

Agilent 34970A BenchLink Data Logger 3

Getting Started Guide



Agilent Technologies

Notices

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Software Revision

This guide is valid for 3.x.x revisions of the Agilent 34970A BenchLink Data Logger 3 software, where x.x refers to minor revisions of the software that do not affect the technical accuracy of this guide.

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Safety Notices

CAUTION

A **CAUTION** notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in damage to the product or loss of important data. Do not proceed beyond a **CAUTION** notice until the indicated conditions are fully understood and met.

WARNING

A **WARNING** notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in personal injury or death. Do not proceed beyond a **WARNING** notice until the indicated conditions are fully understood and met.

Safety Information

Do not defeat power cord safety ground feature. Plug in to a grounded (earthed) outlet.

Do not use product in any manner not specified by the manufacturer.

Do not install substitute parts or perform any unauthorized modification to the product. Return the product to an Agilent Technologies Sales and Service Office for service and repair to ensure that safety features are maintained.

Safety Symbols



Earth Ground



Chassis Ground



Risk of electric shock



Refer to manual for additional safety information

WARNING

Main Power and Test Input Disconnect: Unplug instrument from wall outlet, remove power cord, and remove all external wiring before servicing. Only qualified, service-trained personnel should remove the cover from the instrument.

WARNING

Line Fuse: For continued protection against fire, replace the line fuse only with a fuse of the specified type and rating.

Welcome to the Agilent 34970A BenchLink Data Logger 3

The Agilent BenchLink Data Logger 3 software provides a convenient way to collect and analyze your data. The software uses a familiar spreadsheet environment, streamlining your data gathering needs. Simply identify the measurements you want to acquire, initiate the process, and see the data displayed on the computer screen. Use one of the many options to analyze and display your data—strip charts, histograms with statistical analysis, bar and scatter charts, individual channel results, and more.

What's New in Data Logger 3?

Superior Usability

- Tab-based user interface, simple menu structure.

Data Manager

- Manages all configurations and datalogs.
- Simplifies opening, renaming, deleting and editing.
- Easy access to data export.
- All configurations and datalogs are automatically saved—your data is protected!
- Last configuration automatically opens upon start up.

Datalog Name Template

- Define a name template so you don't need to manually name every datalog or exported data file.

Export Data

- Complete control of the decimal character and field separator.
- Complete control of the export contents.
- Automatically split files greater than 65536 lines (for easy importing into Microsoft Excel).
- Export to clipboard.
- Export configurations.

- Auto Export Data**
 - Automatically export data with pre-configured preferences when the scan completes.

- Graphing**
 - All graph configurations are saved and restored automatically the next time Data Logger 3 is opened.
 - Simplified add/remove channels.
 - Added graph preferences to allow easy control of graph look and feel.
 - Added popup windows for data, alarms, bar charts and markers.
 - Automatically generate a graph for each 34970A.
 - Add additional graphs for the same datalog.
 - Split a graph to allow easy viewing of independent measurements.
 - Editable Y Scale and Y Zero Reference.
 - Full screen mode.
 - Simplified changing the datalog being graphed.
 - Control the color of high and low alarms.
 - Single Channel Statistics available with a Quick Histogram tab.

- Import**
 - Import Data Logger I Configurations.
 - Import Data Logger II Configurations.

- Import Module**
 - Import a module's scan configuration from one configuration to another.

- Configure 34970As**
 - Up to four 34970As scanning simultaneously.
 - Download only the configured channels—saves you time!

- Configure Channels**
 - Improved copy and paste.
 - Improved keyboard data entry.

- Online Help**
 - Completely rewritten with an in-depth technical task orientation.
 - New! Getting Started Guide.

Globalization

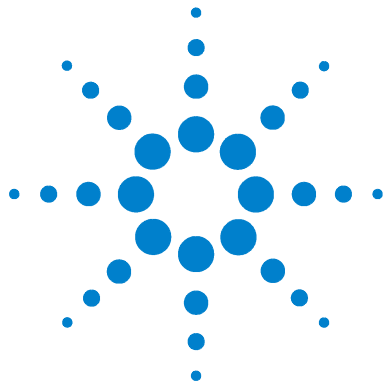
- Uses the operating system settings for decimal and field separators.
- Available in all data entry fields and in export data.

Multiple Languages

- Application and all online help localized for French, German, Simplified Chinese, Korean and English.
- Uses the operating system language settings for supported languages.
- Language changes happen immediately. The operating system can be one language and the product another language.



Important: This tutorial DOES NOT require any wiring or input signals connected to the 34970A(s). Read the safety, warning and caution information in the 34970A User's Guide before operating or connecting wiring to the 34970A and its modules. Module wiring information is located in the 34970A User's Guide.



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Step 1. Install the IO Libraries Suite Software

1 Make sure your PC meets the minimum system requirements:

- **Processor:** 450 MHz Pentium II or higher required, 800 MHz recommended
- **Operating system:** One of the following Microsoft Windows versions:
 - Windows XP Professional or Home Edition, Service Pack 1 or later
 - Windows 2000 Professional, Service Pack 4 or later
- **Browser:** Microsoft Internet Explorer 5.01 or greater
- **Available memory:** 128 MB (256 MB or greater recommended)
- **Available disk space:**
 - 225 MB required for installation:
 - 160 MB for Microsoft .NET Framework
 - 65 MB for Agilent IO Libraries Suite
 - 175 MB required for operation:
 - 110 MB for Microsoft .NET Framework
 - 65 MB for Agilent IO Libraries Suite
- **Video:** Super VGA (800x600) 256 colors or more

If possible, you should use the current version of the Agilent IO Libraries Suite. This version supports the newest interfaces and operating systems, and has the most advanced features. However, you may need an earlier version of the IO Libraries Suite to support an older interface or operating system. For example, Agilent IO Libraries Suite version M which supports Windows 98 SE and Windows NT.

If you have the *Automation-Ready CD*, you can install a previous version directly from the CD-ROM. In Windows Explorer, navigate to the folder called **Previous Versions** on the CD-ROM.

If you do not have the *Automation-Ready CD*, go to: <http://www.agilent.com/find/iolib> to locate the version you need.

2 Install the IO Libraries Suite:

- Close all other applications on your PC, insert the *Automation-Ready CD with Agilent IO Libraries Suite* into your CD-ROM drive, and follow the instructions on your screen.
- If the IO Libraries Suite installation does not start automatically, select **Start > Run** (on the Windows **Start** menu) and type `<drive>:\autorun\auto.exe`, where *drive* is your CD-ROM drive.
- After IO Libraries Suite has been successfully installed, you will see the IO Control (**IO** icon) in the taskbar notification area on your PC screen as in [Figure 1](#). (The taskbar notification area is where the clock is usually displayed.)

