DI-788 Data Acquistion System

Accepts Fully Isolated DI-8B Style Plug-In Amplifiers

32 Analog Input Channels

Ethernet Interface

14-Bit Resolution

Up to 180KHz Sample Throughput Rate

Shown: Rear panel of DI-788

DATAQ Instruments announces model DI-788, a new 32-channel data acquisition system designed specifically to accept DI-8B style modular signal conditioners and based on our Third Generation Ethernet (3GE) communications. The DI-788 is packaged in an enclosure that measures 16.5W × 18.5D × 3.5H inches (42.9W × 47D × 8.9H centimeters) that is suitable for placement on a desktop, or can be mounted in a standard 19-inch rack using optional brackets. It's also the first product from DATAQ Instruments to feature a built-in switching AC power supply, allowing it to be powered directly from AC line voltage.

The DI-788 features 14-bit resolution, programmable gain per channel of 1, 2, 4, and 8, a maximum sample throughput rate up to 180,000 samples per second, and two built-in 16-channel DI-8B module backplanes allowing up to 32 signal-conditioning modules. Measurements include thermocouple, voltage, strain, frequency, process current, RTD, and potentiometric.

The Ethernet communications interface connects the DI-788 to any local area network (LAN). Direct Internet access is also possible. This patent-pending communication option uses standard CAT-5 cable to yield continuous data acquisition throughput rates up to 180kHz. Multiple DI-785 and/or DI-788 products may be daisy-chained together to form an ad-hoc extended network of autonomous, yet fully synchronous data acquisition stations. Add any DI-720 and/or DI-730 for a complete data acquisition system for almost any measurement. Each station can sample at a different rate (up to 150kHz throughput) and still maintain full synchronization. Station separation can be as far as 100 meters.

Features

Make Industrial Measurements Through DI-8B Plug-in Signal Conditioning Modules

Each channel on the DI-788 accommodates one DI-8B module providing a single channel of isolated input protection, amplification, and filtering. DI-8B modules are plugged into a socketed backplane and are secured with a mounting screw. Each DI-788 channel has four screw terminals for signal connections: channel +, channel -, excitation +, and excitation -. These terminals satisfy all transducer inputs and provide sensor excitation if necessary. Access to the DI-8B modules is through a removable top panel.

Convenient Signal Connection

Eight 16-position removable screw terminal blocks allow signal connections to be made easily to the DI-788.

High Sample Throughput Rate

Sample at rates up to 180,000 samples per second throughput (150,000 samples per second per unit when daisy-chained) and as low as 0.01526 samples per second throughput per unit.

High Resolution

14-bit resolution analog to digital conversion provides a responsive instrument capable of registering changes as small as one part in 8,192 (±0.012% of the full scale measurement range).

Synchronized Distributed Ethernet Data Acquisition

Daisy chain multiple DI-785, DI-788, DI-720, DI-730, and/or DI-722 Ethernet units for a fully synchronous distributed Ethernet data acquisition system.

Buit-In AC Power Supply

The built-in switching AC power supply allows the DI-788 to be powered directly from AC line voltage.

Desktop or Rackmount Configuration

The DI-788 is packaged in an enclosure that measures 16.5W × 18.5D × 3.5H inches (41.9W × 47D × 8.9H centimeters) that is suitable for placement on a desktop, or can be mounted in a standard 19-inch rack using optional brackets.

Easy to Connect and Use

All instruments connect in seconds to your PC's Ethernet connector using standard CAT-5 cables.

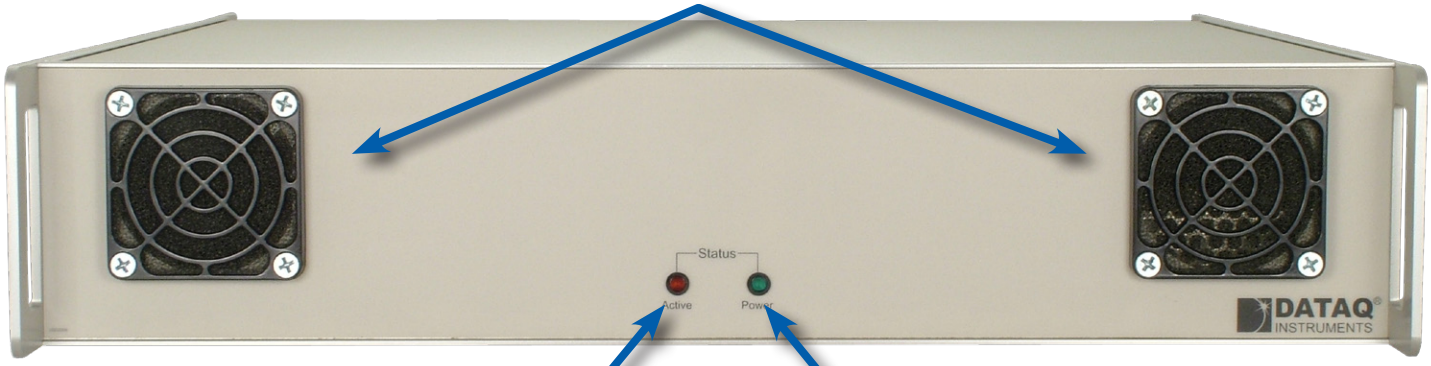
WinDaq Software Included

WinDaq/Lite is free with the purchase of every instrument. WinDaq/Lite is restricted to a maximum of one channel at 180KHz throughput or two or more channels at 240Hz throughput when recording to disk. Increase record-to-disk rates with WinDaq/Pro or WinDaq/Pro+.

Use WinDaq Waveform Browser (free) to review, measure, compare, and analyze the waveform file after it has been recorded by WinDaq acquisition software.

DI-788 Front Panel

Two fans provide filtered chassis ventilation.



Active LED indicates the instrument is acquiring data.

