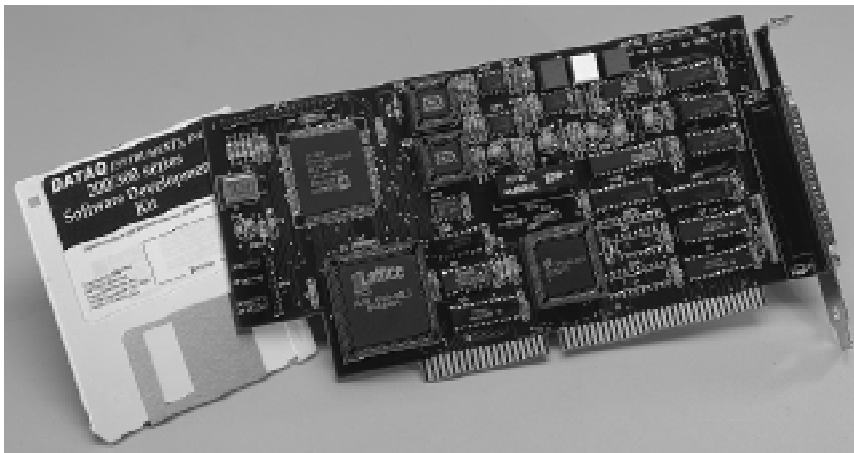


# DI-400 (12-bit) and DI-410 (14-bit) Data Acquisition Card



## 250kHz\* (DI-400) or 125kHz (DI-410) Burst Sampling Rate

## Programmable Gain, SE/DI, Per Channel

## Programmable Sample Rate Per Channel

## Analog Out and Digital I/O

## Input and Output Scan Lists

The DI-400 unifies data acquisition functions with a 32 MIPS DSP to achieve new levels of performance and cost-effectiveness. For those wishing to program, the DI-400 is compatible with the Programmer's Software Development Kit (SDK). For non-programmers, turnkey software support is provided by WINDAQ software (see pages 6-13). The DI-410, which will be available in the fourth quarter of 1997, is a 14-bit version of the DI-400. The DI-410 will offer the same capability as the DI-400, but with four times its A/D and D/A measurement resolution.

\* The DI-400 can be operated at a sample rate of 500kHz with some restrictions. Contact Dataq Instruments for complete details.

## Features

### Half-slot, 16-bit ISA Bus Design

Use with any AT style desktop or portable computer with an expansion slot.

### DAS-16-compatible I/O Connector

Industry-standard I/O connector allows simplified and cost-effective expansion.

### Built-in Pre- and Post-Trigger

Supports analog triggering based on level, slope, hysteresis, and channel specifiers. Supports digital triggering of data acquisition for sample rate synchronization. Either trigger mode allows up to 64k samples of selectable combinations of pre- and post-trigger data.

### Complete Programmability

Channel-by-channel software selection of gain, single-ended/differential configuration, sample rate, and signal averaging.

### Assign Sample Rate Per Channel

256 16-bit counters assigned to the input scan list, and 16 to the output list allow each I/O channel to be programmed for a different sample rate. See the Programmer's SDK data sheet (page 16) for more information.

### Intelligent Oversampling per Channel

Oversampling and signal averaging, minimum value, or maximum value burst reporting options provide excellent data reduction analysis techniques for many applications (see page 31).

### Input and Output Scan Lists

Provides 256- input and 16-element output scan lists for mixed analog and digital I/O.

### Analog Output Channel

16-bit transfers ensure gap-free analog output to over 100,000 samples per second.

### Wide Measurement Range

Measures from  $\pm 1.25V$  to  $\pm 10VFS$ , or  $\pm 100mV$  to  $\pm 10VFS$ .

### FREE WINDAQ Software

We provide WINDAQ/Lite free with every DI-400 or -410 purchased without WINDAQ/Pro or WINDAQ/Pro+ software. WINDAQ/Lite is a 16 channel version of WINDAQ/Pro that works at the full sample rate of the DI-400 or -410, but is restricted to a maximum throughput of 240 Hz when recording to disk.

WINDAQ Waveform Browser, our playback and analysis software for Windows, is distributed free with WINDAQ/Lite and is included free with every WINDAQ/Pro or WINDAQ/Pro+ purchase. It is also available for download free-of-charge from our web site ([www.dataq.com](http://www.dataq.com)).

### Expansion Flexibility

Need more than 16 channels? Increase input channel capacity with the DI-X Series, our line of channel expanders for DI-400 Series instruments. The DI-X Series (see page 58) offers two approaches to channel expansion; economical, board only (no enclosure) models, and enclosed models in either portable or desktop configurations. The enclosed DI-X Series models are identical in appearance to DI-500 Series expansion instruments (see pages 48-53).



**Supported software**

Programmer's SDK; WINDAQ/Pro+, WINDAQ/Pro, and WINDAQ/LT.

**Compatible computer architectures**

16-bit ISA.

**Expansion slot requirements**

One, half length, 16-bit slot.

**Interface I/O**

Addressable locations: 100-3FF<sub>16</sub>  
 Data path: 16 bits.  
 I/O address space: 8 bytes.

