The DATAQ Instruments DI-710 Series of products is a family of instruments for general purpose and stand-alone data logger data acquisition applications. Options include interface type, input voltage range, and PC-connected or stand-alone data logger operation. Interface options are USB or Ethernet. Gain ranges have selectable factors per channel of 1, 2, 4, and 8, or 1, 10, 100, and 1000. Instruments with the stand-alone data logger option feature a built-in multimedia socket that accepts standard Secure Digital (SD) memories to which acquired data may be stored without a connected PC. SD memories are the same commonly available mass storage devices used with digital cameras and MP3 players. Memories ranging in size from 16 MB to 2 GB are supported. Instruments without this option must remain tethered to a PC’s USB or Ethernet port during data acquisition and use the PC’s own program and memory to store acquired data.

All DI-710 Series products feature 14-bit measurement resolution, sixteen analog input channels that may be configured for single ended or differential operation per channel, and an 8-bit digital bi-directional port. PC-connected instruments stream data to the PC from as low as 0.048 Hz up to as high as 4,800 Hz throughput rate. Stand-alone data loggers store to their SD memory from as low as 0.0017 Hz up to as high as 14,400 samples per second. All DI-710 instruments are supplied with two removable, 16-position screw terminal access connectors.

**Stand-alone Data Logger Operation**

Use a Secure Digital Card to record and store data—up to 2 GB. A FIFO memory configuration allows the DI-710 to record continuously using a circular buffer approach. A push button allows manual start/stop control over the recording process. A multi color LED shows instrument status (Record, Standby, Busy, Error).

**Wide Signal Measurement Range**

Suitable for use with all types of transducers, the 16-channel single-ended, 8-channel differential DI-710 features a per-channel measurement range of ±10 V over four gain ranges. This allows you to simultaneously measure a wide range of signals with ease.

**Flexible Programmability**

Channel-by-channel software selection of gain and single-ended/differential operation.

**High Throughput Rate**

Supports sample throughput rates up to 4800 samples/sec to PC (depending on host computer speed) or up to 14,400 samples/sec to memory card (stand-alone data loggers).

**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).

**File Protection**

When powered down unexpectedly, the DI-710 Stand-alone model retains all data saved to its memory card.

**Easy to Connect & Use**

Installs in seconds. Simply connect to your computer’s USB port or to an Ethernet port. Connect power, then connect your signals to the provided screw terminal blocks (16 ports each). Stand-alone data loggers just require a Secure Digital Card and power.

**Includes Software**

Be up and running minutes out of the box with WINDAQ software. WINDAQ Recording and Playback software is included free with the purchase of every DI-710 instrument. Record at rates up to 1000 Hz using WINDAQ Acquisition software. Purchase an option Unlock Code to record data as high as 4,800 Hz throughput to pc. Use Playback software (WWB) to review, measure, and analyze your data during or after a recording session.

**DATAQ Instruments Hardware Manager Software**

Software allows you to effectively manage and run multiple units installed to your PC, your network, or even over the Internet. It includes configuration software for stand-alone data loggers allowing a complete data acquisition configuration to be designed and downloaded from any local or remote PC. Upload software allows you to read data stored to an SD card over the DI-710’s Ethernet interface.
DI-710 Block Diagram

Dual Removable
16-Position
Screw Terminals

Analog In

MUX

PGA

14-Bit ADC

1, 2, 4, 8, OR
1, 10, 100, 1000

Auto Zero

Control/Data

Red
Green

Status

Control*

Microcontroller

Scan List

Sample Rate Clock

Sample Buffer

Interface Code

MMC Code

MMC Memory Socket*

Nonvolatile Memory

Real Time Clock

USB or Ethernet Interface

Power Supply

+V

Power**
9-36 VDC
1.5W

* Stand Alone Models Only
** Non-stand-alone USB models are powered by the PC’s USB port
Ways to transfer SD data files

Physically Transport Memory Card
Remove SD and place in Reader

Power Jack
May be powered by the provided AC adaptor, or from any 9-36 VDC source. Consumes 2 watts.

Interface
May be configured with an Ethernet or USB interface.

“Control” Pushbutton
Allows manual start/stop local control over the recording process and instrument configuration.

“Mode” LED
Tri-color LED indicates instrument status: Standby, Recording, Error.

Removable Storage Slot
Accommodates standard and readily available multi-media memory cards for mass storage. These are the same memories used by consumer electronic devices like MP3 players and digital cameras. Accepts memory sizes from 16 MB to 2 GB.

