

Scienlab Battery Test System

Pack Level – Up to 270 kW

SL1710A SL1720A SL1730A SL1740A



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Scienlab Battery Test System – Pack Level

Systems with an output power range of 90 kW up to 270 kW

Highly efficient test of high-power components on a small footprint.

The Keysight's Scienlab Battery Test System – Pack Level with the new silicon carbide technology is a highly efficient system based on state-of-the-art technology and allows to realistically emulate the environment of the future battery pack application in order to test the high-power battery pack comprehensively and improve its functions and safety.

The test system is supplied with the advanced test and control software Energy Storage Discover (ESD). It helps the user to draw conclusions about durability, range and efficiency, the communication, functioning, heating of the pack and the interaction with other components such as the BMS. The possible switching frequency of silicon carbide transistors is more than a factor ten greater than the switching frequency of IGBTs. This results in a significantly higher efficiency and, conversely, a lower cooling power requirement and lower energy consumption. This space-saving technology without the need for large cooling systems enables systems with small installation space.

Highlights

- Smaller footprint compared to systems with similar power
- 1.5 MW power due to parallelization
- Up to 1500 Vdc for high voltage batteries
- Based on new HV-SiC technology
- Highly efficient with a recovery capability of 96%
- Reduced energy consumption and cooling water

	SL1710A	SL1720A	SL1730A		SL1740A		
Power options	90 kW	90 kW	180 kW		270 kW		
Current options ¹	300 A	300 A	300 A	600 A	300 A	600 A	900 A
Voltage options	50 to 1000 V 50 to 1200 V 50 to 1500 V						

¹ Parallel connection of several systems possible to achieve higher currents.

Output Characteristics and Data Acquisition

Voltage	1000 V	1200 V	1500 V
Voltage accuracy ¹	±0.03% of measured value, ±150 mV (offset)		

¹ Measurement and programming accuracy.

Current	300 A	600 A	900 A
Current accuracy ¹	±0.03% of measured value, ±150 mA (offset)		
Ripple	< 0.2% FS _{eff} = 1.2 A _{eff}	< 0.2% FS _{eff} = 2.4 A _{eff}	< 0.2% FS _{eff} = 3.6 A _{eff}
Rise and fall time ²	-90% → +90% < 1 ms @ 300 V		

¹ Measurement and programming accuracy.

² No switching times within power stage or channel at transition from positive to negative current and vice versa.

Data acquisition and re-calibration	
Resolution	32 bits
Sample rate	Maximum 20 kS/s
Recommended re-calibration period	12 months

System Cabinet

	SL1710A	SL1720A	SL1730A	SL1740A
Basic dimensions (H x W x D)	2.170 x 1.600 x 615 mm	2.170 x 2.400 x 615 mm		
Weight approx.	1.100 kg	1.350 kg	1.600 kg	1.850 kg

- Protection type IP 54
- Control cabinet color: RAL 7035
- Ambient temperature: 10 to 40 °C
- Air humidity: 30 to 75% relative humidity

Documentation

- Operating instructions in English
- CE Certificate of Conformity

System design and realization according to applicable safety and regulatory requirements (such as EU Directives). Special customer standards are not taken into account by default and require explicit agreement and quotation.

System AC power	
Efficiency	96%
Mains supply	3 ~, Protective Earth, 400/480 V, 50/60 Hz
System cooling	
Cooling type	Water/air heat exchanger
Heat transfer	Max. 5% of total output power

Pre-fuse on site	90 kW	180 kW	270 kW
400/480 VAC	160 A gG	315 A gG	500 A gG

Safety

- Power contactors on the mains side ensure voltage-free operation
- Output contactors capable of disconnecting at full load current
- Emergency stop push button
- Discharge of all internal high-voltage sources with regard to service
- Integration into Test Bench Software (ESD) and Test Bench Guard (TBG)
- Insulation resistance: ≥ 10 MOhm
- Intrinsically safe against overheating, overpower, short-circuit
- Reverse polarity protection
- Signal light with magnetic mounting
 - Red: Error; Yellow: Active, Green: Ready

System Options

System type

SL17X0A-HOS Host system with Test Bench Control System

Battery Test System with an integrated industrial PC to control the overall test stand via the automation Software Energy Storage Discover.

