

AFPE v.2.0

IEC 63027: PV Arc Fire Protection

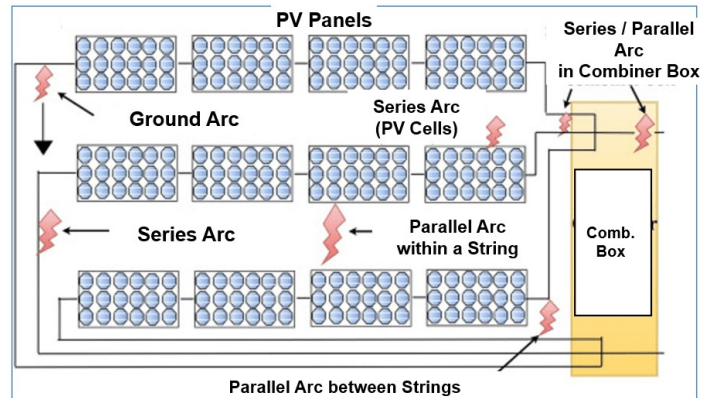
Arc Fire Protection Equipment v.2.0
F-S-AFPE-2-3-2



**Operation and Maintenance Solution
for the DC Power Environment**

01 PV Arc Fires

- Long-term exposure to moisture, salt, and dust, or poor installation, can cause faulty connections in DC power circuits. These faults may produce series or parallel arcs. If the DC arc is not interrupted promptly, a fire may result.



02 Combiner Box and Inverter Models for PV Systems

- External electrical noise, inverter switching, and MPPD operation can cause false trips in PV arc detectors, hindering field deployment. This product uses three arc-detection sensors to improve reliability and prevent false trips.
- P-S-AFPE-2-3-2: Modular combiner-box and inverter models for 8–24 strings, featuring IEC 63027 self-test and remote relay control.
- Trips only the arcing string to minimize PV generation losses.



- ① Communication/Control Terminal
- ② Power Input
- ③ + String Input Terminal

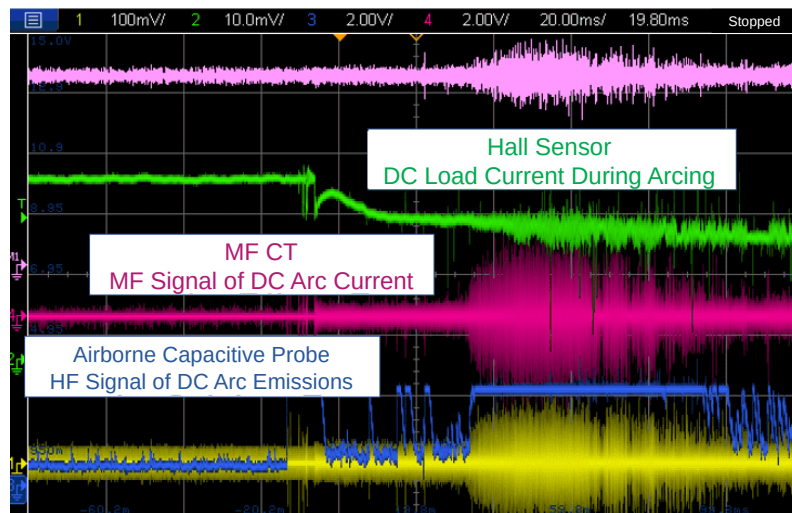
- ① Output Ground Terminal
- ② Self-Test Status LED
- ③ DC Arc Detection Alarm LED
- ④ + String Output Terminal

03 AFPE v. 2.0 : IEC 63027 Compliant

- UL 1699B: PV DC Arc Fault Circuit Protection was established in 2018, incorporating improvements to false-trip prevention proposed by Sandia National Laboratories in 2016. IEC 63027: Photovoltaic power systems — DC arc detection and interruption was established in May 2024. AFPE v.2.0 passes the IEC 63027 test by KTC in Sept. 2026

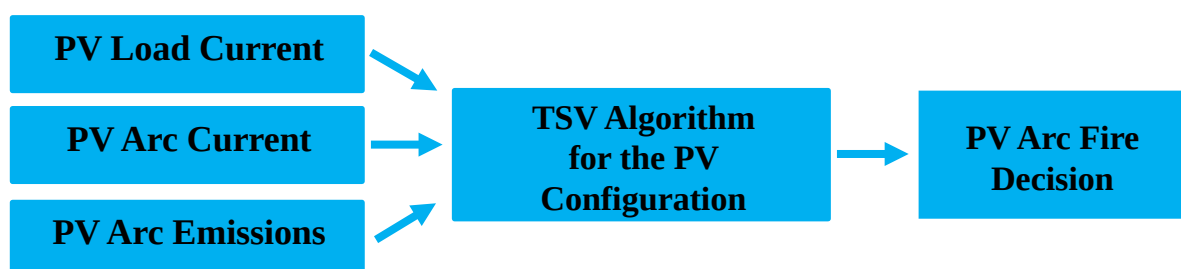
Three-Sensor PV Arc Detection

- Hall CT — DC load current: Detects the drop in DC load current as an arc resistance increases the total circuit resistance.
- MF CT — DC arc current: Detects medium-frequency arc signals when an arc occurs anywhere along the PV circuit.
- ACP (Airborne Capacitive Probe) — High-frequency arc emissions: Detects high-frequency signals induced in nearby conductors when a PV arc occurs.



TSV (Three Signal Voting) for False-Trip Prevention

- Developed by O&M Korea, AFPE v.2.0 combines three-sensor PV arc detection with TSV. The algorithm identifies arc-fire conditions according to the combiner box, inverter, and PV panel configuration, providing arc-fire protection and reliable immunity to false trips caused by external high-frequency noise.



04 Specifications

- AFPE v.2.0: IEC 63027 certified
 - TSV evaluates three sensor signals to trigger arc interruption:
Hall CT for DC current changes, MF CT for arc current, and ACP for radiated arc emissions.
 - Modular combiner-box and inverter models for 8–24 strings
 - F-S-AFPE-2-3-2: Fully stand-alone, 4 strings, 2 AFDs (arc detectors)
 - Self-test and remote relay control
 - Trips only the arcing string to minimize PV generation losses
 - Maximum input: 1,500 VDC, 25 ADC
 - Dimensions: 240 × 115 × 391 (W × H × D)

Arc Sensors

- Hall CT — PV DC Load Current Detection
 - Rated Max. current: 25 A DC
 - Sensitivity: 80 mV/A
 - Frequency bandwidth: 400 kHz (–3 dB)
- MF (Medium Frequency) CT — PV Arc Current Detection
 - Rated current: 60 A DC
 - Sensitivity: 1 mV/mA (300 kHz–1 MHz)
- ACP (Airborne Capacitive Probe) — High-Frequency PV Arc Emissions
 - Frequency range: 2–50 MHz
 - Sensitivity: 100 mV (at 3 A DC arc)

