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Find the *Measurement Computing / IOtech DBK19* at our website: *Click HERE*

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Reference Notes:

- Chapter 2 includes pinouts for P1, P2, P3, and P4. Refer to pinouts applicable to your system, as needed.
- In regard to calculating system power requirements, refer to *DBK Basics* located near the front of this manual.
- Refer to the *Signal Management* chapter for information regarding *Two-Point Calibration of a Temperature Measurement System.*

Overview



DaqView Users: When a DBK19 is used with a /2000 Series Device, the Internal Clock Speed should be set to 100 kHz as described in chapter 3, *DBK Setup in DaqView*.

The DBK19 can attach to 14 thermocouples (T/C) for temperature measurements. The DBK19 features an on-board cold junction sensor and a programmable-gain amplifier for measuring type J, K, T, E, N28, N14, S, R, or B thermocouples. The table shows the temperature range for each thermocouple type.

T/C Type	J	K	T	E	N28	N14	S	R	B
Temperature Range °C	-200 to 760	-200 to 1260	-200 to 400	-270 to 1000	-270 to 400	0 to 1300	0 to 1780	0 to 1780	0 to 1820
Temperature Range °F	-328 to 1400	-328 to 2300	-328 to 752	-454 to 1832	-454 to 752	32 to 2372	32 to 3236	32 to 3236	32 to 3308

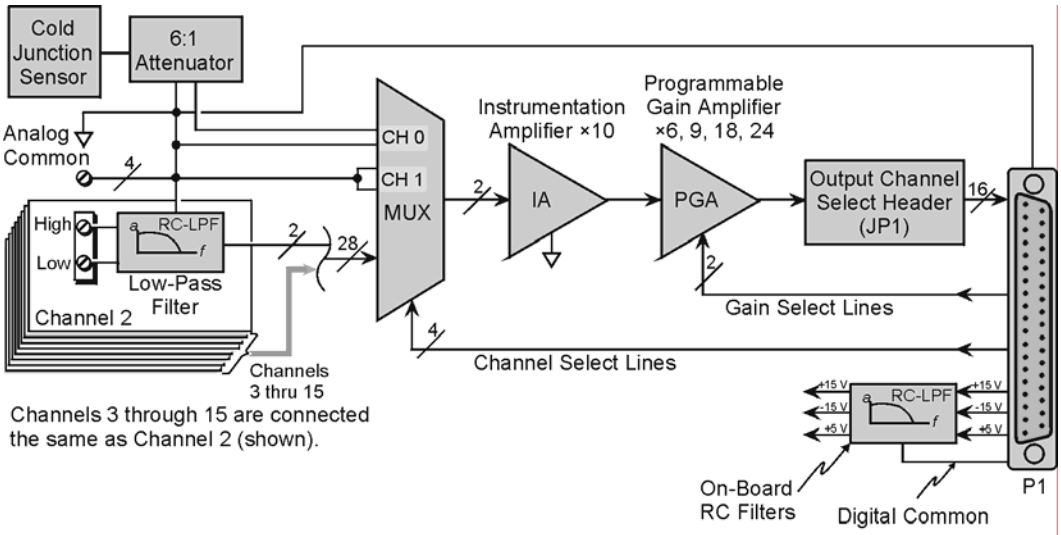
True differential measurements of thermocouples require a bias current referenced to analog common; therefore, resistors connect each input terminal to the analog common. Filter capacitors across each input operate with input protection resistors to form single-pole RC low-pass filters.

Each DBK19 includes a cold-junction compensation circuit wired to channel 0. Channels 2 through 15 accept external thermocouples. The DBK19s can be used with other analog expansion cards and feature screw terminals for direct connection. Up to 16 DBK19s can be attached to a single LogBook or a Daq Device to measure up to 224 (16 × 14) temperatures.

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Note: LogView and DaqView software includes functions for the conversion and linearization of thermocouple readings into temperature data.

Programmers using Daq devices should refer to related sections in the *Programmer's Manual*.



DBK19 Block Diagram

Hardware Setup

Card Connection

Connect the T/C input wires to the intended input terminals. The DBK19 uses screw terminals to connect different types of thermocouples as well as several analog ground access points. Connections are provided for 14 thermocouples.

Thermocouples have polarities that must be observed. Thermocouple types J, K, T, E, N28, N14, S, R and B can be connected to DBK19 channels CH2 through CH15.

- CH0 is reserved for the cold-junction compensation sensor (factory installed).
- CH1 is permanently shorted to common to allow software-driven auto-zero to compensate for temperature drift.

Thermocouple wire is standardized and color-coded as shown in the table. T/Cs have a very small output. Long T/C leads can pickup lots of noise. Use shielding as needed, and average several readings in software to minimize noise effects.

After all connections are in place, secure wires to captive areas (pre-drilled holes) at the rear edge of the board. Nylon tie wraps (not included) work well for this purpose.

