



How Thermarestor protects Rooftop PV installations



RC62: Recommendations for fire safety with PV panel installations

The Joint Code of Practice for fire safety with photovoltaic panel installations, with focus on commercial rooftop mounted systems



PV Rooftop Safety

Top 10 Safety Concerns



Fire safety recommendations for reduced fire risk of PV systems on roofs



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FRISSBE ERA Chair Holder, ZAG

IFE webinar

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Devastating effects of fire on Rooftop PV Installations

Fire on rooftop PV installations become big news due to their visibility and impacts.

Not only does it affect the building and its occupants, it also impacts on business, confidence and obvious financial loss.



Where do fires occur in a PV installation? - BRE Report

Switchgear equates 69% of the fire incidents recorded.

DC connectors and cable 27%

A2.2.3 An analogous UK study, undertaken in 2017 by the BRE and submitted to Government, investigated the PV components most likely to develop faults that led to a fire incident. Their results, based on investigation of 46 incidents, are shown in Figure A2.2.2.

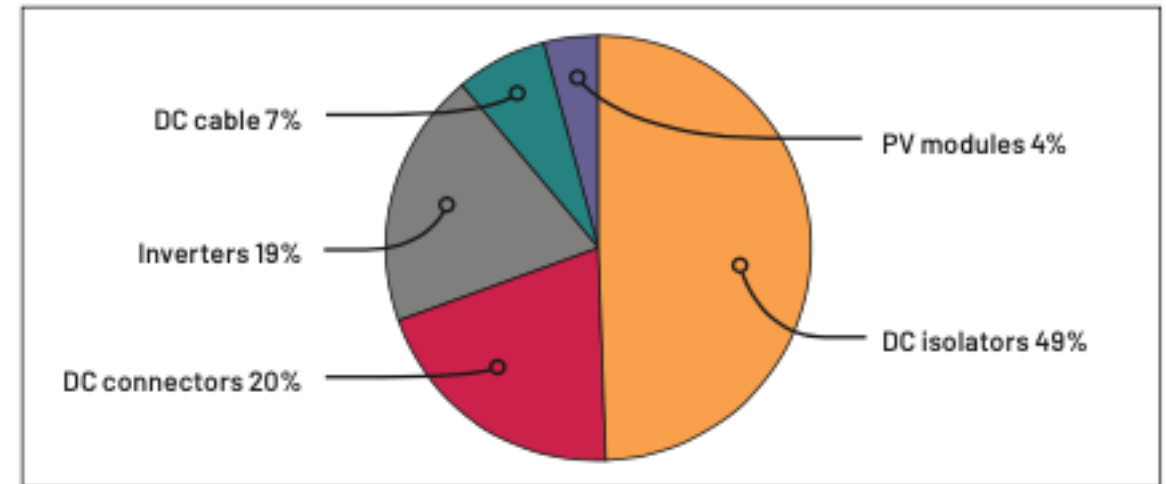
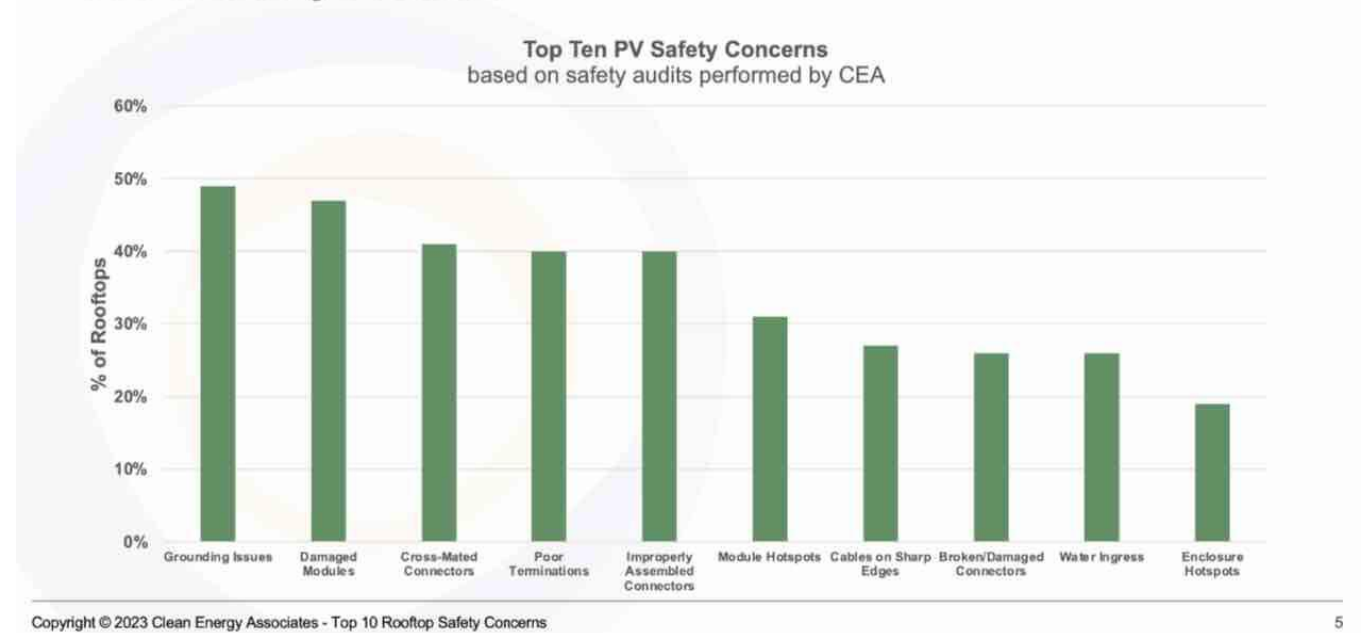


