

Sun Tie - Frequently Asked Questions

Typical Operation

Q. How does the inverter protect against islanding?

A. The internal circuitry of the inverter constantly monitors the voltage and frequency of the grid. Whenever the grid moves out of the specified tolerances stipulated by UL1741 (and IEE929), or drops out completely, the inverter disconnects from the grid. Once grid power is restored and is again within its nominal voltage and frequency range, the inverter resumes grid-tie operation after “seeing” the grid to be within the specified windows for 5 minutes. Any blip outside the established voltage and frequency range will again cause the inverter to disconnect, monitor, and then reconnect after a five-minute interval of “good” power.

Q. How does the inverter decide on the DC operating voltage?

A. The inverter performs a power sweep upon startup to determine the DC voltage at which maximum power can be obtained. During this power sweep, the inverter will operate over a range of voltages, starting at open circuit voltage and decreasing until power output reduces to 0. Then, the inverter will select the point at which maximum power was recognized and begin operating at that point.

Q. Why does the fan turn ON and OFF around the 100 watt conversion level, even when the inverter is very cold?

A. The fan in the ST inverter turns ON when AC output exceeds 100 watts, under normal conditions. This is normal operation.

Q. What do the red and green LED lights mean, and/or how am I supposed to read them?

A. The LEDs are reserved for trouble-shooting by a qualified electrician. Red indicates an error condition usually associated with a bad wiring connection; Green indicates the presence of AC power from the utility. See the Sun Tie manual for a troubleshooting guide on the LEDs.

Q. The inverter makes a faint ticking (zzztt) sound and the display blinks ON and OFF during dusk and dawn times.

A. This is normal operation when light levels are too low to power up the inverter. The result is cycling of the system until the array is able to produce sufficient, sustained output to keep the system up in the morning, or shutdown of the system at night. In both cases, cycling is normal and does not adversely impact any system components.

Performance

Q. Why is my ST is only putting out 65% of the STC nameplate of my array?

A. The power output of the inverter is dependent upon several variables including the type of PV array, installation impacts, and the environmental conditions that the system is subjected to. A general rule of thumb is that a well-designed and installed system should produce 60 to 70% of the STC nameplate rating of the array. More information regarding environmental impacts on a solar system can be found on the Xantrex Grid Tie website in a paper titled [PV array environmental impacts](#).

Q. Where can I find an efficiency curve for the ST inverter?

A. See the "SunTie Field Performance Summary Report" on our web site. It features real-world data that shows the ST2500 efficiency to be around 90% for most of its range. The 94% efficiency published in the Sun Tie spec sheet is peak efficiency as measured under laboratory conditions.

MPPT Issues

Q. Why does DC voltage bounce around so much? I thought Vmp held fairly steady over the short term.

A. The Vmp of an array is an ever-changing value that is dependent upon insolation levels, wind gusts, array shading, atmospheric conditions and temperature. Even the shadow of a power line can greatly reduce the output of the array. The function of the MPPT algorithm in the ST is to constantly monitor and adjust array voltage to capture the maximum power from the array – by varying the DC voltage.

Q. The inverter makes a zapping sound, at times dropping wattage to a lower value for a few seconds before climbing back up. Is this normal?

A. The inverter's MPPT power point tracking system was looking for more power from solar panels but temporally overloaded the array. This condition was common with earlier versions of the firmware (prior to -05) and may be resolved by changing to the -05 chip. For more information regarding this issue, please refer to the Service Bulletin on the Grid Tie website.

Q. Sometimes it takes the inverter several minutes to get back to making the same power it was prior to the DC being reset?

A. There are many conditions that can affect restart time including temperature, shading associated with shadows or cloud cover, the angle of the sun, and the system's MPPT power point tracking feature. Typically, full power production resumes within a few minutes; however, under rare conditions, it can take up to 10 minutes to return to comparable levels.

AC Side Connections

Q. How am I supposed to ground the inverter?

A. The inverter grounds to the utility's ground rod usually located outside, near the main electrical panel. The PV array should also be grounded to this same ground rod. The inverter's operator's manual has recommended grounding diagrams, including wire size; however, always check with your local electrical inspector for recommended grounding practices in your area.

Q. Can I put two inverters in parallel?

A. Yes, several inverters can be installed in a parallel configuration; however, they cannot share the same PV array. The parallel connection is made in the service panel where two separate, 15 amp DPDT breakers are individually utilized for each inverter.

Q. Can I hook the ST unit to 3-phase power? or, can I hook it to single-phase power?

A. For three phase power applications, it is possible to use a buck/boost transformer. Information about this can be found on the Grid Tie website in a document titled [SunTie 208 VAC Hookup](#). The ST Series is meant to be connected to L1 and L2 of single-phase power – as is standard in an everyday residence.

Q. Can two or more ST's share a common AC breaker in main electrical panel?

A. Yes, but it is not recommended. If panel space is limited and the breaker must be shared, the supply breaker and wire must be matched for the total AC load even though each inverter has its own internal 15 amp over-current protection circuitry. Always consult your local electrical inspector for code requirements.

