ARTICLE

242 OVERVOLTAGE PROTECTION

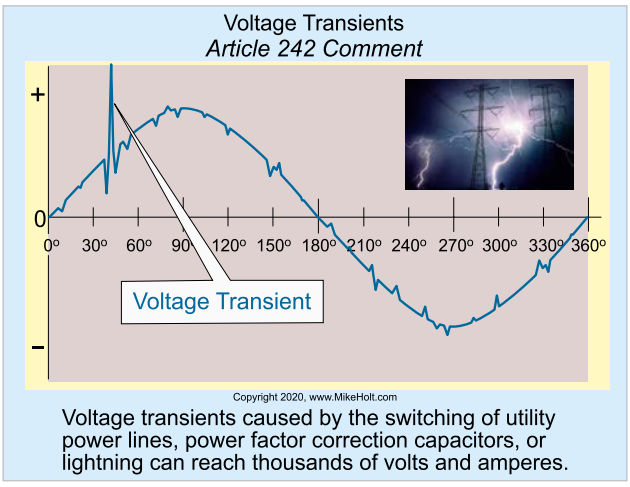
Introduction to Article 242—Overvoltage Protection

Part I of this article provides the general, installation, and connection requirements for overvoltage protection and overvoltage protective devices (surge protective devices or SPDs). Part II covers SPDs rated 1kV or less that are permanently installed on premises wiring systems.

Surge protective devices are designed to reduce transient voltages present on premises power distribution wiring and load-side equipment, particularly electronic equipment such as computers, telecommunications equipment, security systems, and electronic appliances.

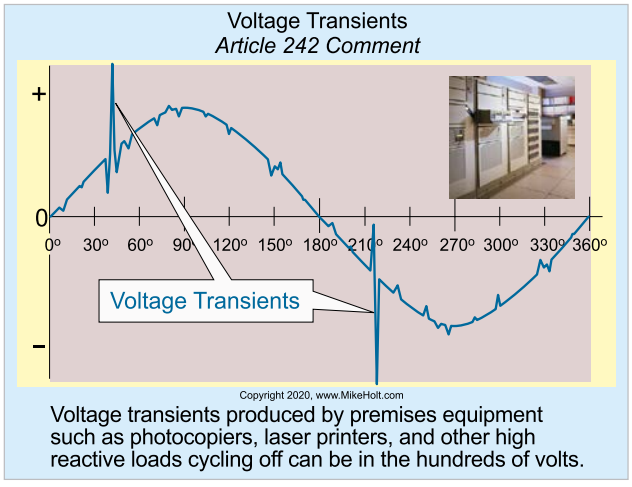
These transient voltages can originate from several sources, including anything from lightning to laser printers. Voltage spikes and transients caused by the switching of utility power lines, power factor correction capacitors, or lightning can reach thousands of volts and amperes. ▸Figure 242–1

Voltage spikes and transients produced by premises equipment such as photocopiers, laser printers, and other high reactive loads cycling off can be in the hundreds of volts. ▸Figure 242–2



Voltage transients caused by the switching of utility power lines, power factor correction capacitors, or lightning can reach thousands of volts and amperes.

▸Figure 242–1



Voltage transients produced by premises equipment such as photocopiers, laser printers, and other high reactive loads cycling off can be in the hundreds of volts.

▸Figure 242–2

The best line of defense for all types of electronic equipment may be the installation of surge protective devices at the electrical service and source of power, as well as at the location of the utilization equipment.

The intent of a surge protective device is to limit transient voltages by diverting or limiting surge current and preventing continued flow of current while remaining capable of repeating these functions [Article 100]. ▸Figure 242–3 and ▸Figure 242–4

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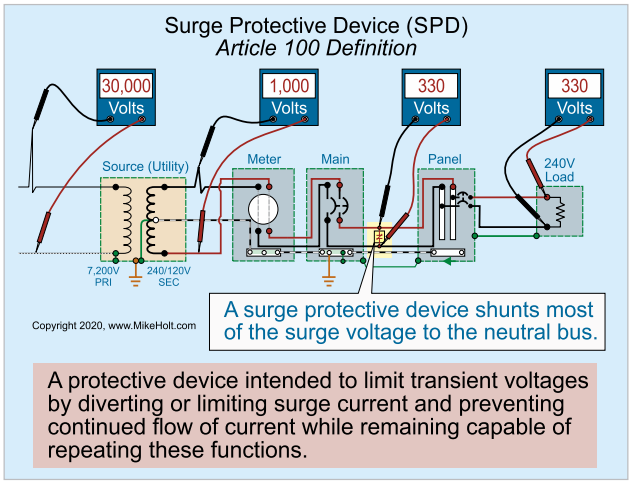


