

# PV Grounding Remediation Case Study



DEHN is a family-owned company and innovation leader in surge, lightning protection and safety equipment with 113 years of experience, innovation and market success. DEHN operates on a global scale and has earned the trust of our customers in more than 70 countries. Our customers perceive us as a reliable manufacturer, developer of new products and concepts for lightning and surge protection and as a reliable market partner.

## Solution Provider

Over decades, we've gathered unparalleled knowledge about lightning event physics and have developed best in class protection concepts that are built with our own high quality products.

## Unique Portfolio

DEHN has provided a strong technology portfolio since 1910 by owning more than 1,100 patents and offering more than 4,000 products. These are solutions for surge protection, lightning protection/earthing, safety equipment, as well as service and support which are customized for applications in buildings, the energy sector and infrastructure.

## DEHN protects

We are a reliable partner with strong knowledge and experience base in many industrial sectors. We have strong presence in international standardization committees all over the world where we contribute substantially with our experience which is also backed by one of the strongest lightning generator in the world and by advanced simulation tools that help us find cost optimized protection concepts for our customers.

## DEHN - facts & figures



**global mindset**

regional roots

**> 70** countries with DEHN presence  
**19** sales subsidiaries



**family-run**

by the fourth generation

**113** years of experience, innovation and brand success



**~ 460** million € turnover  
(FY 22/23)



**~ 2,400** employees worldwide

**125** apprentices in Germany

# Company Case Study

## Grounding Remediation Case Study

Grounding remediation decreased Inverter shut-downs and tracker motor damages caused by the lightning events by up to 90 %.

### Objectives

Grounding of PV plants in north America is designed and implemented for 60 Hz short circuit conditions on the low voltage AC side and for the DC short circuit conditions on the PV string side. Even though lightning events are very frequent throughout the United States, grounding designs do not account for high frequency currents caused by lightning strikes. This causes highly elevated potential rises around the point of strike causing portions of lightning currents to flow through the PV plant equipment. One of the largest PV developers in the U.S. came to DEHN asking for a solution to the constant issues after lightning storms.



### Solution

Central inverters on a 75 MW PV plant have been shutting down and tracker motors were damaged after lightning storms in the area. Inverters shut down due to incorrectly identified isolation fault detection caused by partial lightning currents injected through the inverters. Initial investigations led to very time consuming isolation fault inspections. Over time, it was clear that the issues were due to lightning strikes. This was costly due to inverter down-times as inverters had to be manually restarted following storms. A similar reason was the cause of the failure of tracker engines. DEHN Inc., sent our experts to the PV plant. After inspection and analysis, we identified the main cause for inverter shut-downs and damag-

es on tracker systems were inadequate grounding for HF lightning currents. Using computer modeling simulations, we were able to simulate these high frequency lightning currents and point out where there was insufficient grounding. Due to this, the lightning currents often saw high impedance to ground and these currents were injected into DC combiner boxes, tracking motors and encoders. Our simulations showed that by adding additional grounding bonding and surge protection measures, the customer would reduce inverter shut-downs, blown fuses and relay tripping by up to 90%.

# Company Case Study



### Benefits

- **Inverter shut-downs decreased by up to 90%**  
In the first stage, we implemented grounding remediation which included additional grounding paths and bonding where needed. After implementation and many lightning storms, the inverter tripping was proven to have decreased by 90%.
- **Tracker Control Units (Encoders) stopped**  
Encoder failures were greatly reduced with the grounding remediation and additional surge protection measures.
- **Tracker motors stopped failing.**  
After grounding remediation, lightning currents no longer created dangerous voltages over the torque tubes and pylons. Therefore lightning currents were prevented from being injected into the motor housing internal copper windings.
- **Dissipation of high-frequency lightning currents**  
Better dissipation of high frequency currents into the ground also aids string combiner boxes since their built.

### Problems Identified

- inverter downtimes after every storm
- costly downtime due to inverters offline
- tracker systems down for months; costly fixes due to new motors and installation

### Benefits

- PV plant up-time increased substantially
- high costs for installation of new tracker motor and control units decreased by 90%
- ROI estimation for grounding remediation is 1 to 2 years

Surge Protection  
Lightning Protection  
Safety Equipment  
DEHN protects.

DEHN Inc.  
805 S. Kings Highway  
Fort Pierce, FL 34945  
US

Phone: 877-927-6510  
contact@dehn-usa.com  
<https://www.dehn-usa.com/en-us>

