



MODEL RATINGS

	ProStar-12	ProStar-20	ProStar-30	
PV current (amps)	12	20	30	• All models both 12 V and 24 V (automatic selection)
Load current (amps)	8	16	30	

Note: Current ratings can be exceeded by 25% for up to 5 minutes.

RELIABILITY

- 5-year failure rates at a 90% confidence level
- ProStar-12 < 0.1%
- ProStar-20 < 0.1%
- ProStar-30 0.4%

ENVIRONMENTAL

- Operating temperature -40 to +85°C
- Max ambient temperature +60°C
- Storage temperature -55 to +100°C
- Humidity 100% (NC)

PERFORMANCE / ELECTRICAL

- Accuracy 12V +/- 40 mV
- 24V +/- 60 mV
- Maximum array voltage 50 V
- Min voltage to operate 8.0 V
- Ground negative
- Parallel capability yes
- Self-consumption (tare):
 - Night 11 mA
 - Charging 12 mA
 - Load disconnected 10 mA
- Voltage drops:
 - Maximum: PV/Batt 0.7 V
 - Batt/Load 0.4 V
 - Typical: PV/Batt 0.5 V
 - Batt/Load 0.1 V
- Operating life 15 years
- Noise:
 - µP protection all inputs
 - Output noise pulses < 400 mV
 - Noise pulse width < 500 nanosec
 - Radiated noise < 100 picowatts/kHz
- FETs:
 - Rds (on resistance) 0.018 ohm
 - Pulse rating 120 A
 - Junction temp rating 175°C
 - Operating junction temp 110°C
- µP memory 2k ROM
- µP clock speed 2 MHz
- Transient surge suppressors:
 - Pulse power rating 1500 watts
 - Response < 5 nanosec
- LEDs:
 - Pulse rate 300 Hz
 - Current consumption < 1 mA/LED

METER DISPLAY

- Type LCD
- Display 3-digit x .5 inch
- Temp rating -30 to +85°C
- Voltage accuracy 0.5%
- Current accuracy 2.5%
- Status LEDs 3
- Self-consumption (tare) 10 mA
- Manual disconnect < 100 microsec

MECHANICAL

- Dimensions: (inches) 6.01 (W) x 4.14 (H) x 2.17 (D)
- (mm) 153 (W) x 105 (H) x 55 (D)
- Weight: (oz) 12
- (kg) 0.34
- Wire terminals Euro-style
- Max wire size:
 - (solid) #6 AWG/16 mm²
 - (multistrand) #6 AWG/10 mm²
 - (fine strand) #8 AWG/10 mm²
- Terminal diameter 0.2 inch/5 mm
- Mounting orientation vertical
- Case:
 - Material VALOX #310 SEO
 - Fungicidal resistance ASTM G21-70
 - Moisture absorption < 0.4%
 - UL Thermal Index 120°C/140°C

ELECTRONIC FUSE / SYSTEM SAFETY

- Load short-circuit Short-circuit is > 10X load rating for > 5 msec
- Load disconnected < 50 microsec
- Emergency disconnect If voltage < 2.4 V, PV/load disconnected < 0.1 sec
- Reverse polarity All 4 system inputs fully protected
- High temp shutdown 70°C disconnect PV input
- 80°C disconnect load
- 60°C reconnect load
- 50°C reconnect PV

CONTROL SETPOINTS

	12 Volt	
	Sealed	Flooded
• Low volt load disconnect	11.4	11.5
• LVD reconnect	12.5	12.6
• Constant-voltage regulation	14.1	14.3
• Equalization	14.35	14.6
• HVD	15.5	15.5

(24 V setpoints are twice 12 V values)

CONTROL PARAMETERS

- Charge algorithm constant-voltage
- PWM pulse charging
- series configuration
- Temp comp coefficient -5.0 mV/°C/cell (25°C ref)
- LVD current coefficient -20 mV/amp load
- Auto equalize:
 - Sealed 16 days or 11.9/23.8 V
 - Flooded 11 days or 12.0/24.0 V
- Temp comp setpoints Regulation, Equalize, HVD
- Software delays LVD = 55 sec; HVD = 7 sec
- Software filtering average 2 inputs/50 µsec
- Measurement rate 37.5 samples/sec

Specifications subject to change without notice.

Manufactured in the U.S.A.

WARRANTY: FIVE YEAR WARRANTY PERIOD.
CONTACT MORNINGSTAR OR YOUR AUTHORIZED DISTRIBUTOR FOR COMPLETE TERMS.

AUTHORIZED MORNINGSTAR DISTRIBUTOR:



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PROSTAR

PATENTED

USING ADVANCED TECHNOLOGY FOR:

- High Reliability
- Low Cost
- PWM Battery Charging

PROSTAR™
MID-RANGE PHOTOVOLTAIC CONTROLLERS

PROSTAR SIMPLE, FLEXIBLE, EASY TO USE

AUTOMATIC VOLTAGE SELECT
Provides flexibility for either 12 V or 24 V systems. Processor automatically configures for correct system voltage.

PREVENTS REVERSE CURRENT
Series switching prevents battery from discharging at night through the PV modules.