Figure A2.2.2 PV system component faults as causes of fire (Source: P100874-1004 Issue 2.5 Fire and Solar PV Systems – Investigations and Evidence)

Where do fires occur in a PV installation? – CEA Report

Nearly ALL of the systems inspected
had issues which would lead to a
Thermal Incident

Following Over 600 Detailed Safety Audits, CEA Identified the Most Common Safety Problems



97%

97% of audited systems had major
safety concerns

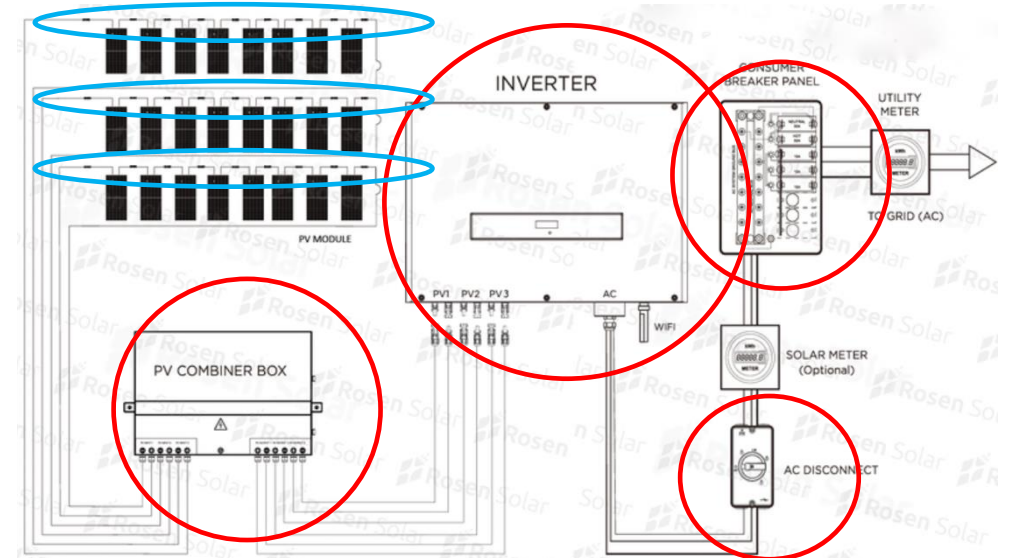
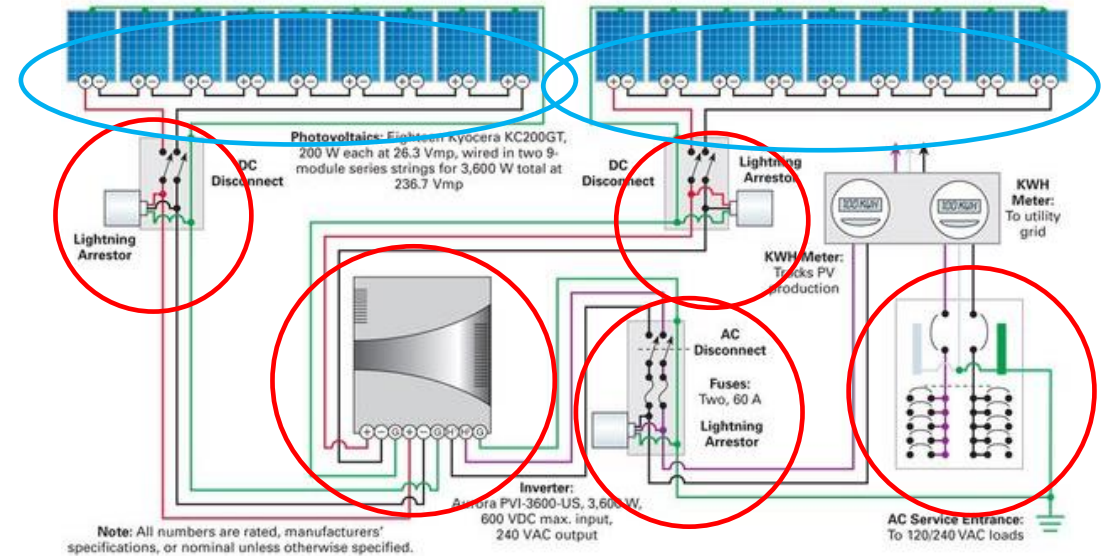
Protect the important elements of the installation