1 If you have difficulty with the installation, see Chapter 3, of the *IO Libraries Suite Getting Started Guide*, which you can display (in PDF format) by clicking the IO Control and choosing **Documentation > IO Libraries Suite Getting Started**. The **Documentation** menu also includes manuals for Agilent interface hardware products that you have installed.



Figure 1 IO Control icon in taskbar notification area

Step 2. Install the BenchLink Data Logger 3 Software

The Agilent BenchLink Data Logger 3 Software is contained on the 34825A product CD-ROM. The 34825A CD-ROM is included with every 34970A shipment.

Installation Procedure

Windows 98, Windows SE, Windows NT 4.0[®], Windows 2000, Windows XP:

- 1 Insert the 34825A Product CD-ROM into your drive.
- 2 From the product CD-ROM window that is displayed (following page), locate *Agilent BenchLink Data Logger Software* in the **Software** menu.
- 3 Click on **Install** and follow the instructions as prompted by the installation utility.

On-Line Help System

The BenchLink Data Logger 3 software is shipped with an extensive on-line help system to help you learn the features of the software as well as troubleshoot any problems that might arise as you are using the software. As you are installing the software, you will notice that the on-line help system is available in several languages.

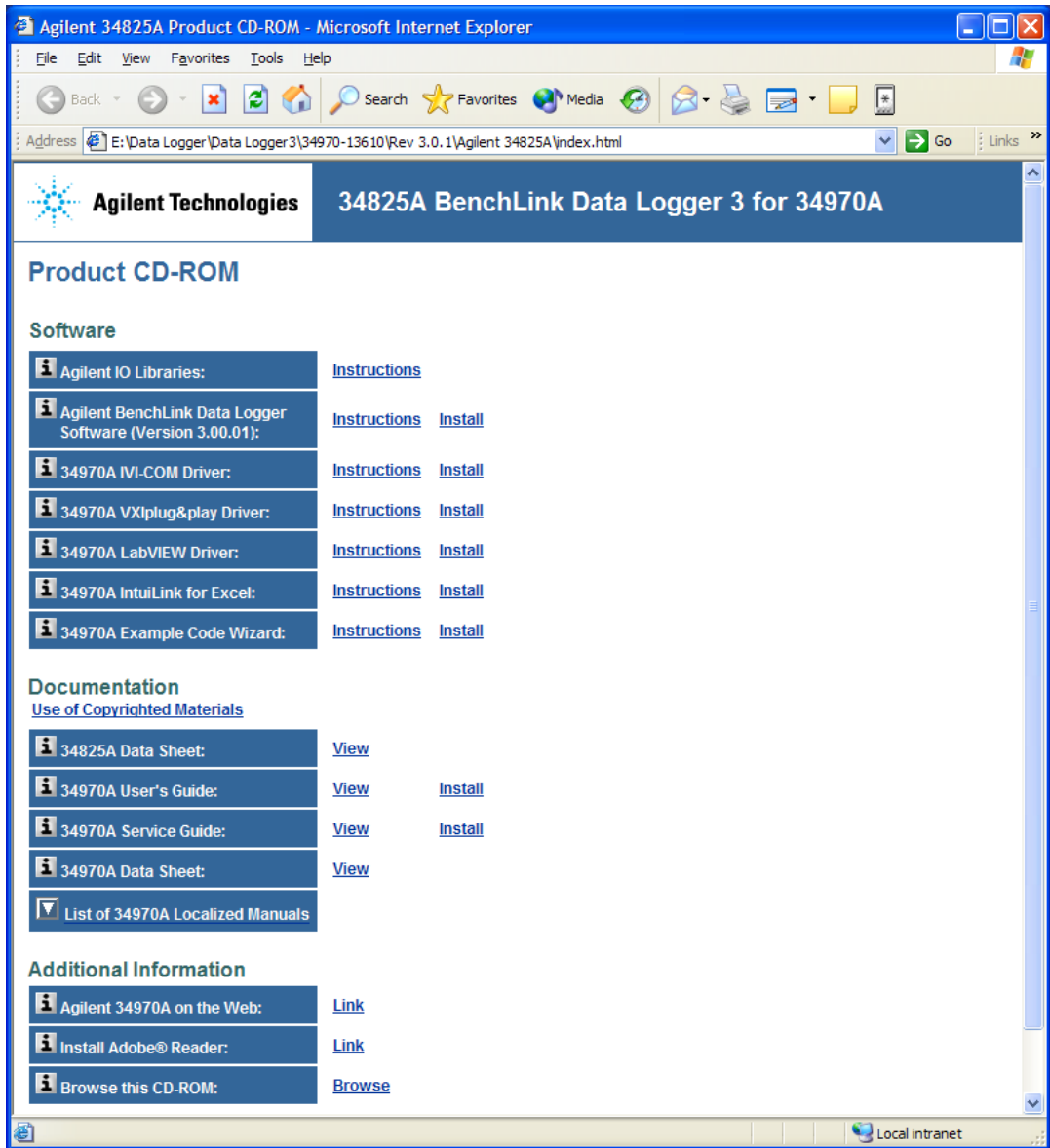


Figure 2 Product CD ROM Window

Step 3. Install Plug-In Modules into the 34970A Mainframe

Refer to the *Agilent 34970A User's Guide* for information on installing modules and connecting test wiring to the modules.

Step 4. Install Interface Hardware

If you received the Agilent IO Libraries Suite when you purchased an instrument or an interface product (such as an Agilent GPIB card or USB/GPIB interface converter), it is time to install the hardware now.

Consult the documentation for your hardware product for installation instructions and specific hardware configuration (for example, setting Ethernet or GPIB addresses). General instructions for hardware installation appear in the *Agilent Connectivity Guide*, which you can display (in PDF format) by clicking the IO Control and choosing **Documentation > Connectivity Guide**. The **Documentation** menu also includes manuals for Agilent interface hardware products that you have installed.

The Computer and Interface Cable

Since computers and operating systems are the subject of many books and periodicals, they are not discussed in this chapter. In addition to the computer and operating system, you will need a serial port (RS-232) or GPIB port (IEEE-488) and an interface cable.

