

TECHNICAL OVERVIEW

Keysight BenchVue Lab

Introduction

Keysight's BenchVue software platform comes with an intuitive interface and removes the need to program, making it simple to control, analyze measurements and quickly build automated tests with Keysight instruments. The BenchVue Lab application builds upon this foundation and is designed as a lab management solution, providing centralized instrument lab configuration, data logging and automation for educators managing teaching labs.

This solution consists of the Manager and Client apps – the Manager app acts as the main software application installed on the lab administrator's PC for centralized control and management, while the Client app runs on test bench PCs and connects all the instruments at individual test benches.

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BenchVue Lab

Key Features and Benefits

Streamline and simplify lab management, saving lab administrators and educators time and freeing them to focus on teaching. BenchVue Lab provides overview connection status of all instruments via a customizable home screen with widget control, and allows administrators to configure the measurement settings of all instruments at once, all from a single admin PC. With this single software platform, administrators also can easily track asset inventories; changes to the asset list – such as when instruments are sent for calibration or removed from the lab on loan – are automatically updated in software's lab configuration status.

Enhance the learning experience of students by utilizing BenchVue Lab as an education lab teaching software platform. Full desktop and BenchVue application sharing allows for easy remote monitoring and student assistance in the test lab. With the BenchVue Lab client app installed at each test bench computer, students can easily control instruments, log data and screen shots, and automatically join lab sessions.

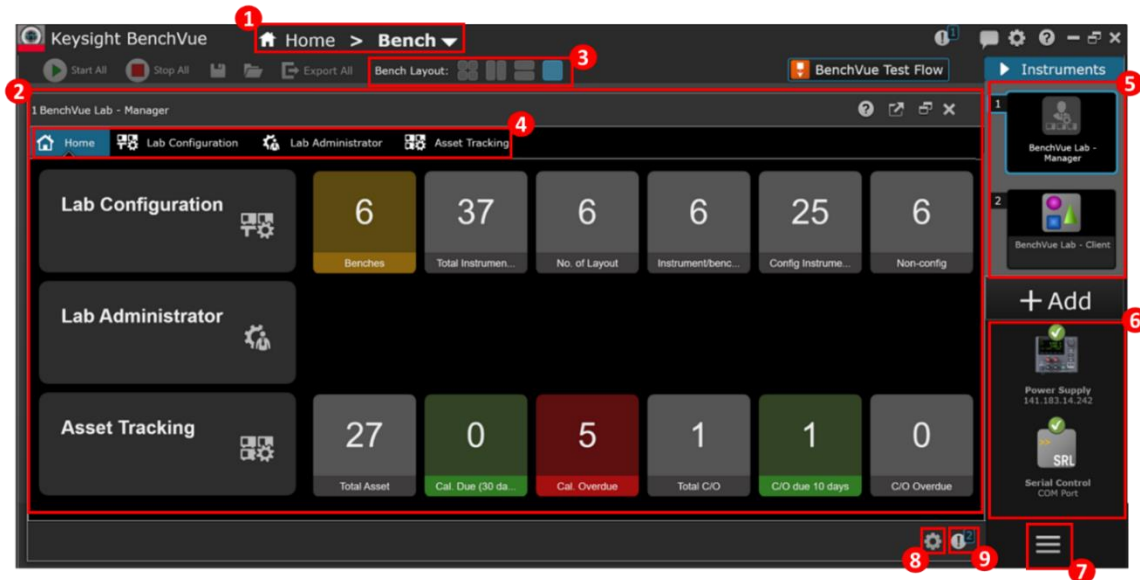
Easily integrate the software into the existing lab setup. BenchVue Lab supports over five hundred Keysight test and measurement instruments, and will also connect to non-Keysight test instruments that are compliant with the VISA connection protocol or IEEE-488 standards. Together with an intuitive GUI and the ability to import CSV files, BenchVue Lab enables educators to quickly set up and configure large labs.