Where are the risks –

Red = 69%

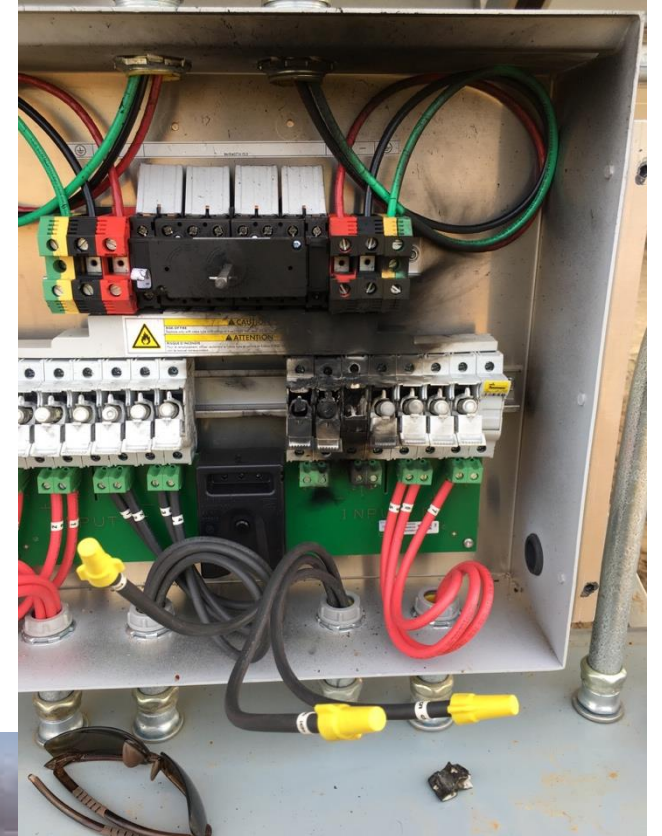
Blue = 27%

No matter the ultimate system design there will be field installed connections between the module strings, an inverter and AC outputs. These are locations where thermal events occur.



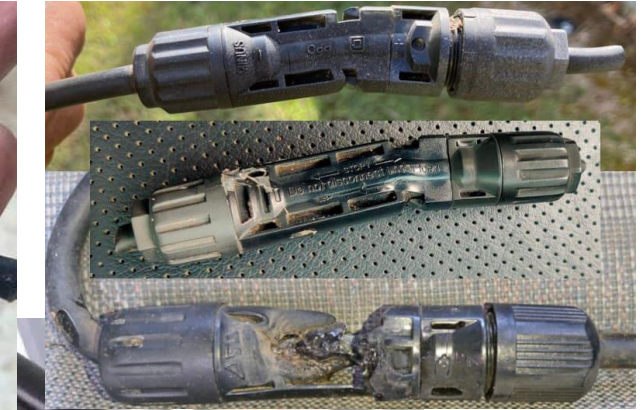
Effects of thermal events in the switchgear

The fires cause physical and economic damage.