Power LED indicates power is applied.

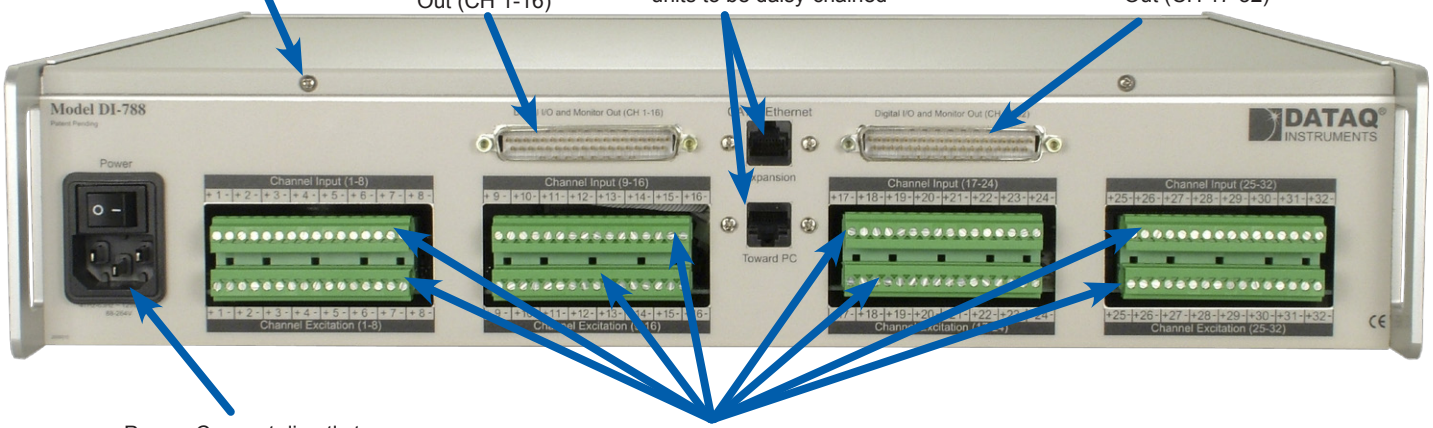
DI-788 Rear Panel

Top screws (2) and removable top panel provide access to DI-5B modules.

Digital I/O and Monitor Out (CH 1-16)

Two Ethernet Ports allow multiple units to be daisy-chained

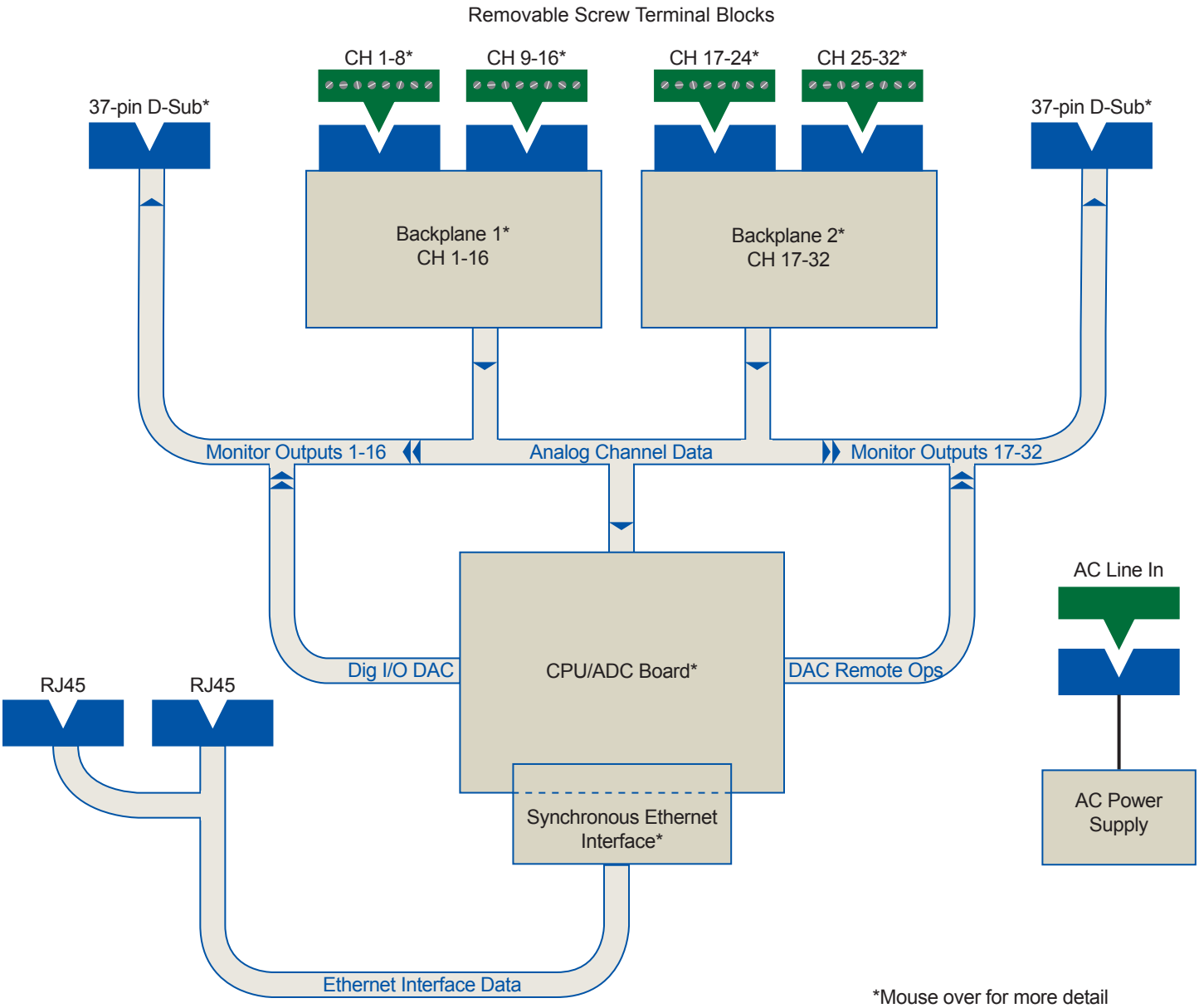
Digital I/O and Monitor Out (CH 17-32)



Power. Connect directly to AC line voltage.