Figure 242–3

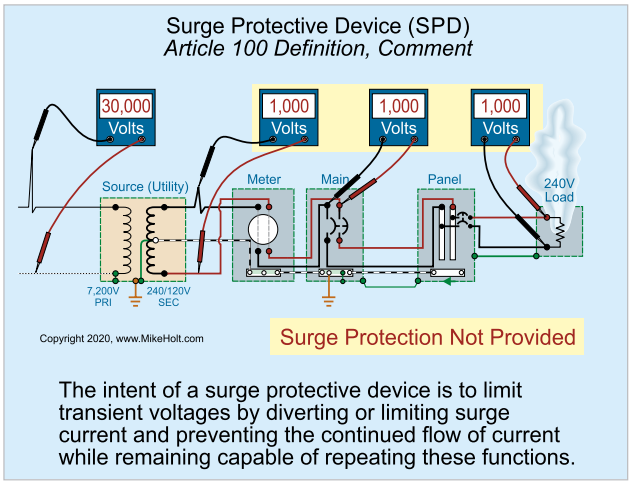


Figure 242–4

Part I. General

242.1 Scope

Part I of this article provides the general, installation, and connection requirements for overvoltage protection and overvoltage protective devices. Figure 242–5

Figure 242–5

Part II covers surge protective devices (SPDs) permanently installed on premises wiring systems of not more than 1,000V, nominal.

Part III covers surge arresters permanently installed on premises wiring systems over 1,000V, nominal.

Part II. Surge Protective Devices (SPDs), 1,000V or Less

242.6 Uses Not Permitted

A surge protective device is not permitted to be used:

(1) In circuits that exceed 1,000V.

(2) In ungrounded systems, impedance grounded systems, or corner-grounded delta systems unless listed specifically for use on these systems.

(3) If the voltage rating of the surge protective device is less than the maximum continuous phase-to-ground voltage available at the point of connection.

242.8 Listing

Surge protective devices must be listed.

Author's Comment:

- According to UL 1449, *Standard for Surge Protective Devices,* these units are intended to limit the maximum extent of transient voltage surges on power lines to specified values. They are not intended to function as lightning arresters. The adequacy of the voltage suppression level to protect connected equipment from voltage surges has not been evaluated.

242.10 Short-Circuit Current Rating

Surge protective devices must be marked with their short-circuit current rating and are not permitted to be installed if their available fault current exceeds that rating.

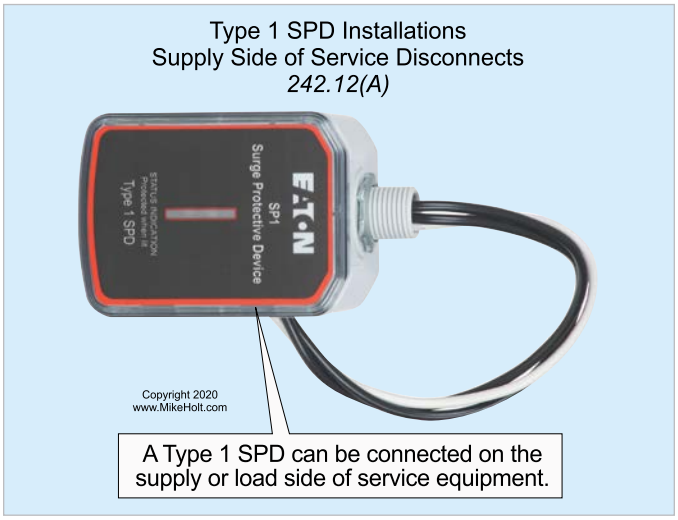
Warning

Surge protective devices are susceptible to failure at high fault currents. A hazardous condition is present if the short-circuit current rating of a surge protective device is less than the available fault current. See 110.10 in this textbook.

242.12 Type 1 SPDs—Line Side of Service Disconnect

(A) Installation. Type 1 surge protective devices can be connected as follows:

(1) On the supply side of the service disconnect [230.82(4)]. ▸Figure 242–6

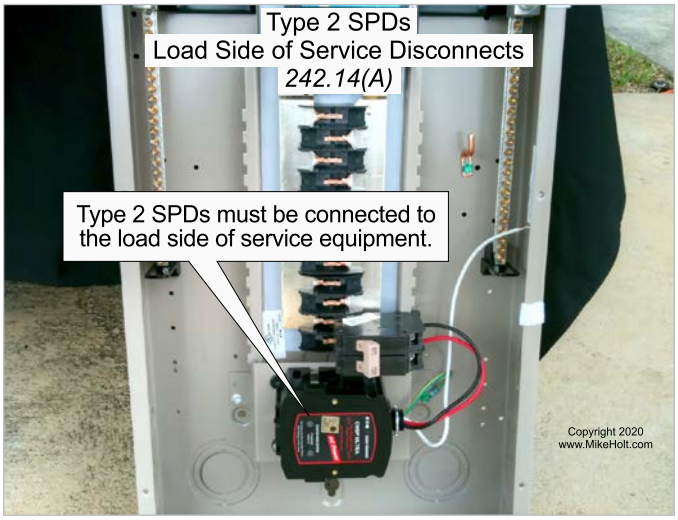


▸Figure 242–6

(2) On the load side of the service disconnect in accordance with 242.14.

