



SHS™ Solar Controllers

Morningstar's advanced **Solar Home System** controller combines the proven **SunSaver** design with a microcontroller for automatic system protection capabilities. This new technology provides:

- Exceptional Reliability
- PWM Battery Charging
- Electronic System Safeguards

The SHS controller's advanced design delivers outstanding performance and value. The SHS low cost is made possible by Morningstar's unique approach to design and manufacturing. All SHS controllers:

- are made on high speed, automated production lines
- are made in ISO 9002 certified facilities
- incorporate the latest power electronic technologies
- incorporate the latest control and logic technologies

Standard Versions Available:

- SHS-6 rated 6.5 amps solar / 10 amps load
- SHS-10 rated 10 amps solar / 15 amps load

These standard versions are conformal coated board assemblies.

Features:

- 100% solid state
- Series design (not shunt)
- True 0 to 100% PWM duty cycle
- Setpoint accuracy is 0.3%
- Rated for 25% overloads
- Temperature compensated setpoints
- Sealed / Flooded battery select
- Four LED indicators (see back)
- LVD
- LVD warning by flashing loads
- Simple to parallel

Protections:

- Full Solar short circuit protection & auto reconnect (see back)
- Full Load short circuit protection & auto reconnect (see back)
- Reverse polarity protected
- High voltage load protection
- Overload protection
- Lightning protected (1500 watt TVS)
- Brownout protection
- Special environmental protections
- Load protected if battery removed

Mechanical Specifications:

- Wire size #10 AWG (5.2 mm²)
- Marine rated terminals
- Weight is 4 oz (0.11 kg)
- Size is 5 in (127mm) x 3 in (76mm)

Electrical Specifications:

- Rated solar input 6.5 / 10 A
- Rated load 10 / 15 A
- Current overload 25%
- Regulation voltage 14.1 / 14.4 V
- Load disconnect 11.7 V
- LVD reconnect 12.8 V
- Temp. compensation -30 mV/°C
- Self-consumption 8 mA
- Ambient temperature -40 / +65 °C

Short Circuit Protection:

✓ *Load Short Circuit*

- LED indicators cycle to indicate a short circuit condition
- Protects in all operating conditions, including:
 - start-up into a short circuit
 - return from LVD into a short circuit
 - overload conditions
- Opens FET in less than 10 microsec to fully protect FET
- Auto restart 3 times

✓ *Solar Short Circuit*

- Green LED indicates solar short circuit
- Protects in all operating conditions
- Opens FET in less than 2 microsec to fully protect FET
- Auto reconnect when short circuit is cleared

Battery State-of-Charge Indicators:

- Red LED ON indicates LVD
FLASH warning of LVD (0.2 volts above LVD)
- Yellow LED ON indicates middle range of battery charge
- Green LED ON indicates higher range of battery charge
FLASH indicates battery in PWM

Note: Green LED flashes at 50% PWM duty cycle. This pulse charging of the battery can desulfate the battery and restore lost capacity. The PWM condition should occur once a month to extend the battery life and increase overall battery capacity.

Rev-2000 04