

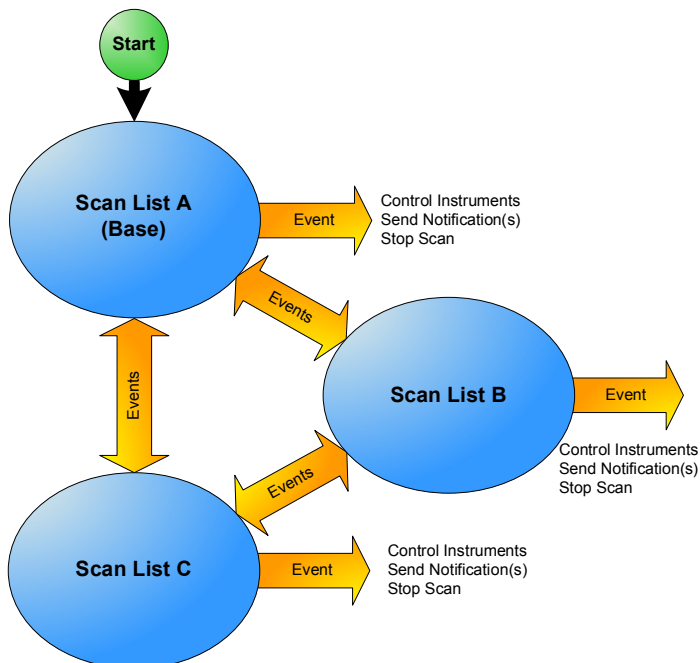


Agilent BenchLink Data Logger Pro Software Quick Start Tutorial

BenchLink Data Logger Installation CD-ROM. You can install the BenchLink Data Logger applications listed below from the *Agilent BenchLink Data Logger CD-ROM*.

Agilent's BenchLink Data Loggers

- **BenchLink Data Logger** - A free application for basic scanning that is included with every Agilent 34970A, 34972A, and 34980A Data Acquisition/Switch Unit.
- **Upgrade to BenchLink Data Logger Pro!** - A licensed application for advanced scan control, limit testing, and SCPI instrument control for use with the Agilent 34970A, 34972A, and 34980A. Your installation CD contains a free 30-day trial version of BenchLink Data Logger Pro. Here are some of the many features of BenchLink Data Logger Pro:



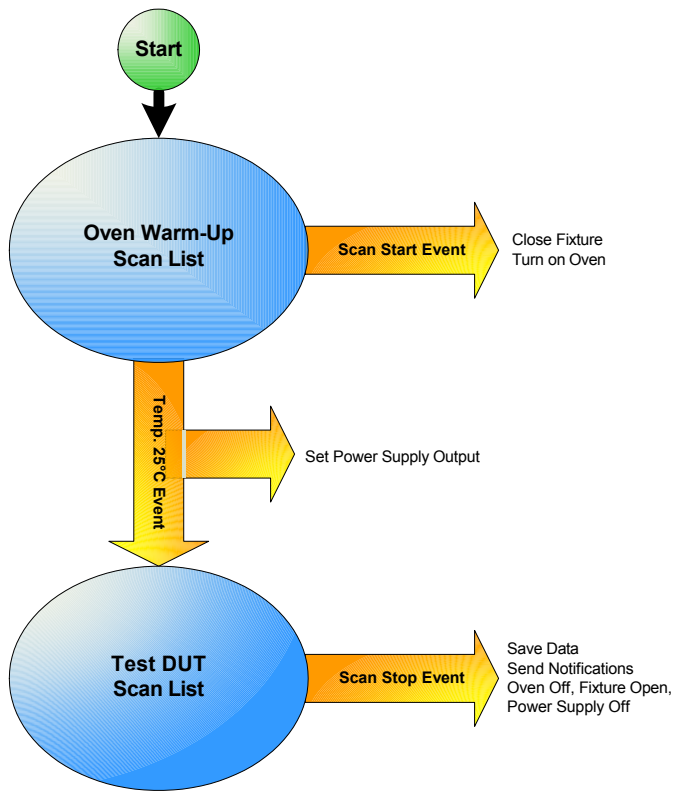
- **Scanning Flexibility!** Multiple scan lists allow you to tailor individual scans to your measurement needs. Event-based decision making controls the scanning. Multiple instruments are seamlessly integrated into scan lists.
- **Real-Time Limit Checking, Decision Making and Event Handling!** Advanced limit checking allows the software to make decisions and branch between scan lists, control instrumentation with flexible SCPI commands, handle errors and send notifications in response to events.
- **Easy Data Storage and Analysis!** Data can be automatically stored in a spreadsheet-compatible data file.
- **No Programming!** Instrument control and decision making that once required extensive programming skills can now be done in an easy to use spreadsheet environment...**all without programming!**



