



# Electronic Solar Switch DC Circuit Breaker for Solar Inverters





# Table of Contents

1	General Information . . . . .	5
1.1	Explanation of the symbols used: . . . . .	5
2	Safety instructions . . . . .	6
3	The Electronic Solar Switch. . . . .	7
3.1	Installing the inverter . . . . .	8
4	Operating principles . . . . .	9
4.1	Disconnecting the DC side . . . . .	10
4.2	Connecting the DC side . . . . .	11
5	Inspection . . . . .	12
6	Technical data . . . . .	13
6.1	Clean report of findings . . . . .	14
7	Contact . . . . .	15
8	Glossary . . . . .	16



# 1 General Information

This user manual provides an overview of the operating principles of the Electronic Solar Switch. The Electronic Solar Switch is a DC circuit breaker that allows you to disconnect the PV generator from the inverter at any time.

The Electronic Solar Switch completely satisfies the requirements of the DIN VDE 0100-712 and IEC 60364-7-712:2002 standards for a DC circuit breaker for a PV system. You will find the industrial trade association clean report of findings for the Electronic Solar Switch in chapter 6.1 "Clean report of findings" (Page 14)

If you require further information, please call the Sunny Boy hotline on the following number:

+49 561 95 22 - 499

## 1.1 Explanation of the symbols used:

In order to guarantee optimum use of this manual and to ensure the safe use of the device during the commissioning, operational and maintenance phases, please pay attention to the following explanations of the symbols used in this manual.

**This symbol indicates a fact that when not observed could result in damage to components or danger to persons. Please read these sections especially carefully.**



*This symbol indicates a fact that is important for optimum operation of the product. Read these sections carefully to ensure optimum operation of your product.*

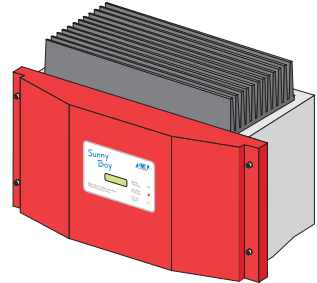


## 2 Safety instructions

The handling of any electronic device, such as a PV inverter, implies particular dangers that are indicated in the following sections.



**Any work on the inverter with the cover removed must be carried out by a qualified electrician! High voltages are present in the device. Before opening the inverter, the AC and DC voltages must be disconnected from the inverter and the capacitors (device-internal energy storage devices) must be discharged.**



*The exact instructions for opening the inverter, and for maintenance work on the opened inverter, are provided in detail in the installation manual for your particular inverter.*



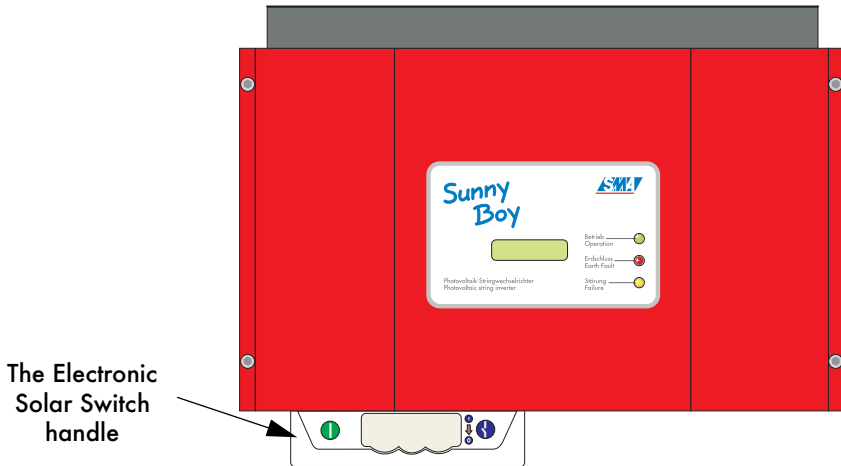
**When working on the inverter and handling the components, remember to observe all ESD safety regulations. Electronic components are susceptible to electrostatic charge. Discharge any electrostatic charge by touching the grounded enclosure before handling any electronic component.**



**Once the handle of the Electronic Solar Switch has been pulled out, the inverter provides protection class IP21.**

### 3 The Electronic Solar Switch

You can recognize an SMA inverter equipped with an Electronic Solar Switch by looking for the handle covering the PV generator plugs on the underside of the device.



