

Scienlab Battery Test System

Cell Level – Up to ± 600 A

SL1007A

Battery Test System | Cell Level

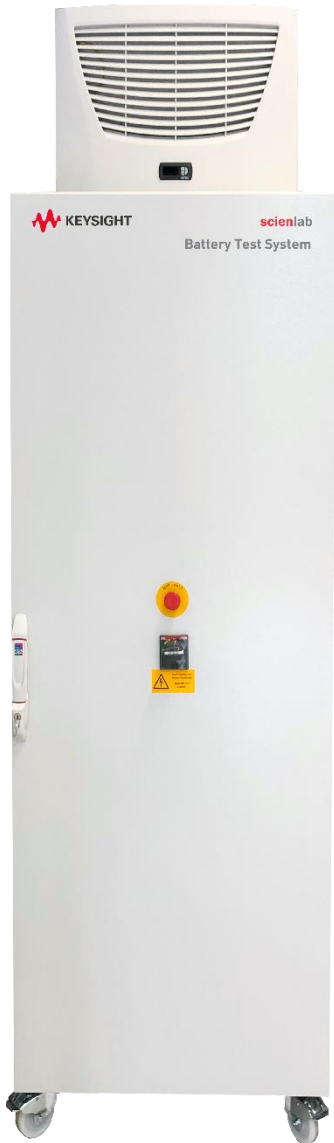
Systems up to 6 V | ± 600 A | 3.6 kW per channel

The SL1007A Scienlab Battery Test System – Cell Level enables you to accurately and productively test battery cells for automotive and industrial applications. The bidirectional power supply charges and discharges your cells under test with very high efficiency.

By combining the SL1007A with cell test system software such as Keysight's Scienlab Energy Storage Discover (ESD), you can perform extensive standard-compliant and individual tests, as well as load and endurance tests. This results in precise characterization of your cells by determining capacity, efficiency, internal resistance, and cyclical life span. The SL1007A offers precise voltage, current, and temperature measurements, and highly controlled current dynamics.

The following voltage, current and power options are available:

System Options								
Voltage range	0 to 6 V							
Current range	± 25 A	± 50 A	± 75 A	± 100 A	± 200 A	± 300 A	± 400 A	± 600 A
Power per channel	0.15 kW	0.3 kW	0.45 kW	0.6 kW	1.2 kW	1.8 kW	2.4 kW	3.6 kW



SL1007A Cell Test System – Single rack-cabinet configuration, front door closed



SL1007A Cell Test System – Double rack-cabinet configuration, front doors opened. Example configuration for large channel count or very high-current system.

SL1007A Power Electronics

The SL1007A cell test system has high regeneration capabilities, allowing highly efficient, cost-effective, and environmentally-friendly operation. Thanks to the bi-directional power supply, more than 90 % of the discharge energy is fed back into the grid.

The SL1007A includes safety features within the power electronics preventing overheating, overcapacity, short circuiting, and idling. It also has reverse polarity protection and monitors all internal voltages, currents and temperatures. In the case of an emergency shutdown, contacts on the mains ensure that there is no voltage and all internal high voltage sources are automatically discharged.

The SL1007A in a Complete Cell Test System

The SL1007A provides electrical charge, discharge, and measurement capability for the cells you are testing. You can select current capacities ranging from ± 25 A to ± 600 A and the number of test system channels from 4 to 64 channels.

In any specific cell test application, the SL1007A will typically be combined with additional system resources that include test system software, contacting and fixturing for your cells, cables, environmental chambers, and redundant safety systems. These types of additional resources can be provided by the user, or can be provided by Keysight, and then combined and integrated with the SL1007A by Keysight to create a customized test solution. Contact Keysight to discuss complete customized test solutions incorporating one or more these additional resources that will meet your specific test needs for the number and types of cells you require.

Software to Control Cell Test Systems

Keysight provides cell test system software that starts with Energy Storage Discover to control your individual cell test systems such as the SL1007A, and extends to PathWave Lab Operations for Battery Test to manage and coordinate your entire battery testing laboratory with multiple systems used to test cells, modules, and battery packs.

