

## TRISTAR MPPT™ 600V

### HIGH VOLTAGE CHARGE CONTROLLER

Morningstar's TriStar MPPT 600V Charge Controller can be used with higher voltage photovoltaic (PV) arrays, and select wind turbines or hydropower systems.\* This product enables the following application scenarios:

- Adding modules incrementally with no string sizing issues
- Off-grid PV systems with input voltages greater than 150V
- Wind/hydro battery charging systems\*
- Fewer combined circuits and lower current for long wire runs from the array to the controller
- New installation grid-tie PV systems with battery back-up
- Retrofitting grid-tie PV systems to include battery back-up without changing the PV array configuration
- Supplementary charging for AC Coupled PV systems



*Standard, DB, TR, and TR with GFPD versions shown with optional display meters*

### KEY FEATURES AND BENEFITS

#### ➤ High Voltage Capacity

- Maximum input voltage of 600V
- Operates with PV array Voc voltages up to 525 Voc
- Wind, hydro operating voltages up to 500 Vdc\*
- Pre-set for 48 Vdc battery systems
- Programmable for 24V, 36V and 60V battery systems
- Allows long wire runs from the array to the controller
- Higher voltage reduces voltage drop and wire costs
- No combiner boxes required for single or two string systems
- Better enables grid-tie PV systems with battery back-up
- Enables easier PV array expansion than lower voltage systems and accommodates increasing loads

#### ➤ Extremely High Reliability

- Robust thermal design and no cooling fans
- No moving parts
- Superior lightning protection from nearby lightning-induced voltage/current spikes
- Extensive electronic protections
- Epoxy encapsulated inductors and conformally coated printed circuit boards

#### ➤ Very High Efficiency

- 97.9 % peak efficiency
- Proprietary tracking algorithm minimizes power losses
- Low self-consumption
- Continuous operation at full power to 45°C ambient temperatures without need to de-rate
- Electronic devices with higher ratings to minimize losses from heating

#### ➤ Maximizes Energy Harvest

Our TrakStar™ MPPT Technology features:

- Better peak power point tracking than other MPPT charge controllers
- Very fast sweeping of the entire PV array
- Recognition of multiple power points during shading or mixed PV arrays
- Low input voltage operation
- Excellent performance at sunrise and low solar insolation levels

#### ➤ Communications Capabilities

- Enables system monitoring, data logging and adjustability. Uses open standard MODBUS™ protocol and Morningstar's MS View software
- Meterbus: Communications between compatible Morningstar products
- Serial RS-232 and EIA-485 serial connectivity
- Ethernet: fully web-enabled interface to a local network or internet; view from a web browser or send email

#### ➤ Other Features

- High-Low voltage barrier improves safety
- Available with optional Disconnect Box: 600V PV disconnect switch, battery breaker and prewired input/output bus bars
- Available with DC Transfer Switch option for switching from a GT string inverter to battery backup charging during a utility outage. Multiple controllers and GFPDs may be added later, on an as-needed basis

\* To avoid product/system failure, please contact Morningstar for latest wind/hydro information.

**Four Versions:**

**TS-MPPT-60-600V-48** Standard

**TS-MPPT-60-600V-48-DB** With Disconnect Box (600V; 25A 1-Pole disconnect switch)

**TS-MPPT-60-600V-48-DB-TR\*** With DC Transfer Switch (600V; 30A double pole; double throw DC Transfer Switch)

**TS-MPPT-60-600V-48-DB-TR-GFPD\*\*** Pre-wired with Ground Fault Protection Device

All non-standard versions include a 1-Pole; 63A PV battery breaker\*\*\* and pre-wired PV/Battery busbars

TR versions also include a pre-wired String Inverter busbar

**TECHNICAL SPECIFICATIONS**

**Electrical**

- Peak Efficiency 97.9%
- Maximum Battery Current 60A
- Maximum Input Operating Current 15A (self limiting)
- Maximum Solar Open Circuit Voltage 600V
- Nominal Maximum Operating Power\*\*\*\* 3200Wp, 48 Volt
- Nominal System Voltage 48 Vdc  
custom programmable to 24V, 36V and 60V
- Battery Operating Voltage Range 16-72 Vdc
- PV Input Operating Voltage Range 100V to Voc = 525V
- Wind/Hydro Input Operating Voltage Range Battery Voltage to 500V
- Self-Consumption 1.75 - 2.50 W
- Transient Surge Protection 4500 Watts/port

**Electronic Protections**

- Input Overload, high voltage
- Battery High voltage, battery sense disconnected, remote temperature sense disconnected
- General Operation High temperature, reverse current at night, lightning and transient surges

**Environmental**

- Ambient Temperature -40 °C to +45 °C
- Storage Temperature -55 °C to +85 °C
- Humidity 100% non-condensing
- Tropicalization Epoxy encapsulation, conformal coating, marine-rated terminals

**Battery Charging**

- Charging Stages MPPT, absorption, float, equalize
- Temperature Compensation
  - Coefficient -5mV/°C/cell (25° ref)
  - Range -30 °C to +80 °C / -22 °F to +176 °F
  - Set points Absorption, Float, Equalize, HVD

Note: Remote Temperature Sensor is included.

**Mechanical**

- Dimensions
  - Standard Version 39.2 x 22.1 x 14.9 cm / 15.4 x 8.7 x 5.9 in
  - DB & TR Version 54.2 x 22.1 x 14.9 cm / 21.4 x 8.7 x 5.9 in
- Unit Weight
  - Standard Version 9.0 kg / 19.8 lbs
  - DB & TR Version 12.8 kg / 28.1 lbs
- Maximum Wire Size
  - Power Terminals 2.5 mm<sup>2</sup> - 35 mm<sup>2</sup> / 14 AWG - 2 AWG
  - RTS/Sense Terminals 0.25 mm<sup>2</sup> - 1.0 mm<sup>2</sup> / 24 AWG - 16 AWG
- Conduit Knockouts M20; 0.50, 1.00, 1.25 inches
- Enclosure Rating Type 1 (indoor and vented), IP20

**Communication**

- Ports Ethernet, EIA-485, RS-232, MeterBus
- Supported Protocols MeterBus, MODBUS RTU, MODBUS TCP/IP, HTTP, SNMP v2, SMTP

**Options**

- TriStar 600V Meter (TS-M-2-600V)
- TriStar Remote Meter (TS-RM-2)
- Meter Hub (HUB-1)
- Relay Driver (RD-1)
- 600V Ground Fault Protection Device (GFPD-600V)

**Certifications**

- CE, RoHS, NEC Compliant
- ETL Listed: UL-1741 and Canadian CSA C22.2 No. 107.1.01
- FCC Class B Part 15 Compliant

\* Can be used as a 2-pole version of the Disconnect Box.

\*\* See GFPD-600V datasheet for additional specifications.

\*\*\* Can be replaced with 2-pole battery breaker.

\*\*\*\* Input power can exceed Nominal Maximum Operating Power, but controller will limit and provide its rated continuous maximum output current into batteries. This will not harm the controller.

WARRANTY: Five year warranty period. Contact Morningstar or your authorized distributor for complete terms.