An extra set of components containing the electronic circuit breaker is located inside the inverter. The Electronic Solar Switch consists of these two elements.

### 3.1 Installing the inverter



*When installing the inverter, be sure to observe all instructions in the installation manual for the device! This chapter only deals with part of the installation process. The special features relating to the installation with an Electronic Solar Switch are described here.*

When choosing the installation site, ensure there is enough space for heat to dissipate. Under normal conditions, the following guidelines should be applied for the space to be kept clear around the inverter:

	<b>Minimum clearance</b>	
	<b>Sunny Boy</b>	<b>Sunny Mini Central</b>
Sides	20 cm	30 cm
Top	20 cm	30 cm
Underneath	50 cm	50 cm
Front	5 cm	5 cm



*Be sure to leave enough free space below the device (recommended is: 50 cm), so that the Electronic Solar Switch can be pulled down safely!*

## 4 Operating principles

The Electronic Solar Switch allows you to safely disconnect the inverter from the PV generator, even in a faulty system. Without the Electronic Solar Switch, removal of the DC plug can cause arcing, which may cause personal injury and may damage the inverter connectors.

It is recommended that you always first disconnect the circuit breaker for the supply line (fuse) of the inverter before operating the Electronic Solar Switch.

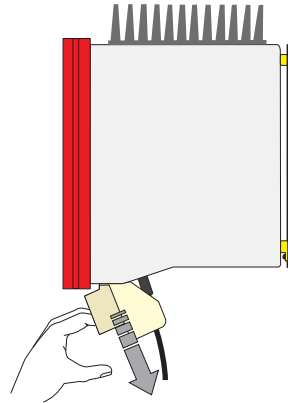
*In inverters equipped with the Electronic Solar Switch, the handle of the Electronic Solar Switch is pulled first after disconnecting the AC side. Pulling the handle starts a switching process that avoids arcing during the following removal of the DC plug.*



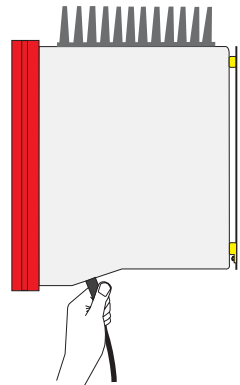
## 4.1 Disconnecting the DC side

Disconnecting the DC side is a two-step process. If you wish to disconnect the DC side (solar generator) of the inverter, proceed as follows:

- Switch off the circuit breaker of the supply line (fuse).
- Step 1:  
Pull the handle of the Electronic Solar Switch off the inverter. Be sure to pull the handle downwards and slightly at an angle to the rear of the device. There is a contact in the middle that automatically starts the switching process when the handle is pulled.



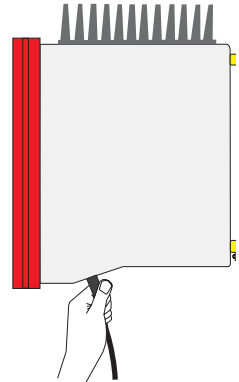
- Step 2:  
Once you have removed the handle, remove the DC plug connectors from the inverter. This procedure carries no danger because the power circuit is now interrupted. However, the plugs must still be removed to guarantee the safe disconnection of the inverter from the solar generator.



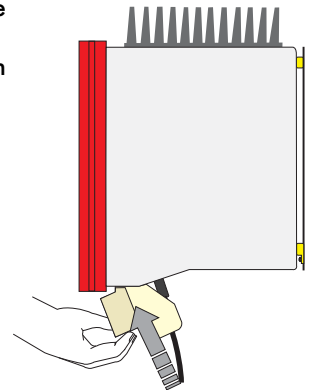
## 4.2 Connecting the DC side

To connect the solar generator to the inverter, proceed as follows:

1. Plug the DC plugs into the sockets of the device. Make sure the plug connectors have the correct polarity.
2. Close the unnecessary DC input sockets with the caps included in the delivery.



