

# SOLAR CHARGE CONTROLLERS

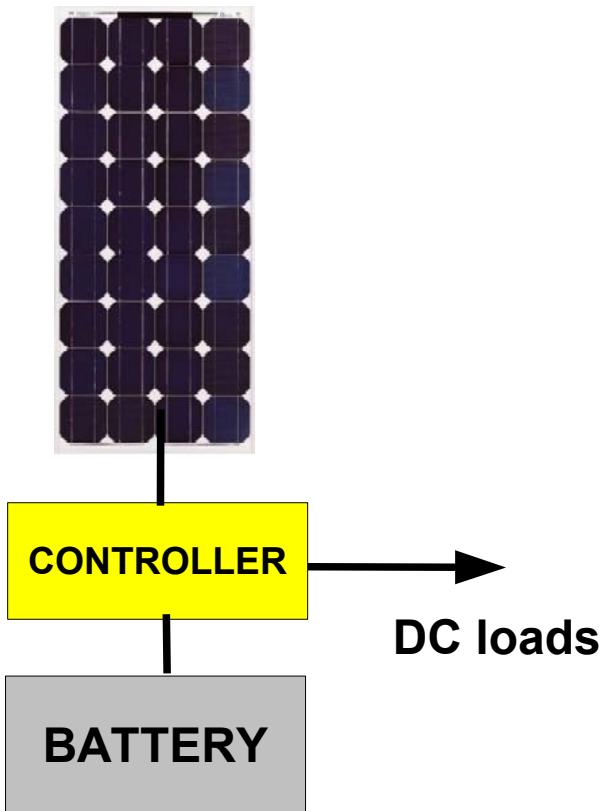


© Steca

# Charge controllers – main points

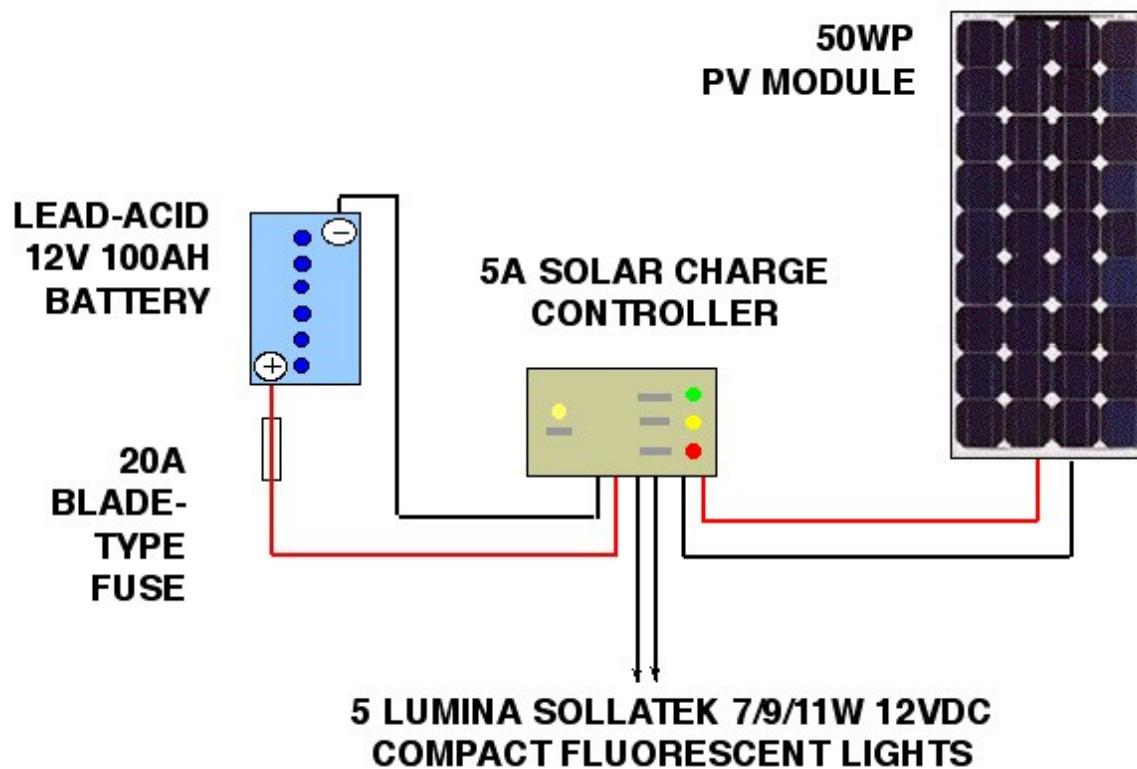
- Function in system
- Place in system / wiring
- Main characteristics of charge controllers
- Examples of commercially available charge controllers
- Charge controller specification sheets
- Sizing charge controllers
- MPPT – maximum power point trackers