Agilent Technologies

Scanning and Instrument Control with BenchLink Data Logger Pro

This Quick Start Tutorial shows just how easy it is to control scanning and instruments with BenchLink Data Logger Pro. The following pages show a typical test scenario where the DUT (Device Under Test) is in a temperature-controlled test fixture. The sequence of operations is:



1. When the first scan list, *Oven Warm-Up*, starts, a script closes switches that close the test fixture and turn on the oven heater.
2. The first scan list, *Oven Warm-Up*, then monitors the oven temperature.
3. When the temperature stabilizes to between 24°C and 26°C for five successive scans, a limit event* runs a script that configures a GPIB power supply that powers the DUT.
4. The second scan list, *Test DUT*, measures the DUT's input and outputs for eight scans.
5. When the DUT test is finished, a script turns off the power supply's output, and opens switches that turn off the oven and open the test fixture.
6. A notification signals the computer to beep and logs the scan finished event.

...all without writing a single line of code!

**Limit events include: above a high value, below a low value, out of range, in range, stabilized in a delta band, and destabilized outside a delta band. You can set any of these limits to occur after a specified number of successive scans.*

Starting BenchLink Data Logger Pro

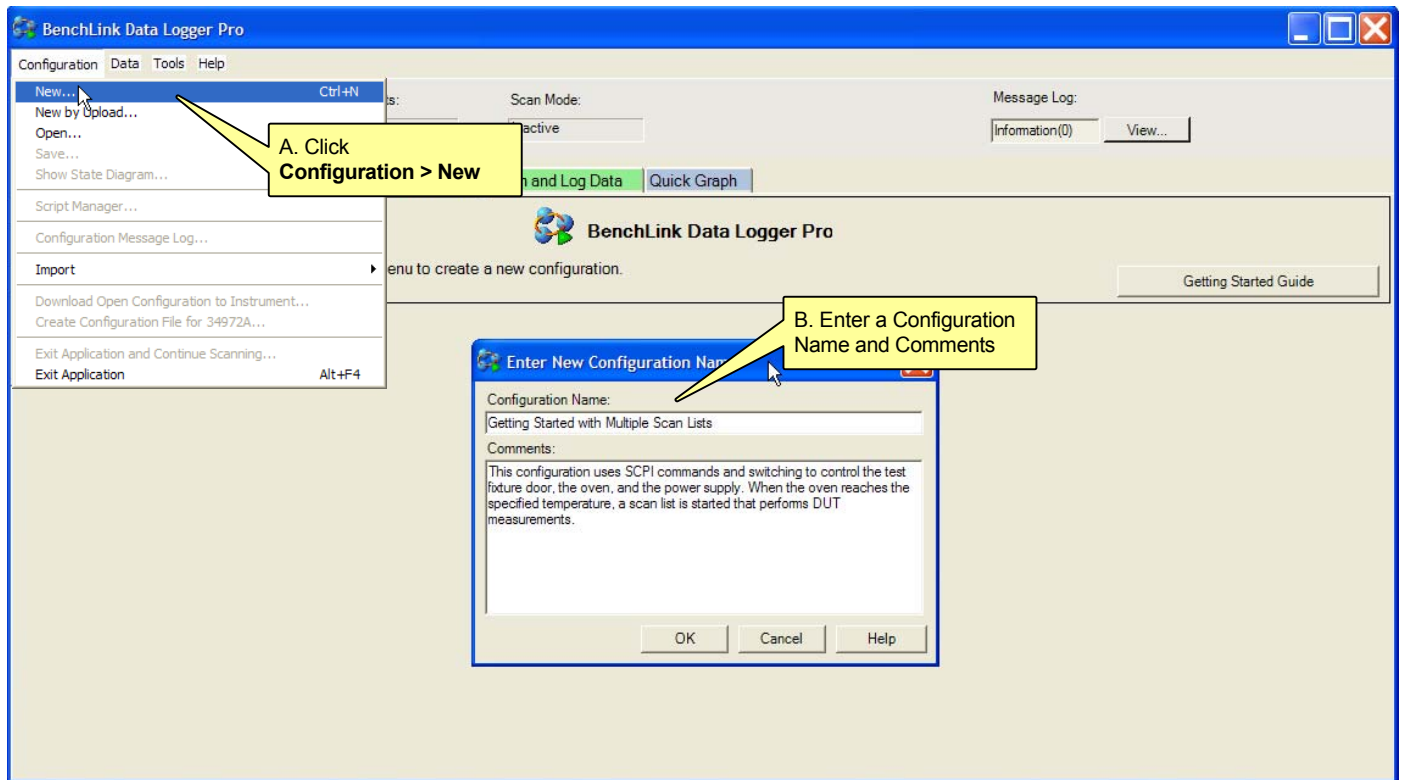
After installing the Agilent IO Libraries and BenchLink Data Logger Pro, click this icon on your desktop to start the application:



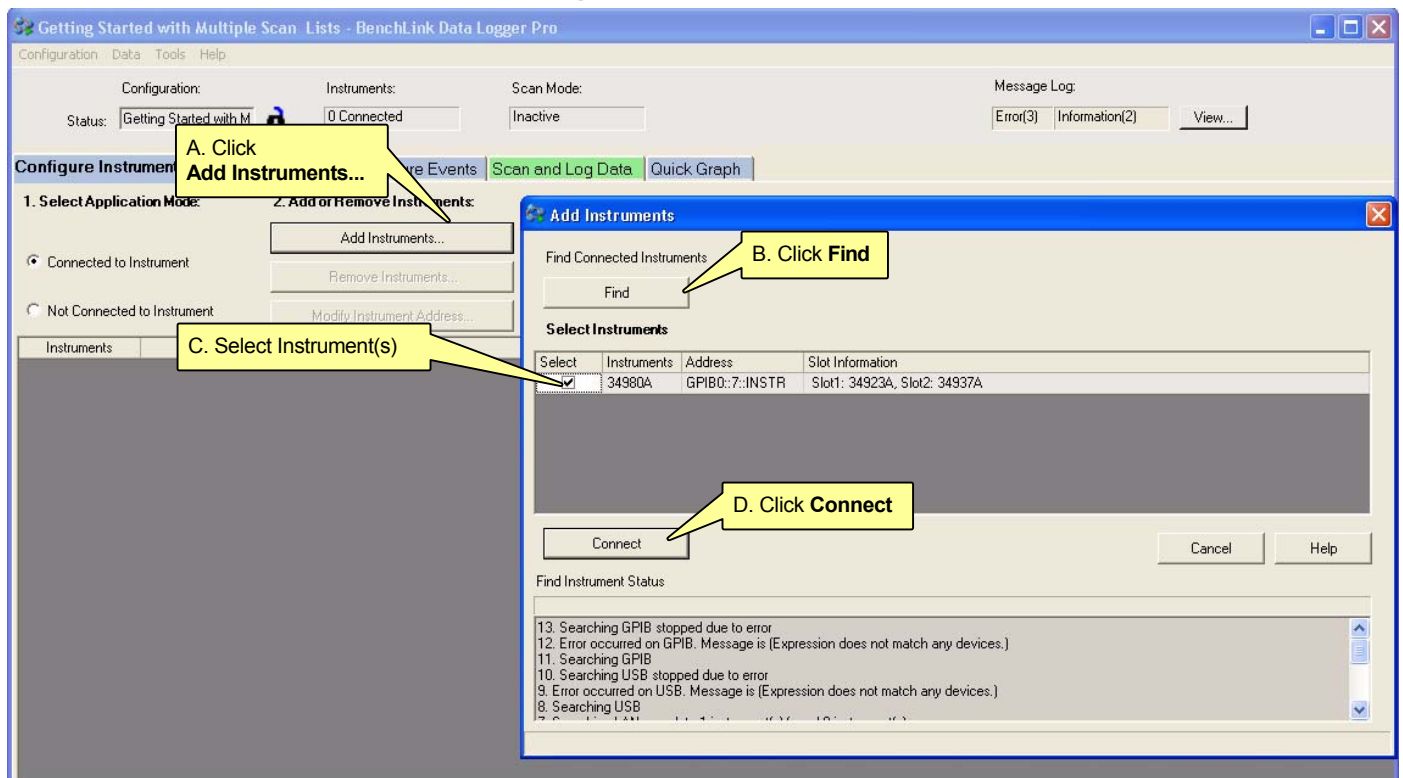
Once the application has started, click **Help > Quick Start Videos** to watch videos that show you how to get started with BenchLink Data Logger Pro.

