



PV Inverter

# SUNNY BOY 2000HF-US/2500HF-US/3000HF-US

User Manual



# Display

Knocking on the upper lid:

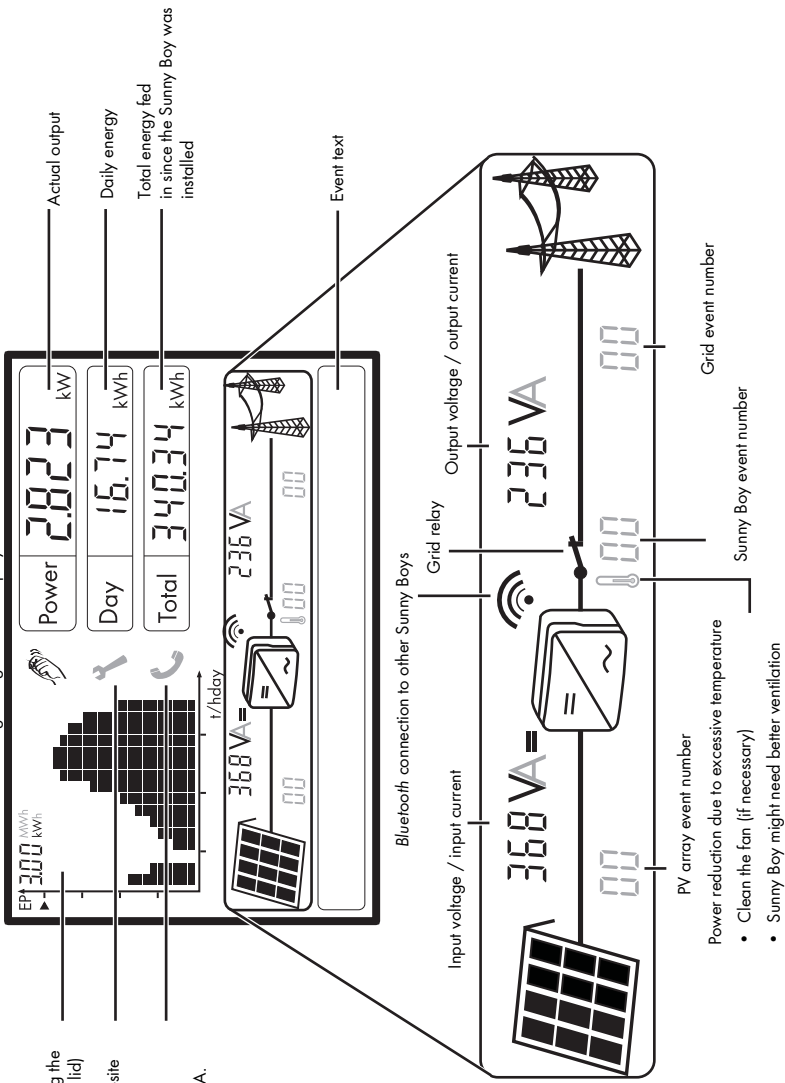
- Activating the background illumination
- Switching through the power values of the past 16 feed-in hours to the daily power values of the past 16 days
- Switching through the line display

Power curve or energy curve of the past 16 feed-in hours or past 16 days (switching the display is done by knocking on the lid)

Failure that can be removed on-site (see chapter 10.3 )

Device fault

Please contact SMA.



Copyright © 2011 SMA America, LLC. All rights reserved.

No part of this document may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photographic, magnetic or otherwise, without the prior written permission of SMA America, LLC.

Neither SMA America, LLC nor SMA Solar Technology Canada Inc. makes no representations, express or implied, with respect to this documentation or any of the equipment and/or software it may describe, including (with no limitation) any implied warranties of utility, merchantability, or fitness for any particular purpose. All such warranties are expressly disclaimed. Neither SMA America, LLC nor its distributors or dealers nor SMA Solar Technology Canada Inc. nor its distributors or dealers shall be liable for any indirect, incidental, or consequential damages under any circumstances.

