SolarEdge Sense Connect - Application note

Revision history

- Version 1.8, November 2023: Updates to compatibility table
- Version 1.6, September 2023: Added legal note
- Version 1.5, July 2023: Updated Three Phase Inverter compatability table

Contents

Overview

SolarEdge Sense Connect technology is a safety feature in S-Series Power Optimizers that provides a high level of protection for the SolarEdge PV system. This technology is supported by inverters having CPU version 4.17.xxx or later. It is designed to detect abnormal temperatures at the input and output connectors of the Power Optimizer and to proactively prevent arcing. Arcing might result from poor installation, bad wire crimping, faulty connectors, incompatible connectors, or improperly connected MC4 connectors. Fires can be caused by such faults, resulting in real danger to the photovoltaic systems and the homes and facilities on which they are installed.

About arcing

Photovoltaic systems have many connection points where faults might occur. An arc is an unintended, self-sustaining plasma discharge formed across a small gap of air. Arcs are physical phenomena that are characterized by heat generation, light emission, RF radiation, magnetic fields, and chemical reactions. Other conditions that can lead to arcing are aging, environmental damage, and mechanical damage.

Degradation of the pins within a connector might cause loose connections. Loose connections can eventually lead to an air gap forming between a pin and its mating part within a connector. If left undetected, arcing can develop and might cause connectors to deform and ignite thus causing a fire.

How Sense Connect works

During normal operation, S-Series Power Optimizers continuously sense the temperature and any temperature fluctuations at the connectors on their short input and output cables. In this way, Sense Connect protects the PV Module (DC) side of the system.

Using a combination of temperature sensors and smart prediction algorithms, Sense Connect accurately predicts the power dissipation at the connectors. Accuracy is improved by eliminating external temperature effects such as changes in ambient temperature, heating caused by PV modules, and heat dissipation within the Power Optimizer itself.

Sense Connect triggers an event when it detects abnormal temperatures in the connectors. An event can occur either during initial commissioning of a new installation, or after the system has been commissioned and is operational.

Events that occur during installation and commissioning might be caused by poor installation or faulty connectors. In this case the Installer is alerted of the event on site and is able to immediately rectify the issue. Thermal events caused by mismatched or low quality connectors, or uncertified products, might take years to occur. In this case, the system detects and identifies the event, the Installer is alerted to the event, and the systems built-in safety feature takes over to prevent any subsequent damage.

When an event triggers while using a Single Phase or Three Phase inverter, energy production automatically ceases and as a safety precaution the inverter locks. Inverters with Synergy Technology are comprised of up to three separate inverters. In this case when an event triggers, only the affected unit ceases energy production and automatically locks. The other units continue to produce energy. The process of detecting, reacting to, and notifying of, the alert is seen in Figure 1.
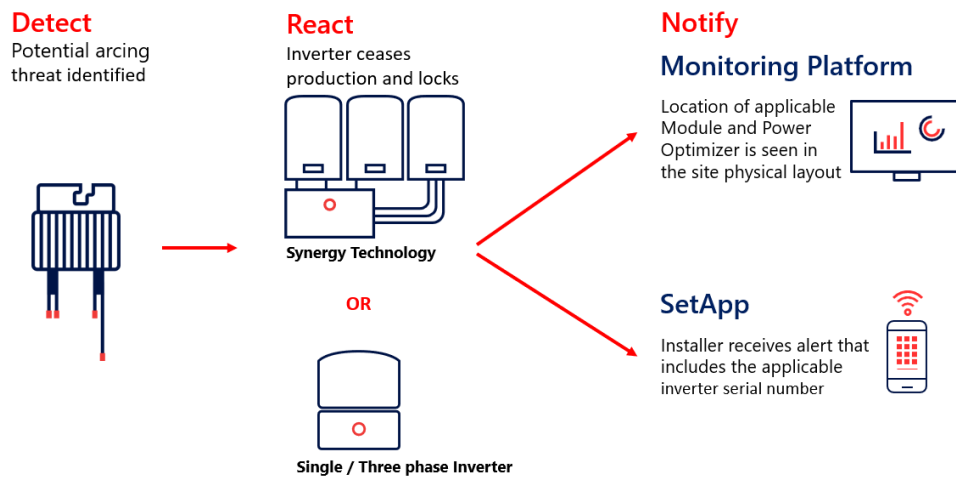

Figure 1: Sense Connect operation for Commercial and Residential inverters.