Eight 16-position removable screw terminal blocks provide easy signal lead connections

DI-788 Block Diagram



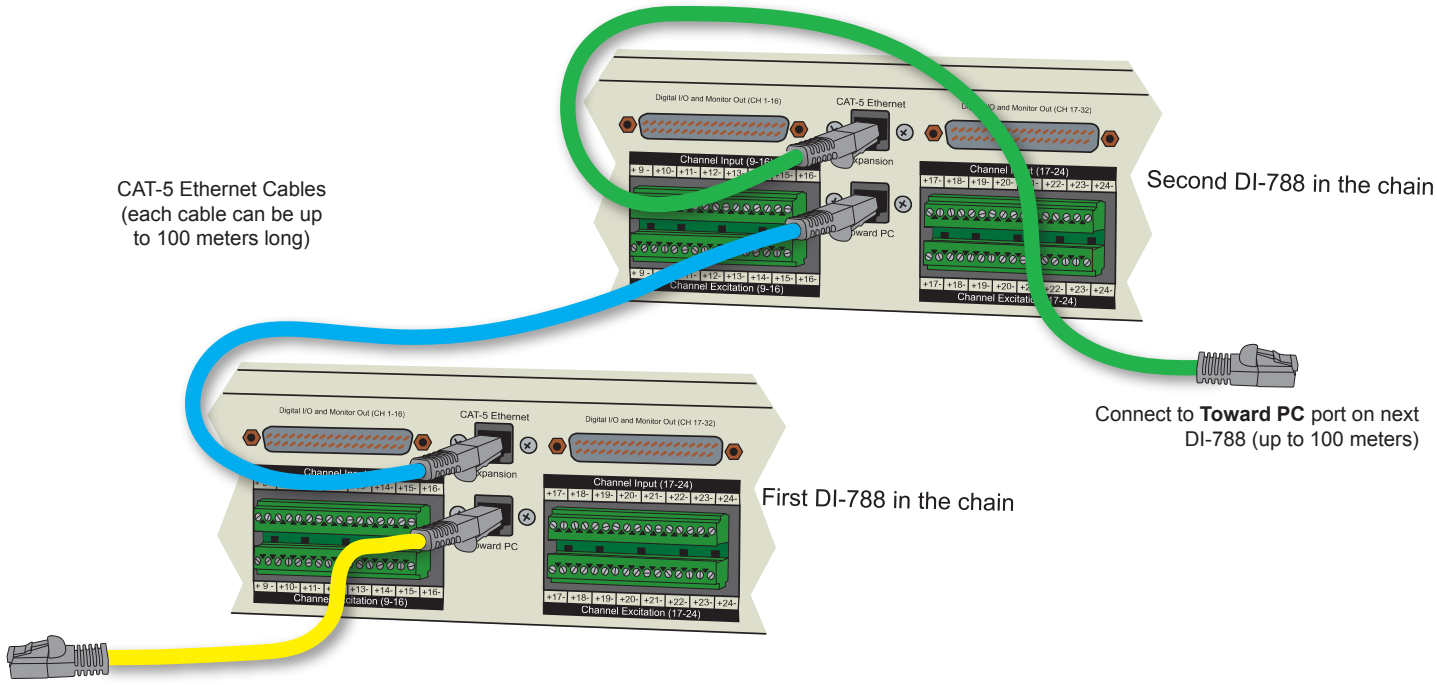
*Mouse over for more detail

Ethernet Interface Description

Our third generation Ethernet interface* offers a number of advantages over USB and printer port alternatives. Of course, the Ethernet option allows CAT-5 cable lengths up to 100 meters without hubs over a local area network (LAN), as well as access from any location using the Internet with a properly configured network. But Ethernet interfaces also allow multiple DI-785, DI-788, DI-720, and DI-730 products to be connected together for channel expansion. Data acquired across multiple units are acquired synchronously, meaning that samples fall within a definable time window with constant latency. For example, the torque, load and rpm of multiple rolling stations in a rolling mill, each instrumented with a DI-785 product, may be precisely correlated as an aid to maintenance and troubleshooting, and the distance between each station can be as great as 100 meters. Finally, the synchronized and distributed nature of these products with an Ethernet interface is simplified by allowing common CAT-5 cable to be strung between units in a daisy-chain fashion without the need for external hubs or switches or costly custom cables.

Ethernet Connections

Use the following diagram to daisy-chain multiple DI-785, DI-788, DI-720, DI-730, or DI-722 Ethernet products together to an ad-hoc extended network of autonomous, yet fully synchronous data acquisition stations.



*Patent Pending

Primary Synchronous Data Acquisition Customers

Primary Customers

Primary customers include:

- Those who need to acquire data from a remote location where it is not practical or economical to leave a computer.
- Users who want a path to easily expand their measurement channels at some future point.
- Customers who need synchronized data acquisition measurements across data acquisition units.
- Troubleshooters/designers who need fine, synchronous measurements to well within millisecond resolution.
- Customers who need fast, synchronized measurements across multiple, distributed data acquisition stations spaced as far as 100 meters between stations.