(The exclusion of implied warranties may not apply in all cases under some statutes, and thus the above exclusion may not apply.)

Specifications are subject to change without notice. Every attempt has been made to make this document complete, accurate and up-to-date. Readers are cautioned, however, that SMA America, LLC and SMA Solar Technology Canada Inc. reserve the right to make changes without notice and shall not be responsible for any damages, including indirect, incidental or consequential damages, caused by reliance on the material presented, including, but not limited to, omissions, typographical errors, arithmetical errors or listing errors in the content material.

All trademarks are recognized even if these are not marked separately. Missing designations do not mean that a product or brand is not a registered trademark.

The *Bluetooth*<sup>®</sup> word mark and logos are registered trademarks owned by Bluetooth SIG, Inc. and any use of such marks by SMA America, LLC and SMA Solar Technology Canada Inc. is under license.

SMA America, LLC  
3801 N. Havana Street  
Denver, CO 80239 U.S.A.

SMA Solar Technology Canada Inc.  
2425 Matheson Blvd  
8th Floor  
Mississauga, ON L4W 5K5  
Canada

## IMPORTANT SAFETY INSTRUCTIONS

### SAVE THESE INSTRUCTIONS

This manual contains important instructions for models Sunny Boy 2000HF-US, 2500HF-US, 3000HF-US PV inverter, that must be followed during installation and maintenance of the PV inverter.

The models Sunny Boy 2000HF-US, 2500HF-US, 3000HF-US are designed and tested according to international safety requirements, but as with all electrical and electronic equipment, certain precautions must be observed when installing and/or operating the models Sunny Boy 2000HF-US, 2500HF-US, 3000HF-US. To reduce the risk of personal injury and to ensure the safe installation and operation of the models Sunny Boy 2000HF-US, 2500HF-US, 3000HF-US, you must carefully read and follow all instructions, cautions and warnings in this user manual.

### Warnings in this document

A warning describes a hazard to equipment or personnel. It calls attention to a procedure or practice, which, if not correctly performed or adhered to, could result in damage to or destruction of part or all of the SMA equipment and/or other equipment connected to the SMA equipment or personal injury.



#### DANGER

DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.



#### WARNING

WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.



#### CAUTION

CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

#### NOTICE

NOTICE is used to address practices not related to personal injury.

## Other Symbols in this document

In addition to the safety and hazard symbols described on the previous pages, the following symbol is also used in this user manual:



### Information

This symbol accompanies notes that call attention to supplementary information that you must know and use to ensure optimal operation of the system.

## Markings on this product

The following symbols are used as product markings with the following meanings.



Warning regarding dangerous voltage

The product works with high voltages. All work on the product must only be performed as described in its documentation.



Beware of hot surface

The product can become hot during operation. Do not touch the product during operation.



Observe the operating instructions

Read the product's documentation before working on it. Follow all safety precautions and instructions as described in the documentation.



This inverter is evaluated to UL 1741, which includes assessment to all of the requirements of IEEE1547 and IEEE1547.1, which are an outgrowth and further development of the IEEE recommended practices and guidelines contained in IEEE Std. 929-2000. IEEE 929-2000 provides recommendations regarding the proper equipment and functionality necessary to ensure compatible operation when power generation is connected to the utility grid. The inverter is additionally evaluated to CAN/CSA C22.2 No. 107.1-1.

## General Warnings



### General Warnings

All electrical installations must be done in accordance with the local codes and *National Electrical Code*® ANSI/NFPA 70 or the *Canadian Electrical Code*® CSA C22.1.

The Sunny Boy contains no user-serviceable parts except for the fan on the bottom of the enclosure. For all repair and maintenance always return the unit to an authorized SMA Service Center.

Before installing or using the Sunny Boy, read all of the instructions, cautions, and warnings on the Sunny Boy in this installation guide.

Before connecting the Sunny Boy to the power distribution grid, contact the local power distribution grid company. This connection must be made only by qualified personnel.