Save on investment. Educators can take advantage of the BenchVue Education Lab and Control Collection bundle, which consists of:

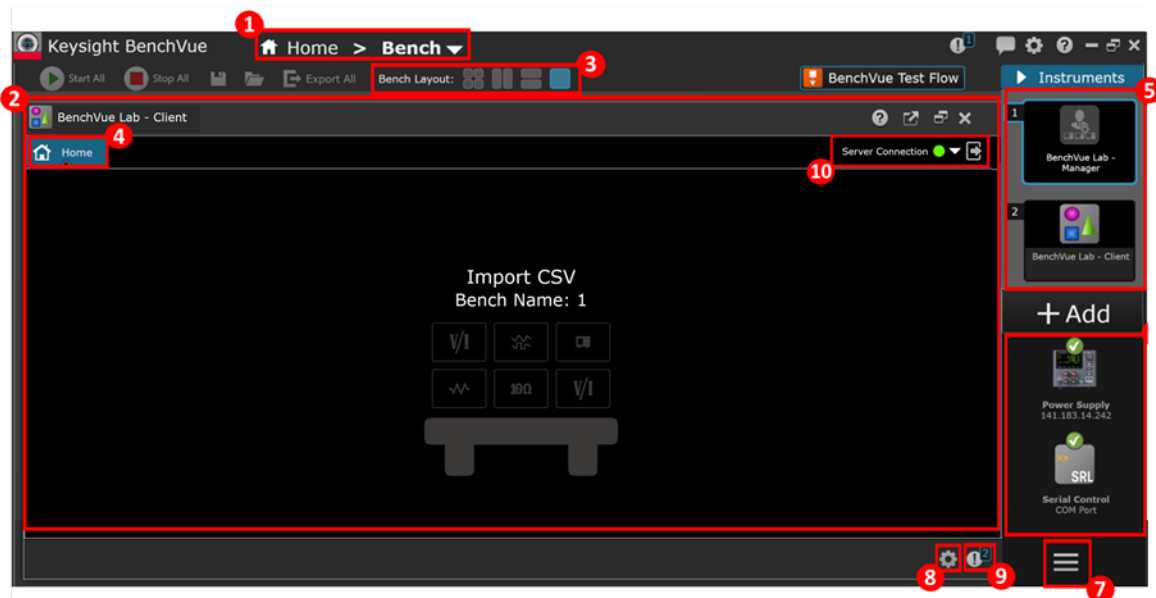
- One BenchVue Lab manager app license, which acts as the main software application installed on the administrator's PC for centralized control and management
- Fifty BenchVue Lab client app licenses, which runs on test bench PCs and connects all the instruments at individual test benches
- Fifty BenchVue EDU network licenses, which allows access to the Pro versions of thirteen control, automation and analysis apps on the BenchVue software platform
- And unlimited student licenses

