

## PRESS RELEASE

# Safe and Reliable PV DC Connections in Single-Axis Tracker Applications

Single-axis tracker systems, frequently used in large solar installations, can cause increased mechanical stress on unsecured wiring and connectors within the DC system due to their regular daily movement. To prevent premature failure of PV DC connections when integrated within tracking systems, several key recommendations must be considered during the installation of the wire management strategy. With its extensive experience, Stäubli is committed to ensuring safety in the installation and operation of PV systems and provides not only training but also other support services to ensure reliable operation.

Single-axis solar tracker systems are common in large solar farms and utility-scale PV plants to maximize energy production, especially in regions with high solar exposure. These systems improve solar energy capture by automatically altering the alignment of photovoltaic panels during the day. In contrast to fixed-tilt setups, they rotate on a singular axis, tracking the sun's path, thereby enhancing efficiency and increasing energy output. While improving efficiency, they also introduce dynamic mechanical stress to the DC wiring and connectors, a factor that is often underestimated in current installation practices.

### **The impact of dynamic PV module installations on the DC system**

One of the critical challenges in this kind of application is mechanical stress on the DC wiring system, due to their inherent dynamic movement. This additional stress can lead to premature failure of the PV DC wiring and connections and thus to potential risks to PV assets.

Stäubli plays a leading role in providing quality products for the DC wiring systems of solar power plants. With our more than 30 years of experience in this industry, we have a responsibility to improve reliability and safety in PV installations. Utilizing our service group, we have witnessed inappropriate wiring practices utilizing Stäubli components as well as other DC connector solutions. Stäubli addresses these challenges with key recommendations for preventing premature failure of PV DC connections.

Grayson Maurer, Head of Renewable Energy Services at Stäubli in North America highlights the significance of respecting manufacturer's instructions: "Strict adherence to the installation manual and procedures ensures a long-term, stable connection. The assembly and appropriate integration of connectors into the PV system is critical for the performance and safety of the asset."

### **Managing dynamic mechanical loads in tracking systems**

Our tests on DC connectors revealed that subpar installation practices can enhance the negative effects of cyclic dynamic loads induced by the tracker movement.

Examination at our in-house testing laboratories in Windsor, California showed that inappropriate wiring practices can negatively impact DC connector systems. Introducing cyclic mechanical loads into a properly assembled DC harness leads to degradation and eventual failure, regardless of connector type or manufacturer. Improving these practices can prevent the negative impact of mechanical loading on PV connectors and enable reliable operation.

Grayson Maurer, Head of Renewable Energy Services at Stäubli in North America adds: "Ensuring the mechanical isolation of connectors is not just about static force protection but equally about safeguarding against dynamic forces inherently present in tracker-based installations."

## Isolation of mechanical loads are paramount

We have also performed extensive testing on both our own Staubli components, but also third-party DC connectors and all test specimens exposed to the effects of inappropriate wiring strategies have shown premature failure of the product.

The Staubli testing has shown that isolation of cyclic mechanical loads, which are intrinsic in tracking systems, can be accountable for many of the failures we have investigated.

## Summarizing considerations

In conclusion, Staubli highlights the use of certified and manufacturer-released tools for assembling and crimping the PV DC connectors. Meticulously follow the instructions of the manufacturer's assembly information. Integrating the DC connection system in the single-axis tracker application requires dedicated wiring management to remove mechanical stress. Staubli created guidelines on DC connector securement on our website or below in the included illustrations.

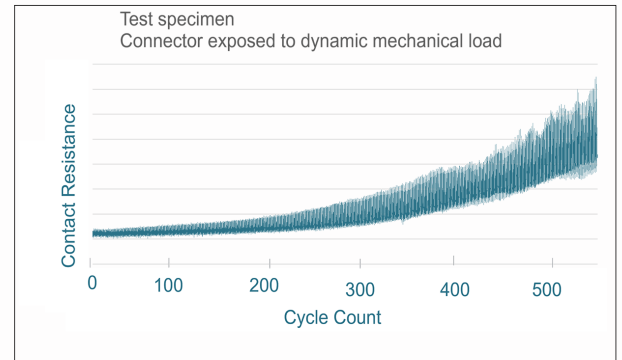
Beyond providing DC components and training courses at different knowledge levels, we are also a service partner to guide you through wire management design and reviews, golden row support, installation oversight, DC health check in field inspections, and root cause analysis in our laboratories.

