

INSTRUMENTATION AND CONTROL SURGE PROTECTION

120 V AC I/O digital signal protection using the PT PLUGTRAB

TRABTECH

Application Note

2556A

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1 Description

The type of signal protection for 120 V AC digital input/output (I/O) signals is different if the signal source neutral line is shared or isolated. Each solution requires protection to ensure the PLC/controller is not damaged by surges. This document explains why a product is recommended, how it's wired, and how to remotely monitor the status.

Both types of signal protection offer remote monitoring with local indication of a failure. Plugs are hot-swappable without interruption of the signal.

In a shared source application, follow-currents are possible. Follow-currents can pass through systems with gas tube type protection, possibly causing downstream fuses to trip that would require manual resetting. In this application, a PT 2X1 VA is used (see Figure 1) and only MOVs are connected between the signal lines and ground.

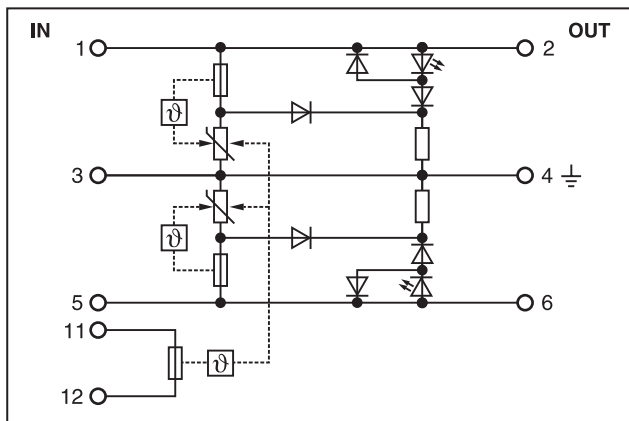


Figure 1. Circuit diagram with PT 2X1 VA

For isolated 120 V AC circuits, the MAINS-PLUGTRAB PT2-PE/S-120AC is recommended (see Figure 2). This product includes a gas discharge tube, but is not used independently in a common mode surge event, eliminating the follow-current issue. In this application, the neutral/return for the 120 V AC source could be at a different potential so it needs to be isolated from the ground with a gas tube. This assures optimum personnel and equipment safety while providing effective surge protection for each circuit.