BenchVue Lab at a Glance

BenchVue Lab – Manager



BenchVue Lab – Client

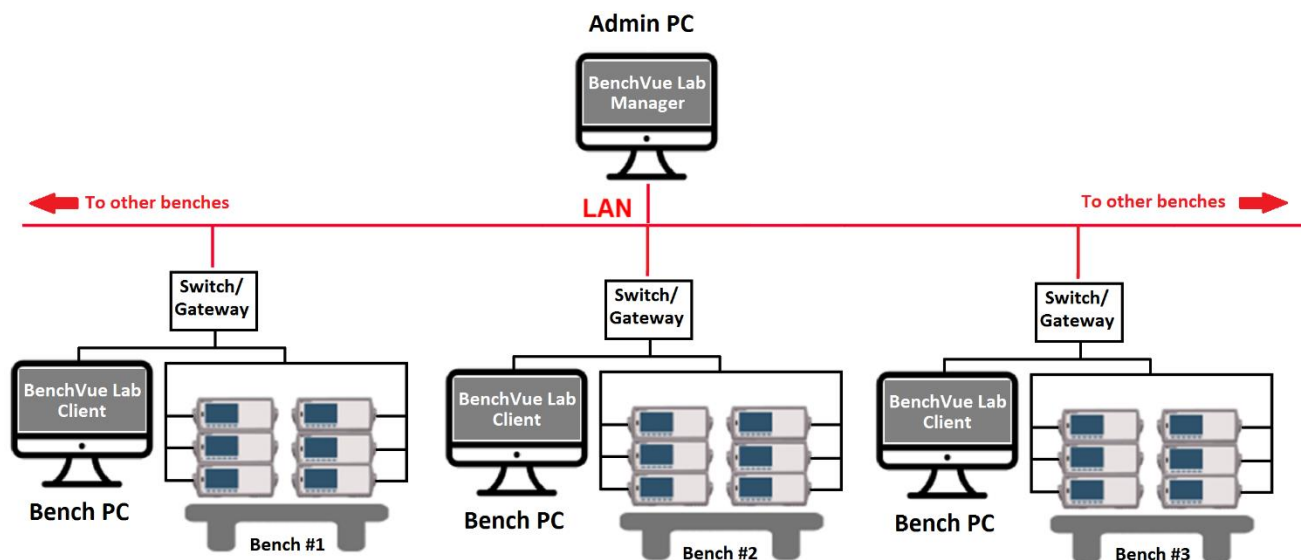


1. BenchVue platform navigation directory. Click the pull-down menu to navigate the platform:
 - a. Bench – The BenchVue applications that are currently running.
 - b. Applications – The list of all BenchVue applications, its details and licensing information.
 - c. Data Manager – Saved measurement data logs.
 - d. Library – Database for the latest instrument manuals, software, FAQs, videos, etc.
2. Bench application main window.
3. Bench layout options to split to multi-window display of all the currently running bench applications.

4. The BenchVue Lab application navigation tabs which comprise four main tabs – Home, Lab Configuration, Lab Administrator and Asset Tracking.
5. Application Panel that list all BenchVue applications currently running.
6. Instrument panel that list all connected instruments.
7. Manage the list of instruments.
8. Application settings.
9. Notification panel.
10. BenchVue Lab – Client application server connection panel.

Lab System Setup

A typical lab setup includes an admin PC installed with BenchVue Lab – Manager software and a number of test benches (BenchVue Lab can support up to a maximum of 100 benches). Each test bench may be equipped with up to 6 instruments. The instruments on the test benches can be connected directly to the admin PC in a LAN system via a multiple-port network switch or gateway. In an alternative lab setup, each test bench may also include a Bench PC, which may be a fixed desktop or a student's mobile PC. Each of the Bench PC is installed with the BenchVue – Client software that are readily connected to the BenchVue Lab – Manager which acts as the server.