Note: *If you are having difficulty running the application, refer to the software installation instructions at the end of this document.*

Step 1. Create a Configuration (Configure Instruments Tab)



Step 2. Add Instruments (Configure Instruments Tab)



Step 3. Configure the Base Scan List (Configure Scan Lists Tab)

Scanning always starts with the Base scan list. In this example, the Base scan list is monitoring the oven temperature in a DUT (Device Under Test) test fixture.

This channel continuously measures the oven temperature.

This limit will occur when the oven temperature is between 24°C and 26°C for five successive scans.

Note: The images shown in of this tutorial are from a built-in Data Logger Pro simulation. Simulations allow you to view BenchLink Data Logger Pro operations without having equipment connected. You can access this simulation by clicking: **Help > Start Simulation Mode > Getting Started with Multiple Scan Lists.**

Instruments	Scan	Name	Measurement	Scale	Gain (M)	Offset(B)	Unit	Channel Limit
1. Instr1								
Computed Channel								
Add								
34923A								
1001	<input checked="" type="checkbox"/>	Oven Temp	Temp 10K Therm	None	C			In Limits...
1002	<input type="checkbox"/>	Power In	DC Voltage	Auto	5.5		VDC	Select...
1003	<input type="checkbox"/>	Freq Out	Frequency	Auto	5.5		HZ	Select...
1004	<input type="checkbox"/>	3VAC Out	AC Voltage	Auto	6.5		VAC	Select...
1005	<input type="checkbox"/>	5VDC Out	DC Voltage	Auto	5.5		VDC	Select...
1006	<input type="checkbox"/>		DC Voltage	Auto	5.5		VDC	Select...
1007	<input type="checkbox"/>		DC Voltage	Auto	5.5		VDC	Select...
1008	<input type="checkbox"/>		DC Voltage	Auto	5.5		VDC	Select...
1009	<input type="checkbox"/>		DC Voltage	Auto	5.5		VDC	Select...
1010	<input type="checkbox"/>		DC Voltage	Auto	5.5		VDC	Select...
1011	<input type="checkbox"/>		DC Voltage	Auto	5.5		VDC	Select...
1012	<input type="checkbox"/>		DC Voltage	Auto	5.5		VDC	Select...

Step 4. Configure Additional Scan Lists (Configure Scan Lists Tab)

Click here to create additional scan lists.

This scan list starts when the oven temperature limit is reached (see above) and performs measurements on the DUT.

These channels measure the DUT's characteristics.

