

# MEASUREMENT STUDIO™

## Version 6.0

These release notes introduce Measurement Studio version 6.0. Refer to this document for system requirements, installation instructions, and information about new features and enhancements in Measurement Studio 6.0.

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## Product Name Changes in Measurement Studio

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Measurement Studio offers three different products to support programmers in the development environment of their choice. Each product offers easy access to data acquisition, instrument control, data presentation and visualization, and analysis.

In the past, National Instruments referred to Measurement Studio for Visual Basic as ComponentWorks and referred to Measurement Studio for Visual C++ as ComponentWorks++ or Tools for Visual C++. National Instruments no longer uses the names ComponentWorks, ComponentWorks++, or Tools for Visual C++.

If you are an ANSI C programmer, choose LabWindows/CVI, a complete ANSI C development environment. For Visual C++ development, choose Measurement Studio for Visual C++, a set of wizards, C++ classes, and ActiveX controls integrated into the Visual C++ environment. If you develop applications in Visual Basic or another ActiveX control container, choose Measurement Studio for Visual Basic, a suite of ActiveX controls.

# Minimum System Requirements

Table 1 lists minimum system requirements for each Measurement Studio product:

**Table 1.** Measurement Studio Minimum System Requirements

	Measurement Studio LabWindows/CVI	Measurement Studio for Visual C++	Measurement Studio for Visual Basic
<b>Microprocessor</b>	Pentium 133 MHz		
<b>Operating Systems</b>	Windows 2000/Me/9x Windows NT, Service Pack 3 or later		
<b>Video Adapter</b>	800 × 600	VGA resolution (or higher) video adapter; 16-bit color for User Interface and 3D Graph controls	
<b>RAM</b>	32 MB for Windows NT/9x 64 MB for Windows 2000/ME		
<b>Free disk space*</b>	175 MB	75 MB	85 MB
<b>Programming Environment</b>	—	Microsoft Visual C++ 6.0, Service Pack 3 or later	32-bit ActiveX control container such as Microsoft Visual Basic
* Size required to install the Full Development System version of the Measurement Studio product. To install all three Measurement Studio products, you need 290 MB free disk space.			

## Installation Instructions

Unless you specify another location during installation, the Measurement Studio installation program copies files to `c:\Program Files\National Instruments\MeasurementStudio\` after you complete the following steps:



**Note** If you have a previous version of LabWindows/CVI or Measurement Studio (including ComponentWorks or ComponentWorks++) installed on your computer, uninstall that version before installing Measurement Studio 6.0. To uninstall existing software, select **Start»Settings»Control Panel»Add/Remove Programs**, and select the product that you want to uninstall.

1. Insert the Measurement Studio CD in the CD drive of your computer. If the CD startup screen does not appear, use Windows Explorer to run `SETUP.EXE` from your CD.
2. Follow the instructions on your screen. On the Select Feature screen, click any component that you do not want to install and select **Entire**

**feature will be unavailable.** If you want to customize the installation of any component, expand the top-level feature and select a feature that you do not want to install. Select **Entire feature will be unavailable.**



**Note** If you decide later that you want to install additional features or components, run the installer again, click the feature or component you want to install, and select **Entire feature will be installed on local hard drive.**

3. Install driver software if you plan to use Measurement Studio with National Instruments hardware.
4. Install your National Instruments hardware. Refer to your hardware installation guide for installation information.
5. Configure your device with National Instruments Measurement & Automation Explorer (MAX).

## New Features and Enhancements

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The following section lists the new features and enhancements in Measurement Studio 6.0.

### LabWindows/CVI

Measurement Studio LabWindows/CVI includes the following new features and enhancements:

#### ActiveX Control Container

You can use ActiveX controls in the User Interface Editor and program them in your LabWindows/CVI programs. For more information, refer to *ActiveX Controls* in the LabWindows/CVI Help.

