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.

- **Metering and Data Logging**
  - Optional TriStar meter and remote meter provides detailed operating data, alarms and faults
  - Three LED’s display system status
  - Up to 200 days of data logging via meters or communications ports

**System Status:**

<table>
<thead>
<tr>
<th>Voltage (V)</th>
<th>Current (A)</th>
<th>Power (W)</th>
</tr>
</thead>
<tbody>
<tr>
<td>53.60</td>
<td>28</td>
<td>542</td>
</tr>
<tr>
<td>2867</td>
<td>MPPT</td>
<td></td>
</tr>
</tbody>
</table>

**Data Logging:**

<table>
<thead>
<tr>
<th>Date</th>
<th>Battery Voltage</th>
<th>Solar Voltage</th>
<th>Battery Current</th>
<th>Solar Current</th>
</tr>
</thead>
<tbody>
<tr>
<td>Today</td>
<td>46.4 Vmin</td>
<td>58.9 Amax</td>
<td>47.2 Vmin</td>
<td>56.8 Amax</td>
</tr>
<tr>
<td>Day: -1</td>
<td>47.2 Vmin</td>
<td>56.8 Amax</td>
<td>46.4 Vmin</td>
<td>58.9 Amax</td>
</tr>
<tr>
<td>Today</td>
<td>107.2 Vmax</td>
<td>0</td>
<td>105.5 Vmax</td>
<td>0</td>
</tr>
<tr>
<td>Day: -1</td>
<td>105.5 Vmax</td>
<td>0</td>
<td>107.2 Vmax</td>
<td>0</td>
</tr>
</tbody>
</table>
### Technical Specifications

#### Electrical

<table>
<thead>
<tr>
<th></th>
<th>TS-MPPT-45</th>
<th>TS-MPPT-60</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Battery Current</td>
<td>45 amps</td>
<td>60 amps</td>
</tr>
<tr>
<td>Nominal Maximum Solar Input</td>
<td>600 Watts</td>
<td>800 Watts</td>
</tr>
<tr>
<td></td>
<td>12 Volt</td>
<td>1200 Watts</td>
</tr>
<tr>
<td></td>
<td>24 Volt</td>
<td>1600 Watts</td>
</tr>
<tr>
<td></td>
<td>48 Volt</td>
<td>3200 Watts</td>
</tr>
</tbody>
</table>

#### 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

#### TS-MPPT-45 and TS-MPPT-60

- Peak Efficiency: 99%
- Nominal System Voltage: 12, 24, 36 or 48 volts DC
- Max. Solar Open Circuit Voltage: 150 volts DC
- Battery Operating Voltage Range: 8-72 volts DC
- Maximum Self-consumption: 4 Watts
- Transient Surge Protection: 4500 Watts/port

#### Electronic Protections

- Solar: Overload, Short Circuit, High Voltage
- Battery: High Voltage, High Temperature, Lightning and Transient Surges, Reverse Current at Night

#### Battery Charging

- Charging algorithm: 4-stage
- Charging stages: Bulk, Absorption, Float, Equalize
- Temperature Compensation: 
  - Coefficient: -5mV/°C/cell (25°C ref)
  - Range: -30°C to +80°C
  - Set points: Absorption, Float, Equalize, HVD

Note: Remote Temperature Sensor is included.

#### Mechanical

- Dimensions: 29.1 x 13.0 x 14.2 cm
- Weight: 4.2 kg / 9.2 lbs.
- Max. Wire Size: 35 mm² / 2 AWG
- Conduit knockouts: M20; ½, 1, 1 ¼ inch
- Enclosure: Type 1 (indoor and vented) IP20

#### Communication Ports

<table>
<thead>
<tr>
<th></th>
<th>TS-MPPT-45</th>
<th>TS-MPPT-60</th>
</tr>
</thead>
<tbody>
<tr>
<td>MeterBus</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>RS-232</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>EIA-485</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Ethernet</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

#### Options

- TriStar Meter-2
- TriStar Remote Meter-2
- Meter Hub
- Relay Driver

#### Certifications

- CE Compliant
- ETL Listed (UL1741)
- FCC Class B Part 15 Compliant
- Complies with (NEC) U.S. National Electric Code
- RoHS Compliant
- Manufactured in a certified ISO 9001 facility

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

**AUTHORIZED MORNINGSTAR DISTRIBUTOR:**

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