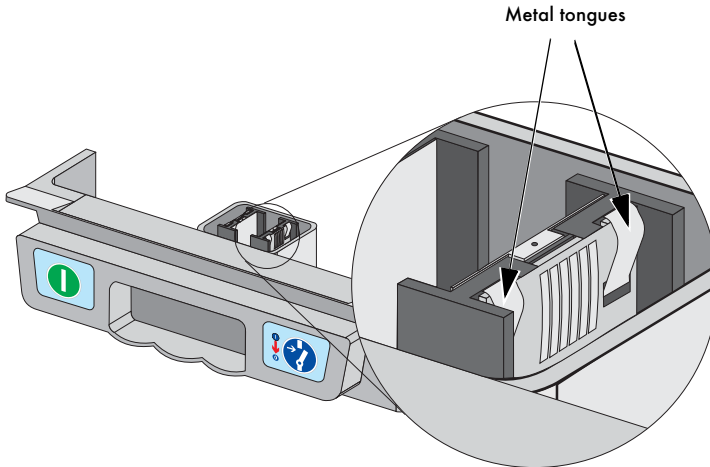
3. **Check the plug in the handle of the Electronic Solar Switch for any significant loss of contact material (see chapter 5 "Inspection" (Page 12)).**
4. Insert the handle once more into the socket of the Electronic Solar Switch on the inverter. If the solar generator is ready for operation, then the inverter LEDs should now illuminate.



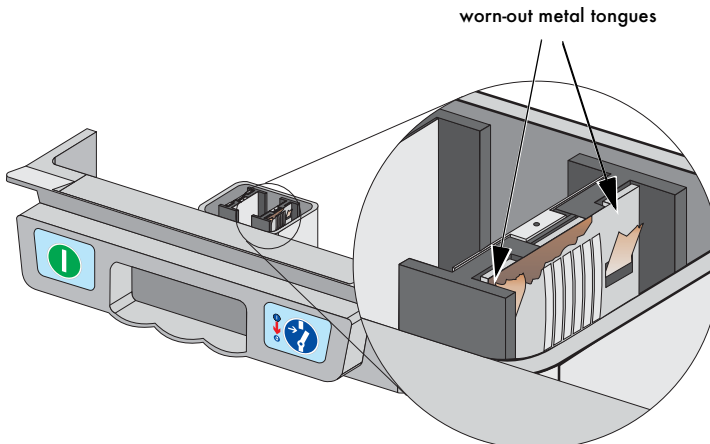
5. Switch on the circuit breaker of the supply line (fuse) again.

## 5 Inspection

You should always check the Electronic Solar Switch for any significant loss of contact material before using it. To do this, inspect the contacts of the integrated plug in the Electronic Solar Switch handle. The plug consists of two plastic legs, each with contacts consisting of two metal tongues.



The metal tongues will show signs of wear when frequently used. This is completely normal. Normally, the amount of wear is very small and the lifetime is correspondingly long. The first signs of wear can be recognized by a brown discoloration. If the metal tongues at any of the two plastic legs are completely worn out (see illustration below), then the Electronic Solar Switch can no longer safely disconnect the DC side. If you notice any signs of damage, please contact SMA for a replacement part.



## 6 Technical data


Mechanical lifetime (without current):	min. 1,000 switching processes
Electrical lifetime (in case of a short circuit, with a nominal current of 30 A):	min. 50 switching processes
Max. switching current	30 A
Max. switching voltage	800 V
Max. PV power	approx. 10 kW
Protection class when plugged	IP65
Protection class when unplugged	IP21

# 6.1 Clean report of findings

Fachausschuss Elektrotechnik  
der Berufsgenossenschaftlichen Zentrale  
für Sicherheit und Gesundheit – BGZ  
des Hauptverbandes der gewerblichen Berufsgenossenschaften