Data Upload
Ethernet (up to 100 Meter length)*

*Unlimited length with Hubs. Internet ready for remote access.

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Six Deployment Methods

Ethernet Models add a new dimension to Data Acquisition applications allowing data access over a LAN to a PC on the other side of your facility or over the internet to a PC on the other side of the world. For more information view our application note on the internet at: http://www.dataq.com/applicat/articles/data_logger_ethernet02.htm.

Deployment #1 - One PC directly connected to one DI-710 with a crossover cable.

Deployment #2 - One or more PCs, one or more DI-710s on a Dedicated Network.

Deployment #3 - One or more PCs, one or more DI-710s on a LAN.
Deployment Methods for Ethernet Models

Deployment #4 - One or more PCs, one or more DI-710s on a Wireless Network.

Deployment #5 - One or more PCs, one or more DI-710s remotely to different LAN subnets.

Deployment #6 - One or more PCs, one or more DI-710s remotely over the Internet.

DI-710 Specifications

Analog Inputs
Number of Channels: 16
Channel Configuration: 16 single-ended; 8 differential; programmable per channel

Measurement range, Accuracy, and Resolution

<table>
<thead>
<tr>
<th>Gain</th>
<th>Range</th>
<th>Accuracy*</th>
<th>Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>PGL Models:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>±10V</td>
<td>±0.05%FSR ±50µV</td>
<td>±1.22mV</td>
</tr>
<tr>
<td>10</td>
<td>±1V</td>
<td>±0.05%FSR ±50µV</td>
<td>±122µV</td>
</tr>
<tr>
<td>100</td>
<td>±100mV</td>
<td>±0.05%FSR ±50µV</td>
<td>±12.2µV</td>
</tr>
<tr>
<td>1000</td>
<td>±10mV</td>
<td>±0.05%FSR ±50µV</td>
<td>±1.22µV</td>
</tr>
<tr>
<td>PGH Models:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>±10V</td>
<td>±0.05%FSR ±50µV</td>
<td>±12.2mV</td>
</tr>
<tr>
<td>2</td>
<td>±5V</td>
<td>±0.05%FSR ±50µV</td>
<td>±610µV</td>
</tr>
<tr>
<td>4</td>
<td>±2.5V</td>
<td>±0.05%FSR ±50µV</td>
<td>±305µV</td>
</tr>
<tr>
<td>8</td>
<td>±1.25V</td>
<td>±0.05%FSR ±50µV</td>
<td>±153µV</td>
</tr>
</tbody>
</table>

*Test Conditions: Single channel, 100S/s, Averaging mode.

Input Impedance, single-ended: 1MΩ
Input impedance, differential: 1MΩ each input to common
Input bias current: 10µA for a 10V input, single channel
Input offset voltage: Auto-zero
Input offset current: 2nA (single channel)
Max. normal mode voltage: 30V DC or peak AC
Max. common mode voltage: 30V DC or peak AC
Common mode rejection: 80db, gain=1, 1KΩ unbalance
Channel-to-channel crosstalk rejection: -75db @ 100Ω unbalance
Gain temperature coefficient: 50 ppm/°C
Offset temperature coefficient: 0.25µV/°C
Digital filtering: Standard: Conditional over-sampling

A/D Characteristics
Type: Successive approximation
Resolution: 14-bit
Monotonicity: ±2 LSB
Conversion Time: 69μs

Scanning Characteristics
Max. throughput sample rate:* Standard: 4,800 Hz (requires Unlock Code)
Stand-alone: 14,400 Hz**
*When acquiring more than one channel at a gain of 100 max throughput is 7200 Hz;
**Dependent on SD card used. Low speed SD cards can sample up to 2,000 Hz;
High speed cards can sample up to 14,400 Hz. Some high speed cards cannot sample as high as 14,400 Hz but their capability can only be determined by trial and error (Model 101014-2G has been tested and approved).

