

Application Note

SolarEdge SafeDC™

Many PV systems require an external DC disconnect to enable DC current disconnection when AC current is switched off. The SolarEdge inverter-integrated SafeDC™ technology enables disconnection of the inverter from the solar modules and the reduction of string DC voltage to a safe level, ensuring safe installation, maintenance and firefighting. This mechanism, which increases the safety of the system compared to a system with a DC switch, has been approved and certified to meet the relevant IEC and VDE standards as a DC disconnect mechanism, eliminating the need for a separate disconnect device. This application note summarizes the functionality and method of operation of the mechanism.

SafeDC™ Functionality

A solar inverter is connected both to the electric grid which is AC voltage based, and to the PV system which uses DC voltage. When the AC side is disconnected for installation and maintenance purposes, or when there is a grid shutdown, there is still DC voltage and in some cases DC current. When DC current is present there is the danger of an electric arc – the continuous flow of current through the air. Therefore the DC current must be terminated as well. A DC disconnect device that performs this termination is required by international and national standards (IEC 60364-7-712, DIN VDE 0100-712, IEC 60947-3, DIN EN 60947-3/VDE 0660-107).

The SolarEdge SafeDC™ technology is such a device. It enables the galvanic disconnection of the inverter from the solar modules whenever AC current is switched off, thus promoting system safety at all times. This eliminates the need for a third-party DC disconnection device. An external device has several drawbacks: it increases system cost as an additional device and the wiring it requires must be purchased, installation time is lengthened due to the necessity of installing a separate device and system losses are greater therefore reducing efficiency.

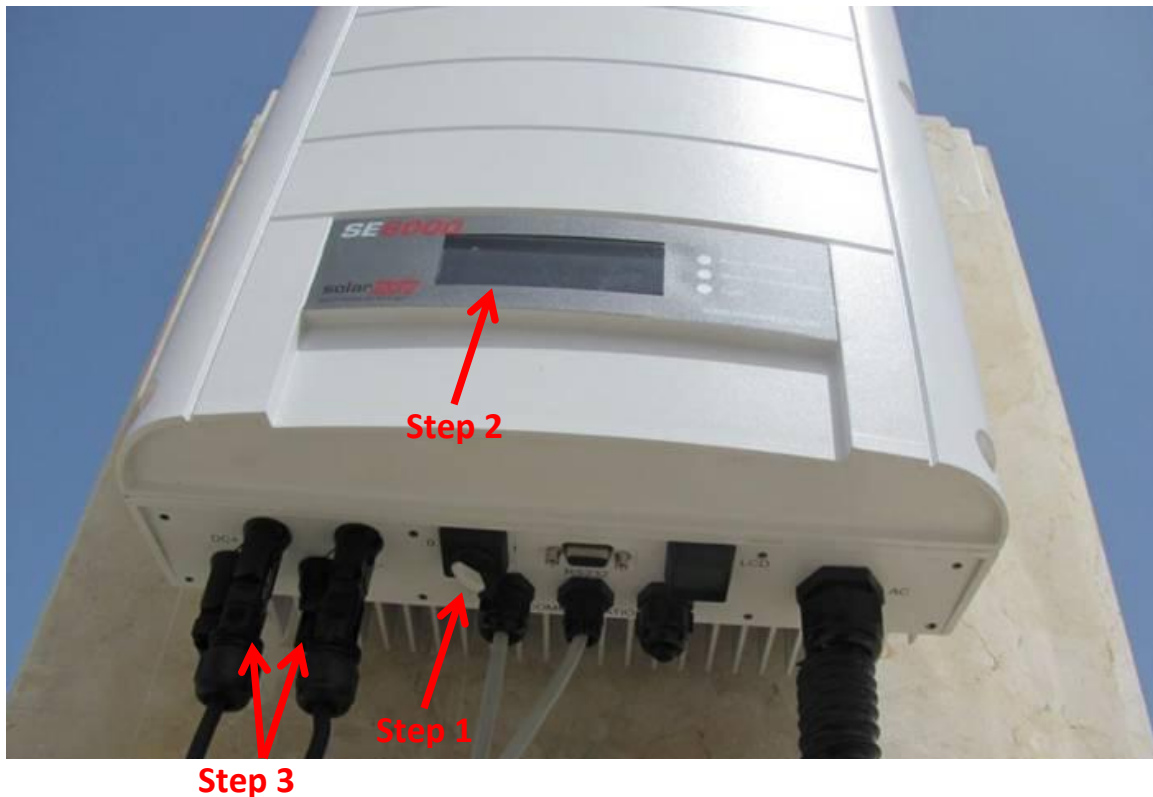
The SolarEdge SafeDC™ mechanism is integrated into the inverter, eliminating the need for extra wiring and installation and incurring no system losses. The procedure cuts the DC off at the source, protecting against arcing even before galvanic isolation is achieved, allowing the disconnection of any connector in the field. This is safer than a regular switch which only stops current to the inverter, allowing currents to flow in other parts of the system.

The SolarEdge SafeDC™ increases the safety of the system compared to a DC switch, and has been approved by the German Bureau Veritas to meet the relevant IEC and VDE standards as a DC disconnect mechanism, eliminating the need for a separate disconnect device.

SafeDC™ - Operation

Three simple steps are needed to operate the **SafeDC™** mechanism:

1. Flip the switch at the bottom of the inverter. As a result the inverter stops feeding in power and disconnects from the main, the power optimizers immediately stop producing power and the capacitors begin to discharge.
2. Wait for the voltage to reach a safe level of less than 120Vdc. The DC voltage can be read on the LCD display. In case of a grid shutdown the display won't work. Wait 3 minutes before performing the next step.
3. Disconnect the PV input ports. This results in galvanic separation between the PV array and the inverter. Each power optimizer outputs a safe voltage of 1V, thus the output voltage of the array is below hazardous values. The danger of arcs has now been eliminated, ensuring the installation is safe.



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Certificate of compliance

Applicant: SolarEdge Technologies Ltd.
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Product: Disconnection device for PV generators

Model: Safe DC disconnect mechanism

Use in accordance with regulations:

Disconnection between a solar inverter and a photovoltaic generator

Applied rules and standards :

In dependence on

IEC 60947-3:1999 + Corrigendum:1999 + A1:2001 + Corrigendum 1:2001 + A2:2005

DIN EN 60947-3; VDE 0660-107:2006-03

"Low-voltage switchgear and controlgear - Part 3: Switches, disconnectors, switch-disconnectors and fuse-combination units"

and

IEC 60364-7-712:2002-05

DIN VDE 0100-712:2006-06

"Electrical Installations of Buildings - Part 7-712: Requirements for Special Installations or Locations - Solar Photovoltaic (PV) Power Supply Systems"

The safety concept of an aforementioned representative product corresponds at the time of issue of this certificate of valid safety specifications for the specified use in accordance with regulations.

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Achim Hänchen
CERTIFICATION