#### ActiveX Server Creation

LabWindows/CVI 6.0 includes a wizard that you can use to create and edit ActiveX server projects. For more information, refer to *Create ActiveX Server Wizard* in the LabWindows/CVI Help.

#### New Palette of User Interface Controls

The User Interface Library includes a new set of controls with a three-dimensional appearance. In addition, the existing controls have been modified to more closely resemble standard Windows controls.

For more information about the user interface controls, select **Control Help** from the context menu of each control in the User Interface Editor.

## Japanese Windows Multibyte Support

LabWindows/CVI 6.0 supports the use of multibyte strings, which are required to display the character sets used in some versions of Windows. In addition, the ANSI C library and the toolbox instrument driver now include functions and macros that you can use to manipulate strings containing multibyte characters. For more information, refer to the function panel help in the multibyte characters class in the ANSI C library and to the function panel help for KeyPress Event functions in the User Interface library.

## Source Code Browser

The Source Code Browser is a cross-reference tool that lists all files, functions, variables, data types, and macros in your program. You can use the browser to identify how different parts of a program interact with each other. For more information, refer to *Source Code Browser* in the LabWindows/CVI Help.

## Graphical Array View

You can use the Graphical Array View window as a debugging tool to view the values of your 1D and 2D arrays in a graph display. For more information, refer to *Graphical Array View* in the LabWindows/CVI Help.

## Custom COM Interfaces

In addition to dual interfaces and dispatch interfaces, you also can use ActiveX servers that contain custom interfaces in LabWindows/CVI 6.0. For more information, refer to *Create ActiveX Controller* in the LabWindows/CVI Help.

## Workspaces

In LabWindows/CVI 6.0, you can group multiple projects into a workspace. All the settings that are extraneous to the build of your project(s) are preserved in the workspace. Using a workspace facilitates sharing LabWindows/CVI projects among multiple developers in a source-code control setting. For more information, refer to *Workspaces* in the LabWindows/CVI Help.

## Additional User Protection

LabWindows/CVI 6.0 includes additional user protection in the form of new compile-time and run-time errors and warnings:

- Uninitialized local variables—Generates compiler warnings and run-time errors when LabWindows/CVI detects the use of variables that do not have assigned values.

- Unreferenced identifiers—Generates compiler warnings for identifiers that are not referenced in your program.
- Assignments in conditional expressions—Checks for possible errors in conditional expressions that make the conditional expression an assignment.

For more information, refer to *Build Options* in the LabWindows/CVI Help.

## Preprocessor Output

LabWindows/CVI displays the preprocessed output of your source code. LabWindows/CVI replaces simple macros, expands function macros, includes header files, and resolves conditional compilation. For more information, refer to *Preprocess Source File* in the LabWindows/CVI Help.

## New LabWindows/CVI Automation Functions

The LabWindows/CVI 6.0 ActiveX server includes new functions to create and manipulate function trees and function panels remotely, manipulate text in source windows, manage workspaces, convert between UIR and TUI files, and create distribution kits. For more information, open `samples\activex\cvi\cvissrvr.fp`.

## Excel Programming Made Easy

LabWindows/CVI 6.0 includes a new instrument driver that contains a LabWindows/CVI-style interface you can use to program Excel with ActiveX automation. To access the driver, open `samples\activex\excel\excelreport.fp`.

## Enhanced Toolbox

The programming utilities in the toolbox instrument driver include new functions to manipulate multibyte characters, create tooltips, and position controls. Open `toolslib\toolbox\toolbox.fp` to access the driver.

## UI Control Customization

You now can save preconfigured user interface controls to use at a later time in your UI panels. For more information, refer to *Custom Controls Overview* in the LabWindows/CVI Help.

## LabVIEW RT Connectivity

LabWindows/CVI 6.0 includes a new instrument driver that communicates with a device running a real-time operating system. LabVIEW Real-Time (RT) must be present in the device. To access the driver, open `toolslib\CVIRTSup\CVIRTSup.fxp`.