Sense Connect Alerts

When an event triggers an inverter to cease energy production and lock, it immediately sends alert notifications via the Monitoring Platform and SetApp. Commercial and residential system owners can see the alerts in the Monitoring Platform.

System owners can contact their service provider or PV module installation provider for assistance in managing alerts.

Monitoring Platform Alerts

The Monitoring Platform provides comprehensive event details which include:

- Impact level
- Alert type
- Component
- Status
- Category
- Description
- Power Optimizer serial number and physical location on the site map

Only previously mapped sites allow viewing of the physical location of the affected Power Optimizer. In addition, the Monitoring Platform provides historical information and past notifications.

The installer can open the alerts tab in the Monitoring Platform to see further details regarding the alert.

Alerts can be viewed at Account level and at Site level. Account level alerts include all alerts raised at all sites in the account. Site level accounts include all alerts raised at a specific site.

View account level Alerts

In the Monitoring Platform, click the **Alerts** tab. The alerts page displays. The default view shows open alerts sorted according to the alert's impact value.
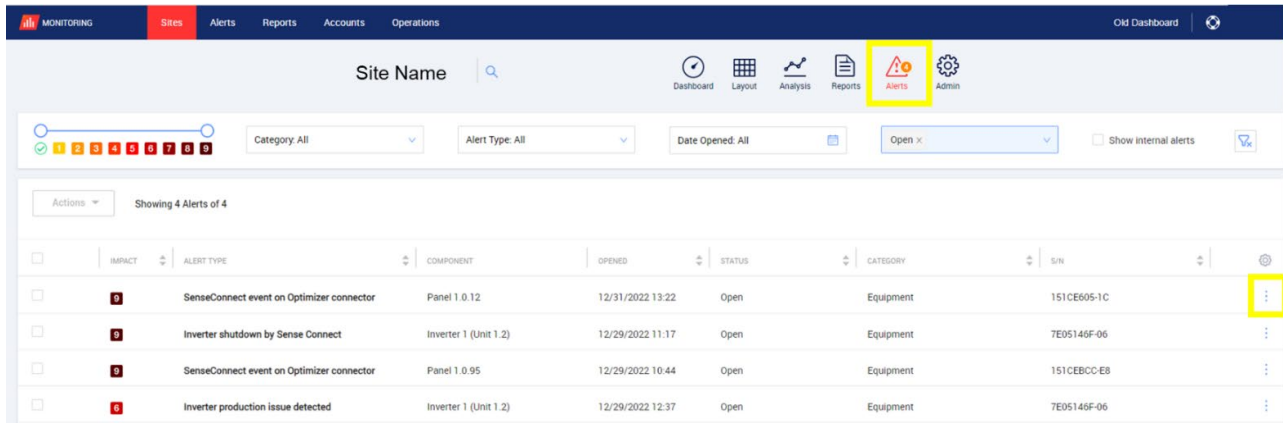
Figure 2: Sense Connect Monitoring Platform account level alerts.

