PRODUCT CATALOG

2010/11

world's leading solar controllers & inverters

MORNINGSTAR corporation

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www.morningstarcorp.com

OUR ADVANTAGE

- **WORLD LEADER –** Since 2005, Morningstar has been the world's leading supplier of solar controllers. We have sold over 1.5 million controllers for professional and consumer off-grid solar systems.
- **LONG-TERM CONSISTENCY –** Morningstar has had a single focus on solar power electronics since we started 17 years ago. Our ownership, management and strategy have not changed.
- **HIGHEST RELIABILITY –** We design our products for installation in the world's harshest environments, from deserts to jungles to mountaintops. Our failure rates are less than 1 per 1,000 units shipped.
- **HIGHEST CUSTOMER SERVICE –** We stock over 50,000 controllers in multiple warehouses and ship most customer orders in 1 to 2 days. We provide "same day" technical support and liberal warranty terms.
- **EXPECTED 15 YEAR LIFE –** Robust thermal designs, electronic protections and tropicalization result in a long product life. Most of our products have a five year warranty.
- **WORLDWIDE DISTRIBUTION –** Morningstar's products are sold through 173 authorized Morningstar distributors located in 67 countries. Our distributors are the solar leaders in each country and provide outstanding local support to resellers and end-users.

BOATS / STREET LIGHTING

INSTRUMENTATION

SECURITY / REMOTE HOMES

RAILROADS

- **TRAKSTAR MPPT TECHNOLOGY –** Morningstar's advanced maximum power point tracking technology, used in our MPPT controllers, will maximize the energy harvest from the solar array and lower solar system costs.
- **EFFICIENT PWM BATTERY CHARGING –** Our patented PWM multi-stage charging increases battery life and recovers lost capacity in a sulfated battery. Our series designs reduce heating and stress on the electronic components.

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TrakStar™

MORNINGSTAR'S TRAKSTAR™ MPPT TECHNOLOGY

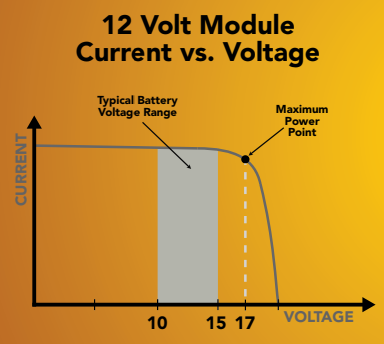
Our TrakStar Maximum Power Point Tracking (MPPT) Technology is an advanced control algorithm used in our TriStar MPPT and SunSaver MPPT controllers. TrakStar technology maximizes the energy harvest from the solar into the batteries due to:

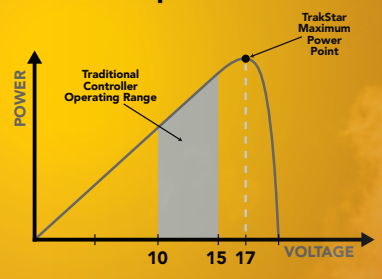
- **Very fast sweeping of the entire solar I-V curve**
- **Recognition of multiple power points during shading or mixed solar arrays**
- **Excellent performance at sunrise and low solar insolation levels**

In addition to maximizing the energy harvest, Morningstar's TrakStar Technology lowers overall system cost by:

- **Enabling the use of less expensive high voltage and thin film modules for off-grid battery charging**
- **Reducing cable sizes by using a higher voltage solar array to charge a lower voltage battery**
- **Decreasing the number of solar modules needed based on the extra energy harvest (boost)**

TRAKSTAR MPPT COMPARED TO TRADITIONAL PWM





TrakStar MPPT harvests power from the peak power point of the solar array, converts the power down to battery voltage, and boosts charging current in the process. Solar array sizing may be done in watts since all of the solar power is utilized.

Traditional PWM (pulse width modulation) charging connects the solar array directly to the battery, operating the solar at battery voltage. At this lower battery voltage, less charging current is going into the battery. Solar sizing must be calculated in amps since less power is available for battery charging as illustrated above.

