DBK50 and DBK51   8-Channel Isolated Voltage Input Modules

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.

Overview

Except for their ranges, the DBK50 (high-voltage) and the DBK51 (low-voltage) are identical. Both have eight channels isolated from themselves (750 V) and from the LogBook or Daq Device analog common (1250 V). Each channel's input impedance is over 10 MΩ to minimize loading of the circuit being measured. Voltages can be read from DC to more than 20 kHz. One of three voltage ranges can be chosen via software:

- for **DBK50**: ±10 V, ±100 V, or ±300 V.
- for **DBK51**: ±100 mV, ±1 V, or ±10 V.

With standard plug-in attenuator assemblies, the voltage ranges are interchangeable. The gain or attenuation factor depends on the range, but the full-scale output for any range is +5 V.

Note: A fourth "range" delivers a shorted input voltage reading to allow offset compensation in some applications.

DBK50/51 Block Diagram
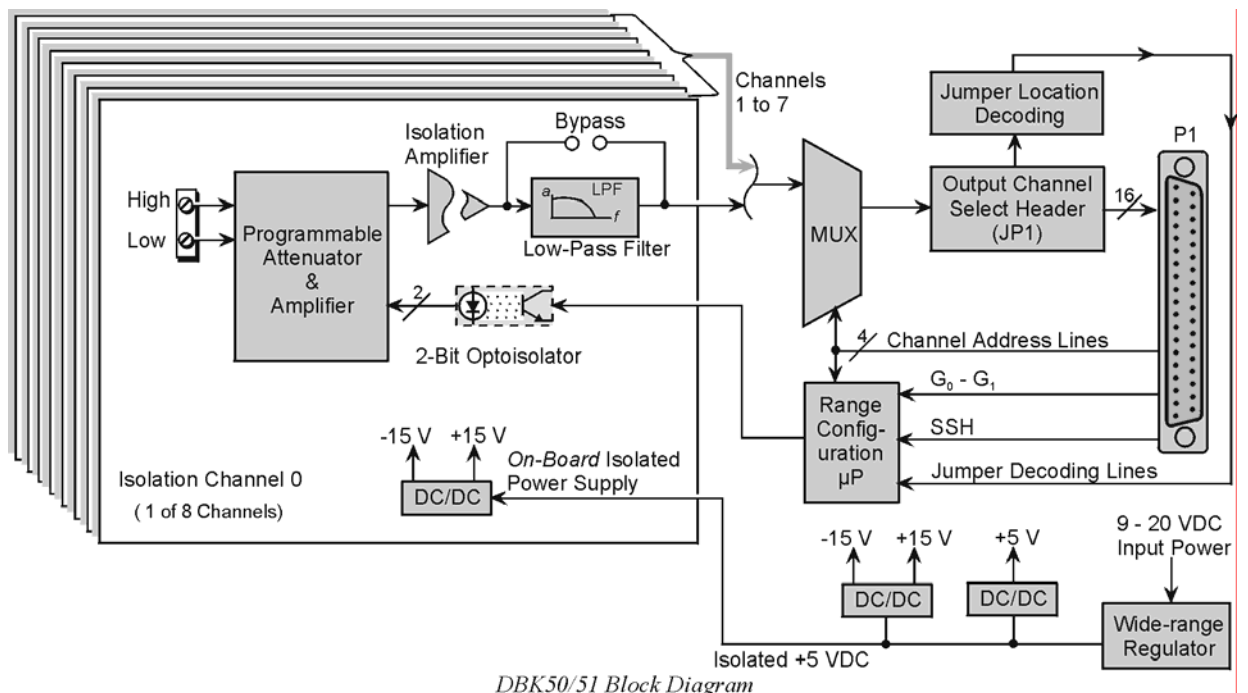
Input Attenuation/Gain Factors

Gain and attenuation may be calculated using the formula:

$$K = Vin / Vout$$

where: **K** is the attenuation or gain factor (the values of **K** for available voltage ranges are given in the table).
**Vin** is the voltage applied to the module input channel.
Vout is the amplified or attenuated voltage from the module output back to the main unit.

Input Range	Function	K
300 V Range	Attenuates	60
100 V Range	Attenuates	20
10 V Range	Attenuates	2
1 V Range	Amplifies	0.2
100 mV Range	Amplifies	0.02
Note: not all input ranges are available on a single unit.		

Hardware Setup

Signal-to-Module Connection

The DBK50/51 rear panel has 8 plug-in screw terminals for easy access to the 8 analog input channels. There is a high (right side) and a low (left side) terminal in each pair to maintain consistent polarity (see figure). For AC signals, the polarity is arbitrary unless multiple signals must maintain their phase relationship.