View site level Alerts

To access site level information, click the three dots on the right side of the alert or click the alert name. A popup window opens showing additional information about the alert, a description of the event, and troubleshooting guidelines.
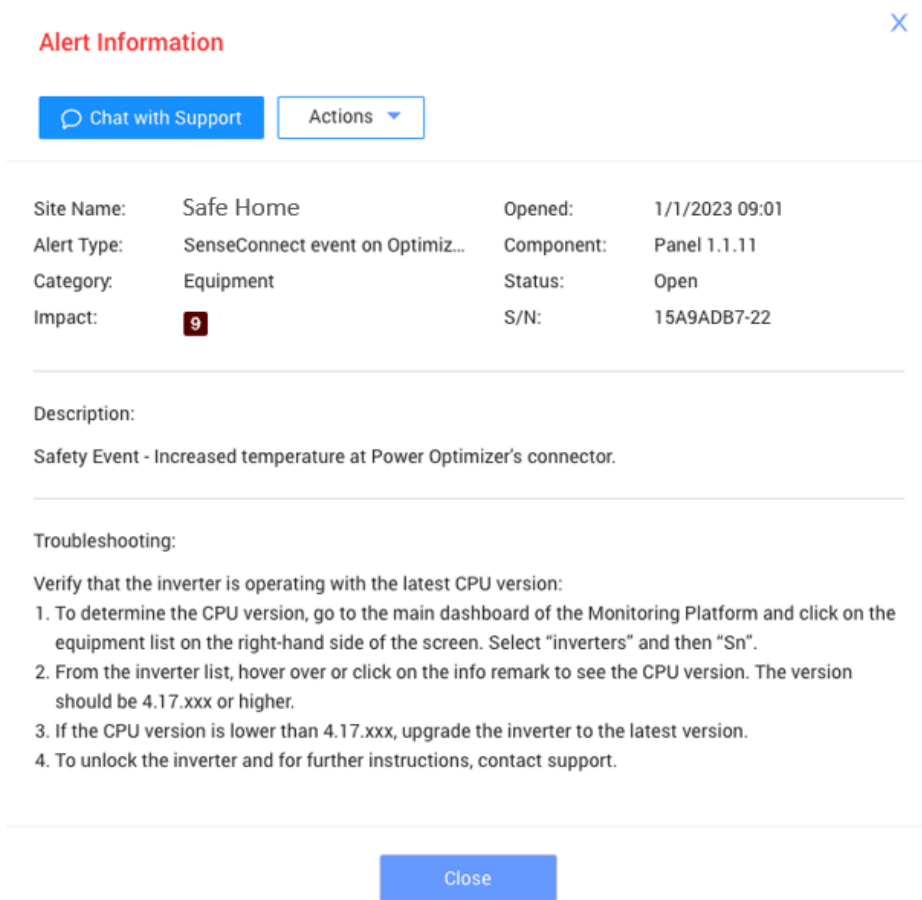

Figure 3: Sense Connect Monitoring Platform alert pop-up window.

View location information

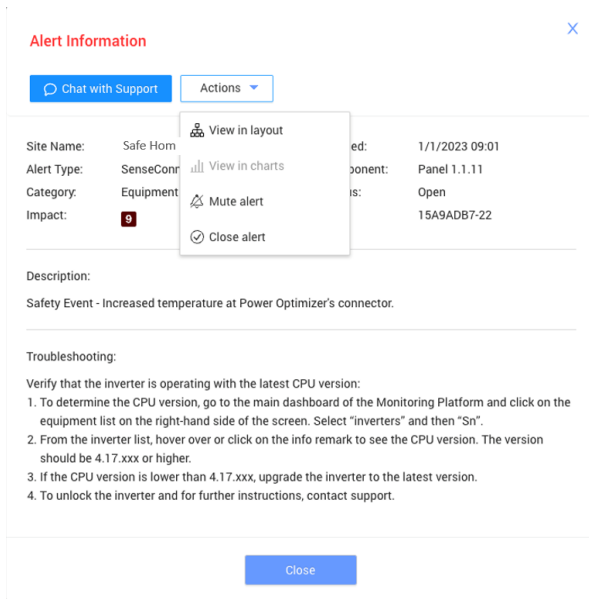To view location information, in the Site Level Alert pop-up window click **Actions > View in layout**.

Figure 4: View location information.