# Charge controller in DC only circuit



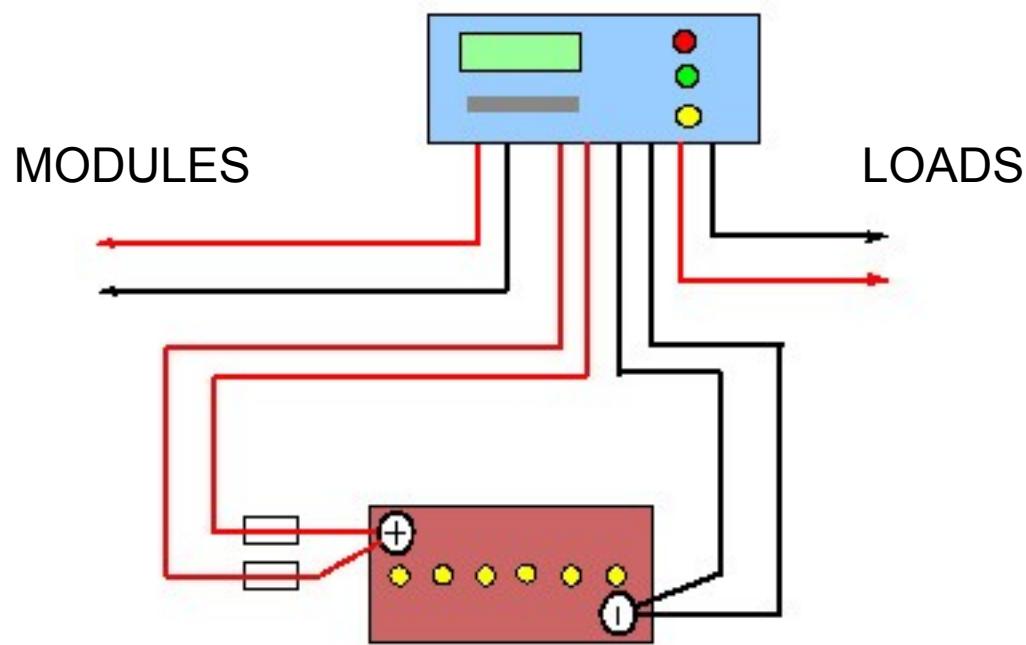
- The main function of the charge controller is to protect the battery from being overdischarged and being overcharging
- DC loads are taken directly from the charge controller - they are automatically disconnected once the battery voltage falls below a certain level
- *Solar pump controllers are different*

