PRELIMINARY

TriStar™

Three-Function Solar Controller*

Morningstar's TriStar Controller is a three-function controller that provides reliable solar battery charging, load control or diversion regulation. This controller operates in only one of these modes at a time but two or more controllers may be used to provide multiple functions.

The TriStar uses advanced technology and automated production to provide exciting new features at a competitive cost. The controller is UL listed and is designed for both solar home systems and professional applications.

TriStar Versions:	**TS-45**	**TS-60**
Rated Solar Current	**45A**	**60A**
Rated Load Current	**45A**	**60A**
UL current ratings	**45A**	**60A**
System Voltage	**12/24/48V**	**12/24/48V**
Options:		
Digital Meter	**yes**	**yes**
Remote Meter	**yes**	**yes**
Remote Temp Sensor	**yes**	**yes**

Standard Features:

- Ratings are actual to 50°C and meet UL requirements; no need to de-rate
- Choice of 7 different regulation or LVD setpoints selectable via DIP switches; eliminates troublesome rotary switches and "trim pots"
- RS-232 comm port provides for a wide range of custom setpoints
  DB-9 connector, 9600 baud
  Designed for PCs and "Palm Pilots"
  May be used for:
  adjusting control setpoints and parameters
  data logging with 30 days storage (future capability)
  remote monitoring and control (future capability)
- Self-test runs continuously. If a fault is detected, the fault will be displayed on the digital meter and indicated with the LED's
- Push button will reset from an error or fault, start or stop battery equalization (charge controller mode) or override LVD (load controller mode)
- 100% solid state for high reliability in harsh environments
- Microprocessor control for extended capabilities
- Conduit-ready enclosure for large wire sizes; provides extra room for wire turns
- Very low voltage drops
- 5 year warranty
- Estimated 15 year life

Electronic Protections:

- Reverse polarity protection (any combination)
- Solar and load short circuit protection
- All other connectors are short circuit protection
- Solar and load overcurrent protection
- Lightning and transient surge protection using 4500W transient voltage suppressors
- High temperature protection via automatic current reduction or complete shut-down

Charge Controller Mode:

- Constant voltage series PWM to provide highly efficient battery charging
- 4 stage charging to increase battery capacity and life: bulk charge, PWM regulation, float and equalize
- 3 LED's indicate battery state-of-charge, controller status and battery service required
- Parallel for larger solar arrays up to 300A or more
- PWM may be changed to "on-off" controller to minimize any possible telecom noise
- Temperature compensation via optional remote temperature sensor
- Battery sense connector to eliminate voltage drops between the controller and the battery

Load Control Mode:

- Electronic short circuit and overload protection with automatic reconnect
- Starts all loads including inductive (meters, pumps) with no damage to controller
- Allows inrush current to 300A
- LVD has 4 minute delay to avoid incorrect disconnect
- LED and meter indicates LVD warning and disconnect
- LVD is current compensated to avoid false disconnect
- Load protected by an automatic high voltage disconnect
- Load protected from solar voltage spikes when the battery is removed

Digital Meter Option:

- Voltage accuracy is 0.2%
- Current accuracy is 1.0%
- Meter may be mounted to the controller by removing the controller cover plate
- 2 x 16 display with backlighting
- Installs to controller with RJ-11 connector for simple installation
- Includes 4 pushbuttons for easy "up/down" and "left/right" scrolling
- Displays self-test results, system information and controller setpoints
- Remote digital meter for mounting away from the controller (in another room):
  Flush mount in a wall or fit into a double-gang electrical box
  Installs with RJ-11 connector
  Available with a 30 meter cable

Diversion Control Mode:

- May be used for solar, wind or hydroelectric
- To protect against battery overcharge, excess energy is diverted from primary battery to a secondary battery or alternate DC resistive load

Remote Temperature Sensor Option:

- Accurately measures temperature at the battery and compensates regulation setpoints
- Cable length is 10 meters; may be increased to 30 meters
- Rated from -30°C to +80°C
- Defaults to 25°C if temperature sensor reading is out of range or fails

Environmental Specifications:

Operating ambient temperature: - 40°C to +50°C
For 60°C, de-rate 20%
Storage temperature**:** -55°C to +85°C
Digital Meter operating temperature: -30°C to +85°C
Humidity: 100% (non-condensing)
Tropicalization:
Conformal coating on both sides of all printed circuit boards
Electrolytic anodized aluminum heat sink
Powder-coated steel enclosure
Stainless steel fasteners

Mechanical Specifications:

Dimensions: 10.1H x 4.9W x 2.3D (inches)
25.7H x 12.4W x 5.8D (centimeters)
Weight: 4 lbs (1.8 kg)
Wire Terminals: Sized for up to 2 AWG (35 mm^2)
Torque to 50 in-lb
Positive terminals are separated from negative terminals
Conduit Knockouts**:** Eccentric 1"/1.25" (2.5/3.2 cm)
Located bottom, sides and back
Enclosure: White powder-coated steel
Indoor rated, vertical mounting
Heat sink: Black electrolytic anodized aluminum

Certifications:

CE Compliant
UL 1741
cUL CSA 22.2 107.1 – 95
Meets all NEC standards
CTIK standards
Manufactured in a certified ISO 9002 facility

* **Preliminary Specifications. Final product release expected December 2002.** **9/02**