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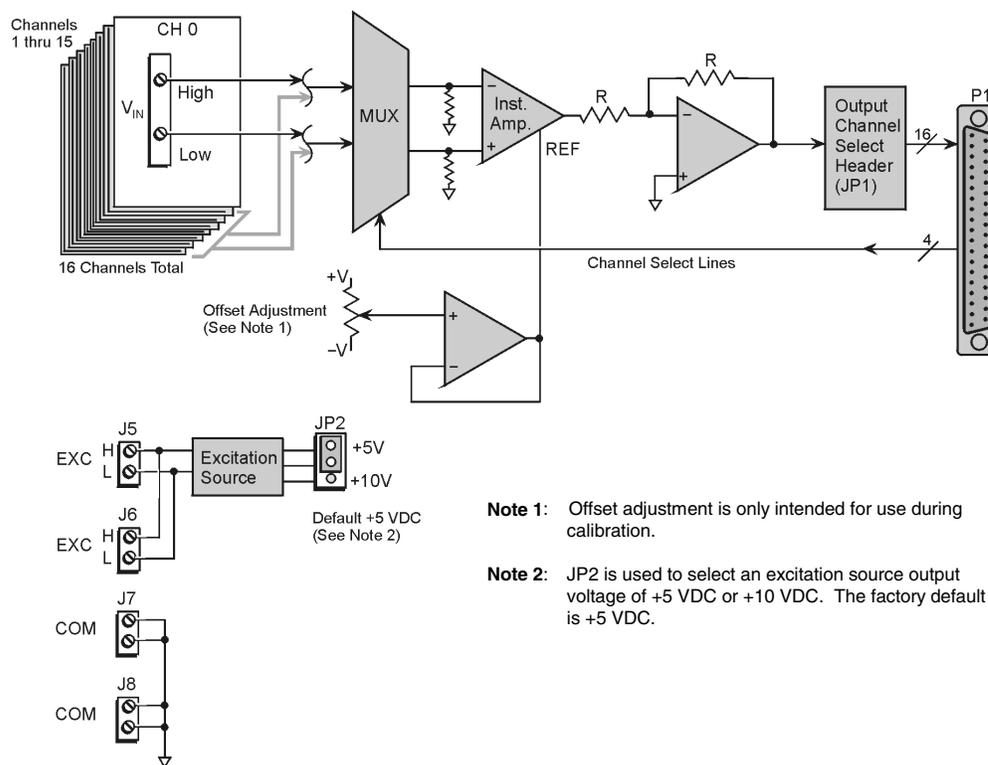
### Reference Notes:

- Refer to [Chapter 2, Power Management](#), in regard to calculating system power requirements.
- [Chapter 3, System Connections and Pinouts](#), includes pinouts for P1, P2, P3, and P4. Refer to the pinouts that are applicable to your system, as needed.

## Overview

The DBK80 is a low-noise, high-speed, unity-gain multiplexer card that provides 16 channels of differential voltage input. Up to 16 such cards can be attached to a single Daq device, providing a possible 256 differential input channels. The card's unity gain combines with DaqBook, DaqBoard, and LogBook gains to accept full scale inputs from  $\pm 156$  mV to  $\pm 10$  V. The DBK80's expansion channels can be scanned at the maximum 200 kHz rate while maintaining measurement integrity.

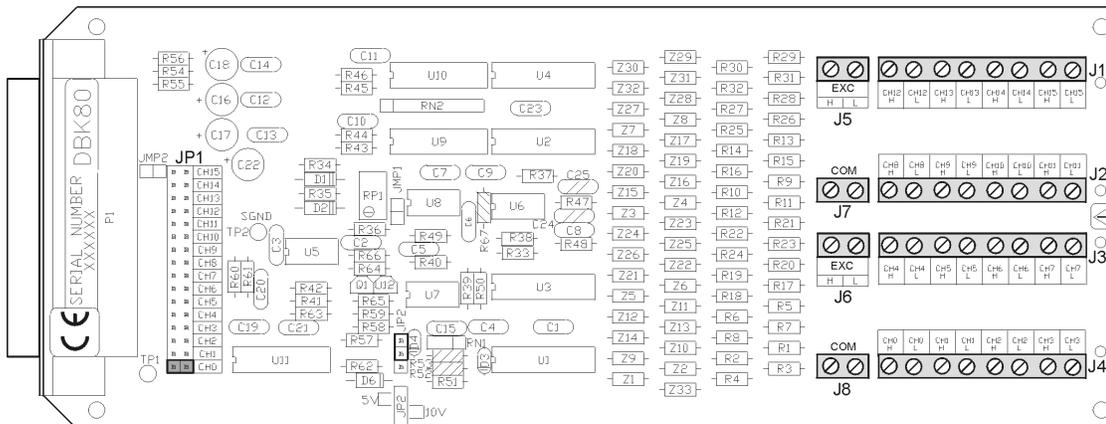
The DBK80 includes an on-board excitation voltage source that is jumper-selectable to be +5 or +10 VDC. This source can be used to bias transducers or to measure resistors and thermistors without additional instrumentation.