For a mapped site you can see the location of the inverter and the Power Optimizer that triggered the event. These are indicated by an exclamation point and an orange border. The service provider is easily directed to the affected Power Optimizer and inverter.
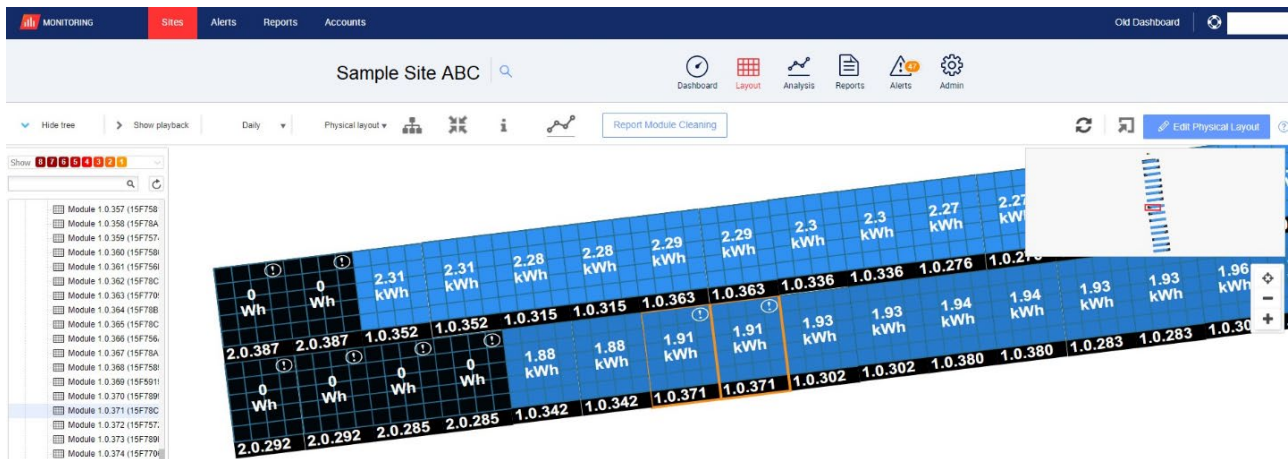
Figures 5: Affected module and Power Optimizer indicated by an exclamation point and an orange border.
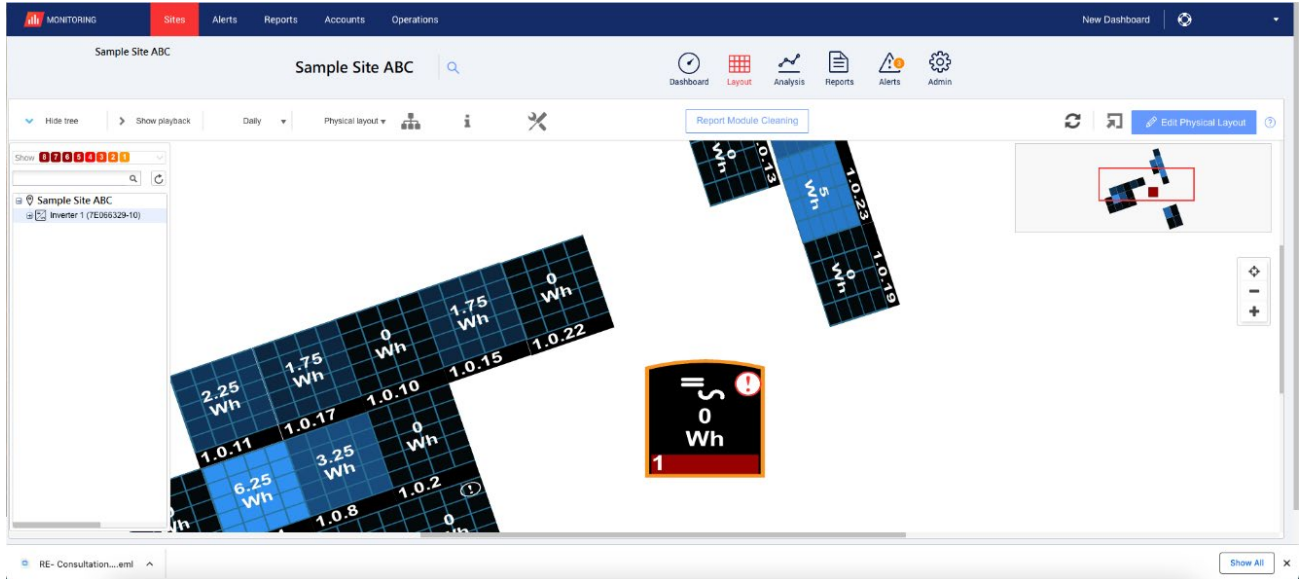
Figures 6: Affected inverter indicated by an exclamation point and an orange border.

