

# Instrumentation Northwest, Inc. (INW)

## APPLICATION NOTE

### GROUNDING INFORMATION FOR SENSOR SYSTEMS

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#### Introduction

The purpose of this document is to provide an overview of grounding issues related to the use of sensor systems. This is just an overview. Be sure to refer to the U.S. Consumer Product Safety Commission, the National Electrical Code, and/or an electrical engineer with experience in grounding issues before installing your system.

#### Why is Grounding Important?

Grounding does two things. First, it protects equipment and personnel from high power spikes. Second, it improves measurement accuracy by eliminating ground loops.

#### Safety Concerns

It is commonly known that when using electronic equipment, both personnel and equipment need to be protected from high power spikes that may be caused by lightning, power line surges, or faulty equipment. **Without a proper grounding system, a power spike will find the path of least resistance to earth ground**, whether that path is through sensitive electronic equipment or the person operating that equipment. In order to ensure safety and prevent equipment damage, a grounding system must be used to provide a low resistance path to ground.

#### Ground Loop Effects

When using several pieces of interconnected equipment, each of which may have its own ground, problems with noise, signal interference, and erroneous readings may be noted. This is caused by a condition known as a **Ground Loop**. Because of natural resistance in the earth between the grounding points, current can flow between the points, creating an unexpected voltage difference and resulting erroneous readings.

## Maximizing Safety and Minimizing Ground Loop Effects

### Safety

Proper grounding and the use of surge protectors are very important to ensure that your system provides **a single low resistance path to ground**. This will shunt high voltage spikes to ground, helping to prevent equipment damage and personal injury. Consult the National Electrical Code for details and safety standards.

### Ground Loop Effects

The single most important step in minimizing a ground loop is to tie all equipment (sensors, dataloggers, external power sources, housings, radios, cell modems and any other associated equipment) to a **single common grounding point**. INW recommends connecting the shield to ground at the connector end.

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Instrumentation Northwest appreciates any comments you may have regarding this application note. Please contact:

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