



**EARTHING
SYSTEMS 4.0**

Smart earthing monitoring system for solar farms



**APLICACIONES
TECNOLÓGICAS**

**S M A R T
EARTHING**

Cost reduction and lifespan extension of photovoltaic facilities by monitoring the earthing system

The SEMS technology developed by Aplicaciones Tecnológicas turns the earthing system of solar farms into an immense sensor where, through Advanced Algorithmics and Artificial Intelligence, it can remotely alert on the need for corrective interventions, implement early preventive actions to mitigate risk situations and even generate predictive models that anticipate future anomalies before they happen.

This 4.0 monitoring system is therefore an essential element to ensure the expected Return on Investment in the expected period.



OPERATIONAL EXCELLENCE

- ▶ Data-driven predictive maintenance.
- ▶ Real-time alerts for corrective maintenance.
- ▶ Prevention of failures and safety-critical situations.
- ▶ Centralised monitoring.
- ▶ Configurable system adaptable to user needs.
- ▶ Remote updates.



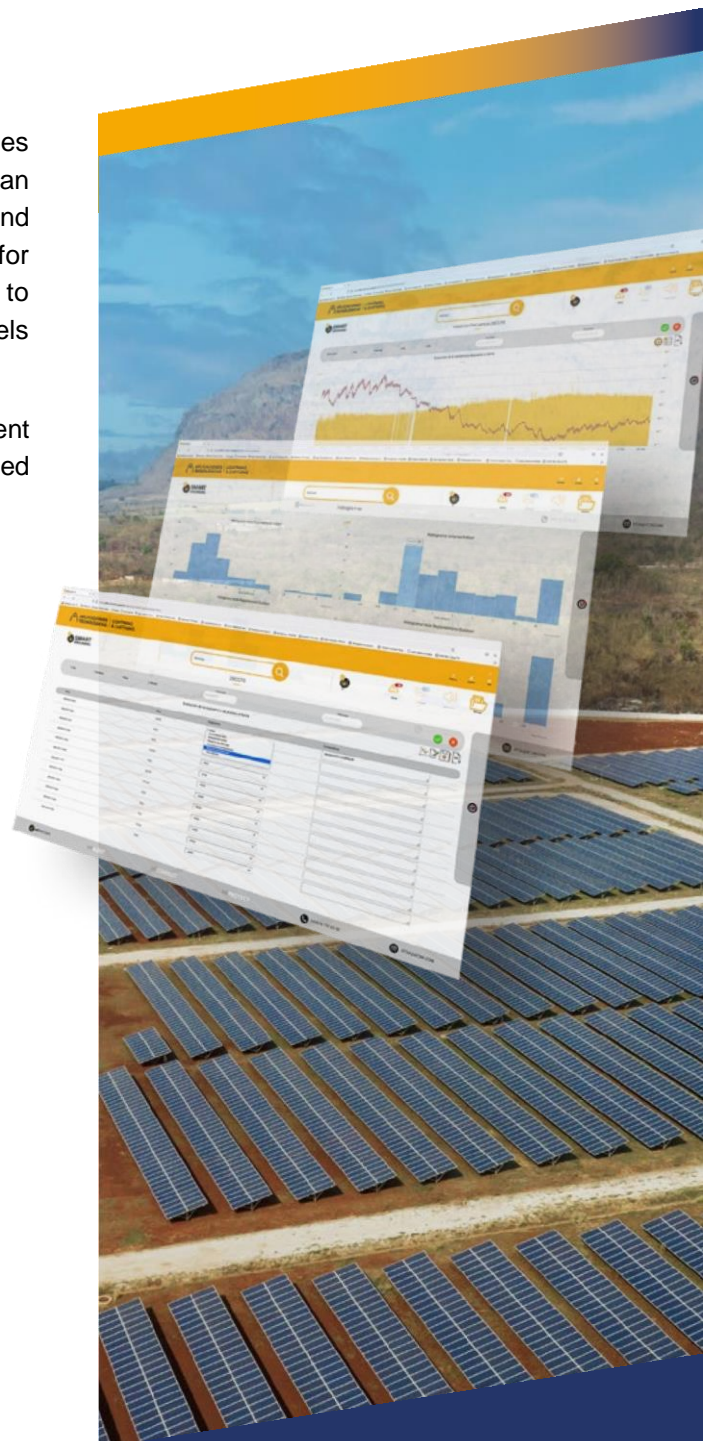
RISK MINIMISATION

- ▶ Reduction of the risk of step and touch voltages with the danger of electric shock for people.
- ▶ Continuous and remote verification of assets status.
- ▶ Real-time detection of earthing disconnections.
- ▶ Alerts in the event of theft, degradation, breakdown or accidental breakage.



FINANCIAL EFFICIENCY

- ▶ Cost savings due to logistical simplification of verification processes.
- ▶ Early detection of asset failure situations.
- ▶ Optimisation of corrective and preventive maintenance.



Smart monitoring solutions for earthing systems in solar farms, our approach:

• Solar farms under project



Preliminary realization of a geolectric study to determine the stratification and soil resistivity. Aplicaciones Tecnológicas S.A. offers a highly competitive geolectric study service.



Designs based on international standards using advanced software that allows us to determine objectively the optimum solution.



