

IO Libraries Suite

The screenshot displays the Keysight Connection Expert 2023 software interface. The main window is titled "Keysight Connection Expert 2023" and features a sidebar on the left labeled "My Instruments" with a "PXI/AXIe Chassis" tab. The sidebar lists various instrument types: GPIB (GPIB0), GPIB (GPIB1), GPIB-USB (GPIB2), GPIB-USB (GPIB3), LAN (TCP/IP0), USB (USB0), and Remote Serial (ASRL1). The GPIB (GPIB0) section is expanded, showing a list of instruments. A green checkmark and a small image of the 34450A instrument are next to the entry "34450A, Keysight Technologies GPIB0::24::INSTR".

The main panel displays "Details for Keysight Technologies 34450A". It includes a toolbar with icons for "Check Status", "Edit", "Remove", "Interactive IO Monitor IO", "Command Expert", "BenchVue", "Web UI", and "Soft Front Panel". The details section lists the following information:

- Manufacturer: Keysight Technologies
- Model: 34450A
- Serial Number: MY00000000
- Firmware Version: 01.03-01.01
- Web Information: [Product Page](#)

A small image of the 34450A instrument is shown on the right side of the details section.

The "Connection Strings" section contains a table with the following data:

VISA Address	Aliases	SICL Address
GPIB0::24::INSTR		gpib0,24

Below the table, there is a section for "Installed IVI Drivers" with an "Update" button. The status below this section is "<No installed drivers>".

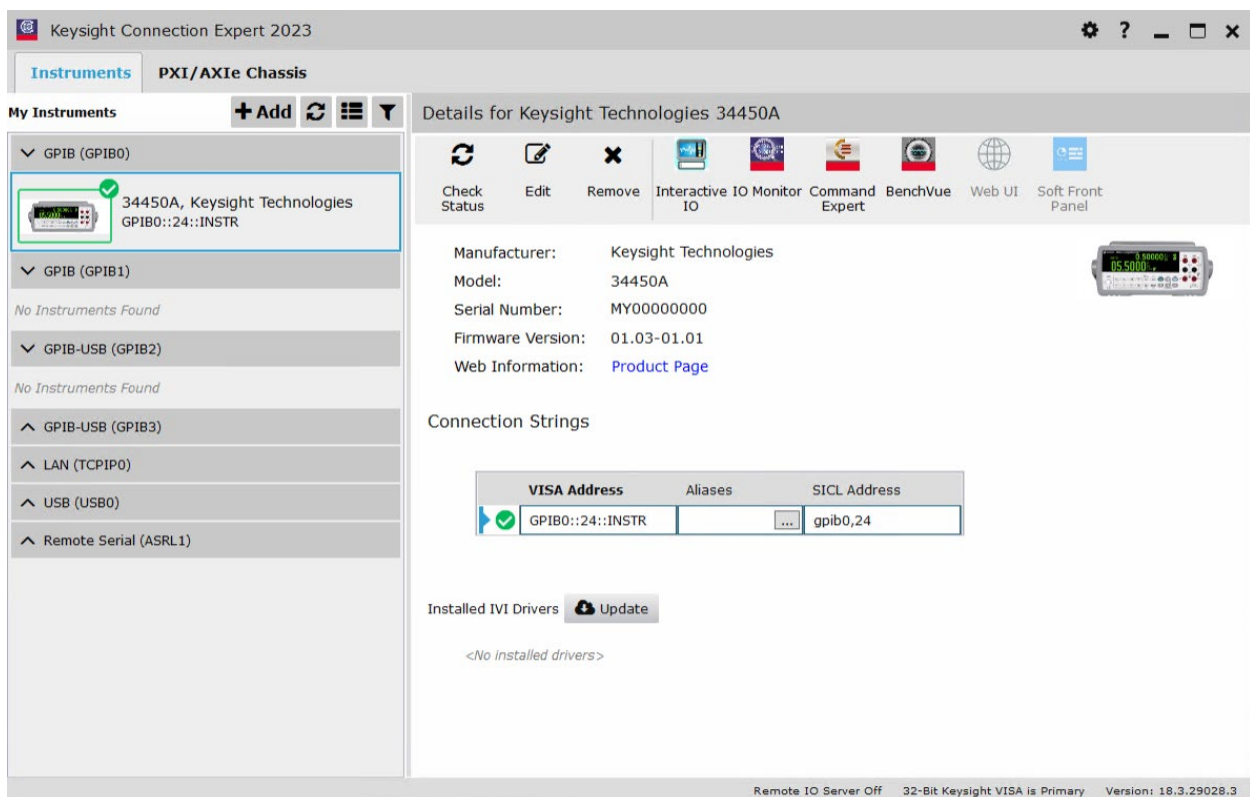
The bottom status bar of the software indicates: "Remote IO Server Off", "32-Bit Keysight VISA is Primary", and "Version: 18.3.29028.3".