In addition, you can build DLLs that can be invoked from a LabVIEW RT program. To choose this build option, select **Build»Target Settings** in the Project window and change the **Runtime Support** option. For more information, refer to *Target Settings* in the LabWindows/CVI Help.

## Updated Distribution Kit Tool

The Create Distribution Kit tool of LabWindows/CVI now uses the Microsoft installer technology. Among the new features added to this tool is the ability to register ActiveX servers at installation time. For more information, refer to *Create Distribution Kit* in the LabWindows/CVI Help.

## Enhanced Code Generation from the User Interface Editor

Generating a new project from a user interface is easier and faster with CodeBuilder. CodeBuilder also can generate drivers for ActiveX controls. For more information, refer to *Generating Code* in the LabWindows/CVI Help.

## Improved Analysis Performance

The following analysis functions that previously required the size of the input dataset to be a power of two now work with datasets of arbitrary size:

- AmpPhaseSpectrum
- AutoPowerSpectrum
- CrossPowerSpectrum
- FFT
- InvFFT
- ImpulseResponse
- NetworkFunctions
- ReFFT
- ReInvFFT
- Spectrum

## Context-Sensitive Help

For help with a menu, dialog box, or particular keyword in the source window, press <F1> to launch the LabWindows/CVI Help. For help with any menu item, you also can right click the item.

## Updated Menu Bars

The look and feel of menu bars in LabWindows/CVI 6.0 matches standard Windows menu bars.

## Graph Cursor Control Palette

This new instrument driver provides you with intuitive, interactive manipulation of graph cursors. To access the driver, open `toolslib\custctrl\graphcursors.fp`.

## Measurement Studio for Visual C++

Measurement Studio for Visual C++ includes the following new features and enhancements:

### Componentized Class Libraries

Measurement Studio for Visual C++ classes are now grouped into components. Each component consists of a static library, a set of common files, and for the User Interface and 3D Graph components, ActiveX controls. This new componentized structure minimizes the number of Measurement Studio header files that you add to your projects. You also can add and remove components and drivers to your MFC projects during development. The following components are available:

- 3D Graph—Interfaces to the Measurement Studio 3D Graph control. Use this component to include three-dimensional data visualization in your applications.
- 488.2—Interfaces to the National Instruments General Purpose Interface Bus (GPIB) driver software. Use the 488.2 component to include GPIB control in your applications.
- Base Analysis/Advanced Analysis—Contains functions for linear algebra, frequency and time domain analysis, signal generation, digital filtering, waveform measurement functions, curve fitting, statistics, and peak detection. To take advantage of all analysis operations listed here, you need the Measurement Studio Full Development System, which contains the Advanced Analysis component.
- Common—Contains classes that you use in conjunction with other Measurement Studio components, primarily data type classes such as `CNiReal64Vector` that you use to store application data.

- DataSocket—Interfaces to National Instruments DataSocket. Use DataSocket to transfer live measurement data over the Internet or between applications on the same computer from your Visual C++ application.
- LabVIEW Real-Time Interface—Reads to and writes from shared memory on a LabVIEW Real-Time Series processor board.
- NI-Reports—Interfaces to the NI-Reports ActiveX Automation server. Use NI-Reports to add reporting functionality to your applications. This component is available only in the Measurement Studio Full Development System.
- User Interface—Interfaces to the Measurement Studio User Interface controls, including two-dimensional graphs and strip charts, slides, knobs, numeric displays, and buttons.
- Utility—Contains miscellaneous classes that encapsulate and enhance system functionality, such as timers, file system objects, and system tray icons.
- VISA—Interfaces to the National Instruments VISA software. Use the VISA component to include I/O through a variety of interfaces in your application. You can use the VISA component with PXI, RS-232 (serial), GPIB, TCP/IP, and VXI interfaces.



**Note** Refer to Chapter 1, *National Instruments Measurement Studio for Visual C++*, in the *Getting Started with Measurement Studio for Visual C++* manual for a list of files included in each component.