TEMPERATURE COMPENSATION
Corrected setpoints referenced to ambient temperature.

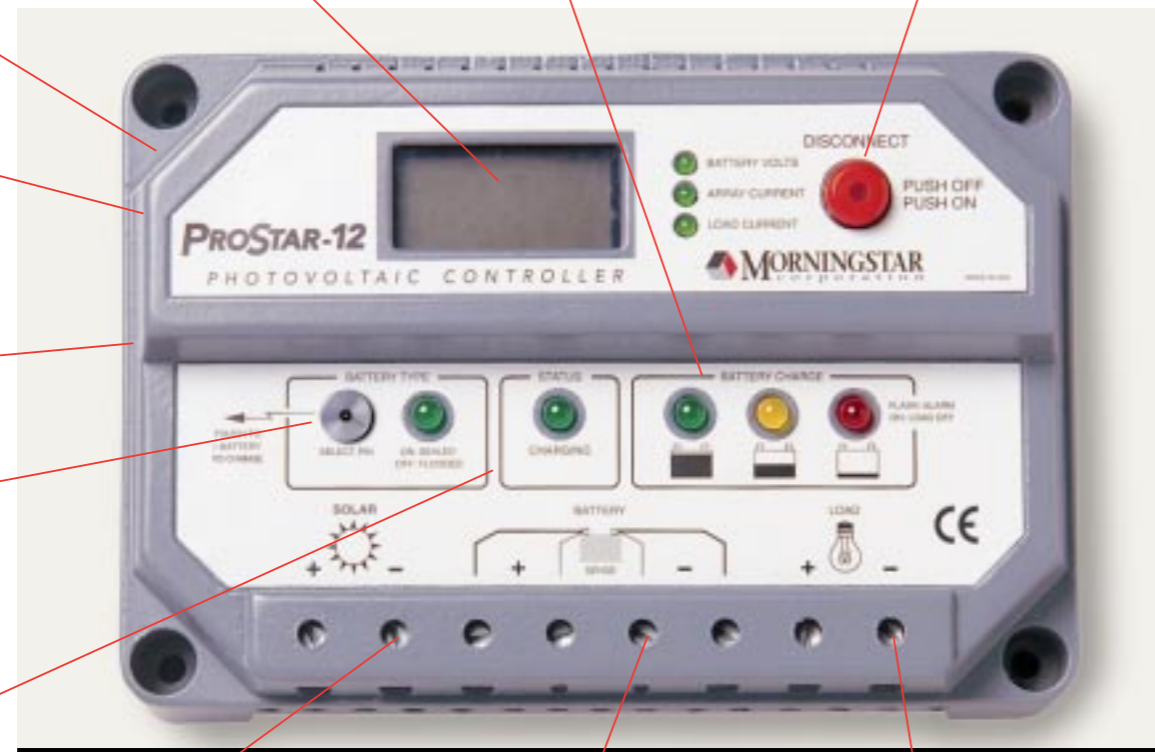
FIELD SELECTABLE BATTERY TYPE
Electronic selection of either a sealed or flooded battery. Two sets of optimized control parameters are built into the processor.

PWM BATTERY CHARGING
Series PWM design will reduce heating and system voltage drops. Precise finishing charge under all system conditions.

LCD METER
(Option) Three-digit display with reflective foil for easy readability. Wide temperature range from -30°C to +85°C. Values displayed are accurate to within 1 and 2 percent.

BATTERY CHARGE LED'S
Three LED's indicate relative battery state-of-charge. All LED's are pulsed to minimize parasitic loads.

MANUAL DISCONNECT
(Option) Button will instantly disconnect all PV and load connections. Same button serves as a manual reconnect.



REVERSE POLARITY PROTECTED
Full electronic protection against any sequence of reversed wire connections.

BATTERY SENSE TERMINALS
Eliminates voltage drops for more accurate control. Automatic default to battery connections if sense is not connected.

LOW VOLTAGE LOAD DISCONNECT (LVD)
Low resistance FET's will handle load starting currents up to 10 times rating. Electronic short-circuit protection. LVD is current compensated with no parasitic loss.

PROSTAR OPTIONS TO MEET YOUR SPECIAL NEEDS

- LCD meter with manual disconnect button
- conformal coating for corrosive environments
- EPROM for custom setpoints (quantities over 500)

FUTURE PROSTAR OPTIONS

- 48 volts and positive ground
- field adjustable setpoints
- additional inputs/outputs
- remote temperature probe
- RS-232 communications port with data acquisition

PROSTAR SUPERIOR SERIES SWITCHING

Design by experienced PV system engineers, ProStar's series design provides many advantages compared to shunt controllers.

Series regulation reduces FET heating and lowers voltage stress on the power FETs. A series configuration also improves protection against lightning surges and reduces switching noise.

The series design improves charging accuracy. In PWM, series switching becomes self-correcting for temperature and system voltage drops.

PROSTAR UNMATCHED SPECIFICATIONS

ELECTRONIC SAFETY DISCONNECTS
Eliminates the need for troublesome fuses. Electronic FET interrupt functions reliably protect against short-circuits, reverse polarity and high voltage.

