

WHERE TO START WITH YOUR NI 4350/4351

This document explains how to begin using your National Instruments 4350/4351 high-precision temperature and voltage meters. The NI 4350/4351 (NI 435x) products include instruments for ISA, PCMCIA, USB, PCI, and PXI/CompactPCI buses.

Install the Software and Hardware

Perform the following procedure to install your NI 435x:

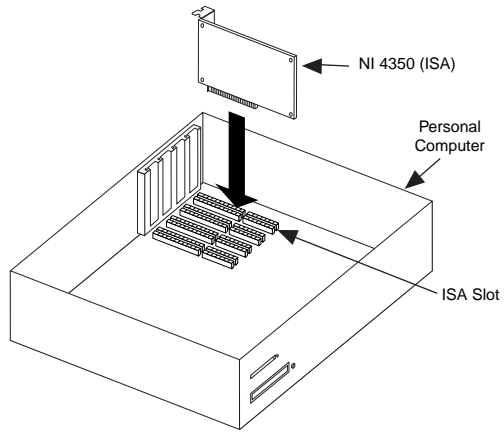
1. Run `setup.exe` from the NI4350/4351 CD.
2. Click **Install NI 4350/4351 Software** on the installation screen.
3. Follow the instructions on the screen and then click **OK** to restart your computer.
4. Turn off your computer and install your NI 435x instrument as shown on the following pages.



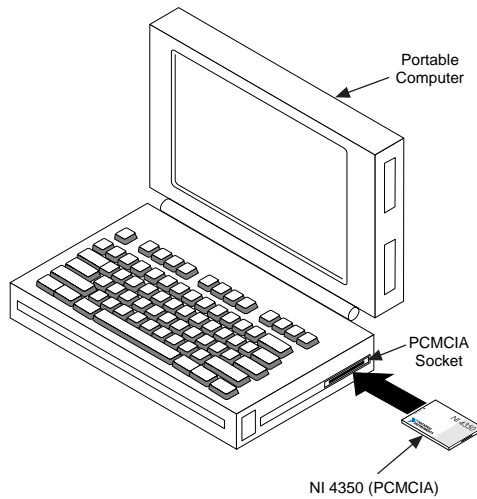
Note

The NI 4350 (PCMCIA and USB) are Plug and Play instruments, and can be plugged in at any time after the drivers are installed, even without turning off your computer.

◆ **NI 4350 (ISA)**

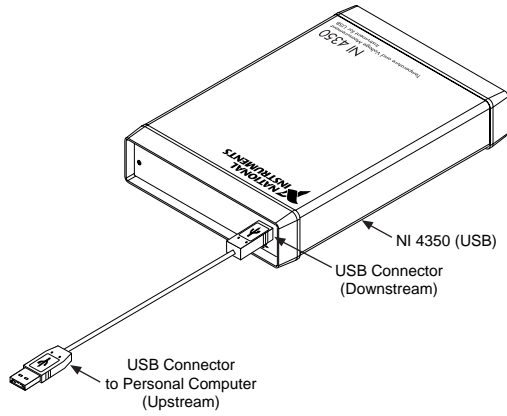


◆ **NI 4350 (PCMCIA)**

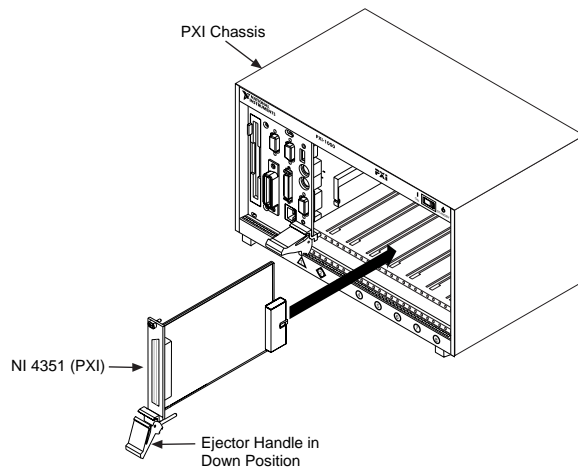


For more information on hardware installation, refer to the *NI 4350/4351 User Manual*.