# Charge controller wiring

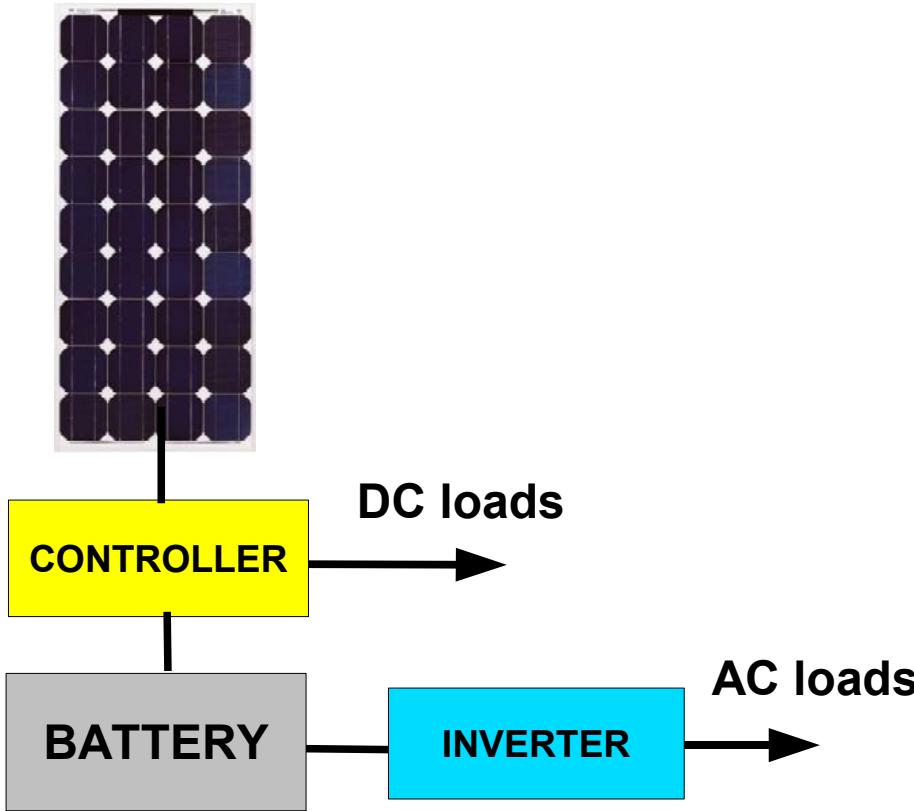


# Battery sense wires

- Some charge controllers have battery sense wires
- These enable a more accurate reading of battery voltage



# Charge controller with inverter



- **The inverter is connected directly to the batteries**
- The inverter will disconnect when battery voltage falls below approx. 10.5V but this is **to protect the inverter not the batteries**
- Having DC loads such as lights connected directly to the charge controller can serve as a warning of low battery voltage if they are cut off. More usual in larger systems

# Charge controller characteristics

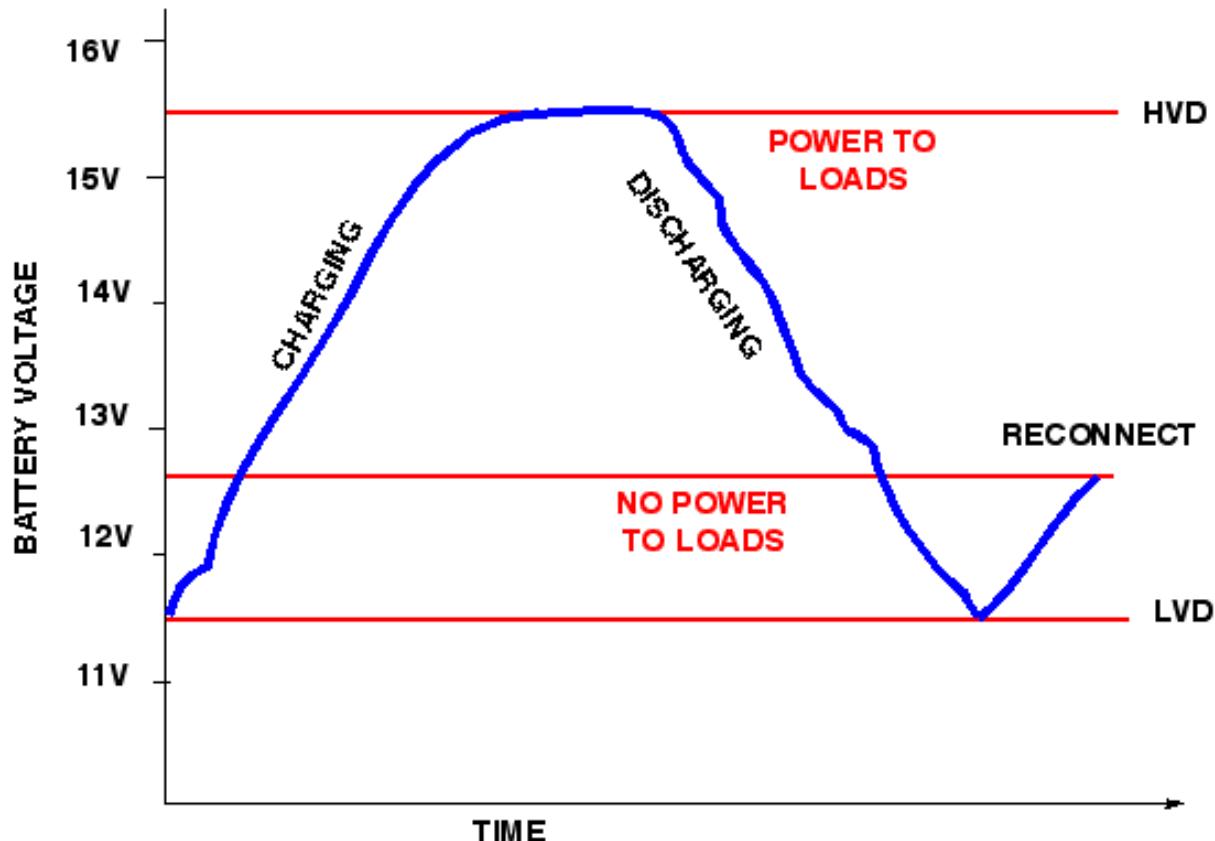
- Rating in amps
- Operating voltages
- Low voltage disconnect
- High voltage disconnect
- Efficiency
- Stand-by power consumption
- Short circuit protection
- Overload protection
- Battery state-of-charge indicators
- Solar charge indicators
- Load indicators
- Reverse polarity protection
- Temperature compensation
- Radio interference
- **RESET** switch