**DBK80 Block Diagram**

# Hardware Setup

## Card Connection



**DBK80 Board Layout**

Referring to the figure above, voltage input signals are connected to the screw terminal blocks labeled J1, J2, J3, and J4. Each channel is labeled “H” and “L” to denote its polarity. These inputs accept voltages up to ±10 VDC.

### Excitation Source

J5 and J6 provide the excitation source output, again labeled with “H” and “L” to denote polarity. Note that J5 and J6 are connected in parallel. There is only one voltage source; two connectors are simply provided for wiring convenience.

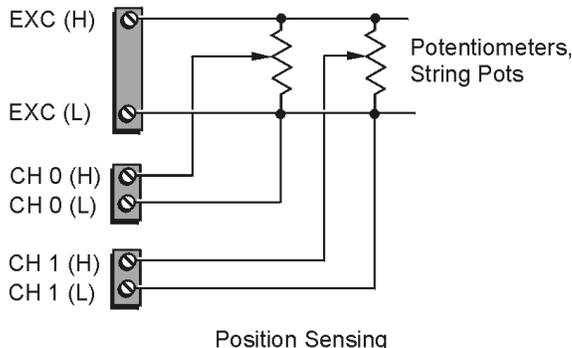
The excitation source is ground-referenced, not floating. That is, its low terminal is connected to the ground of the Daq device. It is designed to interface to circuits where it is the only power source, or where its connection is electrically isolated from other power sources. An example of the latter is an optocoupler.

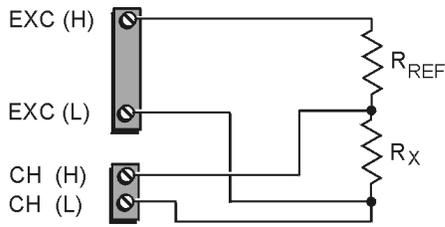
CAUTION

**Do not connect the excitation source to a non-isolated, powered circuit. Making such a connection can cause damage to both the DBK80 and to the circuit under test.**

The excitation source outputs should also be used together, with the “L” of the source providing the ground reference to the connecting circuit. This provides two benefits. It maintains the accuracy of the source, since the regulation of the “H” terminal is referenced to the “L” terminal. It also returns the load current directly to its source, where its path is designed to not influence any other part of the measurement system.

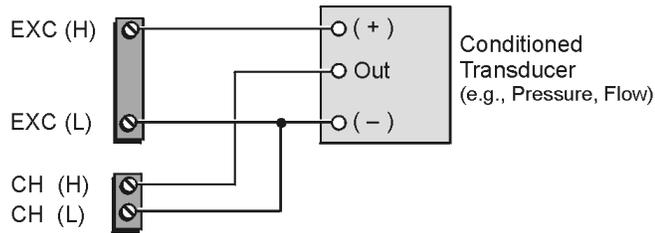
Three examples of using the excitation source follow. They are *Position Sensing*, *Resistance/Thermistor Measurement*, and *Reading a Transducer*.