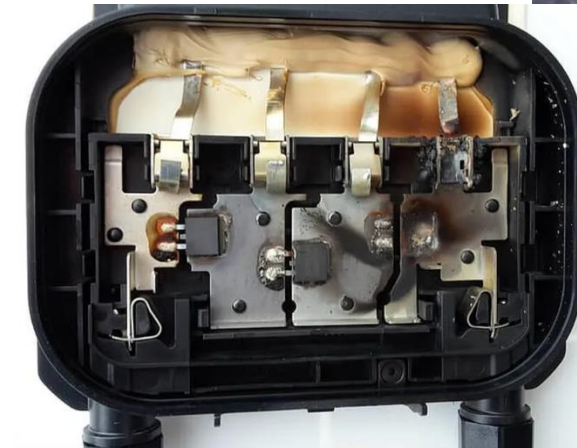
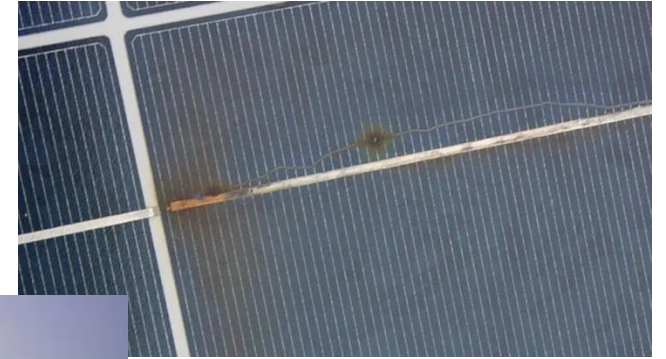
Effects of thermal events in DC connectors

These failures equates to 20% of the fire incidents recorded.



Module Failures

These failures equates to only 4% of the fire incidents recorded.



Current Methods of Monitoring Thermal Events in Rooftop PV Systems

Maintenance?

Infrared Thermal camera – occasional inspection

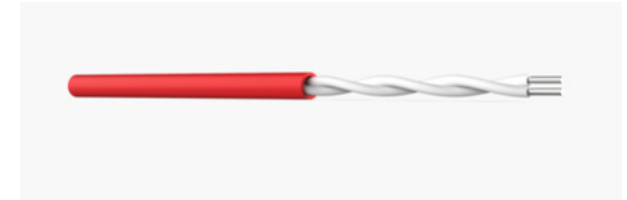
Linear Heat detection – fire already started

Panel Extinguishant – fire already started

Gas Suppression – fire already started

Arc Fault Detection Software – fire already started

Optimisers – fire already started



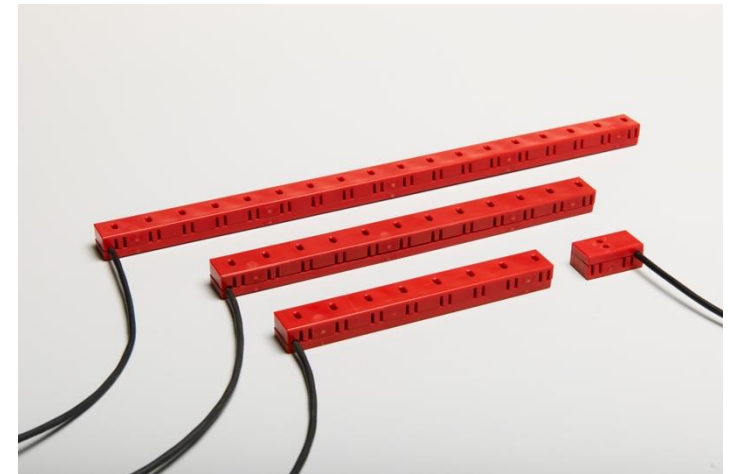
Thermarestor

Thermarestor gives early warning of a Thermal Event. It gives building owners and custodians time to investigate the situation BEFORE a fire occurs.

Thermarestor is a passive device that activates when a heat rise of above 80degC (+/- 5degC) is detected.

