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TECHNICAL NOTE

Sunny Boy US-41 – Secure Power Supply Operation with SunSpec Certified Rapid Shutdown Devices

This notice is applicable to the following inverter types:
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: **3.02.08.R or higher**

Summary
This notice provides instructions for planning the Secure Power Supply installation for a Sunny Boy US-41 PV system outfitted with approved SunSpec certified Rapid Shutdown Devices. A list of approved devices can be found on the SMA-America.com website.

The devices on the approved equipment list have built-in rapid shutdown functionality in accordance with NEC Article 690.12. The rapid shutdown functionality is designed to be triggered when either the DC or the AC power connection to the inverter is switched off. Typically the Rapid Shutdown Initiator per NEC Article 690.12(C) is either the Sunny Boy inverter's built-in DC disconnect or an external AC disconnect switch, depending on whether the location is readily accessible and the disconnect fulfills the requirements in NEC Article 690.12(C) and the labeling requirements in NEC Article 690.56(C).

However, whenever the Sunny Boy is installed with a Secure Power Supply in conjunction with an approved SunSpec Rapid Shutdown system, **a code-compliant DC disconnect switch must be used as the Rapid Shutdown Initiator.** This is because the inverter must be placed in a special operating mode in order to allow the Secure Power Supply to operate when a grid outage occurs, given the presence of Rapid Shutdown Devices on the Photovoltaic System DC Circuit(s). In this special operating mode, the inverter will no longer automatically trigger a Rapid Shutdown event when the AC grid supply is disrupted. Therefore, any external AC disconnect switch will no longer trigger the PV array to shutdown per NEC Article 690.12. This includes pulling the utility meter from the meter socket. Therefore, when designing the system to incorporate the Secure Power Supply feature, it is necessary to thoughtfully plan the

placement of the Sunny Boy inverter and/or the DC disconnect switch according the NEC Article 690.12(C).

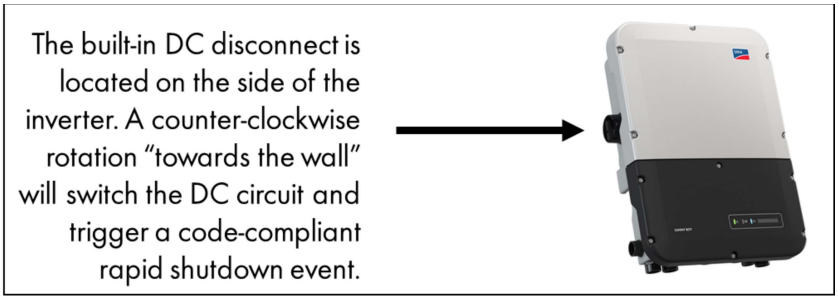

Figure 1: The location of the Sunny Boy US-41 built-in DC disconnect switch

It is also critically important to properly label the DC disconnect switch as the Rapid Shutdown Initiator according to NEC Article 690.56(C).

Figure 2: An example of the Sunny Boy US-41 inverter's built-in DC disconnect switch labeled as the Rapid Shutdown Switch per NEC Article 690.56(C).

When activating the Rapid Shutdown Mode during the Sunny Boy US-41 inverter's commissioning process, it is necessary to select whether the inverter has/will have a Secure Power Supply installed. If "Yes" is selected, as shown in Figure 3 below, then only an interruption to the DC circuit will trigger a rapid shutdown event.