# Table of Contents

- 1 Notes on this Manual. . . . . 9**
- 1.1 Validity . . . . . 9
- 1.2 Target Group . . . . . 9
- 1.3 Additional Information . . . . . 9
- 1.4 Nomenclature . . . . . 9
- 2 Safety . . . . . 10**
- 2.1 Appropriate Usage . . . . . 10
- 2.2 Safety Instructions . . . . . 11
- 2.3 Identifying the Product . . . . . 12
- 3 Operating Modes. . . . . 13**
- 3.1 LED Displays . . . . . 14
- 3.1.1 All LEDs are off . . . . . 14
- 3.1.2 Green LED is flashing . . . . . 14
- 3.1.3 Green LED is continuously lit. . . . . 14
- 3.1.4 Red LED is continuously lit. . . . . 15
- 3.1.5 Blue LED is continuously lit . . . . . 15
- 4 Information on the Display . . . . . 16**
- 4.1 Display Information Overview . . . . . 16
- 5 Maintenance and Cleaning. . . . . 19**
- 5.1 Cleaning the Fan. . . . . 19
- 5.2 Cleaning the Display. . . . . 19
- 5.3 Checking the SMA DC Disconnect. . . . . 20
- 6 FCC Compliance Information . . . . . 21**
- 7 Contact . . . . . 22**



# 1 Notes on this Manual

This manual contains instructions for operating the Sunny Boy inverter. Store this manual so that it is always easily accessible.

## 1.1 Validity

This manual applies to the following inverters:

- Sunny Boy 2000HF-US (SB 2000HF-US-30)
- Sunny Boy 2500HF-US (SB 2500HF-US-30)
- Sunny Boy 3000HF-US (SB 3000HF-US-30)

## 1.2 Target Group

This manual has been prepared for use by qualified personnel and those operating the inverter. Activities to be carried out by qualified personnel have been noted with safety instructions.

- Qualified Personnel

Qualified personnel have received training and have demonstrated skills and knowledge in the construction and operation of the device. Qualified personnel are trained to deal with the dangers and hazards involved in installing electric devices.

- Operator

The operator has been adequately trained and instructed by qualified personnel in order to ensure safe operation of the inverter.

## 1.3 Additional Information

The installation guide included with the equipment contains information regarding assembly, installation, commissioning and maintenance of the inverter as well as technical specifications pertaining to the equipment.

Further information about SMA America Production, LLC equipment is available in the download section of the website [www.SMA-America.com](http://www.SMA-America.com).

The download section includes, among others, the technical description: "SMA Bluetooth® Wireless Technology".

## 1.4 Nomenclature

In this document SMA America Production, LLC and SMA Solar Technology Canada Inc. are referred to in the following as SMA.

## 2 Safety

### 2.1 Appropriate Usage

The Sunny Boy is a solar inverter that converts the DC current of the PV array into an AC current and feeds it into the grid.

Refer to the inverter installation guide for detailed information about the product and its intended use. The limit values specified in the installation guide of the respective inverter must be strictly adhered to.

The inverter may only be operated with PV arrays (modules and cabling) that have protective insulation. Do not connect any power sources other than PV modules to the inverter.

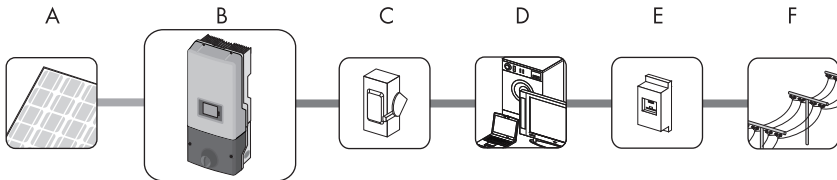
Do not use the inverter for purposes other than those described here. Alternative uses, modifications to the inverter or the installation of components not expressly recommended or sold by the manufacturer void the warranty claims and operating permission.

Contact the SMA Serviceline if you need clarification regarding proper use of the inverter.