MPPT Controllers

TRISTAR MPPT CONTROLLER

45 or 60 amps at up to 150 volts open circuit

The TriStar MPPT with TrakStar Technology is an advanced maximum power point tracking controller for off-grid solar systems up to 3kWp.

- **MAXIMIZES ENERGY HARVEST –** Better peak power tracking than other MPPT controllers.
- **VERY HIGH EFFICIENCY –** the industry's highest peak efficiency of 99% for off-grid charge controllers.
- **EXTENSIVE NETWORKING & COMMUNICATIONS –** Enables system monitoring, data logging and adjustability. On board Ethernet included on the TS-MPPT-60.

AMBIENT OPERATING TEMPERATURE	–40°C to +45°C
TERMINAL	35 mm² / 2 AWG
WEIGHT	4.2 kg / 9.2 lbs.
DIMENSIONS	29.1 x 13.0 x 14.2 cm 11.4 x 5.1 x 5.6 inch
CERTIFICATIONS	CE, ETL Listed (UL1741) cETL (CSA C22.2 No. 107.1-01) FCC Class B Part 15 Compliant Complies with NEC
WARRANTY	5 years

TRISTAR MPPT	TS-MPPT-45	TS-MPPT-60
Maximum Battery Current	45A	60A
Nominal Max. Solar Input		
12V	600Wp	800Wp
24V	1200Wp	1600Wp
48V	2400Wp	3200Wp
Maximum Open Circuit Voltage	150V	
System Voltage	12/24/36 or 48V DC	
OPTIONS*:		
TriStar Meter-2	yes	yes
TriStar Remote Meter-2	yes	yes
MeterHub	yes	yes
EIA-485 Adapter	yes	standard

**remote temp sensor is included with every TS-MPPT.*

SUNSAVER MPPT CONTROLLER

15 amps at 12 or 24 volts

The SunSaver MPPT with TrakStar technology is an advanced maximum power point tracking controller for off-grid solar systems up to 400Wp.

- **POWER BOOST –** Maximum power point tracking provides an increase of amps from the solar array into the battery.
- **USE OF HIGH VOLTAGE MODULES –** In addition to 12 volt crystalline modules, enables the use of high voltage and thin film modules for off-grid battery charging.
- **CONVERTS 24V TO 12V –** Provides a means to use a 24V solar array to charge a 12V battery, reducing power losses in systems with a long cable run between the solar array and the battery.

AMBIENT OPERATING TEMPERATURE	–40°C to +60°C
TERMINAL	16 mm² / 6 AWG
WEIGHT	0.60 kg / 1.3 lb
DIMENSIONS	16.8 x 5.5 x 7.0 cm 6.6 x 2.2 x 2.8 inch
CERTIFICATIONS	CE
WARRANTY	5 years

SUNSAVER MPPT	SS-MPPT-15L
Maximum Battery Current	15A
Maximum Open Circuit Voltage	75V
Nominal Maximum Solar Input	200Wp (12V Battery) 400Wp (24V Battery)
System Voltage	12/24V
OPTIONS:	
Remote Meter	yes
Remote Temperature Sensor	yes
MeterHub	yes
PC Meterbus Adapter	yes
DIN Rail Clips	yes

maximizes
energy harvest

PWM Controllers

TRISTAR CONTROLLER

45 or 60 amps at 12-48 volts

The TriStar is a three-function controller that provides reliable solar battery charging, load control or diversion regulation.

- **HIGHEST RELIABILITY –** Large heat sink and conservative design enables operating at full ratings to 45°C.
- **MORE INFORMATION –** Optional meter displays extensive system and controller information, automatic self-test and reset. Displays in 5 languages.
- **COMMUNICATIONS CAPABILITY –** RS-232 connects to a personal computer for custom settings, data logging and remote monitoring and control.
- **FULLY ADJUSTABLE –** DIP switch provides user with choice of 7 digital presets. Additional custom settings via RS-232.
- **EXTENSIVE ELECTRONIC PROTECTIONS –** Fully protected against reverse polarity, short circuit, overcurrent, high temperature and overvoltage.

