# Application Note - Inverter Arc Detection and Interruption (Three Phase Inverters in EU & APAC)

#### Introduction

The SolarEdge system incorporates many safety mechanisms, ensuring safety for installers, maintenance works and firefighters.

In addition to the built in safety features of the SolarEdge system, the SolarEdge inverters are now certified to UL1699B, for arc fault detection and interruption compliance.

The arc detection option is disabled by default in the SolarEdge inverters. It must be enabled when UL1699B compliance is required. When enabled, the inverter detects arcs as specified in UL1699B and interrupts production. The inverter also performs an automatic self-test for the arc fault detector each time the inverter wakes-up or is switched ON.

This document describes the arc-fault circuit interrupter (AFCI) feature and its use in the SolarEdge inverters.

### **Using the Arc Detection Option**

Enabling the arc detection feature requires a specially created script that upgrades the inverter firmware version and activates the AFCI parameter in the inverter. To obtain the script, contact the SolarEdge Support team and follow this procedure:

#### To upgrade the inverter software:

- Copy the script to an SD card or micro-SD card, depending on the card slot on your inverter communication board, labeled
  ↓ \_\_\_\_ CARD ↓ \_\_\_\_
- 2 Verity that the AC breaker connected to the inverter is OFF.
- **3** Open the inverter cover's six Allen screws and carefully pull the cover horizontally before lowering it, as described in its manual.
- 4 Insert the card into the card slot on the communication board.
- 5 Close the inverter cover and turn the AC on. The upgrade starts automatically.
- 6 Wait for the message "Done" to be displayed on the LCD.
- **7** Remove the card from the inverter.

#### To manually test the arc detection functionality:

- 1 Make sure the inverter ON/OFF switch is turned ON.
- 2 Use the LCD light button to select Maintenance → Manual AFCI Test.
- If the test is successful, the following message is displayed:

Manual Test PASS

The inverter production is then interrupted (as if a real arc detection has occurred), and the following error message is displayed (numbered either 150 or 151):

Error 151 Arc Fault Detected

- Perform manual restart to resume system operation: Turn the inverter ON/OFF switch to OFF and then to ON. The inverter performs an arc detection self-test and starts normal operation.
- If the test fails, contact SolarEdge support.

#### To troubleshoot arc-fault failures:

The inverter continuously performs arc detection while producing power. If an electric arc occurred in the PV system, the inverter detects it and stops producing power. The following error message is displayed (numbered either 150 or 151):

Error 151 Arc Fault Detected

If this message is displayed:

1 Turn the inverter ON/OFF switch to OFF.

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- 2 Check all PV strings for the correct open-circuit voltage:
  - Inspect all connections and cables between the power optimizers in the strings: Verify they are connected properly by firmly pushing the plugs and verifying the connectors are locked.
  - Inspect all connections and cables between the PV modules and the power optimizers: Verify they are connected properly by firmly pushing the plugs and verifying the connectors are locked.
  - Verify that the strings are firmly attached to the Safety Switch terminal blocks.
- **3** Perform manual restart to resume system operation: Turn the inverter ON/OFF switch to OFF and then ON. The inverter performs an arc detection self-test and starts normal operation.

## To troubleshoot self-test failures:

If the self-test fails, the inverter displays an error message indicating that the arc detector hardware failed during wake-up tests:

```
Error 152
AFCI
self-test failed
```

The inverter transmits an error message to the monitoring portal, and continuously repeats the arc detection self-test until it is successful.

If the problem persists, contact SolarEdge support.

## To enable/disable arc detection:

- **1** Use the LCD light button to enter Setup mode (refer to Configuring the Inverter Using the External LCD Light Button in the *SolarEdge installation guide*).
- 2 Short-press the LCD light button to reach the Maintenance menu.
- **3** Select AFCI  $\rightarrow$  Enable or Disable.