# Solar charge controllers and battery type

- Some charge controllers will differentiate between different types of batteries.
- Sealed batteries are not given equalisation charges, and controllers can be set to take this into account.
- Some charge controllers need to be set for the battery type by means of a switch or jump lead.

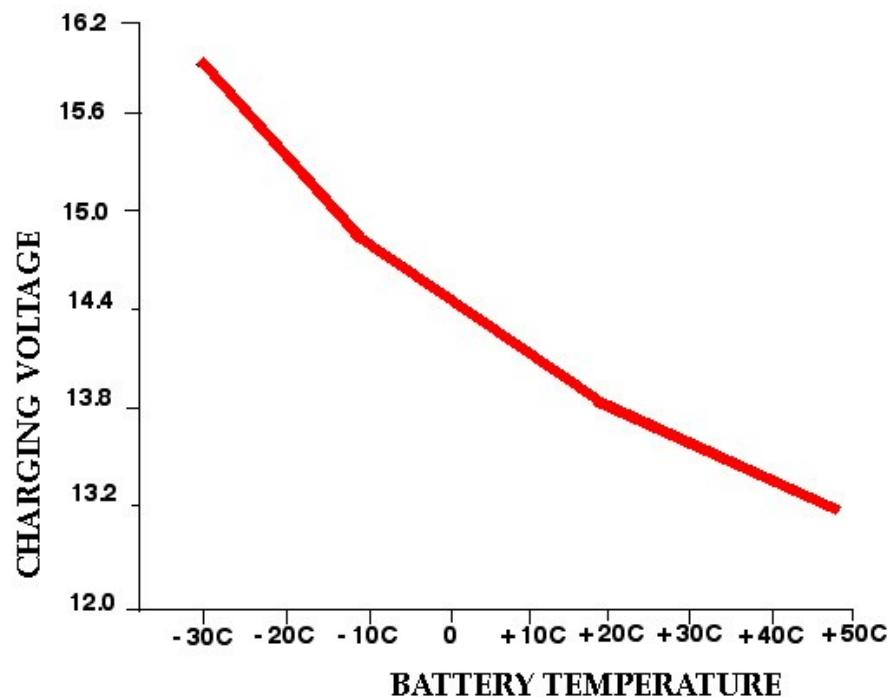
# LVD, HVD & Load Reconnect

Example of a charge and discharge cycle controlled by a solar charge controller



# Temperature compensation

- The lower the temperature the higher the voltage required to charge a battery effectively
- Most charge controllers sense the ambient temperature but some have thermometers which measure the battery temperature
- This curve is for a specific make of sealed battery



# Steca Solsum

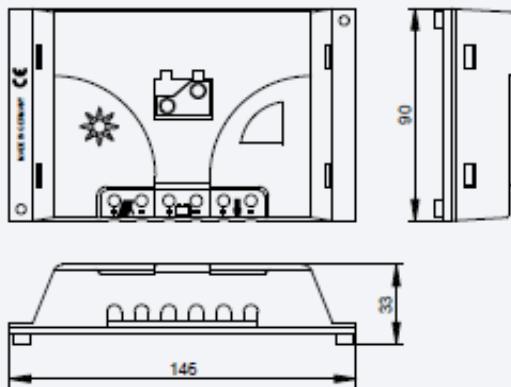
- 5A - 9A
- 12 & 24V
- Low cost
- Basic indicators
- For small one or two module systems