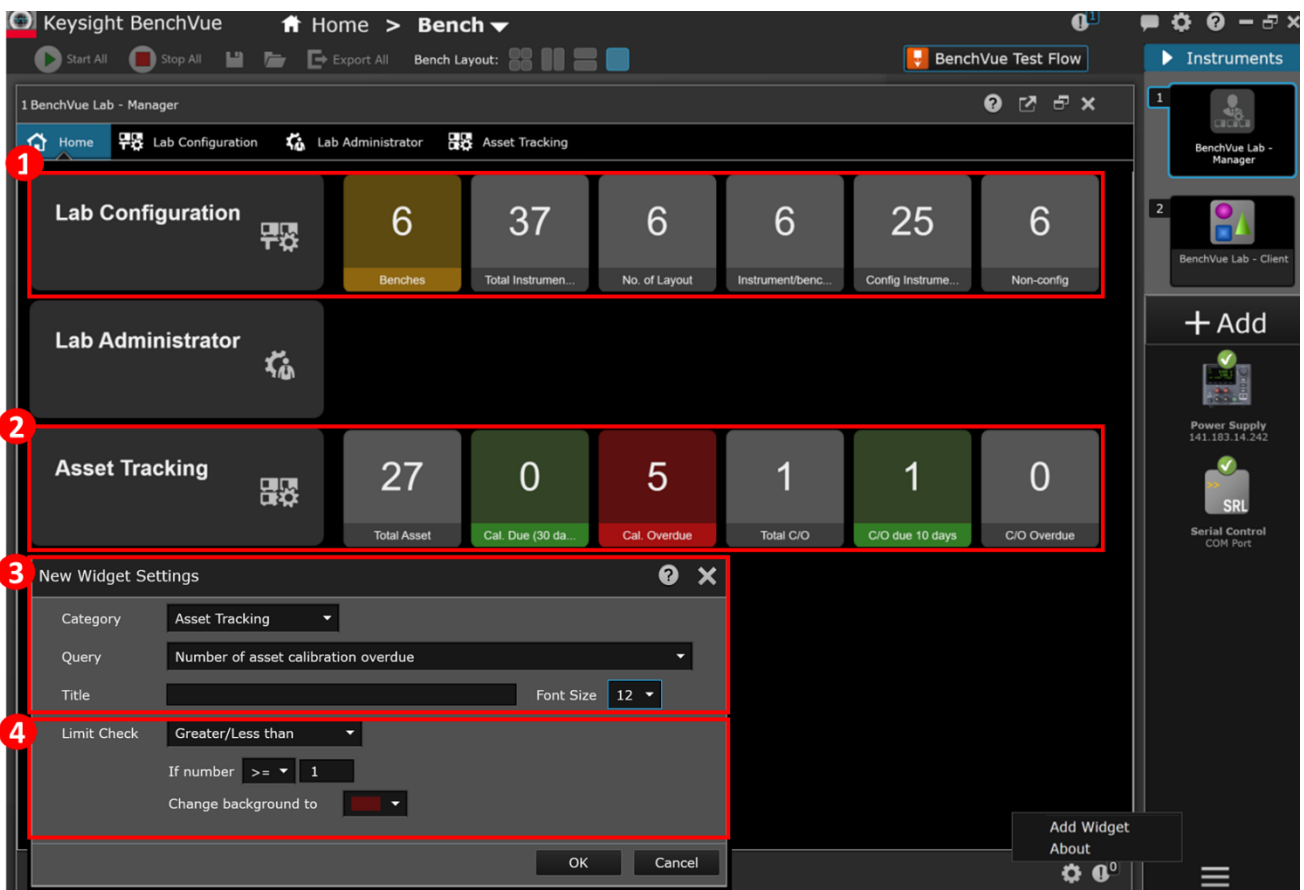
Homepage Dashboard

BenchVue Lab 'Home' displays a dashboard that provides a one-page overview on the lab information, instrument status, pending actions required and other types of reminder notification. The dashboard is highly customizable with various widgets which can be added and configured to automatically change color codes to indicate certain status according to the user's customization. These will readily provide an overview information to the lab manager and/or lecturer at one glance.

Homepage Dashboard Widget

A number of widgets can be optionally added to the homepage dashboard for either the 'Lab Configuration' or 'Asset Tracking' category.

1. In the 'Lab Configuration' category include the widgets of lab information such as total number of benches, instruments, configured or non-configured instruments etc.
2. In the 'Asset Tracking' category include widgets of assets registered and its status such as the total number of assets, the number of asset currently with calibration schedule overdue and the number of assets currently being checked-out etc.
3. You may select the type of widget in the 'Query' pull-down menu and then input the title that would appear on the dashboard and select the font size.
4. Optionally you may customize the 'Limit Check' to specify a certain condition, for example, for calibration overdue widget, you may specify the limit check greater than or equal to 1 instrument, change background color code to 'red' indicating there is 1 or more instrument currently needs to be calibrated. There are several options in the pull-down menu that you may customize the widgets according to your preference or application.

