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Note: DBK202, DBK203, DBK204, and DBK204c include: (a) P1 and P2 DB37 connectors, (b) a P3 40-pin header, (c) a 100-pin P4 connector, (d) screw-terminal blocks, (e) socket locations for custom RC Filter networks. In addition, DBK204 and DBK204c include CE cable kits.



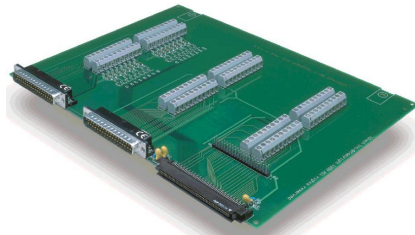
This product is not used for LogBook applications.



Reference Notes:

- Refer to the section *Power Requirements* in the document module *DBK Basics*, in regard to calculating system power requirements.
- The chapter *System Connections and Pinouts*, includes pinouts for P1, P2, P3, and P4. Refer to the pinouts that are applicable to your system, as needed.
- For a quick comparison of all DBK200 Series boards, refer to the *DBK200 Series Matrix*. The matrix is located just before this DBK200 document module.
- Refer to the *DaqBoard/2000 Series and cPCI DaqBoard/2000c Series User's Manual* (p/n 1033-0901) or the *DaqBook/2000 Series User's Manual* (p/n 1103-0901) for information pertaining to those products, as needed.

Overview



DBK202

P4-to-P1/P2/P3 Adapter with Screw-Terminals and Locators for RC Filter Setup



DBK203, with Cover Plate Removed¹

Chassis-Mounted P4-to-P1/P2/P3 Adapter with Screw-Terminals and Locators for RC Filter Setup

¹ **Note:** The DBK203, DBK204, and DBK204c modules are identical. The DBK204 designation indicates that the module includes a CE cable kit for use with DaqBook/2000 Series devices or DaqBoard/2000 Series boards that are of the standard PCI type. The DBK204c designation indicates that the module includes a CE cable kit for use with cPCI (compact PCI) /2000c Series boards.

The DBK203 is the main choice when it comes to expanding a DaqBook/2000 Series Device.

The information included in this section, when combined with that found in related DBK card and DBK module subsections, should enable you to set up your desired configuration.

It is important to note that the **DaqBoard/2000 Series** boards communicate [external from the host PC] through a 100-pin P4 connector. The P1, P2, and P3 connectors discussed in association with these boards are subset connectors of the 100-pin P4 connector. **DaqBook/2000 Series** devices have both a P4 connector and a set of P1, P2, and P3 connectors on the unit. The *System Connections and Pinouts* chapter includes pinouts for both types of devices, i.e., boards and “books.”

The DBK202, DBK203, DBK204, and DBK204c adapters each provide a DB37 P1 connector, DB37 P2 connector, and a 40-pin “on-board” P3 header. P1 is used for ANALOG I/O, P2 for DIGITAL I/O, and P3 for Pulse/Frequency (Digital and Counter/Timer) I/O.

In addition to the P1, P2, and P3 connectors, each of these adapters includes terminal blocks designated TB1 through TB12. The screw terminal blocks tie in to P1, P2, and P3 and provide for easy signal connection.

The three adapters connect to the DaqBook/2000 Series, DaqBoard/2000 Series or to the cPCI DaqBoard/2000c Series 100-pin P4 connector via a CA-195 cable. Note that the P1, P2, and P3 connectors discussed in association with DaqBook/2000 Series devices, DaqBoard/2000 Series boards, and /2000c Series boards are subset connectors of the 100-pin P4 connector that is located on those boards. The *System Connections and Pinouts* chapter includes pinouts for P1,P2, P3, and P4.

DBK202 Screw-Terminal Adapter

Provides a means of connecting signals to a DaqBook/2000 Series device, DaqBoard/2000 Series board or a cPCI DaqBoard/2000c Series board through one of three methods:

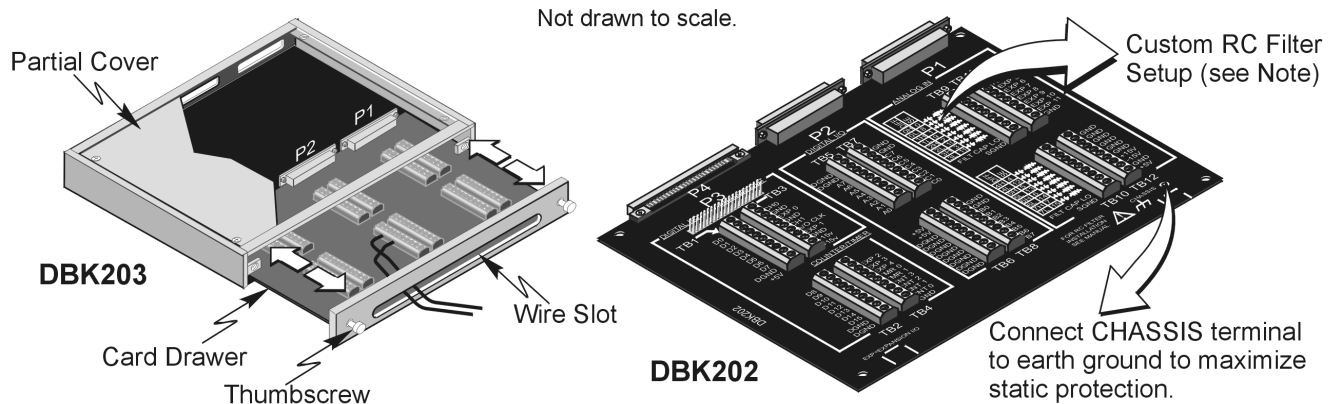
- With cables connected to P1, P2, and P3 connectors, as applicable.
- With signal wires connected to the appropriate screw-terminal blocks (TB1 through TB12). Note that the DBK202 board’s silkscreen clearly identifies all screw terminals.
- With a combination of the above two methods.

Regardless of which method is used, DBK202 connects to a DaqBook/2000 Series device’s, DaqBoard/2000 Series board’s or a cPCI DaqBoard/2000c Series board’s P4 connector via a CA-195 cable. The CA-195 cable has a P4 connector located at each end. Note that DBK202 contains mounting holes that allow the board to be secured inside a user-provided enclosure (not shown).

DBK203, DBK204, and DBK204c Screw-Terminal Adapter Modules

The DBK203, DBK204, and DBK204c modules are identical. The DBK204 designation indicates that the module includes a CE cable kit for use with a DaqBook/2000 Series device, or a DaqBoard/2000 Series board of the standard PCI type. The DBK204c designation indicates that the module includes a CE cable kit for use with a cPCI (compact PCI) DaqBoard/2000c Series board.

The DBK203, DBK204, and DBK204c consist of a DBK202 board that is mounted to a card drawer. The card drawer is housed in a shielded metal enclosure; and can be slid free of the module. The sliding card drawer provides easy access to the board's twelve terminal blocks and to the 40-pin P3 header. Note that the DBK203, DBK204, and DBK204c modules can be easily mounted to other DBK modules via fastener panels that are included in splice plate kits.



DBK203 Includes a Slide-Out Draw with a DBK202 Board



Reference Note for Custom RC Filter Setup:

You can install resistors and capacitors to create RC networks for P1's Analog Input Channels. For detailed information, refer to *Adding Resistor/Capacitor Filter Networks*, which begins on page 11 of this DBK section.

Connection Tips

CAUTION



Turn off power to the host PC and externally connected equipment prior to connecting cables or signal lines to the DBK. Electric shock or damage to equipment can result even under low-voltage conditions.



Take ESD precautions (packaging, proper handling, grounded wrist strap, etc.)