*Signal-Input Connector*
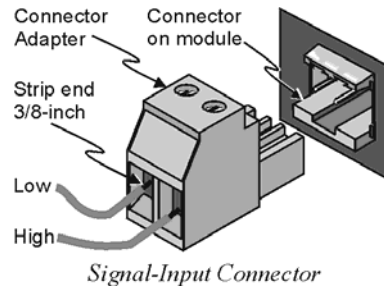
Module Configuration

Factory Default: Low-pass filter – Enabled

Several jumpers must be set on the DBK50 and DBK51 to match your application:
- 2 jumpers on JP1A or JP1B to select the main channel to use (see following figure).
- 1 jumper on JP1C for upper or lower sub channels
- 1 jumper on JPn02 to use or bypass the low-pass filter—one for each channel number (n)

The main output channel is one of the 16 primary data acquisition device [LogBook or Daq device] channels. Each DBK50 [and DBK51] has 8 input channels and can be set to an upper or lower sub-channel that allows 2 modules to share a single LogBook or Daq device channel. Thus, a fully-populated system can have 256 input channels.

After determining a main channel number for the module, set two jumpers on JP1A or JP1B for the desired channel. The two jumpers must be used side-by-side on the selected channel. This is illustrated for channel 0 in the following figure. Next, set the JP1C jumper for the eight upper or eight lower sub-channels. Note that two modules may share the same main channel if one is set to the upper sub channel and the other set to the lower sub channel.

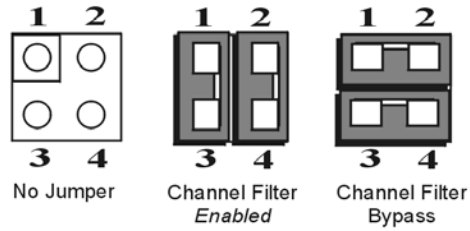*DBK50/51 Channel Configuration*
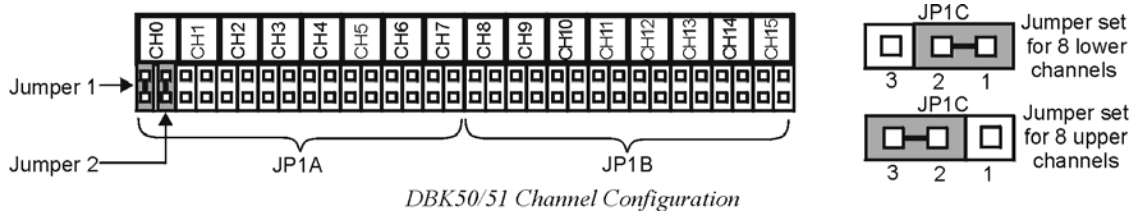
Each of the 8 input channels has a 3-pole low-pass filter that may be manually selected or bypassed by positioning 2 shunt jumpers on 2×2 headers for each channel. Orient the jumpers parallel/horizontal (enable) or perpendicular/vertical (bypass) to the header label (JP102 to JP802 for each of 8 channels). The following figure can be used for orientation.

Not to Scale

P1
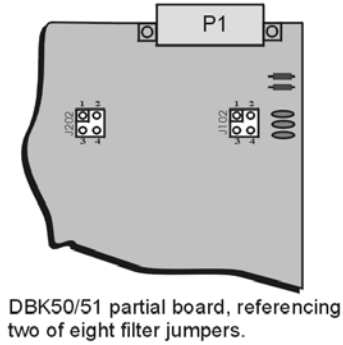
This reference applies to Channel Filter Jumpers J102 through J802 (for channels 1 through 8, respectively).

No Jumper

Channel Filter *Enabled*

Channel Filter Bypass

DBK50/51 partial board, referencing two of eight filter jumpers.

Jumpers Set to 1-3 & 2-4 = Filter Enabled
Jumpers Set to 1-2 & 3-4 = Filter Bypass

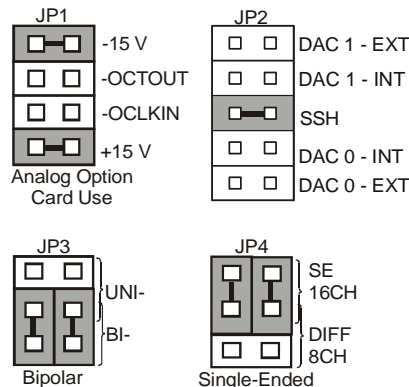*Channel Filter Jumper Settings for DBK50 and DBK51*

The low-pass filters have a default corner frequency of 3.5 Hz when the jumpers are in the LPF-selected positions. This frequency may be readily changed by installing a different value of SIP resistor network in the 6-pin SIP socket of each filter section. Each channel has its own SIP located next to the channel filter bypass jumper and labeled RN(1-8)01A. The table lists values of common networks and their corner frequencies.

