

# Morningstar's TriStar MPPT 600V

## Charge Controller with DC Transfer Switch



### For retrofitting existing grid-tied solar installations with battery backup power

This version of the TriStar MPPT 600V controller includes:

- PV disconnect/Transfer switch
- Grid-tie inverter terminals
- All the features associated with previous versions including
  - Peak efficiency of 97.9%
  - Pre-set for 48 Vdc battery systems
  - Full I-V curve sweep in < quarter of a second
  - Parallel operation of multiple controllers from a single source input
  - Extensive networking and communications capabilities



**Don't let your PV array go to waste.  
It's time for the switch!**

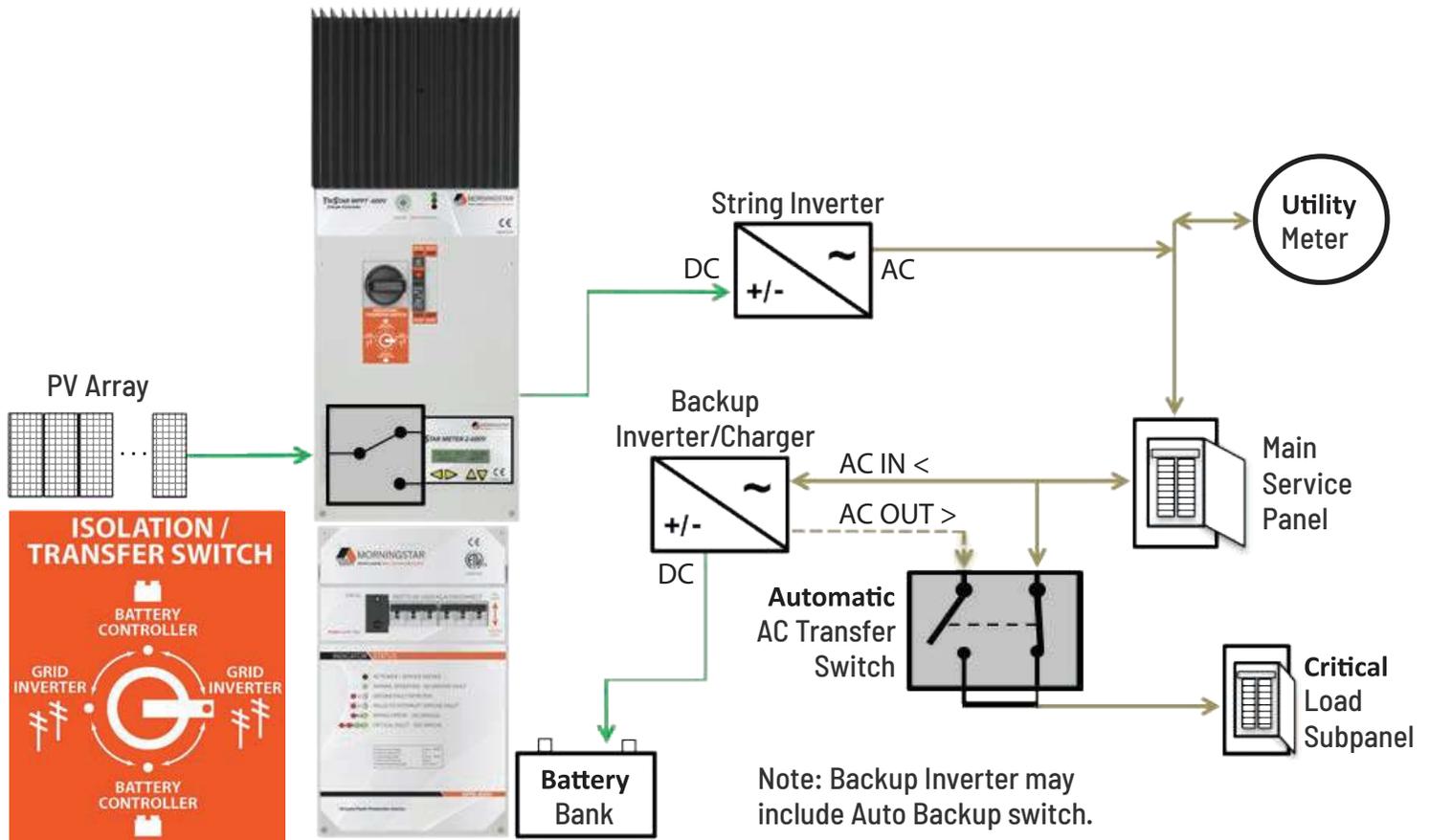


*"Morningstar's DC Coupled backup solution for grid-tied solar systems is a game changer. Now people can use the PV array that they already paid for to create backup power when the grid goes down. This simple, clean, scalable approach has many advantages over AC coupling and other solutions." – Sequoia Cross, CEO, Backwoods Solar*

