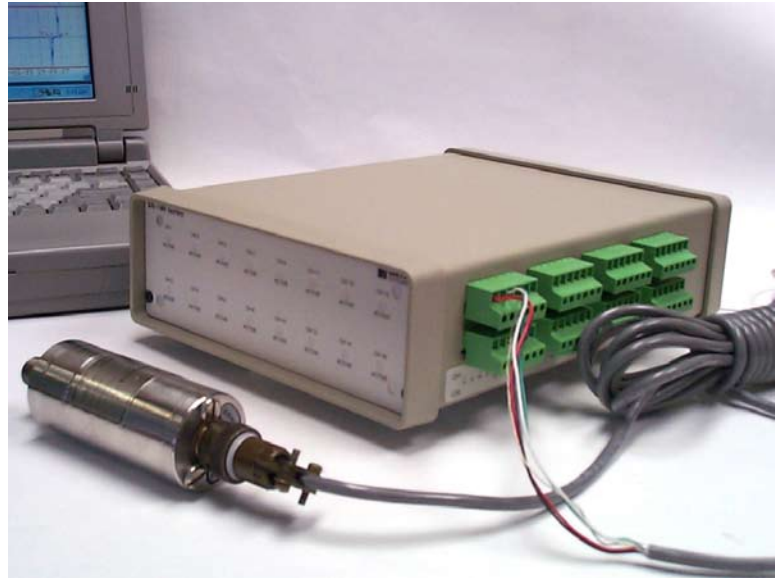# DI-740 Series Transducer-Based Data Acquisition

Designed for Amplified Transducer-Based Applications: Load, Pressure/Vacuum, Acceleration, Displacement, Level, Force, Rotational Position, and More...

Standard Printer Port, Optional USB Interface

14-bit Resolution

The DI-740 Series is a family of instruments with the purpose of simplifying self-amplified, transducer-based measurements. Above all, the DI-740 was designed to offer convenience by providing its own isolated field excitation per channel and data acquisition in one instrument.

Use the DI-740 for amplified transducers such as those used to measure pressure, vacuum, load/force, torque, displacement, acceleration, position, and more. Examples of these applications include stamping presses, hydraulic systems, pump and compressor systems, automotive tests, rolling mills, liquid-level sensing, and injection molding.

The DI-740 is ideal for both desktop and portable computer users who need a flexible data acquisition solution for measurements using self-amplified transducers. Its super compact size allows it to be used in areas with limited space such as machinery, automobiles, aircraft, the shop floor, etc. Its standard port design allows it to be used with laptop or desktop PCs and eliminates the need to open computers or worry about base address, interrupt, or DMA configurations.

Features

Use with Process Current or Voltage Output Transducers

The DI-740 features a per-channel programmable gain range of 1, 2, 4 and 8. Each DI-740 input channel can be programmed to measure ±10, ± 5, ±2.5 or ±1.25 VFS, respectively. In addition, the DI-740 has a built-in 250Ω shunt resistor per channel for process-current mode transducers. With its isolated 28VDC power supply per channel, it allows you to connect virtually any model voltage or current output, self-amplified transducer. Isolation eliminates or greatly reduces errors caused by common mode voltages when multiple transducers are connected.

Connects to Your PC's Printer or USB Port

DI-740 instruments are available with printer port or USB communication interfaces. All instruments have a 25-pin male printer port connector for EPP, bidirectional, or standard mode parallel port communication (Standard mode not available on USB models). Options add a USB port. The optional communication interfaces cannot be used concurrently with the printer port.

Burst Sampling A/D

Connect to DC or near DC signals like static pressures and loads or other slow process variables. Sample rates well into the sub-Hertz range are possible. Use high sample rates for fast applications such as dynamic pressure spikes in hydraulics or dynamic accelerometer waveforms in shock and vibration studies.

Eliminates the Need for Separate Power Supplies

The DI-740 Series features 32 channels: 16 signal-conditioned channels and 16 general purpose channels. Each of the 16 signal-conditioned channels provides its own isolated power supply for transducer excitation. Thus, the DI-740 provides all the electronics needed for measurements using amplified transducers.

High Resolution Capability

DI-740 instruments apply 14-bits of resolution to your measurement task, yielding resolutions as fine as 1 part in over 16,000.
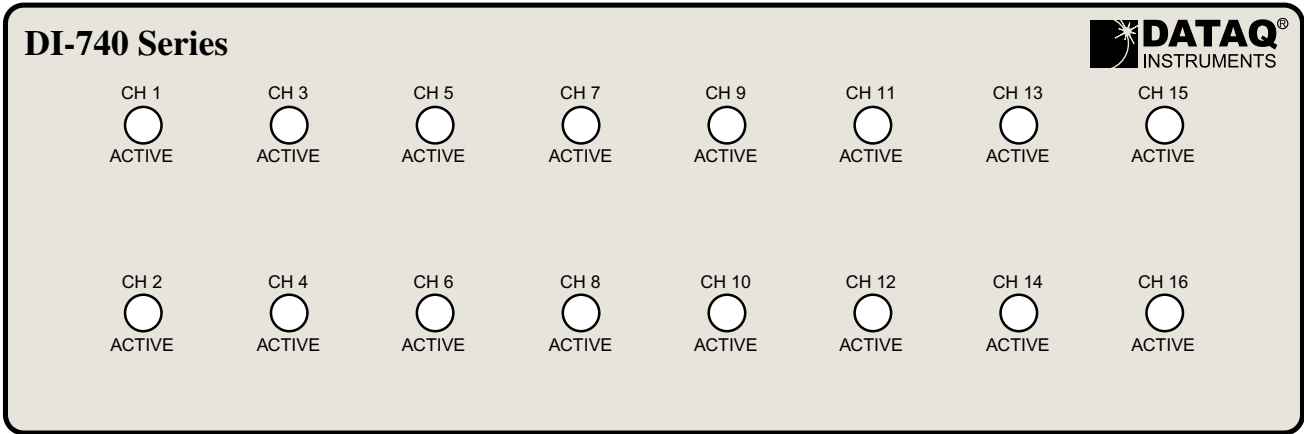
Easy to Connect & Use

