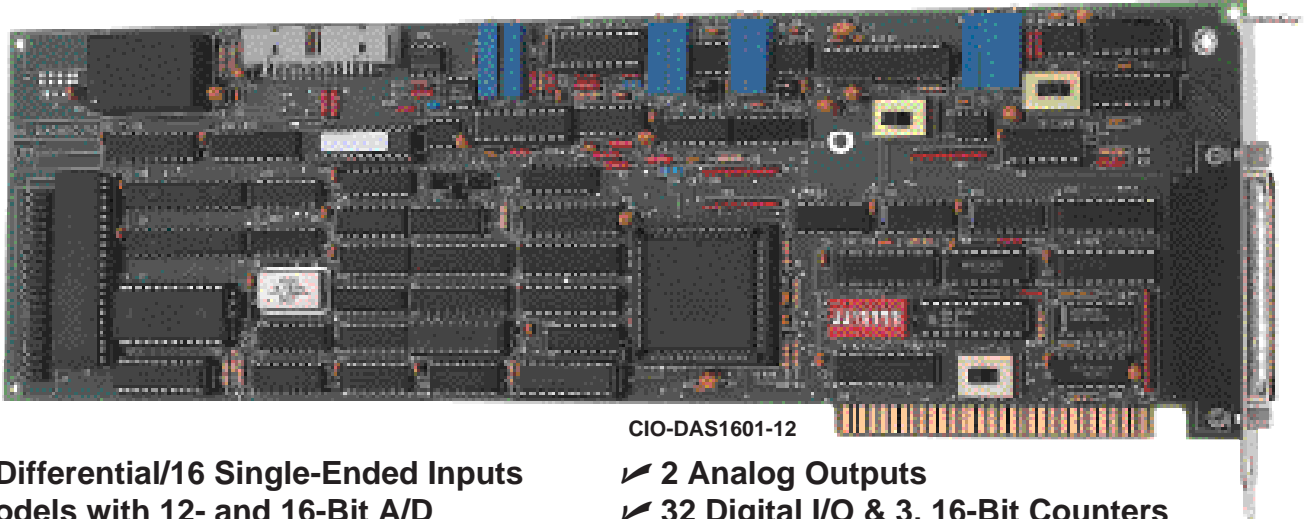




\$599
Basic Unit

CIO-DAS1600 Series High Speed 16-Channel 12- or 16-Bit Multifunction Board



CIO-DAS1601-12

- ✓ 8 Differential/16 Single-Ended Inputs
- ✓ Models with 12- and 16-Bit A/D Resolution
- ✓ 330 KHz Sample Rate (12-Bit Models)
- ✓ 2 Analog Outputs
- ✓ 32 Digital I/O & 3, 16-Bit Counters
- ✓ 512 Sample FIFO

The CIO-DAS1600 Series are multifunction analog and digital I/O boards for IBM PC and compatible computers. The boards feature 16 single-ended or 8 differential analog inputs, 2 analog outputs, 32 digital I/O and 3 counter/timers (2 used for A/D timing). The CIO-DAS1600 is designed to be 100% compatible with the popular DAS-1600 series. It maintains full compatibility while providing several enhancements including a 512 sample FIFO buffer, DT-connect for high speed inter-board communication and improved A/D triggering.

The CIO-DAS1600 turns your personal computer into a high-speed data acquisition and control station suitable for laboratory data collection, instrumentation, production test, or industrial monitoring. There are several different models available, they are described in the table below.