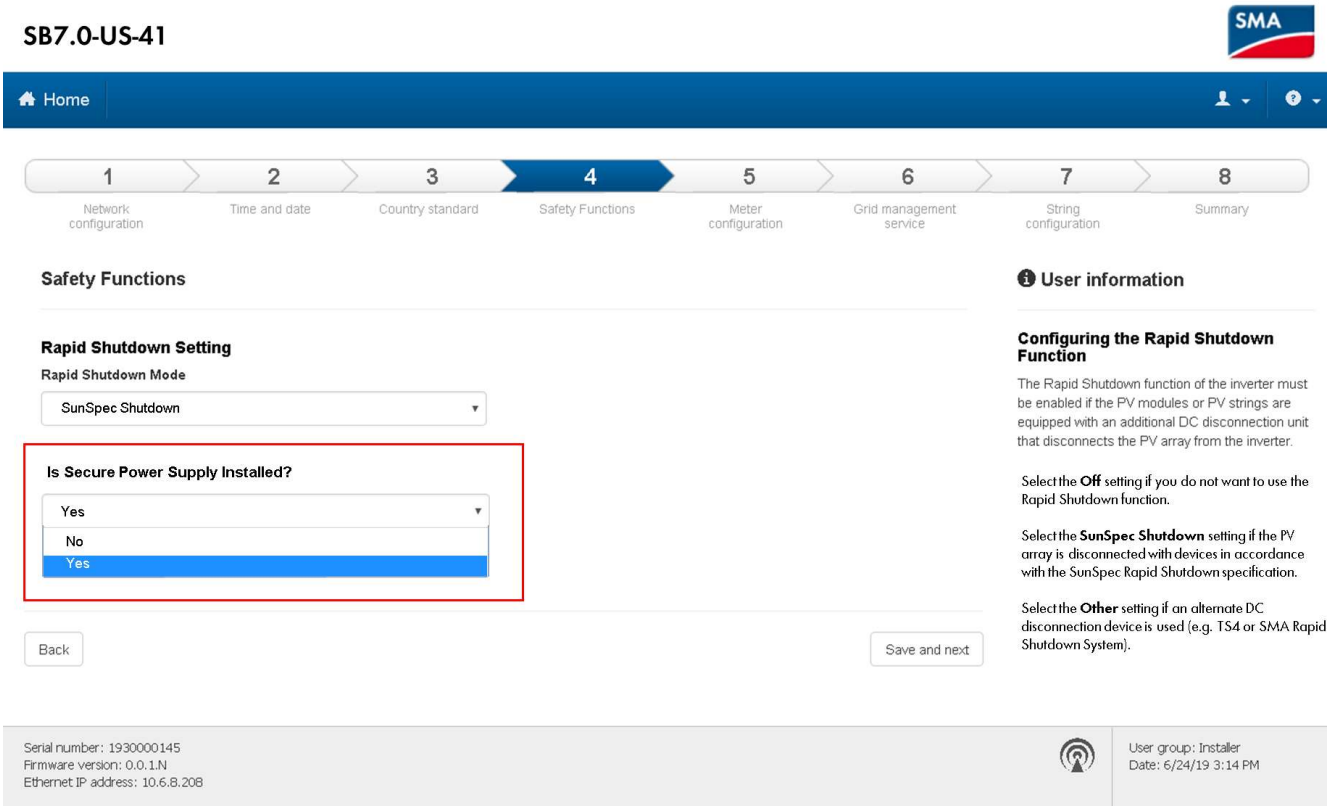

Figure 3: Configuring the Rapid Shutdown Safety Function when using SunSpec Rapid Shutdown

Secure Power Supply operation with approved SunSpec certified Rapid Shutdown Devices

When using the Secure Power Supply during a grid outage, the inverter is only able to supply power from the PV array to the Secure Power Supply outlet when the Secure Power Supply switch is activated before the sun sets and when sufficient solar resource is available. In the event that the DC disconnect switch is turned off, even briefly, the PV array will enter a rapid shutdown state and the Secure Power Supply will cease to operate. After the sun sets for the day the inverter is no longer able to generate power. The following day, if the grid outage continues to persist, the Secure Power Supply will not operate since the PV array will have automatically entered a rapid shutdown state overnight. Therefore, there will not be sufficient DC voltage available at the Sunny Boy US-41 inverter's DC inputs to engage the Secure Power Supply and allow it to supply power to emergency backup load(s). For this reason, the Sunny Boy US-41 **Secure Power Supply should not be considered a backup power solution for multi-day grid power outages when using SunSpec rapid shutdown devices.**

This restriction on multi-day Secure Powder Supply operation does not apply to systems where rapid shutdown compliance is not mandatory; for example, ground mounted PV arrays.

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 the example below. 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 approved SunSpec Certified Rapid Shutdown Devices:

- Sunny Boy US-41 (SB x.x-1SP-US-41) – software package version 03.02.08.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.