AMBIENT OPERATING TEMPERATURE	–40°C to +45°C
TERMINAL SIZE	35 mm² / 2 AWG
WEIGHT	1.6 kg / 3.5 lb
DIMENSIONS	26.0 x 12.7 x 7.1 cm 10.3 x 5.0 x 2.8 inch
CERTIFICATIONS	CE, ETL Listed (UL1741)
WARRANTY	5 years

TRISTAR	TS-45	TS-60
Rated Solar, Load or Diversion Current	45A	60A
System Voltage	12-48V	12-48V
OPTIONS:		
TriStar Meter-2	yes	yes
TriStar Remote Meter-2	yes	yes
Remote Temperature Sensor	yes	yes
MeterHub	yes	yes
EIA-485 Adapter	yes	yes

PROSTAR CONTROLLER

15 or 30 amps at 12/24 volts or 48 volts

The ProStar is a mid-range solar controller for both professional and consumer applications.

- **LONGER BATTERY LIFE –** Constant voltage PWM series regulation uses 4-stage charging. Temperature compensation and choice of 3 battery types. Voltage sense terminals for more accurate battery reading.
- **MORE INFORMATION –** Includes three battery level LED indicators. Optional meter includes a safety disconnect and displays amps, volts, temperature and self-test.
- **EXTENSIVE ELECTRONIC PROTECTIONS –** Avoids use of mechanical fuses. Electronic protections for short-circuit, overload, reverse polarity, high voltage and temperature, and reverse current at night.

AMBIENT OPERATING TEMPERATURE	–40°C to +60°
TERMINAL SIZE	16 mm² / 6 AWG
WEIGHT	0.34 kg / 0.75 lb
DIMENSIONS	15.3 x 10.5 x 5.5 cm 6.0 x 4.1 x 2.2 inch
CERTIFICATIONS	CE
WARRANTY	5 years

PROSTAR	PS-15	PS-30	PS-15M-48V
Rated Solar Current	15A	30A	15A
Rated Load Current*	15A	30A	15A
System Voltage	12/24V	12/24V	48V
OPTIONS:			
Digital Meter	yes	yes	standard
Positive Ground	no	yes	yes
Remote Temp Sensor	yes	yes	yes

**low voltage disconnect included on all ProStar controllers*

PWM Controllers

SUNSAVER CONTROLLER

6, 10 or 20 amps at 12 or 24 volts

The SunSaver is the world's leading small solar controller for industrial and leisure markets.

- **EXTENDED BATTERY LIFE –** PWM series battery charging with temperature compensation. Sealed/flooded battery select.
- **TROPICALIZATION –** Epoxy encapsulation, marine rated terminals and anodized aluminum case provides environmental protection.
- **IDEAL FOR OIL/GAS APPLICATIONS –** Approved for use in hazardous locations: Class 1, Division 2, Groups A-D.

SUNSAVER	SS-6	SS-10	SS-20
Rated Solar Current	6.5A	10A	20A
Rated Load Current	6.0A	10A	20A
System Voltage	12V	12 or 24V	12 or 24V
OPTIONS:			
Low Voltage Disconnect	yes	yes	yes
DIN Rail Clips	yes	yes	yes

AMBIENT OPERATING TEMPERATURE –40°C to +60°C
TERMINAL SIZE 16 mm² / 6 AWG
WEIGHT 0.23 kg / 0.5 lb
DIMENSIONS 15.2 x 5.5 x 3.4 cm
6.0 x 2.2 x 1.3 inch
CERTIFICATIONS CE, hazardous locations
WARRANTY 5 years

SUNSAVER DUO CONTROLLER

25 amps at 12 volts

The SunSaver Duo is a two battery solar controller with optional remote meter for RV's, caravans and boats.

