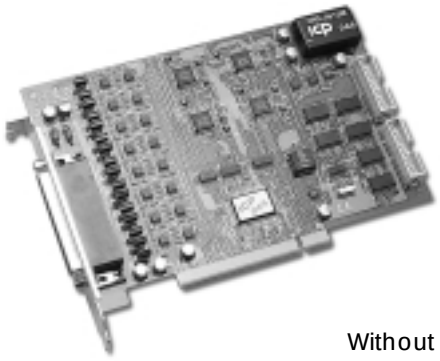
# PIO-DA16/PIO-DA8/PIO-DA4

## 14-Bit 16/8/4 Channel Analog Output Boards



Without trim-pot
With Voltage and
current output

## Functional Description

The PIO-DA16, PIO-DA8, and PIO-DA4 are multi-channel D/A boards for the PCI bus for IBM or compatible PC.

The PIO-DA16/8/4 offer 16/8/4 channel double-buffered analog output. The output range may be configured in different ranges: ±10V, ±5V, 0~10V, 0~5V voltage output or 4~20mA or 0~20mA current loop sink.

The innovative design improves several drawbacks of the conventional D/A boards. For example: 1. Jumperless and without Trim-pot. 2. The calibration is performed under software control eliminating manual trim-pot adjustments. The calibration data is stored in EEPROM. 3. Each channel can be selected as voltage or current output. 4. High channel count output can be implemented in half size.

## Features

- PCI bus
- 16/8/4 channel, 14-bit analog output
- Unipolar or bipolar outputs available from each converter
- Voltage/ current outputs for individual D/A converter
- Output type (Unipolar or bipolar) and output range (0-5V,+/-5V, 0-10V, +/- 10V ) can be software programmable
- 4-20mA or 0-20mA current sink to ground for each converter
- Double-buffered D/A latches
- Software calibration
- 16-channel DI, 16-channel DO

## Applications

- Programmable voltage source
- Programmable current sink
- Harsh environment operation
- Process control

## Specifications

- Analog Outputs
- D/A converter: Quad 14-Bit MDAC
- Channels: 4/8/16 independent
- Resolution: 14 bits
- Type: double-buffered, multiplying
- Integral linearity: 0.006% FSR ; typical
- Differential linearity: 0.006 % FSR ; typical

**Voltage Output Range:**

- Unipolar: 0~5V or 0~10V
- Bipolar: +/-10Vor,+/- 5V
- Current drive: +/-5mA
- Absolute accuracy: 0.01% FSR typical

**Current Output Range:**

- 20mA or 4-20mA
- Absolute accuracy: 0.1% FSR typical
- Excitation voltage range: + 7 V to +40V Stability
- Offset temperature coefficient: +/- 50Vμ/˚C
- Gain temperature coefficient: +/- 10ppm/˚C

**Power consumption:**

- PIO-DA4: +5VDC/600mA (max.)
- PIO-DA8: +5VDC/800mA (max.)
- PIO-DA16. +5VDC/1400mA (max.)

## Environmental

- Operating Temperature: 0 to 50˚C
- Storage Temp.: -20˚C to 70 ˚C
- Humidity: 0 to 90 % non-condensing
- Dimensions: 179 mm x 122 mm

## Software

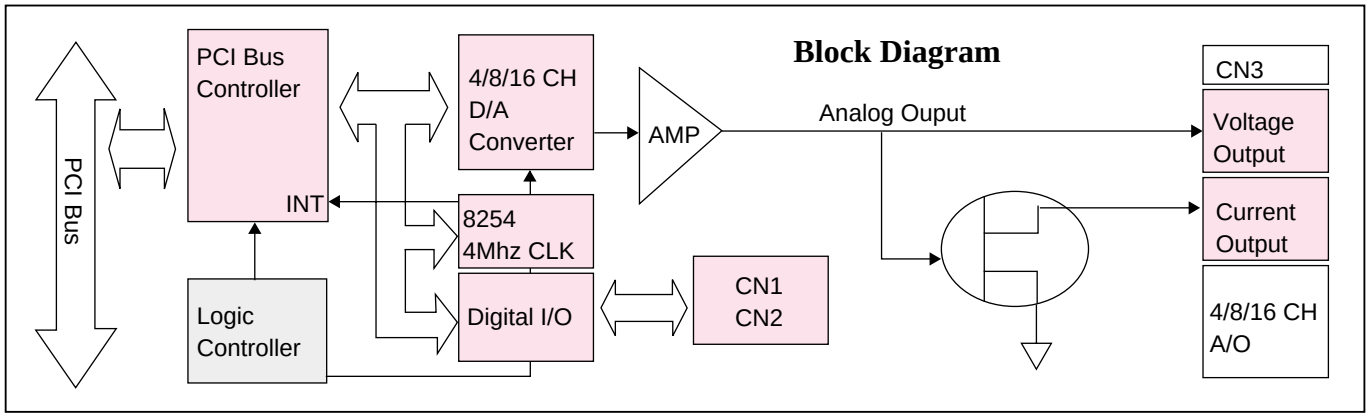
- PIO-DA Development Toolkit for DOS
- PIO-DA Development Toolkit for Win95
- PIO-DA Development Toolkit for WinNT