RANGE TABLE

Model No.	Resolution	Max Speed (Samples/Sec)	Gains	Ranges*
CIO-DAS1601-12	12 bit (1 part in 4,095)	330,000	1, 10, 100 & 1000	0-10V, 0-1V, 0-0.1V, 0-0.01V ±10V, ±1V, ±0.1V, ±0.01V
CIO-DAS1602-12	12 bit (1 part in 4,095)	330,000	1, 2, 4 & 8	0-10V, 0-5V, 0-2.5V, 0-1.25V ±10V, ±5V, ±2.5V, ±1.25V
CIO-DAS1602-16	16 bit (1 part in 65,536)	100,000	1, 2, 4 & 8	0-10V, 0-5V, 0-2.5V, 0-1.25V ±10V, ±5V, ±2.5V, ±1.25V

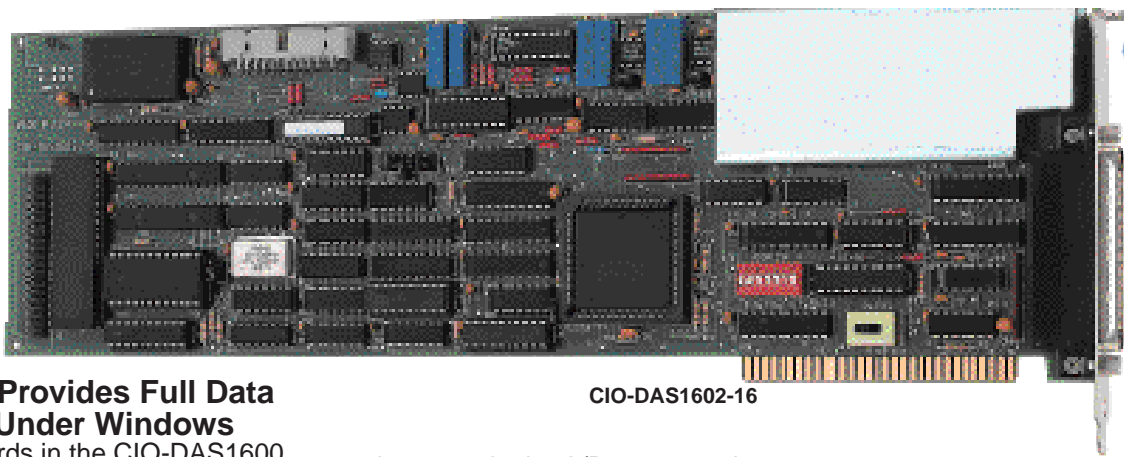
*Range selection is accomplished by a combination of bipolar/unipolar switch and software programmable gain amplifier.

Analog Inputs

The analog input section of the CIO-DAS1600 has been designed for flexibility and accuracy in a number of configurations. A standard 37 pin D connector brings the analog signals directly into two multiplexers. The two multiplexers may be configured as 16 channels of single-ended input or 8 channels of differential input. A programmable gain amplifier amplifies the signals before entering the A/D converter. The data throughput rate is dependent on the method of triggering and data transfer, as the table illustrates.

A/D Conversion and Transfer Speed (samples/sec) 386/20MHz Computer or Faster

Transfer Method	DAS-1600-12	DAS-1600-16
Interrupt/Variable or array	20,000	20,000
DMA	160,000	100,000
DT-connect, multi-channel	250,000	100,000
DT-connect, single channel	330,000	100,000



CIO-DAS1602-16

FIFO Provides Full Data Rate Under Windows

All boards in the CIO-DAS1600 family include a 512-sample FIFO buffer. The FIFO buffer collects the results of A/D conversions and stores them until the computer's CPU is able to transfer the data into PC memory. The FIFO buffer allows the PC to store up the A/D transfer requests, then service the requests in batches. The FIFO is necessary to obtain the full data acquisition rates under multitasking operating systems like Windows.

The best part about the FIFO buffer is transparency; software you have written for the DAS-1600 or CIO-DAS16 will run on a CIO-DAS1600 at higher speed without modification. And you won't miss a sample

DT-Connect

The CIO-DAS1600 boards can transfer A/D conversions to the PC via the ISA bus, or to other boards via DT-Connect. The DT-Connect board-to-board interface is a standard employed by a number of data acquisition, array and signal processing companies. OMEGA makes the MEGA-FIFO sample buffer board which holds up 128 million samples of memory completely freeing the PC bus from data transfer overhead.