$$R_X = R_{REF} \left[ \frac{V_{CH}}{V_{EXC} - V_{CH}} \right]$$

Resistance/Thermistor Measurement

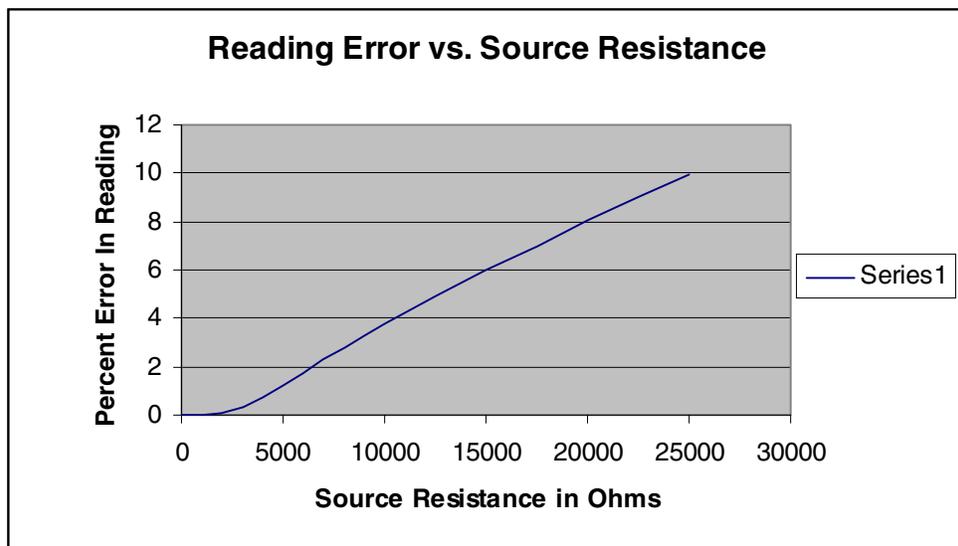


Reading a Transducer

### Source Impedance and Settling Time

High speed multiplexing of signal sources with non-zero impedance will result in reading errors caused by settling time. In the simplest form, a multiplexing system consists of a group of switches, with internal resistance, and an output capacitance at the input of an amplifier feeding an A/D converter with a sample-hold circuit on the input. During the short time a channel signal is connected to the A/D amplifier, the signal must charge the output capacitance to the true value of the signal so that the sample-hold captures an accurate value for the A/D converter to digitize. If the source has significant internal impedance the voltage reading will be reduced.

Source impedance below 1000 ohms will create negligible error. Above 1000 ohms, the effects are increasingly noticeable. An accurate source in series with a variable resistance will readily demonstrate this. Although the effect is exponential, an easy reference point to remember is that 25K of source impedance will result in approximately a 10% error.



## Analog Ground

J7 and J8 provide access to analog ground. The most common use for them is to provide a ground reference point for differential measurements. This is discussed in the *Signal Management* section of Chapter 1.



**Although J7 and J8 are electrically equivalent to the "L" signal of the excitation source, they should never be used as the return point for the excitation source.**

## Card Configuration

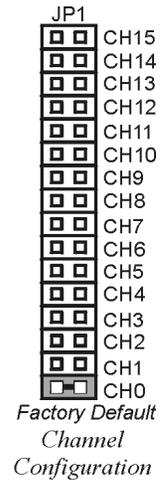
Configuration of the DBK80 involves setting the channel address and selecting the excitation output voltage.

Up to sixteen DBK80 cards can be attached to a single LogBook or Daq device, providing up to 256 differential input channels.

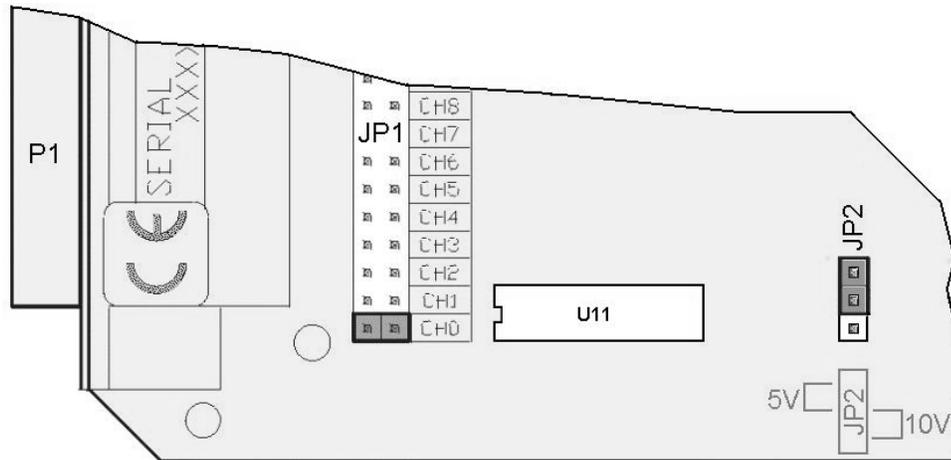
Since multiple cards are connected via a parallel interface, each card must have a unique channel address. To assign a channel number to the card, locate the 16x2-pin header (labeled JP1). JP1's jumper locations are labeled CH0 through CH15. Place the jumper on the two pins that correspond with the intended channel.