242.14 Type 2 SPDs—Feeder Circuits

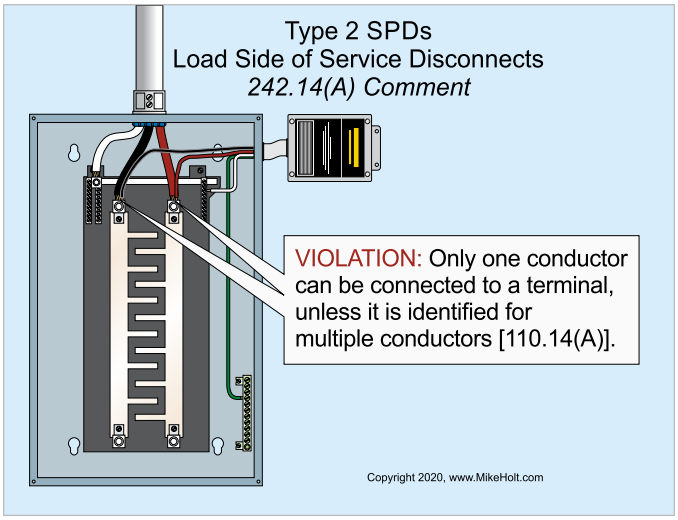
(A) Load Side of Service Disconnect. Type 2 surge protective devices must be connected to the load side of the service disconnect. ▸Figure 242–7



▸Figure 242–7

Author's Comment:

- Only one conductor can be connected to a terminal, unless the terminal is identified for multiple conductors [110.14(A)]. ▸Figure 242–8



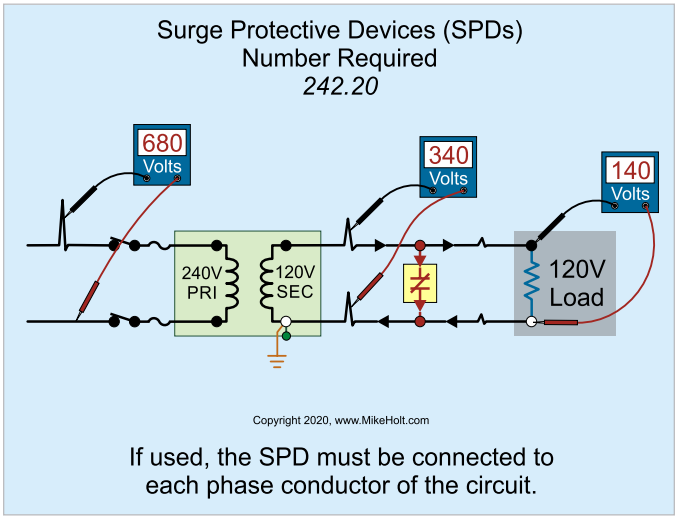
▸Figure 242–8

(B) Feeder-Supplied Buildings. Type 2 surge protective devices must be connected anywhere on the load side of the building overcurrent device.

(C) Separately Derived Systems. Type 2 surge protective devices must be connected anywhere on the premises wiring of the separately derived system.

242.20 Number Required

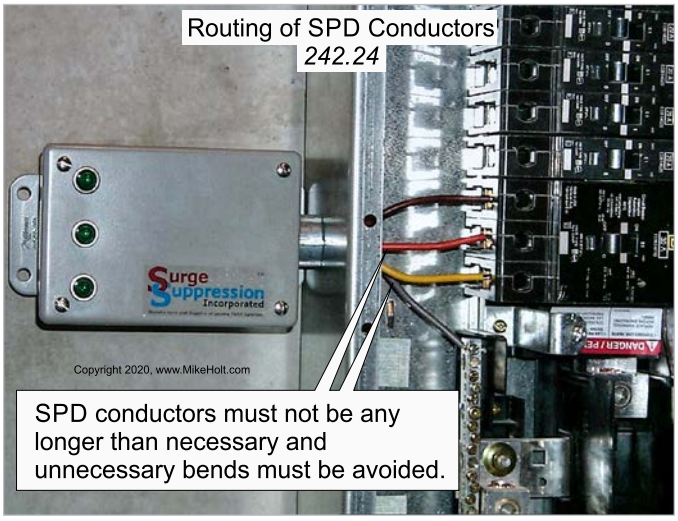
If used, the surge protective device must be connected to each phase conductor of the circuit. ▸Figure 242–9



▸Figure 242–9

242.24 Routing of Surge Protection Device Conductors

Surge protective device conductors must not be any longer than necessary, and unnecessary bends must be avoided. ▸Figure 242–10



▸Figure 242–10

Author's Comment:

- Shorter conductors and minimal bends will improve the performance of the surge protective device by helping to reduce conductor impedance during high-frequency transient events.