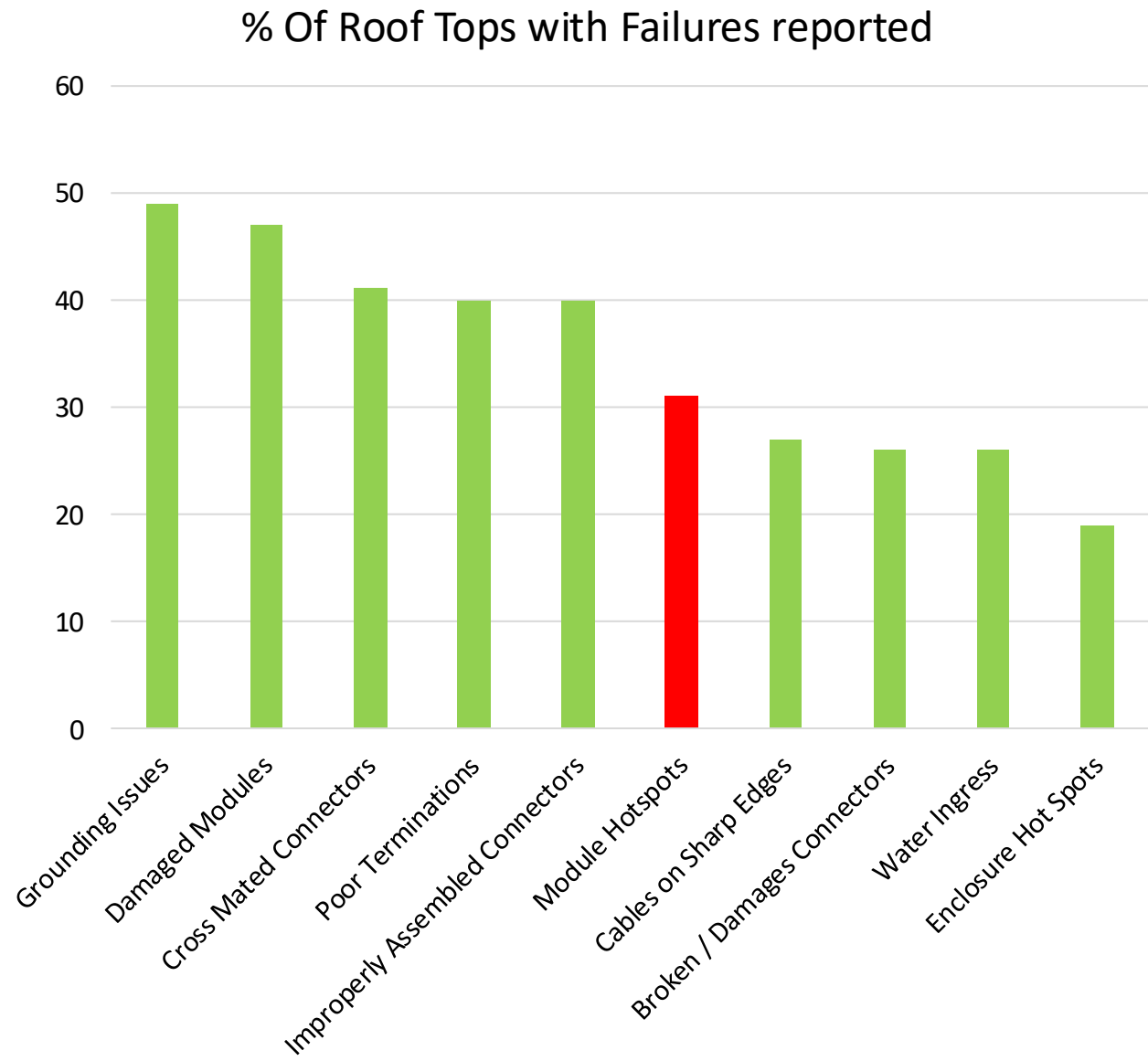
MultiPoint and Single point sensors protect wiring connections.

A pre-ignition solution is better than putting out a fire.



Thermarestor's impact to failures identified in the CEA Inspections

Thermarestor can directly and indirectly sense a thermal event in all of the failures identified in green.



Thermarestor Applications

Thermarestor sensors can be installed in any type of switchgear, in either the DC or AC elements of the systems, whether the equipment is roof mounted or located within roof top plantrooms.

Thermarestor can be installed in new installations and as a retrofit item for existing installations.

Thermarestor can be installed in small scale domestic to every element of a large-scale Commercial PV Installations.



Thermarestor Installed

Generally single sensors are installed, however we have a range of MultiSensors where the switchgear necessitates close proximity.



Signaling / reporting – Communicator

Thermarestor sensors are wired directly our communicators.

Each communicator is connected to our cloud portal via 4G.

The communicator requires no mains connection and has an 18-month battery life.