Serial (RS-232)		GPIB (IEEE-488)	
Advantages	Disadvantages	Advantages	Disadvantages
Often built into the computer; no additional hardware is required.	Cable length is limited to 45 ft. (15 m). *	Speed; faster data and command transfers.	Cable length is limited to 60 ft. (20 m). *
Drivers usually included in the operating system.	Only one instrument or device can be connected per serial port.	Additional system flexibility, multiple instruments can be connected to the same GPIB port.	Requires an expansion slot plug-in card in PC and associated drivers.
Cables readily available and inexpensive. The 34970A is shipped with a serial cable (if internal DMM is ordered)	Cabling is susceptible to noise, causing slow or lost communications. Varying connector pinouts and styles.	Direct Memory Transfers are possible.	Requires special cable.
	Data transfers up to 85,000 characters/sec.	Data transfers up to 750,000 characters/sec.	

** You can overcome these cable length limitations using special communications hardware. For example, you can use the Agilent E5810A LAN-to-GPIB Gateway interface or a serial modem.*

Step 5. Connect the Interface Cable to the 34970A

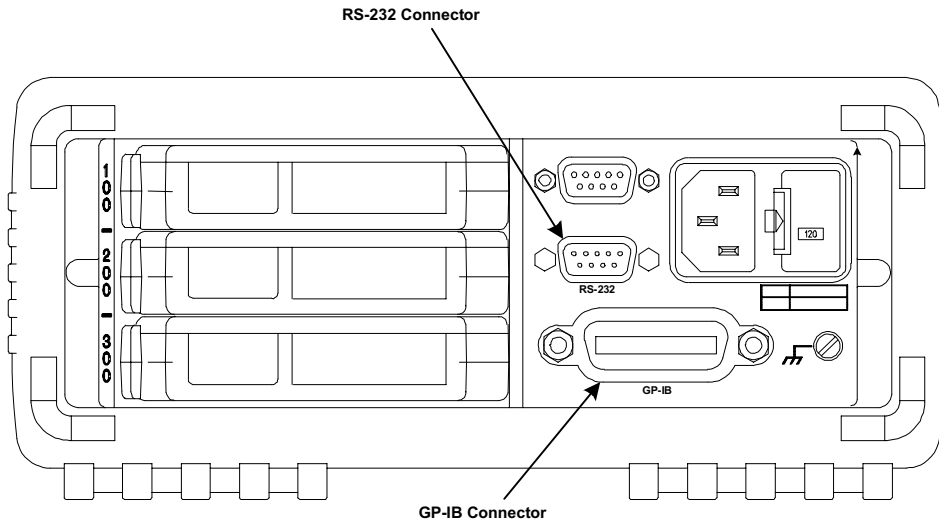




Figure 3 34970A RS-232 and GPIB Connectors


Step 6. Apply Power to the 34970A

- 1 Connect the power cord and turn on the instrument using the

On/Standby Switch  located on the lower left side of the front panel. The front-panel display will light up briefly while the instrument performs its power-on self-test. The GPIB address is also displayed. The instrument initially powers up with all measurement channels turned off. To review the power-on display with all annunciators turned on, hold down

 as you turn on the instrument. If the instrument does not turn on properly, refer to the *Agilent 34970A User's Guide*.

- 2 Perform a complete self-test. The complete self-test performs a more extensive set of tests than those performed at

power-on. Hold down  as you turn on the instrument and hold down the key until you hear a long beep. The self-test will begin when you release the key following the beep. If the self-test fails, see the *34970A Service Guide* for instructions on returning the instrument to Agilent for service.

WARNING



Note that this switch is Standby only. To disconnect the mains from the instrument, remove the power cord.

If the Instrument Does Not Turn On

Use the following steps to help solve problems you might encounter when turning on the instrument. If you need more help, refer to the *34970A Service Guide* for instructions on returning the instrument to Agilent for service.

- 1 Verify that there is ac power to the instrument. First, verify that the power cord is firmly plugged into the power receptacle on the rear panel of the instrument. You should also make sure that the power source you plugged the

instrument into is energized. Then, verify that the instrument is turned on.

- 2 Verify the power-line voltage setting. The line voltage is set to the proper value for your country when the instrument is shipped from the factory. Change the voltage setting if it is not correct. The settings are: **100**, **120**, **220**, or **240** Vac.

NOTE

For 127 Vac operation, use the 120 Vac setting. For 230 Vac operation, use the 220 Vac setting.

Refer to the *Agilent 34970 User's Guide* if you need to change the line voltage setting.

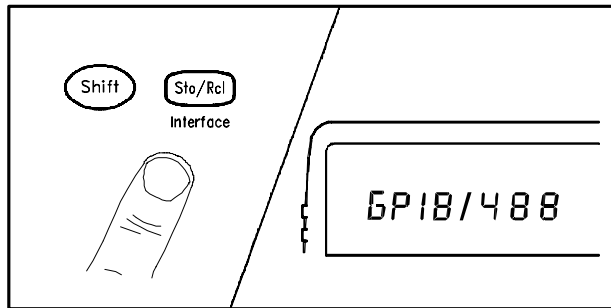
- 3 Verify that the power-line fuse is good. The instrument is shipped from the factory with a 500 mA fuse installed. This is the correct fuse for all line voltages. See the *Agilent 34970A User's Guide* if you need to replace the power-line fuse. To replace the 500 mA, 250 V fuse, order Agilent part number 2110-0458.

Step 7. Configure the 34970A Interface Settings

The Front-Panel Menus at a Glance

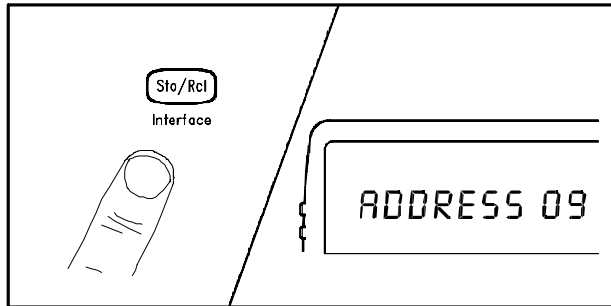
Several of the front-panel keys guide you through menus to configure various parameters of the instrument (see the *Agilent 34970A User's Guide*). The following steps demonstrate the menu structure.

- 1 Press the menu key. You are automatically guided to the first level of the menu. Rotate the knob to view the other choices on the first level of the menu.