Dominic Buergi, Global Head of Renewable Energy Services at Staubli, articulates: "Our commitment extends beyond just providing high-quality products; we aim to empower stakeholders with the knowledge and support needed to ensure the longevity and efficiency of their PV systems."

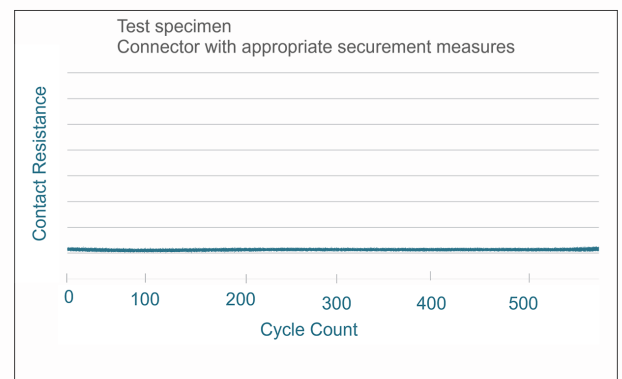
Our initiative is a testament to our commitment to propelling the industry forward, ensuring sustainable energy solutions for the future.

### About Staubli

Staubli offers innovative mechatronics solutions in its four divisions: Electrical Connectors, Fluid Connectors, Robotics, and Textile. Founded in 1892, Staubli is now an international corporation with headquarters in Pfäffikon, Switzerland, and with over 6,000 employees worldwide. Staubli has a presence in 28 countries with production, sales and service subsidiaries, including a network of agents in 50 countries.



Increased contact resistance over time



Contact resistance with isolation of mechanical movement

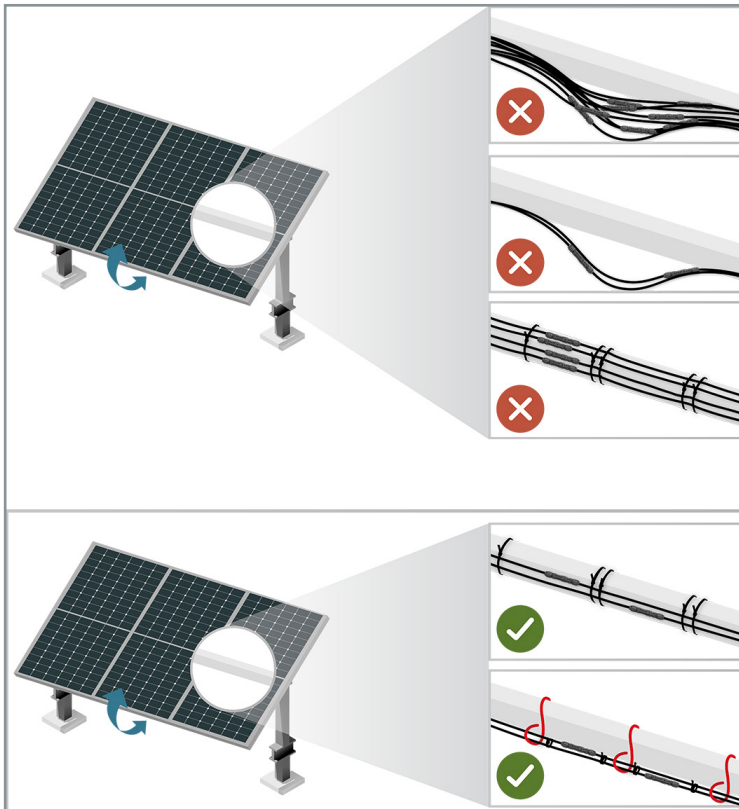
The test setup shows the impact of the mechanical stress on the PV DC connections in single-axis tracker systems resulting in increased contact resistance.

Staubli Electrical Connectors develops advanced connection solutions based on the reliable MULTILAM contact technology and provides connections for life in industries such as industrial automation applications, power transmission and distribution, railway, welding automation, test and measurement, medical devices and E-mobility. In the industry of renewable energy Staubli is a pioneer and global market leader in photovoltaics with its MC4 connector portfolio that has set the industry benchmark. Active in this market for more than 30 years, Staubli Renewable Energy creates the basis for sustainable change.