◆ **NI 4350 (USB)**

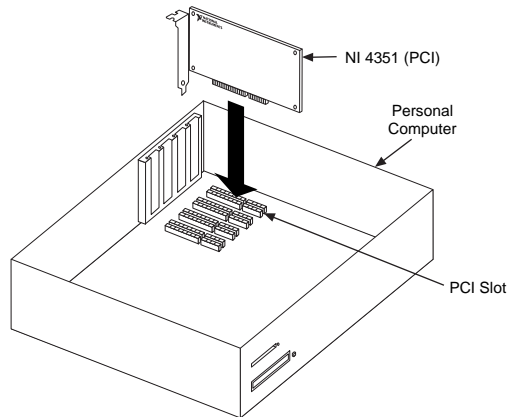


◆ **NI 4351 (PXI)**



For more information on hardware installation, refer to the *NI 4350/4351 User Manual*.

◆ NI 4351 (PCI)



For more information on hardware installation, refer to the *NI 4350/4351 User Manual*.

Configure and Test the NI 435x

Use the following procedure to configure and test your NI 435x:

1. Launch **Measurement & Automation Explorer** on your desktop.
2. Double-click on the **Devices and Interfaces** icon.
3. Right-click on your NI 435x instrument and select **Properties**. In the **System** window, note the **Device Number** that has been assigned. You will need to use this device number when you program your instrument.
4. From the **System** window, click the **Test Resources** button to test the NI 435x resources. A dialog box appears and indicates whether the resource test has passed.
5. In the **Accessory** window, select an accessory that is attached to your NI 435x instrument.
6. From the **System** window, click the **Run Test Panels...** button to run functional test panels. Connect your signal to an input channel on your attached accessory and select your **Channel, Input Limits, Sensor Type** settings. If your sensor type is a thermocouple, select the correct option in **CJC Info**. Your NI 435x instrument immediately starts to acquire data.
7. When you finish testing, click **Close** and then **OK** in the **Configuring Devices** window.

When you finish configuring and testing your NI 435x, you can launch **VirtualBench-Logger** from **Start»Programs»National Instruments VirtualBench**. Use VirtualBench to control your NI 435x without any programming.

NI 435x Software Selection Chart

Figure 1 shows the choices you have for programming your NI 435x. See the *Software Options for NI 435x Explained* section for more information on each software package.

If you do not have LabVIEW, LabWindows/CVI, or ComponentWorks installed on your computer, and would like to evaluate the software package, the evaluation versions are provided on the NI 4350/4351 CD.

