

Grounding SolarEdge Power Optimizers – Application Note

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 NEC¹ requirements. This paper outlines the differing requirements, provides guidelines on how to properly ground SolarEdge power optimizers and supplies a list of racking models and their appropriate grounding method.

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.
 - In a system utilizing a grounded array the Grounding Electrode Conductor is required by NEC 690.47-690.48 and 250.168. This conductor provides the bonding between the grounding system and one of the PV circuit conductors (PV negative or PV positive), and is required to be contiguous or irreversibly spliced. SolarEdge systems utilize ungrounded PV arrays as permitted under Article 690.35.
 - When properly installed SolarEdge systems meet the requirements of 690.35, and therefore 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 power optimizer) 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).



Figure 1: Star washer

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

- 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. Apply torque of 9.5 Nm / 7 ft lb. The plate penetrates the galvanized or anodized coating of the structure to ensure a low-resistance connection and compliance with the ground impedance requirements per the UL1741 certification for SolarEdge power optimizers. The grounding plate may be purchased in bulk from SolarEdge (part number SE-GNDPLATE-100).



Figure 2: Grounding plate

- 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 3: Grounding lug

Racking Models and Corresponding Grounding Method of SolarEdge Power Optimizers

Manufacturer	Model	Fastener	Grounding Method
A.E.T (Applied Energy Technologies)	Rayport P (for pitched roofs)	Accessory Hardware Kit 80677	Supplied SST Star Washer
	Rayport B (ballasted)	Accessory Hardware Kit 80672	Supplied SST Star Washer
	Rayport T6 (ground-mount)	Accessory Hardware Kit 80235	Supplied SST Star Washer
	Rayport G-Eco (ground-mount)	Accessory hardware kit 81068	Supplied SST Star Washer
Conergy	Suntop IV	Quickstone slide nut with M8 socket head cap screw	Grounding lug and conductor
Creotecc	Creomount (flush-mount)		Grounding lug and conductor

Manufacturer	Model	Fastener	Grounding Method
	Base Rail	Drilled and tapped with ¼" inch hardware	Supplied SST Star Washer
DPW Solar (Direct Power and Water)	Power Rail	0.25 inch hex head bolt, washer, nut, for top rail mount	Supplied SST Star Washer
Ecolibrium Solar	Ecofoot 2 for flat roofs	Rocker Bracket, Nut, Serrated Flange Hex, 5/16", Bolt, Serrated Flange Hex, 5/16"	Supplied SST Star Washer
	EcoX mounting clamp	Bolt, Serrated Flange (part of the EcoX clamp)	
Haticon	Haticon Rail		SolarEdge grounding plate
IronRidge	Light Rail XRL	0.25 inch hex head bolt, washer, nut, for top rail mount (#29-5003-005)	Supplied SST Star Washer
	Standard Rail XRS	0.25 inch hex head bolt, washer, nut, for top rail mount	Supplied SST Star Washer
Krannich Solar	K2 Systems	Slide nut with M8 socket head cap screw	SolarEdge grounding plate
Mage	Systemtec	T-bolt and hardware	Supplied SST Star Washer
Mounting Systems Inc	Alpha+	Slide nut with M8 socket head cap screw	SolarEdge grounding plate
mounts4solar	Rail 6.0	M8 SS hammer head bolt	Supplied SST Star Washer
NCP Solar	Flush Mount Racking System Ballasted Roof Racking System	Slide nut with 5/16" socket head cap screw	Grounding lug and conductor
ProSolar	Rooftrac	Channel nut with 5/16" hardware	Supplied SST Star Washer
	Groundtrac Rail	Channel nut with 5/16" hardware	Supplied SST Star Washer
Renusol	Renusol VS	T-bolt and hardware	Supplied SST Star Washer
Schuco	SolarEZ	ezUniversal Screws (M8x14) ezAnchor Blocks	Supplied SST Star Washer
SnapNRack	Series 100/100 UL & Series 200/200 UL	(242-92090) Microinverter/Optimizer Attachment Kit	SolarEdge grounding plate
	Standard Rail	(242-92090) Microinverter/Optimizer Attachment Kit	Grounding lug and conductor
Sollega	InstaRack	Top spring nut with 5/16" hex head bolt	Supplied SST Star Washer

Manufacturer	Model	Fastener	Grounding Method
Sunlink	Core-RMS 490-000000	5/16" hardware; 09-00010-01 screw, 09-00002-01 nut, 09-00154-01 washer	Supplied SST Star Washer
	Precision-RMS 690-000010	5/16" hardware; 09-00010-01 screw, 09-00002-01 nut, 09-00154-01 washer	Supplied SST Star Washer
	Sunlink-RMS	Drilled and tapped with 5/16" inch hardware	Supplied SST Star Washer
Unirac	SunFrame	Drilled and tapped with 1/4" inch hardware	Supplied SST Star Washer
	Solarmount Light	1/4" hex head bolt, washer, nut, for top rail mount	Supplied SST Star Washer
	Solarmount Standard	1/4" hex head bolt, washer, nut, for top rail mount	Supplied SST Star Washer
	Solarmount HD	1/4" hex head bolt, washer, nut, for top rail mount	Supplied SST Star Washer
	SolarMount-I	1/4" hex head bolt, washer, nut, for top rail mount	Supplied SST Star Washer
	SolarMount-E (Evolution)	Drilled and tapped with 5/16" inch hardware	Supplied SST Star Washer