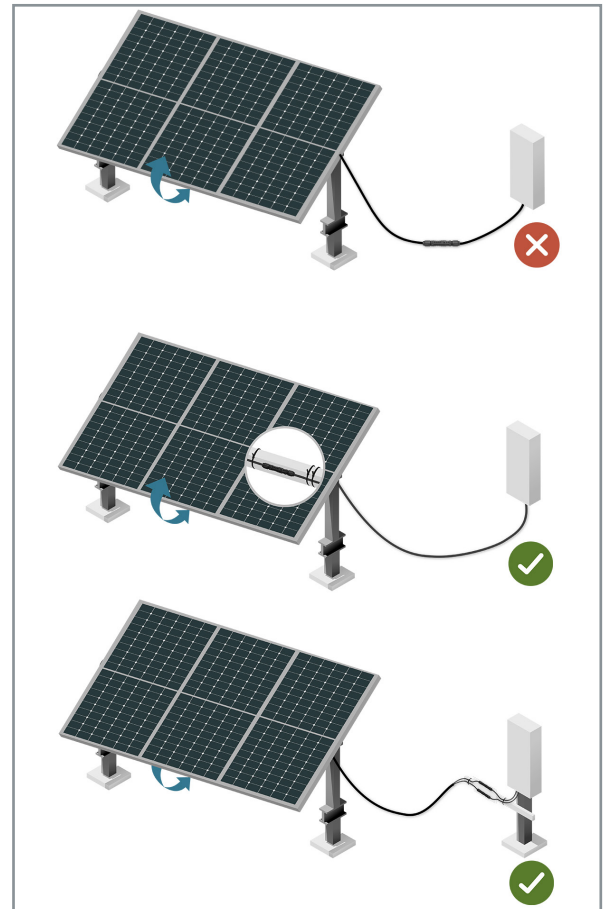
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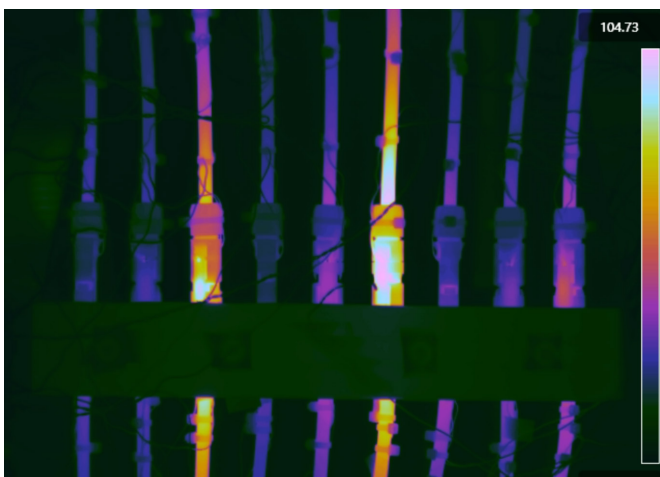
August 20, 2025



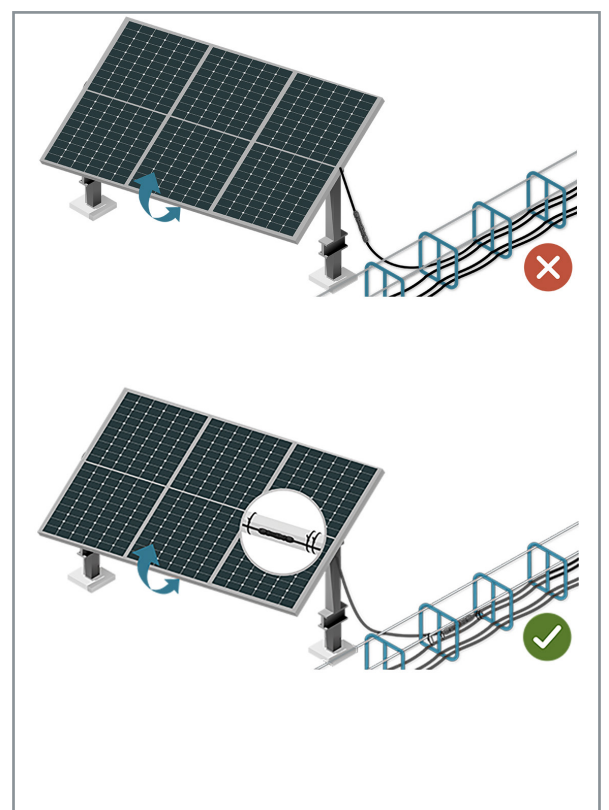
Examples of securement methods at the torque tube



Examples of securement methods at the connection to the combiner box



The thermal imaging reveals intense heat concentration tied to compromised connector integrity, showcasing elevated contact resistance caused by improper wiring under mechanical load within the test setup.



Examples of securement methods at the connection to the combiner box