## HOW IT WORKS:

### During Grid-Tied Operation:

PV array is connected to the string inverter

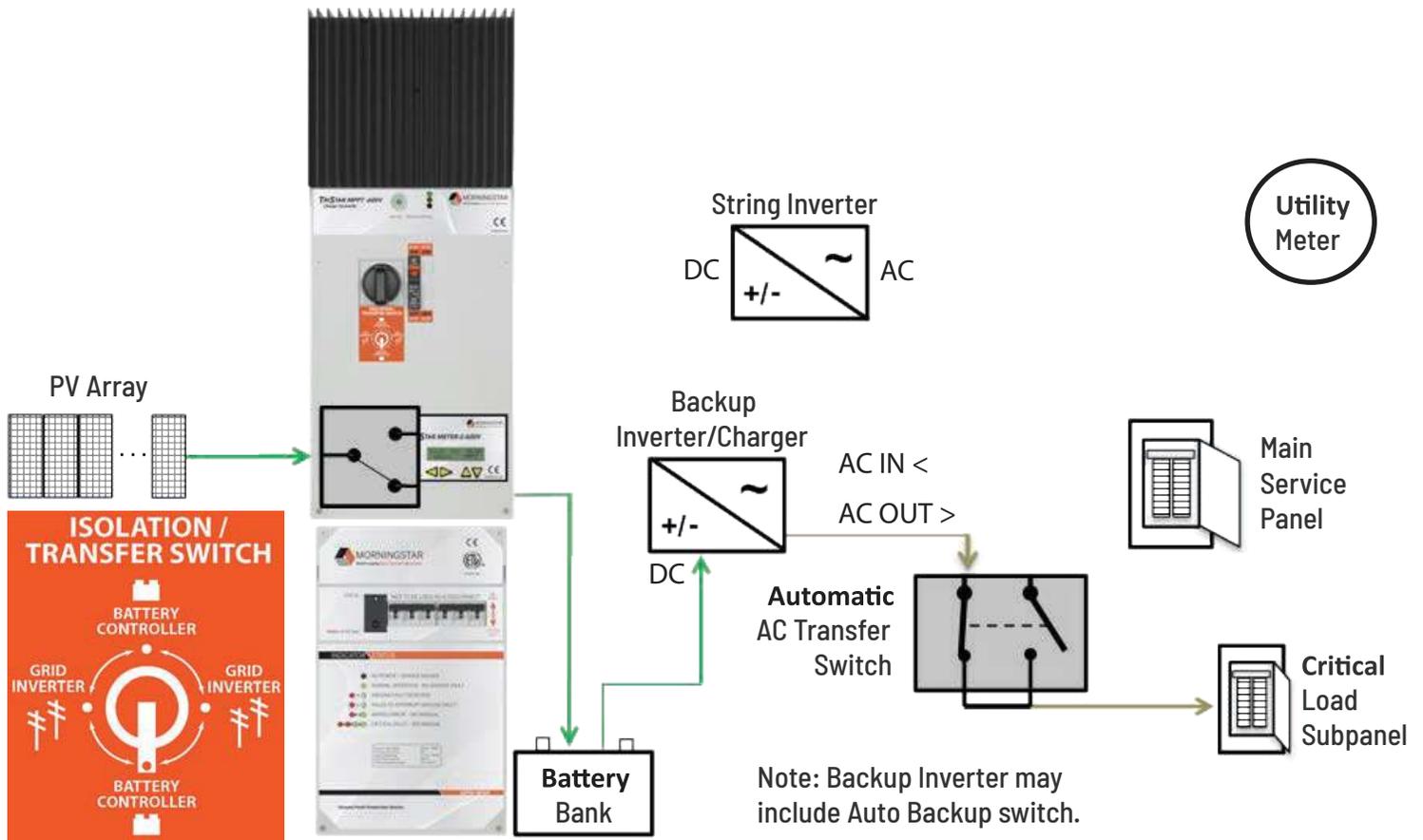


Example of a grid-tied solar system retrofitted with the TriStar MPPT 600V Controller with DC Transfer Switch, a ground fault protection device, batteries, and a backup inverter/charger to enable battery backup in the event of a grid failure. Here's how it works:

1. Through the controller, the PV array is connected to a string inverter the same as in a typical grid-tied system.
2. As long as the grid is up and operating normally, the controller's PV transfer switch (in the Grid ON/controller OFF position) sends solar panel-generated DC electricity through the inveter for AC conversion, and then on to the load panels to offset grid usage. Any excess electricity may be returned to the grid for a utility company a credit.
3. The electricity sent to the main service panel also flows 1. to a second critical load sub-panel and 2. to the backup inverter/charger, which converts AC power to DC power in order to charge the battery bank. This ensures a ready supply of backup power should a grid outage occur.

# HOW IT WORKS:

## During Battery Backup Operation: TriStar MPPT 600V is connected to the PV array



2nd parallel input TS-MPPT600V controller can increase the charging capacity.

During a grid outage, batteries can use the stored electricity generated by the PV array to run critical loads. Here's how it works:

1. The TriStar MPPT 600V is connected to the PV array for battery backup operation. When the PV disconnect transfer switch is set in the Battery Backup/Controller ON position, DC power flows from the array into the controller and then on to the batteries, in order to charge the batteries.
2. Once charged, the batteries can send DC power to the inverter/charger which converts the battery-supplied DC back to AC which can run loads. An AC transfer switch inside the inverter charger sends this electricity to the second critical load sub-panel, which can provide power to a refrigerator, lights, computer, sump pump, and cell phone charging outlet.
