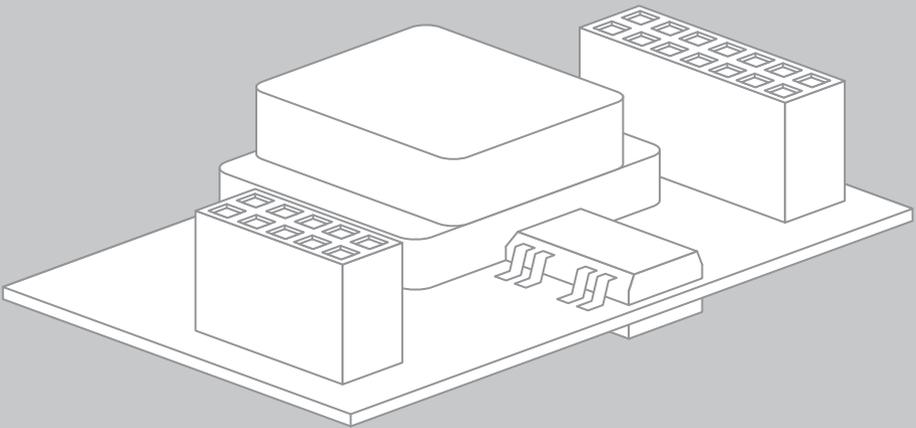




Plant Monitoring
485USPB-NR
Installation Manual



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IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS

This manual contains important instructions for the following products:

- 485USPB-NR

This manual must be followed during installation and maintenance.

The product is 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 product. To reduce the risk of personal injury and to ensure the safe installation and operation of the product, you must carefully read and follow all instructions, cautions and warnings in this 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.

Symbol	Description
 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 symbols are also used in this manual:

Symbol	Description
	Indicates information that is important for a specific topic or objective, but is not safety-relevant.
	Indicates a requirement for meeting a specific goal.
	Desired result
	A problem that could occur

GENERAL WARNINGS

WARNING

General Warnings

All electrical installations must be done in accordance with the local and *National Electrical Code*® ANSI/NFPA 70 or the *Canadian Electrical Code*® CSA C22.1. This document does not and is not intended to replace any local, state, provincial, federal or national laws, regulation or codes applicable to the installation and use of the product, including without limitation applicable electrical safety codes. All installations must conform with the laws, regulations, codes and standards applicable in the jurisdiction of installation. SMA assumes no responsibility for the compliance or noncompliance with such laws or codes in connection with the installation of the product.

For all repair and maintenance, always return the unit to an authorized SMA Service Center.

Before installing or using the product, read all of the instructions, cautions, and warnings in this manual.

Wiring of the product must be made by qualified personnel only.

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1 Information on this Manual

1.1 Validity

This manual applies to the communication interface 485USPB-NR.

This manual does not cover any details concerning equipment connected to the 485USPB-NR. Information concerning the connected equipment is available from the manufacturer of the equipment.

1.2 Target Group

This manual is intended for skilled workers. Only skilled workers are allowed to perform the tasks set forth in this manual (see Section 2.2 "Skills of Skilled Workers", page 10).

1.3 Storage of the Manual

Keep this manual in a convenient place for future reference.

1.4 Nomenclature

In this manual, SMA America Production, LLC and SMA Solar Technology Canada Inc. are hereinafter referred to as SMA.

2 Safety

2.1 Intended Use

The communication interface serves to establish cable-connected RS485 communication. The communication interface may only be used with the following types of inverter.

- SB/WB 700-U
- SB/WB 1100-U
- SWR 1800-U
- SWR 2100-U
- SWR 2500-U
- SB/WB 3000-US
- SB 3300-U
- SB 3800-U
- SB 4000-US
- SB/WB 5000-US
- SB 6000-U
- SB/WB 6000-US
- SB/WB 7000-US
- SB/WB 8000-US
- SB 8000TL-US
- SB 9000TL-US
- SB 10000TL-US

The communication interface (485USPB-NR) complies with the following standards:

- FCC Part 15

The communication interface is provided as a retrofit kit or preinstalled in the inverter.