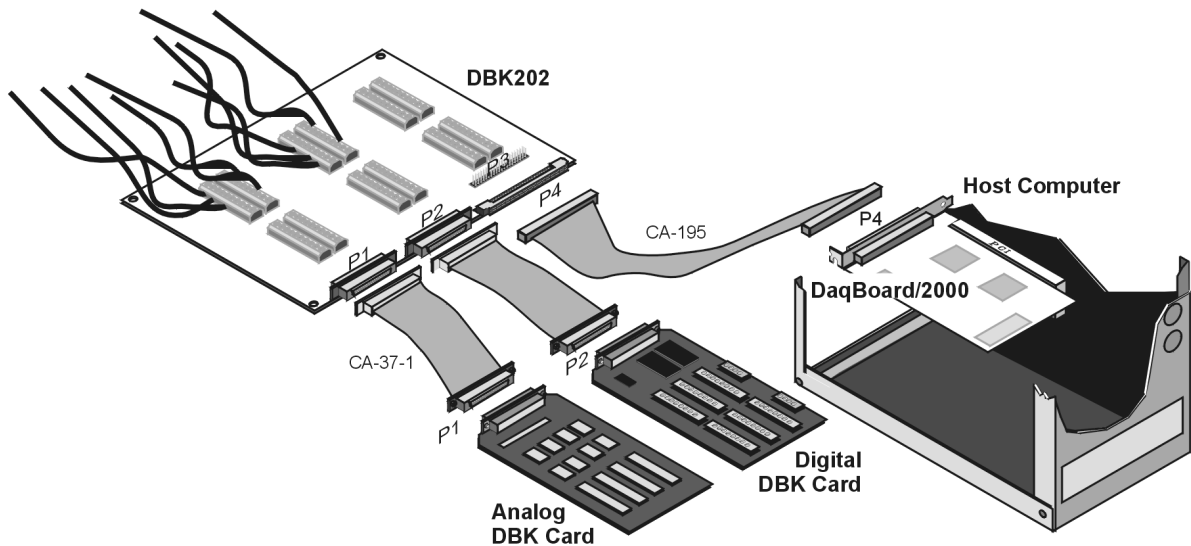


Use care to avoid touching board surfaces and onboard components. Only handle boards by their edges (or ORBs, if applicable). Ensure boards do not come into contact with foreign elements such as oils, water, and industrial particulate.

Do not confuse connectors. Ensure that you only connect P1 I/Os to P1, P2 I/Os to P2, and P3 I/Os to P3. Improper connection may result in equipment damage.



Be sure to align the P4 orientation indicators (▲) prior to mating the P4 connectors.



Example of a DBK202 Connected to Analog and Digital DBK Cards via P1 and P2, Respectively

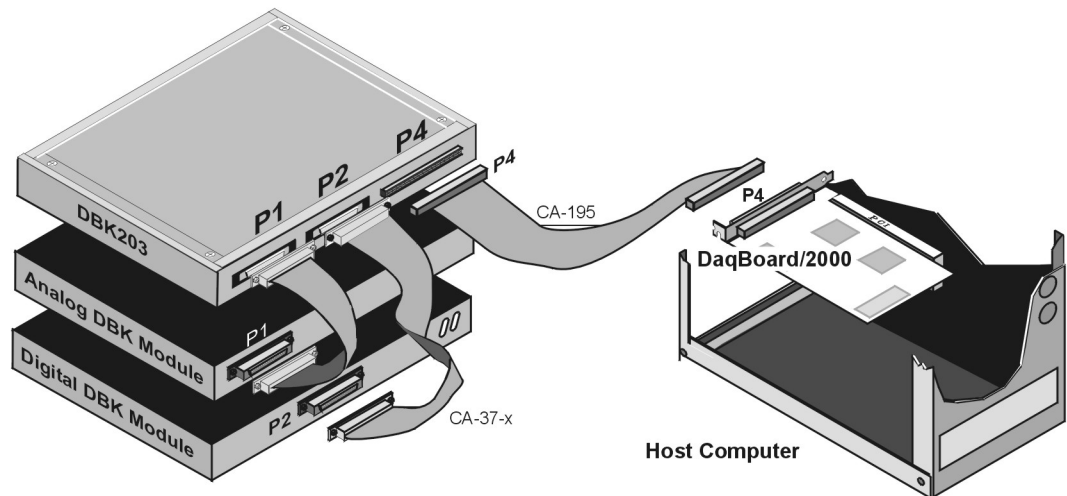
The illustrations and actual board silkscreen are the only references you should need to make proper connections.

A list of connection tips follows:

1. Ensure power is removed from the device(s) to be connected.
2. Observe ESD precautions when handling the board and making connections.
3. Do not make redundant connections. For example, for ANALOG IN you can use the P1 (DB37) connector or Terminal Blocks TB9 through TB12. You would not use both sets of ANALOG IN connectors.
4. For DBK203, DBK204, and DBK204c, you do not need to slide out the card drawer unless you are making connections to P3, or to a terminal block.

5. The board's 100-pin P4 connector connects to the DaqBoard/2000 P4 connector via a CA-195 Cable.
6. To obtain maximum protection from static, connect the CHASSIS terminal to earth ground.
7. For connections to DB37 connectors and the P3 (40-pin) header:
 - (a) P1 connects to an analog DBK card or module's P1 connector via a CA-37 cable.
 - (b) P2 connects to a Digital DBK card or module's P2 connector via a CA-37 cable.
 - (c) The 40-pin header (P3) connects to a Pulse/Frequency DBK card, or to a module's P3 connector via a CA-60 cable. Note that CA-60 cables have a 40-pin female connector at one end and a DB37 (37-pin) male connector at the other end.
 - (d) To access the P3 header in a DBK203, loosen the two thumbscrews and slide the card drawer free of the unit.

Note that P3 is located between TB1 and P4.
8. For DBK204 and DBK204c, refer to the separate CE Cable Kit instructions that are included with the associated CE cable kit.