- **TWO BATTERY CHARGING –** Solar charge current is shared between two batteries based on a user selectable priority. When one battery is fully charged, all of the charge current flows to the other battery.
- **HIGHLY RELIABLE –** Epoxy encapsulation protects the controller against dust and high humidity. Extensive electronic protections, including short circuit, over current and reverse polarity, ensure that the controller will not be damaged by wiring mistakes or overloads.
- **USER ADJUSTABLE –** Control parameters may be adjusted using the DIP switch on the controller. Further customization is enabled by connecting to a personal computer and using Morningstar's PC software.

SUNSAVER DUO	SSD-25	SSD-25RM
Rated Solar Current	25A	25A
Rated Load Current*	none	none
System Voltage	12V	12V

**there is no load connection on the SunSaver Duo*

OPTIONS:		
Remote Meter	yes	standard
Remote Temperature Sensor	yes	yes
PC Meterbus Adapter	yes	yes
DIN Rail Clips	yes	yes

AMBIENT OPERATING TEMPERATURE –40°C to +45°C
LARGEST TERMINAL WIRE 16 mm² / 6 AWG
WEIGHT 0.26 kg / 0.57 lb
DIMENSIONS 17.0 x 5.6 x 4.1 cm
6.7 x 2.2 x 1.6 inch
CERTIFICATIONS CE
WARRANTY 5 years

PWM Controllers

SUNKEEPER CONTROLLER

6 or 12 amps at 12 volts

The SunKeeper solar controller mounts directly to the solar module junction box and eliminates the need for an additional controller housing.

- **HIGH TEMPERATURE RATED –** Rated to 70°C to operate in high temperatures at the solar module. No need to de-rate.
- **OUTDOOR RATED –** Approved for outdoor use without an additional enclosure. IP65, UV resistant case. Epoxy encapsulated electronics and watertight connection to the module junction box.
- **IDEAL FOR OIL/GAS APPLICATIONS –** Approved for use in hazardous locations: Class 1, Division 2, Groups A-D.

AMBIENT OPERATING TEMPERATURE –40°C to +70°C

WIRE TERMINATIONS #8 fork connectors

WEIGHT 0.11 kg / 0.25 lb

DIMENSIONS 9.9 x 5.1 x 1.3 cm
3.9 x 2.0 x 0.5 inch

CERTIFICATIONS CE, hazardous locations

WARRANTY 5 years

SUNKEEPER	SK-6	SK-12
Rated Solar Current	6A	12A
Rated Load Current*	none	none
System Voltage	12V	12V

** there is no load connection on the SunKeeper*

OPTIONS:		
Remote Temperature Sensor	yes	yes

SUNLIGHT CONTROLLER

10 amps or 20 amps at 12 or 24 volts

The SunLight is the world's leading solar lighting controller for street and pathway lighting, parking areas, bus stations and signage.

- **PROVIDES 10 LIGHTING OPTIONS –** User adjustable for 2 to 10 hours on or for on all night. Unique ON/OFF/ON settings conserve energy and turns light on again for 1 or 2 hours before sunrise. Timer accuracy is within 2 seconds.
- **EASY TO INSTALL –** To confirm correct installation, test button turns light on during the day and LED indicates selected lighting option.
- **RUGGED INDUSTRIAL DESIGN –** Epoxy encapsulated electronics, marine rated terminals and anodized aluminum case.

AMBIENT OPERATING TEMPERATURE –40°C to +60°C

TERMINAL SIZE 16 mm² / 6 AWG

WEIGHT 0.26 kg / 0.6 lb

DIMENSIONS 16.8 x 5.5 x 3.4 cm
6.6 x 2.2 x 1.3 inch

CERTIFICATIONS CE

WARRANTY 5 years

SUNLIGHT	SL-10	SL-20
Rated Solar Current	10A	20A
Rated Load Current*	10A	20A
System Voltage	12V or 24V	12V

**low voltage disconnect included on all SunLight controllers*

OPTIONS:		
DIN Rail Clips	yes	yes

MORNINGSTAR corporation

expected
15 year life

PWM Controllers

SUNGUARD CONTROLLER

4.5 amps at 12 volts

The SunGuard is a one module solar controller for professional and leisure markets.