Typical Applications

Typical application examples include maintenance and troubleshooting applications in:

Large web offset and printing press machinery

Hydraulic metalworking presses

Injection moulding machines

Reversing mills

Steel and aluminum rolling mills including:

- Roughing mills
- Intermediate mills
- Finishing mills
- Cold rolling tandem mills
- Cluster mills
- Temper rolling mills
- Coilers

Paper mills, including:

- Wire processes
- Presses
- Dryers
- Size presses
- Calendars
- Reelers
- Unwinders and slitters

Structural wind/weather audits on large structures:

- Tall buildings
- Long bridge spans
- Floating platforms like oil rigs
- Extended length vessels like super tankers
- Any size structure that requires a distributed, yet synchronized approach to data acquisition

PLC fine tuning and troubleshooting to detect:

- Electrical sequencing variations and flaws
- Mechanical valve actuation latencies
- Motor timing conflicts
- Hydraulic spikes or drop outs

Typical Measurements

Typical measurements include:

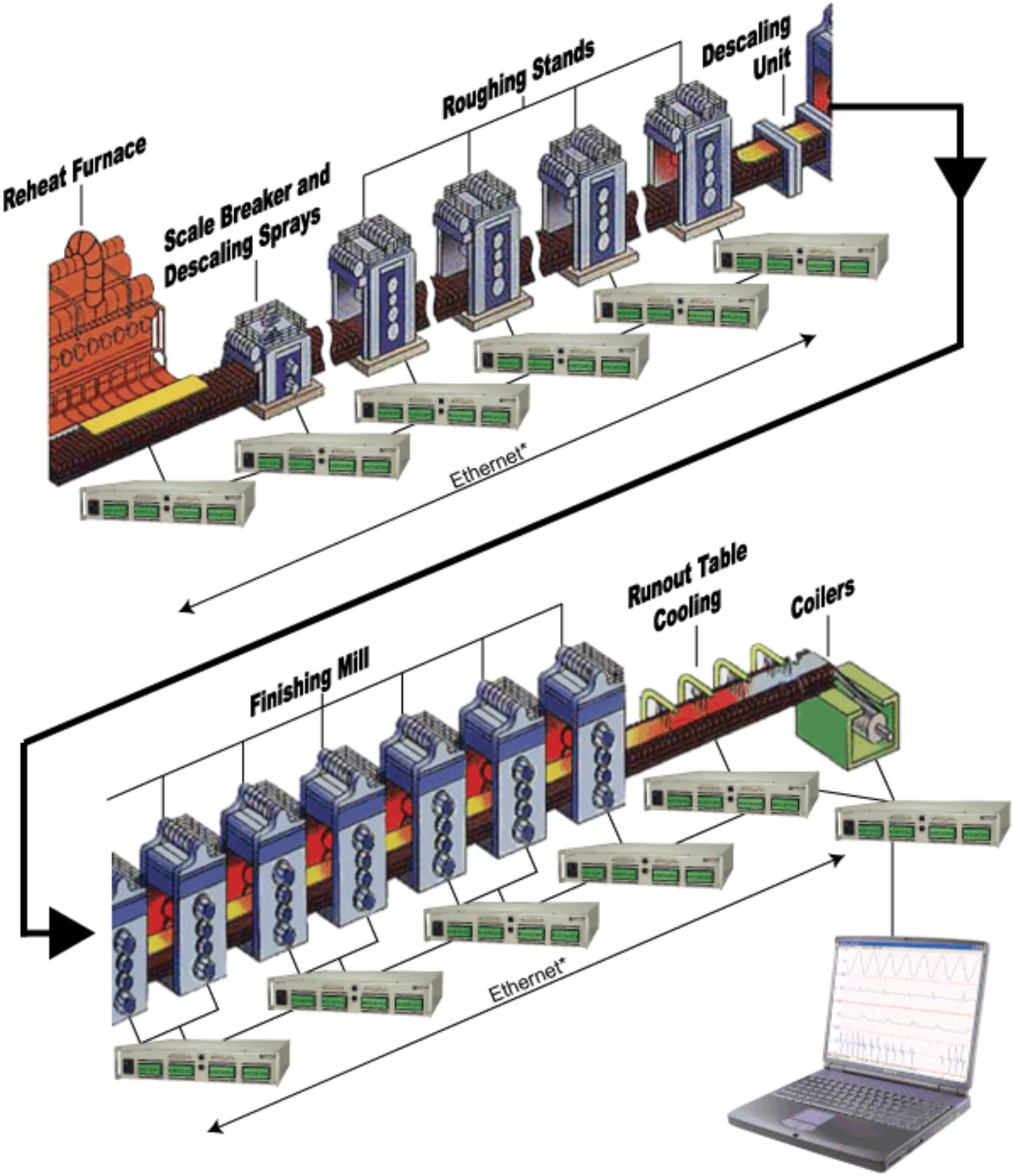
AC/DC drive/motor measurements, including:

- Speed (armature voltage)
- Speed regulation (tach vs. set point)
- Torque (armature current)
- Acceleration/deceleration times
- IR compensation
- Load balancing

Mechanical properties measurements, including:

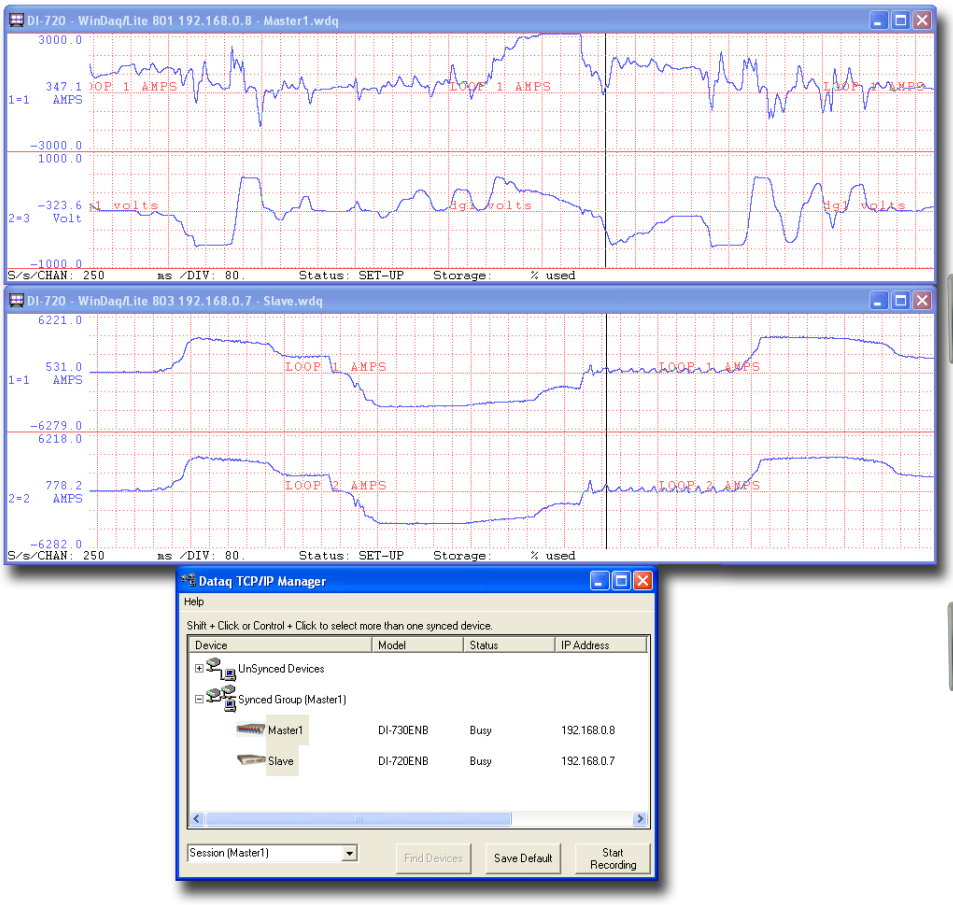
- Load/pressure/stress
- Vibration
- Temperature
- Flow
- Distance/movement
- Tension/compression

Typical Application



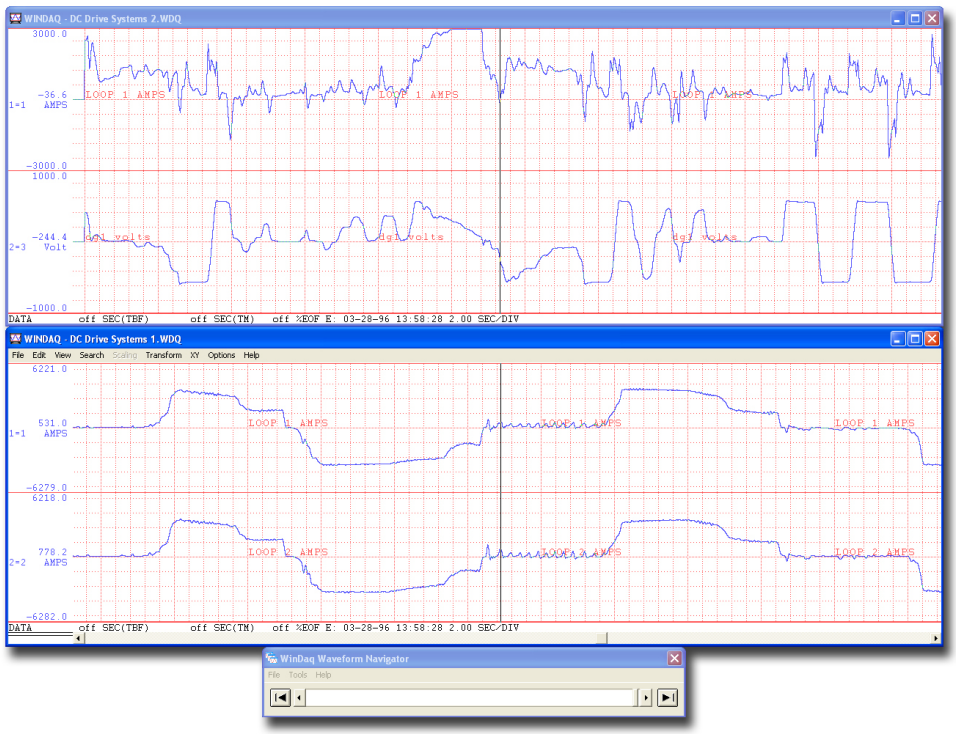
*Each station can be up to 100 meters apart.

Software for Synchronous Data Acquisition



To next DI-785 or DI-788 (or DI-720/730) Instrument

Record and Playback all data synchronously. The TCP/IP Manager (above) allows you to record from all daisy-chained instruments at the click of a button. The WinDaq Waveform Navigator (below) allows you to view all your data perfectly aligned in time.



CAT-5 Ethernet Cable*

*Up to 100 meters.

DI-8B Signal Conditioning Module Selection Guide

Each DI-8B module is a single channel, isolated analog input designed for a specific measurement. The modules filter, isolate, amplify, and convert input signals to a high-level analog signal suitable for A/D conversion. Over 50 modules address the full spectrum of industrial measurements.

Key Features

- Convenient, flexible, mix-and-match approach.
- Full isolation reduces noise and protects you and your equipment from large, common mode voltages.
- Small size 1.105" × 1.65" × 0.40".

Common Specifications

- 1000V Input-to-Ouput Isolation.
- 500V Channel-to-Channel Isolation.
- 240 VAC input protection.
- 160db common mode rejection.