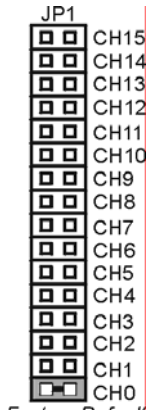
T/C Type	(+) Lead to Channel-Hi	(-) Lead to Channel-Lo
J	White	Red
K	Yellow	Red
T	Blue	Red
E	Violet	Red
N28	Orange	Red
N14	Orange	Red
S	Black	Red
R	Black	Red
B	Gray	Red

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Card Configuration

Assign a LogBook or Daq device channel number to the DBK19 card. Up to 16 DBK19s can connect to a LogBook or a Daq device. (Optional DBK10 expansion card enclosure may be used.) Since this is a daisy-chain interface, each card must have a unique channel address.

To configure the card, locate the 16×2-pin header (labeled JP1) near the front of the board. The 16 jumper locations on this header are labeled CH0 through CH15. Place the jumper on the channel you wish to use. Only one jumper is used on a single card; each card in the system must have a unique jumper setting.



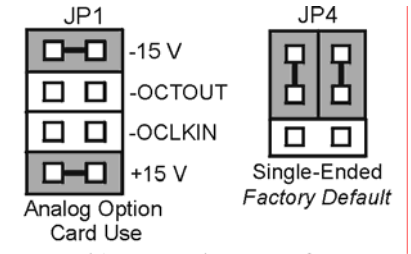
Factory Default Channel Configuration

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

Use of the DBK19 requires setting jumpers in DaqBooks/100 Series & /200 Series devices
and DaqBoards [ISA type].

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

Note: The JP1 default position (above) is necessary to power the interface circuitry of the DBK19 via the internal ±15 VDC power supply. If using auxiliary power (e.g., a DBK32A or DBK33) you must remove both JP1 jumpers. Refer to *Power Requirements* in the *DBK Basics* section and to the DBK32A or DBK33 sections as applicable.



DaqBook/DaqBoard Jumpers for DBK19

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 referenced to analog common.

DaqBook/2000 Series and DaqBoard/2000 Series Configuration

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

Software Setup

Reference Notes:

- **DaqView users** - Refer to chapter 3, *DBK Setup in DaqView*.
- **LogView users** - Refer to chapter 4, *DBK Setup in LogView*.
- **DBK19 Calibration Disk –** Each DBK19 card is shipped with a calibration disk with constants used to correct gain and offset errors inherent in the hardware. This calibration is done automatically by DaqView and LogView. Refer to the **readme.txt file** on the disk.
- Refer to the *Signal Management* chapter for information regarding *Two-Point Calibration of a Temperature Measurement System.*

DaqView Users: When a DBK19 is used with a /2000 Series Device, the Internal Clock Speed should be set to 100 kHz as described in chapter 3, *DBK Setup in DaqView.*

The DBK19 selection allows the user to define the thermocouple types by using the Type column of the analog input spreadsheet.

Each DBK19 card is shipped with a calibration disk with constants used **to correct gain and offset errors** inherent in the hardware. This gain and offset calibration is done automatically by DaqView and LogView.
See the DBK19 readme.txt file on the disk shipped with the board for details on creating this file.

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DBK19 - Specifications

Name/Function: High-Accuracy Thermocouple Card

Connector: DB37 male mates with P1 pinouts. Thermocouples attach to on-board screw terminals.

Thermocouple Types: J, K, S, T, E, B, R, N

Gain Ranges: ×60, ×90, ×180, ×240

7Inputs:
- 14 differential thermocouples
- 1 cold-junction compensation
- 1 auto zero

Cold Junction Sensor Output: 100mV/°C

Voltage Ranges Gains:
- 0 to 80 mV @ ×60
- 0 to 50 mV @ ×90
- 0 to 25 mV @ ×180
- 0 to 20 mV @ ×240
- 0 to ±10 mVDC

Input Impedance: 20 KΩ

Input RC Filter: -3 dB Frequency: 15.9 kHz

Gain Accuracy:
- Uncalibrated: 0.15%
- Calibrated: 0.02%

Maximum Input Voltage: 35 VDC

CMRR (Input Stage): 110 dB type DC to 60 Hz

Offset: Software compensated

Thermocouple Type/Range/Accuracy/Resolution: refer to the following table

Thermocouple Reference

Type	Range		Accuracy		Resolution			
	Min	Max	(<0°C)	(>0°C)	12-bit <0°C	12-bit >0°C	16-bit <0°C	16-bit >0°C
J	-200°C	760°C	0.6°C	0.6°C	1.2°C	0.5°C	0.1°C	0.1°C
K	-200°C	1260°C	1.6°C	1.0°C	1.1°C	0.8°C	0.1°C	0.1°C
T	-200°C	400°C	1.4°C	0.8°C	0.8°C	0.3°C	0.1°C	0.1°C
E	-270°C	1000°C	1.4°C	0.9°C	1.6°C	0.7°C	0.1°C	0.1°C
N28	-270°C	400°C	0.8°C	0.8°C	1.0°C	1.0°C	0.1°C	0.1°C
N14	0°C	1300°C	—	1.0°C	—	5.0°C	—	5.0°C
S	0°C	1780°C	—	1.6°C	—	1.3°C	—	0.1°C
R	0°C	1780°C	—	1.6°C	—	1.7°C	—	0.1°C
B	0°C	1820°C	—	1.8°C	—	1.5°C	—	0.1°C

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