
Controlling Stand-Alone and Modular Instruments with NI LabVIEW SignalExpress

National Instruments LabVIEW SignalExpress is interactive software for common instrument control, analysis and data display tasks. This application note outlines how you can connect to and control more than 400 stand-alone and modular instruments with LabVIEW SignalExpress.

Introduction to LabVIEW SignalExpress

LabVIEW SignalExpress is interactive configuration-based measurement software with a drag-and-drop environment to perform common acquisition, analysis and presentation tasks with stand-alone and modular instruments. You can automatically convert LabVIEW SignalExpress projects to LabVIEW graphical code when you need to extend your application to develop custom user interfaces and handle what if or if-else scenarios as perform analysis functions not available in LabVIEW SignalExpress.

Turning knobs and dials to perform measurements can be tedious, especially when you are performing a series of measurements or using multiple instruments in a system. With LabVIEW SignalExpress you can communicate with and control stand-alone and modular PC-based instruments to automate measurement tasks such as frequency sweeps and limit testing. In addition, you can perform analysis while taking your measurements to save time.

With LabVIEW SignalExpress, you can connect and control more than 300 different stand-alone instruments from multiple vendors as well as NI modular instruments.

NI modular instruments automatically install LabVIEW SignalExpress drivers when you install their device drivers. Please visit [Drivers and Updates](#) to download the latest drivers for your modular instrument hardware. Supported NI modular instruments include the following:

- NI high-speed digitizers
- NI signal sources
- NI high-speed digital I/O
- NI digital multimeters
- NI switches
- NI DC power supplies

Digital Multimeters	Oscilloscopes	Function Generators	Power Supplies
Hewlett-Packard – 34401a	Tektronix – 20xx	Tektronix – AFG3xx	Hewlett-Packard – E3630A
Hewlett-Packard – 3468a	Tektronix – 30xx	Tektronix – AWG6xx	Hewlett-Packard – E3603A
Hewlett-Packard – 34420a	Tektronix – 6xx	Hewlett-Packard – 335xx	Hewlett-Packard – 3E3xx
Keithley – 2000	Tektronix – 7xx	Hewlett-Packard – 33253	Hewlett-Packard – 3E3xx
Keithley – 27xx	Hewlett-Packard – 6401xx	Hewlett-Packard – E24xx	Hewlett-Packard – 3E3xx
Fuke – 746	Hewlett-Packard – 6402xx	Tektronix – VM4730A	Hewlett-Packard – W63xx
Fuke/Philips – FM 2634	Hewlett-Packard – 6404xx	Taber Electronics Ltd – 6xx	American Precision – PPSxx
Advantest – HMO62	Hewlett-Packard – 6401xx	Taber Electronics Ltd – 80xx	Chroma 81E – E1xx
Rohde & Schwarz – NFV0	Hewlett-Packard – 636xx	IFR, Saniflex, Macconi Instruments – 23xx	Keithley – 230xx
Rohde & Schwarz – NRVS	LeCroy – 910xx	Wavetek – 13xx	Kepco Inc – BOPxx_xxx
Tektronix – TX1/TX2	LeCroy – 960xx	Yokogawa – F62xx	Rohde & Schwarz – NRPxx
Wavetek – 362S	LeCroy – 980xx	Yokogawa – F63xx	Keithley – 3xx

Table 1. Subset of instruments supported by LabVIEW SignalExpress. Visit ni.com/idnet for a complete list of instruments.

Controlling Your Instruments

Installing Instrument Drivers for Stand-Alone Instruments

The first step in connecting to and controlling your instruments in LabVIEW SignalExpress is to download and install its IVI-C instrument driver. These industry-standard instrument drivers provide advanced performance and interchangeability. Through this interchangeability, LabVIEW SignalExpress is able to offer a consistent interface for controlling each instrument type.



Figure 1. Select IVI to View Available IVI Drivers on the Instrument Driver Network

You can download all drivers for free from the NI Instrument Driver Network at ni.com/idnet. To find your driver on the network, select **IVI** from the technology category (see Figure 1) and navigate to or search for your specific instrument model. From the instrument driver page, select the driver for the latest version of LabVIEW to begin downloading your driver. Once you have downloaded the driver, run the executable file to install the driver.

Installing NI Modular Instrument Drivers

NI modular instruments automatically install LabVIEW SignalExpress drivers when you install their device drivers. Please visit [Drivers and Updates](#) to download the latest drivers for your modular instrument hardware.