Turn Over for Step 5

Instruments	Scan	Name	Function	Range/Ref	Res	More	Scaling	Gain (M)	Offset(B)	Unit	Channel Limits (for Events)	Limit Setting
1. Instr1												
Computed Channel												
Add												
34923A												
1001	<input type="checkbox"/>	Oven Temp	Temp					1	0	C	Select...	
1002	<input checked="" type="checkbox"/>	Power In						1	0	VDC	Select...	
1003	<input checked="" type="checkbox"/>	Freq Out						1	0	HZ	Select...	
1004	<input checked="" type="checkbox"/>	3VAC Out						1	0	VAC	Select...	
1005	<input checked="" type="checkbox"/>	5VDC Out						1	0	VDC	Select...	
1006	<input type="checkbox"/>							1	0	VDC	Select...	
1007	<input type="checkbox"/>							1	0	VDC	Select...	
1008	<input type="checkbox"/>							1	0	VDC	Select...	
1009	<input type="checkbox"/>							1	0	VDC	Select...	

Step 5. Configure Events (Configure Events Tab)

Configuration: Instruments: Scan Mode: Message Log:
 Status: Getting Started with Mi 1 Connected Simulation Mode Information(6) View...

Configure Instruments Configure Scan Lists **Configure Events** Scan and Log Data Quick Graph

Show State Diagram... These events are configured for the Base scan list (*Oven Warm-Up*). Each script runs when the corresponding event occurs.

Priority	Name	Event	Select Limit(s) that Triggers Event	Run Script	Notification(s)	Next Step
1		At Start of Scan...	Not Applicable	Close Fixture, Oven On	None...	Continue Scan...
2		On Single Channel Limit...	Instr1(1001 <Oven Temp>) Range 2.4e01 To 2.6e01	Program Power Supply	None...	Stop Scan and Start Scan on Test DUT...
3		At End of Scan...	Not Applicable	None	None...	Stop Configuration...

... Add Event

Events when Running Test DUT

Priority	Name	Event	Select Limit(s) that Triggers Event	Run Script	Notification(s)	Next Step
1		At Start of Scan...	Not Applicable	None	None...	Continue Scan...
2		At End of Scan...	Not Applicable	Power Supply Off, Oven	Beep, Log...	Stop Configuration...

... Add Event Delete Event Move Up Move Down

This is the limit event associated with the *Oven Temp* channel. When the limit event occurs, stop scanning on this scan list and start the *Test DUT* scan list.

These events are configured for the *Test DUT* scan list. The configuration stops when this scan list ends.

Step 6. The State Diagram (Configure Events Tab)

State Diagram

Click the Show State Diagram... button (see above) to view the State Diagram.

Current Scan List	Priority	Event Details	A	B	C	D
Oven Warm-Up	1	At Start of Scan	Run Close Fixture, Oven On			
	2	On Single Channel Limit	Stop this Scan	Run Program Power Supply	Start scan on Test DUT	
	3	At End of Scan	Stop this Scan			
Test DUT	1	At Start of Scan				

Print State Diagram Export to JPEG Refresh

The Sequence Table shows the order of execution for scan lists, events, scripts, and notifications.

The State Diagram graphically shows the configured scan lists, scripts, and notifications.

These codes (A2 > B2 > C2 and so on) cross-reference the State Diagram to the rows and columns of the Sequence Table.

```

    graph TD
      Start((Start Scan)) --> A1[1. At Start of Scan (A1)]
      A1 --> Oven((Oven Warm-Up))
      Oven --> A2[2. On Single Channel Limit (A2->B2->C2)]
      Oven --> A3[3. At End of Scan (A3)]
      A2 --> B2[Run Program Power Supply]
      A3 --> C2[Start scan on Test DUT]
      B2 --> Start
      C2 --> Start
  
```

Step 7. Configure the Scan and Data Log Settings (Scan and Log Data Tab)

Configuration: Instruments: Scan Mode: Message Log:
 Status: Getting Started with M 1 Connected Simulation Mode Information(0) View...