NO NEED TO DERATE
All electrical and mechanical designs are for worst-case conditions. In addition, a 1.25 minimum design margin is used.

LOW NOISE
All μ P inputs are filtered. Output line noise held to less than 400 mV pulses under 500 nsec width. Radiated noise less than 100 picowatts/KHz.

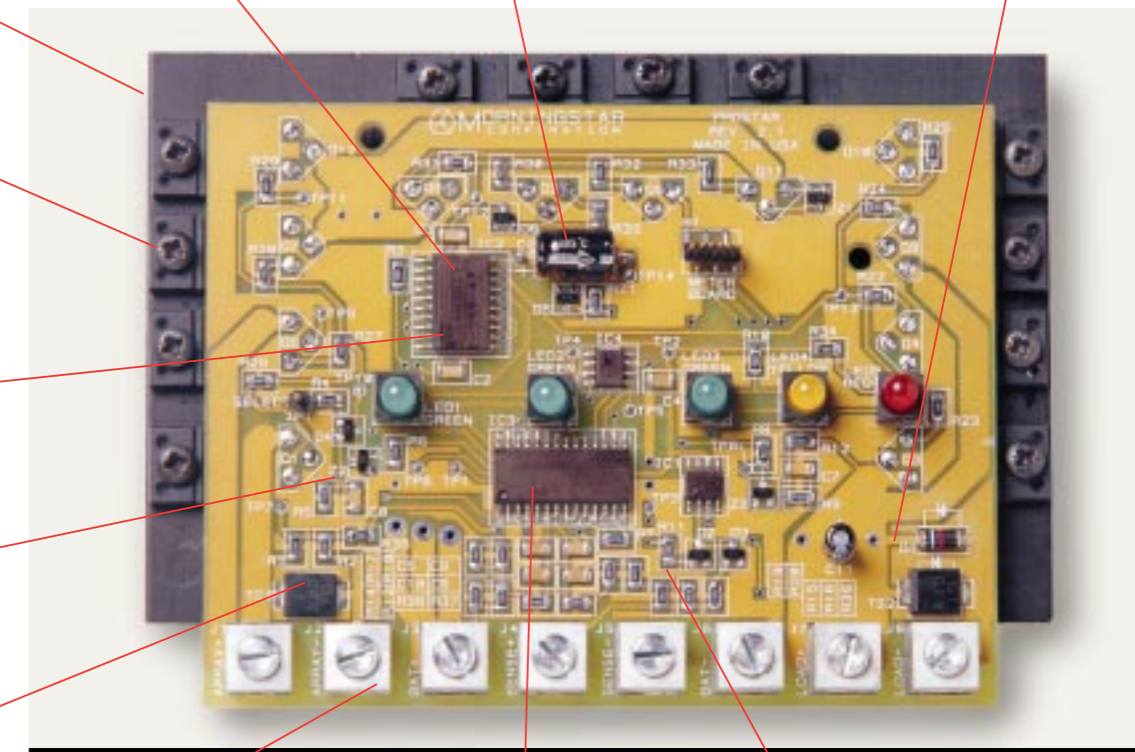
THERMAL DESIGN
Low FET junction temperatures hold 5-year failure rates to less than 1 per 1,000 controllers. Expected life of 15 years.

FIELD EFFECT TRANSISTORS (FET'S)
Eliminates problems with mechanical relays. Rugged, low resistance FET's used for all control functions.

INDUSTRIAL RATED COMPONENTS
Rated operating temperatures of -40°C to +85°C. Controller designed for ambient temperatures up to 60°C.

HIGH EFFICIENCY
Designed to minimize energy losses with very low self-consumption losses and voltage drops.

TRANSIENT VOLTAGE SUPPRESSORS
Each rated for 1500 W. React in nanoseconds for complete surge and transient protection.



EURO-STYLE TERMINALS
Sized for #6 AWG wire (up to 16 mm²). Plastic case provides terminal isolation. Stainless steel screws.

CUSTOM MASKED MICROPROCESSOR
Single-chip microcomputer clocked at 2 MHz. Includes onboard ROM, serial port, A/D converter and multiple I/O channels.

SURFACE MOUNT TECHNOLOGY
Efficient high-speed automated assembly and testing. Results in consistently high quality product at lowest cost.

PROSTAR EXTENDED BATTERY LIFE

INDUSTRY PROBLEM

It has been well documented in recent years that PV batteries suffer extremely low lifetimes, high maintenance needs and unpredictable load availability. The common on/off PV regulators are simple, but ineffective. Typical PV battery problems include:

- sulfation
- extended periods at low state-of-charge
- stratification
- permanent loss of capacity

- positive plate grid corrosion
- excessive gassing and heating
- premature failure

PROSTAR SOLUTION

ProStar's intelligent control and unique features significantly improve battery performance. Features include:

- constant-voltage algorithm
- pulse-width modulation (PWM)
- automatic equalization
- digital control precision
- temperature compensation

- highly accurate setpoints
- low voltage drops
- sealed & flooded control parameters

ProStar provides higher charging efficiency, increases the battery capacity, reduces water loss, and extends the life of the battery.