

Advantech AE Technical Share Document

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Category	■ FAQ □ SOP	Related OS	NA
Abstract	Minimize Noise when Measuring Analog Signal using Advantech DAQ Card(DIFF mode)		
Keyword	Common Mode Voltage		
Related Product	PCI-1714U, PCI-1714UL, PCI-1715U, PCI-1716, PCI-1716L, PCI-1718H DU, PCI-1718H GU, PCI-1741U, PCI-1742, PCI-1747U, PCIE-1744, PCIE-1802, PCIE-1810, PCIE-1816, PCIE-1816H, PCL-818L, PCL-818HD, PCL-818HG, PCM-3718H, PCM-3718HG, PCM-3718HO, PCM-3810I, PCM-3813I, USB-4702, USB-4704, USB-4711A, USB-4716, MIC-3714, MIC-3716		

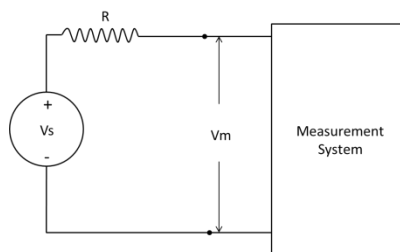
■ **Problem Description:**

In a signal measuring system, there are always noise issues. This is not always true that using the same connection in different measuring system especially there are different ground or different source type in different system. This FAQ will describe how to minimize the noise in the system by proper connections.

■ **Problem Analysis:**

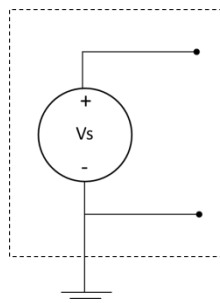
1. **Source types:**

A common signal measurement model is depicted as follow, a source directly be connected to the measurement system. The voltage signal is measured as the potential difference between two points or nodes.



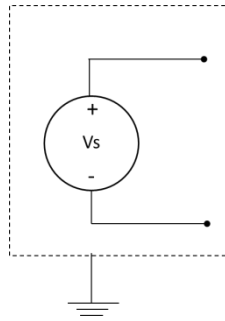
● **Grounded or ground referenced signal source**

A grounded signal source is a signal which is referenced to the earth. For example a DC power supply is has a ground and does not float its output signal. The following figure shows this.

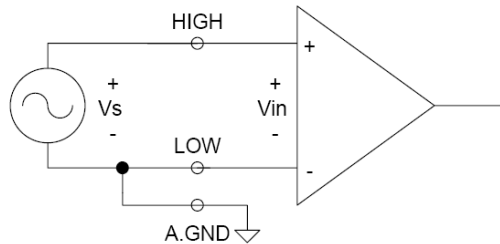


● **Ungrounded or unreferenced signal source**

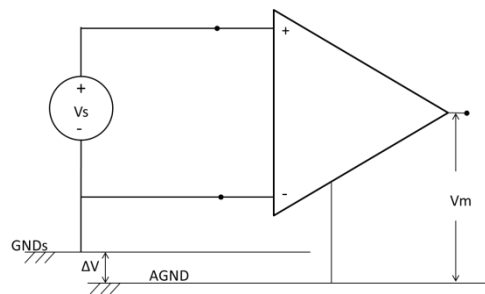
An ungrounded signal source is a signal without a reference ground, in other words it is a floating signal source. The most common example is a battery, the negative side of battery is always floating. Each point in the signal system is independent to earth. The figure below depicts this.



2. Differential Channel Connection



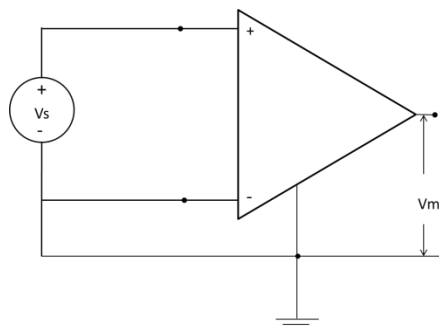
The figure shows measuring a floating source. The HIGH and LOW connect to the both end of the source respectively. However for a ground referenced signal, the unwanted potential will show up between the signal ground and analog ground. The following figure depicts the difference between two grounds graphically.



In this way, the potential between two grounds is unknown and changeable so that V_m will be $V_s + \Delta V$ actually.

■ **Brief Solution - Step by Step:**

To solve the ΔV noise issue, connect both signal ground and analog ground together so that the reference ground of signal and measurement will be on the same level.



■ **Reference:**