# SOLAR ELECTRIC INSTALLATION COURSE – OFF-GRID APPLICATIONS



## Technical data



Solar Charge Controller	PR 0303	PR 0505
System voltage		12 V
Max. module input short circuit current	3 A	5 A
Max. load output current	3 A	5 A
Max. self consumption		3 mA
End of charge voltage (float)		13.7 V
Boost charge voltage		14.4 V
Equalisation charge		-
Reconnection setpoint (LVR)		12.5 V
Deep discharge protection (LVD)		11.0 V...11.5 V
Ambient temperature allowed		-25 °C...+50 °C
Terminal size (fine/single wire)		6 mm <sup>2</sup> / 10 mm <sup>2</sup>
Enclosure protection class		IP 22
Weight		160 g
Dimensions l x w x h		146 x 90 x 33 mm

Technical data at 25 °C / 77 °F

## Power class

3 A - 5 A



**Features:**

- 12 & 24 volt versions available
- Tamper-proof fixed voltage thresholds (options available)
- Lightning protection
- Reverse polarity protected
- Overload protection with automatic reconnection
- Reverse discharge prevention
- Low power consumption
- Pulse width modulation (PWM) charging technique
- Solid state MOSFET technology
- Microprocessor controlled
- Status indication by 5 LEDs



**Sollatek**  
solar systems

**SPCC10**

Small to medium applications,  
home lighting systems & remote  
telemetry

10A

18 mA

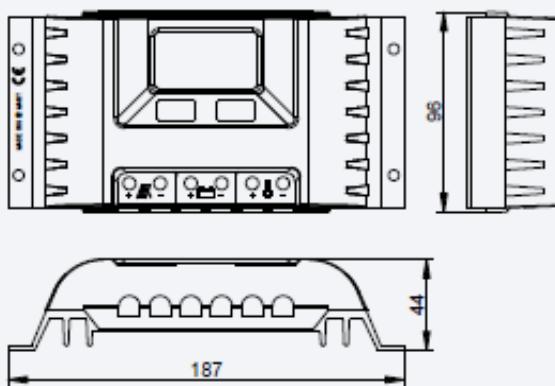
IP 54



# SOLAR ELECTRIC INSTALLATION COURSE – OFF-GRID APPLICATIONS



## Technical data



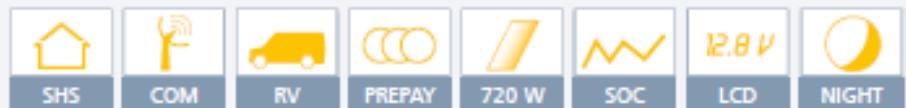
**steca**  
[www.stecasolar.com](http://www.stecasolar.com)

Solar Charge Controller	PR 1010	PR 1515	PR 2020	PR 3030
System voltage	12 V (24 V)			
Max. module input short circuit current	10 A	15 A	20 A	30 A
Max. load output current	10 A	15 A	20 A	30 A
Max. self consumption	12 mA			
End of charge voltage (float)	liquid 13.9 V (27.8 V); gel 14.1 V (28.2 V)			
Boost charge voltage; 2 h	14.4 V (28.8 V)			
Equalisation charge (deactivated for gel accu); 2 h	14.7 V (29.4 V)			
Reconnection setpoint (SOC/LVR)	> 50 % / 12.6 V (25.2 V)			
Deep discharge protection (SOC/LVD)	< 30 % / 11.1 V (22.2 V)			
Ambient temperature allowed	-10 °C...+50 °C			
Terminal size (fine/single wire)	16 mm <sup>2</sup> / 25 mm <sup>2</sup>			
Enclosure protection class	IP 22			
Weight	350 g			
Dimensions l x w x h	187 x 96 x 44 mm			

Technical data at 25 °C / 77 °F

## Power class

10 A - 30 A



# SunSaver from Morningstar

- 10A
- 12V & 24V versions
- Optional LVD
- Encapsulated, approved for “hazardous locations”
- Basic indicators
- Sealed battery selectable



Features:

- Two stage charging (boost & PWM)
- 12V or 24V field selectable
- Reverse polarity protected
- Lightning protection
- Low power consumption
- Remote battery sense
- Temperature compensated battery charging
- LVD break/reset/test switch
- Status indication by 5 LEDs
- Microprocessor controlled
- High efficiency diode-less discharge protection
- Optional digital LCD to display battery voltage



**Sollatek**  
solar systems

**SUNPOWER 30**

Medium to large system, street  
lighting & commercial lighting  
(e.g. billboards)

30A

61  
mA

IP  
54



# Solar charge controller

SLR 308 - Item No. 15505

SLR 316 - Item No. 15503

IRS 110 - Item No. 15506

SLR 1010 S - Item No. 15499

SLR 1010 D - Item No. 15498

SLR 2020 S - Item No. 15497

SLR 2020 D - Item No. 15496

## SLR 308 and 316

These solar charge controllers help your solar system to a high overall efficiency and give the batteries a long life. They particularly are interesting for the use by special additional options in solaren lamp systems, e.g. streets or parking lights.