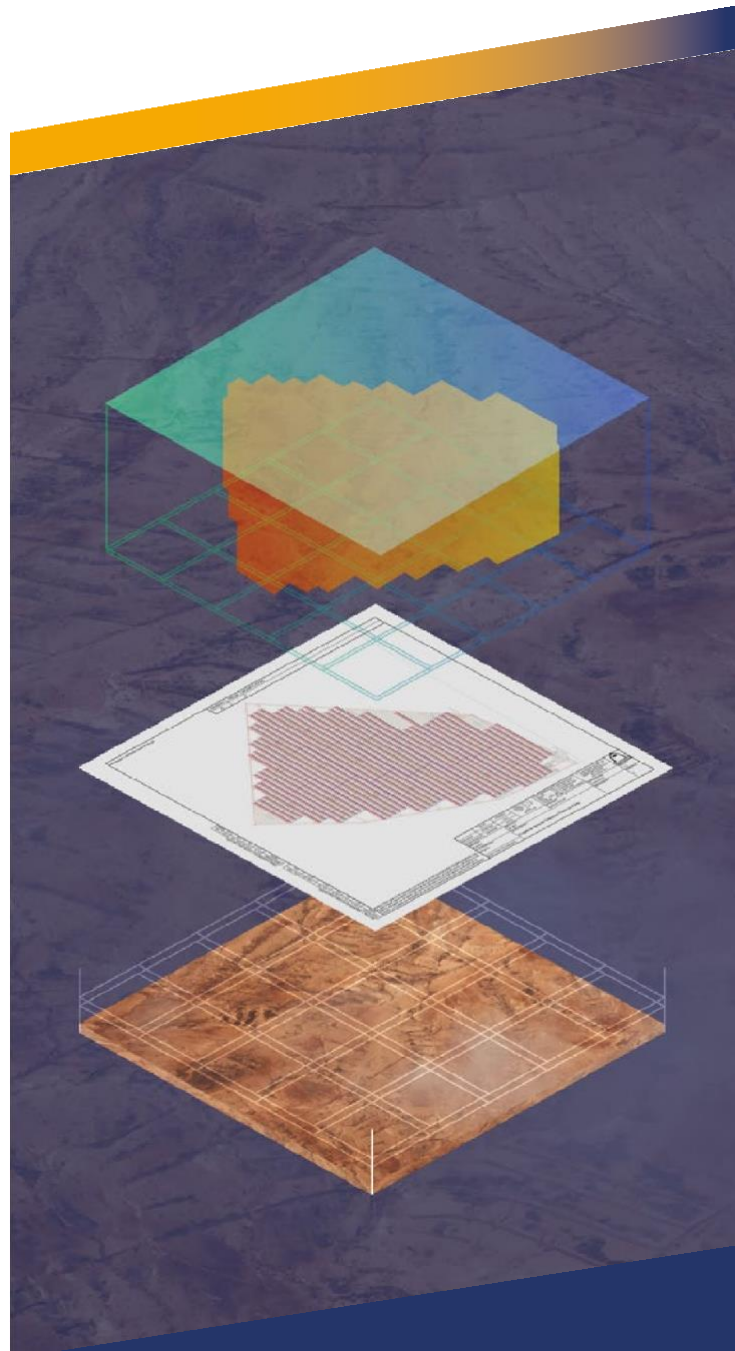
Use of specific anti-theft conductors and electrodes according to the particularities of the terrain: corrosion-resistant electrodes for aggressive soils, special electrodes and/or perimeter ring conductors for highly resistive soils, etc.



Durable connections between conductors by using Apliweld® exothermic welding, which remain in excellent condition for the entire service life of the installation.



Advanced and continuous monitoring system of the status of the earthing system using the Smart Earthing Monitoring System.



• **Operational solar farms**

Diagnosis and enhancement service for solar farm earth connections:



Phase 1: Initial meeting to learn about the problems and areas for improvement identified by the client.



Phase 2: Analysis of the current earthing system using our advanced software GMAT/PAST.



Phase 3: Diagnosis and improvement proposals to achieve the objectives of reducing costs and increasing the longevity of the farm's assets.



Phase 4: Earthing project 4.0. Installation of the Smart Earthing Monitoring System (SEMS).



Efficient supervision of earthing systems: operation scheme.

Distributed sensorization, IoT connectivity and artificial intelligence for the supervision of earthing systems in photovoltaic facilities.



**Data
collection**



**Accurate
diagnostics**



**Multi-channel
objective alerts**

- ▶ Data collection: centralised monitoring of distributed smart sensors.

- ▶ Accurate diagnostics: artificial intelligence for decision-making.

- ▶ Multi-channel objective alerts: multi-platform that allows users to receive feedback, both in the form of alerts and in the form of historical data.

- ▶ Remote problem detection.

- ▶ Real-time reporting.



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Other recommended solutions for photovoltaic facilities

Solutions

- ▶ **ATSTORM®** lightning early warning system for the preventive protection of personnel and sensitive equipment such as inverters, trackers, etc.
- ▶ **DAT REMOTE®** optimised protection against direct lightning strikes, monitoring the status of the protection system in real time.
- ▶ Real-time characterisation and warning of impacts intercepted by the **SMART LIGHTNING LOGGER** protection system.
- ▶ **ATPV enhanced transient overvoltage** protection for sensitive and exposed electronic devices such as inverters, switchboards and data lines.



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SEND

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