# PathWave Lab Operations
## for Battery Test

EP1150A

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## EP1151A PathWave Lab Operations for Battery Test

Keysight's Lab Operations provides several useful features and options to control and monitor test laboratories.

The following functions are part of the standard version:

**Platform**

- Modern browser-based intranet solution, accessed from anywhere within your network
- Connect, control and monitor Test Benches remotely
- Deploy software  updates without system downtime
- Open APIs allow seamless integration into your existing IT solutions
- Established technologies like Docker and Kubernetes allow scaling the solution to fit your requirements

**User management**

- Manage access to information based on user, role and group permissions.
- Users and permissions can retrieved from an Active Directory, allowing single sign.

**Start tests remotely**

- Test programs and associated libraries can be uploaded from your file browser with drag and drop.
- Tests can be scheduled to run immediately or at a specified time.

**Monitoring and controlling test systems**

- Test Benches can be controlled while tests are running. Tests can be started, suspend and cancelled remotely.
- Test Bench overviews show the current status of test systems.
- Test channel measurements like voltage, current and power, are available in the browser interface.

**Notifications**

- Notifications are shown in the browser interface and are also delivered by email.
- Subscribe to Test Benches to receive notifications about important events on your test systems, for example, a test finishing.
- Subscribe to your tests so you are immediately notified if your test is started, interrupted or finished.

**Records and logs (extensions available in Lab Insights)**

- Relevant events in the laboratory are logged and displayed in the browser interface. This includes important status changes in the Test Bench or other events.
- Reports contain a record of all relevant events during test execution and can be viewed in Energy Storage Discover.
- Extended record and logging features are available through Lab Insights Extensions.

**Document management (extensions available in Advanced Collaboration)**

- Upload and manage any documents you need with a simple drag and drop from your file explorer. Download them from anywhere. With the collaboration feature, you can share these files with your colleagues.
- Test programs and libraries can be uploaded and executed on a test system by the person who created them. To share test programs between users, please see extension Advanced Collaboration.

**Licensing**

PathWave Lab Operations for Battery Test can be purchased as a time-based license which is valid for 12 months. At least one Test Bench license (EP1152A) and one user license (EP1153A) must be purchased to use the software.

**EP1152A Test Bench license**

The Test Bench license enables integration of the available systems into PathWave Lab Operations for Battery Test. Each Test Bench requires a tech bench license for integration in the software.

The Test Bench license can be purchased as a time-based license which is valid for 12 months.

**EP1153A User license**

The User license enables the user to work with PathWave Lab Operations for Battery Test. Each employee requires a user license for using the software.

The User license can be purchased as a time-based license valid for 12 months.

# Extensions

## EP1154A Lab Insights

Lab Insights extensions provide features for analyzing processes and workflows in laboratories using data aggregated over test runs. They also offer advanced features for maintaining smooth operations of your test systems.

**Lab statistics**

- Statistics allow you to answer questions about your lab's performance.  For example:
    - How many test channels were idle over a period of time?
    - How much capacity is available for testing?
    - How many tests does the lab complete, on average, over a period of time?

- Data about your DUTs and tests gives you information such as:
    - The average capacity of a batch of cells
    - The percentage of cells that failed a specific test
    - The typical length of the test
    - The typical power consumption of the test

**Lab overview**

- Gain advanced insights into ongoing laboratory operations
- Organize test systems on a canvas to see system status at a glance. You can use this to:
    - Recreate your lab's floor plan, including all systems and their status
    - Offer a full screen view for large monitors
    - Display a slide show overview for a large lab can be displayed on a single monitor
- Aggregate the status of Test Benches, tests and DUTs

**Advanced logging**

- Trace the history of DUTs and processes in the laboratory. For example, you can see a history of the tests in which a specific test object was involved and its physical locations

**Service features**

Service features in this option help you maintain your lab.

- Track test systems and component calibration status
- Notification of pending service tasks
- Track work progress within the browser interface
- Track calibration and adjustment results
- Track installed software versions on the Test Benches and update them remotely

The software automatically takes maintenance into account when planning tests. Tests will not be interrupted by maintenance tasks such as calibration and adjustments.

The Lab Insights extension requires EP1151A PathWave Lab Operations for Battery Test and can be purchased as a time-based license valid for 12 months. At least one user license (EP1155A) need to be purchased to use the extension.

**EP1155A User License - Lab Insights**

The User license enables the user to work with Lab Insights. Each employee requires a user license for using this extension.

The user license can be purchased as a time-based license valid for 12 months.

# EP1156A Test Orders

Test Orders allow you to formally request tests and assist in managing the work happening around the test orders.

Test orders also help with the evaluation of test results.