## Linking to Static MFC

Some Measurement Studio for Visual C++ components now include static libraries that link to the MFC static library. Because these component libraries link to the MFC static library, you can include them in projects that link to the MFC static library.

The User Interface and 3D Graph components include ActiveX controls that link to the MFC DLL rather than the MFC static library. Because a project cannot contain components that link to both the MFC DLL and the MFC static library, you cannot include the User Interface and 3D Graph components in projects that link to the MFC static library.

Because the LabVIEW Real-Time Interface component does not link to any version of MFC, you can include it in projects that link to the MFC DLL and in projects that link to the MFC static library.

## New Measurement Studio Components and Classes

- **Interface to IVI class-compliant instrument drivers from your Visual C++ applications.** Measurement Studio now includes IVI class driver classes so you can integrate instrument control in your Visual C++ applications. Use the IVI classes to control any instrument that has an IVI class-compliant instrument driver.

Measurement Studio provides the following IVI class-compliant specific drivers:

- hp33120a (function generator)
- arpps (DC power supply)
- hp34401a (DMM)
- hpe1463a (switch)
- tktds30xx (oscilloscope)

Visit [ni.com/idnet](http://ni.com/idnet) to download additional IVI class-compliant specific drivers.

- **Pass data between LabVIEW Real-Time (RT) VIs and your Visual C++ application.** The LabVIEW Real-Time Interface component contains classes that you can use to read to and write from shared memory on a LabVIEW Real-Time Series processor board.
- **Add reporting functionality to your Visual C++ applications.** The NI-Reports component includes classes that encapsulate the interfaces to the NI-Reports ActiveX Automation server.
- **Include registry manipulation in your Visual C++ applications.** `CNiRegKey`, `CNiRegKeys`, `CNiRegKey`, `CNiRegValue`, and `CNiRegValues` classes (available in the Common component) encapsulate and enhance the Win32 registry API functions.
- **Place application icons in the taskbar.** Use the `CNiSystemTrayIcon` class (available in the Utility component) to place an icon in the taskbar to display the application status. You also can add tooltip help or a pop-up menu to the icon to give users more information about the application status.

## New Measurement Studio Wizards

You can access any of the following Measurement Studio Wizards in Visual C++ from the Measurement Studio toolbar. To enable the Measurement Studio toolbar, click **Tools»Customize»Add-ins and Macro Files** and select **Measurement Studio Add-in**.

- **Measurement Studio Add/Remove Components Wizard**—Add and remove individual components from your Visual C++ applications. Use this wizard to add Measurement Studio components to any MFC application, including those that you did not create with the

Measurement Studio for Visual C++ AppWizard. For more information, refer to *Measurement Studio Add/Remove Components Wizard* in the Measurement Studio Reference.

- Measurement Studio Project Conversion Wizard—Convert your version 1.0 projects to version 6.0 projects. For more information, refer to *Measurement Studio Project Conversion Wizard* in the Measurement Studio Reference.
- Measurement Studio Preferences—Specify preferences for the Measurement Studio wizards. For more information, refer to *Measurement Studio Preferences* in the Measurement Studio Reference.

## Multithreading Enhancements

Measurement Studio for Visual C++ includes multithreading enhancements you can use to call object methods and get and set 3D Graph, User Interface, or DataSocket object properties from any thread in your application. Use the `CNiThreadLocalVar` class (available in the Common component) to create a variable that has a copy for each thread from which it is used.

## New Data Visualization Features

- Annotations—Display text, shapes, and/or arrows on the 2D graph to mark a specific point or region on the graph or highlight data programmatically. For more information, refer to *CNiAnnotation* in the Measurement Studio Reference.
- Cursors—Display a cursor on a 3D Graph to mark a specific point or region on the graph or highlight data programmatically. For more information, refer to *CNiCursor3D* in the Measurement Studio Reference.

