TECHNICAL NOTE

TOPIC
Sunny Boy US-41: Secure Power Supply Operation with TS4-R-O

PURPOSE
This notice provides instructions for installing the Secure Power Supply for a Sunny Boy PV system outfitted with SMA TS4-R-O devices.

APPLICABLE PRODUCTS
Sunny Boy 3.0 / 3.8 / 5.0 / 6.0 / 7.0 / 7.7-US-41
Type designation: SBx.x-1SP-US-41
Firmware software package version: 3.01.11.R or higher

BACKGROUND
The TS4-R-O devices have built-in rapid shutdown functionality in accordance with NEC 2017 Article 690.12. The rapid shutdown functionality is designed to be triggered when the AC power connection to the inverter is switched off. Therefore, when a grid outage occurs, the inverter signals the TS4-R-O devices to enter a rapid shutdown condition which reduces the DC voltage inside of the PV array boundary to less than 80 Volts within 30 seconds in accordance with NEC 2017 Article 690.12(B)(2)(2). 80 Vdc would normally be less than the Sunny Boy inverter's starting voltage and therefore would be insufficient to power the Secure Power Supply during a grid outage, even if there was sufficient sunlight available.

To overcome this situation, the inverter must release the TS4-R-O devices from their rapid shutdown condition. This can be achieved if the following conditions are met:

1. The inverter model is SBx.x-1SP-US-41 with a firmware package of 3.01.11.R or higher
2. The inverter operating parameter for Rapid Shutdown Mode has been correctly set to: TS4 Shutdown
3. There are two 9-Volt batteries connected in series (18-Volts in total) connected to the high voltage side of the Secure Power Supply Switch (as shown in Figs. 1 and 2)
4. The user manually activates the Secure Power Supply switch

Under these conditions, when the utility grid is disconnected, the 9-Volt batteries energize the rooftop gateway, which releases the TS4-R-O devices from their rapid shutdown condition and therefore allows the inverter to commence operation from the DC inputs, assuming there is sufficient sunlight available.
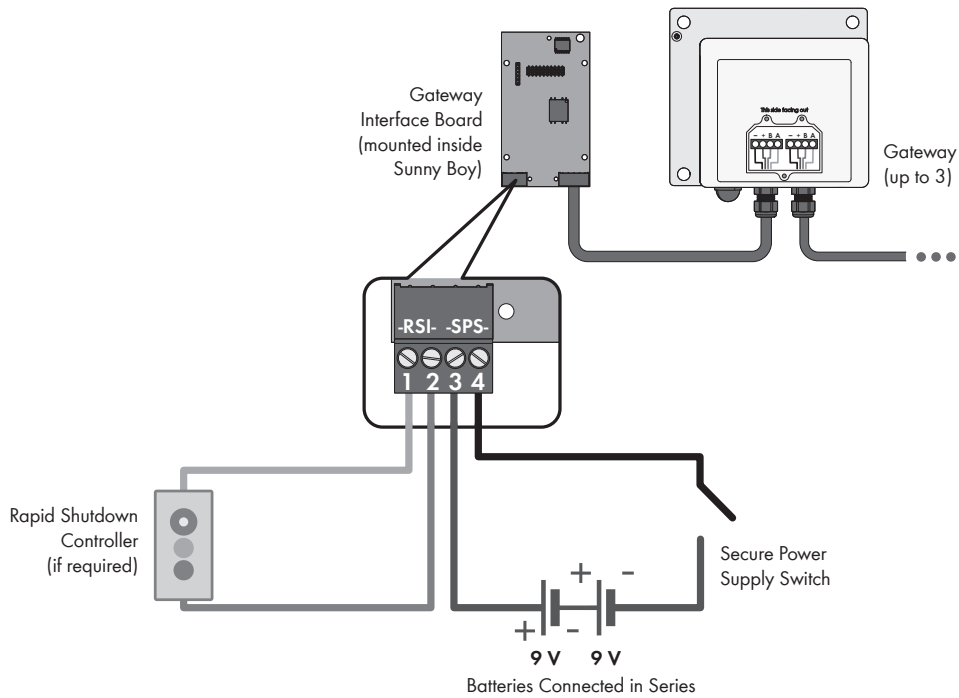
Gateway
Interface Board
(mounted inside
Sunny Boy)