**Analog inputs**

Number of input channels: 16 single-ended, 8 differential.  
 Analog resolution: 12-bit, 1 part in 4096 (DI-400)  
 14-bit, 1 part in 16,384 (DI-410)  
 Sampling rate: 250,000 samples/sec max\* (DI-400)  
 125,000 samples/sec max (DI-410)  
 Relative accuracy: 0.05%  
 Integral nonlinearity: ±1 LSB max.  
 Differential nonlinearity: ±0.9 LSB max.  
 Maximum analog measurement range: ±10V.  
 Overvoltage protection: ±30V  
 Common mode rejection ratio: 80dB min @A<sub>v</sub>=1.  
 Input impedance: 1 MΩ  
 Gain ranges: 1, 2, 4, 8 or 1, 10, 100 (DI-400)  
 1, 2, 4, 8 (DI-410)  
 software selectable per channel.  
 Gain accuracy: 0.25%, calibrated to <0.05%  
 Input offset voltage: 3mV, calibrated to <30μv  
 Input settling time: 10μs to 0.01% for all gains.  
 Temperature coefficient: 25ppm/°C

Analog trigger source: Any analog channel.  
 Analog trigger level: Any between ±FS  
 Analog trigger slope: positive or negative.  
 Analog pre-/post-trigger memory: Up to 65,536 samples allocated in any proportion to pre- and/or post-trigger information.

**Analog output**

Number of channels: Two  
 Resolution: 12-bit; 1 part in 4,096 (DI-400)  
 14-bit; 1 part in 16,384 (DI-410)  
 Data transfers: Programmed I/O.  
 Update rate: 100,000 Hz.  
 Nonlinearity: ±1 LSB max.  
 Differential nonlinearity: ±0.9 LSB max.  
 Relative accuracy: 0.05%  
 Output voltage range: ±10 V.  
 Current drive capability: ±5mA  
 Output settling time to 0.01%: 10μs  
 Output impedance: 0.3Ω

**Digital I/O**

Capacity: 8 each input and output.  
 Compatibility: TTL-compatible.  
 Max source current: 0.4 mA @ 2.4V  
 Max sink current: 8mA @0.5V  
 Digital input termination: 4.7kΩ pull-up to +5VDC

**Input scan list**

Number of elements: 256.  
 Bits per element: 32-bits.  
Architecture per scan list element  
 16-bits: Sample rate definition.  
 4 bits: Channel number.  
 1 bit: Single-ended or differential.  
 2 bits: Gain.

1 bit: Unipolar or bipolar.  
 5 bits: Digital output bits.  
 1 bit: Enable/disable digital output.  
 1 bit: Signal averaging on/off.  
 1 bit: Reserved.

**Output scan list**

Number of elements: 16.  
 Bits per element: 32-bits.  
Architecture per scan list element  
 16 bits: Output rate.  
 1 bit: Specifies analog or digital output.  
 1 bit: Digital output on/off.  
 8 bits: Digital output data.  
 6 bits: Reserved.

**Simultaneous Input/Output Rates**

125 kHz

**On-board DSP**

Type: Analog Devices AD2181, 32MIPS.

**Power requirements (supplied by PC)**

+5VDC @ 0.7A max.

**Physical**

Board dimensions: 8.5 x 4.25 inches.  
 I/O connector: 37-pin D-type; male; DAS-16 compatible pin-out.

**Operating environment**

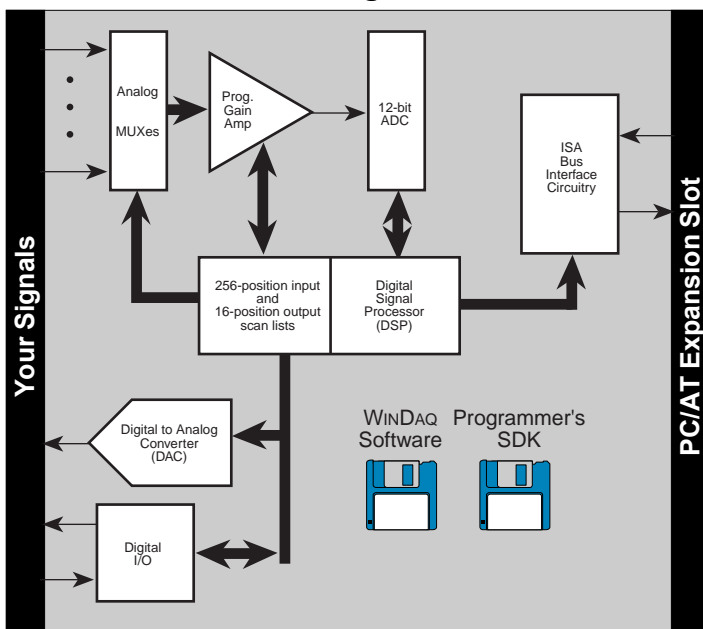
Component temperature: 0° to 70° C  
 Relative humidity: 5% to 90% noncondensing.

**Storage environment**

Temperature: -55° to 150° C  
 Relative humidity: 5% to 90% noncondensing.

\*The DI-400 can be operated at a sample rate of 500kHz with some restrictions. Contact Dataq Instruments for complete details.

**DI-400/DI-410 Block Diagram**



**Ordering & Cross Reference Guide**

Description	Order Number
16-channel analog I/O board with 1, 2, 4, 8 programmable gain factors	DI-400-PGH
16-channel analog I/O board with 1, 10, 100, programmable gain factors	DI-400-PGL
16-channel, 14-bit analog I/O board with 1, 2, 4, 8 programmable gain factors	DI-410

Optional Hardware and Software	Page
WINDAQ/Pro+ or WINDAQ/Pro data recording software	6-13
Advanced CODAS analysis software	18-26
HP VEE visual programming software	14
LabVIEW software driver	by request
DI-205 input/output panel	59
DI-X Series analog channel expanders	58
CABL-1 5B Series signal conditioner interface cable	59
CABL-2 1000 Series amplifier interface cable	59

FREE Software	Page
Programmer's SDK software driver for Windows and DOS	16
WINDAQ/Lite data recording software and WINDAQ	
Waveform Browser playback and analysis software	6-13

