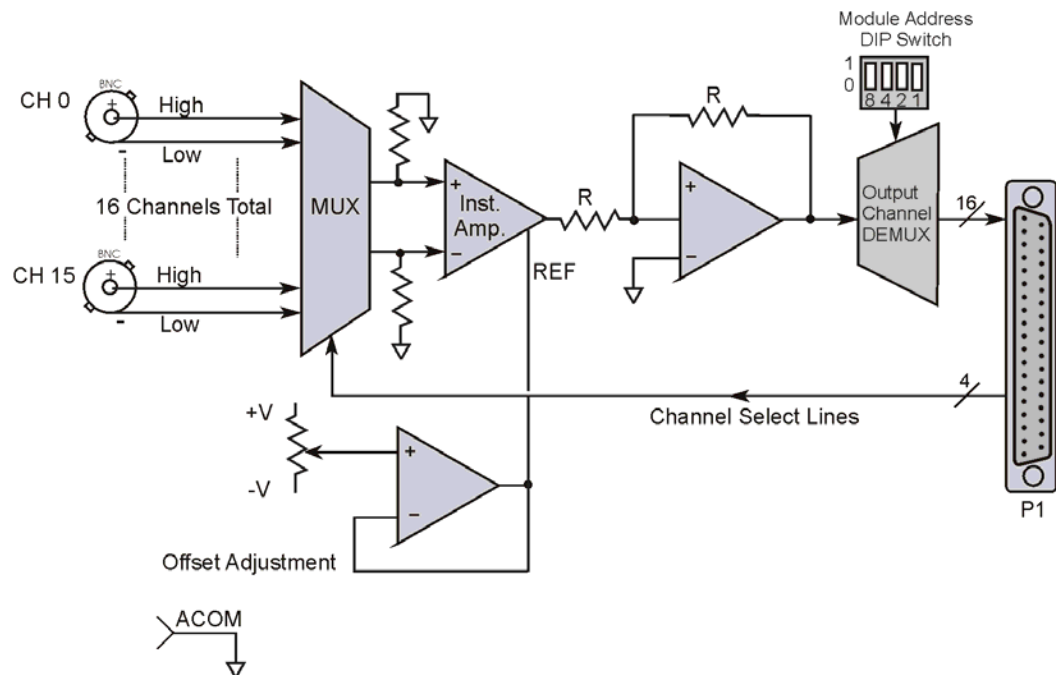# DBK85

16-Channel Differential Voltage Module

Reference Notes:
- o Chapter 2 includes pinouts for P1, P2, P3, and P4. Refer to pinouts applicable to your system, as needed.
- o In regard to calculating system power requirements, refer to *DBK Basics* located near the front of this manual.

DBK85 Front Panel

DBK85 Block Diagram

Overview

The DBK85 is a low-noise, high-speed, unity-gain multiplexer module that provides 16 channels of differential voltage input. Up to 16 DBK85 modules can be attached to a single LogBook or Daq device, providing a possible 256 differential input channels. The module's unity gain of x1 combines with DaqBook, DaqBoard, and LogBook gains to accept full scale inputs from ±156 mV to ±10 V. The DBK85's channels can be scanned at the maximum 200 kHz rate while maintaining measurement integrity.

Hardware Setup

Configuring the DBK85 Module

Up to sixteen DBK85 modules can be attached to a single LogBook or Daq device. Each module must have a unique channel address because they connect to the primary data acquisition device via parallel interface.

CAUTION
Adjustment of the channel address must only be performed when the system power is OFF. Failure to do so may result in equipment damage.

To assign a channel address to the DBK85 module, first locate the DIP switch on the right side of the rear panel. Four micro-switches [on the DIP switch] are used to set the module's channel address in binary. After ensuring that the system power is OFF, adjust the micro-switches to set the desired address. The 16 possible addresses are illustrated in the following figure.

**Each module in the system must have a unique primary device channel address.**
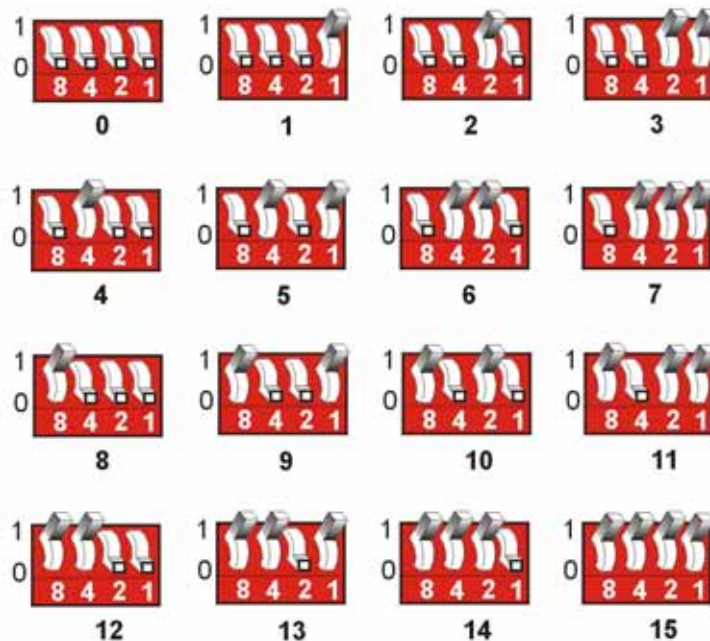
The 16 Possible Address Settings for DBK85 Modules

Configuring the Primary Data Acquisition Device

DaqBook/100 Series & /200 Series and DaqBoard [ISA type] Configuration

Use of a DBK85 with a DaqBook/100 Series, /200 Series devices, or with an ISA-type DaqBoard requires the configuration of jumpers JP1 and JP4. These jumpers are located on the DaqBook/100 Series, /200 Series devices, and DaqBoard [ISA type] board.

