DATAQ INSTRUMENTS

The way PC-based instrumentation should be

DI-148U

8-Channel USB Data Acquisition Starter Kit

User's Manual

Manual Revision B

DATAQ INSTRUMENTS

DATAQ Instruments, Inc.
241 Springside Drive
Akron, Ohio 44333 U.S.A.
Telephone: 330-668-1444
Fax: 330-666-5434

Designed and manufactured in the
United States of America

Warranty and Service Policy

Product Warranty

DATAQ Instruments, Inc. warrants that this hardware will be free from defects in materials and workmanship under normal use and service for a period of one year from the date of shipment. DATAQ Instruments' obligations under this warranty shall not arise until the defective material is shipped freight prepaid to DATAQ Instruments. The only responsibility of DATAQ Instruments under this warranty is to repair or replace, at its discretion and on a free of charge basis, the defective material.

This warranty does not extend to products that have been repaired or altered by persons other than DATAQ Instruments employees, or products that have been subjected to misuse, neglect, improper installation, or accident.

DATAQ Instruments shall have no liability for incidental or consequential damages of any kind arising out of the sale, installation, or use of its products.

Service Policy

1. All products returned to DATAQ Instruments for service, regardless of warranty status, must be on a freight-prepaid basis.

2. DATAQ Instruments will repair or replace any defective product within 5 days of its receipt.

3. For in-warranty repairs, DATAQ Instruments will return repaired items to the buyer freight prepaid. Out of warranty repairs will be returned with freight prepaid and added to the service invoice.

Table of Contents

1. Introduction

This manual contains information designed to familiarize you with the features and functions of the DI-148U data recording module.

Features

The DI-148U data acquisition instrument is a portable data recording module that communicates through your computer's USB port. Power is derived from the interface port so no external power is required. Features include:

- 8 single-ended analog inputs.
- Six digital I/O for Remote control.
- ±10V full scale measurement range.
- 14,400 samples per second maximum sampling rate.

Analog Inputs

Eight single-ended channel inputs located on a single 8-position terminal block allow easy connection and operation. The 10-entry input scan list allow you to scan any sequence of input channels at any software-configurable channel setting. Utilize the functionality of WINDAQ software to experience all the features encased in this small, inexpensive instrument.

Digital Input and Output

The DI-148 contains 6 software-programmable digital lines (bits) for input/output operations. These lines provide an interface for the transfer of data between user memory and a peripheral device connected to the instrument. Digital inputs can monitor alarms or sensors with TTL outputs, while digital outputs can drive TTL inputs on control or measurement equipment. Remote control can be utilized with bits 0 and 1 (for location see “Chapter 4. Connecting Input Signals”) using WINDAQ software. To use the Remote control functions in WINDAQ you **must** enable Channel 1 or Channel 9 as the Digital Input. If eight analog inputs are required for your application, you may enable Channel 9 as the Digital I/O.

Software

All software required to record and playback waveforms is included with the purchase of any DI-148U data acquisition starter kit.

WINDAQ® Recording and Playback Software

WINDAQ Acquisition and WINDAQ Waveform Browser allow you to record and playback data acquired through your instrument. WINDAQ software is an invaluable resource to recording and analyzing your data.

WINDAQ Acquisition software can be used to record waveforms directly and continuously to disk while monitoring a real time display of the waveforms on-screen. It operates and displays waveform signals in real time at the full sample rate of the instrument being used. There are two versions of WINDAQ Acquisition software available for use with DI-148 Instruments: WINDAQ/Lite and WINDAQ/HS (High Speed) option. WINDAQ/Lite is free but is restricted to recording rates of 240 Hz. WINDAQ/HS is an extra-cost option allowing you to record data at the speed of your data acquisition system. When you install the software, a trial version of WINDAQ/HS is automatically installed allowing you to run the software for a limited time. Activation is required for continued use to ensure compliance with the Software License Agreement.

WINDAQ Waveform Browser playback software (also known as “WWB”) offers an easy way to review and analyze acquired waveforms. A built-in data file translator allows the user to display multiple waveforms acquired by WINDAQ Acquisition software or any of a wide range of data acquisition packages. The software’s disk-streaming design allows data files of any length to be graphically displayed rapidly, in normal or reverse time directions. Seven standard cursor-based measurements, frequency domain, and statistical analysis functions help simplify waveform analysis and interpretation. WINDAQ Waveform Browser is free and installed when installing WINDAQ Software.

Help

All WINDAQ software utilizes context-sensitive help. Help may be accessed through the Help menu or by pressing the F1 key with any pull-down menu item selected. This will take you directly to the Help topic most relevant to that particular function or feature. Help topics discuss in detail each function available in the software.