2.2 Skills of Skilled Workers

The tasks described in this manual are intended for skilled workers only. Skilled workers must have the following skills:

- Training in how to deal with the dangers and risks associated with installing and using electrical devices and plants
- Training in the installation and commissioning of electrical devices and plants
- Knowledge of all applicable standards and guidelines
- Knowledge of and adherence to this manual and all safety precautions

2.3 Safety Precautions

DANGER

Electric Shock

High voltages that can result in electric shocks are present in the conductive component parts of the inverter.

- Prior to performing any work on the inverter, disconnect the inverter on the AC and DC sides (see inverter installation manual).

NOTICE

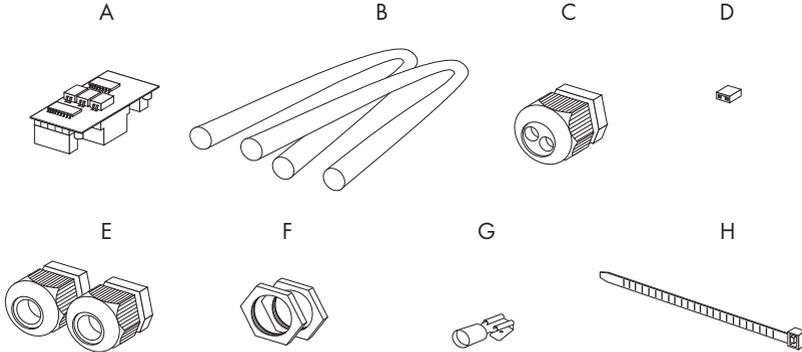
Electrostatic Discharge

By touching electronic component parts, you can cause damage to or destroy the inverter through electrostatic discharge (ESD).

- Ground yourself before touching any component parts.

3 Unpacking

3.1 Scope of Delivery



Item	Quantity	Designation
A	1	Communication interface: 485PB-G3
B	2	Insulating hose
C	1	Cable gland (with double seal insert)
D	1	Jumper
E	2	Cable gland (with single seal insert)
F	2	Counter nut for the cable gland
G	1	Push-on receptacle
H	1	Cable tie

3.2 Designation

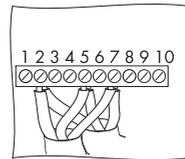
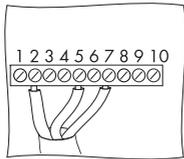
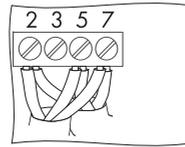
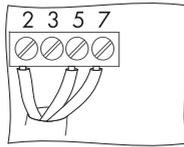
You can identify the communication interface by the type label. The type label is located on one of the female connectors of the assembly.

4 Electrical Connection

This section describes the installation and connection of the communication interface.

The inverter can be connected at one of the following two positions on the RS485 communication bus:

- A At one of the ends of the RS485 communication bus. In this case only one cable is connected to a screw terminal. Termination is necessary.
- B Between the ends of the RS485 communication bus. In this case two cables are connected to a screw terminal. No termination is necessary.



A

B

Connection of the inverter communication cable at the end of the RS485 communication bus.

Connection of the inverter communication cable between the ends of the RS485 communication bus.

If the communication interface is preinstalled, proceed to Section 4.4 "Connecting the Communication Interface", page 18 to continue installation.

4.1 Cable Requirements

The cable length and quality will affect the signal quality. To achieve a good quality signal, observe the following cable requirements:

- Cross-section: min. 2 x 2 x AWG 24 (2 x 2 x 0.20 mm²)
- Shielded
- Twisted pair lines
- UV-resistant (for outdoor use)

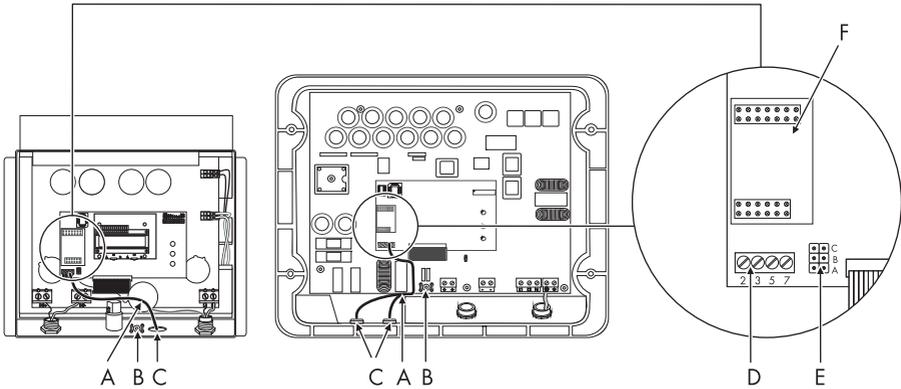
We recommend the following SMA cable types:

SMA order number: COMCAB-OUTxxx*

* Available in the following lengths: xxx = 100 (100 m / 328 ft.); xxx = 200 (200 m / 656 ft.); xxx = 500 (500 m / 1 640 ft.) and xxx = 1 000 (1 000 m / 3 280 ft.)

4.2 Overview of Interface Slot and Cable Route

In a Sunny Boy Type SB/WB



SB/WB 700-U

SB/WB 1100-U

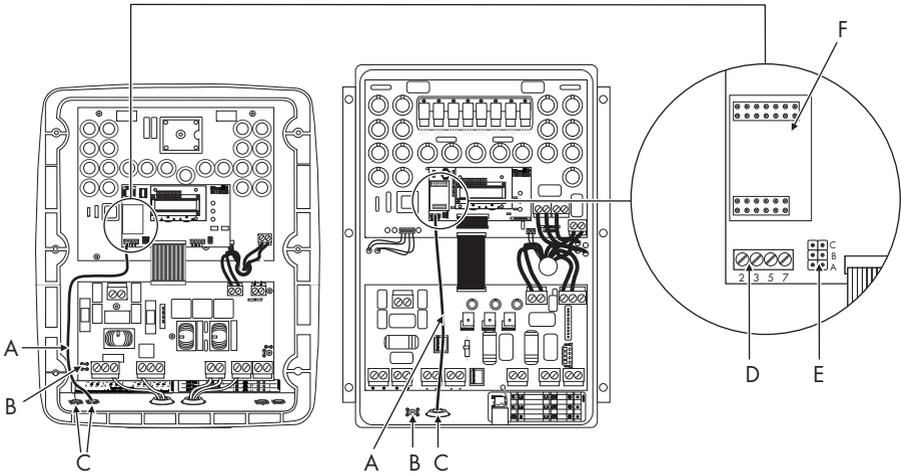
SB/WB 3000-US

SB 3300-U

SB 3800-U

SB 4000-US

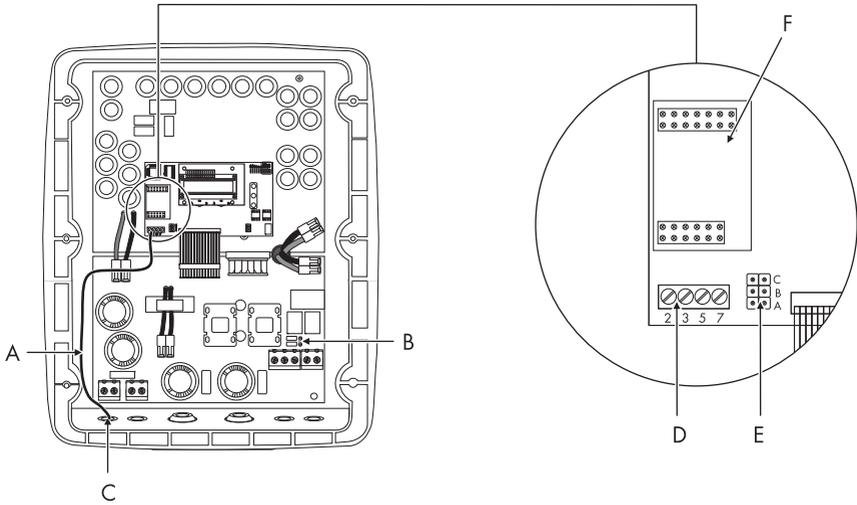
Item	Designation
A	Cable route
B	Pin header for protective conductor
C	Enclosure opening at the bottom of the inverter
D	Screw terminals for connecting the communication cabling
E	Jumper slot
F	Interface slot



