

# VAL-US surge protective devices

## “Best Practices” installation guide

This guide is presented solely for informational purposes. It is intended to inform equipment users of some “best practices” to consider when installing Phoenix Contact’s VAL-US products. **IT IS NOT** intended, **nor should it be considered** as an all-inclusive guide.

For additional installation information, please refer to the product’s detailed installation instructions that are included in the package slip and can also be referenced in the “Download” section of the specific VAL-US model’s data sheet.

### VAL-US product information

All VAL-US Surge Protective Device (SPD) models recommended to protect AC power circuits ranging from 120 Vrms to 600 Vrms feature the following key benefits:

- **All VAL-US models are parallel-installed, DIN-mountable surge protective devices**

Parallel-installed SPDs electrically look like equipment “loads” to power distribution. Therefore, they can be installed on any size power circuit, regardless their ampacity. Per the National Electrical Code (NEC), they can be installed either directly (Figure 1), or “T” connected to the AC power source (Figure 2).

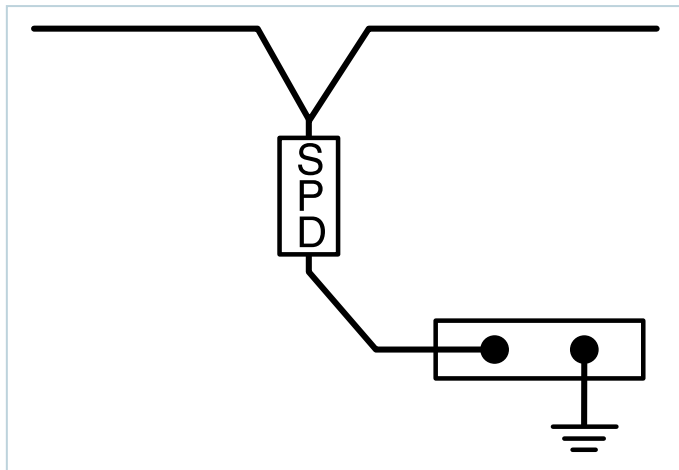


Figure 1

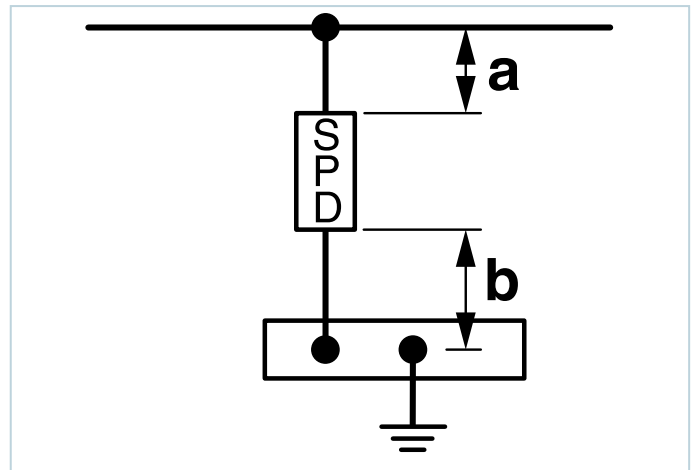


Figure 2

Equipment users requiring a disconnecting mechanism to remove power from the SPD for maintenance purposes can install a fuse or circuit breaker in-line between the SPD and the point where it taps into the power circuit as indicated by the red arrow in Figure 3.

The “a” and “b” notations in Figures 2 and 3 reference the lengths of the leads used to connect the SPD to the power circuit requiring surge protection. SPD lead length considerations will be further discussed later in this guide.

- **All VAL-US SPDs intended to protect on AC power circuits are UL 1449 – 4th edition, TYPE 1 LISTED products, and are MARKED accordingly.**

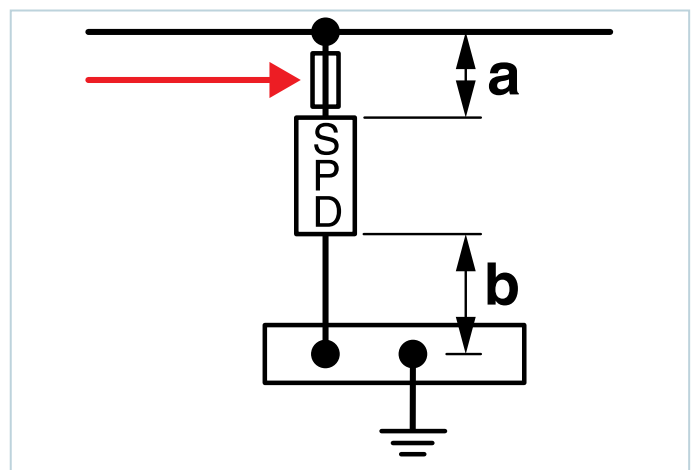


Figure 3

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**UL 1449 LISTED SPDs DO NOT** require any additional surge testing to allow them to be approved for use in **UL 508A LISTED** panels.