Example of a DaqBoard/2000 System using a DBK203

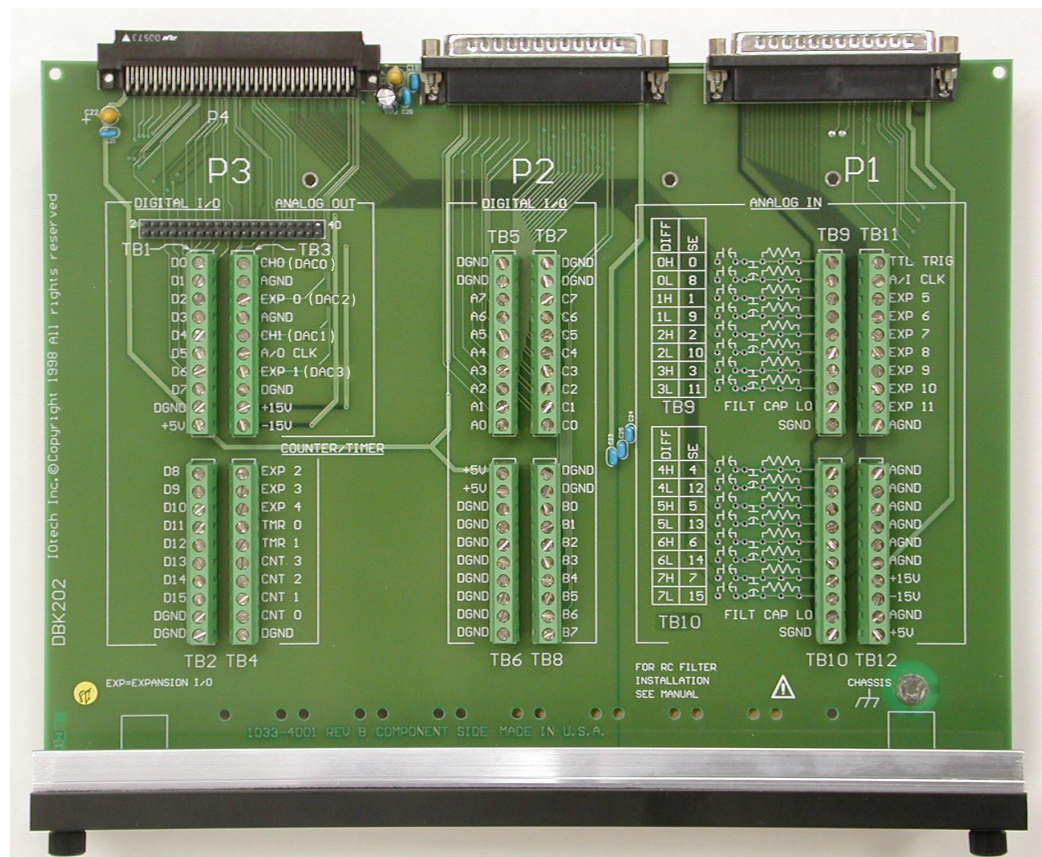
Using the Screw-Terminal Blocks

1. Loosen the two thumbscrews and slide the card drawer free of the unit to access the terminal blocks. See previous figures.
2. Make the wiring connections to the terminals. Refer to the board's silkscreen and to the pin correlations on the next few pages.
3. Tighten the terminal block screws snug. Do not over-tighten.

In general, the following *terminal block-to-signal* relationships apply:

- **TB9, TB10, TB11, and TB12** are used for **ANALOG IN** and provide a connection option to the **P1 (DB37)** connector.
- **TB5, TB6, TB7, and TB8** are used for **DIGITAL I/O** and provide a connection option to the **P2 (DB37)** connector.
- **TB1, TB2, TB3, and TB4** are used for **Pulse/Frequency/Digital I/O** and provide a connection to the 40-pin header (**P3**).


The following pages correlate the DBK206 terminal block connectors with the associated pins of the P1, P2, and P3 DB37 connectors. Note that the *System Connections and Pinouts* chapter contains additional pin-outs, and includes references to the 100-pin P4 connector.



A DBK202 Board with Card Drawer Mount


Correlation to P1 – Pertains to Terminal Blocks TB9, TB10, TB11, and TB12 for Analog I/O.