SB/WB 5000-US
 SB/WB 6000-US
 SB/WB 7000-US
 SB/WB 8000-US

SB 6000-U

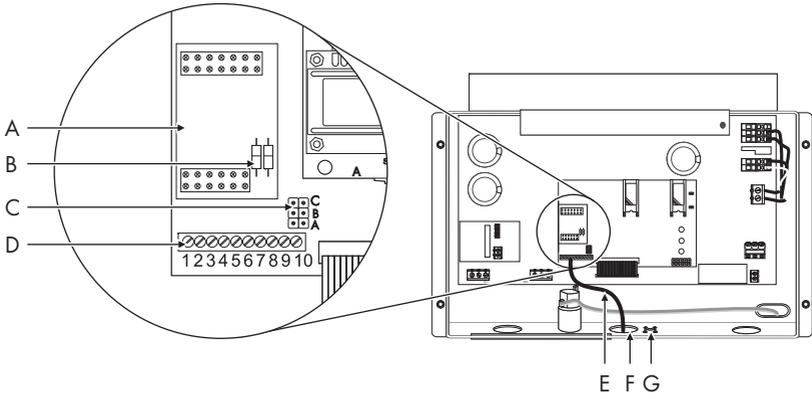
Item	Designation
A	Cable route
B	Pin header for protective conductor
C	Enclosure opening at the bottom of the inverter
D	Screw terminals for connecting the communication cabling
E	Jumper slot
F	Interface slot



SB 8000TL-US
 SB 9000TL-US
 SB 10000TL-US

Item	Designation
A	Cable route
B	Pin header for protective conductor
C	Enclosure opening at the bottom of the inverter
D	Screw terminals for connecting the communication cabling
E	Jumper slot
F	Interface slot

In a Sunny Boy Type SWR



SWR 1800-U
 SWR 2100-U
 SWR 2500-U

Item	Designation
A	Interface slot
B	Resistors (SWR inverters only)
C	Jumper slot
D	Screw terminals for connecting the communication cabling
E	Cable route
F	Enclosure openings at the bottom of the inverter
G	Pin header for protective conductor

4.3 Installing the Communication Interface

i In SWR-type inverters it is possible that the interface slot is occupied by the display. You can install either a display, or a communication interface.

To install the communication interface proceed as follows:

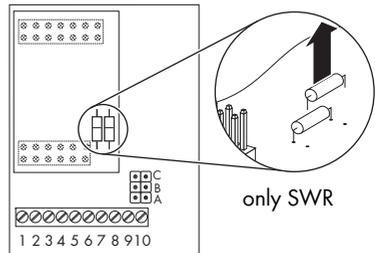
1. **⚠ DANGER**

Electric Shock

High voltages that can result in electric shocks are present in the conductive component parts of the inverter.

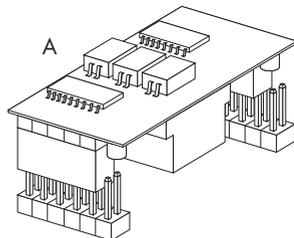
- Prior to performing any work on the inverter, disconnect the inverter on the AC and DC sides (see inverter installation manual).
- Open the inverter as described in the installation manual of the inverter.

2. Prior to installing the communication interface in SWR-type inverters, remove the resistors marked with a black ring with the aid of diagonal cutting pliers.



3. Plug the communication interface (A) flush-left on the interface slot.

The communication interface is now installed.



4.4 Connecting the Communication Interface

⚠ DANGER

Electric Shock

High voltages that can result in electric shocks are present in the conductive component parts of the inverter.

- Prior to performing any work on the inverter, disconnect the inverter on the AC and DC sides (see inverter installation manual).

4.4.1 Preparing the Enclosure Opening on the Inverter

NOTICE

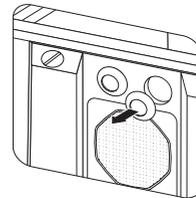
Risk of damage to the inverter due to ingress of liquids.

- For the purpose of inserting the conduits into the enclosure, use only UL-certified rainproof sleeves or waterproof sleeves that fulfill UL 514B.