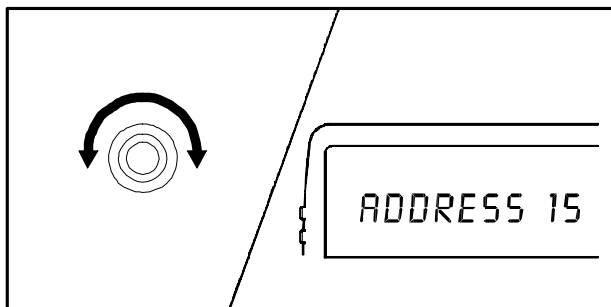


The menu will automatically timeout after about 20 seconds of inactivity. You will be returned to the operation in progress prior to entering the menu.

- 2 Press the *same* menu key again to move to the next item of the menu. Typically, this is where you choose parameter values for the selected operation.

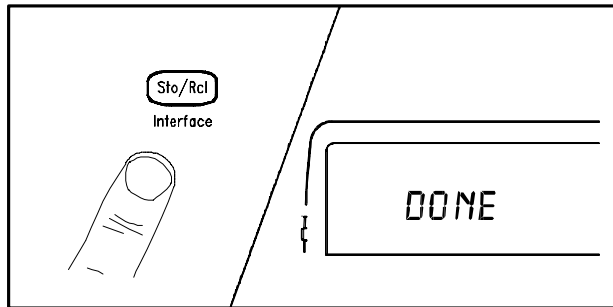


- 3 Rotate the knob to view the choices on this level of the menu. When you reach the end of the list, rotate the knob in the opposite direction to view all of the other choices. The current selection is highlighted for emphasis. All other choices are dimmed.



1 Installing Software and Connecting the 34970A

- 4 Press the *same* menu key again to accept the change and exit the menu. A brief confirmation message is displayed.



NOTE

To review the current configuration of a specific menu, press the menu key several times. A message NO CHANGES is displayed when you exit the menu.

To Configure the Remote Interface

The instrument is shipped with both a GPIB (IEEE-488) interface and an RS-232 interface. Only one interface can be enabled at a time. The GPIB interface is selected when the instrument is shipped from the factory.

GPIB Configuration

- Shift** **Sto/Rcl**
Interface
- 1 Select the GPIB (HPiB) interface.

GPIB / 488

- Sto/Rcl**
Interface
- 2 Use the knob to select the GPIB address. You can set the instrument's address to any value between 0 and 30. The factory setting is address "9".

ADDRESS 09

- Sto/Rcl**
Interface
- 3 Save the change and exit the menu.

NOTE

Your computer's GPIB interface card has its own address. Be sure to avoid using the computer's address for any instrument on the interface bus. Agilent's GPIB interface cards generally use address "21".

RS-232 Configuration

Shift

Sto/Rcl
Interface

- 1 Rotate the knob to select the RS-232 interface.

RS-232

Sto/Rcl
Interface

- 2 Rotate the knob to select the baud rate.
 - Select one of the following: **9600**, **19200**, **38400**, **57600** (factory setting), or **115200** baud.

19200 BAUD

NOTE

The Data Logger 3 software does not support the 1200, 2400, or 4800 baud rate.

Sto/Rcl
Interface

- 3 Rotate the knob to select the parity and number of data bits.
 - Select one of the following: **None** (8 data bits, factory setting), **Even** (7 data bits), or **Odd** (7 data bits). When you set the parity, you are also indirectly setting the number of data bits.

EVEN, 7 BITS

Sto/Rcl
Interface

- 4 Rotate the knob to select the flow control method.
 - Select one of the following: **None** (no flow control), **RTS/CTS**, **DTR/DSR**, **XON/XOFF** (factory setting), or **Modem**.

FLOW DTR/DSR

Sto/Rcl
Interface


- 5 Save the changes and exit the menu.

Step 8. Run the Agilent Connection Expert to Verify the I/O Configuration

- 1 Run Connection Expert. If the Connection Expert utility does not run automatically at this time, click the IO Control (IO icon in the Windows notification area) and then click **Agilent Connection Expert**.



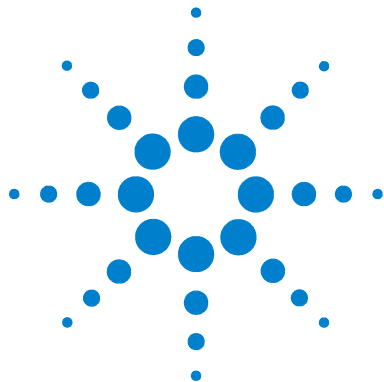
- 2 Change the I/O configuration, if necessary. Connection Expert will automatically detect most interfaces and instruments, and will assign names and other default configuration settings. If you want to change these parameters, you can do so in the Connection Expert window.
 - Select the instrument or interface in the explorer pane in the center of the Connection Expert window.
 - The properties of the selected item appear in the properties pane on the right. When you right-click on an item in the explorer pane, you see a shortcut menu of actions that you may take on that item. These actions are also available from the menus at the top of the Connection Expert window. The most common actions are also listed in the Connection Expert's task guide (the left pane of the window).
 - You may also add instruments or interfaces manually to your test system configuration if Connection Expert does not automatically detect the hardware (for example, if it is connected via Ethernet or via serial port).
 - Refer to the *Agilent IO Libraries Suite Online Help* for more information on Connection Expert and on configuration changes.
- 3 Test the instrument connections.

- Connection Expert will automatically send an identification query (***IDN?**) to any instrument that has its auto-identify property set to **Yes**. (See the *Agilent IO Libraries Suite Online Help* if you want to turn this function off.)
- When you see a green check mark on the icon representing an instrument , this means that the instrument has responded as expected. (Note that some instruments do not support the ***IDN?** query and will not respond appropriately.) The instrument's identification information is displayed in the properties pane on the right side of the Connection Expert window.
- You can explicitly test the connections to your instruments, and exercise more of their functionality, by selecting **Send commands to this instrument** in the task guide or shortcut menu. This starts the Interactive IO utility, which allows you to send commands to your instruments and see their responses. Note that some commands (such as ***TST?**, instrument self-test) may take longer than Interactive IO's default timeout; you can modify the timeout in the Interactive IO window by selecting **Interact > Options...**

Step 9. Run the BenchLink Data Logger 3 Software

You can now run the BenchLink Data Logger 3 software. Chapter 2 contains a step-by-step tutorial showing you how to operate the BenchLink Data Logger 3 software.