TB9		P1 Pin Number and Description (see Note 1)	
DIFF	SE		
0H	0	37	CH 0 IN (Single-Ended Mode) / CH 0 HI IN (Differential Mode)
0L	8	18	CH 8 IN (Single-Ended Mode) / CH 0 LO IN (Differential Mode)
1H	1	36	CH 1 IN (Single-Ended Mode) / CH 1 HI IN (Differential Mode)
1L	9	17	CH 9 IN (Single-Ended Mode) / CH 1 LO IN (Differential Mode)
2H	2	35	CH 2 IN (Single-Ended Mode) / CH 2 HI IN (Differential Mode)
2L	10	16	CH 10 IN (Single-Ended Mode) / CH 2 LO IN (Differential Mode)
3H	3	34	CH 3 IN (Single-Ended Mode) / CH 3 HI IN (Differential Mode)
3L	11	15	CH 11 IN (Single-Ended Mode) / CH 3 LO IN (Differential Mode)
FILT CAP LO		N/A	For RC filter networks install a wire jumper between the relevant FILT CAP LO and AGND. Note that there is no association between FILT CAP LO and P4.
SGND		19	Signal Ground, Sense Common; reference ground, not for general use.




P1 – TB9

TB10		P1 Pin Number and Description (see Note 1)	
DIFF	SE		
4H	4	33	CH 4 IN (Single-Ended Mode) / CH 4 HI IN (Differential Mode)
4L	12	14	CH 12 IN (Single-Ended Mode) / CH 4 LO IN (Differential Mode)
5H	5	32	CH 5 IN (Single-Ended Mode) / CH 5 HI IN (Differential Mode)
5L	13	13	CH 13 IN (Single-Ended Mode) / CH 5 LO IN (Differential Mode)
6H	6	31	CH 6 IN (Single-Ended Mode) / CH 6 HI IN (Differential Mode)
6L	14	12	CH 14 IN (Single-Ended Mode) / CH 6 LO IN (Differential Mode)
7H	7	30	CH 7 IN (Single-Ended Mode) / CH 7 HI IN (Differential Mode)
7L	15	11	CH 15 IN (Single-Ended Mode) / CH 7 LO IN (Differential Mode)
FILT CAP LO		N/A	For RC filter networks install a wire jumper between the relevant FILT CAP LO and AGND. Note that there is no association between FILT CAP LO and P4.
SGND		19	Signal Ground, Sense Common; reference ground, not for general use.




P1 – TB10

TB11		P1 Pin Number and Description	
TTL TRIG	25		TTL Trigger, Digital IN, External TTL Trigger Input
A/I CLK	20		A/I Clock, External ADC Pacer Clock Input/ Internal ADC Pacer Clock Output
EXP 5	5		Expansion 5. Digital OUT, external GAIN select bit 1
EXP 6	6		Expansion 6. Digital OUT, external GAIN select bit 0
EXP 7	3		Expansion 7. Digital OUT, external ADDRESS, select bit 3
EXP 8	22		Expansion 8. Digital OUT, external ADDRESS, select bit 2
EXP 9	4		Expansion 9. Digital OUT, external ADDRESS, select bit 1
EXP 10	23		Expansion 10. Digital OUT, external ADDRESS, select bit 0
EXP 11	26		Expansion 11. Simultaneous Sample and Hold (SSH)
AGND	*		Analog Ground, Common



P1 – TB11

TB12		P1 Pin Number and Description	
AGND	*		Analog Ground, Common
AGND	*		Analog Ground, Common
AGND	*		Analog Ground, Common
AGND	*		Analog Ground, Common
AGND	*		Analog Ground, Common
AGND	*		Analog Ground, Common
AGND	*		Analog Ground, Common
+ 15 V	21		Expansion, +15 V Power
- 15 V	2		Expansion, -15 V Power
AGND	*		Common Ground
+ 5 V	1		Expansion, +5 V Power




P1 – TB12

*Refer to Ground Correlation Tables in the *System Connections and Pinouts* chapter.

Note 1: For TB9 and TB10, the filter network portion of the silkscreen is not shown. Instead, the DIFF and SE channel identifiers have been moved next to the screws for ease in identification.


Correlation to P2 – Pertains to Terminal Blocks TB5, TB6, TB7, and TB8 for Digital I/O.