Min. throughput sample rate:
Standard: 0.0034 Hz
Stand-alone: 0.0017 Hz
Max. scan list size: 17 entries
Sample buffer size: 2KB

Controls (Stand-alone models)
Single push-button: Manual control Record and Standby

Calibration
Calibration cycle: One year

Digital I/O
Bits: 8 bidirectional bits
Configuration: Each bit is programmable as Input or Output
Output voltage levels: Min. “1” 3V @ 2.5mA sourcing; Max. “0” 0.4V @ 2.5mA sinking
Output current: Max. source, -2.5 mA; Max. sink, 2.5mA
Input voltage levels: Min. required “1” 2V; Max allowed “0” 0.8V

Ethernet Interface
Type: 10/100Base-T
Connector: RJ-45
Protocol: TCP/IP
Server Type: DHCP

Removable Memory (Stand-alone models)
Type: Standard SD (not SDHD or SDxc). Minimum speed of 13x. For sample rates above 2kHz SD speed should be 133x or higher.
Capacity: 16 MB to 2 GB

Real Time Clock (Stand-alone models)
Type: Date, hour, minute, second
Resolution: 1 second
Accuracy: 20 ppm

Indicators
Stand-alone models: Three-color LED indicating Record, Standby, and Error conditions
Standard models: Power LED

Transfer Rate to PC
Real Time: up to 4,800 samples per second
From Memory Card: up to 2,400 samples per second (Ethernet only)

General
Panel indicators: Mode LED
Panel-accessible Power: 5 VDC @ 10 mA max
Panel Controls: Control push button (Stand-alone models)
Panel Slots: Accepts SD-type flash memory
Input connectors: Two, removable sixteen position terminal blocks
Operating Environment: 0°C to 70°C
Enclosure: Aluminum base with steel wrap-around. Aluminum end-panels with plastic bezels.
Dimensions: 5½”D ×4½”W ×1½”H (138.1D × 104.8W × 38.1H cm)
Weight: 14 oz.

Power Requirements: USB (stand-alone): 9 to 36 VDC, 2 watts max
USB (non stand-alone): 5V @ < 2 watts max
(supplied by USB port)
Ethernet:  9 to 36 VDC, 2.5 watts max

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<table>
<thead>
<tr>
<th>Description</th>
<th>Order No.</th>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>DI-710-UH USB Instrument</strong></td>
<td>DI-710-UH</td>
<td><strong>DI-710-EH Ethernet Instrument</strong></td>
<td>DI-710-EH</td>
</tr>
<tr>
<td>Low cost, portable, USB data logger with programmable gain ranges of 1, 2, 4, and 8.</td>
<td></td>
<td>Low cost, portable, Ethernet data logger with programmable gain ranges of 1, 2, 4, and 8. Includes Power Supply.</td>
<td></td>
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<tr>
<td><strong>DI-710-UL USB Instrument</strong></td>
<td>DI-710-UL</td>
<td><strong>DI-710-EL Ethernet Instrument</strong></td>
<td>DI-710-EL</td>
</tr>
<tr>
<td>Same as DI-710-UH but with programmable gain ranges of 1, 10, 100, and 1000.</td>
<td></td>
<td>Same as DI-710-EH but with programmable gain ranges of 1, 10, 100, and 1000. Includes Power Supply.</td>
<td></td>
</tr>
<tr>
<td><strong>DI-710-UHS USB Stand-alone Instrument</strong></td>
<td>DI-710-UHS</td>
<td><strong>DI-710-EHS Ethernet Stand-alone Instrument</strong></td>
<td>DI-710-EHS</td>
</tr>
<tr>
<td><strong>DI-710-ULS USB Stand-alone Instrument</strong></td>
<td>DI-710-ULS</td>
<td><strong>DI-710-ELS Ethernet Stand-alone Instrument</strong></td>
<td>DI-710-ELS</td>
</tr>
<tr>
<td>Same as DI-710-UL but with stand-alone capability. Includes Power Supply.</td>
<td></td>
<td>Same as DI-710-EL but with stand-alone capability. Includes Power Supply.</td>
<td></td>
</tr>
<tr>
<td><strong>SD Card Reader</strong></td>
<td>101014-CR</td>
<td><strong>WinDaq/HS-710</strong></td>
<td>WinDaq/HS-710</td>
</tr>
<tr>
<td>Reads Secure Digital (SD) and MultiMedia Card (MMC) Memories. For use with Stand-alone models.</td>
<td></td>
<td>High-Speed Unlock Code for WinDaq Acquisition software allowing higher sample rates (4.8kHz).</td>
<td></td>
</tr>
<tr>
<td><strong>SD Card</strong></td>
<td>101014-2GS</td>
<td><strong>Power Connector</strong></td>
<td>100952</td>
</tr>
<tr>
<td>Low Speed 2GB SD Card (up to 2 kHz sample rate)</td>
<td></td>
<td>Power Connector (for customers who want to provide their own power).</td>
<td></td>
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<tr>
<td>High Speed 2GB SD Card (up to 14.4 kHz sample rate)</td>
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</table>

**Data Acquisition Product Links**

(click on text to jump to page)

*Data Acquisition | Data Logger*