SetApp Alerts

SetApp alerts provide information relating to the alert type and the affected inverter. Installers can see real-time production information and Sense Connect alerts while on site. When a Sense Connect event triggers, a red banner displays across the top of the screen along with an error code.
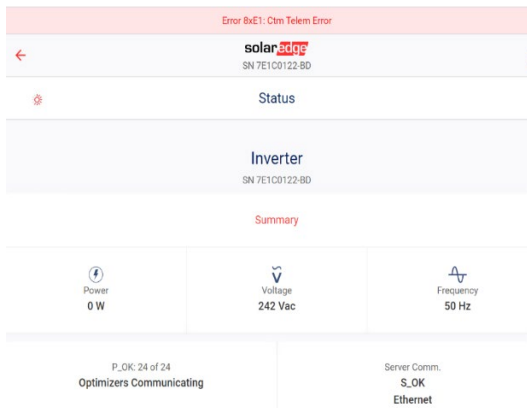

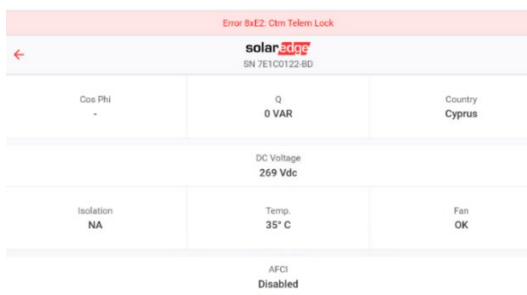**Figure 7: Example of SetApp error code 8XE1**

Figure 8: Example of SetApp error code 8XE2

The error code descriptions are shown in the table.

Error Code	Inverters	Error Title	Error Description
18x104	Single Phase	CTM Telem Error	Safety Event - Increased temperature at Power Optimizer's connector. When an error is detected 5 consecutive times, the inverter automatically locks and energy production from the affected inverter unit stops.
8xE1	Three Phase		
18x105 / 3x10E	Single Phase	CTM Telem Lock	Safety Event – Energy Production is affected due to increased temperature at the Power Optimizer connector. The affected inverter is locked.
8xE2 / 3x10E	Three Phase		

Troubleshoot Sense Connect

If the CPU version is earlier than 4.17.xxx the Sense Connect feature will not working properly.

