

242.14 Type 2 SPDs. Type 2 SPDs shall be installed in accordance with 242.14(A) through (C).

(A) Service-Supplied Building or Structure. Type 2 SPDs shall be connected anywhere on the load side of a service disconnect overcurrent device required in 230.91 unless installed in accordance with 230.82(8).

(B) Feeder-Supplied Building or Structure. Type 2 SPDs shall be connected at the building or structure anywhere on the load side of the first overcurrent device at the building or structure.

(C) Separately Derived System. The SPD shall be connected on the load side of the first overcurrent device in a separately derived system.

242.16 Type 3 SPDs. Type 3 SPDs shall be permitted to be installed on the load side of branch-circuit overcurrent protection up to the equipment served. If included in the manufacturer's instructions, the Type 3 SPD connection shall be a minimum 10 m (30 ft) of conductor distance from the service or separately derived system disconnect.

The point in the electrical system where SPDs are connected is dependent on the type of SPD. UL 1449, *Standard for Surge Protection Devices*, is the product standard used to evaluate safe performance of SPDs. A Type 2 SPD must be installed on the load side of the service-disconnect overcurrent protection unless installed in accordance with 230.82(8), and a Type 3 SPD must be installed on the load side of a branch-circuit OCPD. The requirement for Type 2 SPDs to be connected on the load side of the first OCPD in a feeder-supplied structure is necessary due to the exposure of external feeder conductors to a more hostile surge environment, such as lightning.

Two requirements — 230.82(4) for Type 1 surge-protection devices and 230.82(8) for Type 2 surge-protection devices — permit the installation of SPDs on the line side of the service disconnecting means. Section 230.71(A)(2) permits an additional disconnecting means at the service equipment for SPDs installed as part of listed equipment. The disconnecting means for the SPD does not count as one of the six permitted by 230.71(A)(2) where the SPD and its disconnecting means are provided in the listed equipment by the manufacturer. Type 2 SPDs must be installed in listed equipment where the SPD is provided with a disconnecting means and overcurrent protection.

242.18 Type 4 and Other Component Type SPDs. Type 4 component assemblies and other component type SPDs shall only be installed by the equipment manufacturer.

Type 4 and other component-type SPDs are incomplete devices that are acceptable only if installed as part of listed equipment.

242.20 Number Required. Where used at a point on a circuit, the SPD shall be connected to each ungrounded conductor.

242.22 Location. SPDs shall be permitted to be located indoors or outdoors and shall be made inaccessible to unqualified persons unless listed for installation in accessible locations.

242.24 Routing of Conductors. The conductors used to connect the SPD to the line or bus and to ground shall not be any longer than necessary and shall avoid unnecessary bends.

High-frequency currents, such as those common to lightning discharges, tend to reduce the effectiveness of a conductor that connects the device to ground. To optimize performance of SPDs, the length of the conductor that connects the device to ground is limited. Short conductors with few bends will have a lower impedance to surge current. Higher impedance drives the clamping voltage higher and reduces the protection provided by the SPD unit. Maximum protection is achieved where the SPD is located as close as practicable to the equipment being protected as shown in Exhibit 242.3.

242.28 Conductor Size. SPD line conductors and conductors to ground shall not be smaller than 14 AWG copper or 12 AWG aluminum.

242.30 Connection Between Conductors. An SPD shall be permitted to be connected between any two conductors —

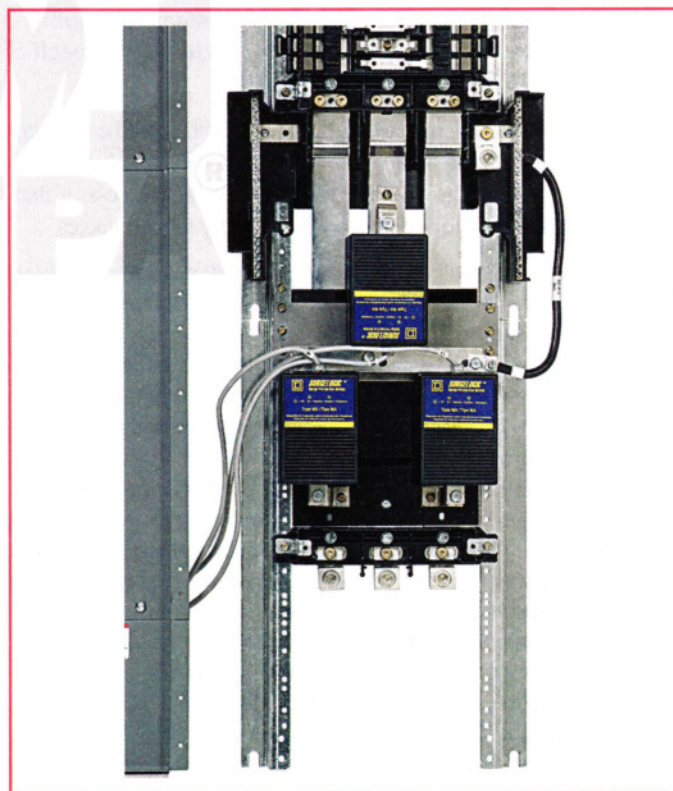


EXHIBIT 242.3 A Type 2 SPD mounted as an integral component of a panelboard, which minimizes conductor length between the electrical system and the SPD. (Courtesy of Schneider Electric)