All instruments connect in seconds to your PC's parallel port or USB port using the supplied cable. The DI-740 features a removable terminal strip per channel to simplify transducer connections to the instrument.

WINDAQ Software Included Free

Currently, with the purchase of any DI-740 Series Instrument, receive a free upgrade to WINDAQ/Pro+. WINDAQ/Pro+ allows you to record data at the highest rate possible and set variable sample rates per channel.

Every Instrument Purchased from DATAQ Instruments, Inc. comes with WINDAQ/Lite Recording and Playback Software. WINDAQ/Lite Recording Software is restricted to a maximum throughput rate of 240Hz when recording to disk. Use the Playback Software (WINDAQ Waveform Browser) to review, measure, compare, and analyze your waveforms during or after recording to disk.
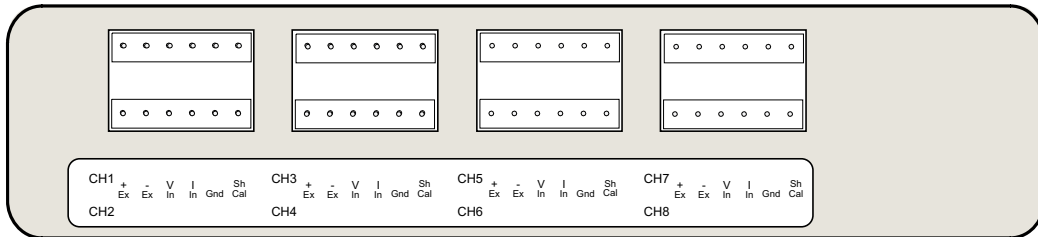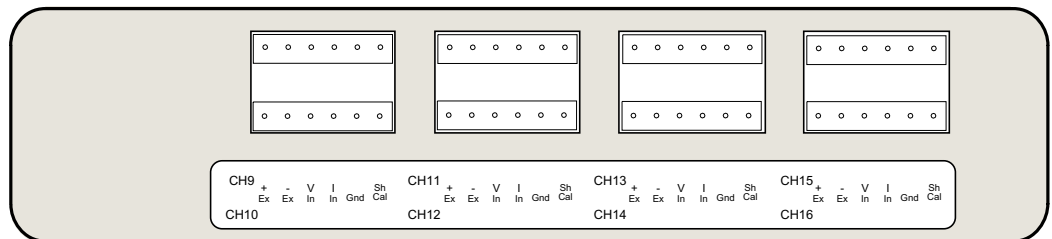
DI-740 Front Panel

DI-740 Series

DATAQ® INSTRUMENTS

CH 1	CH 3	CH 5	CH 7	CH 9	CH 11	CH 13	CH 15
ACTIVE	ACTIVE	ACTIVE	ACTIVE	ACTIVE	ACTIVE	ACTIVE	ACTIVE

CH 2	CH 4	CH 6	CH 8	CH 10	CH 12	CH 14	CH 16
ACTIVE	ACTIVE	ACTIVE	ACTIVE	ACTIVE	ACTIVE	ACTIVE	ACTIVE

The DI-740 Series Instruments feature front panel "ACTIVE" LEDs per channel. The corresponding glowing light will indicate at a glance the channels that are connected to transducers as an aid to measurement setup.
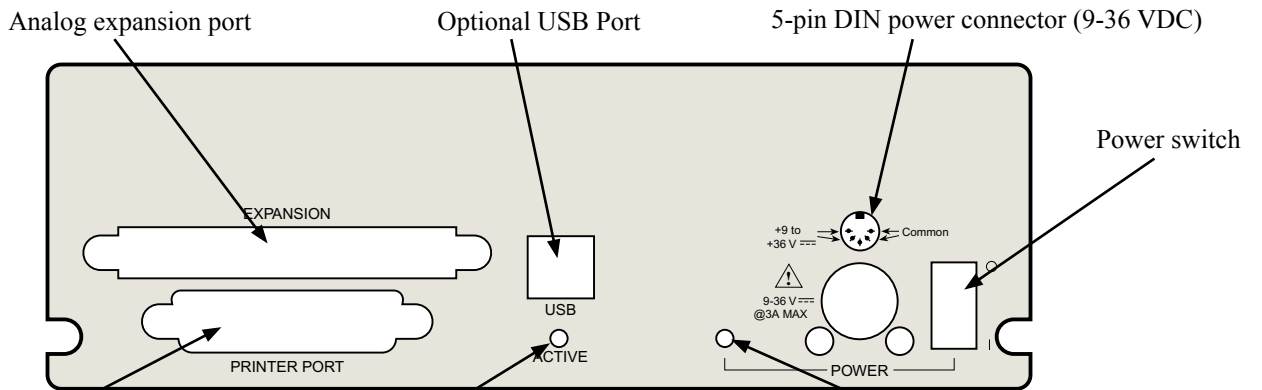
DI-740 Side Panels