1 Installing Software and Connecting the 34970A



1 Getting Started with BenchLink Data Logger 3

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Getting Started Tutorial

This getting started tutorial introduces you to the BenchLink Data Logger 3 and shows you how to:

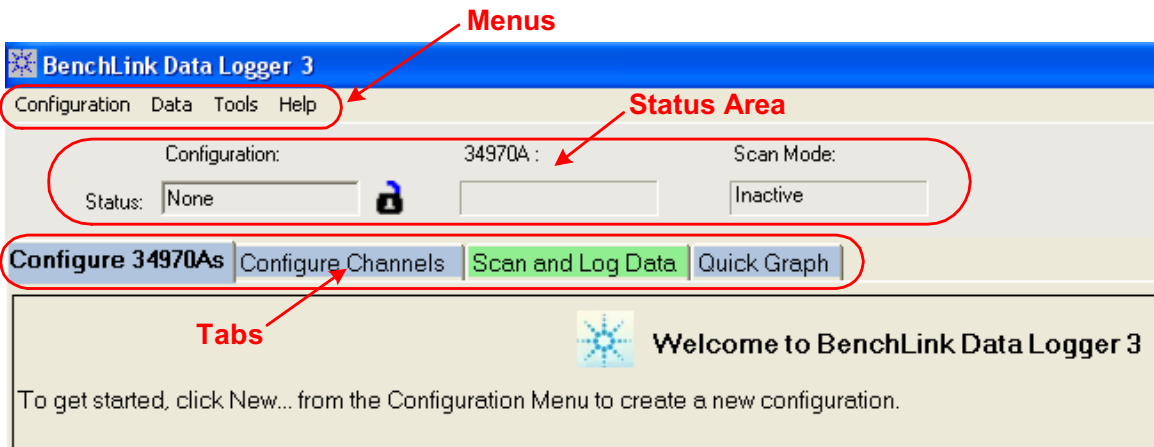
- Connect to one or more 34970As
- Set up a simple channel configuration
- Scan channels and measure some data
- View the data in graphical form
- Export the data to a Microsoft Excel-compatible spreadsheet
- Save the configuration

To start Benchlink Data Logger 3, click this shortcut on your desktop:



34970A Data
Logger 3

The graphic below shows the menus, status area and tabs in the user interface. The Data Logger 3 online help (available by pressing F1 or clicking the Help menu) describes the user interface in detail.



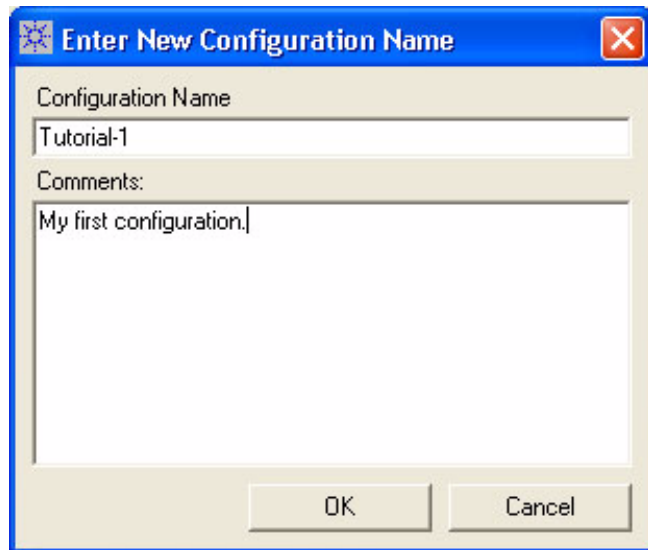
Step 1. Create a New Configuration

In this step we will create a new configuration. A configuration contains all of the instrument settings, scan settings and graph settings that you have configured in the Data Logger 3 application. Following a scan, each scan datalog is also associated with the configuration. A configuration events log is also associated with each configuration.

NOTE

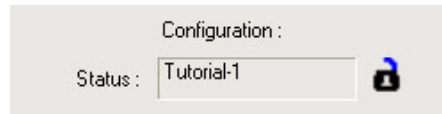
For purposes of example, this tutorial assumes you have a 34901A or 34902A multiplexer module installed in a 34970A. Although you can use up to four 34970As in a configuration, this tutorial uses only one 34970A. You should not have any channels connected to external equipment or signal sources for this tutorial.

- 1 Click **Configuration > New...** to create a new configuration.
- 2 You will be prompted to enter a new configuration name and comments. For this tutorial, enter the information shown below and click **OK**.



1 Getting Started with BenchLink Data Logger 3

The configuration name appears under **Configuration:** in the status area of the application window. For example:



NOTE

Notice the unlocked padlock icon to the right of the configuration name. This indicates the configuration does not yet have a datalog and is editable. Once a scan has occurred and a datalog exists for the configuration, the padlock will be shown as locked. To alter a locked configuration, you must either delete the associated datalog(s) or copy and rename the configuration.

Step 2. Configure 34970As

In this step you will identify which 34970A(s) to use in the configuration.

Data Logger 3 can be used in either of these two modes:

- **Connected to 34970A (Connected Mode)** – Select this mode if you have one or more 34970As connected via interface to your computer. Connected Mode is the recommended mode to use whenever possible. This is because, in Connected Mode, the software automatically determines the 34970A address and installed modules.
- **Not connected to 34970A (Not Connected Mode)** – This mode allows you to develop scanning configurations “off-line” without being connected to any 34970As. For example, you can develop a configuration in your office and later connect to 34970As on the production floor.

NOTE

This tutorial uses the **Connected Mode** and assumes your PC is connected via interface to at least one 34970A and communication has been established. If you have not done so, you can use the Agilent Connection Expert to automatically configure interfaces and check 34970A communications. This utility is on the *Automation-Ready CD ROM* included with the 34970A.

- 1** On the **Configure 34970As** tab, click **Connected to 34970A**. Notice on the **Configure 34970As** tab, the configuration steps (1 through 4) are shown in bold lettering from left to right.