SL1091A Scienlab Energy Storage Discover (ESD)

Scienlab Energy Storage Discover (ESD) is the intuitive test-software environment for developing, performing, and analyzing tests for an individual test system.



Scienlab Energy Storage Discover controls individual test systems

- Central controlling component for all Keysight Scienlab-brand energy storage test environments.
- Comprehensive overview, user-friendly operation, easy-to-learn.
- Powerful visualization of tests and results.
- Several ESD offline versions support creating test programs.
- Available simulation environment for offline test.
- Ethernet communication with the battery test system.
- Easy integration with external control and monitoring software via optional standardized remote-interface.
- Holistic vehicle emulation from the perspective of battery cell, module and pack levels.

- Support for Windows 7 and 10. Single software license per workstation
- Integration of external components into the test environment and process, such as environmental chambers, cooling and heating equipment, or optional Scienlab-brand Measurement and Control Modules.

EP1150A PathWave Lab Operations for Battery Test

PathWave Lab Operations for Battery Test enables efficient planning and coordination of your entire battery test laboratory. It manages all resources, including test facilities, test systems, and your test objects or devices under test (DUTs). PathWave Lab Operations for Battery Test provides an integrated, web-based lab management platform that helps you modernize your test workflows, eliminating legacy paper-based processes, and increasing data integrity and traceability.

This powerful set of tools helps you to improve test throughput for all the cells and batteries you need to test, to fulfill the testing requirements for your projects on-schedule, and to optimize test asset utilization.

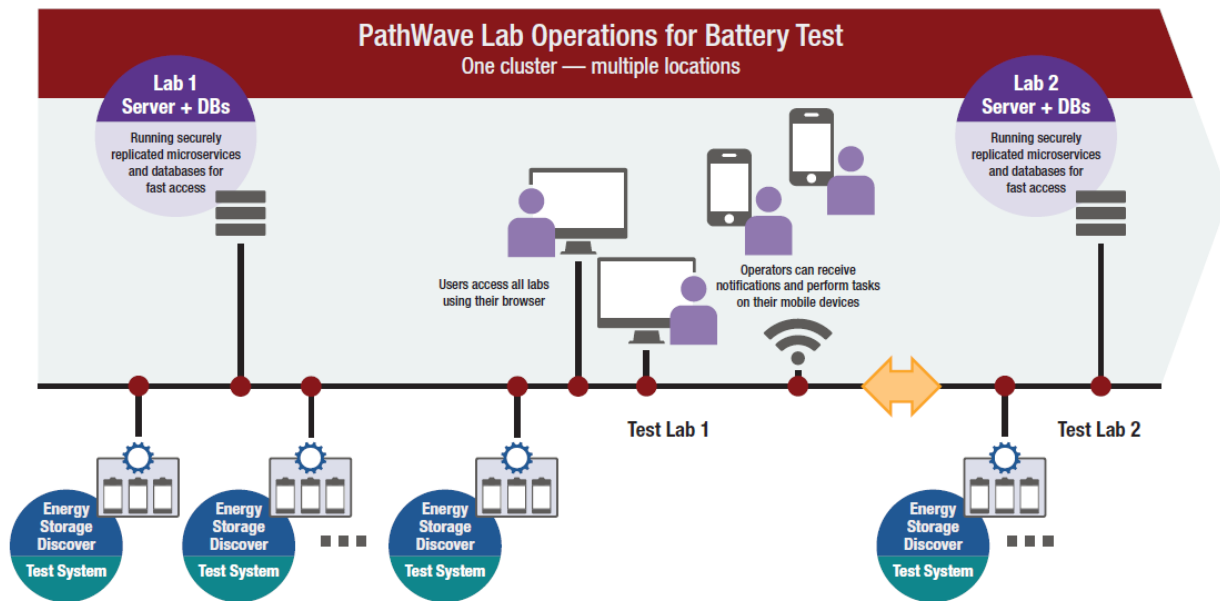


Figure 1. PathWave Lab Operations for Battery Test manages multiple test systems in a laboratory

- Easily register and track test objects in your lab.
- Quickly analyze your data and statistics.
- Organize your test lab workflow, documents, lab orders, and tasks.
- Plan and optimize your test capacities and sequences.
- Share and control test plans, results, data, and other documents. Collaboration and discussion among lab staff become easy and productive.
- Remotely control your lab and its devices anywhere, anytime.
- Manage and route notifications to your preferred device or email service.
- Automated, networked, and scalable for any size of testing lab – up to thousands of channels.