Accelerate Instrument Connection and Control with IO Libraries

- Automatically detects instruments connected to your PC and configures the interfaces.
- Enables instrument communication for a variety of development environments (Mathworks MATLAB, Python, NI LabVIEW, Microsoft Visual Studio, and more).
- Compatible with most common instruments.
- The Windows product includes support for AXIe, PXI, GPIB, USB, Ethernet/LAN, RS-232, and VXI test instruments from a variety of vendors.
- Windows users can also download popular Keysight software such as BenchVue and Command Expert to work with IO Libraries.
- The Linux product includes support for GPIB, USB, Ethernet/LAN, and RS-232.

IO Libraries for Windows 11

IO Libraries Suite introduces support for Windows 11 on ARM (64-bit x86 emulated applications or ARM64EC applications), which includes LAN (HiSLIP, VXI-11/SICL-LAN, and SOCKET), USB/GPIB, USBTMC, PXI, AXIe, PXI, PXIe, and PCIe devices, RS-232, Remote GPIB, and Remote USB.



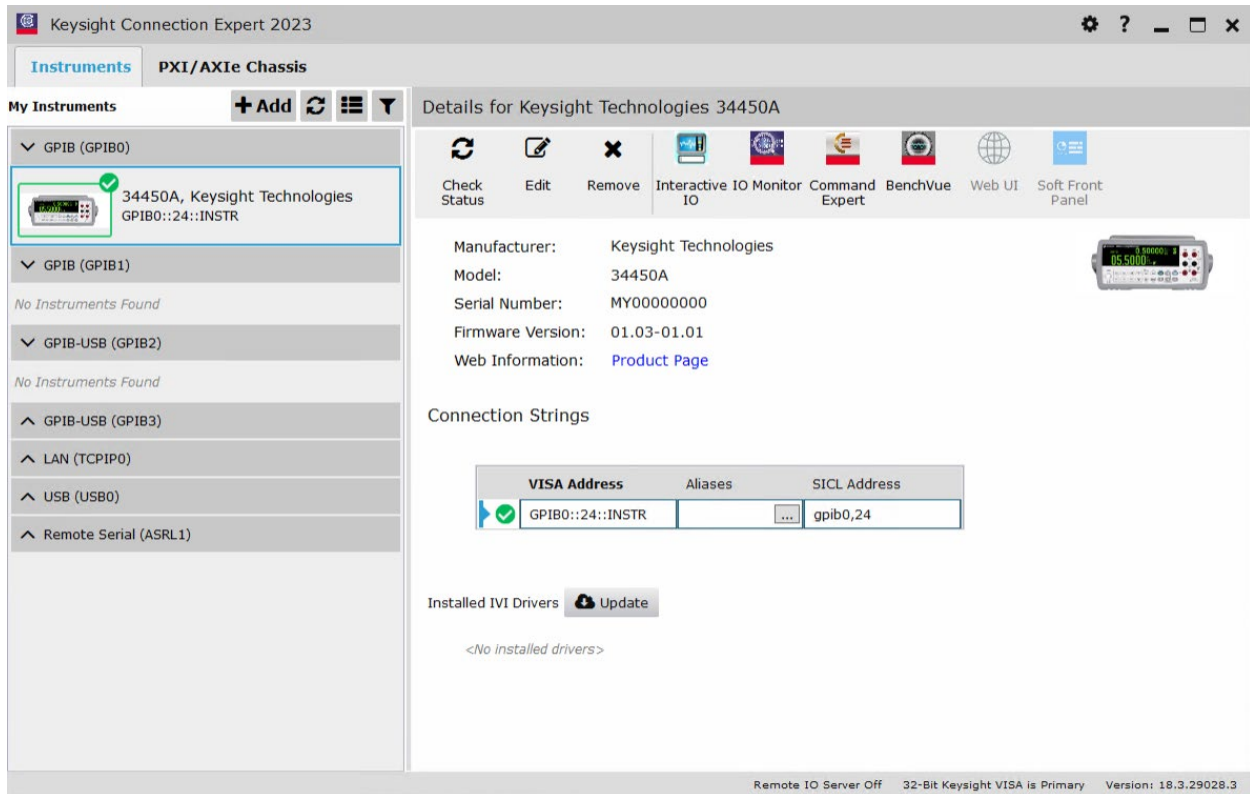
Getting Started is Easy!