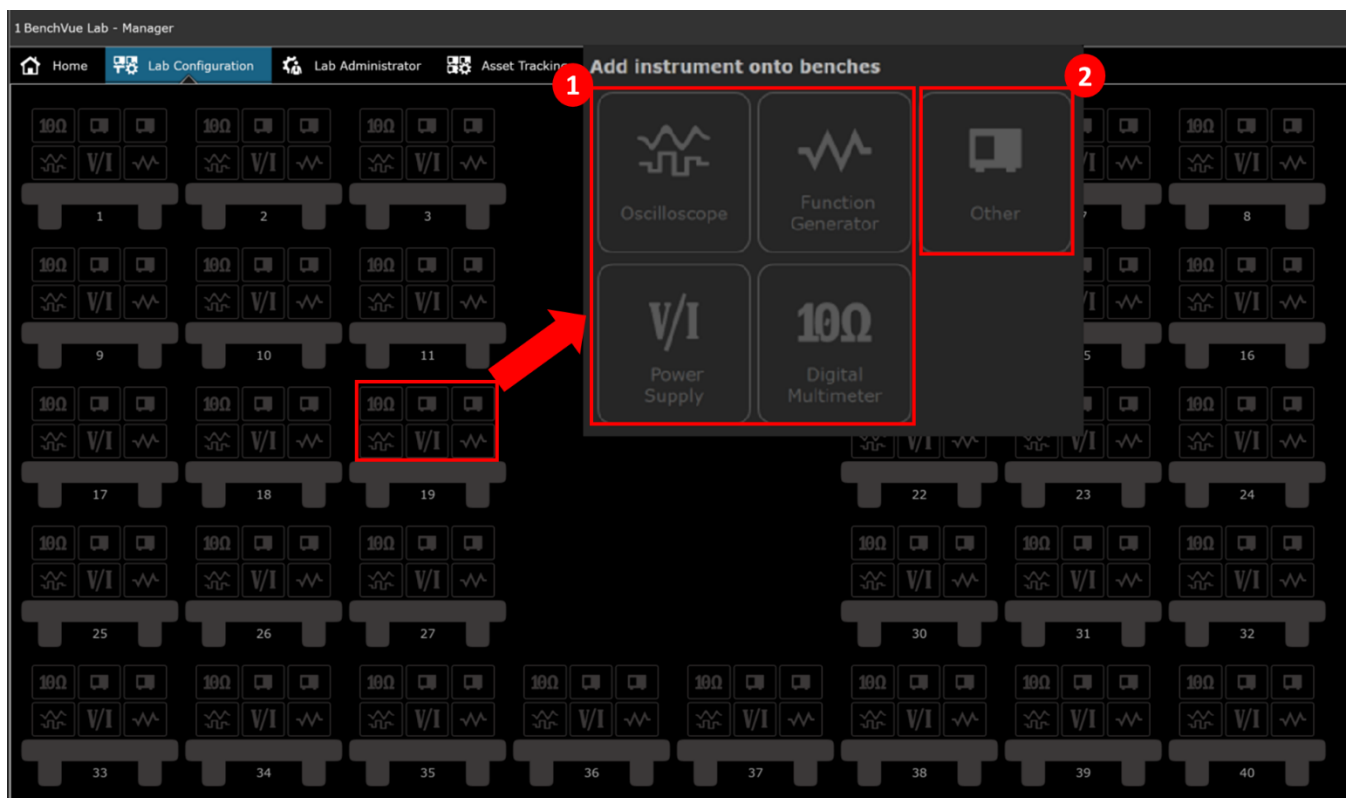


Lab Configuration

Configure Bench Layout

The Lab Configuration Tab allows you to configure your lab layout, number of benches, type and number of instruments, name of the benches etc. according to your actual lab layout. The total number of rows and columns of test benches (the maximum limit is 10 X 10 benches). There are two options to configure your lab layout - either manually or by importing from a CSV file. Multiple lab layouts can be saved and easily interchanged to allow flexibility for different classes sharing a lab.

1. There are four pre-configured basic instrument types including oscilloscope, function generator, power supply and digital multimeter.
2. Other types of instrument can be added as 'Other' category. Up to six instruments per bench may be added.



Configure Instruments

The instruments can be configured either by using the instrument's VISA address or by its model and serial numbers. The instrument's VISA address, model and serial numbers can be readily acquired from the Keysight Connection Expert application. The Keysight Connection Expert application automatically detects the instrument connected to the PC via USB/GPIB/LAN/RS-232 interface. BenchVue Lab currently supports over 500 instruments from both Keysight and non-Keysight manufacturers that comply with IEEE-488 protocols.

Lab Administrator

Check Instrument Status

Lab administrator allows the lecturer or/and lab manager to monitor the current instrument connection status. This feature provides the lecturer/lab manager a quick overview of the current instrument connection status and easily identify which instrument and on which bench that is not correctly connected.

Note: Currently all Keysight and non-Keysight instruments that comply with the IEEE-488 interface protocols are supported by the check instrument status feature.

The connection status of all configured instruments is displayed in the following color codes:

- Green – connected and active
- Red – disconnected or connection error
- Grey-out – Instrument that are not configured yet



Configure Measurement State/Settings of All Instruments at Once Seamlessly

Lab administrator also allows the lecturer or/and lab manager to configure the measurement state/settings of all the instruments on the benches in bulk easily. This feature enables centralized control for lecturer/lab manager to quickly reset or send a pre-set measurement state/setting to all the instruments at once for a specific measurement session.