PV Array Wiring

Q. I have an ST1000 and have one string of modules hooked up, but only get 100 W from my 300 W string of four 75 W modules. Why is my efficiency so bad? 300 W is not so small for a 1000 W inverter.

A. The efficiency of any inverter is lower at lower power levels. See the "SunTie Field Performance Summary Report" on our web site. Even though that shows the efficiency for an ST2500 instead of an ST1000, the shape of the curve is similar for the ST1000. Also, the inverter has a harder time tracking a smaller array due to the lower array impedance. Consider adding another string so that you get an array of at least 500 W. This will substantially boost system output.

Q. I have eight strings coming into my ST2500 that has only six inputs. How do I combine the strings?

A. In some cases it may be possible to parallel strings at the module's J-boxes, but this is dependent upon the specifics of the module. The module manufacturer and your local electrical inspector can supply a concrete answer for this. Otherwise, a separate combiner box or boxes can be used for combining more than six strings in parallel.

Q. Can I use larger fuses, smaller fuses, etc., on the combiner board? Where do I get them?

A. You can use smaller fuses than the standard 20-amp, but not larger. They are standard GBB Buss fuses and are available from Newark Electronics and Allied Electronics, among others. Each fuse holder has an ampacity limitation of 20 amps.

Q. How can I bring my externally combined array into the ST's combiner board?

A. For ST1000 or ST2000 units, a terminal block is provided for array input. On ST1500, ST2000CB, or ST2500 units, a combiner board is provided for array combination – this combiner board cannot be bypassed in the field.

Q. Can I use 5 or more modules in series on my ST? Why not?

A. The Sun Tie inverter is designed for use with four modules in series yielding a 48 VDC configuration. If additional crystalline modules are added (i.e., 60 VDC with five), the inverter can be damaged due to the over-voltage.

Q. Is the ST inverter compatible with ASE modules?

A. It is possible to use strings of four ASE300DG17s with the ST1000 or ST2000, since the standard 20 amp combiner board fuses and fuse holders on ST1500, ST2000CB, and ST2500 will not meet the current requirements for these modules. If the installation is a residential roof-mounted array, it will also be necessary to purchase a separate PVGFP for code compliance – since this is not included in ST1000 or ST2000 models.

Display Issues

Q. Is there any way I can monitor my ST to record WHrs each day and cumulative WHrs? The display is often blank by the time I get home. I've heard the Sun Tie XR will have a remote option -- will that be compatible with my existing ST?

A. The ST Series inverter does not have a provision for recording WHr readings. A simple and low cost solution is the addition of a secondary utility meter mounted on the ST's output to keep track of your solar Watt-hours. These meters are available through your installer or solar catalog houses. The remote option on the STXR is not available for current ST inverters.

Q. How can I keep the ST's display from resetting at night?

A. The Sun Tie display is designed to reset each night in order to begin each new day accumulating values for that particular day. There is currently no capability with the Sun Tie unit to prevent the display from resetting.

Q. Can I interface, download, etc. between the ST and my computer?

A. The ST inverter does not provide access to computer communication. System monitoring can be accomplished via external data-logging equipment such as the Power Tracer available from Xantrex.

Q. The display on my ST is does not always work – what can I do to fix it?

A. This may indicate a problem with the inverter's display or an earlier version of firmware. Contact your dealer or the Technical Service department at Xantrex for further assessment.

Miscellaneous

Q. The ST manual has suggested wire sizes that do not seem correct – is this a typo?

A. Yes, the ST manual (P/N 975-0003-01-01 Rev. B, page 3 Table 2) is wrong, and the wire sizes shall be corrected in the next version. Please refer to the SW manual for recommended wire sizes, as derived from National Electric Cod (NEC) standards. Generally, wire sizes tend to be slightly oversized, erring on the side of caution, since undersized wires can create potential fire hazards.

Q. Should I “update” my ST with the chip referenced in the Service Bulletin?

A. The Sun Tie Service Bulletin 2001-002 titled “Decreased Performance at High Ambient Conditions” recommends installation of the -05 chip if the system performance is unstable under certain conditions. The -05 chip is designed to safeguard against array collapse, a non-damaging condition that occurs when too much current is drawn from a PV array – causing the voltage to fall to zero, and to optimize the thermal management of the electronics. The new software also reduces the amount of error displayed on the AC out reading. Earlier software had a display tolerance of 5 to 10%. The -05 chip achieves greater meter accuracy, thus yielding values that are more in line with system output. If the solar system is operating as expected, no update is necessary. For specifics in regard to this issue, please refer to the Sun Tie Service Bulletin on the Grid Tie website

Q. Do you have grid tie inverters larger than 2.5 kW?

A. Yes, for larger grid-tie applications consider the SW Series (up to 5 kW) or the PV Series (up to 100 kW). Additionally, it is possible to parallel ST Series inverters at a site – as long as each has its own array.