1. Install Keysight IO Libraries Suite software on your PC.
2. Connect the interface cables between your chassis and/or instruments and your PC.
3. Detect interfaces, chassis, and instruments and configure them using Keysight Connection Expert.
4. In just minutes you have an error-free connection that simply works.



Fast and Easy Access to your Test and Measurement Equipment from your PC

Connection Expert is an easy-to-use software for discovering and connecting instruments on Windows, Windows-on-ARM, or Linux PC. You can quickly add a new Instrument or I/O Interface and access their Web UI.



Connection Expert allows you to discover and verify instruments. Additionally, you can update IVI instrument drivers and soft front panels from the instrument properties in Windows. As a result, you save time and ensure your application uses the latest driver.

IO Libraries Suite software updates can be found at www.keysight.com/find/iosuite, or from the option available in Connection Expert. Windows users can also enable automatic updates.

Save time with the bundled tools IO Monitor and Interactive IO, which can be launched from within Connection Expert.

IO Monitor, Interactive IO, and Included APIs

- IO Monitor lets you monitor and trace instrument I/O traffic, greatly simplifying and speeding up the debugging process.

The screenshot shows the Keysight IO Monitor application. The main window displays a table of captured messages with columns: Time Stamp, Program, Address, Source, Method Call, IO Data, Return Value, and Time(ms). The selected message at 13:50:51.800 shows a viRead operation returning +4.99900000000000E+00.

Time Stamp	Program	Address	Source	Method Call	IO Data	Return Value	Time(ms)
13:50:51.797	Keysight BenchVue	TCPIP0::156.140.	Keysight VISA	VISA::viWrite	SOUR2:VOLT:LIM:	VI_SUCCESS	3.25744
13:50:51.800	Keysight BenchVue	TCPIP0::156.140.	Keysight VISA	VISA::viRead	+4.99900000000000E+00	VI_SUCCESS	6.32697
13:50:51.807	Keysight BenchVue	TCPIP0::156.140.	Keysight VISA	VISA::viWrite	SOUR2:VOLT:LIM:	VI_SUCCESS	3.21108
13:50:51.810	Keysight BenchVue	TCPIP0::156.140.	Keysight VISA	VISA::viRead	-5.00000000000000E+00	VI_SUCCESS	3.2
13:50:51.814	Keysight BenchVue	TCPIP0::156.140.	Keysight VISA	VISA::viWrite	SOUR2:VOLT:LIM:	VI_SUCCESS	3.10113
13:50:51.817	Keysight BenchVue	TCPIP0::156.140.	Keysight VISA	VISA::viRead	0\n	VI_SUCCESS	3.13559
13:50:51.820	Keysight BenchVue	TCPIP0::156.140.	Keysight VISA	VISA::viWrite	TRIG2:DEL? MIN\	VI_SUCCESS	3.2
13:50:51.824	Keysight BenchVue	TCPIP0::156.140.	Keysight VISA	VISA::viRead	+0.00000000000000E+00	VI_SUCCESS	3.07815
13:50:51.827	Keysight BenchVue	TCPIP0::156.140.	Keysight VISA	VISA::viWrite	TRIG2:DEL? MAX\	VI_SUCCESS	3.09661
13:50:51.831	Keysight BenchVue	TCPIP0::156.140.	Keysight VISA	VISA::viRead	+1.00000000000000E+00	VI_SUCCESS	3.8039
13:50:51.835	Keysight BenchVue	TCPIP0::156.140.	Keysight VISA	VISA::viWrite	TRIG2:DEL?n	VI_SUCCESS	3.38708
13:50:51.839	Keysight BenchVue	TCPIP0::156.140.	Keysight VISA	VISA::viRead	+0.00000000000000E+00	VI_SUCCESS	3.05764
13:50:51.842	Keysight BenchVue	TCPIP0::156.140.	Keysight VISA	VISA::viWrite	TRIG2:LEV? MIN\	VI_SUCCESS	3.0121
13:50:51.845	Keysight BenchVue	TCPIP0::156.140.	Keysight VISA	VISA::viRead	+9.00000000000000E+00	VI_SUCCESS	3.15897
13:50:51.849	Keysight BenchVue	TCPIP0::156.140.	Keysight VISA	VISA::viWrite	TRIG2:LEV? MAX\	VI_SUCCESS	3.11385
13:50:51.852	Keysight BenchVue	TCPIP0::156.140.	Keysight VISA	VISA::viRead	+3.80000000000000E+00	VI_SUCCESS	3.10974
13:50:51.855	Keysight BenchVue	TCPIP0::156.140.	Keysight VISA	VISA::viWrite	TRIG2:LEV?n	VI_SUCCESS	3.33333
13:50:51.859	Keysight BenchVue	TCPIP0::156.140.	Keysight VISA	VISA::viRead	+3.30000000000000E+00	VI_SUCCESS	2.97395
13:50:51.862	Keysight BenchVue	TCPIP0::156.140.	Keysight VISA	VISA::viWrite	TRIG2:SLOP?n	VI_SUCCESS	3.16061
13:50:51.865	Keysight BenchVue	TCPIP0::156.140.	Keysight VISA	VISA::viRead	POS\n	VI_SUCCESS	3.61108
13:50:51.869	Keysight BenchVue	TCPIP0::156.140.	Keysight VISA	VISA::viWrite	TRIG2:SOUR?n	VI_SUCCESS	3.3842