2. Specifications

Analog Inputs

Number of Channels:	8
Channel Configuration:	Single-ended
Voltage Measurement Range:	±10V Full Scale
Accuracy:	±0.1% of FSR
Resolution:	±19.5mV
Input Impedance:	200KΩ
Input bias current:	50µA for a 10V input, single channel
Maximum normal mode voltage:	40V peak to peak
Channel-to-Channel crosstalk rejection:	-60db
Gain temperature coefficient:	100ppm/°C
Offset temperature coefficient:	.5µV/°C

A/D Characteristics

Type:	Successive approximation
Resolution:	10-bit
Monotonicity	±2LSB
Conversion Time:	200µs

Scanning Characteristics

Maximum throughput sample rate:	14,400
Minimum throughput sample rate:	0.007 Hz
Maximum scan list size:	10 entries
Sample buffer size:	2kb

Digital I/O

Channels:	6 bi-directional ports
Output voltage levels:	Minimum “1”, 3V @ 2.5mA sourcing; Maximum “0”, 0.4V @ 2.5mA sinking
Output current:	Maximum source, -2.5mA; Maximum sink, 2.5mA
Input voltage levels:	Minimum required “1”, 2V; Maximum allowed “0”, 0.8V

Calibration

Calibration Cycle:	One year
Calibration method:	Digital calibration with scale and offset constant per channel.

General

Input connectors:	Two 8 position terminal blocks
Operating Environment:	0°C to 70°C
Enclosure:	Molded ABS plastic.
Dimensions:	2.6D x 2.6W x 1.1H in. 66D x 66W x 28H mm.
Weight:	3 oz. (85 gr.)
Power Requirements:	None required—power derived from communication cable.

3. Installation

The following items are included with each WINDAQ Starter Kit. Verify that you have the following:

- DI-148U Instrument.
- The *WINDAQ Resource* CD-ROM.
- USB Communications cable.
- Screwdriver for securing your signal leads into the screw terminal inputs.

If an item is missing or damaged, call DATAQ Instruments at 330-668-1444. We will guide you through the appropriate steps for replacing missing or damaged items. Save the original packing material in the unlikely event that your unit must, for any reason, be sent back to DATAQ Instruments, Inc.

Connecting the Instrument to Your Computer

The DI-148U can be connected to your computer's USB port using the provided cable. No external power is required. Connect one end of the communications cable to the instrument port and the other to your PC's port.

Installing the Device Drivers

1. With your computer powered, Windows running, and all other applications closed, plug the appropriate end of the supplied USB communications cable into the USB port on the side of the instrument. Connect the other end of this cable to one of your computer's USB ports. The addition of this new piece of hardware will be "sensed" by Windows and the "Found New Hardware Wizard" will automatically be launched, anticipating the installation of a device driver for the new hardware.

2. Insert *The WINDAQ Resource* CD-ROM into your CD-ROM drive. It contains the device drivers for the DI-148U. If your Windows auto play feature is enabled, the WINDAQ Software Installation will start. Click on the Exit button to leave the installation.

3. Click through the defaults. When completed, the "Found New Hardware Wizard" will run again - and again you should click through the defaults until you exit the Wizard. The DI-148U requires two drivers to be installed, a Serial Port and a USB driver. This will look like two instruments are installed when there is only one.

   Note: *If you receive the Microsoft-issued warning that the software "has not passed Windows Logo testing to verify its compatibility with Windows XP" click "Continue Anyway" to continue with installation.*

4. After the Drivers are installed, click Finish to close the Found New Hardware Wizard. Windows should prompt you that the device has been installed properly.

5. Repeat this process for each instrument before installing WINDAQ software.

Installing WINDAQ Software and the Dataq Device Manager

The WINDAQ Resource CD-ROM contains all the software required for use with all DI-148 instruments. This installation includes the following software: WINDAQ Acquisition software (WINDAQ/HS (High Speed) option Trial version), WINDAQ Waveform Browser playback software, and the Dataq Device Manager.

Note: *For continued use of WINDAQ/HS (High Speed) option, the software must be activated—see "Activation of WinDaq/Pro High Speed Option" below for details.*

1. Re-insert the WINDAQ Resource CD for the auto play feature to run or run the Setup application.

2. In the “What do you want to do?” window, select “Install Software” and click OK.

3. In the “Installing Software” window, select “Install Software for DI-148, DI-158, and DI-710 instruments” and click OK.

