

## Using surge suppressor with VAMP protection relays

Immunity of the VAMP protection relays for electromagnetic disturbances are tested according to the following standards IEC 60255-26, EN 50263, EN 61000-6-2 and IEC 61000-6-5. All VAMP protection relays fulfill requirements stated in these standards. In environments where electromagnetic disturbance levels are very high (above levels declared in standards) using extra protection against disturbances might be necessary. This application note describes surge suppressor using with VAMP protection relays.

Conducted disturbances are generated by different sources of interference, and can be transferred by inductive or capacitive coupling to the supply cables, the signal cables and the earthing of measuring relays, protection equipment as well as PLC. The interference voltages are particularly disturbing when breaking currents in inductive circuits, and breaking even small currents and low voltages can cause high interference voltages, Also in the sub-station, arcs are caused by the operation of circuit-breakers and disconnectors, this breaking operation also generates transients, which have high energy content.

Surge Suppressors are used to suppress the high voltage spike that is generated when a relay or contactor coil is de-energized. The electromagnetic field collapsing across the coil generates a voltage spike in the wires of the control system. Without the suppressor, the surge can reach value, which is many times greater than rated coil voltage and can propagate through the system causing electronic controls to go to unwanted operations. In addition using surge suppressors increases life time of the contactor and control system.

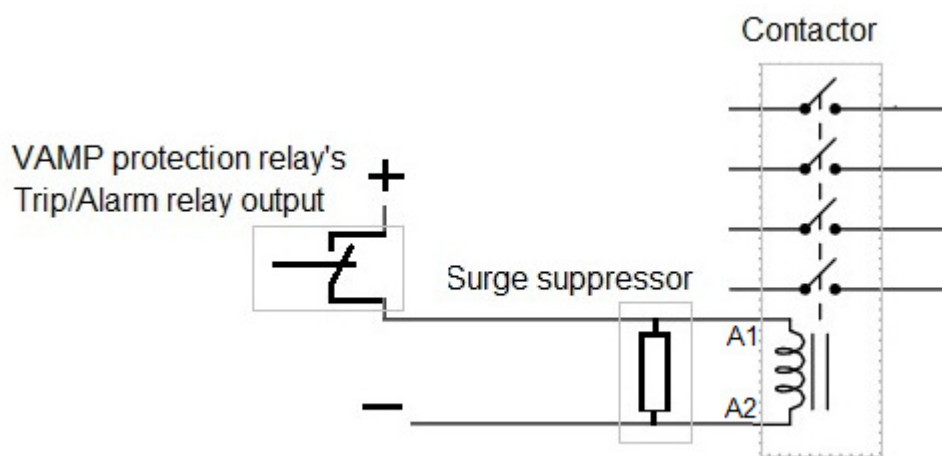
Different surge suppressor types:

- Diode suppressor (Used on DC coil)
  - Suppresses the DC voltage by recirculating the voltage through the coil. The energy will be dissipated by the coil itself.
  - Most common surge suppressor on DC coils
  - Breaking inductive DC currents without surge suppressor generates voltage peaks up to kilovolts. Therefore using surge suppressor is highly recommended.
  
- ResistorCapasitor suppressor (Used on AC coil)
  - The resistor controls the rate of capacitor charging and to limit the coil's inrush current. The capacitor is used to limit the voltage peaks.
  
- Varistor suppressor (Used on AC and DC coil)
  - The varistor limits the voltage peak coming from coils inductive discharging current.
  - Maximum reduction of transient voltage peaks.

- Bidirectional peak limiting diodes (transil)
  - o Maximum reduction of transient voltage peaks.

In general using surge suppressor increases lifetime of the contacts and decrease conducted and radiated disturbances.

When VAMP protection relays with surge suppressors are used the surge suppressor shall be installed close to the contactor according to the manufacturer's instruction of the surge suppressor or using contactor with integrated surge suppressor. When external surge suppressor is used the length of wires should be minimized.



Picture 1. Wiring example

Poor wiring and earthing are most common reason for electromagnetic problems. Checking and preparing wiring and earthing might solve many of disturbance problems.

Recommended types by our experience:

**Varistors (peak limiting)**

- Protection provided by limiting the transient voltage to 2 Uc max.
- Maximum reduction of transient voltage peaks.

Clip-on mounting on all ratings and all coils.	~ or ≡	24...48 V	<b>LA4 FVE</b>	0.040
		50...110 V	<b>LA4 FVF</b>	0.040
		127...240 V	<b>LA4 FVP</b>	0.040
		265...415 V	<b>LA4 FVV</b>	0.040

**Bidirectional peak limiting diodes (transil)**

- Protection provided by limiting the transient voltage to between 2 and 2.5 times Uc max.
- Maximum reduction of transient voltage peaks.

Clip-on mounting on all ratings and all coils.	~ or ≡	24...48 V	<b>LA4 FTE</b>	0.040
		50...110 V	<b>LA4 FTF</b>	0.040
		127...240 V	<b>LA4 FTP</b>	0.040
		265...415 V	<b>LA4 FTV</b>	0.040

Picture 2. Recommended types

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