## User Interface Enhancements

- Dimming of all User Interface controls—Display any user interface control as disabled or dimmed. For more information, refer to the *Enabled* property in the Measurement Studio Reference.
- New User Interface styles—Display all controls with three-dimensional styles. By default, the User Interface controls use the new three-dimensional styles. If you have an existing user interface that you built with a previous version of Measurement Studio or ComponentWorks++ and want to update it, click the **Convert** button on the Style property page for each control.

The following properties and method have been added or updated for the three-dimensional styles:

- `SetBuiltinStyle` for `CNiKnob`, `CNiButton`, and `CNiSlide`
- `ButtonStyle` and `BorderStyle` for `CNiNumEdit`

For information about these properties, refer to the Measurement Studio Reference.

- More configuration options for the Numeric Edit control—Change the color of the increment and decrement buttons, the control frame, and the area behind the increment and decrement buttons on any new three-dimensional style. For more information, refer to the *ButtonColor* and *BackColor* properties in the Measurement Studio Reference.

## Analysis Enhancements

The following analysis functions that previously required the size of the input dataset to be a power of two now work with datasets of arbitrary size:

- `CNiMath::AmpPhaseSpectrum`
- `CNiMath::AutoPowerSpectrum`
- `CNiMath::CrossPowerSpectrum`
- `CNiMath::FFT`
- `CNiMath::InverseFFT`
- `CNiMath::ImpulseResponse`
- `CNiMath::NetworkFunctions`
- `CNiMath::RealFFT`
- `CNiMath::RealInverseFFT`
- `CNiMath::Spectrum`

## VISA 2.5 Support

The VISA classes now support VISA 2.5 and include enhanced attribute documentation. For information about VISA 2.5 features, refer to the *NI-VISA Readme*.

## General Enhancements

- `CNiVariant` now supports the `VT_I1`, `VT_UI2`, and `VT_UI4` datatypes.
- All compiler warnings, except for C4786, have been enabled. In Measurement Studio version 1.x, many compiler warnings were disabled. When you compile your code, you might see warnings that were previously disabled by Measurement Studio.

## Online Reference Additions

- You can open the Measurement Studio Reference from a User Interface control on your dialog. Right click the control and select ***ControlName* Object>Help**, where *ControlName* is the name of the control that you clicked.
- You can access help from the AppWizard, Add/Remove Components Wizard, Conversion Wizard, and Preferences Wizard.
- The Measurement Studio Reference includes additional overview and how-to topics designed to make it easier for you to use Measurement Studio.

## Measurement Studio for Visual Basic

Measurement Studio for Visual Basic includes the following new features and enhancements:

### New IVI ActiveX Controls

- DC Power Supply—Configures and runs DC power supplies with IVI-compliant instrument drivers.
- Function Generator—Configures and runs function generators with IVI-compliant instrument drivers.
- Switch—Connects and disconnects channels of a switch with IVI-compliant instrument drivers.
- SwitchScan—Creates scan lists containing electrical connections, disconnections, and breakpoints for a switch with IVI-compliant instrument drivers.

For more information about the IVI controls, refer to *IVI Objects Reference* in the Measurement Studio Reference.

### Measurement Studio Project Templates

Rather than manually loading the Measurement Studio ActiveX controls into every new Visual Basic project, choose from four predefined project templates to open a new Visual Basic project that contains the appropriate Measurement Studio ActiveX controls. For more information, refer to *Project Templates* in the Measurement Studio Reference.

## New Data Visualization Features

- Annotations—Display text, shapes, and/or arrows on the 2D graph to mark a specific point or region on the graph or highlight data programmatically. For more information, refer to *CWAnnotation* in the Measurement Studio Reference.
- Cursors—Display a cursor on a 3D Graph to mark a specific point or region on the graph or highlight data programmatically. For more information, refer to *CWCursor3D* in the Measurement Studio Reference.