**Only one channel configuration jumper is to be used per card. Each card in the system must have a unique jumper setting.**



The excitation output voltage is set via JP2.



**JP2 Location Reference**

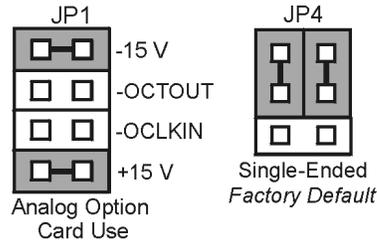
The above figure is of a partial DBK80. JP2 is shown selected to +5VDC. Note that the card's overlay for JP2's voltage selection, also depicted in the figure, indicates the jumper positions that are required to select the +5 or +10 VDC excitation output.



## DaqBook and DaqBoard [ISA type] Configuration

Use of a DBK80 with a DaqBook, or with an ISA-type DaqBoard, requires the configuration of jumpers JP1 and JP4 located on the DaqBook, or DaqBoard, as applicable.

1. If not using auxiliary power, set the JP1 jumper for **Analog Option Card Use**, also referred to as the expanded analog mode.



*Required Jumper Settings in DaqBooks and ISA-Type DaqBoards*



**The JP1 default position (above) is necessary to power the interface circuitry of the DBK80 via the internal  $\pm 15$  VDC power supply. If using auxiliary power (e.g., a DBK32A or DBK33), you must remove both JP1 jumpers. Refer to chapter 2, [Power Management](#) and to the DBK32A or DBK33 sections as applicable.**

2. For DaqBook/100, DaqBook /112, and DaqBook /120 *only*, place the JP4 jumper in the *single-ended* mode.

**Note:** Analog expansion cards convert all input signals to single-ended voltages that are referenced to analog common.

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## Software Setup

The DBK80 has no special software settings. The software controls are equivalent to those for a direct connection; e.g., for a DaqBoard/2000 Series board there are *Type* selections of x1 to x64, representing the internal gain of that board. When using the DBK80 with that board you will have the same *Type* options, since the DBK80 is always a constant gain of x1.

Note that there is no software control related to the excitation source. The selection of a +5 VDC or +10 VDC source is determined by JP2.

### Reference Notes:



- **DaqView users** - Refer to [Chapter 4, DBK Setup in DaqView](#).
- **LogView users** - Refer to [Chapter 5, DBK Setup in LogView](#).

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## **DBK80 - Specifications**

**Connector:** DBK37 male, mates with P1 pinout on a DaqBook, DaqBoard, or LogBook. The board includes screw-terminals for signal connection.

**Gain Ranges:** 1, x1

**Inputs:** 16 differential voltage inputs

**Maximum Voltage Range:**  $\pm 10$  V

**Input Impedance:** 20M Ohm

**Accuracy:**  $\pm[0.025\% + 150 \mu\text{V}]$  (typ),  
 $\pm[0.1\% + 250 \mu\text{V}]$  (max)

**Noise:** 60  $\mu\text{Vrms}$  (typ)

**Maximum Input Voltage (without damage):**  $\pm 35$  V

**3 dB Bandwidth:** 2.6 MHz

**CMRR:** 80 dB typ

**Excitation Voltage:** 1 channel, jumper-selectable to +5 V or +10 V

**Excitation Voltage Accuracy:**  $\pm 0.5\%$

**Excitation Voltage Current Limit:** 20 mA Src, 1 mA Sink

**Power:** 25 mA max from  $\pm 15$  V (with no load on excitation voltage)