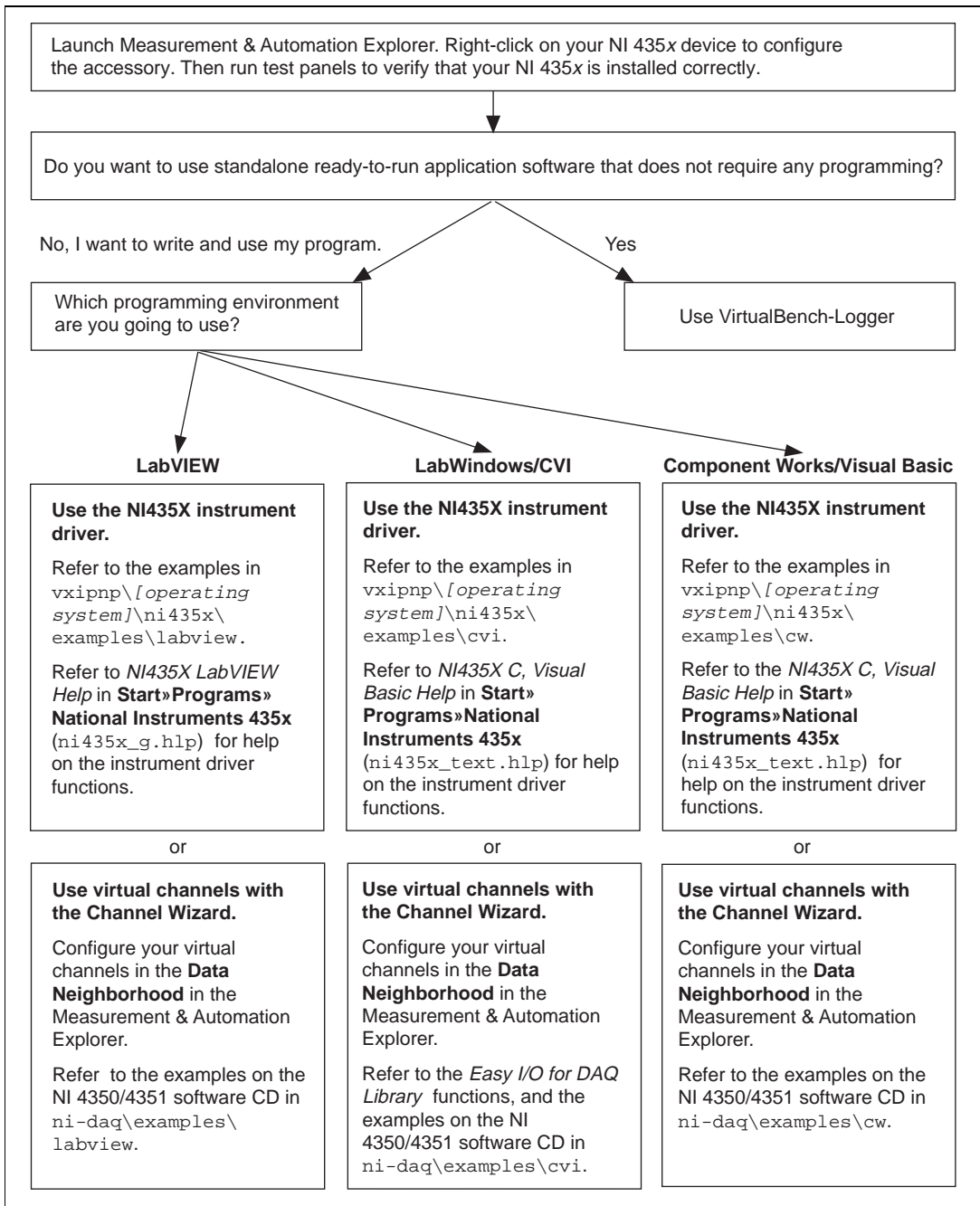


Figure 1. Software Choices for Your NI 435x

Software Options for NI 435x Explained

This section explains the software choices for your NI 435x.

What Is VirtualBench?

Traditional instruments have three basic components—acquisition and control, data analysis, and data presentation. The trends in desktop and notebook PCs have delivered computers that surpass the display and processing capabilities of most instruments. The technology of today's computer-based instruments is comparable to much of the data acquisition and control capabilities of traditional instruments.

You use VirtualBench just as you use standalone instruments, but you benefit from the processing, display, and storage capabilities of PCs. VirtualBench instruments load and save waveform data to disk in a form that can be used by popular spreadsheet programs and word processors. A report-generation capability complements the raw data storage by adding timestamps, measurements, user name, and comments. You can print the waveforms and the settings of VirtualBench to a printer connected to the PC. Because the user manual and help are all online, you can easily refer to them at any time.

What Is VirtualBench-Logger?

When used with the NI 435x, VirtualBench-Logger acquires up to 16 channels of data from one instrument while displaying all of the channels. With menus, you configure the parameters of each channel including channel name, conversion factors ($Mx+B$), units, display range, and display scale.