## User Interface Enhancements

- Dimming of all User Interface controls—Display any user interface control as disabled or dimmed. For more information, refer to the *Enabled* property in the Measurement Studio Reference.
- New User Interface styles—Display all controls with three-dimensional styles. By default, the User Interface controls use the new three-dimensional styles. If you have an existing user interface that you built with a previous version of Measurement Studio or ComponentWorks and want to update it, click the **Convert** button on the Style property page for each control.

The following properties and method have been added or updated for the three-dimensional styles:

- `SetBuiltinStyle` for `CWKnob`, `CWButton`, and `CWSlide`
- `ButtonStyle` and `BorderStyle` for `CWNumEdit`

For information about these properties, refer to the Measurement Studio Reference.

- More configuration options for the Numeric Edit control—Change the color of the increment and decrement buttons, the control frame, and the area behind the increment and decrement buttons on any new three-dimensional style. For more information, refer to the *ButtonColor* and *BackColor* properties in the Measurement Studio Reference.

## Improved Analysis Performance

The following CWDSP analysis functions that previously required the size of the input dataset to be a power of two now work with datasets of arbitrary size:

- `AmpPhaseSpectrum`
- `AutoPowerSpectrum`
- `CrossPowerSpectrum`
- `FFT`

- `InvFFT`
- `ImpulseResponse`
- `NetworkFunctions`
- `ReFFT`
- `ReInvFFT`
- `Spectrum`

## VISA Enhancements

The CWVISA control now supports VISA 2.5 and includes enhanced attribute documentation. For information about VISA 2.5 features, refer to the *NI-VISA Readme*.

# Measurement Studio Resources

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### How do I get started?

Read the Getting Started manual for your Measurement Studio product. The Measurement Studio package includes the following manuals:

- *Getting Started with Measurement Studio LabWindows/CVI*
- *Getting Started with Measurement Studio for Visual C++*
- *Getting Started with Measurement Studio for Visual Basic*

### Are there known issues or late-breaking information?

Each Measurement Studio product installs a Readme, which you can access from **Start»Programs»National Instruments»Measurement Studio»Readme Files**. Each Readme contains information about known issues.

### Where can I find reference information?

The LabWindows/CVI Help and Measurement Studio Reference for Visual C++ and Visual Basic contain complete reference information.

LabWindows/CVI Help contains the following sections:

- *Using LabWindows/CVI* describes each window and dialog box in the LabWindows/CVI IDE.
- *Library Reference* includes reference for functions you can call in LabWindows/CVI.
- *Programmer Reference* provides information to help you develop applications.

- *Example Programs* contains LabWindows/CVI samples you can launch and run from the help topic.
- *Tools Library* lists instrument drivers included with LabWindows/CVI.

Measurement Studio Reference contains the following sections:

- *Visual Basic Help* includes reference information to help you programmatically control the Measurement Studio ActiveX controls in Visual Basic.
- *Visual C++ Help* includes the Measurement Studio for Visual C++ API reference.
- *Tutorials* provides a combination of application notes, getting started materials, and procedures for using Measurement Studio in Visual Basic and Visual C++.

You can launch either help file from **Start»Programs»National Instruments»Measurement Studio»Help**.

### **Where can I find examples?**

Measurement Studio installs example programs in the Program Files\National Instruments\MeasurementStudio\VB\Samples directory. You also can visit National Instruments Developer Zone at [ni.com](http://ni.com) for new examples.

### **Is there a list of all Measurement Studio documentation?**

Visit the Measurement Studio Library, available from **Start»Programs»National Instruments»Measurement Studio»Help**. The Library lists all currently available Measurement Studio documentation organized by development environment. The Library also describes and links to Measurement Studio manuals, application notes, and white papers in PDF format.

You can view the Measurement Studio PDFs with Adobe Acrobat 3.0 or later. You can install a free copy of Acrobat Reader from the Adobe Web site at [www.adobe.com](http://www.adobe.com) or from your Measurement Studio CD.

### **Where else can I go for Measurement Studio information?**

Visit the Measurement Studio Web site and National Instruments Developer Zone at [ni.com](http://ni.com) for the most up-to-date information.

