

HISbox

■ DC/AC string boxes

Fault detection and insulation monitoring



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Locating insulation faults in PV systems — before they affect power generation

Large-scale photovoltaic power generation systems consist of thousands of DC strings spread across vast areas. Minor insulation defects caused by moisture, cable damage, faulty connectors, or aging components often go unnoticed until they trigger inverter shutdowns or safety alarms.

While conventional monitoring systems can detect that a fault exists, they cannot pinpoint exactly where it is.

The HIS insulation monitoring system precisely identifies which generator connection box (GAK) and which PV string has an insulation fault, enabling faster maintenance, higher system availability, and better protection of the systems.

Why this is important for owners of solar power systems

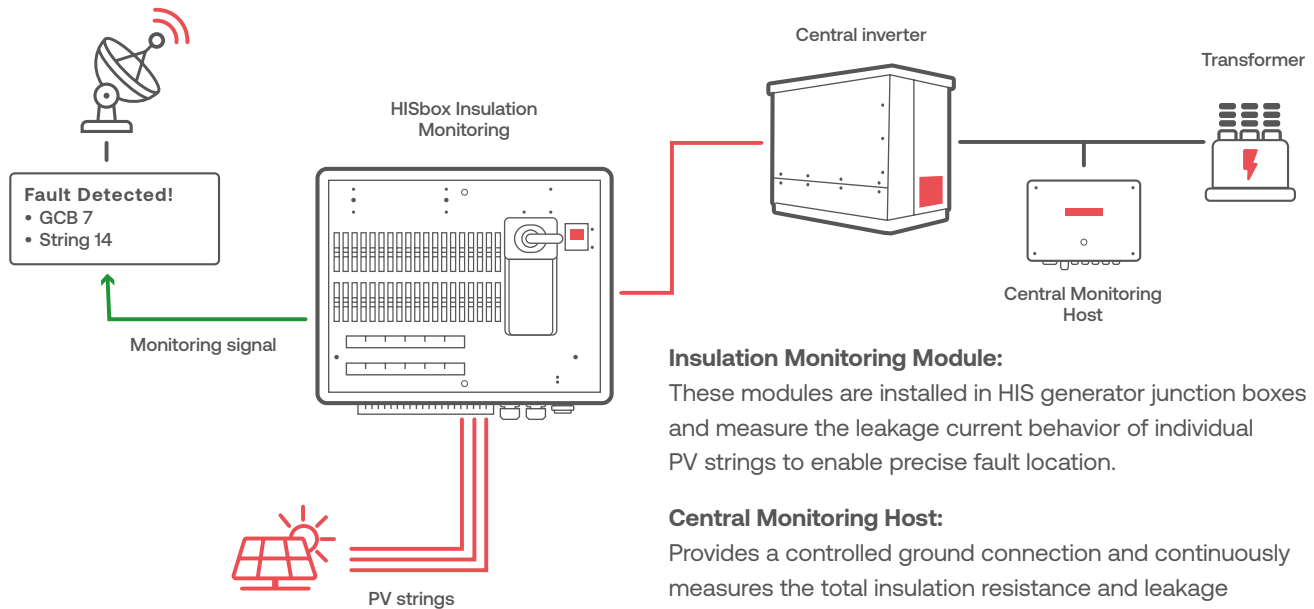
- Ensuring Energy Yield – Early detection prevents inverter failures and production downtime.
- Pinpointing Faults – You can see the exact PV string where insulation degradation has occurred.
- Reducing Operating and Maintenance Costs – Faster troubleshooting and a lighter workload for technicians.
- Increased system availability – Continuous monitoring during the operation of the PV system.
- Improved safety – Early detection reduces risks associated with electrical faults.

Designed for large-scale solar power plants

Large PV systems typically use floating DC systems (IT grounding concept). This design allows the systems to continue operating after the first insulation fault occurs, while operators diagnose and resolve the issue. HIS Insulation Monitoring can be integrated directly into generator connection boxes (GCBs) and system monitoring systems.



Architecture for insulation monitoring at the string level



Insulation Monitoring Module:

These modules are installed in HIS generator junction boxes and measure the leakage current behavior of individual PV strings to enable precise fault location.

Central Monitoring Host:

Provides a controlled ground connection and continuously measures the total insulation resistance and leakage capacitance of the PV system.

Intelligent fault detection:

By analyzing leakage currents at the string level, the system precisely identifies the generator junction box and the PV string where insulation degradation has occurred.

How does insulation monitoring technology work?

- 01** The central monitoring computer establishes a controlled measurement path to assess the overall insulation condition.
- 02** Monitoring modules measure the leakage current behavior of each individual PV string.
- 03** The system calculates the insulation resistance and the leakage capacitance of the PV plant.
- 04** If insulation deterioration occurs, the system identifies the affected generator junction box and the affected phase.

Main advantages

- +** Continuous insulation monitoring during system operation
- +** Fault localization at the string level
- +** Shorter troubleshooting time
- +** Lower operating costs
- +** Improved reliability of PV systems

Applications

- Large solar farms with decentralized generator connection boxes
- Solar power systems that require high operational availability
- Großanlagen zur Stromerzeugung aus Photovoltaik
- PV-Anlagen mit Zentralwechselrichter

Designed for potential-free DC systems (IT earthing system). Not suitable for earthed systems (TN systems).

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