Minimizing Channel to Channel Skew

All of the channels on the CIO-DAS1600 are multiplexed into a single A/D converter. Since there is only one A/D converter on the board, a channel to channel time skew (delay) occurs when scanning multiple channels. With many A/D boards, the time skew is equal to the sample rate, so a 1 KHz sample rate would produce a 1 millisecond skew time. The CIO-DAS1600 features an enhanced triggering mode called the burst mode. In the

burst mode the A/D converter is run at its maximum rate for the entire multi-channel scan, thus reducing the channel-to-channel skew time to the maximum A/D rate which is 3.3 μ S for the 12-bit boards and 10 μ S for the 16-bit board.

If even less skew is required, the optional CIO-SSH16 simultaneous sample and hold accessory board can be used to reduce the channel-to-channel time skew to 0 with 50 nS aperture uncertainty.

Analog Outputs

Two 12-bit multiplying D/A converters provide analog voltage output. This type of converter accepts a reference voltage and provides an output proportional to the reference voltage. A precision -5 V and -10 V reference provide on-board D/A ranges of 0-5 V, 0-10 V, \pm 5 V, and \pm 10 V. Other ranges between \pm 10 V are possible with the use of an external reference.

The D/A converters provide program and interrupt transfer capability. Interrupts may be initiated by the on-board pacer clock or by external trigger.

Digital I/O

The CIO-DAS1600 provides 32 channels of digital I/O. Eight channels of I/O are accessed through the main connector. These channels are fixed as 4 inputs and 4 outputs. There is also a second auxiliary digital I/O connector that contains 24 digital I/O lines (these channels are not present on the -P5 version). The digital I/O on this connector are arranged as two 8-bit and two 4-bit banks. Each bank may be configured through software as an input or output.

-P5 Option for Obstructed Computer Slots

The CIO-DAS1600 requires a full size computer expansion slot. The -P5 version of the board is used in computer systems where the expansion slot is obstructed and cannot accommodate the full board. This version contains only the eight fixed digital I/O channels on the main connector; the auxiliary digital I/O channels are not present.

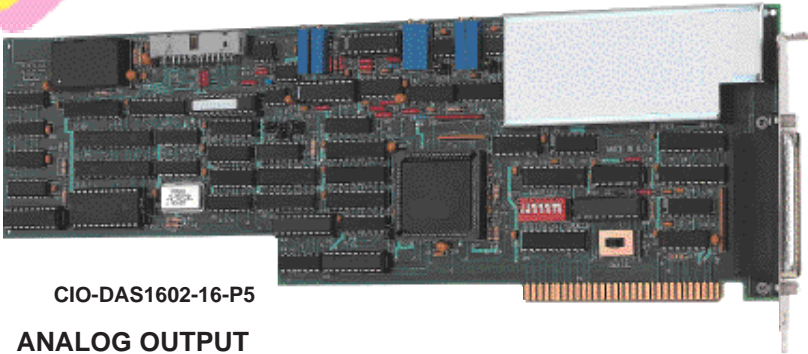
Software

The CIO-DAS1600 includes a complete test and calibration program. The program provides a step-by-step procedure for installing and configuring the card. It also creates a configuration file used by the optional Universal Library.

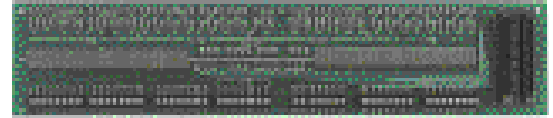
The Universal Library is a set of I/O libraries and drivers for those users creating their own custom programs. The Universal Library is compatible with most DOS and Windows based languages and supports the entire CIO family of boards. The Library includes an extensive set of programming examples written in Visual Basic, C and Pascal for both Windows and DOS languages.

An optional driver for LabView is also available. The LabView driver works in conjunction with the Universal Library, so both are needed to use the CIO-DAS1600 in LabView.