Acquiring and Generating from the Instrument

Once you have installed your drivers and connected your instrument to the PC, you are ready to begin measurements in LabVIEW SignalExpress. To start a measurement, click the **Add Step** button and select the appropriate step to either acquire or generate from the instrument.

This application note focuses on connecting to and controlling an oscilloscope. The process of setting up other instrument types is very similar. Please refer to the LabVIEW SignalExpress Help for more information on controlling your specific instrument type.

To begin a measurement from your oscilloscope, select the **IVI Scope Acquire** step from the Acquire Signals->IVI Acquire menu.

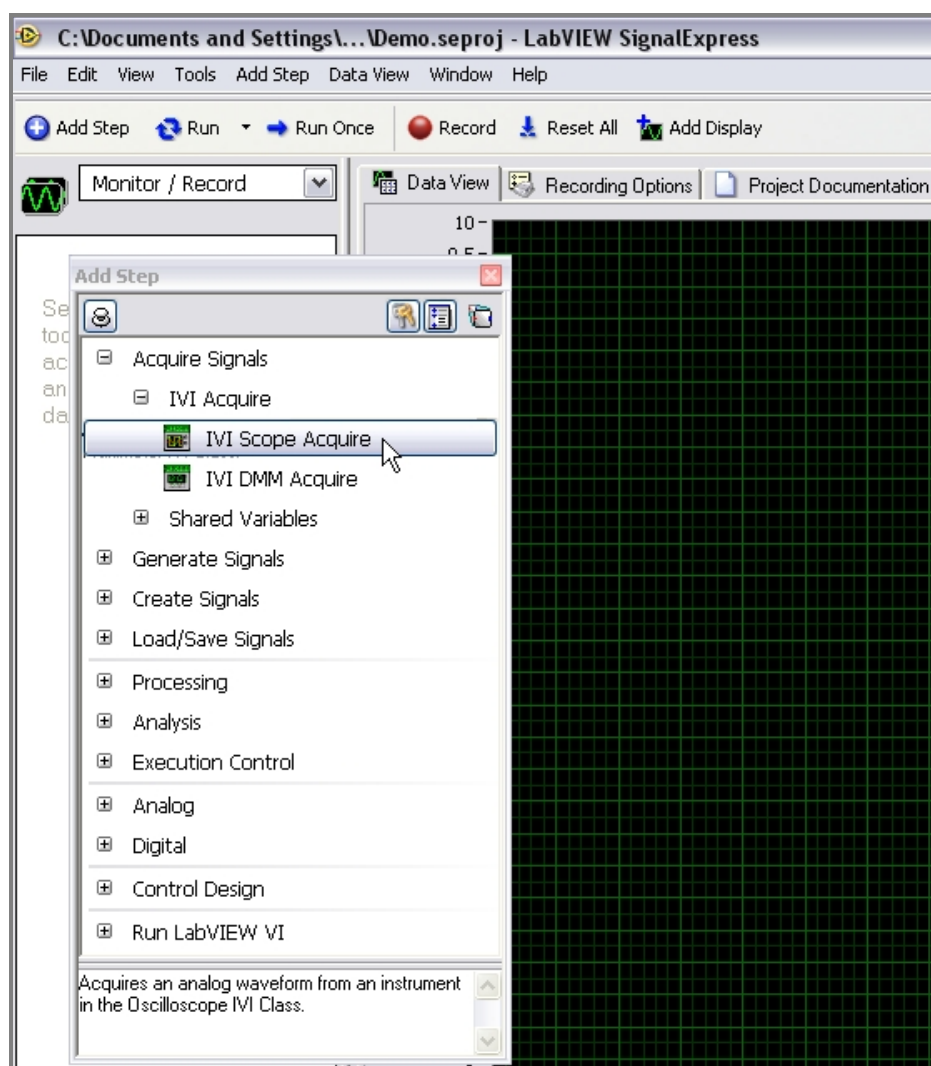


Figure 2. Add IVI Scope Acquire Step to Start Acquiring Data from an Oscilloscope

Once you click on the IVI Acquire step, the Step Setup window for that step opens. You can now select channels from which to acquire measurement data.

Start by creating a connection to the instrument with a new IVI session. To do so, click on the pull-down list for “IVI session name” and select “Create New” to create the session.