3. Once grid power is restored, turning the controller's PV transfer switch to the Grid On/Controller OFF position resumes the electricity flow in a typical grid-tied system path.

# TriStar<sup>TS-MPPT-600V</sup>

Maybe on a **COLD** day here,  
the other charge controllers  
will catch up.



But for now, there's only one high-voltage charge controller that doesn't need fans to keep its cool: the Morningstar TriStar TS-MPPT-600V.

Solar designers and installers have long sought the benefits provided by a high-voltage charge controller. By allowing longer and fewer strings, they reduce wire, cable and breaker costs, and make installations go faster and easier.

But higher voltages come with the penalty of higher operating temperatures. The short-cut other brands take, of using fans to deal with extreme heat, can shorten the operational life of the controller by sucking in dirt and debris and adding moving parts that can fail in the field. Worse, powered fans are a parasitic load that reduces efficiency in solar harvesting. For these reasons, even achieving medium voltage is a struggle for conventional designs. Morningstar's high-voltage 600V is a true technical breakthrough.

Advanced digital processing responds much more quickly and accurately on both input and output sides, avoiding the transient "swings" of ordinary controllers. The internal architecture is laid out for maximum performance and thermal management rather than economy, with critical parts located where they make the most engineering sense. And finally, the controller is built with high quality, "over spec" components used throughout.

This may go way beyond the standard industry approach, but it's business as usual at our employee-owned brand. With 25 years of experience and well over three million products made, installers know they can bet their reputation on ours.

When it's time to push the design envelope on your next system, our revolutionary 600V TriStar is ready when you are. Contact your Morningstar distributor for complete information or visit us at [www.morningstarcorp.com](http://www.morningstarcorp.com)