Electrochemical Impedance Spectroscopy (EIS)

You can gain deeper insights into the characteristics of your cells with the optional EIS capability. This provides integrated electrochemical impedance spectroscopy measurements per test-channel, independently programmable within a test sequence.

Parallel Channels to Increase Current

You can increase the total current/power for a cell being tested by manually connecting channels in parallel, external to the system cabinets. Up to 10 identical-current channels can be connected in parallel up to maximum total current of 1000 A. For example:

- Up to two ± 400 A channels can be connected in parallel to provide up to ± 800 A.
- Up to three ± 300 A channels can be connected in parallel to provide up to ± 900 A.
- Up to 10 channels rated at ± 100 A can be connected in parallel to provide up to ± 1000 A.

The Energy Storage Discover software (page 3) allows you to define groups of channels that have been connected in parallel, so they may be treated as a single channel for programming purposes.

Note: For SL1007A configurations with two cabinets of power electronics (see the configuration table on page 7), channels from the power electronics in one cabinet cannot be connected in parallel with the channels from the power electronics in the second cabinet.

SL1007A Specifications

Voltage/Current Control and Measurement	
Voltage accuracy*	$<\pm 1$ mV (typ. 0.5 mV)
Current accuracy*	± 0.05 % (measured value) ± 0.01 % (Full Scale offset)
Current dynamics	3 ms (10 to 90 % of max. current range) **
Resolution	32 bits
Sampling frequency	1 kHz

* Measurement and programming accuracy

** No switching times at transition from positive to negative current and vice versa.

Operating Characteristics

Temperature Measurement	≤100 A	200 A	≥300 A
Temperature channels per DC channel	1x	2x	3x
Measurement type	Pt1000 (4-wire measurement)		
Measurement accuracy	±1 K		
Sampling frequency	10 Hz		
Ambient Conditions			
Storage temperature	5 to 40 °C		
Operating temperature	10 to 35 °C		
Relative air humidity	30 to 75 %		

System AC Power	
Efficiency	>90 %
Reactive power compensation under load	$\cos(\varphi) > 0.98$
Mains supply	3 ~, Protective Earth, N, 400 VAC (+10 %/-5 %), 50 Hz (±0.2 Hz)
System Cooling	
Cooling type	Water/air heat exchanger
Heat transfer	Max. 10 % of total output power
Inlet temperature	10 to 20 °C
Return temperature	Max. 30 °C
Inlet pressure	Max. 6 bar
Pressure difference	Min. 1 bar
Connection	$\frac{3}{4}$ "

Documentation

Supplied documents: Operating instructions in English, CE Declaration of Conformity, Acceptance and calibration protocol. Contact Keysight to discuss custom or special requirements.

Channel Options and Dimensions

System cabinet

- The System is placed on rollers and can be moved flexible.
- Dimensions (H x D): 2.6 m x 0.8 m

The system width varies depending on current range, and the number of channels selected:

System Width								
Current Range	±25 A	±50 A	±75 A	±100 A	±200 A	±300 A	±400 A	±600 A
4 channels	-	-	-	-	0.8 m	0.8 m	0.8 m	1.6 m
6 channels	-	-	-	-	0.8 m	0.8 m	0.8 m*	1.6 m
8 channels	-	0.8 m	0.8 m	0.8 m	0.8 m	1.6 m	1.6 m	-
12 channels	-	-	-	-	0.8 m*	1.6 m	1.6 m*	-
16 channels	0.8 m	0.8 m	0.8 m	0.8 m	1.6 m	-	-	-
20 channels	-	-	0.8 m	0.8 m	-	-	-	-
24 channels	0.8 m	0.8 m	0.8 m	0.8 m*	1.6 m*	-	-	-
32 channels	0.8 m	0.8 m	1.6 m	1.6 m	-	-	-	-
36 channels	-	-	1.6 m	1.6 m	-	-	-	-
40 channels	1.6 m	1.6 m	1.6 m	1.6 m	-	-	-	-
48 channels	1.6 m	1.6 m	1.6 m	1.6 m*	-	-	-	-
56 channels	1.6 m	1.6 m	-	-	-	-	-	-
64 channels	1.6 m	1.6 m	-	-	-	-	-	-