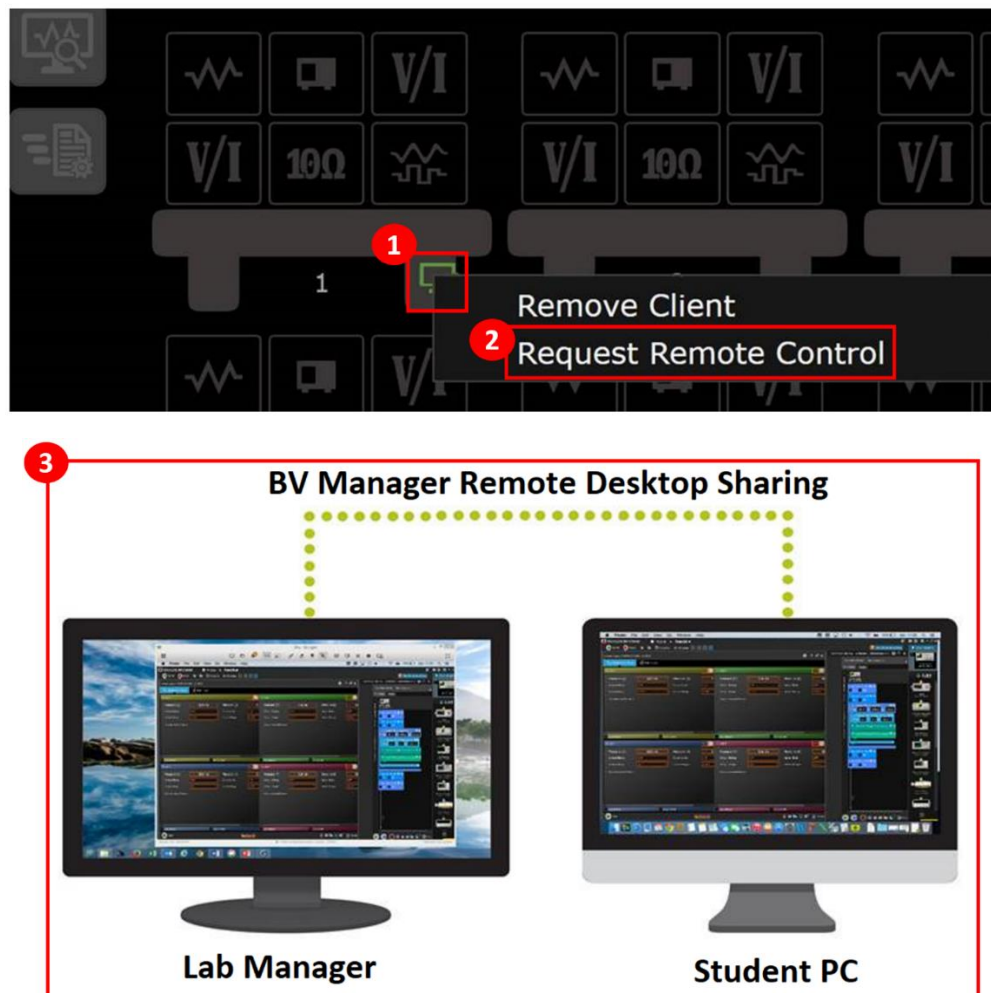
Note: Currently only the four types of pre-configured Keysight basic instruments i.e. function generator, DMM, power supply and oscilloscope are supported by this feature.

A new state file can be created from the BenchVue instrument App i.e. BenchVue Function Generator, DMM, Oscilloscope and Power Supply App. These Apps can be accessed from the 'Application' tab on the BenchVue platform.

Full Remote Control and Access to Students PC

Lab manager may request for full remote control of the student's PC from BenchVue Lab Manager using the "Remote Desktop Sharing" feature.

1. At the "Lab Administrator" tab, once a BenchVue Lab Client from the student's PC is connected to Bench Lab Manager, a "green icon" appears at the bottom-right of the bench.
2. Right-click the "green icon" and select "Request Remote Control." The student will receive a prompt message from his BenchVue Lab Client to either to "accept" or "reject". If the student selects "accept" then the lab manager/lecture will have full control of the student's PC remotely from the BV Lab Manager.
3. Full control here includes control of the mouse cursor, control of all software applications (including BenchVue), measurement data and full access to all files in the student's PC.



Asset Tracking

Asset Tracking in A Glance

BenchVue Lab Manager Asset Tracking provides intuitive management tool for lecturer and/or lab manager to easily keep track of a long list of assets in the lab including but not limited to instruments, equipment and accessories. The Asset Tracking is designed to manage instrument loaning, instrument calibration schedule tracking with e-mail reminder/alert system and asset reports viewing as well as export. Items may be added to the asset tracking list manually, import from lab layout and/or import from CSV file.

The screenshot shows the 'Asset Tracking' window in BenchVue Lab Manager. The interface includes a top navigation bar with 'Home', 'Lab Configuration', 'Lab Administrator', and 'Asset Tracking'. Below this is a toolbar with icons for adding, editing, and deleting assets, and a search box labeled 'Asset Keyword Search Box - to filter out specific list'. The main area displays a table of assets with columns: Model Number, Manufacturer, Department, Asset Location, Asset Owner, Calibration Due Date, Calibration Interval, and Instrument Option. The table lists several assets, including N6705B, EDU-X 3200, DSO-X 2004A, N6705C, 34970A, 34465A, M12, M15, M16, and M1. On the left side, there are callouts for 'Asset Full List', 'Assets Pending Calibration List', 'Assets Available for Checking Out', 'Configure Reminder Setting', and 'Asset Check Out List'. At the bottom right, there is an 'Export' button with a callout 'Export Asset List Report'.