NOTE

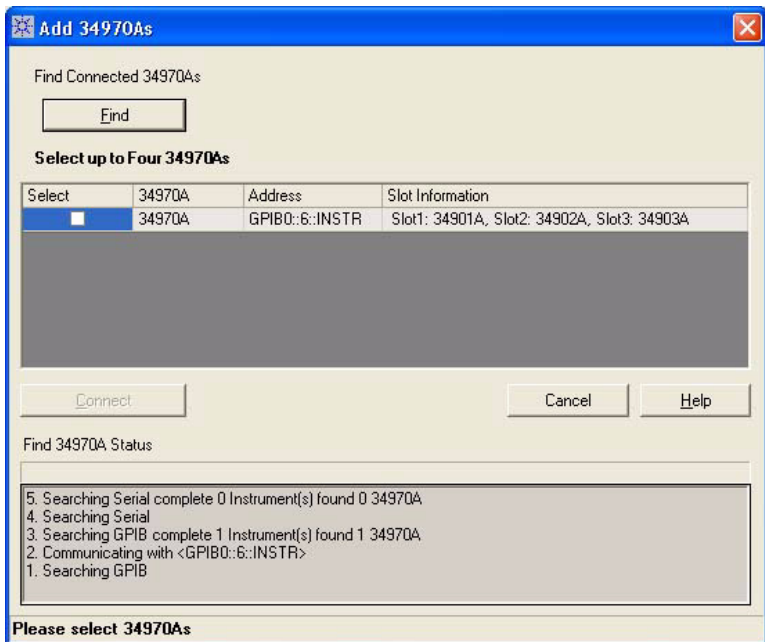
You can access the help for the selected tab by clicking the F1 key.

- 2** Click the **Add 34970s...** button.
- 3** Make sure the 34970s to be added are powered-on and connected to the PC via an interface. In the **Add 34970s** dialog box, click the **Find** button.

NOTE

The Find button will find only 34970As. It is not a general discovery tool for all devices on the interface.

- 4 You should now see a listing of the 34970As found. For example:



The **Find 34970A Status** area shows the status of the find operation. If you do not see any 34970As listed, check that the interface is connected and the 34970A is powered-on. For more information on troubleshooting configuration problems, refer to the Agilent Connection Expert application on the *Automation-Ready CD ROM* included with the 34970A.

NOTE

Data Logger 3 uses the IO Libraries to find 34970As.

- 5 In the column labeled **Select**, click the box next to the 34970A(s) you want to add. You can add up to four 34970As in a single configuration.
- 6 Click the **Connect** button. This reads the configuration of the 34970A(s) and populates the **Configure 34970As** tab with the 34970A number, address and modules found in the 34970A.
- 7 Notice the **Module Mode** column. For multiplexer modules, this mode will be set to **Scan Mode**. Typically, you should leave the **Module Mode** set to **Scan Mode**. For switch modules, this mode will be set to **Switch Mode**. If you want to change the **Module Mode**, click in the field next to the right of the text and a drop down list will be available. You may choose **Inactive Mode** if you are not interested in the channels for a given module.

Step 3. Configure Channels

In this step you will add channels and measurement functions to a scan list.

- 1 Click the **Configure Channels** tab.

NOTE

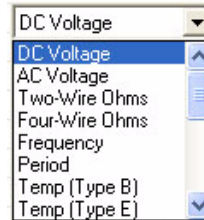
Whenever you move from tab to tab or close the application, the configuration information is automatically saved.

- 2 You may see this progress message **Populating scan grid...** This may take several seconds depending on the number of modules you have.
- 3 The 34970A number, address and modules are shown in the tree view in the column labeled **Channels** on the left side of the grid. You can collapse the tree view by clicking next to a 34970A or module. Click to expand a collapsed tree view.
- 4 The **Enable Channel** column allows you to select channels to be in the scan and, optionally, name each channel. To select a channel, click the checkbox in the **Scan** column under the **Enable Channel** column. For this tutorial, click the checkboxes next to channels 101, 102, 103, 104 and 105.
- 5 In the **Name** column, enter these names for the five selected channels: *Power In, Low Load, High Load, Out Freq, Oven Temp*.

Channels	Enable Channel	
	Scan	Name
34970A		
<input type="checkbox"/> 1. GPIB0:6::INSTR		
<input type="checkbox"/> 34901A		
<input type="checkbox"/> 101	<input checked="" type="checkbox"/>	Power In
<input type="checkbox"/> 102	<input checked="" type="checkbox"/>	Low Load
<input type="checkbox"/> 103	<input checked="" type="checkbox"/>	High Load
<input type="checkbox"/> 104	<input checked="" type="checkbox"/>	Out Freq
<input type="checkbox"/> 105	<input checked="" type="checkbox"/>	Oven Temp

- 6 The **Measurement** column allows you to select the measurement function, the range, the resolution and set advanced measurement properties for each selected channel. The default measurement function for scanned channels is

DC Voltage. To change the measurement function, click on the word **DC Voltage** in the **Measurement Function** column. Click the down arrow to see the available measurement functions:



For this tutorial, set the measurement functions in sequence to **DC Voltage, Four-Wire Ohms, Two-Wire Ohms, Frequency and Temp (Type B)**.

Channels	Enable Channel		Mea:
	Scan	Name	
34970A			
└─ 1. GPIB0::6::INSTR			
└─ 34901A			
└─ 101	<input checked="" type="checkbox"/>	Power In	DC Voltage
└─ 102	<input checked="" type="checkbox"/>	Low Load	Four-Wire Ohms
└─ 103	<input checked="" type="checkbox"/>	High Load	Two-Wire Ohms
└─ 104	<input checked="" type="checkbox"/>	Out Freq	Frequency
└─ 105	<input checked="" type="checkbox"/>	Oven Temp	Temp (Type B)
└─ 106	<input type="checkbox"/>		DC Voltage
└─ 107	<input type="checkbox"/>		DC Voltage
└─ 108	<input type="checkbox"/>		DC Voltage
└─ 109	<input type="checkbox"/>		DC Voltage
└─ 110	<input type="checkbox"/>		DC Voltage
└─ 111	<input type="checkbox"/>		DC Voltage
└─ 112	<input type="checkbox"/>	Low Load	Four-Wire Ohms

NOTE

Notice that for 4-wire ohms, a paired channel (channel n+10 for the 34901A or channel n+8 for the 34902A), is automatically configured for the sense lines.

7 The **Range** column allows you to specify a fixed range or Autorange (the default). To change the range, click the word **Auto** in the **Range** column. A drop down arrow appears

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allowing you to select the range. For this tutorial, set the ranges in sequence to: **+/- 1V, 10K, 100K, and Auto**.