TB5		P2 Pin Number and Description	
DGND	*	Digital Ground, Common	
DGND	*	Digital Ground, Common	
A7	30	Digital I/O: P2, Digital Port A, Bit 7; or P2 Expansion Data Bit 15	
A6	31	Digital I/O: P2, Digital Port A, Bit 6; or P2 Expansion Data Bit 14	
A5	32	Digital I/O: P2, Digital Port A, Bit 5; or P2 Expansion Data Bit 13	
A4	33	Digital I/O: P2, Digital Port A, Bit 4; or P2 Expansion Data Bit 12	
A3	34	Digital I/O: P2, Digital Port A, Bit 3; or P2 Expansion Data Bit 11	
A2	35	Digital I/O: P2, Digital Port A, Bit 2; or P2 Expansion Data Bit 10	
A1	36	Digital I/O: P2, Digital Port A, Bit 1; or P2 Expansion Data Bit 9	
A0	37	Digital I/O: P2, Digital Port A, Bit 0; or P2 Expansion Data Bit 8	




P2 – TB5

TB6		P2 Pin Number and Description	
+5 V	18	Expansion +5 V Power	
+5 V	20	Expansion +5 V Power	
DGND	*	Digital Ground, Common	
DGND	*	Digital Ground, Common	
DGND	*	Digital Ground, Common	
DGND	*	Digital Ground, Common	
DGND	*	Digital Ground, Common	
DGND	*	Digital Ground, Common	
DGND	*	Digital Ground, Common	
DGND	*	Digital Ground, Common	
DGND	*	Digital Ground, Common	




P2 – TB6

TB7		P2 Pin Number and Description	
C0	29	Digital I/O: P2, Digital Port C, Bit 0; or P2 Expansion Data Bit 0	
C1	28	Digital I/O: P2, Digital Port C, Bit 1; or P2 Expansion Data Bit 1	
C2	27	Digital I/O: P2, Digital Port C, Bit 2; or P2 Expansion Data Bit 2	
C3	26	Digital I/O: P2, Digital Port C, Bit 3; or P2 Expansion Data Bit 3	
C4	25	Digital I/O: P2, Digital Port C, Bit 4; or P2 Expansion Data Bit 4	
C5	24	Digital I/O: P2, Digital Port C, Bit 5; or P2 Expansion Data Bit 5	
C6	23	Digital I/O: P2, Digital Port C, Bit 6; or P2 Expansion Data Bit 6	
C7	22	Digital I/O: P2, Digital Port C, Bit 7; or P2 Expansion Data Bit 7	
DGND	*	Digital Ground, Common	
DGND	*	Digital Ground, Common	



P2 – TB7

TB8		P2 Pin Number and Description	
B7	3	Digital I/O: P2, Digital Port B, Bit 7; or P2 Expansion Address Bit 0 Out	
B6	4	Digital I/O: P2, Digital Port B, Bit 6; or P2 Expansion Address Bit 1 Out	
B5	5	Digital I/O: P2, Digital Port B, Bit 5; or P2 Expansion Address Bit 2 Out	
B4	6	Digital I/O: P2, Digital Port B, Bit 4; or P2 Expansion Address Bit 3 Out	
B3	7	Digital I/O: P2, Digital Port B, Bit 3; or P2 Expansion Address Bit 4 Out	
B2	8	Digital I/O: P2, Digital Port B, Bit 2; or P2 Expansion RESET Output	
B1	9	Digital I/O: P2, Digital Port B, Bit 1; or P2 Expansion WRITE Output	
B0	10	Digital I/O: P2, Digital Port B, Bit 0; or P2 Expansion READ Output	
DGND	*	Digital Ground, Common	
DGND	*	Digital Ground, Common	



P2 – TB8

* Refer to Ground Correlation Tables in the *System Connections and Pinouts* chapter.

Correlation to P3 – Pertains to Terminal Blocks TB1, TB2, TB3, and TB4 for Pulse/Frequency/Digital I/O.