#### Principle of the string inverter

The string inverter connects solar modules that are connected in series (strings) to the power distribution grid. Thus, even large PV arrays can be set up using multiple individual strings, each having its own respective string inverter.

#### Principle of a grid-connected PV system with a Sunny Boy



Position	Description
A	PV array
B	Sunny Boy with integrated DC disconnect
C	Line circuit breaker
D	Load
E	Energy meter
F	Power distribution grid

## 2.2 Safety Instructions



### DANGER

High voltages in the inverter. Death resulting from electric shock and burns.

The following work on the inverter may be carried out by qualified personnel only.

- Electrical installation
- Repairs
- Modification

Even if an external supply is not present, the equipment may still be under high voltage. This high voltage can lead to death or severe injuries.



### CAUTION

The enclosure of the Sunny Boy can get hot during operation. Risk of burn injuries.

- Do not touch the enclosure during operation.
- Only touch the lid and display during operation.

### NOTICE


Damage to the inverter due to overvoltage.

- Verify that the DC voltage of your installation does not exceed the maximum values specified on the type rating label.

## 2.3 Identifying the Product

You can identify the inverter by the type plate. The type plate is on the right side of the enclosure.

The type plate specifies among other things the device type (Type / Model), the serial number (Serial No.) and device-specific key data of the product.

www.SMA-America.com 


**SUNNY BOY**  
Utility interactive 1-phase inverter

Model  
**SB XXXXHFUS-XX**


Serial No.  
**XXXXXXXXXXXX**

Date of manufacture **xx/xxxx**




Max. continuous output Power* <b>XXXX Wac</b>		
Operating voltage range (Vac)*		
MIN xxx xxx	NOMINAL xxx xxx	MAX xxx xxx
Operating frequency range (Hz)*		
MIN xx.x	NOMINAL xx.x	MAX xx.x
Max. continuous output current* <b>xx Aac</b>		
Output power factor <b>x</b>		
Range of input operating voltage <b>xxx-xxx Vdc</b>		
MPPT Range of input operating DC voltage* <b>xxx-xxx Vdc (@xxx Vac)</b> <b>xxx-xxx Vdc (@xxx Vac)</b>		
Max. operating current <b>xx Adc</b>		
This unit contains a Residual Current Monitor, Isolation Monitor and Interrupteur		
ENCLOSURE Type 3R (IP54)		
*For more details and for tightening torque, allowable wire size and type see the Operator's Manual		



**US LISTED**  
Utility Interactive inverter  
LISTED UL 1741 36A/N

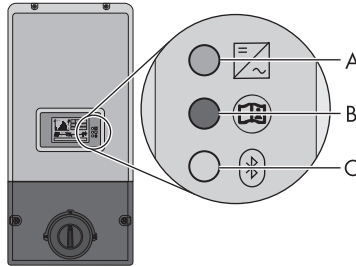


Utility Interactive 1-Phase Inverter  
Tested To Comply  
With FCC Standards  
FOR HOME AND OFFICE USE

### 3 Operating Modes

The inverter indicates various operating conditions with the help of 3 LEDs on the enclosure lid. The equipment must be connected to a DC power supply. Furthermore the equipment must be connected to the grid on the AC side to be able to indicate its operational state via display and integrated LEDs. There must be adequate solar radiation for the inverter to receive the necessary DC voltage.



LED	Description
<b>A</b>	Green LED LED lit: Inverter in normal operating mode LED flashing: Inverter waiting for adequate solar radiation
<b>B</b>	Red LED LED lit: Fault in the inverter. Note the serial number of the inverter and the fault number and contact your installer. The fault number is indicated on the inverter display unit.
<b>C</b>	Blue LED LED lit: Inverter is connected to a <i>Bluetooth</i> network and can communicate with other devices having the same NetID.



#### LED display

In case you do not have any communication devices available, monitor the LEDs of the inverter and graphic display regularly at various times during the day and under varying conditions of solar radiation, particularly in the first year after installation. Thus, you can detect any potential faults in the system in a timely manner.