Channels	Enable Channel		Measurement	
	Scan	Name	Function	Range
34970A				
└─ 1. GPIB0::6::INSTR				
└─ 34901A				
└─ 101	<input checked="" type="checkbox"/>	Power In	DC Voltage	+/- 1 V
└─ 102	<input checked="" type="checkbox"/>	Low Load	Four-Wire Ohms	10 K
└─ 103	<input checked="" type="checkbox"/>	High Load	Two-Wire Ohms	100 K
└─ 104	<input checked="" type="checkbox"/>	Out Freq	Frequency	Auto
└─ 105	<input checked="" type="checkbox"/>	Oven Temp	Temp (Type B)	None
└─ 106	<input type="checkbox"/>		DC Voltage	Auto
└─ 107	<input type="checkbox"/>		DC Voltage	Auto
└─ 108	<input type="checkbox"/>		DC Voltage	Auto
└─ 109	<input type="checkbox"/>		DC Voltage	Auto
└─ 110	<input type="checkbox"/>		DC Voltage	Auto
└─ 111	<input type="checkbox"/>		DC Voltage	Auto
└─ 112	<input type="checkbox"/>	Low Load	Four-Wire Ohms	10 K

NOTE

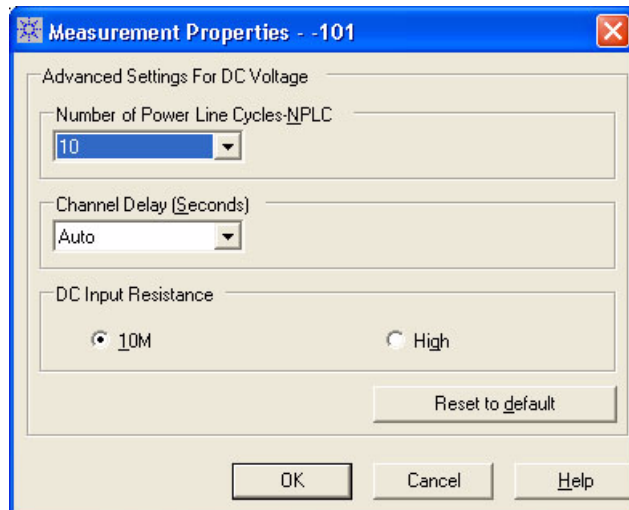
Notice the range for temperature measurements is fixed and displayed as None.

- 8 The **Res** column allows you to set the measurement resolution for most measurement functions and the temperature scale (C, K, or F) for temperature measurements. To change the resolution, click the number **5.5** in the **Res** column. A drop down arrow appears allowing you to select the resolution. For this tutorial, set the

resolutions in sequence to: **5.5, 6.5, 5.5, 4.5** and **F**.

34970A	Scan	Name	Function	Range	Res
1. GPIB0::6::INSTR					
34901A					
101	<input checked="" type="checkbox"/>	Power In	DC Voltage	+/- 1 V	5.5
102	<input checked="" type="checkbox"/>	Low Load	Four-Wire Ohms	10 K	6.5
103	<input checked="" type="checkbox"/>	High Load	Two-Wire Ohms	100 K	5.5
104	<input checked="" type="checkbox"/>	Out Freq	Frequency	Auto	4.5
105	<input checked="" type="checkbox"/>	Oven Temp	Temp (Type B)	None	F
106	<input type="checkbox"/>		DC Voltage	Auto	5.5
107	<input type="checkbox"/>		DC Voltage	Auto	5.5
108	<input type="checkbox"/>		DC Voltage	Auto	5.5
109	<input type="checkbox"/>		DC Voltage	Auto	5.5
110	<input type="checkbox"/>		DC Voltage	Auto	5.5
111	<input type="checkbox"/>		DC Voltage	Auto	5.5
112	<input type="checkbox"/>	Low Load	Four-Wire Ohms	10 K	6.5

- 9 The **More** column under **Measurement** allows you to select advanced settings for the measurement function. For example, for the DC Voltage function, you can set Number of Power Line Cycles, Channel Delay and DC Input Resistance. For this tutorial, click **...** in the **More** column for channel 101, and set the **Number of Power Line Cycles-NPLC** to **10** and click **OK**. This sets the integration time for the DMM.




Notice the resolution for channel 101 is now 6.5 digits—not 5.5 digits. This is because integration time and measurement resolution are directly related.


10 Optionally, you can use the **Scaling (Mx + B)** column and **Alarm Limits** column to set scaling and alarms. We will not set scaling or alarms for this tutorial.

Step 4. Set Up Scan Control and Data Control

In this step we will set the scan start and stop criteria and define when to log the data.

- 1 Click on the **Scan and Log Data** tab—the channel configuration is automatically saved. The **Scan and Log Data** tab contains **Scan Control**, **Data Control**, **Start/Stop** and **Scan Status** sections. The default settings start the scan immediately.
- 2 Typically, you will want to add more scan control to the scan than starting immediately. Let's set the scan to start at a specific time and stop after a number of scans.
- 3 Click  in the **Scan Control** column. The **Scan Control** dialog box appears. In the column labeled **When Start Button Pressed**, click the **At Time** button. We will use the default date and time which is a few minutes from now based on your PC clock. In the **Stop Scanning** column, click the **After N Scans** button and enter *20* in the box below. Click **OK** to save the settings.

Notice the scan control settings are now summarized in the **Scan Control** column.

- 4 Click  in the **Data Control** column. The **Set Datalog Fields** dialog box appears. From this dialog you can automatically name the datalog from the template, or uncheck the default naming and enter a name for the datalog. You can also add comments, change the owner, and choose to have the datalog automatically saved as a CSV (Comma Separated Values) file. For this tutorial, we will use the default **Name** from the template, the default **Owner**, and not automatically save the datalog. Click **Cancel** to close this dialog box.


NOTE

The template allows you to select the fields that will be included in the datalog name. By clicking the **Edit Template** button, you can enter a custom prefix (default = **Data**) and either have the instrument number listed or not listed. The date and time timestamp is always included in the datalog name when using the template.

- 5 Notice the data control settings are now summarized in the **Data Control** column.



Step 5. Start the Scan

In this step we start the scan and view the results.

- 1 To start the scan, click the start button  under the **Start/Stop** column. Once you have started the scan, the settings you configured in **Scan Control** become enabled. For example, if scanning was set to start **Immediately**, the scan will start when you click the start button. For this tutorial, we set a date and time to start the scan. Our scan will start when the specified date and time occurs.

NOTE

If you took too long to get to this step, you will receive a message that the scan start time is prior to the current time. If this occurs, go back to the **Scan Control**, reset the start time, and then click the start button again.

- 2 You will see some messages indicating the configuration is being downloaded to the 34970A.
- 3 Once scanning begins, the start button turns into a stop button  and a small clock icon  appears on the tab label area to indicate that the scan is in progress. The clock icon and the stop button also appear in the status area above the tabs.



- 4 Once the scan begins, you can view the **Last Scan Results** per channel in the grid below the control area.
- 5 You can view the scan status in the **Scan Status** column.

