

Digital to Analog Output Board for PCI  
8ch type

DA12-8(PCI)



\* Specifications, color and design of the products are subject to change without notice.

Features

**Support for unipolar and bipolar output ranges**

An output range can be set for each channel by software.

**Two output modes selectable**

This product offers a choice of two output modes selectable. One updates only the output voltage of a specified channel and the other updates the output voltages of all channels.

**Capable of updating the output voltage using a sampling clock**

This product can update the output voltage periodically using the internal sampling clock or in synchronization with external events using an external sampling clock.

**Safety design to adjust output voltage to 0V when power supply is turned on**

To prevent the unstable voltage and the connected device of D/A converter from fault and malfunctions when the power supply is turned on, the circuit is designed to adjust output voltage of the analog output to 0V.

**Optional units**

Using optional units facilitates connections. For more details on the option, please refer to "Cable & Connector" or "Accessories (Option)".

This product is a PCI bus-compliant interface boards that performs digital-to-analog conversion.

This product performs D-A conversion using 8 output channels at a conversion speed of 10  $\mu$ sec [100KSPS] and a resolution of 12 bit.

Using the bundled driver library [API-PAC (W32)], you can create Windows application software for this board in your favorite programming language supporting Win32 API functions, such as Visual Basic or Visual C++.

Specification

Item	DA12-8(PCI)
Analog Output	
Isolated specification	Non-isolated
Number of output channels	8channel
Output range	Bipolar $\pm 10V, \pm 5V$ , Unipolar 0 - +10V (Software setting by channel)
Absolute max. output current	$\pm 5mA$
Output impedance	10 $\Omega$ or less
Resolution	12bit
Non-Linearity error *1	$\pm 3LSB$
Conversion speed *2	10 $\mu$ sec [100KSPS] (Max.)
Sampling clock	Internal sampling clock : 10,000 - 1,073,741,824,000nsec (Can be set in 250nsec units) External sampling clock : TTL level falling edge
Output mode	Transparent output, synchronization output
Programmable timer	
Setting frequency	500 - 1,073,741,824,000nsec (Can be set in 250nsec units)
Status	Count up, count up overrun
Timer output signal	TTL level 250nsec Low pulse, Low level output current $I_{OL} = 24mA$
External trigger input	
External trigger input signal	Non-isolated input 1 channel (TTL level falling edge)
Status	Trigger input, trigger input overrun
I/O address	32 ports boundary
Interrupt level	1 point
Operating condition	0 - 50°C, 10 - 90%RH (No condensation)
Power consumption (Max.)	+5VDC 800mA
Bus specification	32bit, 33MHz, Universal key shapes supported *3 *4
Connector	37pin D-SUB connector [F (female) type] DCLC-J37SAF-20L9 [mfd.by JAE] or equivalence to it
Dimension (mm)	176.41(L) x 105.68(H) *5
Weight	135g
Certification	CE,VCCI

\*1 A linearity error approximately 0.1% of full-range may occur when operated at 0°C or 50°C ambient temperature.

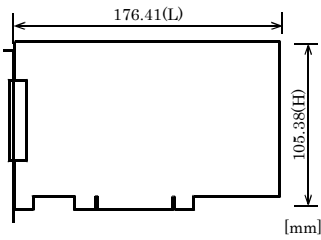
\*2 The minimum clock speed actually available depends on the OS and driver.

\*3 This product requires +5V power supply from the expansion slot (it does not work in a +3.3V environment).

\*4 DA12-8(PCI): If the board No. is 7184, PCI bus specification is 32bit, 33MHz, 5V.

\*5 Boards with different board numbers are different in these specifications. See Table 6.4 "Different in the specification" at the end of this document.

## Board Dimensions



The standard outside dimension (L) is the distance from the end of the board to the outer surface of the slot cover.

## Support Software

### Windows version of analog I/O driver API-AIO(WDM)/API-AIO(98/PC) [Stored on the bundled Disk driver library API-PAC(W32)]

These drivers are the Windows version driver library software that provides products in the form of Win32 API functions (DLL). Various sample programs such as Visual Basic and Visual C++, etc and diagnostic program useful for checking operation is provided.

For more details on the supported OS, applicable language and how to download the updated version, please visit the CONTEC's Web site (<http://www.contec.com/apipac/>).

### Linux version of analog I/O driver API-AIO(LNX) [Stored on the bundled Disk driver library API-PAC(W32)]

The API-AIO(LNX) is the Linux version driver software which provides device drivers (modules) by shared library and kernel version. Various sample programs of gcc are provided. available after installation.)

For more details on the supported OS, applicable language and how to download the updated version, please visit the CONTEC's Web site (<http://www.contec.com/apipac/>).

### Data acquisition VI library for LabVIEW VI-DAQ (Available for downloading (free of charge) from the CONTEC web site.)

This is a VI library to use in National Instruments LabVIEW. VI-DAQ is created with a function form similar to that of LabVIEW's Data Acquisition VI, allowing you to use various devices without complicated settings.

