Morningstar’s TriStar MPPT solar controller with TrakStar Technology™ is an advanced maximum power point tracking (MPPT) battery charger for off-grid photovoltaic (PV) systems up to 3kW. The controller provides the industry’s highest peak efficiency of 99% and significantly less power loss compared to other MPPT controllers.

The TriStar MPPT features a smart tracking algorithm that maximizes the energy harvest from the PV by rapidly finding the solar array peak power point with extremely fast sweeping of the entire I-V curve. This product is the first PV controller to include on-board Ethernet for a fully web-enabled interface and includes up to 200 days of data logging.

### Key Features and Benefits

#### Maximizes Energy Harvest

Our TrakStar MPPT Technology features:

- Better peak power point tracking than other MPPT controllers
- Very fast sweeping of the entire I-V curve
- Recognition of multiple power points during shading or mixed PV arrays
- Excellent performance at sunrise and low solar insolation levels

#### Extremely High Reliability

- Robust thermal design and no cooling fans
- Parallel circuit design provides less stress and longer life for electronic components
- No mechanical relays
- Extensive electronic protections including PV short circuit protection
- Epoxy encapsulated inductors and conformally coated printed circuit boards

#### Very High Efficiency

- Peak efficiency of 99%
- Proprietary tracking algorithm minimizes power losses
- Low self-consumption
- Continuous operation at full power to 45°C without need to de-rate
- Selected electronic devices with higher ratings to minimize losses from heating

### Extensive Networking and 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: connection to a personal computer
- EIA-485: communications between multiple devices on a bus
- Ethernet: fully web-enabled interface to a local network or internet; view from a web browser or send email/text messages
- EMC-1: IP based network and internet connectivity

### Metering and Data Logging

- TriStar meter and remote meter provides detailed operating data, alarms and faults
- Three LEDs display system status
- Up to 200 days of data logging via meters or communications ports

<table>
<thead>
<tr>
<th>System Status:</th>
<th>53.60V</th>
<th>28C</th>
<th>54.2A</th>
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<td>2867W</td>
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<td>MPPT</td>
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<table>
<thead>
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<th>Data Logging:</th>
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</thead>
<tbody>
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<tr>
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## Technical Specifications

### Versions

<table>
<thead>
<tr>
<th>Versions</th>
<th>TS-MPPT-30</th>
<th>TS-MPPT-45</th>
<th>TS-MPPT-60</th>
<th>TS-MPPT-60M</th>
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<td>TS-RM2</td>
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### Electrical

- **Maximum Battery Current**
  - 30 amps
  - 45 amps
  - 60 amps
  - 60 amps

- **Nominal Maximum Operating Power**
  - **12 Volt**
    - 400 Watts
    - 800 Watts
    - 1600 Watts
  - **24 Volt**
    - 1200 Watts
    - 2400 Watts
  - **48 Volt**
    - 3200 Watts

- **Peak Efficiency**
  - 99%

- **Nominal System Voltage**
  - 12, 24, or 48 volts DC

- **Maximum PV Open Circuit Voltage**
  - 150 volts DC

- **Battery Operating Voltage Range**
  - 8-72 volts DC

- **Maximum Self-consumption**
  - 2.7 Watts

- **Transient Surge Protection**
  - 4500 Watts/port

### Battery Charging

- **Charging Algorithm**
  - 4-stage

- **Charging Stages**
  - Bulk, Absorption, Float, Equalize

- **Temperature Compensation**
  - Coefficient: –5mV/°C/cell (25° ref)
  - Range: –30°C to +80°C
  - Set Points: Absorption, Float, Equalize, HVD

- **Remote Temperature Sensor (RTS)**
  - Included

### Communication Ports

<table>
<thead>
<tr>
<th>Communication Ports</th>
<th>TS-MPPT-30</th>
<th>TS-MPPT-45</th>
<th>TS-MPPT-60</th>
<th>TS-MPPT-60M</th>
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</thead>
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<td>EMC-1</td>
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<td>Yes</td>
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</tr>
</tbody>
</table>

### Electronic Protections

- **Solar**
  - Overload, Short Circuit, High Voltage

- **Battery**
  - High Voltage

- **High Temperature**

- **Lightning & Transient Surges**

- **Reverse Current at Night**

### Environmental

- **Ambient Temperature**
  - –40°C to +45°C

- **Storage Temperature**
  - –55°C to +100°C

- **Humidity**
  - 100% non-condensing

- **Tropicalization**
  - Epoxy encapsulation, Conformal coating, Marine rated terminals

### Mechanical

- **Dimensions**
  - 29.1 x 13.0 x 14.2 cm
  - 11.4 x 5.1 x 5.6 in

- **Weight**
  - 4.2 kg / 9.2 lbs

- **Maximum Wire Size**
  - 35 mm² / 2 AWG

- **Conduit Knockouts**
  - M20; ½, 1, 1 ¼ in

- **Enclosure**
  - Type 1 (indoor and vented) IP20