Step 6. View Data Graph

In this step we will view the scan data as a graph.

- 1 Click the **Quick Graph** tab
- 2 After scanning begins, the data logged from the scan is displayed in the graph using the default graph setup.

NOTE

There may be a slight delay from the start of the scan until you see the data in the graph.

- 3 Notice that each channel in the graph is a different color. Also notice the **Channels** column below the graph and the corresponding channel colors.

Step 7. Customize the Graph

This step shows you some of the many graphing features. You can customize the graph even while data is being logged.


NOTE

If you do not see the data, you may need to adjust the x and y scales.

- 1 To autoscale the data to fit the graph, Click on the **Autoscale Y** button. A confirmation dialog will appear. Click **OK** to autoscale all channels.
- 2 You can adjust individual Y scales for each channel in the area below the graph labeled **Modify Y-axis View**.
- 3 Adjust the time per division by using the up/down arrows under **Scale X-Axis (Time)**.
- 4 To select which channels to graph, click the **Channels...** button. The **Channels** dialog box will appear. By default all channels are checked. Uncheck the channels that you do not wish to display.

Step 8. Stop the Scan

In this step we will stop the scan.

- 1 To stop the scan, either wait until the 20 scans you specified finish or click the stop button  located on the upper toolbar area of the application. If you click the stop button, a confirmation dialog will appear. Click **Yes** to stop the scan.
- 2 After a slight delay, you will see a **Scan and Log Data Summary** dialog box. From this dialog box, you may optionally, modify the data log name, the owner, or comments for this datalog. You can also use this dialog box to export your data directly to a file. For this tutorial, just click **Close** to close the **Scan and Log Data Summary**. We will export the data in the next step.

Scan and Log Data Summary

1.GPIB0:6::INSTR SCAN_SUMMARY

Instrument Settings :

Instrument : 34970A <GPIB0:6::INSTR>
Module : 34901A, 34902A, 34903A
Channel Configured :101, 102, 103, 104, 105

Scan Settings

Scan Count : 20
Scan Start : At Future time
Start Time : 10/19/2005 10:45:45 AM
Scan Stop : After 20 Scan
Stop Time : 10/19/2005 10:48:55 AM

Your data has been saved in Data Manager as:

Name: Data10-19-10-41-59

Owner: Dave

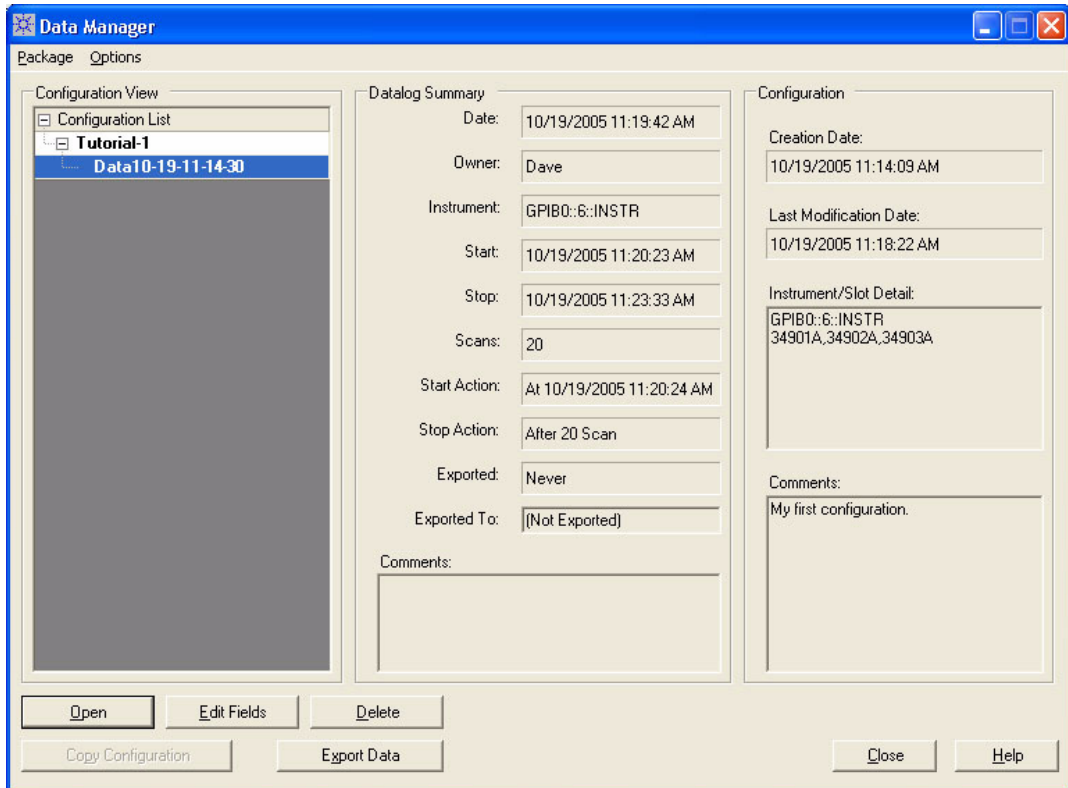
Comments:

Your data has been exported to:

[Not Exported]

Step 9. Export the Data

- 1 The Data Manager provides complete flexibility in opening, editing, and exporting datalogs. To open the Data Manager, click **Data > Data Manager**. You will see a display similar to this:



- 2 The **Tutorial-1** configuration and the recently scanned datalog should appear in the **Configuration View** column. With the datalog selected as shown above, click the **Export Data** button. The **Export Data** dialog box appears and allows you to specify how to export the data and which data to export. For this tutorial, we will use the default export settings which creates a CSV (Comma Separated Values) file.

Click the **Export to File...** button in the **Export Data** dialog box.

- 3** Browse to the directory path in which to store the data file and click **Save**. The CSV file can later be imported directly into Microsoft Excel.
- 4** You can now close the **Export Data** dialog box.
- 5** As you create configurations and deal with datalogs, you will find the Data Manager to be particularly useful to organize and locate configurations and datalogs. As the last step in this tutorial, click **Data > Data Manager** to open the **Data Manager** dialog box and click the **Help** button. The help describes, in detail, all of the capabilities of the Data Manager.

Congratulations! You have completed the tutorial. You can now start creating your own scanning configurations. Use the online help for the tabs (F1 key) and the help buttons in the dialog boxes to learn more about each step in the process. This help file also contains a number of advanced topics available from the help **Contents** tab, **Index** tab or by searching the help.

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