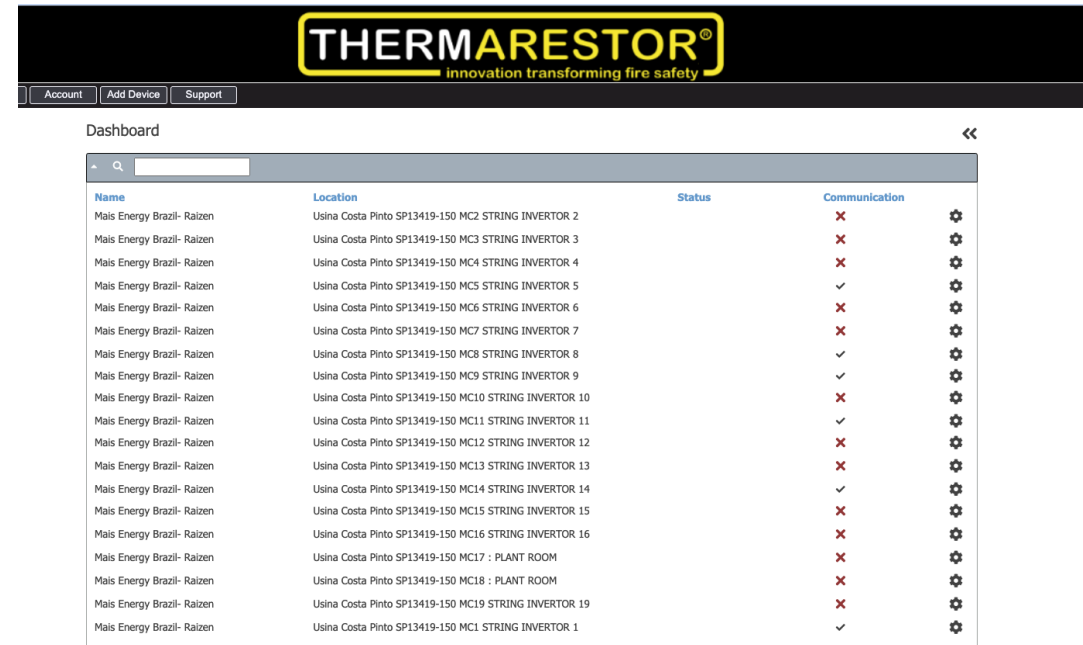
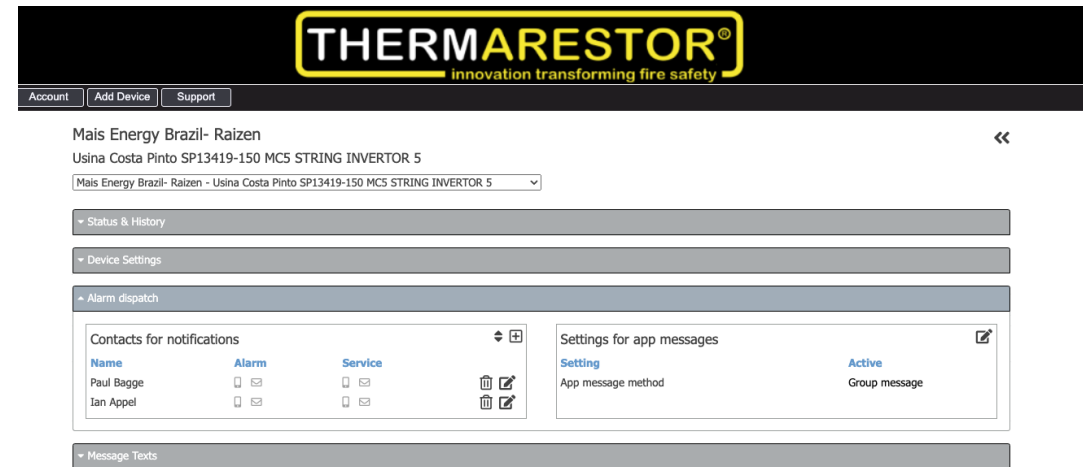
Signaling / reporting – Cloud Platform

The Thermarestor communicator is partnered with our cloud portal.

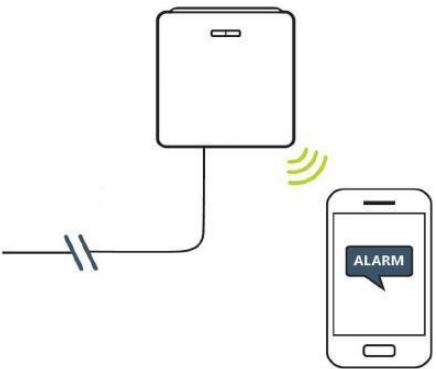
The portal issues a notifications of activation to unlimited users.

The portal allows maintenance staff to review the status of the devices and communicators.

It allows an operators to control and monitor the notifications issued for effective maintenance management.



Signaling / reporting – Phone App



The alarms can be signaled by a push notification on our App.

- OR email
- OR SMS
- OR Voice Call

MEB-Raizen-El Santo

Invertor 1 REF DCB1

2024-01-2915:04

HIGH TEMPERATURE ALERT- Thermarestor activation. Maintenance required

Confirmed by Jason Tomkins (15:05)

13:16

mobeye®

Salisbury Cathedral (UK)

Salisbury SP1 2EJ

2024-04-2412:37

ATTENTION REQUIRED:Thermarestor Board DBCT2

CONFIRM

ME (BR) ENEL

Rio De Janerio RJ 20220-297

2024-03-0512:48

Thermarestor Alarm DIST Board 1

Confirmed by Ian Appel (12:48)

Salisbury Cathedral (UK)