* Max. simultaneity factor 0.8. For these configurations, up to 80 % of the maximum rated power is available if all channels are used for charge-discharge at the same time, due to system cooling reasons. Because the maximum rated power of the channel is based on a channel output voltage of 6 V, lower channel output voltages consume less than full rated power. The channel output voltage required to deliver the desired voltage at the cell will depend on the IR voltage drop in your wiring connecting the system to the cell.

System Options

Electrochemical Impedance Spectroscopy (EIS)

SL1007A-001 Electrochemical Impedance Spectroscopy	
Description	Integrated EIS per test-channel, independently programmable within a test sequence
Measuring method	Potential- and galvanostatic
Frequency range	1 mHz to 10 kHz
Absolute accuracy	$\pm 50 \mu\Omega$
Relative accuracy	1 %
Phase accuracy	2 degrees

SL1070A Test Bench Guard-ready enable kit

To use the Keysight Scienlab Test Bench Guard redundant safety system with the SL1007A, you must separately order the Keysight SL1070A in a configuration that matches your configuration of the SL1007A Cell Test System. You may order either or both of the following optional items to enable the SL1070A Test Bench Guard to operate with your SL1007A Cell Test System.

SL1079A-CM1 Manual Parallel Connection

- Support by the Test Bench Guard (TBG) for manual parallel connections of test channels.
- Supports monitoring of the current and voltage limit values of the respective director of the redundant measurements in parallel operation.

SL1079A-CM2 Redundant Current/Voltage Measurement

- Data rate 16 2/3 Hz per measuring signal (connection via Ethernet)
- Measurement accuracy ± 1 % of measurement range of current and voltage.

Note: Use of the SL1079A–CM2 Redundant Current/Voltage Measurement requires the SL1070A-105 option to be chosen when ordering the SL1070A.

Support Service Options

The service features of the SL1007A Cell Test System can be tailored to the requirements of your facilities, expertise, and the overall scope of your test project. Keysight will work with you to define your service options based on your requirements and goals. Keysight offers the following services to secure a successful project execution and to reduce your ramp-up time.

PS-XPS-100 Project Management and Technical Consulting

With this Project Management service, an experienced Keysight project manager is dedicated to your project and acts as direct communication interface between Keysight and your Project Management Team.

The project manager assumes these responsibilities:

- Observes internal project progress, helping ensure the project schedule and project milestones are maintained.
- Notifies you of any unexpected project-related events or occurrences.
- Provides complete and accurate project documentation for your project.

R9001A-201 Installation Service

The scope of this Installation Service strongly depends on your individual facilities. After sharing all relevant information and requirements regarding test bench components that require installation such as connection to the local grid and the local water supply with your Keysight field engineer, the scope of service personnel and material costs for installation can be calculated.

R9001A-202 Commissioning – Test Solution

The Commissioning Service is offered to provide guidance to your team during the initial usage of the test bench following installation. Commissioning is highly recommended for each test bench project. The Commissioning Service includes:

- Local presence of experienced test bench engineer(s) during initial usage of the test bench.
- Consulting with your personnel regarding the intended usage of the test bench (e.g. initial test with your test specimen).
- Review of executed hardware installation of Keysight products.
- Review and consulting related to software settings of operational software if ordered.
- Travel expenses of Keysight personnel related to the performing of the commissioning service.

Note: Commissioning is offered on a daily basis. Keysight recommends at least two days for each test bench project.

HS0002A-100 Productivity Assistance

Productivity Assistance is offered to support, consult, and train your operational personnel to reduce the ramp-up time for initial usage of a new test bench and for any unexpected system behavior during the test bench life cycle. Productivity Assistance is executed either remotely (phone/ Internet) or on site (on request). It includes:

- Direct access to an experienced system specialist via Phone/Internet.
- Support for failure analysis and troubleshooting.
- Software and programming support and consulting.

Note: Keysight recommends at least two days of Productivity Assistance for each test bench project.

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