Side one

CH1 +Ex -Ex V In I In Gnd Sh Cal CH2
CH3 +Ex -Ex V In I In Gnd Sh Cal CH4
CH5 +Ex -Ex V In I In Gnd Sh Cal CH6
CH7 +Ex -Ex V In I In Gnd Sh Cal CH8

Side two

CH9 +Ex -Ex V In I In Gnd Sh Cal CH10
CH11 +Ex -Ex V In I In Gnd Sh Cal CH12
CH13 +Ex -Ex V In I In Gnd Sh Cal CH14
CH15 +Ex -Ex V In I In Gnd Sh Cal CH16

The DI-740 Series Instruments feature as many as 16 removable terminal strips to simplify transducer connections to the instrument.

DI-740 Rear Panel I/O

Analog expansion port   Optional USB Port   5-pin DIN power connector (9-36 VDC)

Power switch

EXPANSION

PRINTER PORT

USB

ACTIVE

+9 to +36 V ===
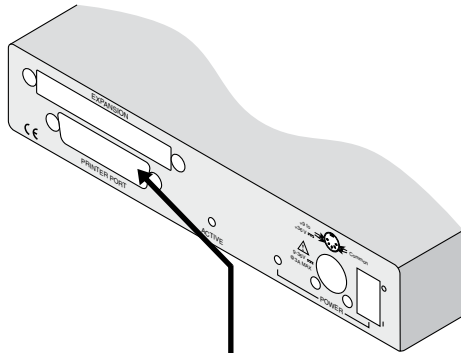Common
9-36 V === @3A MAX
POWER

Printer port standard on all models   ACTIVE LED indicates data acquisition activity   POWER LED indicates power is applied

Parallel Port
Model DI-740-P

Maximum Distance
6 feet (2 meters)

**Maximum Continuous
Stream-to-Disk Rate**
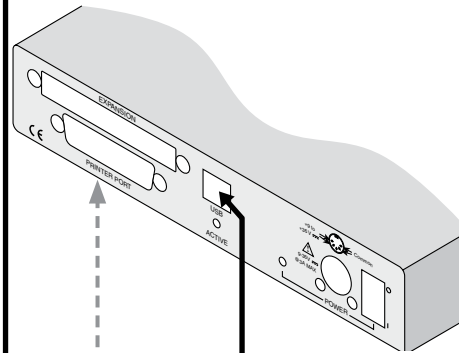
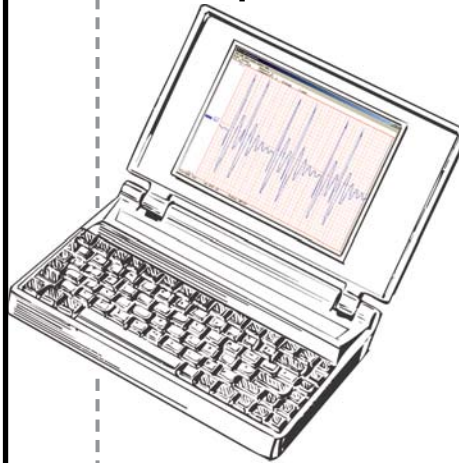|	
EPP:	200 kHz
Bidirectional:	80 kHz
Standard:	40 kHz

Benefits
• Connects to any PC.

USB
Model DI-740-USB

Maximum Distance
16 feet (5 meters)