- **HIGHLY RELIABLE –** 100% solid state design and epoxy encapsulated for environmental protection. Rated for 25% overloads and no need to de-rate.
- **EXTENDED BATTERY LIFE –** Series design (not shunt) PWM battery charging with temperature compensation. Low self-consumption.
- **EASY TO INSTALL –** Outdoor rated connecting wires for waterproof connection to solar module and battery.

SUNGUARD	SG-4
Rated Solar Current	4.5A
Rated Load Current*	none
System Voltage	12V

**there is no load connection on the SunGuard*

AMBIENT OPERATING TEMPERATURE –40°C to +60°C
WEIGHT 0.09 kg / 0.2 lb
DIMENSIONS 6.4 x 5.1 x 3.8 cm
2.5 x 2.0 x 1.5 inch
CERTIFICATIONS CE
WARRANTY 5 years

SHS CONTROLLER

6 or 10 amps at 12 volts

The SHS is a low cost controller for rural electrification solar systems*.

- **LOW COST –** Designed to meet the economic needs of developing country rural markets. The latest electronic technology and high volume automated production resulted in lower costs.
- **HIGH RELIABILITY –** Built-in electronic fuses ensures that any wiring mistakes during installation will not damage the controller. The printed circuit board is conformally coated for protection against humidity and nesting insects.
- **EASY TO USE –** LED indicators display battery level and system status. All control functions are automatic and require no user adjustments.

SHS	SHS-6	SHS-10
Rated Solar Current	6A	10A
Rated Load Current**	6A	10A
System Voltage	12V	12V

**not sold in USA or Canada*
***low voltage disconnect included on all SHS controllers*

AMBIENT OPERATING TEMPERATURE –25°C to +50°C
TERMINAL SIZE 6 mm²
WEIGHT 113 g
DIMENSIONS 15.1 x 6.6 x 3.6 cm
CERTIFICATIONS CE, World Bank
WARRANTY 2 years

Inverters

SURESINE INVERTER

300 Watts; 12 volts DC input, 115 or 220 volts AC output

The SureSine is a pure sine wave inverter for off-grid solar applications requiring AC power. Applications include rural electrification, telecom, remote homes, RV/caravans and boats.

- **IMPROVED LOAD OPERATION –** Pure sine wave provides quality AC equivalent to grid power. Toroidal transformer design generates good wave form throughout the range of input voltages. Handles 200% surge up to 600 watts.
- **HIGH RELIABILITY –** No internal cooling fan or other moving parts prone to failure. Uses epoxy encapsulation, conformal coating, stainless steel hardware, and an anodized aluminum enclosure to protect against harsh tropical and marine environments.
- **MORE POWER AVAILABLE –** High efficiency and low self consumption maximizes power to the loads. Automatic stand-by reduces consumption during no load conditions.

AMBIENT OPERATING TEMPERATURE	–40°C to +45°C
LARGEST TERMINAL WIRE	35 mm² / 2 AWG
WEIGHT	4.5 kg / 10 lb
DIMENSIONS	21.3 x 15.2 x 10.5 cm 8.4 x 6.0 x 4.1 inch
CERTIFICATIONS	CE, UL, cUL
WARRANTY	2 years

SURESINE	SI-300
Continuous Power Rating	300 watts @ 25°C
Peak Power Rating (10 minutes)	600 watts @ 25°C
DC Input System Voltage	10.0-15.5V
Waveform	pure sine wave
AC Output Voltage (RMS)	220V or 115V +/– 10%
AC Output Frequency	50 or 60 Hz +/– 0.1%
OPTIONS:	
Remote Meter	yes
PC Meterbus Adapter	yes

Accessories

TRISTAR METER-2 (TS-M-2)

Digital Display for TriStar Controllers

COMPATIBLE WITH:
TriStar
TriStar MPPT

- 2 x 16 character display
- Mounts to the controller
- Provides system and controller information, data logging, bar graphs
- Choice of 5 languages

TRISTAR REMOTE METER-2 (TS-RM-2)

Remote Digital Display for TriStar Controllers

COMPATIBLE WITH:
TriStar
TriStar MPPT

The TS-RM-2 is the same as the TS-M-2 except that it includes 30 meters of cable for mounting away from the controller.