Voltage Input Modules (3Hz BW)

MODEL NO.	Input Range
DI-8B30-01	±10mV
DI-8B30-02	±50mV
DI-8B30-03	±100mV
DI-8B31-01	±1V
DI-8B31-02	±5V
DI-8B31-03	±10V
DI-8B31-07	±20V
DI-8B31-09	±40V
DI-8B31-12	±60V

Current Input Modules (3Hz BW)

MODEL NO.	Input Range
DI-8B32-01	4 to 20mA
DI-8B32-02	0 to 20mA

Linearized 2- or 3-wire RTD Modules (3Hz BW)

MODEL NO.	Type	Input Range
DI-8B34-01	100Ω Pt	-100°C to +100°C (-148°F to +212°F)
DI-8B34-02	100Ω Pt	0°C to +100°C (+32°F to +212°F)
DI-8B34-03	100Ω Pt	0°C to +200°C (+32°F to +392°F)
DI-8B34-04	100Ω Pt	0°C to +600°C (+32°F to +1112°F)

Linearized 4-wire RTD Modules (1kHz BW)

MODEL NO.	Type	Input Range
DI-8B35-01	100Ω Pt	-100°C to +100°C (-148°F to +212°F)
DI-8B35-02	100Ω Pt	0°C to +100°C (+32°F to +212°F)
DI-8B35-03	100Ω Pt	0°C to +200°C (+32°F to +392°F)
DI-8B35-04	100Ω Pt	0°C to +600°C (+32°F to +1112°F)

Potentiometer Input Modules (3Hz BW)

MODEL NO.	Input Range
DI-8B36-01	0 to 100Ω
DI-8B36-02	0 to 500Ω
DI-8B36-03	0 to 1kΩ
DI-8B36-04	0 to 10kΩ

Strain Gage Input Modules

MODEL NO.	Type	Bandwidth	Input Range
DI-8B38-01	Full	3kHz	±10mV, 3mV/V 100 to 10k
DI-8B38-02	Full	3kHz	±30mV, 3mV/V 300 to 10k
DI-8B38-05	Full	3kHz	±20mV, 2mV/V 300 to 10k
DI-8B38-31	Full	3Hz	±10mV, 3mV/V 100 to 10k
DI-8B38-32	Full	3Hz	±30mV, 3mV/V 300 to 10k
DI-8B38-35	Full	3Hz	±20mV, 2mV/V 300 to 10k

Voltage Input Modules (1kHz BW)

MODEL NO.	Input Range
DI-8B40-01	±10mV
DI-8B40-02	±50mV
DI-8B40-03	±100mV
DI-8B41-01	±1V
DI-8B41-02	±5V
DI-8B41-03	±10V
DI-8B41-07	±20V
DI-8B41-09	±40V
DI-8B41-12	±60V

Current Input Modules (3Hz BW)

MODEL NO.	Input Range
DI-8B42-01	4 to 20mA
DI-8B42-02	4 to 20mA

Frequency Input Modules (3Hz BW)

MODEL NO.	Input Range
DI-8B45-01	0 to 500Hz
DI-8B45-02	0 to 1kHz
DI-8B45-03	0 to 3kHz
DI-8B45-04	0 to 5kHz
DI-8B45-05	0 to 10kHz
DI-8B45-06	0 to 25kHz
DI-8B45-07	0 to 50kHz
DI-8B45-08	0 to 100kHz

Linearized Thermocouple Input Modules (3Hz BW)

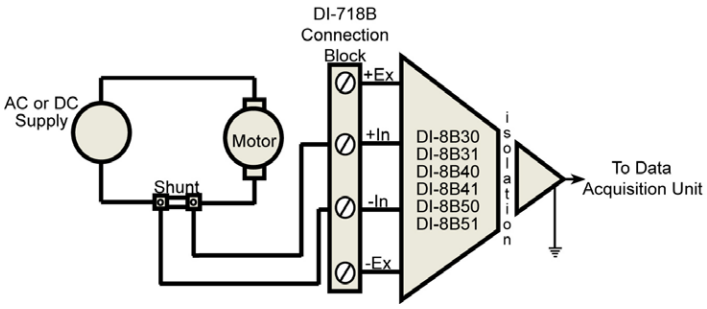
MODEL NO.	Type	Input Range
DI-8B47J-01	J	0°C to +760°C (+32°F to +1400°F)
DI-8B47J-02	J	-100°C to +300°C (-148°F to +572°F)
DI-8B47J-03	J	0°C to +500°C (+32°F to +932°F)
DI-8B47J-12	J	-100°C to +760°C (-148°F to +1400°F)
DI-8B47K-04	K	0°C to +1000°C (+32°F to +1832°F)
DI-8B47K-05	K	0°C to +500°C (+32°F to +932°F)
DI-8B47K-13	K	-100°C to +1350°C (-148°F to +2462°F)
DI-8B47K-14	K	0°C to +1200°C (+32°F to +2192°F)
DI-8B47T-06	T	-100°C to +400°C (-148°F to +752°F)
DI-8B47T-07	T	0°C to +200°C (+32°F to +392°F)

Voltage Input Modules (20kHz BW)

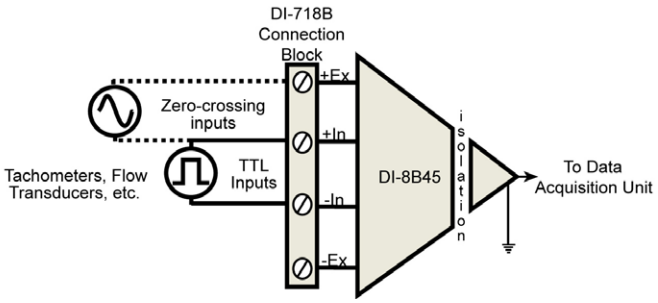
MODEL NO.	Input Range
DI-8B50-01	±20mV
DI-8B50-02	±50mV
DI-8B50-03	±100mV
DI-8B51-01	±1V
DI-8B51-02	±5V
DI-8B51-03	±10V
DI-8B51-07	±20V
DI-8B51-09	±40V
DI-8B51-12	±60V

