

## Technical Note

**Date:** April 5, 2005

**Attention:** PV Installer or Electrical Inspector

**From:** Mark Edmunds, Director Engineering –RE Products

**Subject:** **GT 3.0**, additional back-feed protection should not be required

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Both UL1741 and NEC 690 have considerations for backfeed current that can flow from any source other than the solar array, onto the array wiring. UL calls the current that can flow from the utility grid onto the array wiring the "max utility backfeed current" and they want a specification and a marking/label for the maximum value that current may have.

For the GT3.0 this value was initially set at 20 amps based on the internal AC output fuse rating. The following paragraphs explain that the GT3.0 can not, by design, provide backfeed current to the array and for the purpose of array fuse sizing, the utility backfeed rating should in fact be zero.

The GT 3.0 series of utility interactive inverters utilize a high frequency switching scheme to transfer power through a toroidal transformer which achieves full galvanic isolation between the grid and array potentials. This design by its very nature is unidirectional, due to passive diode rectification used to generate the internal high voltage dc bus feeding the grid side inverter stage. Because of this, even if the electronic protection and control circuitry somehow failed, there is no way for the grid voltage to excite the grid side of the isolation transformer through these passive rectifiers, ensuring that no power can be back-fed to the PV array.

Even if the transformer isolation barrier somehow failed in addition to the main inverter bridge transistors, there still could not be any reverse power flow, unless the rectifiers somehow also failed short. The probability of 3 failures like this happening simultaneously is almost non-existent, and extensive single fault testing done during UL 1741 qualification by CSA shows that any one of these faults either open the grid disconnect relay, or blow the internal grid connect fuse, completely preventing any power flow from the grid.

In conclusion, the GT3.0, with an isolated design and multiple power conversion stages, can not have any single fault that will cause backfeed current to flow. So Xantrex's position is that the GT3.0 backfeed current into the array wiring is zero, and labeling will be revised to reflect this in the near future. In the interim, if you have any questions or concerns please contact me by telephone or email.

Thank you,



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