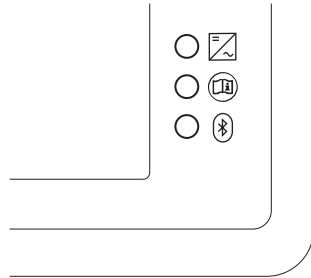
The following section contains a detailed description of various LED displays and inverter operating states.

### 3.1 LED Displays

#### 3.1.1 All LEDs are off

##### Overnight shutdown

The DC voltage on the inverter is too low for grid feeding. If this operating state occurs during the day with proper solar radiation, have your installer check the DC voltage.

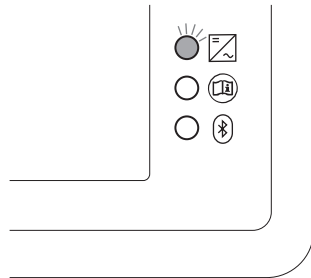


#### 3.1.2 Green LED is flashing

##### Startup

The DC voltage is adequate for the inverter to be calibrated. However, the DC voltage is not adequate for feeding operation of the inverter.

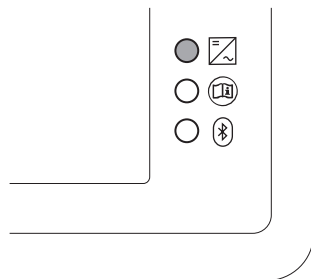
Usually, inverter calibration requires less than 10 seconds. Thereafter, the inverter commences normal feeding operation.



#### 3.1.3 Green LED is continuously lit

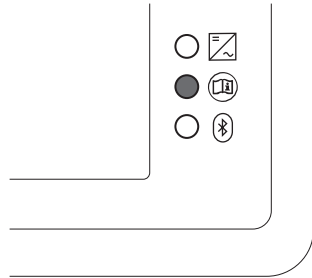
##### Feeding operation

The inverter is operating normally and is feeding power to the power distribution grid.



### 3.1.4 Red LED is continuously lit

The inverter has detected a malfunction within the device or in the grid. The inverter has disconnected from the power distribution grid. The inverter indicates the error number on the display unit (see section 4.1 "Display Information Overview" (page 16)). Note the serial number of the inverter and the error number and contact your installer.

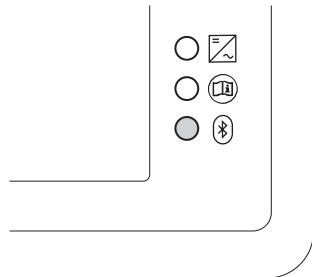


#### Troubleshooting by installer

Contact your installation technician, who will troubleshoot the error or get in touch with the SMA Serviceline.

### 3.1.5 Blue LED is continuously lit

The inverter is connected to a *Bluetooth* network.



## 4 Information on the Display

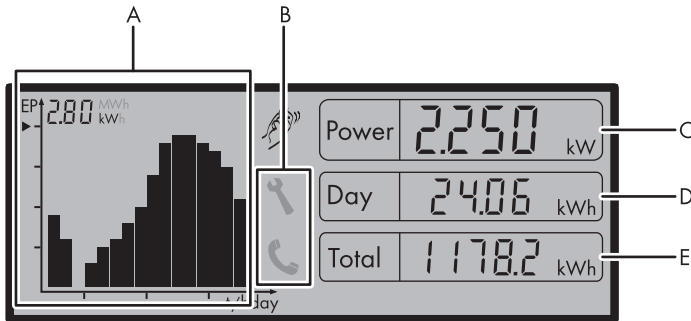
The Sunny Boy provides information on the display unit during operation.