See <http://www.contec.com/vidaq/> for details and download of VI-DAQ.

## Cable & Connector

### Cable (Option)

- Flat Cable with 37-Pin D-SUB Connector at One End : PCA37P-1.5 (1.5m)
- Shield Cable with 37-Pin D-SUB Connector at One End : PCA37PS-0.5P (0.5m)  
: PCA37PS-1.5P (1.5m)
- Flat Cable with 37-Pin D-SUB Connectors at either Ends : PCB37P-1.5 (1.5m)
- Shielded Cable with Two 37-pin D-SUB Connectors : PCB37PS-0.5P (0.5m)  
: PCB37PS-1.5P (1.5m)
- Coaxial Cable for Single-ended Inputs (16 channels) : PCC16PS-1.5 (1.5m)  
: PCC16PS-3 (3m)

### Connector (Option)

- 37-pin D-SUB (Male) Connector Set (5 Pieces) : CN5-D37M

## Accessories

### Accessories (Option)

- General Purpose Terminal (M3 x 37P) : DTP-3A \*1
- Screw Terminal (M2.6 x 37P) : DTP-4A \*1
- Termination panel with BNC connectors for Analog Multi-function Boards : ATP-16 \*1
- Screw Terminal Unit (M3 x 37P) : EPD-37A \*1\*2
- Screw Terminal Unit (M3.5 x 37P) : EPD-37 \*1

\*1 PCB37P-\* or PCB37PS-\* optional cable is required separately.

\*2 "Spring-up" type terminal is used to prevent terminal screws from falling off.

\* Check the CONTEC's Web site for more information on these options.

## Packing List

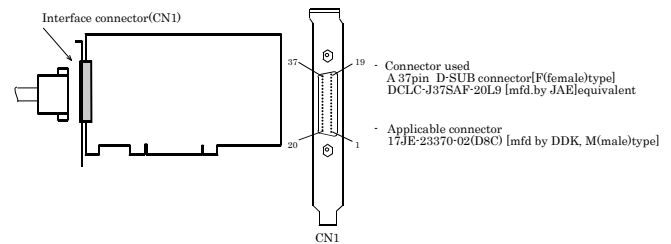
- Board [DA12-8(PCI)] ... 1
- First step guide ... 1
- Disk \*1 [API-PAC(W32)] ... 1
- Serial number label... 1
- Product Registration Card & Warranty Certificate... 1

\*1 The Disk contains the driver software and User's Guide.

## How to connect the connectors

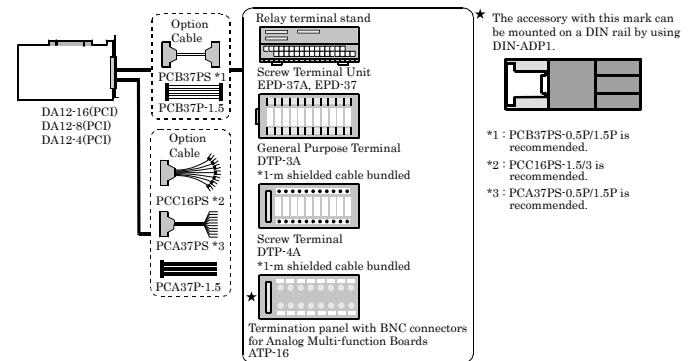
### Connector shape

To connect an external device to this product, plug the cable from the device into the interface connector (CN1) shown below.



\* Please refer to page 2 for more information on the supported cable and accessories.

### Examples of Connecting Options



### Connector Pin Assignment

CN1			
Settling Busy Output	37	19	Timer Output
Digital Ground	36	18	External Trigger Input
Analog Ground	35	17	External Sampling Clock Input
Analog Ground	34	16	N.C.
Analog Ground	33	15	Analog Output 7
Analog Ground	32	14	N.C.
Analog Ground	31	13	Analog Output 6
Analog Ground	30	12	N.C.
Analog Ground	29	11	Analog Output 5
Analog Ground	28	10	N.C.
Analog Ground	27	9	Analog Output 4
Analog Ground	26	8	N.C.
Analog Ground	25	7	Analog Output 3
Analog Ground	24	6	N.C.
Analog Ground	23	5	Analog Output 2
Analog Ground	22	4	N.C.
Analog Ground	21	3	Analog Output 1
Analog Ground	20	2	N.C.
Analog Ground		1	Analog Output 0

Analog Output 0 to Analog Output 7	Analog output signal. The numbers correspond to channel numbers.
Analog Ground	Common analog ground for analog output signals.
External Trigger Input	External trigger input signal.
External Sampling Clock Input	External sampling clock input signal.
Timer Output	Programmable timer output signal.
Settling Busy Output	Output signal indicating the settling time until the analog output reaches a predetermined voltage after output data is set.
Digital Ground	Comm Digital ground common to the signals other than the analog output signal, including the external sampling clock input signal.
N.C.	No connection to this pin.

#### CAUTION

Do not connect any of the outputs and power outputs to the analog or digital ground. Neither connect outputs to each other. Doing either can result in a fault.