Gateway
(up to 3)

-RSI- -SPS-

1 2 3 4

Rapid Shutdown
Controller
(if required)

Secure Power
Supply Switch

+   −

+

9 V   9 V

Batteries Connected in Series

FIGURE 1

A simple diagram showing the wiring method for Secure Power Supply functionality with TS4-R-O

Gateway
Interface Board
(mounted inside
Sunny Boy)

Gateway
(up to 3)

-RSI- -SPS-

1 2 3 4

Rapid Shutdown
Controller
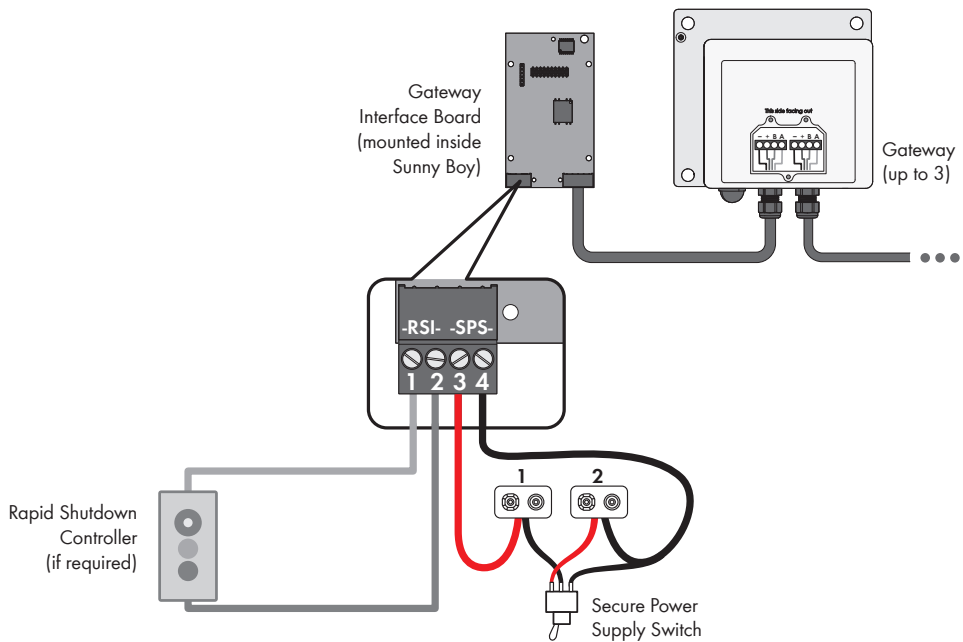(if required)

1   2

Secure Power
Supply Switch

FIGURE 2

A practical example showing a wiring method for Secure Power Supply functionality with TS4-R-O

IMPORTANT NOTES

Rapid Shutdown Compliance when using Secure Power Supply

In the event the inverter has had the Secure Power Supply functionality manually activated during a grid outage, the rapid shutdown restriction will be temporarily lifted while the Secure Power Supply is switched on. However, in the event of an emergency, a first responder may re-activate a rapid shutdown event by triggering a rapid shutdown controller (if required by local code enforcement). Triggering the rapid shutdown controller forces the TS4-R-O devices within the PV array to reduce the DC voltage inside of the PV array boundary to less than 80 Volts within 30 seconds in accordance with NEC 2017 Article 690.12(B)(2)(2).

Verifying inverter firmware version

The firmware software package version currently installed on inverters can be verified under Device Configuration in the SMA WebUI as shown in Figure 3. If the installed firmware package version is not equal to or greater than the version noted below for each inverter type, the latest available firmware should be obtained from SMA America's website and uploaded to the inverter(s).

Required firmware versions for Secure Power Supply functionality with TS4-R-O:
* Sunny Boy US-41 (SB x.x-1SP-US-41) – software package version 3.01.11.R or higher

FIGURE 3
Verifying installed inverter firmware version

ADDITIONAL ASSISTANCE

For additional assistance in completing any of the instructions described above, contact SMA Service Line at 1-877-697-6283.

SMA America, LLC
+1 916 625 0870
Service@SMA-America.com