Configure Instruments Configure Scan Lists Configure Events **Scan and Log Data** Quick Graph

Scan List Name	Scan Control			Data Control			Start/Stop	Scan Control	Time
	Set	Start	Interval	Stop	Set	Name			
Oven Warm-Up (Base)	...	Immediately	00:00:02:00	User	...	Data <Date><Time>	Manual	Start/Stop	DD.HH.MM.SS
Test DUT	...	On E			...	Same as			

Click a Start button to start the configuration.

Click here to configure the Base scan list's start and stop settings.

Set data log naming preferences here.

Click this button (one button for each additional scan list) to set the stop event for this scan list.*

Last Scan Results

Instruments	Channel	Scan Order	Measurement	Data	Limit	Min	Max	Average
1 <1.Instr1>	1 <Oven Temp>	1	Temp 10K Therm					

* Only the Base scan list has a start setting. Any additional scan lists start on an event such as a limit occurring.

Step 8. View Scanned Data (Quick Graph Tab)

Configuration: Instruments: Scan Mode: Message Log:
 Status: Getting Started with M 1 Connected Simulation Mode Information(5) View...

Configure Instruments Configure Scan Lists Configure Events **Scan and Log Data** **Quick Graph**

This is the *Oven Temp* channel. The red dot indicates when the limit occurred.

Oven Warm-Up Started

Test DUT Started

This line indicates the start of the *Oven Warm-Up* scan list.

This line indicates the start of the *Test DUT* scan list.

DUT measurements.

Configure the graph(s) here.

Current data.

Scan Count: 19 Of 19 Elapsed Time: 00:00:36.968 Of 00:00:36.968 Current Data Time: 10/21/2007.08:44:13.171

Graph Options:
 Data: Data 10/21/2007 08_43
 Channels... Preferences... More Tabs...
 Scale X-Axis (Time): 2 \$
 Set Y Scale by Units...
 Auto-Scale Y

Channels			Modify Y-Axis View			Current Data	Markers		Popup Views		
ID	Color	Graph	Scale Y	Move Y Ref			M1	M2	Data	Limit	Bar
1001 <Oven T			2	C	18	C	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1002 <Power			200.0	uVDC	16.03000	VDC	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1003 <Freq O			2.000	m HZ	60.01800	HZ	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1004 <3VAC C			2	VAC	6	VAC	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1005 <5VDC C			2.000	m VDC	-5.927847	VDC	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Step 9. Scan and Log Data Summary

This dialog box appears automatically when scanning is finished.

Scan and data summaries are listed here.

Click here to export the data.

If you configured data to be saved automatically during the scan (**Data > Export Data Preferences**) the path to the data file appears here.

The dialog box, titled "Scan and Log Data Summary", displays scan details. The "Scan Summary" section includes "Scan Lists History" (Oven Warm-Up), "Instruments" (34980A<Instr1> and Modules< Computed 34923A 34937A >), and "Scan Settings" (Scan Start: Immediately, Scan Stop: User Terminated). Below this, it states "Your data has been saved in Data Manager as:" followed by fields for "Name" (Data 7/4/2009 12_20_01), "Owner" (Dave), and a "Comments" text area. There are buttons for "Edit Fields...", "Delete Data Log", and "Export Data...". At the bottom, it says "Your data has been exported to:" with a text field and "Close" and "Help" buttons.

Step 10. Export the Data

This dialog box appears after clicking the **Export Data...** button above.

Select format options (or use the defaults).

Select rows to export (or use the defaults).

Click a button to export the data to a file or to the clipboard.

Select columns to export (or use the defaults).