Built-in conversion factors for B, E, J, K, N, R, S, and T-type thermocouples and resistance temperature detectors (RTDs) simplify temperature measurement. Thermocouple measurements use polynomial equations for linearization and automatically perform cold-junction compensation. Automatic-current scaling is available for current measurements. Software-selectable 50 and 60 Hz noise rejection helps acquire accurate signals in noisy environments and complements the analog noise filters built on the NI 435x hardware. Dual y-axes make it possible to monitor signals of different types on the same display.

What Is LabVIEW?

LabVIEW is a graphical programming language for building instrumentation systems. With LabVIEW, you quickly create front panel user interfaces, giving you interactive control of your software system. To specify the functionality, you intuitively assemble block diagrams—a

natural design notation for engineers and scientists. LabVIEW has all of the same development tools and language capabilities of a standard language such as C—looping and case structures, configuration management tools, and compiled performance.

What Is LabWindows/CVI?

LabWindows/CVI is an interactive, ANSI C programming environment designed for automated test applications.

LabWindows/CVI has an interactive drag-and-drop editor for building your user interface and a complete ANSI C development environment for building your test program logic. The LabWindows/CVI environment has a wide collection of automatic code-generation tools and utilities that accelerate your development process, without sacrificing any of the power and flexibility of a language such as C. In addition, the LabWindows/CVI run-time libraries are compatible with standard C/C++ compilers, including Visual C++ and Borland C++ under Windows.

Use the Easy I/O for DAQ Library or the NI435X instrument driver with your NI 435x.

What Is ComponentWorks?

ComponentWorks is a collection of 32-bit ActiveX controls designed for scientists building virtual instrumentation systems. With ComponentWorks, you can combine the power and flexibility of standard development tools, such as Microsoft Visual Basic or Visual C++, with the instrumentation expertise of National Instruments. Based on ActiveX technology, ComponentWorks controls are easy to configure through simple property sheets and easy to control from your programs using high-level properties and methods. ComponentWorks features instrumentation-based graphical user interface (GUI) tools, including graphs, meters, gauges, knobs, dials, and switches.

Use the NI435X instrument driver with ComponentWorks.

What Is the NI435X Instrument Driver?

An instrument driver packages instrument capabilities as a set of standard functions. Each function corresponds to a programmatic operation such as configuring, reading from, writing to, and starting and stopping the measurements. An instrument driver reduces your program development time and simplifies instrument control by eliminating the need to learn complex programming protocol for each instrument.

The NI435X instrument driver provides flexibility and programmability in a standard instrument driver format. The instrument driver application

programming interface (API) was designed after a traditional, full-featured data-logger instrument driver. The NI435X instrument driver is *VXIPlug&Play* compliant and also contains the source code, so that you can examine and modify it, if you wish. The NI435X instrument driver works with LabVIEW, LabWindows/CVI, or conventional programming languages such as C, C++, and Visual Basic.

For more details on what an instrument driver is, visit the www.vxipnp.org web site.

What Is the Channel Wizard? What Is a Virtual Channel?

In the past, data acquisition system developers spent a large amount of time defining the signal types, connections, transducer equations, and unit conversions before beginning development of the actual system. For example, if you are using thermocouples, you must perform additional cold-junction compensation (CJC) calculations to convert raw voltage values into actual temperature readings, and then apply scaling factors that depend on the type of thermocouple used. From there, you may need to use additional code to convert the temperature into proper units, such as degrees Celsius, Fahrenheit, or Kelvin.

With the Measurement & Automation Explorer channel wizard, you simply fill in the blanks to define an input signal by specifying its name and description, the type of transducer being used, any scaling factors or equations required, CJC settings, and unit conversion factors. The channel name, also known as a virtual channel, is then referenced throughout the application—with all of the conversion processes performed transparently.

At this time, you cannot use the channel wizard with the NI435X instrument driver. Refer to the examples recommended for use with the channel wizard in the chart shown Figure 1.



321562C-01

Jan99