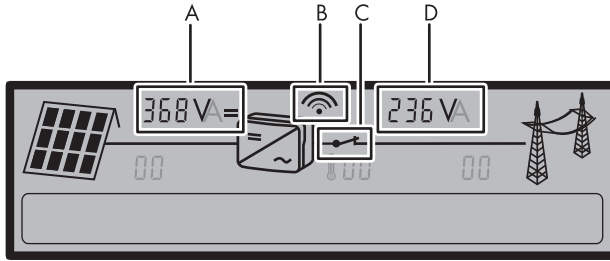
### Activate display unit background illumination

Activate the display background illumination by tapping on the cover of the enclosure lid. The background illumination switches off automatically.

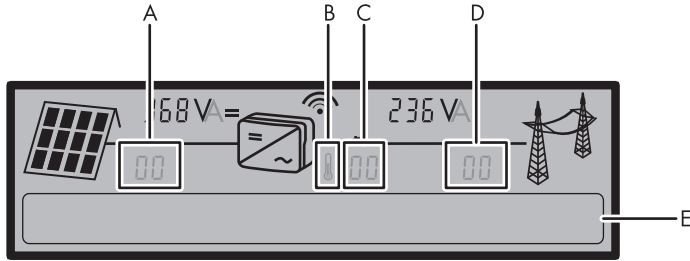
### 4.1 Display Information Overview



Position	Description
<b>A</b>	Performance chart of the past 16 hours / last 16 days. The inverter displays the feed-in power in the performance diagram. By default, the inverter displays the feed-in power of the past 16 hours. The inverter refreshes the display every 5 seconds. When you tap on the cover of the enclosure lid, the display changes and shows the power fed over the past 16 days.
<b>B</b>	A malfunction has occurred. The inverter displays this icon when it detects a malfunction in the equipment or the power grid. The inverter indicates the error number on its display unit. Note the serial number of the inverter and the error number and contact your installer.
<b>C</b>	Current inverter output power.
<b>D</b>	Total energy produced on this day.
<b>E</b>	Total energy output of the inverter since commissioning.



Position	Description
<b>A</b>	Current DC voltage at the inverter.
<b>B</b>	<p>Quality of the link to other PV system <i>Bluetooth</i> devices.</p> <p>You can see whether the inverter has a radio link to a device of its PV system on the link quality icon. The number of rings indicates the quality of the <i>Bluetooth</i> connection between the devices. The more rings displayed, the better the link quality.</p>
<b>C</b>	<p>Status display of power feed</p> <p>Switch closed: The Sunny Boy feeds power to the power distribution grid and supplies power to loads connected to it directly.</p> <p>Switch open: The Sunny Boy does not feed power into the power distribution grid and does not supply power to any loads connected to it directly.</p>
<b>D</b>	Current AC main voltage



Position	Description
<b>A</b>	PV array event number Shows events that have occurred on the PV array.
<b>B</b>	Warning icon for power reduction. The temperature in the inverter is too high. The inverter reduces power output in order to cool down. If the inverter fan is dirty, clean it (see section 5.1 "Cleaning the Fan" (page 19)). If the inverter displays the icon even after the fan has been cleaned, ensure proper ventilation.
<b>C</b>	Inverter event number. It displays events that have occurred on the inverter.
<b>D</b>	Grid event number. This displays events that have taken place on the power distribution grid.
<b>E</b>	Event display line of text. The text field displays additional information if any events have occurred on the PV array or on the power distribution grid. Tapping on the lid leads you to further information on the event.



**Display messages**

The inverter installation manual provides detailed information regarding event numbers, various error and malfunction messages.



**Measurement accuracy**

The inverter does not have a calibrated meter. The values on the display unit may differ from the actual values. You may not use the values as the basis for any billing purposes.

## 5 Maintenance and Cleaning

Check for proper inverter operation at regular intervals. Dirt, such as dust, can cause heat accumulation, which can lead to yield losses. Check the inverter and cables for any signs of external damage. Have repairs carried out if necessary.