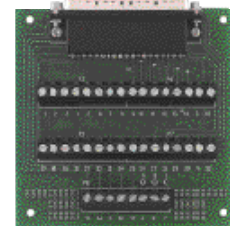
The CIO-DAS1600 is also compatible with many off-the-shelf programs including Labtech, DASyLab and SnapMaster.



CIO-DAS1602-16-P5



CIO-TERMINAL



CIO-MINI37

ANALOG OUTPUT

Resolution: 12 bits

Number of Channels: 2

Voltage Ranges: ±10 V, ±5 V, 0-10 V, 0-5 V or user defined range between 0 and 10 V. Each channel independently configurable by jumper.

Offset Error: Adjustable to 0

Gain Error: Adjustable to 0

Non-linearity: ±1 bit

Current Drive: ±5 mA

DIGITAL I/O

Number:

32 total (8 on -P5 versions),

8 on main connector,

24 on auxiliary connector

Digital I/O on Main Connector

Inputs: 4 bits

Input Voltage:

Low = 0.8 V max.,

High = 2.0 V min. @ 20 µA

Outputs: 4-bits

Output Voltage:

Low = 0.5 V max. @8.0 mA (sink),

High = 2.7 V min. @ -0.4 mA (source)

Digital I/O on Auxiliary Connector

Configuration: Two 8-bit banks and

two 4-bit banks. Each bank

programmable as inputs or outputs

Output Voltage:

Low = 0.4 V max. @ 2.5 mA (sink),

High = 3.0 V min. @ -2.5 mA (source)

COUNTER/TIMER

Type: 82C54

Counters:

Three 16-bit,

two dedicated to A/D pacer

XTAL: 1 or 10 MHz

ENVIRONMENTAL

Temperature Range:

Operating: 0 to 50°C (32 to 122°F),

Storage: -20 to 70°C (-4 to 158°F)

Humidity: 0-90% non-condensing

Weight: 11.2 oz. (318 g)

SPECIFICATIONS

ANALOG INPUTS

	CIO-DAS1601/1602-12	CIO-DAS1602-16
Channels	16 single-ended or 8 differential	16 single-ended or 8 differential
Resolution	12 bit	16 bit
Accuracy	0.01% of reading ±1 bit	0.0015% of reading ±1.5 bit
Conversion Speed	3.3 µs	10 µs
Ranges	See Range Table	See Range Table
Overvoltage	±35 V continuous	±35 V continuous
Linearity	±1 bit	±1.5 bit
Impedance	10 MΩ	10 MΩ
Zero Drift	10 ppm/°C max.	2 ppm/°C max.
Gain Drift	30 ppm/°C max.	7 ppm/°C max.

To Order (Specify Model No.)

Model Number	Price	Description
CIO-DAS1601-12	\$599	12-bit board with gains of 1, 10, 100 and 1000
CIO-DAS1602-12	599	12-bit board with gains of 1, 2, 4 and 8
CIO-DAS1602-16	699	16-bit board with gains of 1, 2, 4 and 8

To order "-P5" option for use in computers with obstructed slots (only 8 digital I/O) add "-P5" to model number, no change in price.

All boards include a user's manual and test and calibration software.

Ordering Example: CIO-DAS1602-16 board, CIO-MINI37 screw terminal panel, C37FF-2 cable and UNIV-DRVR Universal Driver Library = \$699 + 49 + 25 + 49 = \$822.

ACCESSORIES

Model No.	Price	Description
CIO-TERMINAL	\$99	Screw terminal panel, 16" x 4" with prototype area, requires cable
CIO-MINI37	49	Screw terminal panel, 4" x 4" with prototype area, requires cable
CIO-SSH16	399	16 channel simultaneous sample and hold accessory board, 4 channels installed, requires cable(see CIO-SSH16 page for additional details)
C37FF-2	25	2' ribbon cable, used with screw terminal panels
C37FFS-10	40	10' shielded cable, used with screw terminal panels
UNIV-DRVR	49	Universal Driver Library
CIO-LABVIEW-DRVR	49	LabVIEW driver, requires Universal Driver Library