MORNINGSTAR
PROFESSIONAL SERIES
World's Leading Solar Controllers & Inverters

+1-215-321-4457
sales@morningstarcorp.com

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

Shown with optional meter

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 with PV array max power (Pmp) up to 4.2 kW. The controller provides the industry's highest peak efficiency of 99% and significantly less power loss compared to other MPPT controllers. Detailed battery programming options allow for advanced battery support for the latest Lithium, Nickel Cadmium, and Lead Acid battery types.

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 (including SNMP)

Simple Network Management Protocol SNMP COMPATIBLE

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

MORNINGSTAR
PROFESSIONAL SERIES
World's Leading Solar Controllers & Inverters

+1-215-321-4457
sales@morningstarcorp.com

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	
Nominal Maximum Output Power*			Max Output	Max PV Input*
12 Volt	400 Watts	600 Watts	800 Watts	1100 Watts
24 Volt	800 Watts	1200 Watts	1600 Watts	2100 Watts
48 Volt	1600 Watts	2400 Watts	3200 Watts	4200 Watts
Max Recommended Solar PV Input*	~ 130% of Nominal Max Ouput Power (60 Amp models shown above)			
Peak Efficiency	99%			
Nominal System Voltage	12, 24, or 48 volts DC			
Maximum PV Open Circuit Voltage**	150 volts DC (without damage to unit)			
Battery Operating Voltage Range	8-72 volts DC			
Voltage Accuracy	12 / 24 V: ≤ 0.1% ± 50 mV 48 V: ≤ 0.1% ± 100 mV			
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	–5mV/°C/cell (25° ref); –30°C to +80°C			
Settings Range	Absorption, Float, Equalize, HVD			
Remote Temperature Sensor (RTS)	Absorption, Float, Equalize, HVD			

Certifications:

- CE and RoHS Compliant
- ETL Listed (UL1741)
- cETL (CSA C22.2 No. 107.1-01)
- FCC Class B Part 15 Compliant
- Manufactured in a certified ISO 9001 facility
- IEC 62109-1 (UL/CSA/IEC requires ambient temperature limited to 45°C)

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:

*The PV array power rating may exceed the controller's Max Nominal Output Power specification. The controller will limit battery current and prevent damage. Array oversizing should be considered on a case by case basis. See our array string sizer tool and related tech documentation. https://www.morningstarcorp.com/array-oversizing

**PV Voltage must be greater than Vbattery + 1 Volt to start charging

*** Assumes 75Vmp, unvented enclosure. See operating manual for further performance characteristic data.

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 Operating Temperature Range	–40°C to 60°C
May derate above the following temperature***	TS-MPPT-60 = 45°C TS-MPPT-45 = 50°C TS-MPPT-30 = 55°C
Storage Temperature	–55°C to +85°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) IP 20

8 Pheasant Run, Newtown, PA 18940 USA www.morningstarcorp.com

Control # MS-001901 Revision: 2/2025