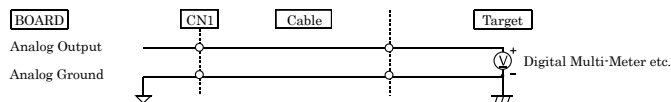
### Connecting the Analog Output Signal

The sections below describe how to connect the signals using flat cable and shielded cable.

The following figure shows an example of optional flat cable (PCA37P) connection.

Connect the CN1 analog output channels and ground to the external device's input and ground.

#### Connecting the Analog Output (Flat Cable)

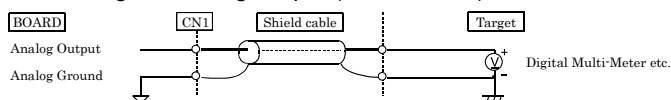


The following example connects a signal source to this product using a shielded cable such as a coaxial cable (PCC16PS) available as an option.

Use shielded cable if the distance between this product and external device is long or if you want to provide better protection from noise.

Use the core of the shielded cable to connect the analog output of CN1 to the input of the external device and use the shield braid to connect the CN1's analog ground to the external device's ground.

#### Connecting the Analog Output (Shield Cable)



#### CAUTION

If this product and the target receive noise or the distance between this product and the signal source is too long, data may not be input properly.

The maximum output current-carrying capacity of the analog output signal is  $\pm 5$  mA. Check the specifications of the target before connecting this product to it.

Do not connect any of the outputs and power outputs to the analog or digital ground.

Do not connect the analog output signal to the other analog output signal and output signal of external device. Doing so may malfunction.

Do not plug or unplug the interface connector to or from while the PC or external device power is turned on. Doing so may malfunction.

The DA converter may cause glitches as it contains no deglitcher.

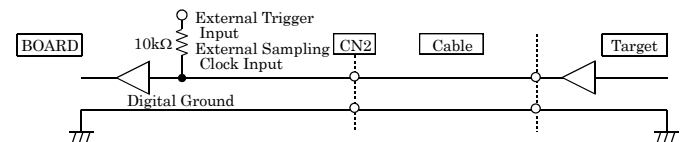
The analog output signal may temporarily vary in output voltage when the power is turned on or when the range is switched. If this variation in output voltage is a problem, insert, for example, a relay between this product and the external device.

### Connecting the Control signal

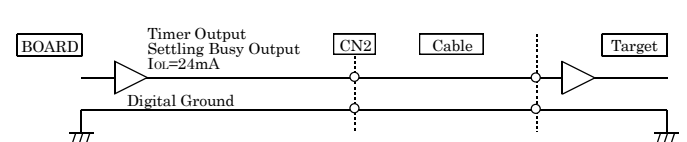
This section shows how to connect the control signal ("External Trigger Input", "Settling Busy Output" and so on) by using a flat cable.

All the control signals are TTL level signals.

#### Connecting the Input Signal



#### Connecting the Output Signal

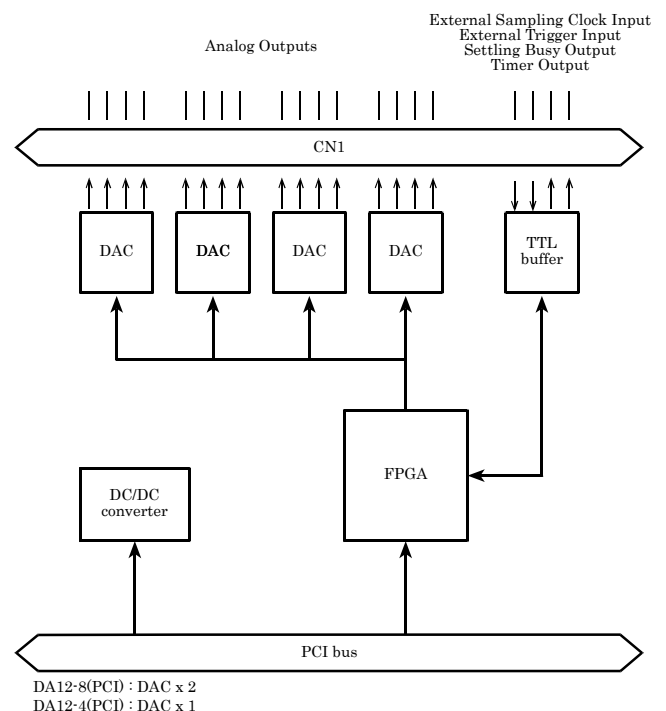


#### CAUTION

Do not short the output signals to analog ground, digital ground, and/or power line. Doing so may damage this product.

Do not connect the each output signal to the other output signal and output signal of external device. Doing so may malfunction.

### Block Diagram



## Different in the specification

The DA12-8(PCI) is different in specifications, depending on the board number as listed below.

### ■ DA12-8(PCI)

Board No.	No.7184	No.7184A	No.7184B
Dimension (mm)	176.41(L) × 106.68(H)	176.41(L) × 106.68(H)	176.41(L) × 105.68(H)