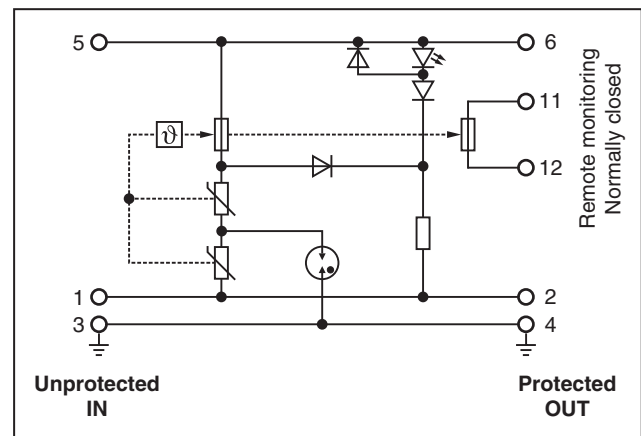


Figure 2. Circuit diagram with PT 2-PE/S-120AC

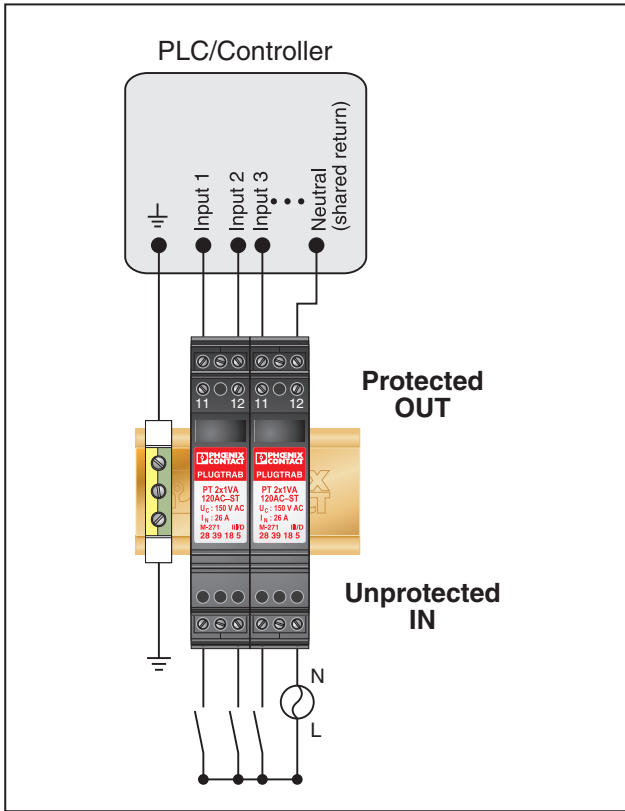


Figure 3. Shared 120 V AC input connections

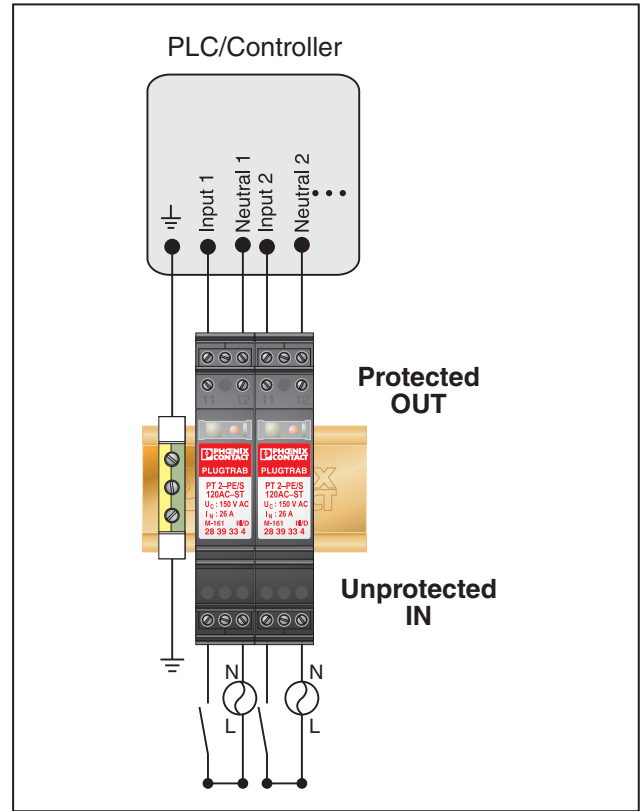


Figure 5. Isolated 120 V AC input connections

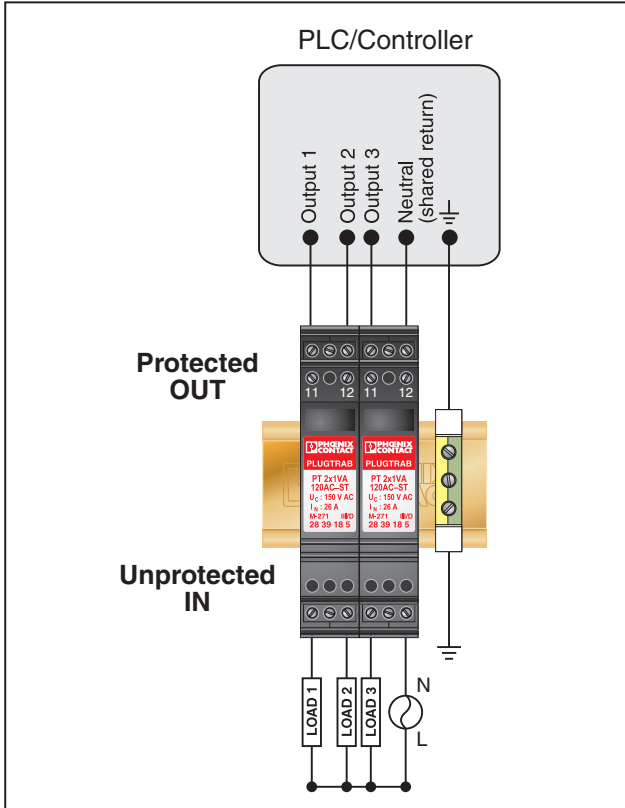


Figure 4. Shared 120 V AC output connections

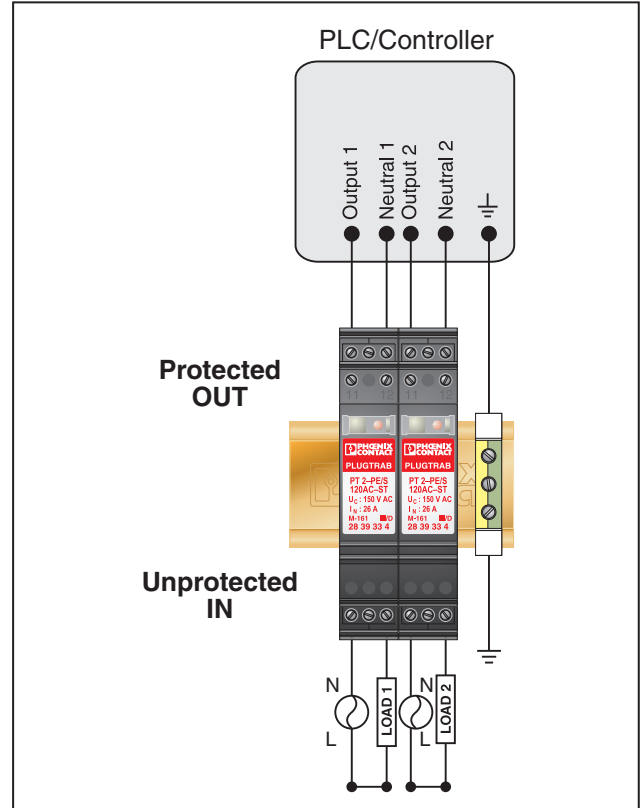


Figure 6. Isolated 120 V AC output connections