The dialog box, titled "Export Data", is divided into several sections. On the left, "Data Log Summary" shows "Name" (Data 7/4/2009 12_20_01), "Start Time" (7/4/2009 12:20:04 PM), and "Stop Time" (7/4/2009 12:20:31 PM). Below is "Format Options" with "Column Separator" set to "Tab" and "Decimal Symbols" set to "Period [.]". There is a checked "Include Configuration" option and an "Options..." button. The "Select Rows to Export" section has "All Scans" selected. On the right, "Select Columns to Export" has "Scan Number", "Channel Limit", "Start Time", and "Include M" checked, while "Elapsed Time" is unchecked. Below this is "Select by Channel" with "Instr1" selected. At the bottom right, "Select by Function Type" has "Volt", "Frequency", and "Temperature" checked. Buttons for "Export to File...", "Export to Clipboard", "Close", and "Help" are at the bottom.

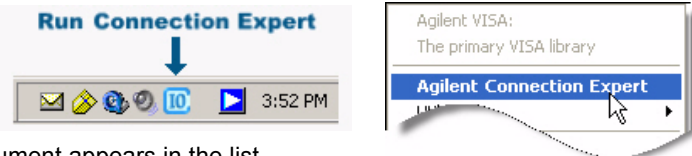
Installing the Software

Use Agilent Connection Expert to Connect to Instruments

Agilent Connection Expert is an Agilent IO Libraries utility that configures the IO interface between the instruments and your PC. The IO Libraries are contained on the *Agilent Automation-Ready CD* or may be downloaded from the Agilent Developer Network website at: <http://adn.tm.agilent.com>. Data Logger Pro supports the M.01.01.04 version of the Agilent IO Libraries and newer.

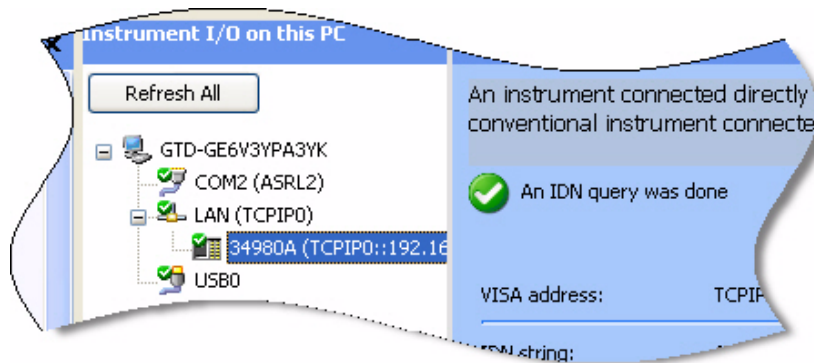
1. Install the Agilent IO Libraries on your PC. Connect the instrument to the PC via LAN, GPIB, or USB.*

2. From the PC taskbar, click the Agilent IO Control icon and select **Agilent Connection Expert** from the menu.



3. Double-click the interface from the list. If your instrument appears in the list, with a green check mark, Connection Expert has already found and verified communication with the instrument. You can now skip ahead to *Install the Agilent BenchLink Data Logger Pro Software* below. If the instrument is not in the list, continue on to step 4.

4. With the interface selected, right-click and select **Add Instrument**. If this is a LAN interface, click the **Auto Find** button. Follow the instructions on the screen to complete the installation. When finished, you should see your instrument in the list with a green checkbox.



5. If you are having difficulty connecting to the instrument, use the instrument's front panel to ensure the interface is enabled and configured properly. Refer to the instrument's user's guide for details.

**You can also use a serial interface for the 34970A only.*

Install the Agilent BenchLink Data Logger Pro Software

Agilent BenchLink Data Logger Pro is a licensed product that has a 30-day free trial evaluation period. To get a license, go to www.agilent.com/find/34830A (for the 34970A/34972A) or www.agilent.com/find/34832A (for the 34980A).

1. Insert the Agilent BenchLink Data Logger CD into your PC's CD ROM drive. Installation should start immediately. If not, navigate to the CD drive in Windows Explorer and click Setup.exe.

2. Follow the instructions appearing on your screen. When prompted to select a data logger click: Agilent BenchLink Data Logger Pro.

3. After completing the installation, click the Data Logger Pro icon on your desktop to start the application:



See the instrument user's manual for safety and wiring information.