The integrated photo electric switch and the clock timer assure an individual adaptation of the operation period of the consumer. Through this, unnecessary operation times can be avoided – an efficient construction of the solar system is possible.

### Safety features

- automatic over load protection
- automatic deep discharge protection

### Charging features

- pulse charging
- high charge efficiency > 96%

### Solar charge controller SLR 308/316



### Unusual features

- integrated photo electric switch
- integrated clock timer, 6 blocks
- integrated timer, 1 to 15 minutes
- IP 65 casing, splash - proof
- optionally up to two motion detectors IRS 110 can be connected\*

# Amperehourcounter

## DCC 4000 - Item No. 9000

- Item No. 9030 - sensor resistor up to 60 A
- Item No. 9031 - sensor resistor up to 100 A
- Item No. 9032 - sensor resistor up to 200 A
- Item No. 9033 - sensor resistor up to 600 A



Whether self-sufficient house systems, campmobile, or boat, always the question surrenders:

*How much efficiency is still in the battery?*

The answer gives the DCC 4000  
or the DCC 4000 E

### Technical specifications:

- Supply voltage: 8-30V DC
- Charging rate: 4 mA
- Charging rate with display lighting: 25 mA
- Measuring system: current averaging, 4 measurements / second
- Dimensions outside covering: 122 x 43 mm
- Installation dimension: 105 x 40 x 80 mm

The following value can be programmed at the DCC 4000: sensor resistor, charge coefficient, warning, **counter-overflow lock**, metering capacity dilation, counter setting.

The DCC is also available in a simpler, cheaper version (DCC 4000 E), which is not programmable though!



## SOLAR ELECTRIC INSTALLATION COURSE – OFF-GRID APPLICATIONS

Model	SunPower 6	
	12V	24V
<b>Solar current</b>	6A	
<b>Load current</b>	6A	
<b>Nominal voltage</b>	12V	24V
<b>System voltage</b>	fixed	
<b>Voltage thresholds</b>	fixed	
<b>LVD</b>	11.3V	22.6V
<b>LV hysteresis</b>	1.2V	2.4V
<b>HVD</b>	13.9V	PWM 27.8V
<b>HV hysteresis</b>	N/A	N/A
<b>Max. current consumption</b>	8.5 mA	8 mA
<b>Temperature compensation<sup>1</sup></b>	optional	
<b>External battery sense</b>	no	
<b>System status indication</b>	5 x LEDs	
<b>Timer (dusk/dawn or 2-10 hrs)</b>	optional (fixed)	
<b>Connections type</b>	screw	