REMOTE METER (RM-1)

Universal Digital Display for Several Morningstar Products

COMPATIBLE WITH:
SunSaver Duo
SunSaver MPPT
SureSine Inverter

- 4 digit display with custom icons
- Displays systems information, logged data, alarms and errors
- May be mounted in the wall or on the wall with included frame
- Includes 10 meters of cable

Accessories

RELAY DRIVER (RD-1)

Logic Module for System Control Functions

COMPATIBLE WITH:

- **TriStar**
- **TriStar MPPT**
- **All other controllers**

- 4 independent relay driver outputs (relays not included)
- Used for high/low voltage alarms, load control, generator start
- Reads digital data inputs from TriStar or TriStar MPPT
- Reads battery voltage in systems with other controllers

METERHUB (HUB-1)

Solar Controller Communications Hub

COMPATIBLE WITH:

- **TriStar, TriStar MPPT**
- **TriStar Meter-2**
- **TriStar Remote Meter-2**
- **SunSaver MPPT**
- **Relay Driver**

- Allows several Morningstar products to communicate over a Meterbus network (maximum 15 devices)
- Enables multiple controllers to share a TriStar Meter or Relay Driver
- Provides electrical isolation

REMOTE TEMPERATURE SENSOR (RTS)

Sends Battery Temperature Data to Controllers

COMPATIBLE WITH:

- **TriStar, TriStar MPPT**
- **ProStar**
- **SunKeeper**
- **SunSaver Duo**
- **SunSaver MPPT**

- Improves battery charging by using temperature at the battery for very accurate temperature compensation
- Recommended for solar systems that experience temperature variations during the year or whenever the temperature at the battery will be more than 5°C (9°F) different than the temperature at the controller

PC METERBUS ADAPTER (MSC)

Converts RJ-11 to RS-232 Connector

COMPATIBLE WITH:

- **SureSine inverter**
- **SunSaver Duo**
- **SunSaver MPPT**

- Used to connect a Morningstar controller or inverter to a PC or other third party serial enabled devices
- Comm link enables monitoring and logging of data as well as customizing of set points
- May be used with any Morningstar product having an RJ-11 port that does not already have a RS-232 port

EIA-485 / RS-232 ADAPTER (RSC-1)

Converts RS-232 to EIA-485 Connector

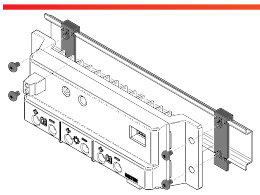
COMPATIBLE WITH:

- **TriStar**
- **TriStar MPPT**
- **Relay Driver**

- Allows up to 128 Morningstar products to communicate on the same comm. bus and over much greater distances
- All data is transmitted in MODBUS protocol

DIN RAIL CLIPS (DIN-1)

For Installing SunSaver Controllers to DIN Rails



COMPATIBLE WITH

- **SunSaver**
- **SunLight**
- **SunSaver Duo**
- **SunSaver MPPT**

- Rugged plastic clips match SunSaver mounting holes
- Provide a simple way to install controllers to DIN rails
- Enables removal of controllers from DIN rails without removing the clips

...over 1.5 million
solar controllers and
inverters used in
off-grid applications

W O R L D W I D E

ROAD SIGNS | TELECOM | RVs/CARAVANS / SOLAR HOME SYSTEMS | OIL/GAS

THIS CATALOG IS AVAILABLE IN MULTIPLE LANGUAGES. PLEASE CONTACT MORNINGSTAR FOR DETAILS.

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PRINTED IN USA 215E-R3-1/10