Parallel port that supports EPP and bi-directional modes is also included in this model.
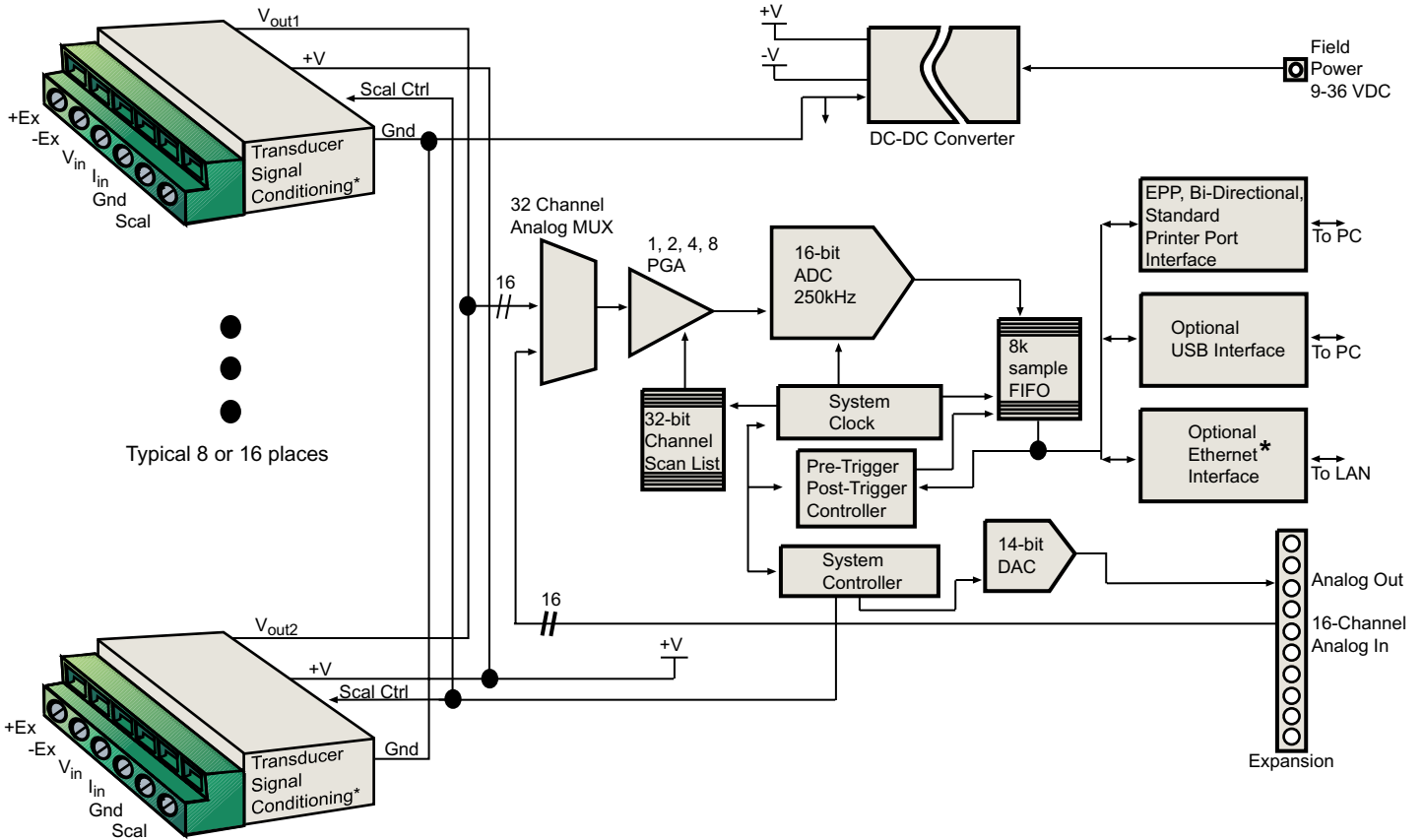
**Maximum Continuous
Stream-to-Disk Rate**
200 kHz