| Model Number | Manufacturer | Department | Asset Location | Asset Owner | Calibration Due Date | Calibration Interval | Instrument Option |
|--------------|-----------------------|------------|----------------|-------------|----------------------|----------------------|-------------------|
| N6705B | Keysight Technologies | RnD | Jersey City | John | <Disabled> | <Disabled> | Usb/Gpib/Lan |
| EDU-X 3200 | Keysight Technologies | RnD | Beijing | Peter | 2/3/2010 | 1 | Usb/Gpib |
| DSO-X 2004A | Keysight Technologies | RnD | Bayan Lepas | Mei | 12/9/2016 | 11 | Usb/Gpib/Lan |
| N6705C | Keysight Technologies | C | Bayan Lepas | Alice | 12/8/2016 | 12 | Usb/Lan |
| 34970A | Keysight Technologies | B | Bangalore | Nick | 12/9/2016 | 11 | Usb |
| 34465A | Keysight Technologies | RnD | | Mark | 7/7/2016 | 6 | Usb/Gpib/Lan |
| M12 | | | | | <Disabled> | <Disabled> | |
| M15 | | | | | <Disabled> | <Disabled> | |
| M16 | | | | | <Disabled> | <Disabled> | |
| M1 | | | | | <Disabled> | <Disabled> | |

Asset Keyword Search

Specific list of assets can be filtered out by using keyword search. Input any keyword queries in the 'Search Box' at the top-right and the list of assets containing any information that matches to the keywords will be shortlisted. The keyword search may include a specific date, location, model no., manufacturer, instrument type etc. for easy filtering and management of the assets. To close the search filtering list, simply clear the search query in the 'Search Box' and the full asset list will be re-populated.

Customize Display Option

To customize display option, right-click on any of the 'Column Header'>More Column. A pop-up menu will show a list of 'Available Information' that are currently not displayed in the asset tracking window, and a list of the currently 'Displayed Information.' You may customize the information category to be displayed on the asset tracking window by clicking the 'Horizontal Arrow' icons to add or remove the list in the 'Displayed Information.' The order of the information category can also be customized by selecting a desired category and then click the 'Vertical Arrow' icons to move the selected category up or down the order sequence. Click 'OK' to apply all the changes made.

You may also sort the list of assets according to the information category by clicking on the desired 'Column Header' and list will automatically be sorted column values 'largest to smallest or alphabetically A-Z. Clicking the same 'Column Header' again will sort the column values from smallest to largest or reverse alphabetically Z-A.

Managing Instrument Calibration

BenchVue Lab Manager include management tools to keep track of instrument calibration. Calibration information can be added to each asset. A notification message will appear when the date is approaching and/or on the actual date. The notification settings are customizable with an optional reminder via e-mail.

To view the list of instruments currently with calibration due date over lapsed, click 'Pending Calibration Asset' icon. The list will of asset will appear in red indicating calibration overdue. The 'Remaining Days' information in negative value indicates the number of days has lapsed since the calibration due date.

After calibration has been completed, click 'Edit Asset' icon on the selected instrument to update the 'Calibration Due Date.' The system will automatically track the next recurrent calibration due date.

Asset Checking Out

Asset checking out feature is useful for tracking the physical location of the instruments where it is often sent out for loan or calibration. All the items that are currently available in the lab are shown in the 'Asset Available for Check Out' list. The items on this list can be checked out by clicking the 'Check Out' icon. Various 'Check-Out Information' including check-out date, target return date, contact name, number and e-mail etc may be included during check out. A notification message will appear when the target return date is approaching and/or on the actual date. The notification settings are customizable with an optional reminder via e-mail. You can also easily select the reason for check-out in a drop-down menu for either 'Send for Calibration' or 'Send for Loan.' For other reason, you may select 'Other' and input the 'Comments' section for specification. Checked out items will be removed from the 'Asset Available for Check Out' list and moved to the 'Asset Checked Out List.'

Configure Reminder Settings

The BenchVue Lab Manager provides automatic reminder notification for instrument calibration due date and asset check-out end date. The reminder notification settings are customizable according to the user preferences. You may customize how often (i.e. daily, weekly or monthly) and at what time the system performs reminder scan on the lab assets for notification for calibration and/or asset check-out reminder. The type of notification (i.e. Message, Warning or Alert) that appear on the notification panel can also be customized to distinguish the calibration reminder from other types of notifications.

