

Badger Meter electronic meters, instruments, and sensors have been designed for industrial and commercial use and generally have a high degree of built-in noise immunity and transient spike protection. However, even the best equipment can experience difficulties in operation if certain minimal considerations are not adhered to when installing the equipment.

Electrical spikes of several thousand volts can occur in certain industrial equipment. These can penetrate electronic equipment and cause momentary disruption, erratic displays, lock-up, or permanent damage. Electrical noise or spikes can develop from the following sources:

- (a) Supply line due to power surges from switch on and off large motors, solenoids, welders, or by electronic switching of large variable speed drives.
- (b) Relay contact noise results in large spikes that are generated by switching inductive loads such as solenoids, motors, or even small relay coils driven by relay contacts.
- (c) RFI or EMI noise can be developed by high frequency communications or high power switching of other types of equipment. This noise can be transmitted through the air and can penetrate electronic equipment.
- (d) Lightning spikes caused by direct lightning strikes or nearby strikes.

As with any electronic meter, instrument, or sensor that is designed to suppress the effects of these "noise" conditions, there is no absolute guarantee that all conditions are protected against. The Badger Meter sensor has been tested in many different severe "noise" environments, some testing has been done in direct competition with competitive impeller type sensors. The Badger Meter impeller sensor protects against "noise" better than virtually all of our competitors. However, in some extreme situations, additional external protection is required.

All Badger Meter instruments and meters are designed for optimum "noise" immunity. We have extensively tested our Series 1500 and Series 2000 instruments in direct heavy inductive load environments. However, there may be field situations that require external suppression to ensure operation in a specific installation.

Cautions and Various Recommendations to Reduce the Effects of Electrical Noise:

A. Supply Line:

A metal oxide varistor (MOV) placed across supply lines at a unit often clips high voltage spikes sufficiently to prevent malfunction. An RFI line filter added protection. In some cases, the user may need to install lightning arrestors or isolating power supplies feeding electronic equipment.

B. Relay Contact:

Arc suppression should be used across inductive loads such as solenoids, motors, or relay coils. Suppressing spikes at the coil is always advisable. For DC powered coils, a simple diode placed across the relay coil is usually very effective. For AC powered coils, and MOV placed across the coils will clamp the voltage and usually reduces effects on equipment. In addition, placing a capacitor across a coil is also effective. Sometimes both of these are necessary.

C. RFI Noise:

If electrical noise can not be suppressed, it is recommended that any electronic equipment be mounted away from relay coils, solenoids, variable speed drives, or other noise sources. Often it is sufficient to separate the instrument by 6 to 18 inches from the noise source, but in some instances metal shielding or metal cases may be necessary where strong RF noise fields exist.

D. Signal Input Lines:

Signal input or output lines should be run separately from power lines, or lines that have large surges that can couple electrically to signal lines. Signal lines should not be run in the same trough or bundle as power lines. It is always good practice to run the low current signal lines through shielded cable with the shield tied to DC ground at the source. Tying the shield to earth ground is recommended only if there is still noise after the unit is installed. As often as not, the shield connected to earth ground causes as many problems as it solves. If a shield is tied to earth ground, it should be connected at one place or point, ideally as close to or coincident with the DC ground as possible.

E. Lightning Protection:

Proper grounding is a key to sound lightning protection. In addition, if you are high lightning incidence area you may need arrestors and certainly opto-isolators or other such isolation devices. Lightning requires specialized protection in high incidence areas.

F. Grounding:

Grounding from an instrument or sensor to earth ground should always be with as short a wire run as possible, and should always be with eighteen gauge wire or heavier.

Badger Meter Application Engineers are always available to assist you; however, we can't know your exact noise condition or system configuration, and you may need local expertise in certain cases.

DAB-042-01

4-09

Badger® and Data Industrial® are registered trademarks of Badger Meter, Inc.



Please see our website at www.badgermeter.com
for specific contacts.

Copyright © Badger Meter, Inc. 2009. All rights reserved.



BadgerMeter, Inc.

6116 E. 15th Street, Tulsa, Oklahoma 74112

(918) 836-8411 / Fax: (918) 832-9962

www.badgermeter.com