Grounding SolarEdge Power Optimizers – Application Note North America

Version History

- v1.5: Added grounding star washer is only for P-series
- v1.4 Added S-series
- v1.3 Added part numbers for purchasing the grounding start washer in bulk. PN: OPT-Washer-100 and OPT-Washer-500

Introduction

PV Systems with module-level electronics (DC-DC power optimizers or micro-inverters) introduce another PV system component which must be grounded to meet NEC[1] requirements. This paper outlines the differing requirements and provides guidelines on how to properly ground SolarEdge power optimizers.

There are two types of grounding connections used in PV systems:

- **Equipment grounding** – Equipment grounding is required for all electrical devices with exposed metal surfaces, as outlined in 690.43-690.46 and, by reference, Table 250.122. Methods for equipment grounding of SolarEdge power optimizers are detailed in the examples below.
- **Grounding Electrode Conductor / System Bonding Jumper** – not required in SolarEdge systems.
  - SolarEdge inverters are listed as non-isolated transformer-less inverters with integrated ground fault detection and electronic ground reference. This constitutes a "Functional Grounded PV System" as defined in NEC 2017 article 641. NEC 2014 Article 690.35 also permits this and uses the term "ungrounded" PV array. SolarEdge systems are not considered solidly grounded and will not function if one of the array conductors are grounded.
  - When properly installed, SolarEdge systems meet the requirements of NEC and no Grounding Electrode Conductor/System Bonding Jumper is required.

Equipment Grounding of SolarEdge Power Optimizers

Use the following power optimizer grounding methods depending on the mounting structures used for the PV system installation.

For full details refer to the *SolarEdge Installation Guide*.

1. For power optimizers mounted on a grounded metal structure, use the 5/16'' stainless steel grounding star washer (provided with the P-series only). Place it between the railing and the flat side of the optimizer mounting bracket. Apply torque of 9.5 Nm / 7 ft lb. The star washer is used for attachment of the power optimizer to galvanized steel, stainless steel and anodized aluminum structures. It penetrates the galvanized or anodized coating of the structure to ensure a low-resistance connection. The star washer is approved as a listed grounding means in accordance with the requirements of NEC Article 690.43(C). The grounding star washer may be purchased in bulk from SolarEdge (part number OPT-Washer-100 and OPT-Washer-500).

Figure 1: Star washer

2. If the star washer cannot be used, such as when mounting on some grounded rails with sliding nut fasteners, use the SolarEdge grounding plate between the railing and the flat side of the optimizer mounting bracket. The plate penetrates the galvanized or

[1] All Code references are to NFPA 70, NEC 2014 Edition.

anodized coating of the structure to ensure a low-resistance connection and compliance with the ground impedance requirements. Depending on applicable regulation requirements, grounding plates of the following two types can be purchased in bulk from SolarEdge:

- Compliant with UL1741 certification for SolarEdge power optimizers. Part number SE-GNDPLATE-100).

  When installing, apply a torque of 9.5 Nm / 7 ft lb.

Figure 2: Grounding plate SE-GNDPLATE-100

- Compliant with UL2703 certification for SolarEdge power optimizers. Part number: MCM-MC-03533-A

  Make sure to observe the following conditions of use:

  - Fuse Rating: 30A
  - For use with anodized coating up to 28 microns
  - For use with material thickness greater than 1.3mm
  - Component to be secured with 300 series stainless steel M6 or 1/4" hardware, consist of 1 nut, 2 flat washers, 1 spring washer, and 1 bolt
  - Torque: 10N-m.

Figure 3: Groundng plate, PN: MCM-MC-03533-A

3. For power optimizers mounted on un-grounded (non-metallic) structures, or in case the star washer or the grounding plate cannot be used: Use the SolarEdge grounding lug with an equipment-grounding conductor. After connecting the lug to the power optimizer, connect the equipment-grounding conductor to the grounding terminal. Tighten the screws connecting the power optimizer to the rack and the grounding terminal screw with a torque of 9.5 Nm / 7 ft lb. The grounding terminal will accept a wire size of 6-14 AWG and must be sized for equipment in accordance with NEC Table 250.122.

   The grounding lugs may be purchased in bulk from SolarEdge (part number SE-GNDLUG-100). The lug kit includes four stainless steel parts to prevent corrosion of the copper grounding conductor and of the aluminum housing of the power optimizer.

Figure 4: Grounding lug