**UL defined TYPE 1** SPDs can connect directly to the AC power circuit they are intended to protect without requiring any dedicated external fuses, circuit breakers, or other types of disconnecting mechanisms between them and their point of connection to the power circuit. They can also be installed anywhere in the power circuit on either the **LINE** or **LOAD** sides of the circuit’s **MAIN** disconnect.

**ALL VAL-US AC surge protection devices have an SCCR of 200kA and can be installed within electrical distributions in use nationwide.**

## • Best practice SPD placement considerations

SPDs should be installed on the AC power inputs to the cabinet power supplies and as physically close to them as possible.

“Protected” and “unprotected” AC power lines **SHOULD NOT** be routed in parallel with each other.

Equipment cabinets are best safeguarded against surge threats when they are individually protected with dedicated surge protective devices.

## • Best practice SPD lead length considerations

A surge protective device’s suppression circuit is not bound to just its internal suppression components. It also entails the wiring conductors used to connect it to the power circuit it protects. The SPD’s actual in-circuit voltage protection level is derived by adding the voltage drops across the wiring conductors utilized to connect it to the power circuit (the “a” reference in Figure 2) and to complete the suppression circuit to either the ground, neutral, or another phase conductor (Figure 2, “b” reference) to the SPD’s reported voltage protection level.

The inductance associated with the lengths of the wiring conductors used to connect SPDs to AC power circuits, if overly long, can and **WILL** seriously compromise the suppressors’ performance capabilities.

Longer lead lengths introduce higher values of inductance into the suppression circuits that will increase the surge voltage drop across the wiring conductors. Moreover, those voltage drops will further increase as the bursts of current associated with the surge impulses they are called upon to suppress intensify.

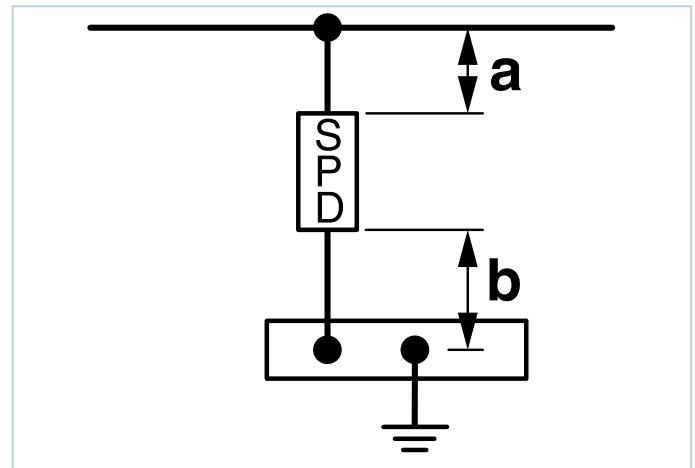


Figure 2

Therefore, as a rule of thumb, equipment users should assume every inch of combined lead length used to install their SPDs will add an additional 20 V/inch to the SPD’s overall voltage protection level during an extreme surge event.

It is recommended to use 10 AWG or larger sized wiring conductors to install Phoenix Contact’s VAL-US products to the AC power circuit requiring surge protection and to maintain those leads to lengths as short as possible - up to 18 inches (Figure 2 “a + b” reference), without loops, and with the largest possible bending radii.

## • Best practice SPD grounding considerations

The SPD’s ground connection terminal should be secured to a properly installed grounding bus bar that is directly connected to the cabinet’s chassis ground reference. If the DIN rail is properly grounded to the cabinet’s chassis ground reference, then a grounding terminal block that is secured to the DIN rail can serve as the SPD’s grounding bus bar. This grounding method ensures the wire lead utilized to ground the SPD can be cut to a minimal length, just long enough to cover the distance from SPD to the grounding terminal block, as shown in Figure 2’s “b” notation.

If the DIN rail is **NOT GROUNDED**, then a properly installed grounding bus system that directly references the cabinet’s chassis ground must be utilized. That system must include a grounding bus bar that is physically positioned as close to the surge protective device as possible. The combined lengths of the leads used to connect to the AC power circuit and to ground the SPD must be limited to a maximum of 18 inches to ensure the SPD performs as designed.