DI-8B Signal Conditioning Module Applications

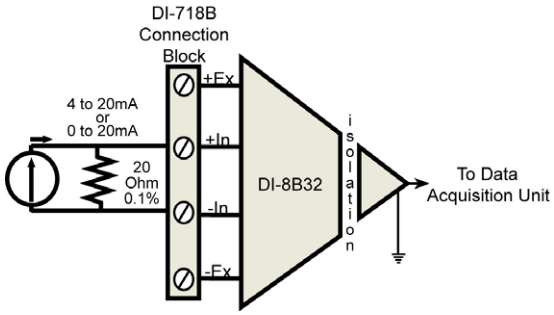
AC or DC Current Shunt



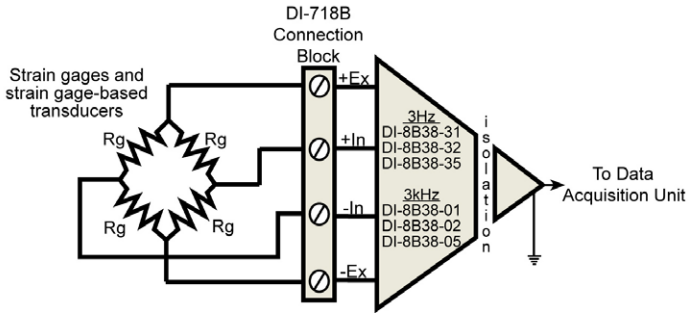
Frequency



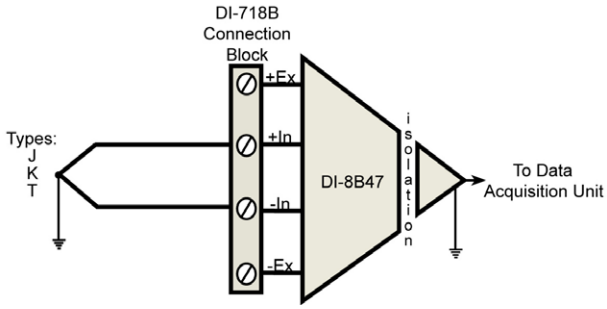
Process Current



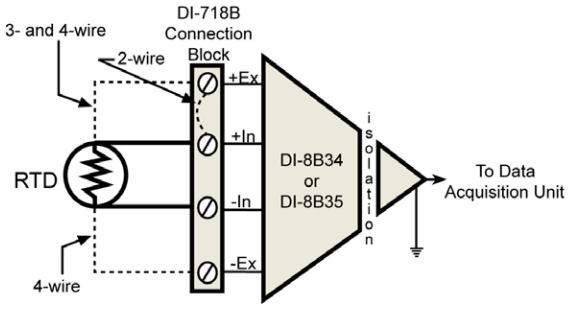
Full-Bridge Strain Gage



Floating Grounded TC



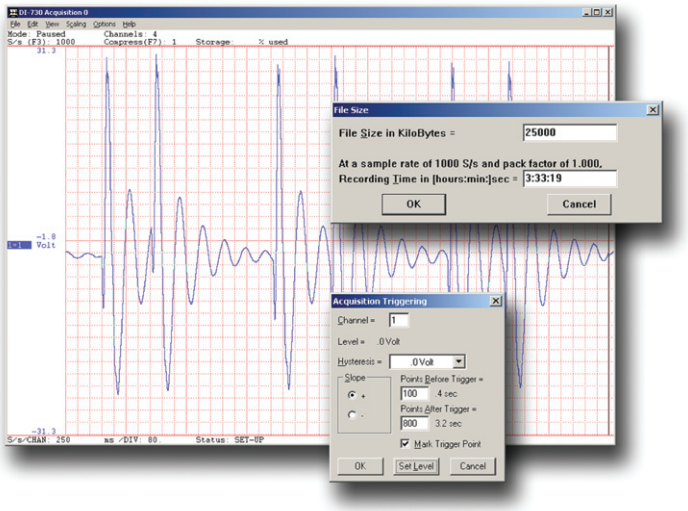
RTD

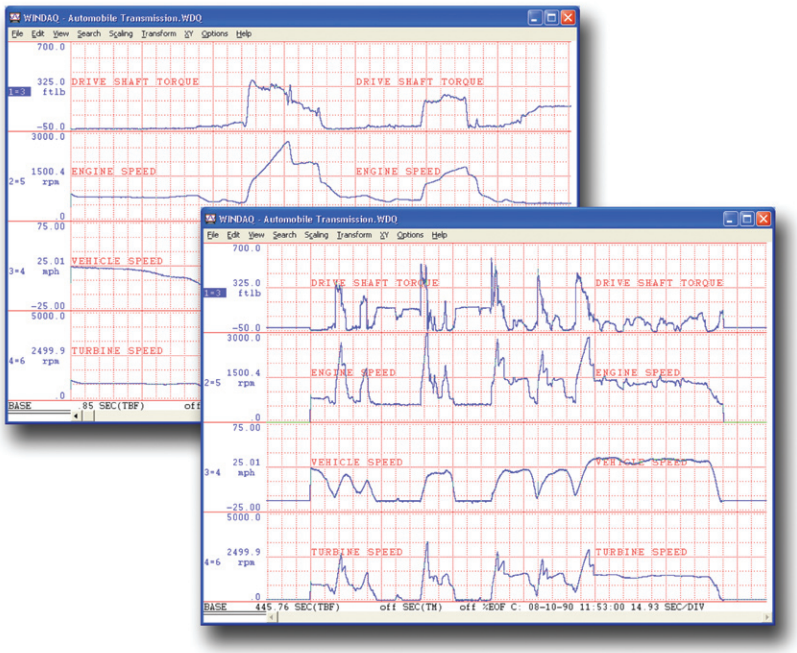


WinDaq…The Most Widely Used Turnkey Test Instrumentation Software*

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.