VISA::viRead-Process ID 12100;Thread ID 1920

Parameters:

Name	Type	Value
Buffer buf	out: uint8[]	+4.99900000000000E+00
cnt	in: uint32	1000
retCnt	out: uint32	23
status	ret: int32	0
vi	in: uint32	1

Output:

Offset	Hexadecimal	ASCII
00000000	2b 34 2e 39 39 30 30	+4.99900
00000008	30 30 30 30 30 30 30	00000000
00000016	30 30 45 2b 30 30 0a	00E+00\n

Monitoring Off, Logging Disabled

- Interactive IO lets you quickly send commands to instruments and read responses.
- Use the Keysight IO Libraries APIs to control your instruments or other devices from your custom automation software. APIs are available to support a wide variety of programming languages, hardware interface types, and industry-standard I/O library layers.
- Get up to 5x faster data transfers with the HiSLIP protocol for LAN-based instruments – HiSLIP speed is faster than any other current interface, and for some instruments can approach the theoretical limit of Gigabit LAN for TCP/IP connections. Easily convert an existing VXI-11 program to HiSLIP by simply changing the address string.

Quick Access to Test and Measurement Equipment from your PC

Support for modular instruments (Windows-only) - Keysight VISA and Connection Expert support modular instruments such as PXI (PCI eXtensions for Instrumentation), AXIe (ATCA eXtensions for Instrumentation), and PCIe® (PCI EXPRESS®) devices. The PXI Resource Manager will discover and display both chassis and modules.



Specifications: Version 2023 and Later

Supported interfaces

GPIB: Standard IEEE 488.1, 488.2	
USB: USBTMC-USB488	
LAN/Ethernet: Standard LAN (with HiSLIP, LXI, VXI-11, SICL-LAN and sockets)	
(Windows only)	PXI, AXIe, PXI, PXIe, and PCIe devices
	VXI: FireWire (Windows 7, 10, and 32/64-bit)

Supported development environments and supported I/O software

(Windows)	.NET languages (VB.NET, C#): VISA.COM, VISA, Keysight 488, VISA.NET
	C/C++/CLI: VISA.COM, VISA, Keysight 488
	EXCEL VBA: VISA COM, VISA, SICL, Keysight 488
	MATLAB: VISA
	Python: PyVISA
	LabVIEW: VISA, Keysight 488
(Linux)	C/C++: VISA, SICL
(Windows on ARM)	C/C++: VISA, SICL
	Python: PyVISA

I/O utilities

Connection Expert	Automatically scans and configures your instrument I/O, helps you get connected quickly and easily, and displays the status of your interfaces and instruments
Interactive IO	Lets you quickly send commands to instruments and read response
IO Monitor	Lets you monitor and debug I/O calls made on any of Keysight's supported buses
	(Windows: SICL, VISA, VISA COM, or Keysight IVI instrument drivers) (Linux: SICL or VISA)
IO Control	Provides easy access to the IO Libraries Suite utilities and documentation from the system tray
viFind32	Windows and Windows on ARM debug utility that uses VISA functions to find resources and 32-bit VISA implementations, listing them in a console window
viFind64	Debug utility that uses VISA functions to find resources and 64-bit VISA implementations, listing them in a console window

1. See the latest information on supported interfaces and operating systems for IO Libraries Suite 2023 from the [Keysight website](#) (Trials and Licenses tab). To identify which versions of IO Libraries, support particular operating systems and interface combinations, consult the information for the current and previous versions. Go to the Trials and Licenses tab, click Details and Download, and then install the most recent version that fits your OS and instrument combination.

