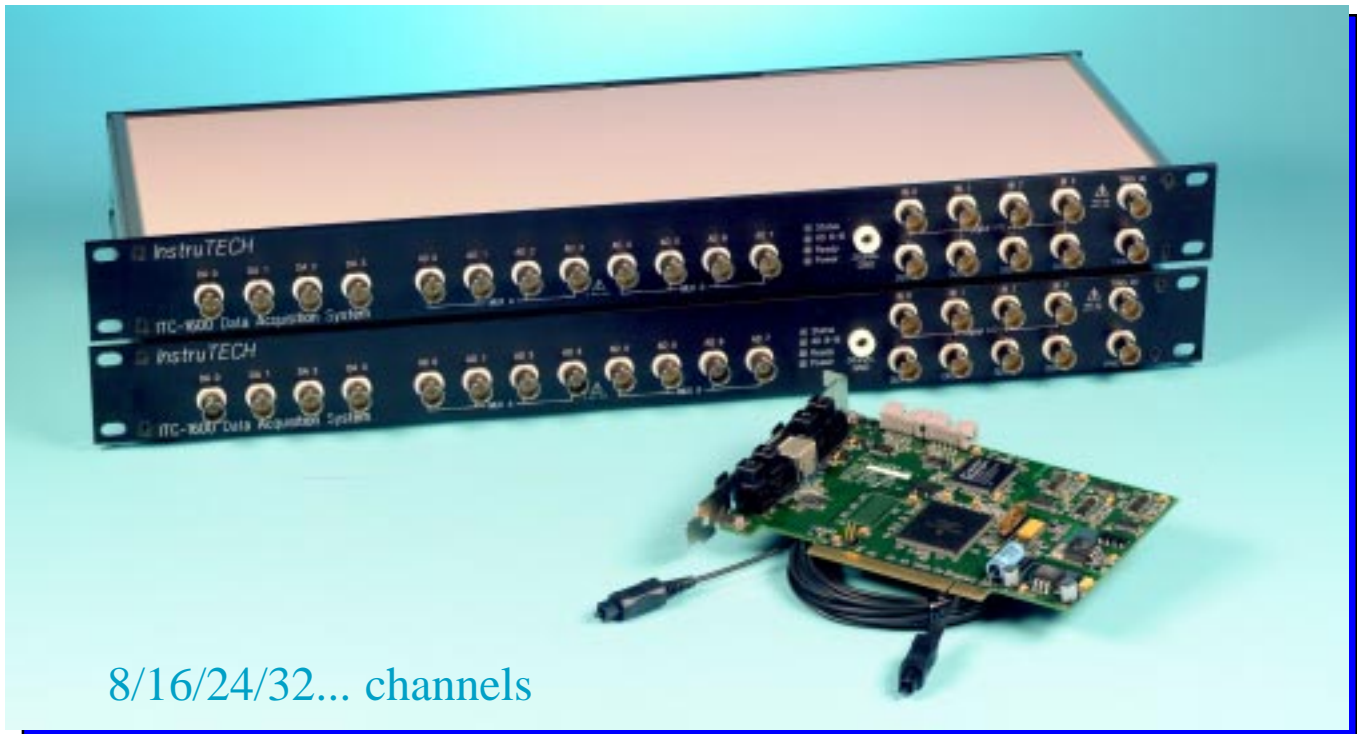


# ITC-1600

## 16 bit Multi-channel Data Acquisition System



8/16/24/32... channels

ITC-1600-2: dual rack version shown

Instrutech Corporation is proud to introduce the ITC-1600, expandable 16-bit data acquisition system. The ITC-1600 is not only a product of our historical commitment to designing high resolution, low-noise scientific data acquisition systems, but also a technological leap forward. The ITC-1600 utilizes the newest fiber optic and digital signal processing technologies, in addition to many of the exceptional features of its predecessors the ITC-16 and ITC-18. The ITC-1600 provides expandability and versatility that will satisfy both current and future needs.

The ITC-1600 system comprises of a PCI-1600 computer interface card, one or two I-1600 analog rack units connected by the InstruLINK fiber optic data cables. The fiber optics provide superb optical isolation, virtually eliminating ground loops, while increasing the distance between the computer and the recording setup to at least five meters. Fiber optic cables are small, flexible, and, unlike conventional electrical cables do not emit electromagnetic radiation.

The I-1600 rack unit has eight analog inputs, four analog outputs, twenty digital inputs and thirty-six digital output channels all sampling synchronously. In addition, four 12-bit asynchronous "telegraphing" ADC channels are available for monitoring slow changing parameters.

The eight analog input channels are separated into two banks of four. Each bank is multiplexed into one 16-bit 200kHz A/D converter. Both A/D converters sample simultaneously and synchronously at the maximum conversion rate resulting in a total throughput of 400kHz. This unique arrangement allows pairs of channels to be digitized without phase-shift. If the bandwidth of the experiment calls for lower sampling rates, the DSP decimates and/or filters the data. An added benefit of filtering is the reduction of noise.