Salisbury SP1 2EJ

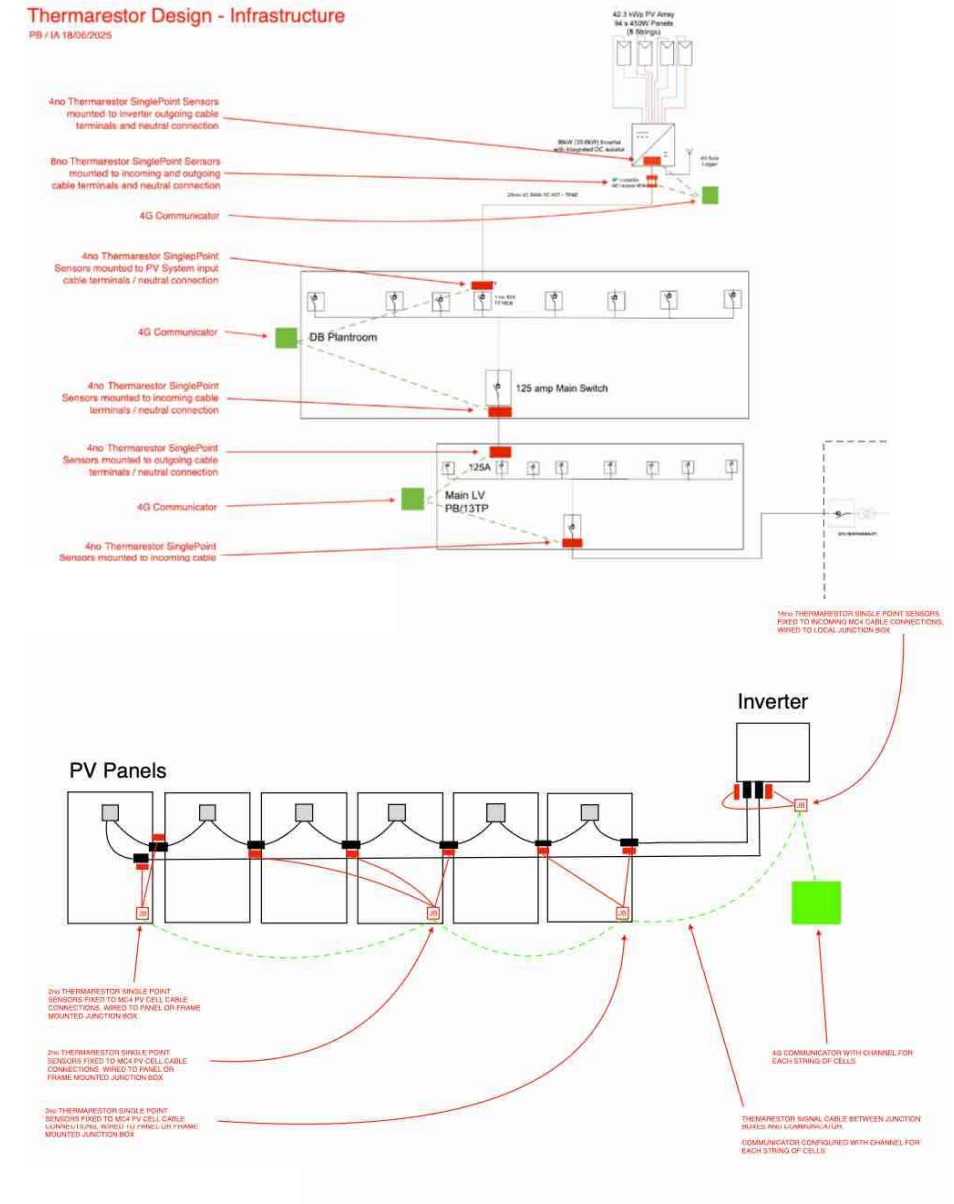
2024-02-2314:42

ATTENTION REQUIRED:Thermarestor Board DBCT2

Confirmed by Ian Appel (14:44)