Verify the CPU Version

1. In the main dashboard of the Monitoring Platform, in the **EQUIPMENT** field on the right-hand side of the screen, click **Inverters**.
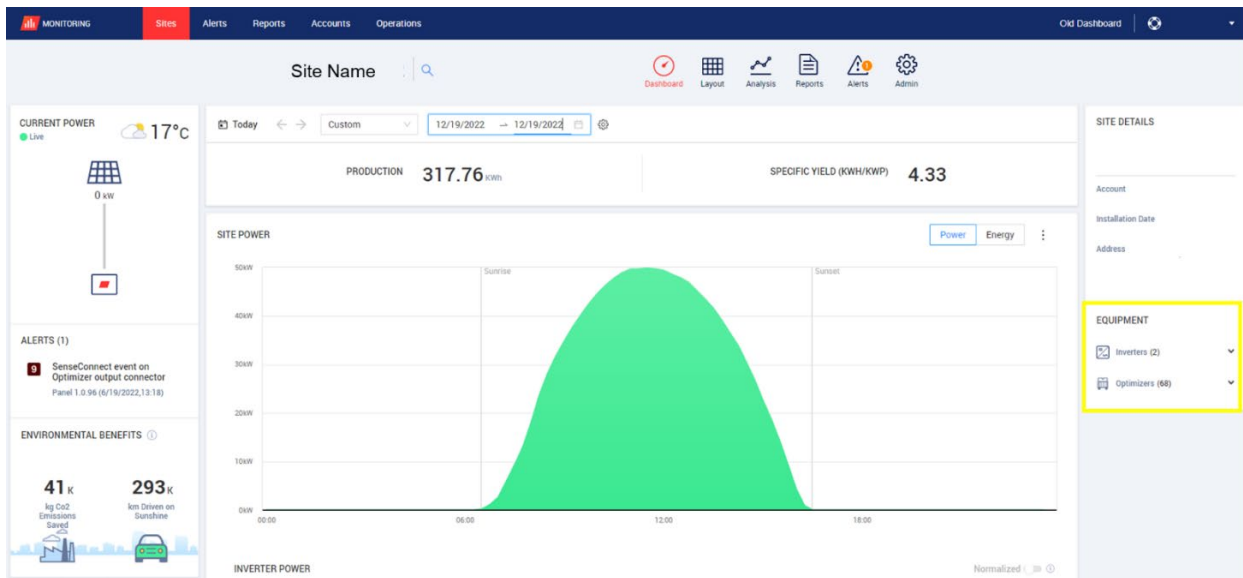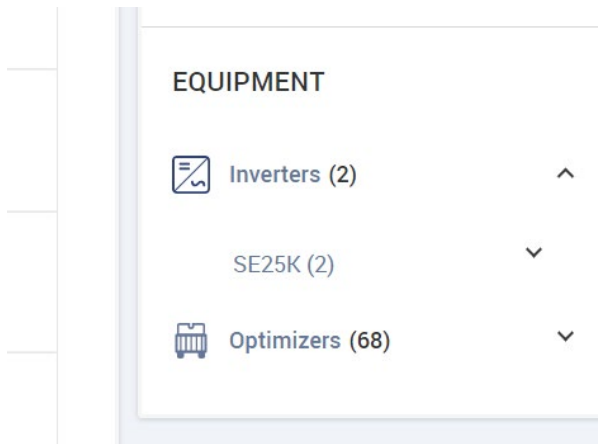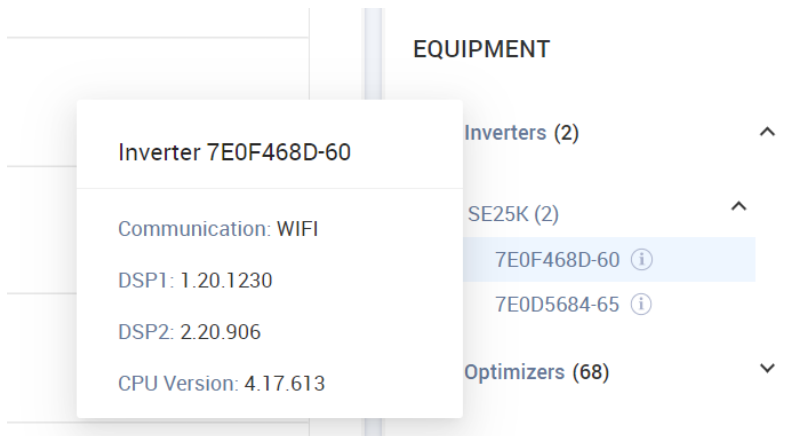

Figure 10. Monitoring Dashboard Equipment list

2. Click the applicable inverter.

3. In the list of inverters, find the relevant inverter and click the info icon ⓘ.

The CPU version must be 4.17.xxx or later.

If the CPU version is earlier than 4.17.xxx, upgrade the inverter to the latest version.

To unlock the inverter and for further details, contact SolarEdge support.

Appendix A – Identify Power Optimizers

An event can be triggered either from the input (module side) or the output (string side) of the Power Optimizer. Each Power Optimizer is comprised of 4 cables. There are two short input cables on the module side and one short and one long output cable on the string side (Figure 9a). In some models, there are two long input cables on the module side and one short and one long output cable on the string side (Figure 9b).

Figure 9a. Power Optimizer with two short input cables on the module side, one short and one long output cable on the string side

Figure 9b. Power Optimizer with two long input cables on the module side, one short and one long output cable on the string side

NOTE

Power Optimizers with long input cables (> 0.1m) only support the Sense Connect feature in the short output (string) cables. You can identify S-Series Power Optimizers with long input cables by the character in the fourth position in the suffix of the Part Number:

- Power Optimizer with short input: Sxxxx - xxx4xxx
- Power Optimizer with long input: Sxxxx - xxxL/X/Y/Zxxx

NOTE

To ensure optimal functionality of Sense Connect, use identical connectors between the Power Optimizer and the PV module.