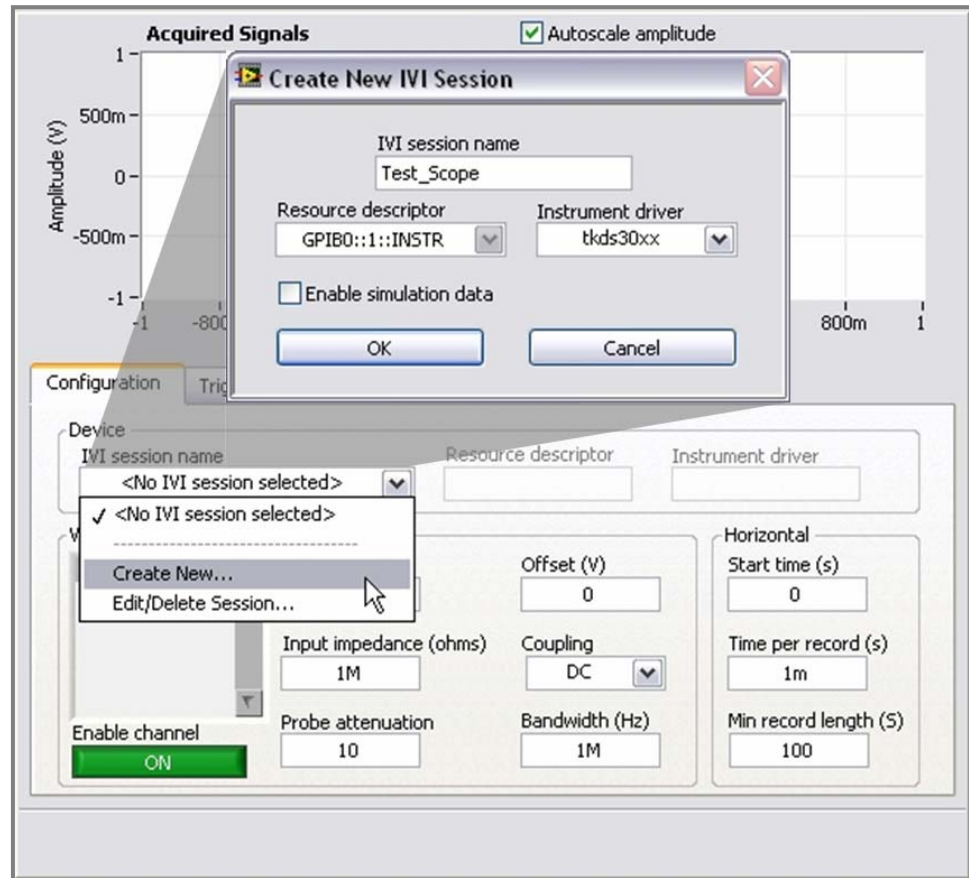


Figure 3. Create a New IVI Session

In the dialog box (see Figure 3), select your instrument from the **Resource Descriptor** drop-down menu and select the **instrument driver** from the instrument driver drop-down menu. Click the **OK** button to finalize the creation of the session.

To begin acquiring from the instrument, click the **Run** button on the LabVIEW SignalExpress toolbar. LabVIEW SignalExpress immediately connects to the instrument and begins showing its acquired data, live, on the screen. To configure the instrument, simply change any of the settings on the Step Setup window. As soon as you make a change, LabVIEW SignalExpress immediately reconfigures the instrument.

Completing the Measurements

Your measurements often require saving the data, presenting it in a report or performing additional analysis. This section explores how you can use LabVIEW SignalExpress software to view, process, analyze, save and document your measurements.

Viewing Data and Generating Reports

Along with viewing your measurements in the individual steps, LabVIEW SignalExpress has an interactive data view for viewing all of your acquired and analyzed data. To view a signal on the data view, simply click the **Data View** tab and drag and drop the desired data from the step on the left to the data view on the right. Customize the graphs by right-clicking on them and changing

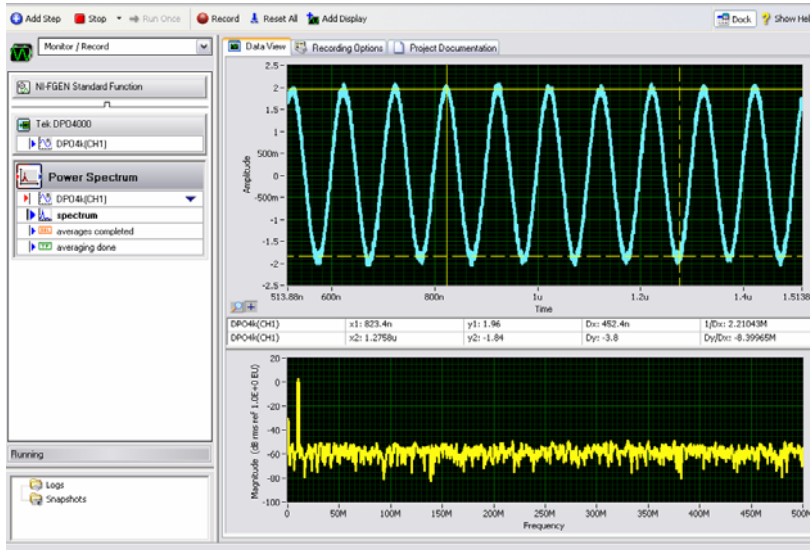


Figure 4. View Data in LabVIEW SignalExpress

properties such as plot styles, colors and axis labels. The graphs also provide zooming capabilities and the ability to add interactive cursors.