The PCI-1600 Bus mastering host interface card supports one or two I-1600 rack units. If two rack units are used, then all input and output channels are doubled and fully synchronized. For systems requiring even more channels, multiple PCI-1600 and I-1600 units are used. Multiple PCI-1600 cards installed in the same or in separate computers can be synchronized.

**InstruTECH**  
Precision Instrumentation for Biological Research

# Technical Specification

## I-1600 rack unit

### Analog inputs:

Number of channels	8, 2 ADC, each multiplexed into 4 inputs MUX A channels 0-3, MUX B channels 4-7
Input type	differential, optically isolated
Type of ADC	successive approximation
Input connector	BNC on front panel
Resolution	16 bit, 1 in 65536
Acquisition rate	400 kHz aggregate, 200 kHz per ADC
Input range	-10.24 to +10.23 Volts
Aperture delay	10 ns maximum
Aperture jitter	50 ps rms maximum
Conversion speed	software selectable, minimum 5 $\mu$ s per ADC
Differential nonlinearity	$\pm 0.002\%$ of FSR
Drift	$\pm 2$ ppm/ $^{\circ}$ C
Input impedance	1M $\Omega$
Signal-to-noise ratio	86dB at DC to 160kHz, < 1mV PP
No missing codes	16-bit
Crosstalk	between ADC: not measureable between MUX inputs: -110dB 20 Volt 1kHz sine
Maximum over voltage	$\pm 40$ Volts

### Asynchronous "telegraphing" inputs:

Number of channels	4, single-ended
Input connector	BNC on rear panel
Resolution	12 bit
Acquisition rate	5kHz aggregate
Input range	$\pm 10$ Volts
Max. input over voltage	$\pm 40$ Volts

### Digital inputs:

Digital inputs	20, logic level, optically isolated
Input type	3.3 and 5 Volt logic compatible
Operational mode	selectable, level or latching, active high or low
Minimum pulse width	150 ns
Input connectors	4 on front panel BNC, 16 on rear panel connector
Maximum over voltage	$\pm 30$ Volts D.C.

### Trigger In:

Number	1, optically isolated
Input type	3.3 and 5 Volt logic compatible
Operational mode	selectable, edge, level, active high or low
Minimum pulse width	150 ns
Input connector	BNC on front panel
Maximum over voltage	$\pm 30$ Volts D.C.

### Analog outputs:

Number of channels	4, individual D/A converters
Output type	pseudo differential, optically isolated
Type of DAC	double buffered, multiplying
Output connector	BNC
Resolution	24 bit converter, 16 bit data (1 in 65536)
Output range	-10.24 to +10.23 volts
Conversion speed	software selectable, minimum 5 $\mu$ s each
Settling time	<4 $\mu$ s to 0.001%
Gain error	0.2% of FSR
Gain linearity	<2dB
Drift	$\pm 4$ ppm/ $^{\circ}$ C, after 10 minute warm up
Signal-to-noise ratio	116dB
Output impedance	10 $\Omega$ (for output overload protection)
Short circuit to ground	indefinite
Current output	$\pm 20$ mA maximum
Capacitance drive	200pF

### Digital outputs:

Number	36, optically isolated
Output driver	3.3 Volt, TTL, LS, ACT, and HCT compatible
Output connectors	4 on front panel BNC with LED indicators 32 on rear panel connector
Sink output current	6.4 mA (front panel), 3.2 mA (rear panel)
Source output current	6.4 mA (front panel), 3.2 mA (rear panel)
Power-on state	logic low

### Trigger Out:

Number	1, optically isolated
Output driver	3.3 Volt, TTL, LS, ACT, and HCT compatible
Output connector	BNC on front panel
Output current	6.4 mA sink or source

### Dimensions:

Width: 19" (47.5cm), Height: 1.75" (4.375cm), Depth: 6" (15 cm),  
Weight: 8 pounds (3.6 kg)

### Power requirements:

85-264VAC, 47-440 Hz, 25 Watts

### Warranty:

Two years parts and labor

## PCI-1600 computer interface

Form factor	short, 32 bit, 33MHz	Connectors	2 pairs InstruLINK fiber optic transmitters/receivers, Unisolated Trigger In, Trigger Out, auxiliary digital output for optional expansion panel and for synchronization of multiple PCI-1600 interfaces
Type	Bus mastering, PCI 2.0 compliant		
Cable	1 pair 5 meter fiber optic cable for each ITC-1600 rack unit		

## Software support

MacOS Classic and X	C/C++ Metrowerks libraries Application builder libraries Wavemetrics IGOR Pro XOP	Windows 9x, NT, 2000	32 bit C/C++ library and VxD driver Wavemetrics IGOR Pro XOP National Instrument LabVIEW Mathworks MATLAB Strathclyde WinWCP Instrutech ECELL
---------------------	---	----------------------	--

MacOS / Windows are registered trademarks of their respective manufacture. Specifications are typical at 25 $^{\circ}$ C unless otherwise noted and are subject to change without prior notice. ©2001 Instrutech Corporation



800.998.MATE | www.autom8.com | 336 Baden Street, San Francisco, CA 94131 USA  
tel 415.239.6080 | fax 415.239.6801 | e-mail info@autom8.com