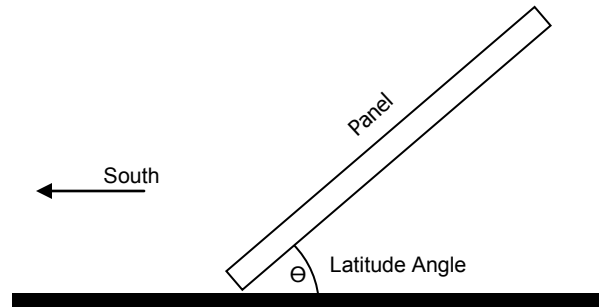
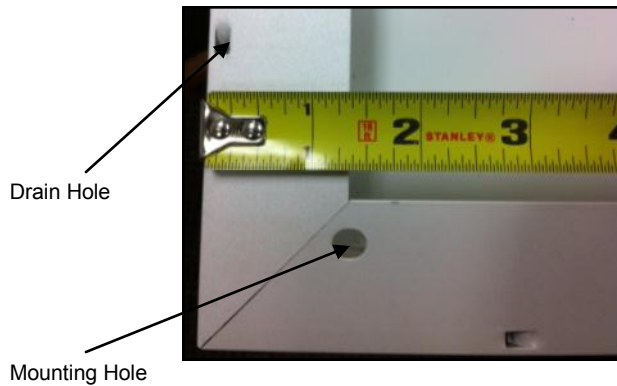
Below are some sample schematics detailing the connections between panels.



## Mounting Hardware & Additional Accessories

### Mounting

Because of the wide variety of possible user applications, Grape Solar panels do not come standard with mounting hardware, but the panels come with sturdy aluminum frames that have mounting holes and can be mounted to a variety of structures and materials including wooden or metal frames.



For optimum energy production solar panels should be pointed in the direction of the sun to maximize the surface area that can receive light. Since the sun is a moving target, this is best approximated by pointing the panel to the South (for those of us that live in the Northern hemisphere) at a tilt angle equal to your latitude.

### Grounding

The inverters and panels have grounding terminals but grounding is not a requirement for operation. The systems in our test lab have been operated with and without grounding with no differences in performance.

### Positive Grounding

This panel does not require positive grounding. **Do not use positive grounding.**

For more information contact Grape Solar Technical Support at:

**info@grapesolar.com**

**1-877-264-1014**



## GRAPE SOLAR LIMITED WARRANTY FOR PV MODULES

The following modules are covered under this warranty:

### Grape Solar P/N

- GS-Star-*nnn*W series, whereas “*nnn*” is number from 010 to 300;

### **1 Limited Product Warranty – Five (5) Year Repair, Replacement or Refund Remedy**

Grape Solar Corporation with offices at 1305 S. Bertelsen Road, Eugene, OR 97402 (“Grape Solar”) warrants that for five (5) years from the date of delivery, its Photovoltaic modules (“PV modules”) shall be free from defects in materials and workmanship under normal application, installation, use and service conditions. If the PV modules fail to conform to this warranty, then for a period ending five (5) years from date of delivery to the original end-customer (“the Customer”), Grape Solar will, at its option, either repair or replace the product, or refund the purchase price as paid by the Customer (“Purchase Price”). The repair, replacement or refund remedy shall be the sole and exclusive remedy provided under the Limited Product Warranty and shall not extend beyond the five (5) year period set forth herein. This Limited Product Warranty does not warrant a specific power output, which shall be exclusively covered under Limited Power Warranty.