Along with the data view capability, LabVIEW SignalExpress offers a documentation view for creating custom reports. Create reports by dragging and dropping your measurement data onto the blank piece of paper and adding text. You can send custom reports to the printer or save them as HTML files for viewing in any Web browser.

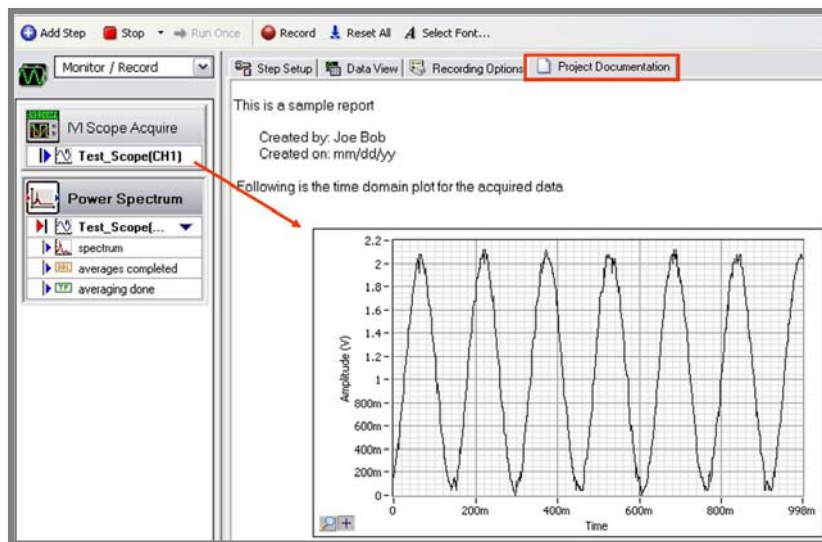


Figure 5. Create Interactive Reports in LabVIEW SignalExpress

Signal Processing and Analysis

You can perform common analysis tasks with LabVIEW SignalExpress, including scalar math, time-domain measurements such as amplitude measurements as well as frequency-domain measurements such as distortion measurements and power spectrums.

To add analysis to your measurement projects, select the appropriate processing or analysis step from the **Add Step** menu. Once selected, the step loads and begins analyzing your acquired data.