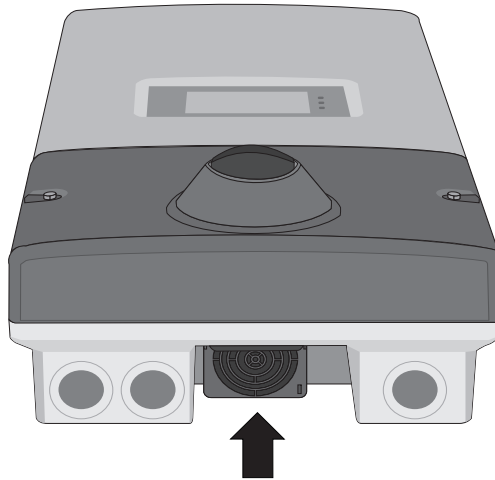
### 5.1 Cleaning the Fan



#### WARNING

Only qualified personnel may dismantle the inverter fan.

The procedure for dismantling the fan for cleaning is described in the inverter installation guide.



If the fan guards are dirty with loose dust, then you can clean them with a vacuum cleaner. Hold the pipe of the vacuum cleaner below the fan of the inverter (see Figure). If you are unable to clean the fan properly, contact your installer who will dismantle the fan in order to clean it.

### 5.2 Cleaning the Display

If the status LED's or the display unit are dirty and cannot be read clearly, clean them using a moist cloth.



#### Cleaning the status LED's and the display unit

Do not use any solvents, abrasives or corrosive substances for cleaning.

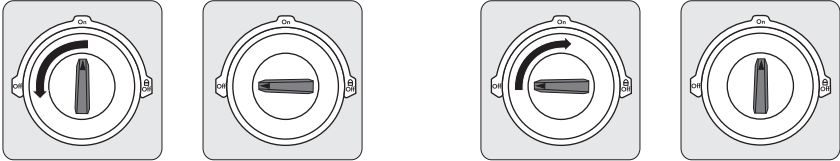
### 5.3 Checking the SMA DC Disconnect

When used appropriately the SMA DC Disconnect does not need maintenance.

It is recommended, though not compulsory to:

- Check the SMA DC Disconnect regularly.
- Operate the SMA DC Disconnect once a year 10 times.

Operating the switch will clean the contacts of the SMA DC Disconnect.



## 6 FCC Compliance Information

### **SMA PV inverter, model Sunny Boy 2000HF-US, Sunny Boy 2500HF-US, Sunny Boy 3000HF-US**

This device complies with Part 15 of the FCC Rules. Operation is subject to the following conditions:

- (1) This device may not cause harmful interference, and
- (2) this device must accept any interference received, including interference that may cause undesired operation.

**NOTE:** This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.
- The user is cautioned that changes or modifications not expressly approved by SMA America, LLC could void the user's authority to operate this equipment.

Contact SMA America for more information.

### **RF-exposure Statement**

The SMA Sunny Boy 2000HF-US, Sunny Boy 2500HF-US, Sunny Boy 3000HF-US contains a modular transmitter. Thus it must have a separation of at least 8 in. (20 cm) between the antenna and the body of the user or nearby persons, excluding hands, wrists, feet, and ankles.

## 7 Contact

If you have technical problems with our products, please contact our Serviceline. We require the following information in order to provide you with the necessary assistance:

- Inverter type
- Serial number of the Sunny Boy
- Type and number of modules connected
- Event number or display message of the Sunny Boy
- Type of communication, if applicable
- Type of fault signaling contact connected, if applicable

### **SMA Solar Technology America, LLC**

6020 West Oaks Blvd, Ste 300

Rocklin, CA 95765

Tel. +1 916 625 0870

Tel. +1 877-MY SMA TECH

Tel. +1 877 697 6283 (Toll free, available for USA, Canada and Puerto Rico)

Fax +1 916 625 0871

Service@SMA-America.com

www.SMA-America.com

### **SMA Solar Technology Canada Inc.**

2425 Matheson Blvd, 8th Floor

Mississauga, ON L4W 5K5, Canada

Tel. +1 877 506 1756 (Toll free, available for Canada)

Service@SMA-Canada.ca

www.SMA-Canada.ca



SMA America, LLC

[www.SMA-America.com](http://www.SMA-America.com)