TB1	P3 Pin Number and Description		 <p>P3 – TB1</p>	
D8	29	P3 Digital Port Bit 8		
D9	28	P3 Digital Port Bit 9		
D10	27	P3 Digital Port Bit 10		
D11	26	P3 Digital Port Bit 11		
D12	25	P3 Digital Port Bit 12		
D13	24	P3 Digital Port Bit 13		
D14	23	P3 Digital Port Bit 14		
D15	22	P3 Digital Port Bit 15		
DGND	*	Digital Ground, Common		
DGND	*	Digital Ground, Common		
TB2	P3 Pin Number and Description			 <p>P3 – TB2</p>
D0	10	P3 Digital Port Bit 0		
D1	9	P3 Digital Port Bit 1		
D2	8	P3 Digital Port Bit 2		
D3	7	P3 Digital Port Bit 3		
D4	6	P3 Digital Port Bit 4		
D5	5	P3 Digital Port Bit 5		
D6	4	P3 Digital Port Bit 6		
D7	3	P3 Digital Port Bit 7		
DGND	*	Digital Ground, Common		
+5V	20	Expansion, +5 Volt Power		
TB3	P3 Pin Number and Description		 <p>P3 – TB3</p>	
CH0 (DAC0)	34	Analog Out; Analog DAC 0 Output		
AGND	*	Analog Ground, Common; intended for use with DACs		
EXP 0 (DAC2)	32	Analog Out; Analog DAC 2 Output		
AGND	*	Analog Ground, Common; intended for use with DACs		
CH1 (DAC1)	33	Analog Out; Analog DAC 1 Output		
A/O CLK	21	Analog Out Clock; External DAC Pacer Clock Input/ Internal DAC Pacer Clock Output		
EXP 1 (DAC3)	31	Analog Out; Analog DAC 3 Output		
DGND	*	Digital Ground, Common		
+15 V	19	Expansion, + 15 VDC		
-15 V	37	Expansion, -15 VDC		
TB4	P3 Pin Number and Description		 <p>P3 – TB4</p>	
EXP 2	12	Reserved		
EXP 3	13	Reserved		
EXP 4	14	Reserved		
TMR 0	15	P3 Timer 0 Output		
TMR 1	16	P3, Timer 1 Output		
CNT 3	35	P3 Counter 3 Input		
CNT 2	17	P3 Counter 2 Input		
CNT 1	36	P3 Counter 1 Input		
CNT0	18	P3 Counter 0 Input		
DGND	*	Digital Ground, Common		

* Refer to Ground Correlation Tables in the *System Connections and Pinouts* chapter.

Using the 40-Pin Header

CAUTION



Disconnect the DBK202, DBK203, DBK204, or DBK204c from power and signal sources prior to connecting the CA-60 cable to the 40-pin header.

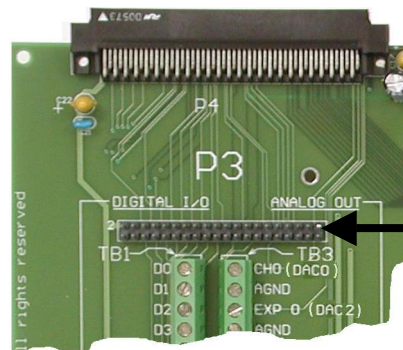


Take ESD precautions (packaging, proper handling, grounded wrist strap, etc.)

Use care to avoid touching board surfaces and onboard components. Only handle boards by their edges (or ORBs, if applicable). Ensure boards do not come into contact with foreign elements such as oils, water, and industrial particulate.



Do not confuse connectors. Ensure that you only connect P1 I/Os to P1, P2 I/Os to P2, and P3 I/Os to P3. Improper connection may result in equipment damage.



P3 40-Pin Header

If you need a DB37 connector for P3, connect a CA-60 cable to this 40-pin header.

The P3 Corner Section of a DBK202

The P3 40-pin header can be used to obtain a DB37 type connector via a CA-60 cable. To obtain the DB37 connector:

1. Ensure that power is removed from the system devices.
2. If the DBK202 is housed in a module (DBK203 or DBK204) loosen the card drawer's thumbscrews and slide the drawer free of the unit.
3. Connect the CA-60 cable to the 40-pin header.
4. Return the system to normal operation.



Reference Note:

There is no direct pin-to-pin correlation between the pins on the header and those on the DB37 connector. For P3 pinout information refer to chapter 2, *System Connections and Pinouts*.

Adding Resistor/Capacitor Filter Networks

WARNING



Disconnect the DBK202, DBK203, DBK204, or DBK204c from power and signal sources prior to installing capacitors or resistors.

CAUTION



Ensure wire strands do not short power supply connections (+15 V, -15 V, +5 V, etc.) to any terminal potential. Failure to do so could result in damage to DaqBook/2000 Series devices, DaqBoard/2000 Series boards, or DaqBoard/2000c Series boards.

Do not exceed maximum allowable inputs (as listed in product specifications). There should never be more than 30 V with reference to analog ground (AGND) or earth ground.

Do not operate DBK202 on an exposed metal surface.

You must provide strain-relief (lead slack) to all leads leaving DBK202, DBK203, DBK204, or DBK204c. Use tie-wraps [not included] to secure strain-relief.

Always connect the CHASSIS terminal to earth ground. This will maximize static protection.

You can install customized RC filter networks to improve the signal-to noise ratio when an unacceptable level of noise exists. DBK202, DBK203, DBK204, and DBK204c include sockets for installing RC filter networks directly on the board.