SL17X0A-MBX Member system 1 to 5

Additional Battery Test System for increasing the power/current/channels of the battery test system group.

Additional features

SL17X0A-F01 Precision current range – 200 A

- Measuring range: ± 200 A
- Accuracy: $\pm 0.03\%$ of measured value, ± 60 mA (offset)

SL17X0A-F03 Precision current range – 50 A

- Measuring range: ± 50 A
- Accuracy: $\pm 0.03\%$ of measured value, ± 15 mA (offset)

SL17X0A-F02 Precise extended voltage range – 300 V

- Voltage Range: 20 V to 300 V
- Accuracy: $\pm 0.03\%$ of measured value, ± 45 mV (offset)

Cabinet base option class

SL170XA-C01 Base stand

Battery Tester is placed on top of base stand.

SL17X0A-C02 Rollers

Battery Tester is placed on top of heavy-duty rollers and can be moved flexible.

Additional cabinet options

SL170XA-C03 Mirrored cabinet layout

To provide a higher flexibility for the lab design a mirrored cabinet layout is available.

SL17X0A-C04 Halogen-free cables

Cabling inside the system cabinet with halogen-free material.

SL17X0A-C05 Cabinet interior lighting

Illumination of the output terminals in the control cabinet.

Safety functions

SL170XA-T01 Insulation monitor

Insulation monitor Bender iso685 to supervise the isolation value of the connected DUTs.

SL17X0A-T02 Insulation monitor – key switch

Key switch for enable/disable the insulation monitor. The following operation modes are available:
0: Auto, 1: Off, 2: On

SL17X0A-T03 Test Bench Guard

Beckhoff Industrial PC and safety programmable logic controller (PLC) for operating a battery test stand in a safe and supervised condition. The individual safety matrix is the backbone of the system and defines the reaction of the safety measures in a certain situation. The safety matrix is always tailored to the customer's hazard and risk analysis.

SL17X0A-T04 Redundant current/voltage measurement

- Redundant DUT current and voltage measurement to maintain the safety of the test stand if the primary current and voltage measurement – performed by the pack test system – has failed.
- Interface to the test bench guard (Ethernet)

Upgrade options

Power upgrades

Extension of the SL1720A or SL1730A system with additional 90 kW/300 A power modules.

- SL1700AU-PU1 Power upgrade (90 kW to 180 kW)
- SL1700AU-PU2 Power upgrade (90 kW to 270 kW)
- SL1700AU-PU3 Power upgrade (180 kW to 270 kW)

Voltage upgrades

Extension of the voltage range to 1200 V or 1500 V.

- SL1700AU-VU1 Voltage upgrade (1000 V to 1200 V)
- SL1700AU-VU2 Voltage upgrade (1000 V to 1500 V)
- SL1700AU-VU3 Voltage upgrade (1200 V to 1500 V)

Current upgrades

Increase the output current of a system via software. If the maximum achievable current with certain hardware is already reached (see table on page 3), further increase is only possible with additional hardware (power upgrade or an additional system connected in parallel).

- SL1700AU-CU1 Current upgrade (300 A to 600 A)
- SL1700AU-CU2 Current upgrade (300 A to 900 A)
- SL1700AU-CU3 Current upgrade (600 A to 900 A)

Project Management, Consulting and Installation Services

Service features depend on the facilities, customer expertise, and overall scope of the project. For that reason, it is not possible to give exact service efforts without knowing the customer's requirements and goals. Keysight offers the following services to secure a successful project execution and reduce ramp-up time for our customers.

PS-XPM-100-SL Project management services

Keysight recommends Project management services for each test bench project. By ordering the Project management services, an experienced project manager is dedicated to your project and acts as a direct communication interface from Keysight to the customer's project management team.