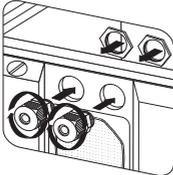
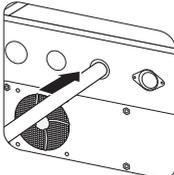
In the following description we distinguish between inverter types with two or one enclosure openings.

Inverter Types with Two Enclosure Openings

1. Unscrew or push out the filler-plugs according to the number of cables which are to be fed through on the bottom side of the inverter.



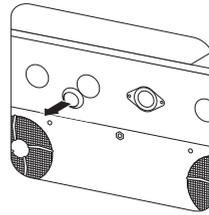
2. Prepare the enclosure opening:

Enclosure opening with cable gland	Enclosure opening with conduit
<ul style="list-style-type: none"> • Insert cable glands with single seal insert in the appropriate openings on the inverter. • Screw to the inner side of the enclosure using counter nuts. 	<ul style="list-style-type: none"> • Insert conduits into the openings provided. 

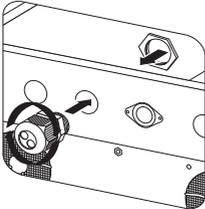
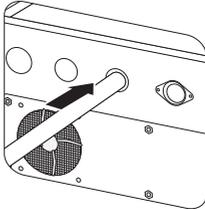
- Preparation of the enclosure opening on the inverter is now complete.

Inverter Types with One Enclosure Opening

1. Unscrew or push out the filler-plug from the hole on the bottom side of the inverter.



2. Prepare the enclosure opening:

Enclosure opening with cable gland	Enclosure opening with conduit
<ul style="list-style-type: none"> • Insert cable gland with double seal insert in the appropriate opening on the inverter. • Screw to the inner side of the enclosure using counter nuts.  <ul style="list-style-type: none"> • Unscrew the swivel nut of the cable gland. Press the seal insert out. • Use a screwdriver to pierce the seal insert according to the number of cables which are to be fed through. 	<ul style="list-style-type: none"> • Insert conduit into the opening provided. 

- Preparation of the enclosure opening on the inverter is now complete.

4.4.2 Routing the Cable in the Inverter

⚠ DANGER

Risk of electric shock due to incorrect installation of the communication cable.

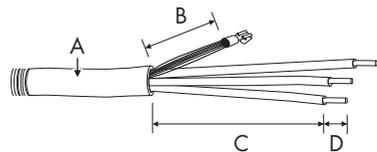
Risk of death or serious injury due to contact with the communication cable.

If the communication cable is routed together with conductive cables, lethal voltages may be induced.

- Always route the communication cables separately from the conductive cables.

Requirements:

- The swivel nut of the cable gland has been unscrewed.
1. Lead the cable into the enclosure through the swivel nut and the seal insert or through the conduit. In doing so, lead the cable into the enclosure along the described cable route (see Section 4.2 "Overview of Interface Slot and Cable Route", page 14) until it reaches the terminals.
 2. Strip the cable sheath to the length of the cable route (C).
 3. Cut back unneeded insulated conductors to the length of the cable sheath (A).
 4. Cut and twist the cable shield (B) to the length needed to reach the protective conductor pin header in the inverter.
 5. Connect the push-on receptacle with the cable shield.
 6. Connect the push-on receptacle to the protective conductor pin header.
 7. Strip $\frac{1}{4}$ in. off the conductor insulation (D).



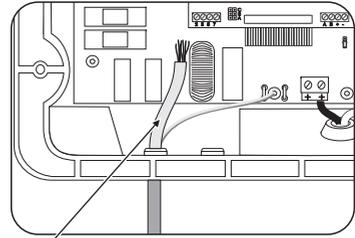
8. **⚠ DANGER**

Risk of electric shock due to incorrect insulation of the communication cable.

Risk of death or serious injuries.

In case of incorrect insulation, high voltages outside of the inverter on the communication cable are possible.

- Pull the insulating hose (A) over the insulated conductors. In doing so the insulating hose must completely cover the insulated conductors inside the enclosure.
- If necessary, cut the insulating hose to the required length.