You may also choose to send e-mail notification to the e-mail address recipients via POP/IMAP E-mail forwarding for convenience to notify multiple targeted recipients.

BenchVue Lab – Client

BenchVue Lab – Client app is designed for test bench PCs and connects all the instruments at individual test benches. The BenchVue Lab – Client readily links with the BenchVue Lab – Manager installed on the main Admin PC via LAN connection.

System Requirements and Licensing

Installation requirements

Operating System – Microsoft Windows 10: 32-bit & 64-bit (Professional, Enterprise, Education, Home versions); Microsoft Windows 8: 32-bit & 64-bit (Professional, Enterprise, Core); Microsoft Windows 7: SP1 and later 32-bit & 64-bit (Professional, Enterprise, Ultimate, Home Basic, Home Premium)

CPU – 1 GHz or faster (>2 GHz is recommended for optimum performance)

RAM – 2 GB (>3 GB is recommended for optimum performance)

Interfaces – LAN/USB/GPIB/RS-232

An interface cable for each instrument – LAN/USB/GPIB/RS-232 (depending on the type of interface ports availability and compatibility on instruments)

Install BenchVue Lab Application

Free trial BenchVue platform software can be downloaded from the following URL: <https://www.keysight.com/my/en/software/application-sw/benchvue-software/benchvue-complete-control-collection.trial.html?checked=y>

After installing BenchVue, launch the platform application Windows Start>All Apps>Keysight BenchVue. On the BenchVue window, click 'Bench' to expand the dropdown menu and select 'Applications'. The main window will be populated with all applications including those that are currently not installed. Select 'Lab Manager' application and click 'Install' to start installing the application.

After the installation has completed, you may choose to purchase the license options or start a free 30-day trial. After the trial period expires, you will be required to purchase a software license to continue to use the application. Keysight's flexible licensing options allow you to select the license type and license terms that best fit your software needs. For more information on BenchVue software free trials and licensing options, go to www.keysight.com/find/benchvue_apps.

Floating License Server Requirements

Network Floating licenses require loading a vendor daemon on a license server. This server may be the same PC running BenchVue software or a separate server. Full installation instructions and support are provided for compatible server operating systems: Windows 7 Professional, Enterprise, Ultimate (64 bit); Windows Server 2008.

Selecting The Right BenchVue Lab License

Keysight offers a variety of licensing options to fit your needs. Choose your type. Choose your term. Take control of your budget.

With every BenchVue app or bundle you may choose different licensing terms. Most users will want a Perpetual Transportable license.

BenchVue Lab – Manager

| Product Number | License Types | Subscription Period |
|---------------------------|---------------|---------------------|
| BV0110B-1FP ^{ab} | Node-locked | Perpetual |
| BV0110B-1NP ^{ab} | Floating | Perpetual |
| BV0110B-1TP ^{ab} | Transportable | Perpetual |
| BV0110B-1UP ^{ab} | USB portable | Perpetual |
| BV0110B-TRL | Trial | 30-day trial |

^aTime-based subscriptions with 6, 12, 24, 36, 60-month options are available.

^bSoftware support subscription bundled option is available

BenchVue Lab – Client

| Product Number | License Types | Subscription Period |
|---------------------------|---------------|---------------------|
| BV0111B-1FP ^{ab} | Node-locked | Perpetual |
| BV0111B-1NP ^{ab} | Floating | Perpetual |
| BV0111B-1TP ^{ab} | Transportable | Perpetual |
| BV0111B-1UP ^{ab} | USB portable | Perpetual |
| BV0111B-TRL | Trial | 30-day trial |

^aTime-based subscriptions with 6, 12, 24, 36, 60-month options are available.

^bSoftware support subscription bundled option is available

License Terms and Types

Perpetual – A permanent license which can maintained with an update subscription service for access to new enhancements. This is the most cost effective in the long term.

Time Based – A time-limited license which will expire after 1 year. This is suitable for short-term projects or limited budget

Fixed Node Locked– Software license for 1 PC

Transportable – Ability to transfer license from PC to another PC using online tools

USB Transportable – Ability to transfer license from PC to another PC using USB dongle

Network Floating – Network based license multiple users access to SW license from server

Learn more at: www.keysight.com

For more information on Keysight Technologies' products, applications or services, please contact your local Keysight office. The complete list is available at:
www.keysight.com/find/contactus