### **2 Limited Power Warranty**

a) If, within ten (10) years from date of purchase to the Customer any PV module(s) exhibits a power output less than 90% of the Minimum Peak Power as specified at the date of purchase in Grape Solar’s Product datasheet, provided that such loss in power is determined by Grape Solar (at its sole and absolute discretion) to be due to defects in material or workmanship Grape Solar will replace such loss in power by either providing to the Customer additional PV modules to make up such loss in power or by providing monetary compensation equivalent to the cost of additional PV modules required to make up such loss in power or by repairing or replacing the defective PV modules.

b) If, within twenty five (25) years from date of purchase to the Customer any PV module(s) exhibits a power output less than 80% of the Minimum Peak Power as specified at the date of purchase in Grape Solar’s Product datasheet, provided that such loss in power is determined by Grape Solar (at its sole and absolute discretion) to be due to defects in material or workmanship Grape Solar will replace such loss in power by either providing to the Customer additional PV modules to make up such loss in power or by providing monetary compensation equivalent to the cost of additional PV modules required to make up such loss in power or by repairing or replacing the defective PV modules

### **3 Exclusions and Limitations**

a) Warranty claims must be filed within the applicable Warranty period.

b) Warranty claims may only be made by the customer with proof of purchase.

c) The Limited Warranties do not apply to any of the following:

i. PV modules that have been subjected to: misuse, abuse, neglect or accident; alteration, improper installation, application or removal; repair or modifications by someone other than an approved service technician; power failure surges, lightning, flood, fire, accidental breakage or other events outside Grape Solar’s control.

ii. Cosmetic defects stemming from normal wear and tear of PV module materials.



iii. PV modules installed in locations which may be subject to direct contact with salt water.

d) The Limited Warranty does not cover transportation cost for return of the PV modules; reshipment of any repaired or replaced PV Modules to the applicable location. It does not cover the cost associated with installation, removal or reinstallation of the PV modules.

e) Warranty claims will not apply if the type or serial number of the PV modules is altered, removed or made illegible.

#### **4 Limitation of Warranty**

THE LIMITED WARRANTY SET FORTH HEREIN IS EXPRESSLY IN LIEU OF AND EXCLUDES ALL OTHER EXPRESSED OR IMPLIED WARRANTIES INCLUDING, BUT NOT LIMITED TO, THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE AND ALL OTHER OBLIGATIONS OR LIABILITIES ON THE PART OF GRAPE SOLAR, UNLESS SUCH OTHER WARRANTIES, OBLIGATIONS OR LIABILITIES ARE EXPRESSLY AGREED TO IN WRITING BY GRAPE SOLAR. GRAPE SOLAR SHALL HAVE NO RESPONSIBILITY OR LIABILITY WHATSOEVER FOR DAMAGES OR INJURY TO PERSONS OR PROPERTY, OR FOR OTHER LOSS OR INJURY RESULTING FROM ANY CAUSE WHATSOEVER ARISING OUT OF OR RELATING TO THE PV MODULE(S) INCLUDING, WITHOUT LIMITATION, ANY DEFECTS AND/OR FAILURES IN THE PV MODULE(S) OR FROM USE OR INSTALLATION.

GRAPE SOLAR'S AGGREGATE LIABILITY SHALL NOT EXCEED THE PURCHASE PRICE PAID TO GRAPE SOLAR BY THE CUSTOMER, FOR THE UNIT OF PRODUCT OR SERVICE FURNISHED OR TO BE FURNISHED, AS THE CASE MAY BE, WHICH GAVE RISE TO THE WARRANTY CLAIM.

SOME JURISDICTIONS DO NOT ALLOW LIMITATIONS ON WARRANTIES OR EXCLUSIONS OR LIMITATION OF DAMAGES. ACCORDINGLY, THE ABOVE EXCLUSIONS OR LIMITATIONS MAY NOT APPLY. THESE WARRANTIES GIVE A CUSTOMER SPECIFIC LEGAL RIGHTS, AND A CUSTOMER MAY HAVE OTHER RIGHTS THAT VARY FROM JURISDICTION TO JURISDICTION.

#### **5 Obtaining Warranty Performance**

If you feel you have a justified claim covered by this Limited Warranty, immediately notify the (a) Installer who sold the PV-modules, or (b) any authorized Grape Solar distributor of the claim in writing, or (c) send such notification to 1305 S. Bertelsen Road, Eugene, OR 97402, directly. In addition, please enclose evidence of the date of purchase of the PV module. If applicable, your installer or distributor will give advice on handling the claim. If further assistance is required, please write to Grape Solar for instructions. The return of any PV-modules will not be accepted unless prior written authorization has been given by Grape Solar.