Fachausschuss Elektrotechnik, Postfach 51 05 80, 50941 Köln

**SMA Technologie AG**  
**Hannoversche Straße 1-5**  
**34266 Niestetal**



**BG**  
Federführung:  
Berufsgenossenschaft  
der Feinmechanik  
und Elektrotechnik

Ihre Zeichen/Nachricht vom	Unser Zeichen (Bitte stets angeben)	Bearbeiter	☎ (02 21) 37 78-	Datum
	UB (PS)	Meh/hu	6300	24.02.2006

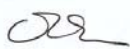
### Unbedenklichkeitsbescheinigung

<b>Erzeugnis:</b>	Lasttrennschaltung für PV-Anlagen
<b>Typ:</b>	ESS
<b>Bestimmungsgemäße Verwendung:</b>	Trennung der Gleichspannungsseite eines Solarwechsellrichters unter Last
<b>Prüfgrundlagen:</b>	
In Anlehnung an EN 60947-3:1999 + A1:2001; DIN EN 60947-3/VDE 0660-107:2001-12	Niederspannungsschaltgeräte – Teil 3: Lastschalter, Trennschalter, Lasttrennschalter und Schalter-Sicherungs-Einheiten
und IEC 60364-7-712: 2002-05; HD 60364-7-712: 2005-07	Elektrische Anlagen von Gebäuden – Teil 7-712: Anforderungen für Betriebsstätten, Räume und Anlagen besonderer Art: Photovoltaik (PV)-Ver- orgungssysteme

Das geprüfte Sicherheitskonzept des oben beschriebenen Erzeugnisses entspricht den zum Zeitpunkt der Ausstellung dieser Bescheinigung geltenden sicherheitstechnischen Anforderungen für die aufgeführte bestimmungsgemäße Verwendung.

Die Unbedenklichkeitsbescheinigung gilt befristet bis

**31.12.2010**



- Mehlem -  
Leiter der Prüf- und  
Zertifizierungsstelle

Hausadresse:
Güter-Heinemann-Ufer 130
50968 Köln
Tel. (02 21) 37 78-63 01
Fax (02 21) 37 78-63 22

## 7 Contact

If you have any questions or technical problems concerning the Electronic Solar Switch, please contact our hotline. Please have the following information available when you contact SMA:

- Inverter type
- Type and number of modules connected
- Communication method
- Inverter's serial number
- Inverter's blink code or display



Address:

**SMA** Technologie AG  
Hannoversche Strasse 1 - 5  
34266 Niestetal  
Germany

Tel.: +49 (561) 95 22 - 499  
Fax: +49 (561) 95 22 - 4699  
hotline@SMA.de  
www.SMA.de

## 8 Glossary

### AC

Abbreviation for "Alternating Current"

### DC

Abbreviation for "Direct Current"

### Inverter

A device for converting the direct current (DC) from the PV generator into alternating current (AC), which is used by most normal household devices and especially for feeding energy into an existing mains supply network.

### PV

Abbreviation for "Photovoltaic", describes the conversion of solar energy into electrical energy.

### PV system

Describes the complete collection of components needed for the acquisition and utilization of solar energy. As well as the PV-generator, this also includes the inverters in the case of mains coupled systems.

### PV generator

Technical device for the conversion of light energy into electrical energy. This normally also describes all installed and electrically connected solar modules in a PV system.

### Solar module

A collection of solar cells in an enclosure that protects the sensitive cells from mechanical stresses and allows easy installation.

### Solar cell

An electronic component that generates electrical energy when irradiated with sunlight. Since the voltage produced by a solar cell is very small (ca. 0.5 V), several solar cells are combined to form a solar module. The most common material presently used for solar cells is Silicon, which is manufactured in different forms (monocrystalline, polycrystalline, amorphous) In addition to different mechanical variations, that are usually designed to increase the level of efficiency, completely new materials are currently being tested (Cadmium Telluride, Cadmium Indium Sulphide, Titanium Dioxide and many others.)



**Sales**  
**Solar Technology**

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