Benefits
• Plug and play configuration
• "Hot swap" capability
• Highly recommended for USB-equipped PCs running Windows 2000 or higher
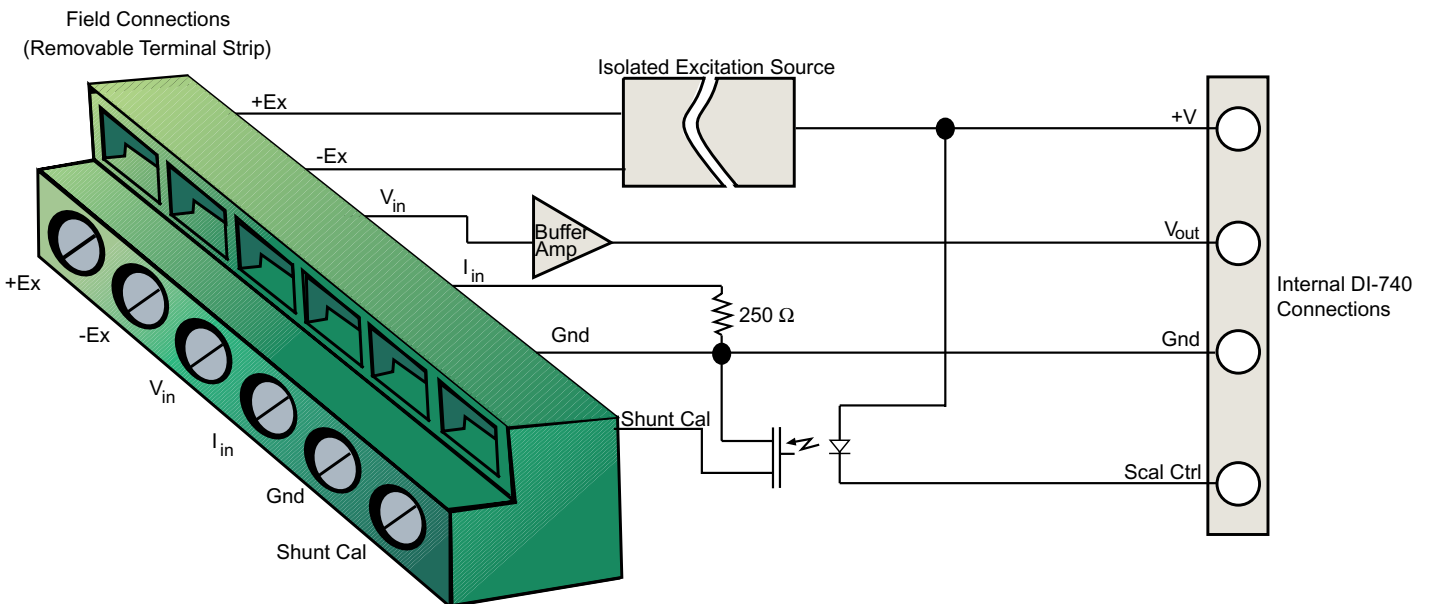
Preferred Configuration
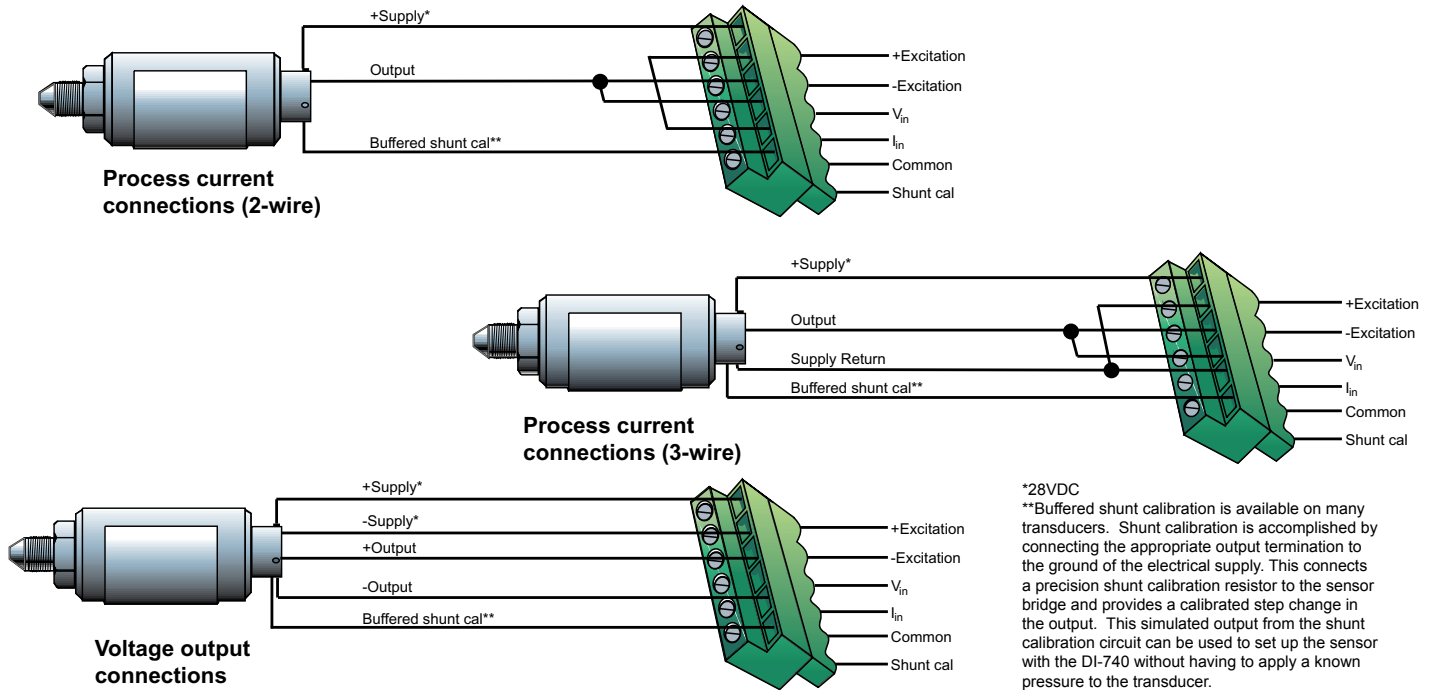
DI-740 System Block Diagram

*See Typical DI-740 Transducer Channel Block Diagram below.

* Ethernet Interface no longer available

Typical DI-740 Transducer Channel Block Diagram

Typical DI-740 Field Connections

Process current connections (2-wire)

+Supply*
Output
Buffered shunt cal**

+Excitation
-Excitation
V_{in}
I_{in}
Common
Shunt cal

Process current connections (3-wire)

+Supply*
Output
Supply Return
Buffered shunt cal**

+Excitation
-Excitation
V_{in}
I_{in}
Common
Shunt cal

Voltage output connections

+Supply*
-Supply*
+Output
-Output
Buffered shunt cal**

+Excitation
-Excitation
V_{in}
I_{in}
Common
Shunt cal

*28VDC
**Buffered shunt calibration is available on many transducers. Shunt calibration is accomplished by connecting the appropriate output termination to the ground of the electrical supply. This connects a precision shunt calibration resistor to the sensor bridge and provides a calibrated step change in the output. This simulated output from the shunt calibration circuit can be used to set up the sensor with the DI-740 without having to apply a known pressure to the transducer.