# PIO-DA16/PIO-DA8/PIO-DA4

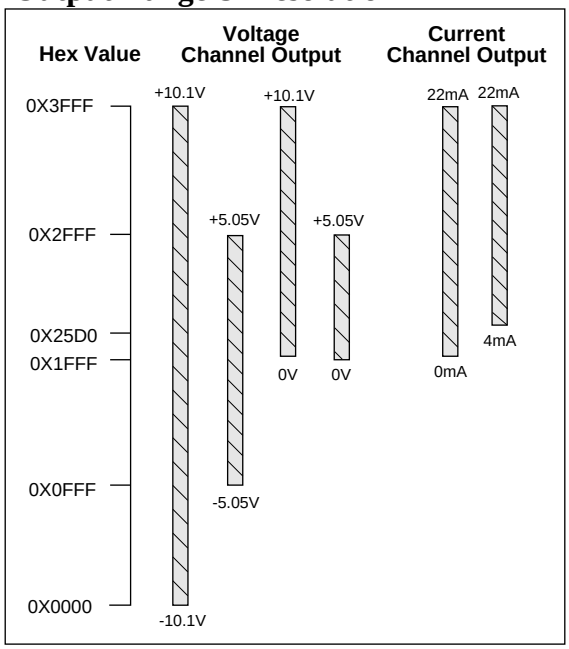
## 14-Bit 16/8/4 Channel Analog Output Boards



### Block Diagram




### Output Range & Resolution




### The resolution of each range is given as follows

| Configuration | Equivalent bit | Resolution |
|---|---|---|
| -10 ~ + 10V | 14bit | 1.22mV |
| 0V ~ + 10V | 13bit | 1.22mV |
| -5V ~+ 5V | 13bit | 1.22mV |
| 0V ~ +5V | 12bit | 1.22mV |
| 0mA ~ 20mA | 13bit | 2.70μA |
| 4mA ~ 20mA | 13bit | 2.70μA |

### Pin Assignment

**CN1**

| | | | | | |
|---|---|---|---|---|---|
| DO 0 | 1 | ● ● | 2 | DO 1 |
| DO 2 | 3 | ● ● | 4 | DO 3 |
| DO 4 | 5 | ● ● | 6 | DO 5 |
| DO 6 | 7 | ● ● | 8 | DO 7 |
| DO 8 | 9 | ● ● | 10 | DO 9 |
| DO 10 | 11 | ● ● | 12 | DO 11 |
| DO 12 | 13 | ● ● | 14 | DO 13 |
| DO 14 | 15 | ● ● | 16 | DO 15 |
| GND | 17 | ● ● | 18 | GND |
| +5V | 19 | ● ● | 20 | +12V |

**CN2**

| | | | | | |
|---|---|---|---|---|---|
| DI 0 | 1 | ● ● | 2 | DI 1 |
| DI 2 | 3 | ● ● | 4 | DI 3 |
| DI 4 | 5 | ● ● | 6 | DI 5 |
| DI 6 | 7 | ● ● | 8 | DI 7 |
| DI 8 | 9 | ● ● | 10 | DI 9 |
| DI 10 | 11 | ● ● | 12 | DI 11 |
| DI 12 | 13 | ● ● | 14 | DI 13 |
| DI 14 | 15 | ● ● | 16 | DI 15 |
| GND | 17 | ● ● | 18 | GND |
| +5V | 19 | ● ● | 20 | +12V |

| | | | | | |
|---|---|---|---|---|---|
| IO_15 | 37 | ● ● | 19 | VO_15 |
| IO_14 | 36 | ● ● | 18 | VO_14 |
| IO_13 | 35 | ● ● | 17 | VO_13 |
| IO_12 | 34 | ● ● | 16 | VO_12 |
| IO_11 | 33 | ● ● | 15 | A.GND |
| IO_10 | 32 | ● ● | 14 | VO_11 |
| IO_9 | 31 | ● ● | 13 | VO_10 |
| IO_8 | 30 | ● ● | 12 | VO_9 |
| A.GND | 29 | ● ● | 11 | VO_8 |
| IO_7 | 28 | ● ● | 10 | A.GND |
| IO_6 | 27 | ● ● | 09 | VO_7 |
| IO_5 | 26 | ● ● | 08 | VO_6 |
| IO_4 | 25 | ● ● | 07 | VO_5 |
| A.GND | 24 | ● ● | 06 | VO_4 |
| IO_3 | 23 | ● ● | 05 | A.GND |
| IO_2 | 22 | ● ● | 04 | VO_3 |
| IO_1 | 21 | ● ● | 03 | VO_2 |
| IO_0 | 20 | ● ● | 02 | VO_1 |
| | | | 01 | VO_0 |

## Order Description

- PIO-DA4: 4 channel 14-BIT Analog Output Board
- PIO-DA8: 8 channel 14-BIT Analog Output Board
- PIO-DA16: 16 channel 14-BIT Analog Output Board

## Options

- DN-37: I/O connector block with DIN-rail mounting and 37-pin D-Sub connector
- DN-37: 37-pin directly connecing board
- DB-16P: opto-isolated digital input board
- DB-16R: Relay output board
- DB-24PR: Power relay output board
- DB-24C: Open-collector output board
- DB-24POR: photo-mos relay output board
- ADP-20/PCI: 20-pin extender
- PCI-DA LabVIEW Development Toolkit for Win95
- PCI-DA LabVIEW Development Toolkit for WinNT