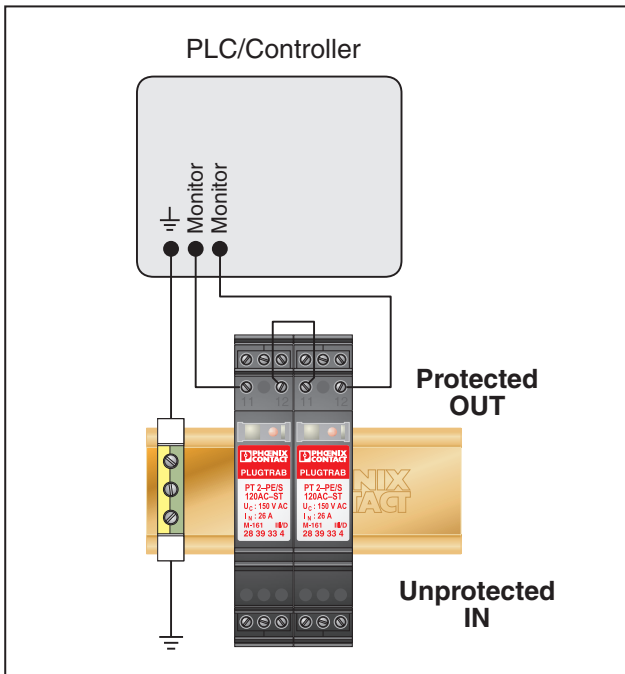


Figure 7. Remote monitoring connections

Monitoring can be daisy-chained so only one alert is sent to the PLC/Controller. An LED on the plug identifies which plug needs replaced.

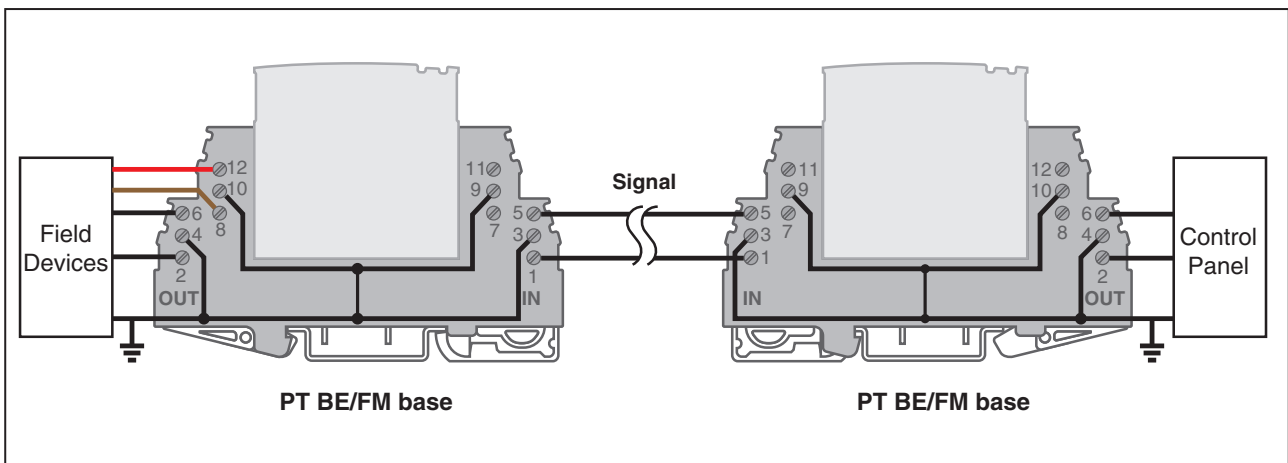


Figure 8. Base element grounding

Only one base element is used for protection of 120 V AC signals. The grounding and remote monitoring are the same for both types of signals.