Compatible Transducer Selection Guide

Manufacturer	Mechanical Property	Application	Models
Sensotec www.sensotec.com	Load	Low Cost Miniature Pancake Type Rod Ends	53 31, 34 41, 43, 44, 45, 73, 75 RM, RF
	Pressure/Vacuum	High Precision Ultra High Precision General Purpose Triple Range Low Cost Oil Field/Wing Union Vacuum High Line Differential Clean-In-Place (Sanitary) Process Control (4-20mA)	TJE STJE A-105, A-205, Z, A-5, FP2000, HV, A-10 TRG/TRA LV JAF V HL-Z, HL-A-5 CIP-Ultra 415, 440, LV
	Acceleration	Strain Gage-Based Piezoelectric	JTFA PA
	Displacement (DC LVDT)	Long Stroke Submersible	MDL, DLA, MDLC, DLB, DLE, DLF DW7U, DW7C, DW7S
Druck www.druck.com	Pressure/Vacuum	Voltage Output Current Output	PMP, LPM, PDCR, LPX Series PTX, 1830, PTX, LPX Series
Viatran www.viatran.com	Pressure/Vacuum	Rugged High Range Low Cost Low Range High Accuracy Electronic Barometer Very Low Cost High Accuracy/Rugged Low Range, wet/wet DP Small Size Low Pressure Pulp and Paper Explosio-Proof Low Power	218, 318 220, 320 240, 340, 584 244, 344 245, 345 246, 346 247, 347 249, 349 274, 374 276, 376 544 550, 551, 553, 554, 559 550, 770, 571, 574 LP770
	Level	Secondary Containment Clean-In-Place (Sanitary)	572 358, 350, 351
Schaevitz **(Lucas Variety)** www.schaevitz.com	Displacement (DC LVDT)	Submersible Clean-In-Place (Sanitary) General Purpose Hermetically Sealed	516 353, 359 DC-SE Series, GCA/GCD, RBB HCD Series
	Rotational Position	4-20mA position transmitters VDC and mA outputs	PTS 420, CTS 420, HCT 420 Series Magnerule Plus
	Pressure/Vacuum	RVDT RVIT Low Cost Silicon-Based Digitally Compensated Strain Gage-Based Very Low Pressure Rolling Mill	R30D R60D, RVIT 15-1201 PS3363, PS3383 PS10000, P9000 Series P960, P980, P990 P3000 Series P9081-010X Series
	Force	Gram Range	FT Series

DI-740 Series Hardware Options

| Order No.		Description
DI-205		**Banana Plug Signal Input/Output Box.** 16 single-ended/8 differential channel signal interface box that allows analog channel access through 5-way banana posts. The DI-205 also features a screw terminal block to provide access to analog outputs and digital I/O. Includes model CABL-5 six-foot extension cable. Requires model 100679 adapter cable.
DI-705		**Screw Terminal Input/Output Option.** Small, lightweight screw terminal interface board that allows access to all DI-740 analog and digital I/O expansion signals through an array of screw terminals. The screw terminals accept AWG 16-22 stripped wire. Optional CABL-5 extends the DI-705 up to six feet. Requires model 100679 adapter cable.
CABL-4		**BNC Input Signal Interface Cable.** Four-foot cable with a 37-pin D-type female connector on one end and 16 fast connect/reconnect female BNC connectors on the other. CABL-4 allows as many as 16 analog input signals to be connected to the expansion port of the DI-740 using industry-standard BNC connectors. Requires model 100679 adapter cable.
DI-75B		**5B Signal Conditioning Module Expansion Backpack.** Eight-channel 5B-type amplifier module expansion backpack that connects to the expansion port of DI-740 instruments. Allows the expansion channels of the DI-740 to be connected to virtually any range of industrial signals through fully isolated signal conditioners. Up to two DI-75B units may be connected for a total of 16 signal-conditioned channels.
DI-725		**32-Channel Analog Expansion Backpack.** Provides 32 additional differential analog input channels featuring a programmable gain per channel. Measurement ranges per channel are ±1.25, 2.5, 5, and 10 volts full scale. Multiple DI-725s may be connected for a total of 240 analog input channels.
DI-725/E		**32-Channel Expanded Range Analog Expansion Backpack.** Similar to Model DI-725, but with an extended measurement range of ±2.5, 5, 10, and 20 volts full scale. Model DI-725E is also ruggedized to offer enhanced input channel protection to 120vrms.
CABL-7		**Expansion Port Adapter Cable.** This cable adapts the 40-pin expansion connector on the rear panel of the DI-740 to a 37-pin male D-sub required by many DI-740 accessories. Overall cable length is 5.5 inches (14 cm).

DI-740 Series Software Accessories

Software	Purpose	Availability	Application
ActiveX Controls	Programming	FREE	Programming environment for Windows programming languages such as Visual BASIC, C++, Delphi, and LabVIEW.
WINDAQ/Lite	Recording/Playback and Analysis	FREE	True multitasking waveform recording and analysis software for the Windows environment. Record with the WINDAQ Acquisition software while analyzing data with the WINDAQ Waveform Browser software (includes frequency and filtering analysis with FFT and DFT functions, statistical analysis, and X-Y plotting capabilities). Supplied with every hardware purchase, WINDAQ/Lite supports hardware-capable stream-to-disk rates for one channel. Two or more channels are restricted to a maximum stream-to-disk throughput rate of 240Hz.
WINDAQ/Pro	Recording/Playback and Analysis	Unnecessary (see WINDAQ/Pro+)	Identical to WINDAQ/Lite, but adds the ability to sample at hardware rates.
WINDAQ/Pro+	Recording/Playback and Analysis	Included with purchase of a DI-740	Identical to WINDAQ/Pro, but adds the ability to sample different channels at different rates.
WINDAQ/XL	WINDAQ to Excel Bridge	Extra-Cost Option	Allows you to port data, in real time and without programming, to Microsoft Excel.
XControls	Display	Extra-Cost Option	Allows you to display virtual instrumentation directly on your computer without programming. Supports a multitude of angular and sliding gages, thermocouple columns, and much more. May be used directly in Microsoft Excel without programming (requires WINDAQ/XL). May also be accessed from any Windows programming language.
Advanced CODAS	Analysis	Extra-Cost Option	Sophisticated analysis add-on to WINDAQ Software. Functions include differentiator, integrator, rectifier, moving average filter, arithmetic operations, peak and valley detector, and report generator.

