



NEXT GENERATION SURGE PROTECTION

Requirements, products and trends

DC surge protection: Designed to Protect Any Industrial Application & EV Systems

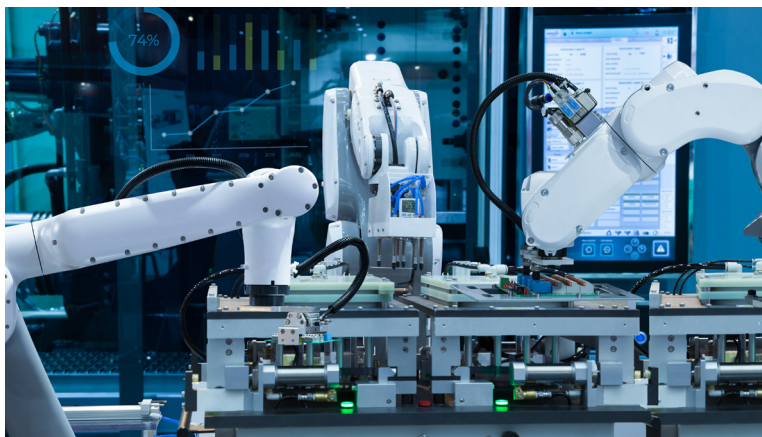
Raycap has developed a new DC DIN Rail SPD portfolio that meets the requirements of the IEC 61643-41:2025 DC SPD sub-standard under IEC 61643 and is at the same time certified to UL 1449 5th Edition under requirements of SUPPLEMENT SB – DIRECT CURRENT (DC) SPDs.



Key application differences:

This new DC surge protection standard is necessary because existing Power SPDs, compliant with the IEC 61643-31 DC PV SPD supplement or IEC 61643-11 AC SPDs, do not cover requirements present in DC applications.

Raycap's DC products are suitable for various general DC applications, including powering



industrial equipment like robotic arms and motor drives, EV fast chargers, battery energy storage systems, control cabinet supply lines, safety lighting, and other DC uses, eliminating the need for AC/DC conversion to improve efficiency.

General DC applications have higher short-circuit currents – either because of the AC supply behind (network) or due to a high short-circuit capability (batteries). For safe operation, most new DC SPDs will rely on an external overcurrent protection device as disconnect in the case of failure.

IEC 61643-41:2025 Standard requirements:

The IEC 61643-41:2025 standard has some major differences from the PV standard.

These are:

- Short-circuit requirements
- Different supply & protection configurations (middle point, grounded, isolated,...)
- TOV requirements (worst case – double voltage on the SPD)

DC systems – applications for DC SPDs

- **Battery energy storage:** Network reserve, local distribution storages (next to the transformer stations), Fast charging EV parks, home energy storage
- **Control cabinet for DC supply lines**
- **Safety lighting:** Lights inside buildings with safety features that are supplied with AC and DC
- **Industrial DC bus:** New trend to increase power consumption efficiency in industry and omit AC/DC conversion in equipment that is using DC power, such as robotic arms, servo motors, etc.



UL 1449 Standard requirements:

UL 1449 5th Edition allows SPDs to be certified for PV or DC applications. The testing for DC SPDs is outlined in Supplement SB, which has stricter end-of-life disconnection requirements than PV SPDs. Raycap's new DC products are UL certified under these standards.

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INNOVATING POWER PROTECTION WORLDWIDE



DC Product Portfolio

Raycap's DC DIN rail SPDs are designed to meet both UL DC and IEC DC-41 standards. They use specialized components and circuitry to handle DC power and surges, and have undergone extensive testing to ensure compliance.

Unipolar systems can be found in various applications, including battery-powered devices, electronics, and certain industrial processes that rely on DC power.

Bipolar power systems are used in more complex systems, where multiple voltage levels are used for different levels of power

The most common application is the DC industrial bus, where power in industrial facilities is distributed using DC instead of AC.

ProTec T2 DCU 3Y (Unipolar)

- **Location of Use:** Industrial DC Systems
- **Network Systems:** Unipolar grounded / ungrounded TN, TT and IT
- **Compliance:** IEC 61643-41:2025 Ed. 1 UL 1449 5th Edition
- **Voltage Range:** 500, 1000, 1500V DC
- **IEC/UL Category:** Type 2, DC SPD Type 1

ProTec T2 DCB 3Y (Bipolar)

- **Location of Use:** Industrial DC Systems
- **Network Systems:** For grounded TN network systems.
- **Compliance:** IEC 61643-41:2025 Ed. 1 UL 1449 5th Edition
- **Voltage Range:** 250, 500, 750V DC
- **IEC/UL Category:** Type 2, DC SPD Type 1



Purpose-built EV Protection Complies with EV and DC Standards

The ProTec T2 DCGU DIN rail SPD is designed specifically for DC EV charging applications. It meets the requirements of IEC 61851-23, the standard for DC EV charging, and complies with IEC 61643-41:2025.

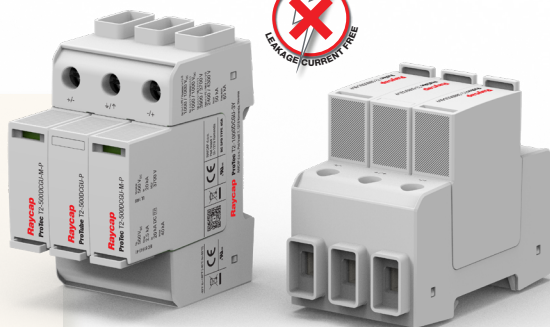
ProTec T2 DCGU is a T2 SPD, which is also capable of handling limited levels of direct lightning current. It uses standard DIN rail mounting that allows for minimum footprint installation within the DC charger enclosure.

It can work with fuses up to 200A that are already present in a system.

ProTec T2 DCB 3Y (Bipolar) and ProTec T2 DCU 3Y (Unipolar) for grounded and ungrounded, DC network systems.

ProTec T2 DCGU 3Y

- **Location of Use:** EV Chargers
- **Network Systems:** For grounded / ungrounded TN, TT and IT
- **Voltage Range:** 1000 and 1500 V DC
- **Compliance:** IEC 61643-41:2025 Ed. 1, UL 1449 5th Edition
- **IEC/UL Category:** Type 2, DC SPD Type 4CA



ProTec T2 DCGU 3Y (Unipolar)

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