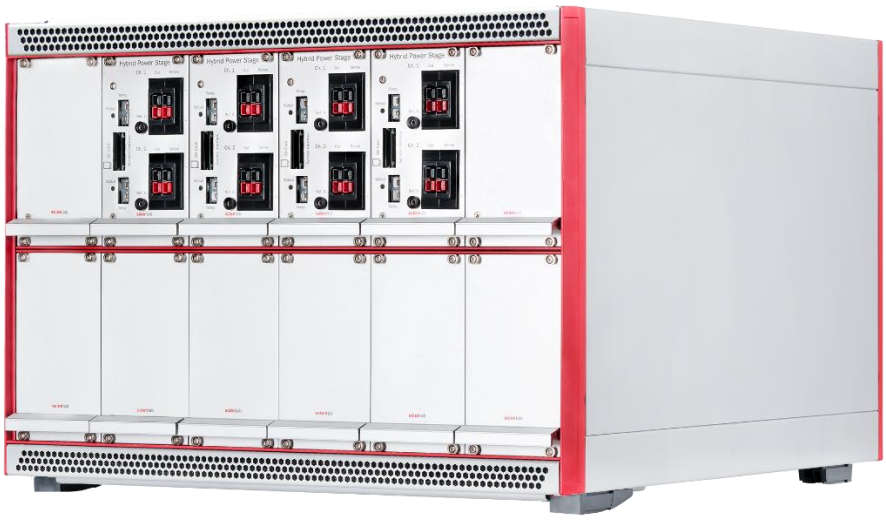
SL1004A Scienlab Battery Test System Cell Sample Level

Tabletop tester with eight 5 A channels



KEYSIGHT

Tabletop Battery Cell Test System

Systems up to 8 V | 5 A | 0.04 kW per channel

The Keysight tabletop cell test system can simultaneously test up to eight cells. Common tests include capacity, internal resistance, state of charge and cyclic voltammetry. Temperature effects are easily correlated using built-in temperature channels.

The SL1091A Scienlab Energy Storage Discover (ESD) software makes it easy to configure tests and record data. Learn more about the ESD software below.

High performance for all your applications

From cell R&D to quality verification, the SL1004A packs the features you need to create and select the best cells.

- Multiple current ranges provide higher accuracy
- Reference electrode for determining the contribution of each cell component
- Four quadrant operation, test cells down to zero volts or reverse voltage

Highlights

- Eight channels that feature a reference electrode and temperature input
- Quickly add and remove cells with detachable Anderson Powerpole® connector

The following voltage, current and power options are available per channel:

Voltage range options per test channel	-2 to +8 V
Current options per test channel	±5 A
Power per test channel	±0.04 kW

Control unit and power amplifier

- Embedded system for autonomous program sequence control
- Measurement data acquisition
- Communication to test environment via Ethernet

Three modes of operation

- Constant current
- Constant voltage
- Constant power

For each kind of control, the voltage measurement can be chosen between anode/cathode, reference electrode/cathode or reference electrode/anode.

Analog acquisition of voltage and current data acquisition (4-wire measurement)

Voltage options	-2 to +8 V
Voltage accuracy[1]	±1 mV

[1] Measurement and programming accuracy

Current ranges	-150 to +150 µA	-5 to +5 mA	-150 to +150 mA	-5 to +5 A
Current accuracy[1]	±0.05% of measured value, ±30 nA (offset)	±0.05% of measured value, ±1 µA (offset)	±0.05% of measured value, ±30 µA (offset)	±0.05% of measured value, ±1 mA (offset)

1 Measurement and programming accuracy, automatic selection of most suitable measurement range. Number of Power-Line-Cycles (NPLC) = 100.