Thermarestor Design

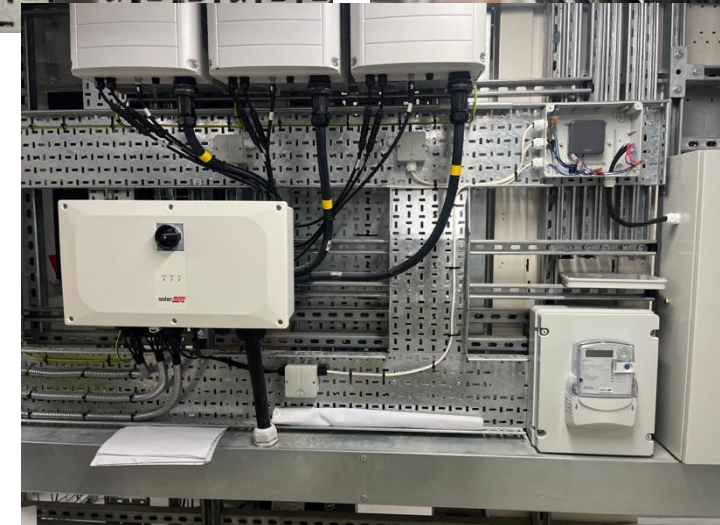
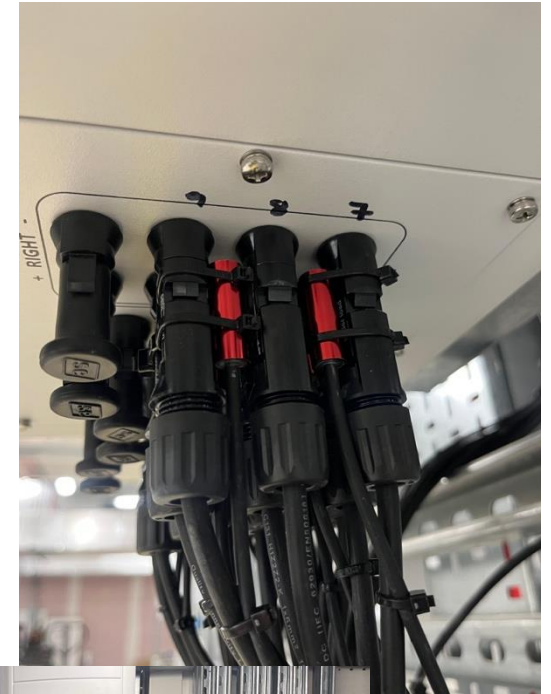
The Thermarestor creates a design for each installation which details, for the installation team where the sensors are to be placed.



Thermarestor Installed

Thermarestor sensors are installed outgoing cell string MC4 connectors, inverter interconnecting DC cable connectors, inverter outgoing AC cable connections, AC isolators and connections in the electrical network in each building

Sensors are linked into local communicators



Case Study – UK – National Health Service

Thermarestor has been specified to protect rooftop PV systems on buildings operated by a number of NHS Hospital Trusts and are working with other Trusts on currently planned projects.

- University Hospitals Plymouth NHS Trust
- Kingston and Richmond NHS Foundation Trust
- St Georges, Epsom and St Helier Hospital Group



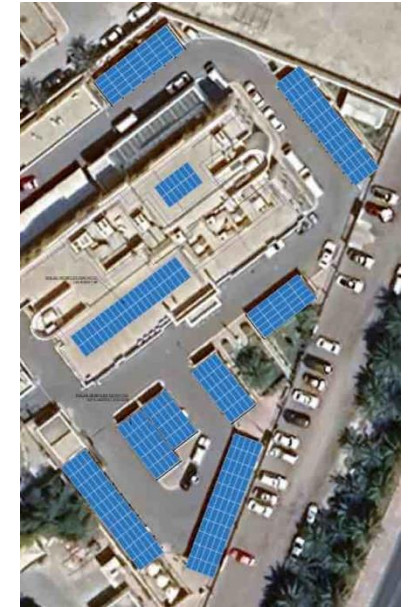
Case Study – The Kingdom of Bahrain

Thermarestor has been specified to protect rooftop PV systems at a number of municipal buildings within their estate.

- Ministry of Interior
- Transport Directorate
- Exhibition World Halls
- Central Stores
- Marassi Galleria Mall

Thermarestor is fitted to all AC, DC components, including all MC4 connectors.

This enables maintenance teams to permanently monitor the connections on 56,628 PV modules and associated plant and switchgear for thermal events.



Thermarestor's Unique Selling Points

1. British Patented Design.
2. Pre-ignition solution is better than putting out a fire.
Turns an emergency into simple maintenance.
3. Cost effective
4. Sensor warranty for lifetime of Rooftop PV system.
5. Complete and independent system.
6. Communicator / portal gives notifications to unlimited users.
7. Remote monitoring – by App & portal gives real time reporting 24/7
8. The portal gives recordable incident & maintenance logs



What are we currently looking at?

Utility Scale Battery Energy Storage Systems (BESS) and Long Duration Energy Storage (LDES)

The move from fossil fuels to renewable energy generation will be accompanied with the need for energy storage to be able to 'hold and release' the energy at the time needed.

From electrical distribution systems to battery terminals, all will have the potential for high resistance connections which can be protected by Thermarestor

