

AN507: SCM5B

Application Note: Shield Grounding

Cable shielding is used primarily to minimize or eliminate capacitively coupled interference from electric fields. When properly implemented, it can also be used to minimize inductive coupling from magnetic fields. Shielding is only effective against electric fields if it provides a low impedance path to ground. A floating shield provides no protection against interference. Grounding of shields can be a controversial subject because there are several ways to do it. The correct place to connect an electrostatic shield is at the reference potential of the circuitry contained within the shield. This point will vary depending upon whether the source and receiver are both grounded or whether one or the other is floating.

Block diagrams of the SCM5B modules, found in the Product Catalog, show the reference potential for the input signal (i.e. -IN). This point is generally also the reference potential of the field-side circuitry (shown with the ground symbol). Because all of the SCM5B modules have a high level of isolation between the field-side and system-side circuitry, the field-side connections are effectively differential inputs or outputs.

When using sensors with no shield connection at the sensor, connect the signal line shield to the SCM5B input signal reference potential (Figure 1). Some data acquisition systems require the sensor to be grounded. This might be found when using thermocouple or RTD probes which are designed for insertion into thermowells. In this configuration, the SCM5B module provides the isolation necessary to eliminate signal degradation from differences in ground potentials and ground loop currents. If a cable shield is present, it should be tied to ground at the sensor (Figure 2). Make the shield connection to ground as close as possible to the sensor connection to ground to avoid a difference in potential between signal lines and shield grounds. This potential difference can induce noise on the signal lines.

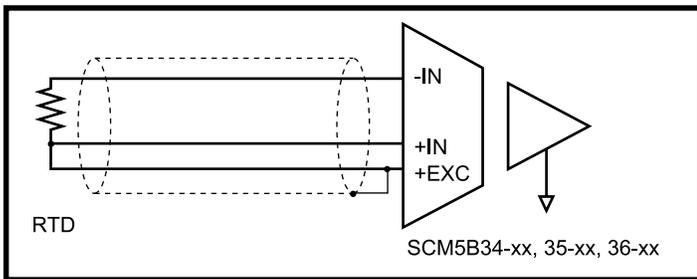


Figure 1: Shield Grounding, Ungrounded Sensor

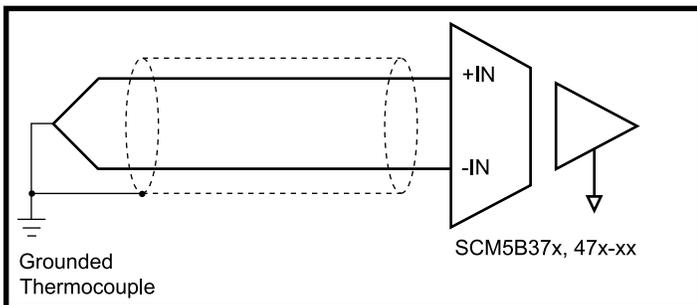


Figure 2: Shield Grounding, Grounded Sensor