Record…

Record analog channel data using WinDaq's continuous recording mode, or its triggered mode with selectable trigger level, slope, and pre- and post-trigger times. WinDaq automatically time- and date-stamps, then streams acquired data and your commented event markers to disk—acquire as much data as you need. At the same time, WinDaq reveals on your monitor a real time graphical display of any or all channels, so you can easily chart your progress, identify critical events, and plan your next action. No other product gives you WinDaq's power, speed, and flexibility. That's why it's the most widely used turnkey software package for PC-based test instrumentation.
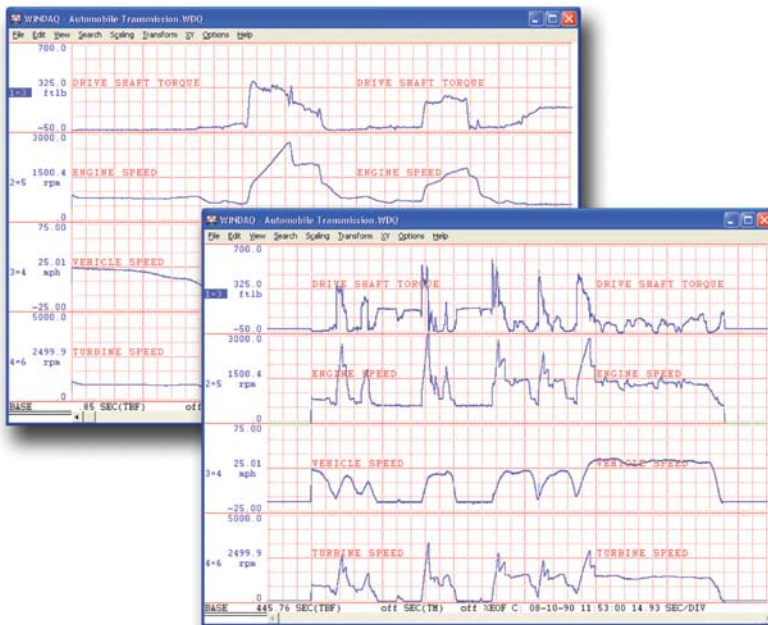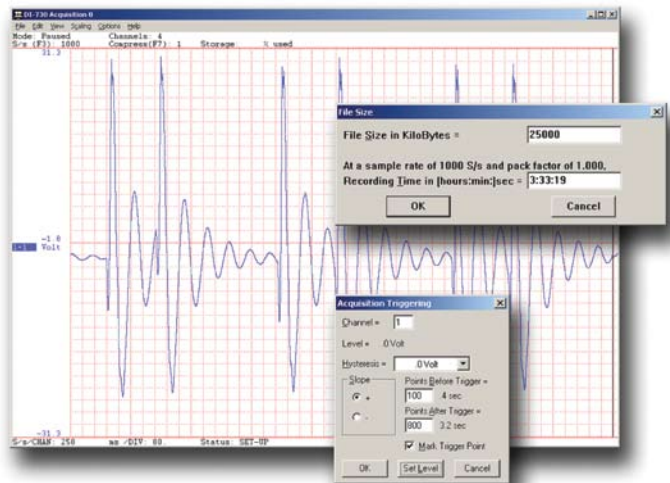

Review…

Use the WinDaq Waveform Browser to review, compare, qualify, and export recorded waveform data in ways you've never seen on a PC. Compress an entire session's recording to one screen width for a bird's eye view, then expand around an area of interest for a closer look. Use cursors to precisely measure amplitudes and timing. Move to any event marker in the file with the click of a mouse button. Then access WinDaq's wealth of analysis tools to gain further insight. And you can do it all immediately, without the burden of programming.

and Analyze the Results.