The project manager takes over the responsibility:

- To develop and manage the project plan.
- To track project progress and milestones.
- Communication project status regularly and ensure any unscheduled project events or project deviations are communicated and promptly discussed with the customer project team.
- To provide complete and accurate project documentation to the customer.

PS-XINS-100-SL Project installation services

These services provide installation expertise to manage, deliver and coordinate local facilities installation for the test bench. Specific installation efforts depend on the customer's individual facility, the locally available power and cooling and the test bench being delivered.

PS-XENG-100-SL Project engineering services

Project engineering services provide specialized engineering services during project development and implementation. The customer's project team will have access to engineering expertise to aid in various tasks specific to their project including but not limited to – safety matrix and test bench guard, facilities and lab layout, special power requirements, etc.

PS-XCOM-100-SL Project commissioning services

Project commissioning services for the test solution provide an experienced test bench engineer to validate and complete the test bench setup in readiness for the customer's initial usage. It includes validating specific hardware and software configurations per the project requirements and any specific consulting agreed to beforehand, given the test bench's customer-specific usage.

Startup assistance training

Startup assistance training provides insight into the solution setup and quickly prepares your team to use the solution including hardware and software. Receive training at your site with the purchase of a new solution. For ongoing training needs, cost-effective web services and advanced training are available through the Post-Acceptance Services described below.

Basic training - 1 day training about introduction to the hardware

- Switching a system on, order of instruments
- Getting a system in ready mode (software & hardware)
- Resetting system & safety matrix after emergency off
- Connect cables to DUT
- Setting up a system in software and start a test
- System care

Advanced training - 1 or 2 days advanced use of the software

- Programming examples and exercises
- Details on system warnings/errors and how to react to them

Premium - Custom # of days

- Custom content based on customer needs

KeysightCare Solutions

The KeysightCare Solutions provide comprehensive coverage for all support needs, including all hardware support and technical support.

Two levels of post-delivery solution support are available:

- KeysightCare Premium Solution Support – Prioritized support designed to minimize down time with committed technical support response times and hardware support turnaround times.
- KeysightCare Basic Solution Support – complete solution coverage for installations where uptime is less critical. Includes technical support and hardware support with non-committed response times.

Both Premium and Basic Solution support include on-site options. This is necessary for large installations and an option for smaller solutions (such as some portable solutions).

Service deliverables

	KeysightCare Solution Basic	KeysightCare Solution Premium
	Onsite R-55L-001-X ⁷	Onsite R-55M-001-X ⁷
Technical support (Application and solution specific for both hardware and software¹)		
Self-service web portal & knowledge center, 24/7	✓	✓
Technical support response times	2 business days	4 business hours ³
Weekend support available on request ²	X	✓
On-site technical support response time ²	7 business days ²	3 business days ²
Software configuration support ¹	✓ remote	✓ remote or onsite ⁴
Solution hardware support⁵		
Repair service coverage	✓	✓
Repair service turnaround or onsite response time	7 business days response	3 business days response
Calibration service ⁴	✓	✓
Calibration type	Keysight Calibration	Keysight Calibration + Measurement Uncertainty + Guard Banding
Calibration turnaround or onsite response time	mutually scheduled	priority scheduled
Preventive maintenance ⁸	X	✓
Preventive maintenance frequency	X	twice a year
Application of service notes ⁶	✓ mandatory notes only	✓ mandatory and recommended notes
Customer care review twice a year on request	X	✓

- 1 KeysightCare Software Agreement required for software support including software updates and notifications. Onsite support at the discretion of Keysight.
- 2 Onsite technical support is provided or at the discretion of Keysight. Weekend support is only available for existing tickets by prior arrangement.
- 3 Technical support response times may vary for specific solutions.
- 4 Annual calibration service and calibration after repair if applicable is included for instruments that require calibration.
- 5 Offering may be different by country. Certain solution configurations are not applicable for return to Keysight. Please contact regional representatives.
- 6 We perform application of service notes during scheduled service events.
- 7 Service Product Number (SPN). When ordering, update with the relevant SPN based on the length of service required (e.g. -1, -2, -3, or -5 for 1 year, 2 years, 3 years or 5 years).
- 8 3rd party products are excluded for basic and premium packages.