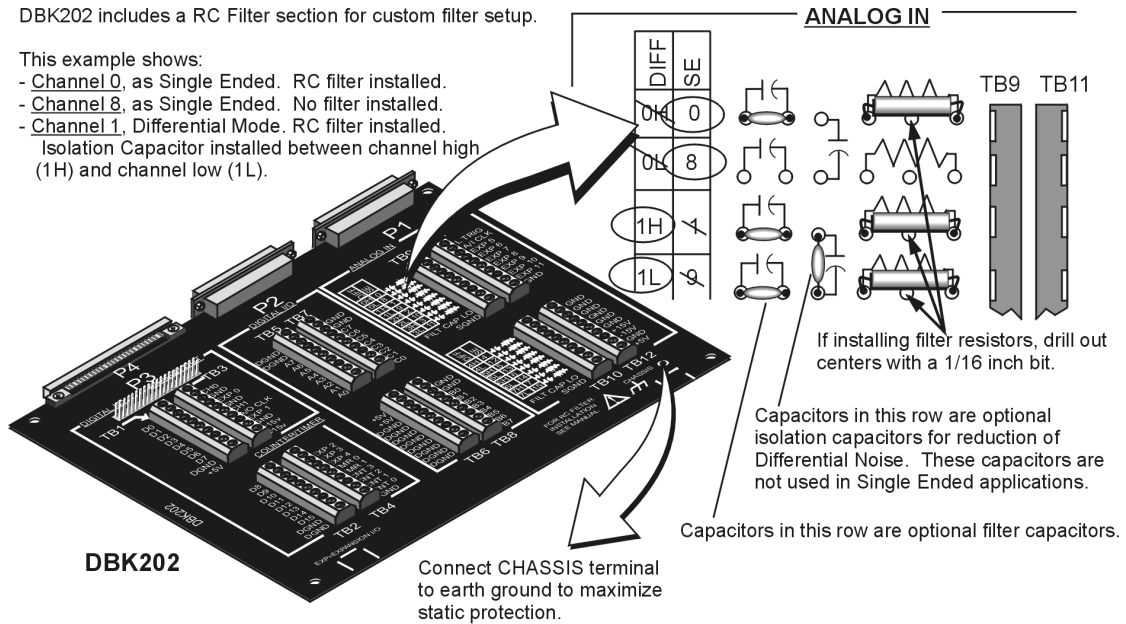
The following table contains values that are typical for RC filter network components.

Typical One-Pole Low Pass Filter Values for DBK202, DBK203, DBK204, and DBK204c			
R	C	f	f
Ohms	μF	Hertz (-3dB)	kHz (-3dB)
510	1	312	0.31
510	0.47	664	0.66
510	0.22	1419	1.42
510	0.1	3122	3.12
510	0.047	6643	6.64
510	0.022	14192	14.19
510	0.01	31223	31.22
510	0.0047	66431	66.43
470	0.0033	102666	102.67

DBK202 includes a RC Filter section for custom filter setup.

This example shows:

- Channel 0, as Single Ended. RC filter installed.
 - Channel 8, as Single Ended. No filter installed.
 - Channel 1, Differential Mode. RC filter installed.
- Isolation Capacitor installed between channel high (1H) and channel low (1L).



An Example of Customer-Installed Capacitors and Filters for RC Networks on a DBK202

Prior to installing RC components, review the previous Warning and Caution statements, then read over the following information regarding resistors and capacitors.



- Do not use RC filters in conjunction with additional DBK expansion accessories.
- Prior to installing a resistor to the filter network you must drill a 1/16" hole through the center pinhole [beneath the board's silkscreen resistor symbol] as indicated in the above figure. Failure to do so will short-circuit the resistor.
- Do not drill holes on the board for channels, unless those channels are to receive a filter network (see preceding statement).
- Resistors should be 1/4 watt, film-type with up to 5% tolerance. Do not use wire-wound resistor types.
- A resistor value of 510 Ω is recommended. Do not exceed 510 Ω.
- Capacitors used are to be of the film dielectric type (e.g., polycarbonate or NPO ceramic), above 0.001 μF.
- **RECOMMENDED:** For reduction of both *Common Mode Noise* and *Differential Mode Noise*, use one capacitor between Channel High and AGND; and use a second capacitor between Channel Low and AGND.
- For reduction of *Differential Noise* [when no reduction of *Common Mode Noise* is needed] position a capacitor across the respective Channel High and Channel Low.
- When in Differential Mode, using capacitors between Channel High, Channel Low, and AGND may cause a slight degradation of *wideband Common Mode rejection*.
- When making a RC filter network, always install a wire jumper between the relevant FILT CAP LO and AGND. FILT CAP LO terminals are located on TB9 and TB10.