4. In the Welcome! box, click OK to continue.

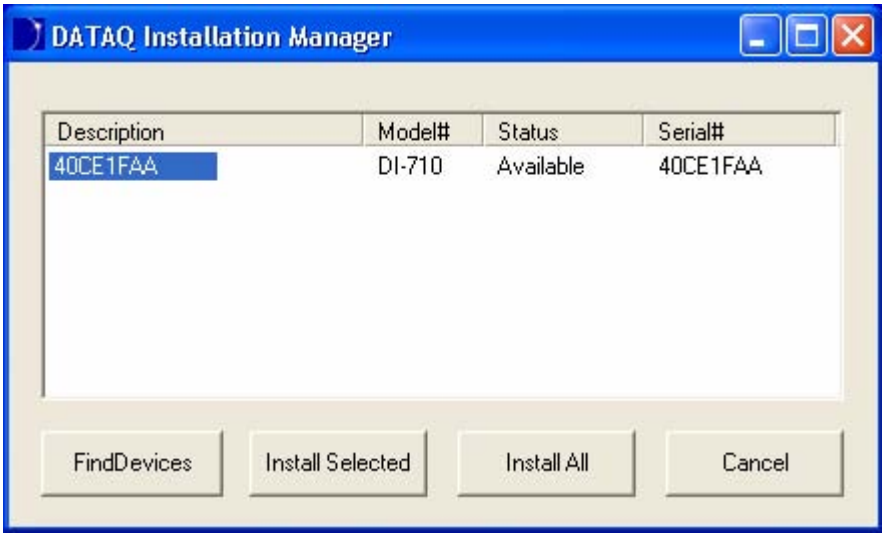
5. Read the License Agreement. If you accept the terms, click “Accept and Continue.” If you choose not to accept, this will end the installation.

6. When prompted, enter your registration information in the appropriate text boxes and click OK. Confirm your registration information before continuing.

7. When prompted, specify the directory where you want to install your WINDAQ software. It is recommended that you accept the default.

8. **Make sure each instrument is connected to your PC and all device drivers are installed. You must install a device driver for each USB instrument.** Click OK to continue.

9. The DATAQ Installation Manager runs.



If you do not see any instruments, click on the **Find Devices Button**. If you still do not see anything on the screen make sure that all device drivers have been properly installed and that the devices are connected to your PC (see “Installing the Device Drivers” above).

10. Choose which instrument to install by clicking on it - then click **Install Selected**. Choose **Install All** to install all devices connected to your PC and properly configured.

11. When prompted to Select a Program Manager Group specify a destination (or group window) in the Start Menu for WINDAQ software icons. It is recommended that you accept the default.

12. After WINDAQ Software installs, you will prompted to install WINDAQ/XL and Advanced CODAS Analysis software. If you purchased either software click on Yes in the appropriate dialog box. If you did not - click on No. Follow the on-screen prompts to complete installation.

13. Installation is complete - you will now see a Successful Installation box - click on OK to exit WINDAQ Installation.

14. To run WINDAQ Data Acquisition software go to the appropriate program group (specified above—default is *Start > Programs > WINDAQ*) and click on **Dataq Device Manager**. All other software is located in the same program group.

Activation of WINDAQ/High Speed Option

Activation is required for continued use of WINDAQ/HS (High Speed) option to ensure compliance with the Software License Agreement. The Software License Agreement can be found in the WINDAQ Software manual or in the WINDAQ program group (License.txt). The WINDAQ/HS option may be activated through the **Help** menu by clicking on **Unlock WINDAQ/HS** or by waiting for the trial version to expire. Trial versions are good for 40 High Speed recording sessions. The High Speed version may be purchased after the trial period expires through our online store or by phone. For help or for questions regarding Activation and/or the Software License Agreement, contact DATAQ Instruments Customer Support.

Dataq Device Manager

The Dataq Device Manager is installed when installing any DI-148 instrument. This software allows you to effectively manage multiple devices installed on the same PC. WINDAQ Data Acquisition Software and the Digital I/O setup are both accessed through the Dataq Device Manager. The Dataq Device Manager may be accessed through the Windows Program Manager Group as specified during installation (default is *Start > Programs > WINDAQ > Dataq Device Manager*). All available devices will automatically appear in the list box when you run the software. For help with the Dataq Device Manager access the Help Files using either the Help menu item or by pressing the F1 key to access context-sensitive help.