System Requirements: Keysight IO Libraries Suite

Windows on ARM PC software: Operating system

- Windows 11 on ARM (64-bit x86 emulated applications or ARM64EC applications)
- Windows 10 on ARM (32-bit x86 emulated applications)

Windows PC software: Operating system

- Windows 11 (64-bit), Home, Pro, Enterprise
- Windows 10 (32-bit and 64-bit), Home, Pro, Enterprise
- Windows 8 and 8.1 (32-bit and 64-bit), Pro, Enterprise
- Windows 7 SP1 (32-bit and 64-bit), Starter, Home Basic, Home Premium, Professional, Ultimate, Enterprise
- Windows Server 2008 R2 SP1 (64-bit), Standard and Enterprise
- Windows Server 2012 (64-bit), Standard

Linux PC software: Operating system

- 64-Bit Red Hat Enterprise Linux Desktop Workstation 7.4 to 8.3
- 64-Bit CentOS Desktop Workstation 7.4 to 8.3
- 64-Bit Ubuntu Desktop 18.04.x and 20.04.2

PC hardware (Windows on ARM)

- Processor: 2.40 GHz, 8 Core (e.g. Qualcomm Snapdragon 7c)
- RAM: 4 GB minimum
- Hard disk space required: 2.5 GB (2 GB for Microsoft .NET Framework 4.6, 100 MB for Keysight IO Libraries Suite)
- Display: 1024 x 768 96 or 120 DPI
- Web connection for Internet download

PC hardware (Windows and Linux)

- Processor: 1 GHz, no support for Itanium64
- RAM: 1 GB minimum
- Hard disk space required: 2 GB
- Display: 1024 x 768 96 or 120 DPI
- Web connection for Internet download

Download information

If you like to install or upgrade to the latest version of IO Libraries Suite, download the free software from the [Keysight](#) website.

The most recent versions are available for Windows, Windows on ARM, and Linux on the Trials and Licenses tab. Windows users can also browse the Trials and Licenses tab for past versions compatible with specific operating systems or older instruments. In addition, Windows users can obtain a DVD ISO image for IO Libraries Suite by clicking a link on the Overview and Features tab.

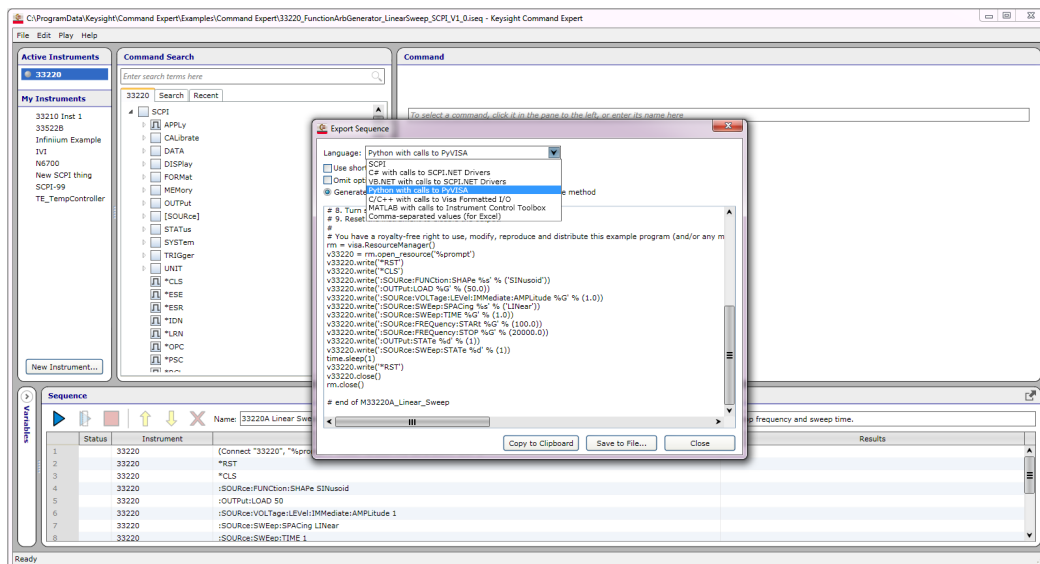
Additional Windows Utilities that Work with IO Libraries

Windows IO Libraries users can also download other I/O utilities from the [Keysight](https://www.keysight.com) website.

For example, BenchVue software enables instrument control and simplified automation – no programming required. Download it at www.keysight.com/find/BenchVue



Command Expert is a no-cost software application that provides fast and easy instrument control in many PC application environments. Download it from: www.keysight.com/find/commandexpert



Keysight enables innovators to push the boundaries of engineering by quickly solving design, emulation, and test challenges to create the best product experiences. Start your innovation journey at www.keysight.com.



This information is subject to change without notice. © Keysight Technologies, 2012 – 2023, Published in USA, August 10, 2023, 5990-6770EN