Corner Frequency	R-SIP	Bournes Part #
7500 Hz	47 Ω	4606M-102-470
3500 Hz	100 Ω	4606M-102-101
1750 Hz	200 Ω	4606M-102-201
750 Hz	470 Ω	4606M-102-471
350 Hz	1 kΩ	4606M-102-102
175 Hz	2 kΩ	4606M-102-208
75 Hz	4.7 kΩ	4606M-102-208
35 Hz	10 kΩ	4606M-102-103
17.5 Hz	20 kΩ	4606M-102-203
7.5 Hz	47 kΩ	4606M-102-473
3.5 Hz	100k Ω	4606M-102-104

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

Several setup steps in DaqBook/100 Series & /200 Series devices and DaqBoards [ISA type] are required to use a DBK50 or DBK51 module in a system.

1. If not using auxiliary power, set the JP1 jumper [in the DaqBook/100 Series & /200 Series devices or ISA-Type DaqBoard] to the Analog Option Card Use, also referred to as the expanded analog mode.

JP1
-15 V
-OCTOUT
-OCLKIN
+15 V
Analog Option Card Use

JP2
DAC 1 - EXT
DAC 1 - INT
SSH
DAC 0 - INT
DAC 0 - EXT

JP3
UNI-
BI-
Bipolar

JP4
SE 16CH
DIFF 8CH
Single-Ended

DaqBook/DaqBoard Jumpers for DBK50/51

Note! To power the interface circuitry of the DBK50 [or DBK51] via the internal ±15 VDC power supply, JP1 must be set to "Analog Option Card Use." However, if using auxiliary power, e.g. the DBK32A or the DBK33, you must remove both JP1 jumpers. Refer to *Power Requirements* in the *DBK Basics* section and to the DBK32A and DBK33 sections as applicable.

CAUTION
When using the SSH output, do not use an external voltage reference for DAC1. Applying an external voltage reference for DAC1, when using the SSH output, will result in equipment damage due to a conflict on P1, pin #26.

2. Place the JP2 jumper in the SSH position.

3. For DaqBook/100, DaqBook /112 and DaqBook /120 *only*, place the JP3 jumpers in *bipolar mode*.

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

DaqBook/2000 Series and DaqBoard/2000 Series Configuration

No jumper configurations are required for these /2000 series devices.

Software Setup

Reference Notes:
- o **DaqView users** - Refer to chapter 3, *DBK Setup in DaqView*.
- o **LogView users** - Refer to chapter 4, *DBK Setup in LogView*.

Note! DaqBooks/100 Series & /200 Series devices and DaqBoards [ISA type] must have the Simultaneous Sample and Hold (SSH) jumper in place when using a DBK50 or DBK51. DaqView will remind you of this when you exit Hardware Setup with a DBK50 or DBK51 selected.

DBK50 and DBK51 – Specifications

Name/Function: 8-Ch. Isolated Voltage Input Module

Connectors: Male DB37, mates with P1

Inputs: Removable screw terminals

Number of Channels: 8, individually isolated

Isolation:
Channel-to-Channel: 500 V
Channel-to-System: 500 V

Input Impedance:
DBK50: 1 MΩ
DBK51: >10 MΩ

Bipolar Input Ranges:
DBK50: ±10 V, ±100 V, ±300 V
DBK51: ±100 mV, ±1 V, ±10 V

Output Voltage Range: ±5 VDC

Accuracy:
Without Offset Correction: 1% of range
With Offset Correction: 0.2% of range

Offset: ±50 mV max

Noise:
With Low-Pass Filter: <5 mV peak to peak
Without Low-Pass Filter: <50 mV peak to peak

Temperature Coefficient: 0.2 mV/°C

Attenuation Ratios: $V_{out} = V_{in} / K$
DBK50:

10 V	K = 2.0	gain = 0.5
100 V	K = 20.0	gain = 0.05
300 V	K = 60.0	gain = 0.0166

DBK51:

0.1 V	K = 0.02	gain = 50
1 V	K = 0.2	gain = 5
10 V	K = 2.0	gain = 0.5

Bandwidth: 20 kHz (LPF bypassed)

Low-Pass Filter: Factory installed 3-pole, 3.5Hz (bypass or user-set)

Operating Power Voltage Range: +9 to +20 VDC

Module Power Requirements: 7.5 W

AC Adapter Rating: 15 VDC @ 0.9 A

Dimensions: 285 mm W x 221 mm D x 36 mm H (11" x 8.5" x 1.375")

Weight: 1.7 kg (4 lbs)