1. If not using auxiliary power, set the JP1 jumper for **Analog Option Card Use**, also referred to as the expanded analog mode.
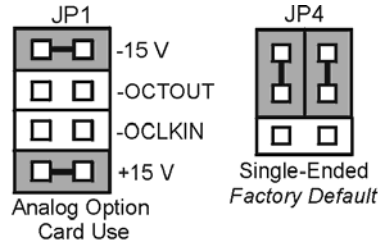
> **Note**:
> These jumpers do not apply to /2000 Series Devices.

Required Jumper Settings in DaqBook/100 Series & /200 Series and ISA-Type DaqBoards

The JP1 default position (above) is necessary to power the interface circuitry of the DBK85 via the internal ±15 VDC power supply. If using auxiliary power (e.g., DBK32A or DBK33) you must remove both JP1 jumpers.
For additional information refer to *Power Requirements* **in the** *DBK Basics* **section and to the DBK32A and DBK33 sections, as applicable.**

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

Reference Note: Analog expansion cards convert all input signals to single-ended voltages that are referenced to analog common. The DBK85's analog common connector is located next to the channel 1 BNC. The connector is typically used to provide a ground reference point for differential measurements as discussed in Chapter 1, *Signal Management*.

DaqBook/2000 Series & DaqBoard/2000 Series

No jumper configurations are required on the DaqBook/2000 series and DaqBoard/2000 series devices in regard to connecting a DBK85.

LogBooks

No jumper configurations are required on LogBook devices in regard to connecting a DBK85.

CE Compliance

If your data acquisition system needs to comply with CE standards, the DBK85 must be connected to the LogBook or Daq device by a CA-143-x cable. In addition, the CE compliant operating conditions must be met as specified on the DBK85 module's *Declaration of Conformity* card, which is shipped with the module.

Reference Notes: If your data acquisition system needs to comply with CE standards, refer to the following:
- o the DBK85's *Declaration of Conformity*
- o the *CE Compliance* section of *Signal Management* chapter of this manual

Connecting the DBK85 to Signals and to the Primary Data Acquisition Device

You can connect the DBK85 module to your primary data acquisition device and to its signal inputs after you have completed the following:

- set the DBK85 module's address
- configured the primary data acquisition device, if applicable

You can connect up to 16 signal lines to one DBK85, i.e., one per BNC. These inputs accept voltages up to ±10 VDC.

Connect the DBK85 module as follows. Note that if your system needs to be CE Compliant, be sure to read the preceding *CE Compliance* section prior to connecting the DBK85.

1. Connect each signal input line's BNC connector to a mating connector on the module. Overlays for CH0 to CH15 identify the associated BNC. Remember, signal input is limited to ±10 VDC.

   Tip: Label each signal input line with its associated channel information.

2. For a single DBK85 module, connect one end of the P1 cable to the module's male DB37 output connector.

   - For DaqBook applications - use a CA-37-x cable.*
   - For DaqBoard/2000 Series or /2000c Series boards - use a CA-37-x with a DBK200 Series adapter.*
   - For DaqBoard [ISA type] boards - use a CA-131-x cable.*

   * CA-37-x and CA-131-x cables do not meet CE compliance requirements. Refer to the preceding CE section if CE compliance must be met.

3. Connect the free end of the cable to the P1 port of the LogBook or Daq device. For multiple DBK85 modules, use a CA-37-x (or CA-131-x) cable to daisy-chain several modules or an expansion module. For example, three DBK85s could be connected to a LogBook or a Daq device via a CA-37-3 cable.

   Note: For longer cable runs you can use a CA-113 cable to add 6 ft of length.

Analog Common

DBK85's analog common connector is located just left of the channel 1 BNC. The connector is typically used to provide a ground reference point for differential measurements as discussed in the *Signal Management* section of Chapter 1.

Software Setup

The DBK85 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 DBK85 with that board you will have the same *Type* options since the DBK85 has a fixed gain of x1.

LogView does not include the means to directly select a DBK85. To use a DBK85 with LogBook, select DBK80. This will recognize the DBK85, but will identify it as a DBK80.

Reference Notes:
   o **DaqView users** - Refer to Chapter 3, *DBK Setup in DaqView*.
   o **LogView users** - Refer to Chapter 4, *DBK Setup in LogView*. See above note.

Specifications – DBK85

Connectors:

<u>DBK37</u> male connector designated as P1. Connects to P1 on a DaqBook, DaqBoard, or LogBook via a CA-37-x or a CA-131-x cable.

<u>BNC</u>: 16 BNC connectors (CH0 through CH15) for signal connection.

<u>Analog Common</u>: Binding Post/Banana Jack. Provides a ground reference point for differential measurements.

Gain Ranges: fixed gain at x1

Inputs: 16 differential voltage inputs

Maximum Voltage Range: ±10 VDC

Input Impedance: 20M Ohm

Accuracy: ±[0.025% +150 µV] (typ), ±[0.1% +250 µV] (max)

Noise: 60 µVrms (typ)

Maximum Input Voltage (without damage): ±25 V

3 dB Bandwidth: 2.6 MHz

CMRR: 80 dB typ

Power: 25 mA max from ±15 VDC

A Note Regarding 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.

Reading Error vs. Source Resistance