- Sample rate: up to 1 kHz
- 1x temperature per input: Thermocouple Type K, -20 to +200 °C, ±1 K per test channel, 8 Hz sample rate[1]
- Control of external components:
    - Temperature chamber, conditioning unit (Ethernet interface required), etc.
    - Additional protocol implementation possible if component not yet supported

1 Supplemental characteristic

Current output characteristics

Current option	±5 A
Rise and fall time[1]	< 10 ms (10 to 90% of max. current range)

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

Inherent safety

- Inherent safety against overheating, overcapacity, short circuit, and idling
- Monitoring of all internal voltages, currents, and temperatures

Manual parallel operation

- Manual parallel operation of two channels
- Requires an interconnection of the output contact and sense terminals
- Director/follower definition via control software Energy Storage Discover (ESD)

DUT connection

- Load and sense connection via Anderson Powerpole® connector (see option SL1004A-P01)
- Reference electrode connection via 2 mm laboratory plug
- Thermocouple connection via miniature plug

Dimensions (H x D x W)		Channels
Stand feet folded in	0.33 x 0.45 x 0.5 m	8
Stand feet folded out (necessary for proper operation)	0.37 x 0.45 x 0.5 m	

Note: Width and depth without accessories such as switches, etc.

- Degree of protection IP43
- Ambient temperature: 10 to 40 °C
- Air humidity: 30 to 75% rel. H.
- Sound pressure level according to DIN EN 3744 <70 dB(A) measured at 1 m distance from front

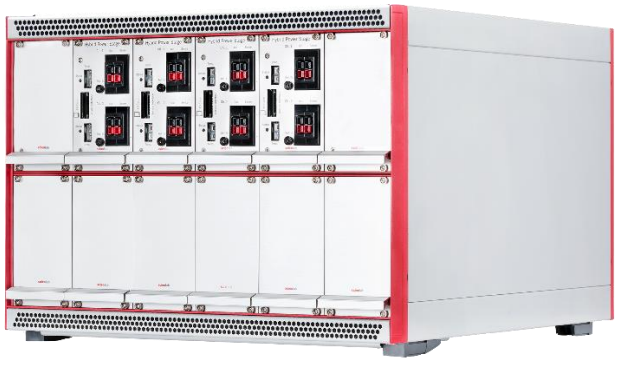


Figure 1. SL1004A Tabletop device (8 channels 5 A)

Mains supply

- 1, N, PE 230 V (+10%/-5%) 50 Hz (±0,2 Hz)

System cooling

- Fan forced air

Documentation

- Operating instructions
- CE declaration of conformity
- Acceptance and calibration protocol

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.

SL1004A-P01 Connector Standard

Assembly set for Anderson Powerpole® Connector to connect load and sense lines of one channel consisting of:

- 1x APP 1460G1 PP PAK 2-4P HSG-PLUG W/LATCH
- 1x APP 115G7 CABLE CLIP HARDWARE
- 4x APP Crimp PP15 – 1332 PP15 #16-20 AWG CONTACT
- 2x APP PP15/45 HOUSING ONLY BLACK
- 2x APP PP15/45 HOUSING ONLY RED

Suitable for wire diameters of #16-20 AWG or 1.3 to 0.52 mm².

Note: Connectors for reference electrode (2 mm laboratory plug) and thermocouple (miniature plug) are not included in this kit.

Figure 2. Connector

Software to Control Cell Test Systems

Keysight provides cell test system software that starts with Scienlab Energy Storage Discover to control your individual cell test systems such as the SL1004A 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.

