MORNINGSTAR
PROFESSIONAL SERIES
World's Leading Solar Controllers & Inverters

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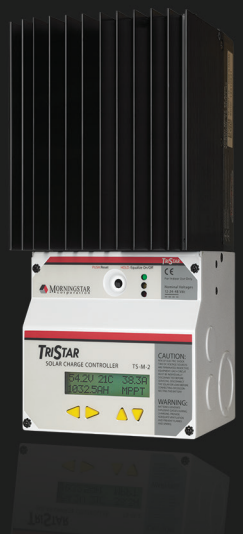

30, 45 or 60 amps at up to 150 volts open circuit.

TriStar MPPT™

SOLAR CONTROLLER WITH MAXIMUM POWER POINT TRACKING

- Maximizes Energy Harvest
- Extremely High Reliability
- Very High Efficiency
- Extensive Networking

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

System Status:

53.60V	28C	54.2A
2867W		MPPT

Data Logging:

Today Batt 46.4 Vmin	Day:-1 Batt 47.2 Vmin
Today Solar 58.9 Amax	Day:-1 Solar 56.8 Amax
Today Solar 107.2 Vmax	Day:-1 Solar 105.5 Vmax

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Technical Specifications

Versions	TS-MPPT-30	TS-MPPT-45	TS-MPPT-60	TS-MPPT-60M
Meter				
TS-M2	Optional	Optional	Optional	Included
TS-RM2	Optional	Optional	Optional	Optional
Electrical				
Maximum Battery Current	30 amps	45 amps	60 amps	60 amps
Nominal Maximum Operating Power* 12 Volt 24 Volt 48 Volt	 400 Watts 800 Watts 1600 Watts	 600 Watts 1200 Watts 2400 Watts	 800 Watts 1600 Watts 3200 Watts	 800 Watts 1600 Watts 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: Coefficent Range Set Points	 –5mV/°C/cell (25° ref) –30°C to +80°C Absorption, Float, Equalize, HVD			
Remote Temperature Sensor (RTS)	Included			

Certifications:

- CE and RoHS Compliant
- ETL Listed (UL1741)
- cETL (CSA C22.2 No. 107.1-01)
- FCC Class B Part 15 Compliant
- U.S. National Electrical Code (NEC) 690.5 Compliant
- Manufactured in a certified ISO 9001 facility
- IEC 62109

Options:

- TriStar Meter-2 (TS-M-2)
- TriStar Remote Meter-2 (TS-RM-2)
- Meter Hub (HUB-1)
- Relay Driver (RD-1)
- EMC-1

Notes:

*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 (reminder: do not exceed Voc).

**Exceeding Maximum PV Open Circuit Voltage may damage the controller.

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

Communication Ports	TS-MPPT-30	TS-MPPT-45	TS-MPPT-60	TS-MPPT-60M
MeterBus	Yes	Yes	Yes	Yes
RS-232	Yes	Yes	Yes	Yes
EIA-485	No	No	Yes	Yes
Ethernet	No	No	Yes	Yes
EMC-1	Yes	Yes	Yes	Yes

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

Control # MS-001901 Revision: 2/2018