Find out more about KeysightCare Service and Support [here](#).

Extend the Capabilities of your Scienlab Battery Test System

Keysight provides battery test system software that starts with Scienlab Energy Storage Discover to control your individual battery test systems such as the SL1000A, 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

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.

Find out more about Scienlab Energy Storage Discover [here](#).

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.

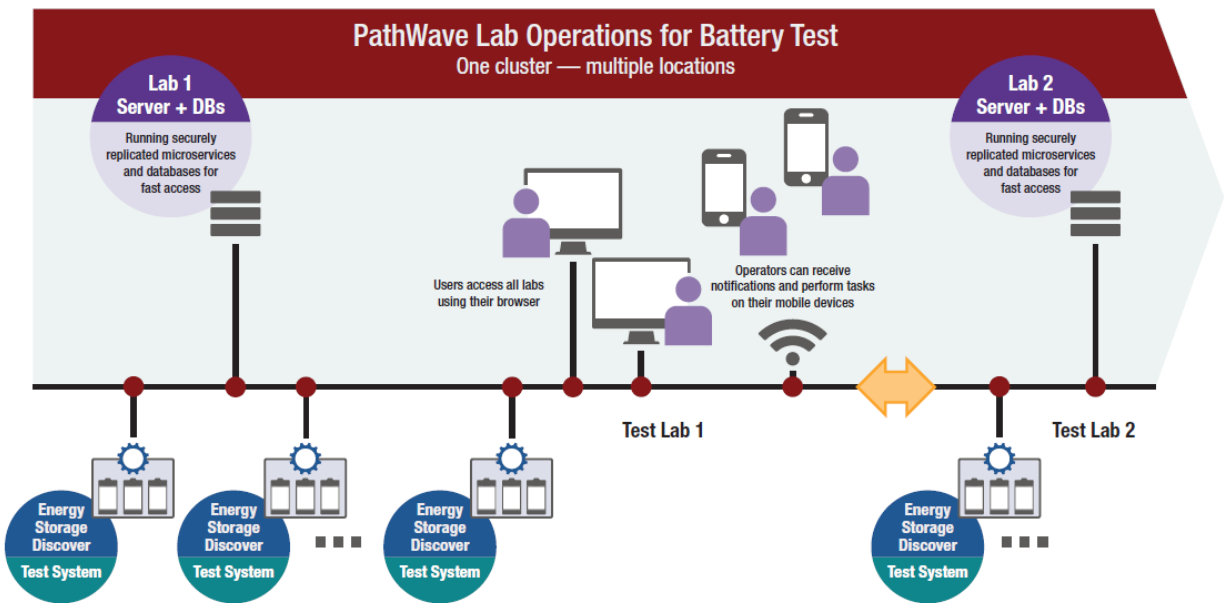


Figure 1. PathWave Lab Operations for Battery Test manages multiple test systems in a laboratory.

- 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.

Find out more about PathWave Lab Operations for Battery Test [here](#).

Meet the SL106XX Series Scienlab Measurement & Control Module

The Scienlab SL106XX Series covers a wide range of test, measurement, and control tasks. If required, you can combine your measurement task and scope.

They are ideal for carrying out challenging measurement tasks, even under difficult environmental conditions, for example, a climate chamber. The modules offer top quality, robustness, and easy and intuitive operation.

- Precise, reproducible, and time-synchronous measurement data recording
- Fully electrically isolated measurement channels up to 1000 V insulated between each channel
- Connection via open Ethernet interface; automatic detection of Scienlab Energy Storage Discover (ESD) software
- Easy to use in challenging test environment (-40 to +80 °C, IP20)
- Individual combination of different measurement module types

Find out more about the Scienlab Measurement & Control Modules [here](#).

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