## SOLAR ELECTRIC INSTALLATION COURSE – OFF-GRID APPLICATIONS

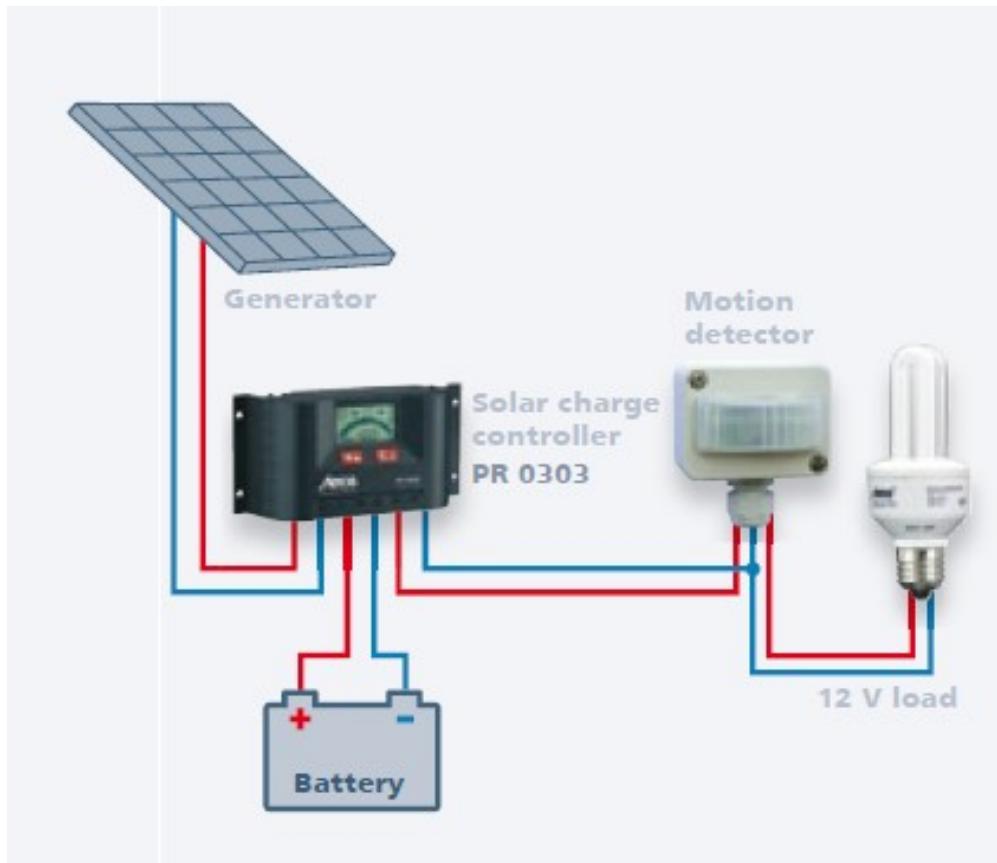
Maximum wire gauge	6 mm <sup>2</sup>
Enclosure protection rating	encapsulated
Open circuit protected	yes
Overload protected	yes
Short circuit protected	yes
Lightning protection	MOV on all terminals
Reverse polarity protected	yes
Operating temperature range	0°C - 70°C
Warranty period	two years
Packaging	50 per carton
Unit packed dimensions	90 x 72 x 37mm
Unit weight	0.2 kg
Carton quantity	50
Carton weight	10kg
Order code	94061205
Order number + temp comp	94061200
'Temp comp probe	94900000

# Prostar Series from Morningstar

- 20A charge/ 16A load & 30A charge/ 30A load versions
- LCD display
- Full range of features



# STECA automatic systems



# STECA Power Tarom

- Incorporates MPPT
  - can capture up to 35% more power from array
- 8,400 watts
- IP 65
- 12 / 24 / 48 VDC
- Built in Ah meter
- 10 kg



Steca PowerTarom  
2070, 2140, 4055, 4110, 4140

# ***Apollo T80 TurboCharger™***

- Incorporates MPPT
  - can capture up to 35% more power from array
- 5,300 watts
- 80A output
- 70A input
- 12 / 24 / 48 VDC
- Data logger
- 39cm x 22cm x 11cm
- 7.3 kg



**Features:**

- Available in 12V, 24V and 48V versions
- Unique solid state switching technique for high efficiency and high reliability
- Microprocessor controlled
- Modular, configurable system construction
- Fully adjustable voltage thresholds, locked by maintenance switch
- Multi-tier charging algorithm to accurately match solar current with load and battery charging requirements for optimum battery management
- Temperature compensation and lightning protection
- True 4-terminal battery voltage sensing



**Sollatek**  
solar systems

**SOLAR CONTROL CENTRE**

For professional large systems.  
Modular in design and suitable as part of hybrid power stations



# Choosing a charge controller

- Amps in?
- Amps out?
- More modules can be added if the charge controller is oversized
- Battery type
- Ease of installation
- The user
  - What information does the user require?
- Efficiency / voltage drop
- LVD adjustable?
- Cost
- Effect of heavy loads, inverter in system



# SUNSAVER MPPT<sup>TM</sup>

SOLAR CONTROLLER WITH MAXIMUM  
POWER POINT TRACKING



Morningstar's **SunSaver MPPT** solar controller with TrakStar Technology™ is an advanced maximum power point tracking (MPPT) battery charger for off-grid photovoltaic (PV) systems. The controller features a smart tracking algorithm that maximizes the energy harvest from the PV and also provides load control to prevent over discharge of the battery.

The SunSaver MPPT is well suited for both professional and consumer PV applications. Its charging process has been optimized for long battery life and improved system performance. This product is epoxy encapsulated for environmental protection, may be adjusted by the user via four settings switches or connection to a personal computer, and has an optional remote meter and battery temperature sensor.

# SUNSAVER MPPT™ SOLAR CONTROLLER