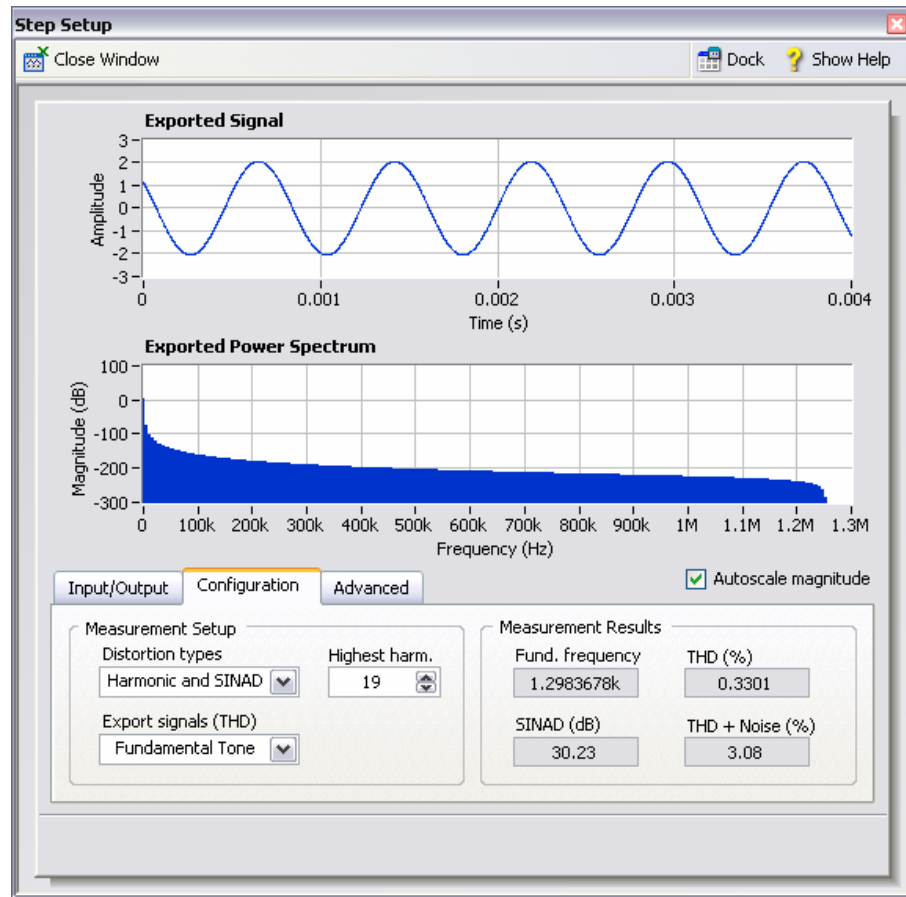


Figure 6. Step Setup for the Power Spectrum Step

Exporting and Saving Data

The simplest way to save your data is to press the **Record** button in the LabVIEW SignalExpress toolbar. By pressing this button, you begin logging your measurements to disk using the highly optimized technical data management streaming (TDMS) file format. You can open TDMS files in all National Instruments software products as well as Microsoft Excel. You also can convert TDMS files to ASCII text for use in most third-party applications.

Along with streaming your measurements to disk, you can export your data to Microsoft Excel by right-clicking on any graph and selecting **Export to Microsoft Excel**. Additionally, you can just drag and drop your data into most third-party applications.

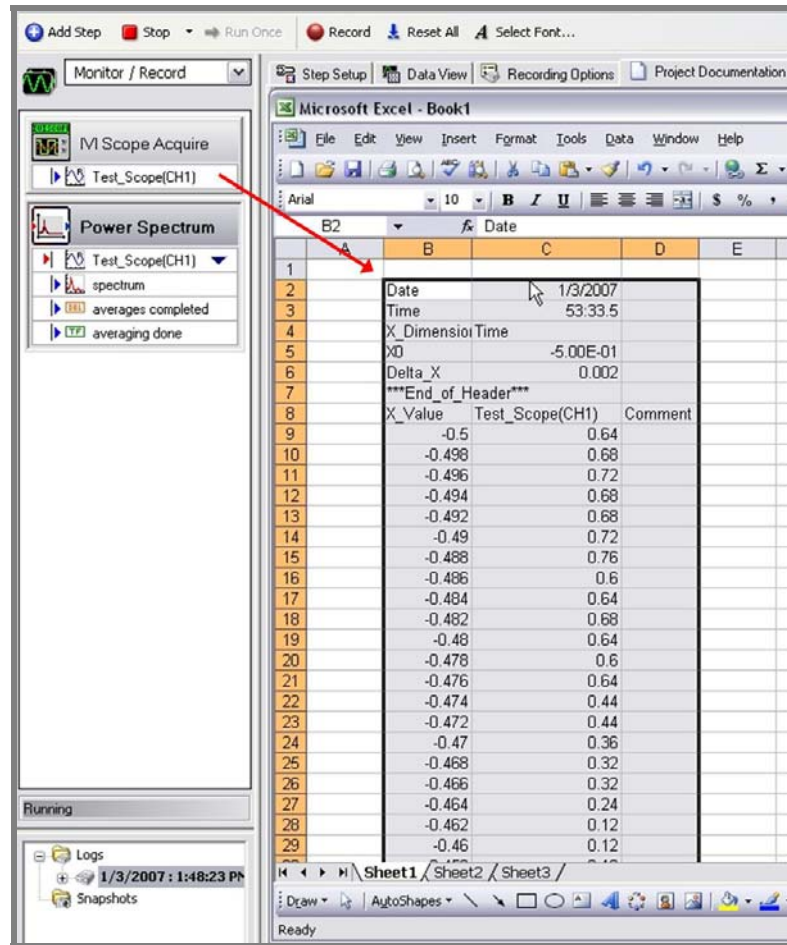


Figure 7. Drag and Drop Data from LabVIEW SignalExpress into Third-Party Applications

Saving Projects

Save your LabVIEW SignalExpress project to avoid manually documenting instrument settings. LabVIEW SignalExpress projects save the instrument setting as well as your analysis, logging and documentation configuration.

Conclusion

You can use LabVIEW SignalExpress to perform your basic instrument control tasks interactively to save time. This includes acquiring, analyzing and presenting your measurement results from more than 400 stand-alone and modular instruments.



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