4. Connecting Input Signals

All input signal connections are made to the two 8-port screw terminals. Each terminal is labeled directly on the Instrument. Refer to the following for screw terminal port identification:

AGnd: Analog Ground

D5: Digital I/O bit 5

D4: Digital I/O bit 4

D3: Digital I/O bit 3

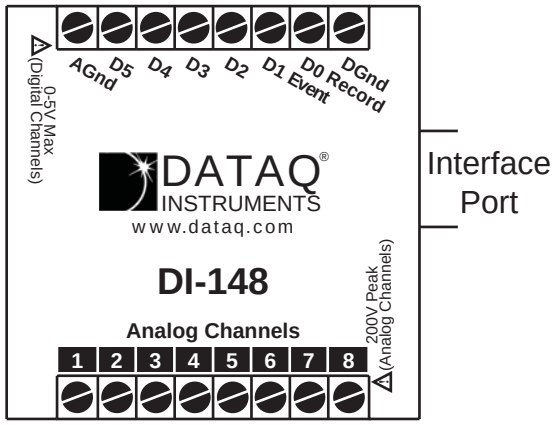
D2: Digital I/O bit 2

D1: Digital I/O bit 1—Remote Event Marker*

D0: Digital I/O bit 0—Remote Start/Stop*

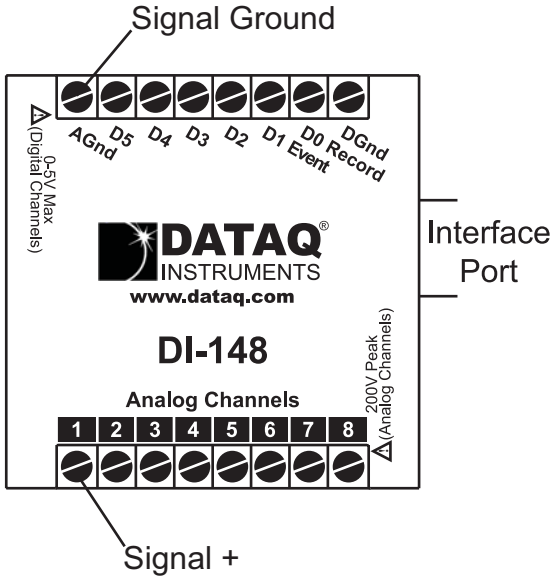
DGnd: Digital Ground

Analog Channels: 8 Single-ended analog channels



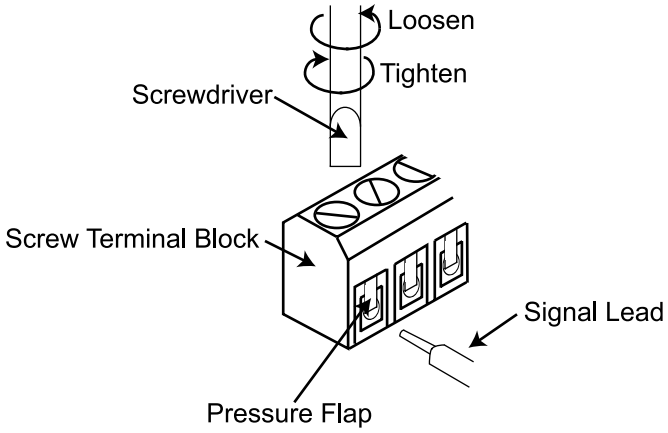
*When using WINDAQ Acquisition software **you** must enable either Channel 1 or Channel 9 as the Digital Input to use the Remote Control Functions.

Use the following diagram to connect Input Channel 1.



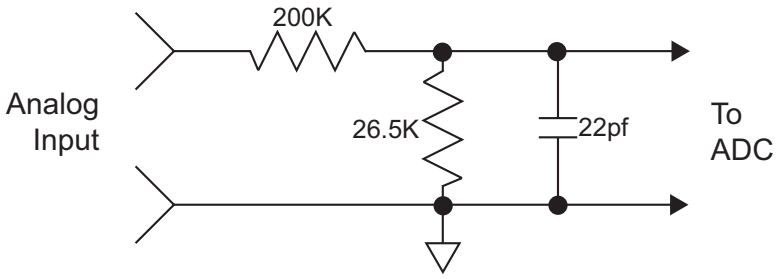
To connect signals to the DI-148U:

1. Insert the stripped end of a signal lead into the desired terminal directly under the screw.
2. Tighten the pressure flap by rotating the screw clockwise with a small screwdriver. Make sure that the pressure flap tightens only against the signal wire and not the wire insulation. Do not over-tighten.
3. Tug gently on the signal lead to ensure that it is firmly secured.



When an input signal is connected and WINDAQ Acquisition software is run, WINDAQ's real time display immediately reveals the input waveform on your computer's monitor.

Analog Input Diagram



Input Impedance > 200KΩ

DATAQ Instruments, Inc.
241 Springside Drive
Akron, Ohio 44333
Telephone: 330-668-1444
Fax: 330-666-5434
E-mail: support@dataq.com

Direct Product Links

(click on text to jump to page)

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