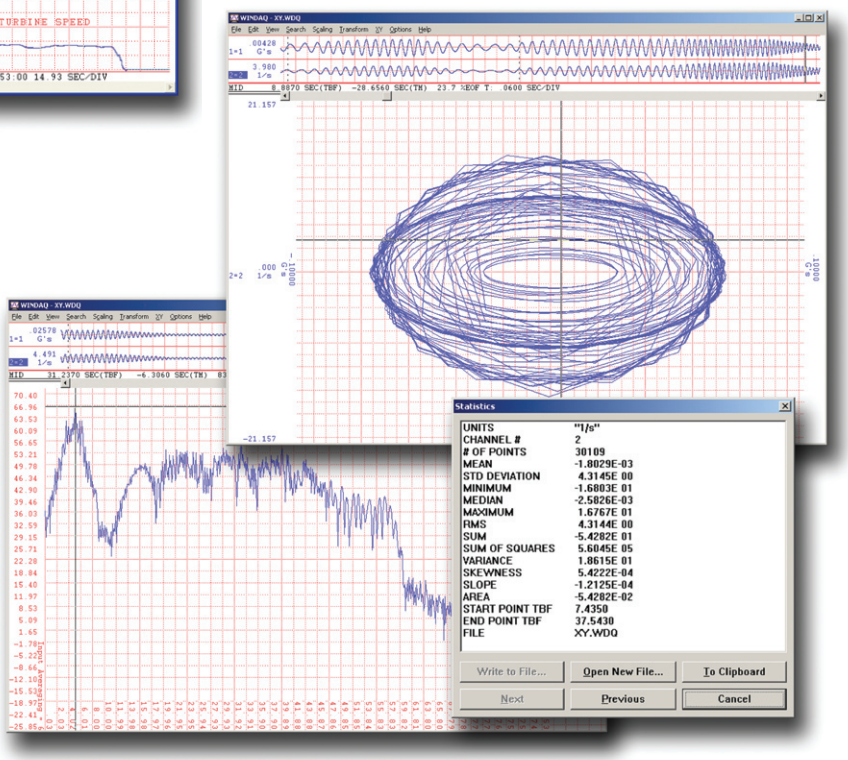


Review…

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

DI-788 Specifications

Analog Inputs

Number of Channels:	32 configured for DI-8B modules
Channel Configuration:	Defined by DI-8B module
Measurement Range:	Defined by DI-8B module
Measurement Accuracy:	±0.25% of full scale range, ±100 µV
Resolution:	1 part in 16,384 (14-bit)
Input Impedance:	Defined by DI-8B module
Input offset voltage:	Defined by DI-8B module
Channel-to-channel crosstalk:	-75db @ 100 kHz sample throughput rate
Offset temperature coefficient:	±10 PPM/°C, plus DI-8B module
Analog Frequency Response:	Defined by DI-8B module
Digital filtering:	Peak, Valley, Average
CJC Error:	±1.5°C plus signal conditioning module (10-min. warm-up; still air; 2-amp max current draw for backplane; average IOS mode).
Gain:	1, 2, 4, 8 (software selectable per channel)

Isolation (via Signal Conditioning Modules)

Input-to-Output:	1000V
Channel-to-Channel:	500V

A/D Characteristics

Type:	Successive approximation
Resolution:	14-bit
Sample Rate Timing Accuracy:	50 PPM
Sample Rate Timing Resolution:	62.5 ns
Integral Linearity Error:	±1LSB
Minimum Conversion Time:	4 microseconds

Calibration

Calibration cycle:	One year

Digital I/O

Bits:	8 inputs and 8 outputs
Input voltage levels:	Min. required “1” 2V; Max allowed “0” 0.8V
Connections:	Two 37-pin D-sub male

Scanning Characteristics

Max. throughput sample rate:	Single Unit: 180,000 Hz Multiple Units (daisy-chained): 150,000 Hz per unit
Min. throughput sample rate:	0.01526 Hz
Max. scan list size:	34 entries
Sample buffer size:	2kb

Ethernet Interface (optional Ethernet to USB converter available)

Type:	10/100Base-T
Connectors:	RJ-45 (Two: Primary and Expansion)
Protocol:	TCP/IP
Server Type:	DHCP or Fixed IP
Cross-unit synchronization:	Via secondary Ethernet port (RJ-45)

Rear Panel I/O Connections

Power Cable:	Standard receptacle
Digital I/O and Monitor Out:	37 pin D sub (2)
Signal I/O:	Removable Phoenix-type screw terminals (8)

General

Front Panel Indicators:	Power LED and Active LED
Certification:	CE (non-daisy chained, 3m CAT-5 cable)
Rear Panel Controls:	AC Power Switch
Internal I/O Connections:	DI-8B module inputs (32)
Operating Temperature:	0°C to 50°C
Storage Temperature:	-55°C to 125°C
Dimensions:	16.5W × 18.5D × 3.5H in. 41.9W × 47.0D × 8.9H cm.
Weight with no modules:	11 lbs. (5Kg)
Weight with 32 DI-5B modules:	12 lbs. (5.44Kg)

Power Characteristics

Type:	AC Line
Voltage Range:	88 to 264 VAC rms
Current Range:	1.3A @ 115VAC; 0.8A @ 230 VAC
Frequency Range:	47 to 63 Hz

Ordering Guide

Description	Order No.	Description	Order No.
DI-788 32-channel DI-8B module industrial data acquisition system.	DI-788	**USB to Ethernet Converter** Converter that allows you to connect your DI-788 to a USB port. Manufacturer varies. Adds an external network card to your PC through the USB port.	101014-EA
Rack Mounting Kit Optional 19-inch rack mounting kit.	RMK-500		

DATAQ® INSTRUMENTS

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Data Acquisition Product Links

(click on text to jump to page)

Data Acquisition | Data Logger | Chart Recorder | Thermocouple | Oscilloscope

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