**Order management**

- Internal and external customers can request tests on batches of cells. This includes:
    - Entering necessary information for the order directly in the browser interface
    - Lab managers reviewing, accepting and rejecting orders
    - Lab managers and customers discussing orders via the comment system
- Lab managers booking time slots for the tests needed to fulfill an order
- All invested parties can track order progress through the web interface
- Lab personnel required to fulfill an order are guided through the necessary work steps

**Test statistics & Evaluation**

Lap Operations aggregates statistics over all the tests that run in the lab. This includes

- Statistics on duration, success and failure rate
- Evaluation routines can automatically process test measurements
- Requested specific evaluations in test orders

**Test Suites**

- Multiple tests can be grouped into a test suite.
    - In the simplest case, a test suite is just a set of tests running one after the other.
    - Multiple DUTs can go through a test suite simultaneously and Lab Operations automatically orchestrates the execution of the tests in the test suite for each DUT.
    - In more complex cases, test suites can make subsets of cells go through different branches of testing based on characteristics of the DUTs that were determined in previous tests.
    - For example, a battery  test suite can start with a test that determines the capacity of the batteries and then performs:
        - an aging test on the batteries with the highest capacity
        - a destructive test on the cells with the lowest capacity.
- Test suites can be parameterized. If, for example, a test cycles a battery, the number of cycles can be entered through the web interface for each time a test suite is run.
- This allows labs to offer both standardized suites of tests to reliably characterize DUTs,  and the flexibility to adapt the tests for more exploratory evaluations.


The Test Orders extension requires EP1151A PathWave Lab Operations for Battery Test and can be purchased as a time-based license valid for 12 months. At least one user license (EP1157A) needs to be purchased to use the extension.


**EP1157A User License - Test Orders**

The User license enables the user to work with Test Orders. Each employee requires a user license for using this extension.

The User license can be purchased as a time-based license valid for 12 months.

## EP1158A Logistics and Materials

The Logistics and Materials extension helps taking inventory of the laboratory materials and tracks logistic processes.

**Resource and material management**

- Track materials, including availability and location
- Print and scan optical codes for materials
- Locate materials equipped with RFID tags is tracked automatically (in laboratories that employ Keysight's RFID solution)
- Customize the data tracked for materials by adding new fields for data input

**Resource planning**

- Materials such as DUTs, fixtures and equipment (Test Benches, test channels, etc.) can be reserved to coordinate the work in the lab
- Time tables and other visualizations allow coordination of the resources and give an overview of the lab resources

The Logistics and Materials extension requires EP1151A PathWave Lab Operations for Battery Test and can be purchased as a time-based license valid for 12 months. At least one user license (EP1159A) needs to be purchased to use the extension.

**EP1159A User license - Logistics and Materials**

The User license enables the user to work with Logistics and Materials. Each employee requires a user license for using this extension.

The User license can be purchased as a time-based license valid for 12 months.

## EP1160A Advanced Collaboration

Advanced Collaboration provides features that foster communication and exchange between the users of Lab Operations.

The documentation system becomes a collaborative document for all users and thus provides a way to organize files and information in your lab. You can easily provide, for example, work instructions and make them available to everyone in the lab.

**Document cloud**

- Access to uploaded documents can be restricted. Files are shared with all users that are provided access through this system.
- The history of documents is tracked.
    - New uploads generate a new version that users receive when they download the file.
    - Old document versions are kept and can be accessed and restored from the web interface.
    - This allows you to check changes.

**Collaboration platform**

Lab Operations offer a comment system allowing richly formatted comments on most things in the laboratory. Users can reply to comments and join selected discussions (e.g. discussions regarding test orders).

 Teams distributed across multiple shiftsor multiple locations can collaborate through a central system.

The Advanced Collaboration extension requires EP1151A PathWave Lab Operations for Battery Test and can be purchased as a time-based license valid for 12 months. At least one user license (EP1161A) needs to be purchased to use the extension.

**EP1161A User License - Advanced Collaboration**

The User license enables the user to work with Advanced Collaboration. Each employee requires a user license for using this extension.

The User license can be purchased as a time-based license valid for 12 months.

## EP1198A Customization

This package customizing the software to your specific needs.

This means that we:

- analyze your lab's workflow and propose ways to optimally realize this workflow within the software.
- implement new features in the software that fit your needs based on specifications we work out with you.

**Note:** Contact your sales representative to create a detailed statement of the requested customization.

## Services

### HS0002A-107 Productivity assistance

Lab Operations deploy to one or more servers that you manage locally. We support you with the deployment process and help you set up a cluster of servers that fit the scale of your lab.

Based on your needs, this may include talking to your IT department to ensure servers are set up with the  appropriate software and hardware configuration. This may also include advising you on your local network setup and ensuring that the software runs smoothly in your lab.

**Note:** Keysight recommends at least 10 days of Productivity Assistance for each PathWave Lab Operations for Battery Test project (5 days at customer site, 5 days remote service).

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