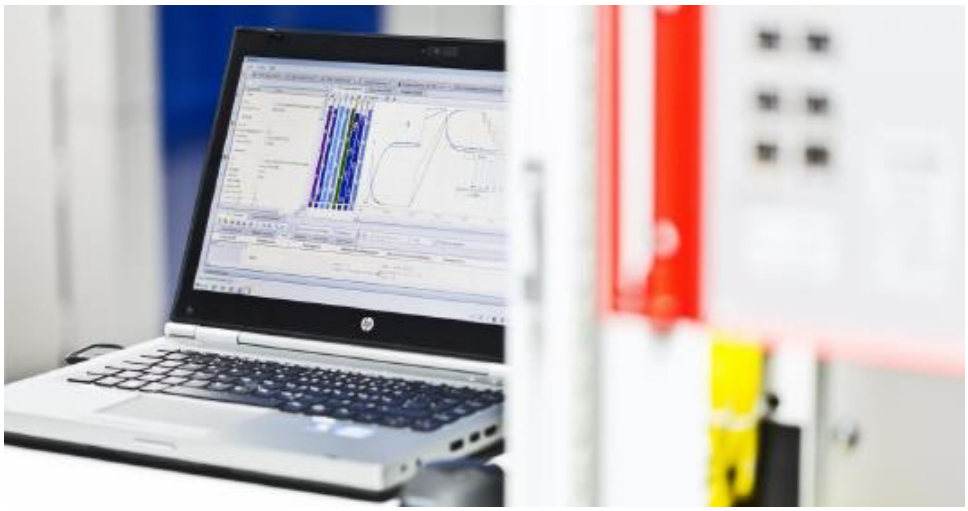


Figure 3. Scienlab Energy Storage Discover controls individual test systems.

- Central controlling component for all Keysight Scienlab-brand energy storage test environments. The SL1004A is supported up to bundle version 21.2.0 which includes ESD version 9.3.
- Comprehensive overview, user-friendly operation, easy-to-learn.
- Powerful visualization of tests and results.
- ESD supports creating test programs even offline.
- 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 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.

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 customers 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.

Education Service

Education Service provides insight into the solution setup and quickly prepares your team to use the solution. Keysight experts help you optimize your usage of Keysight solutions whether through integration or optimization of performance. Receive training at your site to gain the confidence to make accurate, efficient, fast, and repeatable measurements, every time.

PS-S40-01 Startup assistance

Instrument fundamentals and operations starter training

- 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

PS-S40-02 Advanced training

Technology and measurement science standard training

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

PS-XPS-100 Premium consulting

Custom training to focus on your application

- Customized content based on customer needs

KeysightCare for Solutions

KeysightCare for Solutions services goes beyond basic warranty, providing a priority-one connection between our resources and your teams. Every support tier includes access to the Keysight Support Portal and Knowledge Center where you can find answers, manage service requests, and interact with Keysight experts familiar with the instruments and software you are using and the challenges you face. And all the packages offer onsite options for large systems which cannot be moved.

- Warranty Plus – Reduce risk and avoid project delays with technical support coverage.
- Assured – Increase supportability to match your application needs with a committed turnaround time.
- Enhanced – Keep your project schedules on track and receive priority support and even faster turnaround times for repairs and calibration to optimize your solution.

Service deliverables

	KeysightCare for Solutions Warranty Plus	KeysightCare for Solutions Assured	KeysightCare for Solutions Enhanced
	Onsite Upgrade R-55T-005- X[1]	Onsite Upgrade R-55U-005-X[1]	Onsite Upgrade R-55V-006-X[1]
Solution technical support (SW[2] & HW)			
Keysight Support Portal & Knowledge Center, 24x7	•	•	•
Remote technical support response time[3]	2 business days	4 business hours	2 business hours
Onsite Technical Support[4]		•	•
Solution hardware support			
Repair service coverage	Onsite	Onsite	Onsite
Onsite response time	No commitment	12 business days response time[6]	5 business days response time[6]
Solution calibration[7]			Up to Keysight calibration + uncertainty + guard banding - Onsite
Calibration turnaround time			Scheduled
Application of service notes	Safety and recalls	Recommended - during service	Recommended - proactive
Preventative maintenance[5]			•
Proactive firmware release notifications		•	•

1 When ordering, update with the relevant (Solution Product Number (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).

2 KeysightCare Software Agreement required for software support.

3 Remote Technical Support Response time is measured from the time you contact the KTAS team to have an initial meaningful response from the case owner.

4 Onsite technical support is provided or at the discretion of Keysight.

5 3rd party products are excluded for assured and enhanced packages.

6 Response time is measured from the date the service request is received to the date Keysight arrives at your site.

7 Recommended re-calibration period is 12 months.

Find out more about KeysightCare Service and Support here.

For more information on Keysight Technologies' products, applications, or services, please visit: www.keysight.com

Published in USA, April 20, 2023, 5992-4253EN