9. Lead the insulated conductors with insulating hose (A) to the screw terminals in line with the cable route (see Section 4.2 "Overview of Interface Slot and Cable Route", page 14).
10. Tighten the swivel nut of the cable gland to secure the cable.
 - The routing of the cable in the inverter is now complete.

4.4.3 Connecting the Cable to the Communication Interface

Requirements:

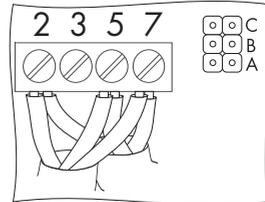
- The RS485 bus nodes are identically interconnected.



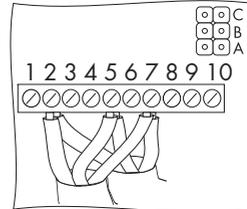
See the RS485 cabling plan poster for the terminal assignment, wiring, and termination of an RS485 communication bus.

For the inverters described in this document use terminals 2, 5, and 7 of the screw terminal.

1. Release screws 2, 5, and 7 of the screw terminal underneath the communication interface.
2. Connect the stripped insulated conductors to the screw terminal.
3. Tighten screws 2, 5, and 7.



4. Pull the cable to check that it is securely in place.
5. Note the color of the insulated conductors:



	Signal	485USPB-NR	Insulated conductor color	RS485 bus
	GND	5		5
	Data+	2		2
	Data-	7		7

6. Set the termination if necessary (see 4.5 "Termination", page 24).
7. Close the inverter as described in the inverter manual.
 - The communication interface is now connected.

4.5 Termination

You only need to set the termination if the inverter is located at one end of the RS485 communication bus. Termination is effected via a jumper at the jumper slot.

i Refer to the RS485 cabling plan poster for the termination of an RS485 communication bus.

Carry out the following steps to terminate the RS485 communication bus:

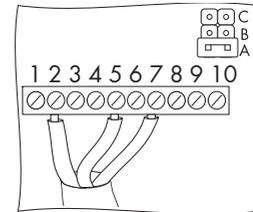
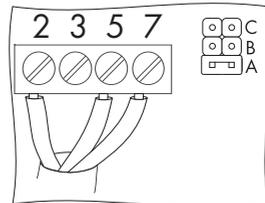
⚠ DANGER

Electric Shock

High voltages that can result in electric shocks are present in the conductive component parts of the inverter.

- Prior to performing any work on the inverter, disconnect the inverter on the AC and DC sides (see inverter installation manual).

1. Plug the jumper into jumper slot A in the inverter.
 2. Close the inverter as described in the inverter manual.
- The RS485 communication bus is now terminated.



5 Decommissioning

5.1 Disassembly

1. ** DANGER**

Electric Shock

High voltages that can result in electric shocks are present in the conductive component parts of the inverter.

- Prior to performing any work on the inverter, disconnect the inverter on the AC and DC sides (see inverter installation manual).
 - Open the inverter as described in the installation manual of the inverter.
2. Remove the communication interface from the interface slot.
 3. Release the screws of the screw terminal (counterclockwise), and remove conductors.
 4. Remove the jumper, if applicable.
 5. If necessary, remove cable ties.
 6. Remove the push-on receptacle from the protective conductor pin header.
 7. Remove insulating hose.
 8. Loosen the nut of the cable gland (counterclockwise).
 9. Pull the cable out of the device.
 10. Remove the cable gland or conduit from the enclosure.
 11. Close enclosure openings at the bottom of the inverter with filler-plugs.
 12. Close the inverter as described in the inverter manual.
- The communication interface has been decommissioned.

5.2 Disposal

- Observe the disposal regulations for electronic waste that apply at the installation site when disposing of the communication interface.
- To dispose of the communication interface, return the communication interface to SMA at your own cost with the information "FOR DISPOSAL".

6 Compliance Information

FCC Compliance

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 A & 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, Inc. could void the user's authority to operate this equipment.

IC Compliance

This device complies with Industry of Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions:

- This device may not cause interference, and
- This device must accept any interference, including interferences that may cause undesired operation of the device.

7 Contact

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

- Type of inverter
- Type and number of modules connected
- Communication method
- Sunny Boy failure or warning number
- Display message of the Sunny Boy

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