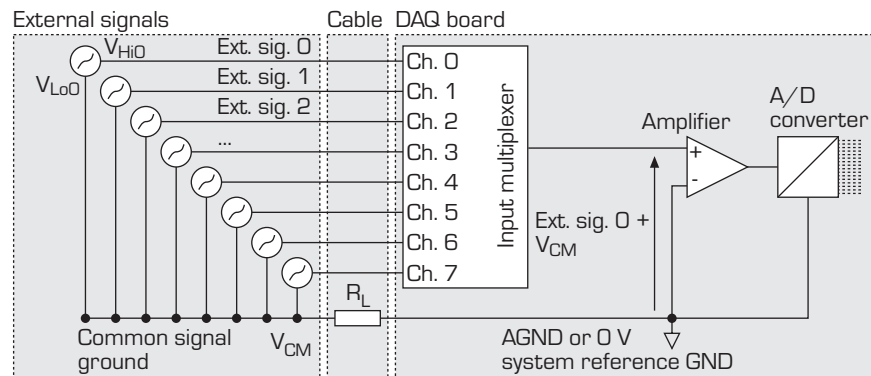


Subject: Single-ended and Differential Inputs on DAQ Analog Input Boards

FAQ: How do single-ended and differential channels work?

What it does: On the PCI and CompactPCI boards of the ME series you can use the analog inputs as single-ended or differential channels - depending on the length of your acquisition lines and on the signal levels.

Single-ended: Boards with single-ended inputs have one single input wire for each signal (the "Hi" side or the source). All sources' "Lo" sides are connected to a common AGND pin (analog ground).



Advantages:

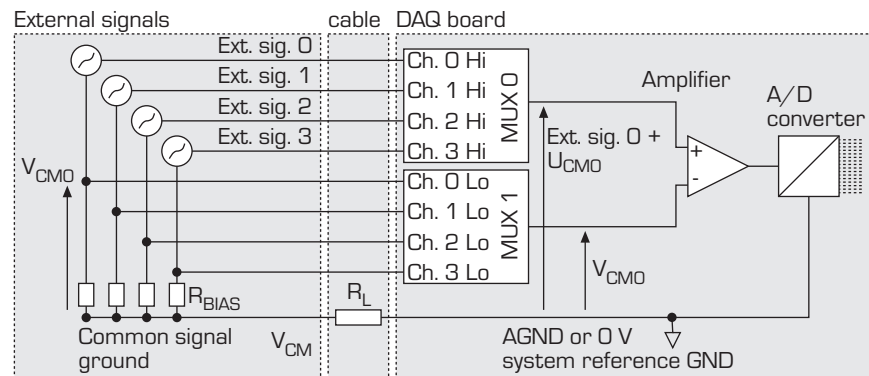
- Simple connectivity (only one common ground).
- Maximum number of input channels of a DAQ board can be used for measurement.
- ADC input circuitry on the DAQ board is simple and cheaper.

Disadvantages:

- Loss of common mode rejection, introduces offset as an error into readings.
- Very sensitive to noise when wires longer than ~ 0.5 m (depending on the signal level) are used. Not recommended for high gains (higher than 5x).

Differential:

True differential channels have one individual input for the signal's "Hi" side and "Lo" side per channel. Differential channels provide the maximum noise immunity. Moreover this method must be used where signal sources have different ground points and cannot be connected together.

**Advantages:**

- The common mode voltages are fed to the amplifier's "Lo" terminal, the individual V_{CMx} voltages are subtracted.
- Noise signals will tend to be cancelled out, as they are present on both inputs.
- Ideal solution for wires of up to 1 m length (depending on the signal level) and higher gains.

Settings:

On most of the ISA DAQ boards you had to set jumpers to configure the board for the use with single-ended or differential input channels. Today, in the "age of Plug&Play", the single-ended or differential mode is almost always software selectable on modern PCI and CompactPCI boards. The Meilhaus Electronic DAQ boards ME-2000i, ME-2600i and ME-3000 for example are supported by a driver software function "...AIMakeChannelListEntry" ("me2600AIMakeChannelListEntry" or "me2600AIMakeChannelListEntry"). This function has a parameter "mode" that sets the channel operating mode to single-ended or differential.

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