Waveform interpretation is easy with our built-in analysis functions. Apply frequency and filtering analysis with the WinDaq Waveform Browser's FFT and DFT functions. Or analyze any range of waveform data with its statistics function. Use X-Y plotting to examine the relationships of one channel to another. You'll gain insights you never thought possible. Advanced CODAS allows additional software analysis functions such as waveform integration, differentiation, arithmetic operations, peak detection, and more. Then export waveform graphics or data to any other application.
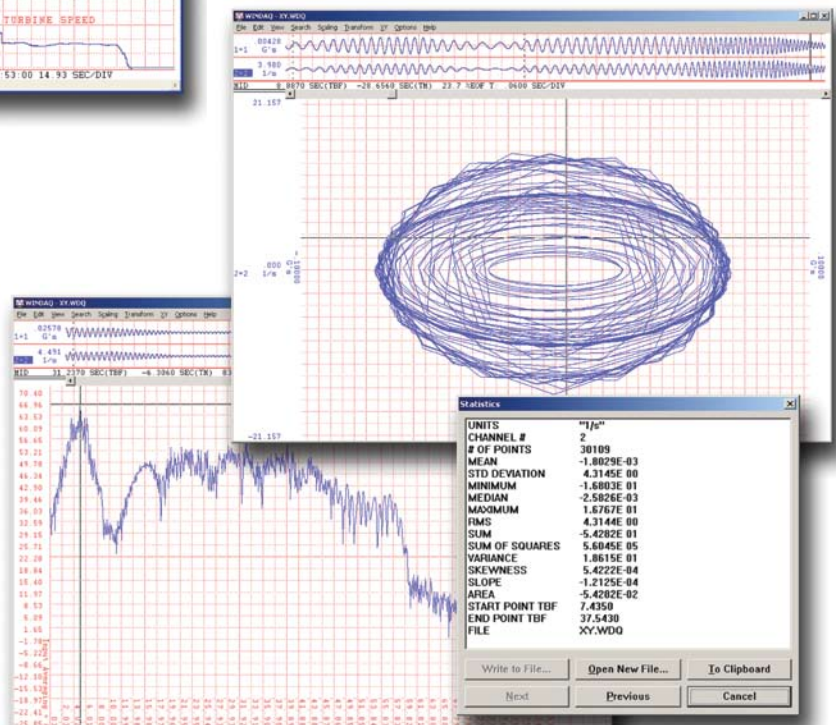
* Source: Test & Measurement World Market Insight Study, PC-based Test Instrumentation, May 1998

Specifications

Interface

Standard, Bi-directional, or EPP parallel port. Optional USB.

Analog Inputs

Number of Channels:	32 (16 transducer, 16 general purpose)
Analog Resolution:	14-bit

Sample Throughput Rate

Printer Port:	40,000 standard; 80,000 bi-directional; 200,000 EPP samples/second max (software selectable per channel)
USB:	200,000 samples/second max
Measurement Range Full Scale (general purpose channels):	$\pm10V$ @ $A_v=1$; $\pm5V$ @ $A_v=2$; $\pm2.5V$ @ $A_v=4$; $\pm1.25V$ @ $A_v=8$
Common Mode rejection ratio (general purpose channels):	80dB min @ $A_v=1$
Overall accuracy:	$\pm(0.25\%$ of full scale range $\pm100\mu V)$
Channel-to-channel crosstalk:	-75dB @ 100kHz and 100Ω unbalance
Input impedance:	$1M\Omega$ resistor tied to GND on each input channel

Analog Outputs

Number of Channels:	One buffered analog output
Resolution:	12-bit, 1 part in 4096 @ 250kHz
Output voltage range:	$\pm10V$ full scale
Output impedance:	10Ω
Sample throughput rate:	40,000 standard; 80,000 bi-directional; 250,000 EPP samples/second max (software selectable per channel)
Output offset voltage:	1 bit max @ 1kHz sample rate

Excitation Output

28VDC @ 60mA DC, isolated per channel

Shunt Cal

Software activated through optical isolator to GND

Scan Lists

Input Scan List:	Capacity 240 elements
Output Scan List:	Capacity 16 elements

Triggering

Pre-Trigger and Post-Trigger Lengths

With WinDaq Software:	64,000 samples
With User-Written Software:	15,000 samples
Trigger channel:	Any channel
Trigger level hysteresis:	8-bit (256 counts)

Intelligent Oversampling Modes

Signal averaging, maximum value, minimum value, RMS, frequency, and last point

On Board DSP

Type:	Analog Devices ADSP2181, 32 MIPS
Clock frequency:	16 MHz external, 64 MHz internal
Data Memory:	16k words
Program Memory:	16k words

Physical/Environmental

Dimensions:	7.29 inches wide by 9 inches long by 2.52 inches high
Operating temperature range:	0 to 70°C
Storage temperature range:	-55 to 150°C
Humidity:	0-90% non condensing
Weight:	3.3 lbs

Power Supply Voltage and Power Consumption

Voltage:	9-36 VDC
Power:	35 Watts

Miscellaneous

Supported Software:	ActiveX Controls; WINDAQ/Lite, WINDAQ/Pro, WINDAQ/Pro+, or WINDAQ/XL recording software; WINDAQ Waveform Browser playback and analysis software.
Minimum Computer Requirements:	IBM PC-compatible running Windows 2000 or XP; one CD-ROM drive; one hard drive; one parallel printer port or USB port (as needed)
I/O Connector:	16 removable screw terminals

Ordering Guide

Description	Order No.
32-channel data acquisition system featuring 16 transducer channels and 16 general purpose channels. Included AC adapter, parallel communications cable, WINDAQ waveform recording, playback and analysis software, and ActiveX Control software.	**DI-740-P**
Same as DI-740-P, but with USB communications option.	**DI-740-USB**

Contact DATAQ Instruments regarding a
DI-740 Instrument with 8 transducer channels:
DATAQ Instruments, Inc.
241 Springside Drive
Akron, Ohio 44333
330-668-1444
www.dataq.com

DATAQ®
INSTRUMENTS

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