Appendix B - SolarEdge Sense Connect compatibility tables

For Sense Connect to function as designed, the inverter and the Power Optimizer must be compatible. The tables below define which inverters and Power Optimizer models are supported by Sense Connect.

Power Optimizers

Sense Connect is included in all S-Series residential and commercial Power Optimizers.

In installations where both P-series and S-series Power Optimizers are connected to the same inverter unit, the Sense Connect feature is enabled only in the S-series Power Optimizer connectors.

Single-phase inverters

⚠ **CAUTION!**
In a SolarEdge installation with incompatible system components, the Sense Connect feature is disabled for the entire system.
Sense Connect is only active on inverters with CPU version 4.17.xxx or above. Using an earlier firmware version might cause false alarms or features to be turned off.

Product Name	Inverter Part Number (PN)[1]	Region	Residential S-series Power Optimizers	Commercial S-series Power Optimizers
StorEdge Inverter	SE3000A-SE11400A	Worldwide	No	N/A
SolarEdge Home Wave Inverter - Single Phase	SE2000H-SE11400H	Worldwide	Yes	N/A
SolarEdge Home Hub Inverter – Single Phase	SE3000H – SE11400	Worldwide	Yes	N/A
SolarEdge Home Genesis Inverter	SE3000H-AUL00 - SE10000H-AUL00	Australia	Yes	N/A
Single Phase Inverter with HD-Wave Technology (JET certified)	SE5500H-JPxxxxxxx	Japan	Yes	Yes

Three Phase Inverters

⚠ **CAUTION!**
In a SolarEdge installation with incompatible system components, the Sense Connect feature is disabled for the entire system. Sense Connect is only active on inverters with CPU version 4.17.xxx or above. Using an earlier firmware version might cause false alarms or features to be turned off.

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[1] "x" in Inverter Part Number represents a single Letter (A-Z) or Number (0-9).

Product Name	Inverter Part Number (PN)[2]	Region	Residential S-series Power Optimizers	Commercial S-series Power Optimizers
SolarEdge Home Wave Inverter – Three Phase	SE12.5K, SE15K	EU, ROW	Yes[3]	N/A
SolarEdge Home Wave Inverter – Three Phase[4]	SE3K - SE10K	EU, ROW	Yes	N/A
Three Phase Residential Inverter	SExK-AUBxxxxxx	Australia	Yes	N/A
SolarEdge Home Short String Inverter – Three Phase	SExK-RWBTExxxx	EU	Yes	N/A
StorEdge Three Phase Inverter[5]	SExK-RWS48xxxx	ROW	Yes	N/A
SolarEdge Home Hub Inverter – Three Phase	SExK-RWB48xxxx	ROW	Yes	N/A
Three Phase Inverter	SE12.5K, SE15K, SE16K, SE17K SE9K-US, SE20K-US	Worldwide	Yes[3]	Yes[3]
	SExxK –xxxxIxxxx (The fifth letter in the suffix of the PN is "I")	Worldwide	Yes	Yes
	Other PN formats	Worldwide	No	No
Three Phase Inverter with Synergy Technology	SExxK –xxxxIxxxx (The fifth letter in the suffix of the PN is "I")	Worldwide	Yes	Yes
	Other PN formats	Worldwide	No	No

💬 **IMPORTANT NOTE:**
Using a configuration in contradiction to the compatibility table(s) above may result in the exclusion of warranty.

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[2] "x" in Inverter Part Number represents a single Letter (A-Z) or Number (0-9).

[3] Sense Connect technology is supported by inverters with CPU version 4.19.xxx or later.

[4] Only supported by Sense Connect in inverters that were produced after WW42/2020. The information is shown on the label of the inverter S/N: SJWWYY-xxxxxxxxx-xx.

[5] Only supported by Sense Connect in inverters that were produced after WW26/2022. The information is shown on the label of the inverter S/N: SJWWYY-xxxxxxxxx-xx.