

# Scienlab Battery Test System

Cell Sample Level

SL1004A SL1005A



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## Battery Test System – Cell Sample Level

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

The Battery Test System – Cell Sample Level is an electric system designed to emulate sink and source for battery cells for automotive and industrial applications.

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

Voltage Range Options per Test Channel	-6 to +6 V	-2 to +8 V
Current options per test channel	±5 A	±5 A
Power options per test channel	±0.03 kW	±0.04 kW

### Control unit and power amplifier

Measurement and Control Unit (MCU) – Linux real-time PC

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

### Different kinds of control

- Constant current
- Constant voltage
- Constant power
- Cyclic voltammetry

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	-6 to +6 V	-2 to +8 V
Voltage accuracy*	Full Scale 0.01 %, ±1 mV	

\* Measurement and programming accuracy

Current Options	-150 to +150 $\mu$ A	-5 to +5 mA	-150 to +150 mA	-5 to +5 A
Current accuracy*	±0.05 % of measured value, ±30 nA (offset)	±0.05 % of measured value, ±1 $\mu$ A (offset)	±0.05 % of measured value, ±30 $\mu$ A (offset)	±0.05 % of measured value, ±1 mA (offset)

\* Measurement and programming accuracy, automatic selection of most suitable measurement range

- Resolution: 32 bits
- Sample rate: up to 1 kHz
- 1x temperature input: Thermocouple Type K, -20 to +200 °C,  $\pm 1$  K per test channel, sample rate: 8 Hz
- Control of external components:
  - Temperature chamber, conditioning unit (Ethernet interface required), etc.
  - Additional protocol implementation possible if component not yet supported

### Current output characteristics

Current Option	$\pm 5$ A
-90 to +90 % of current range	-4.5 to +4.5 A
Rise and fall time	<10 ms (with output voltage of 0 V)

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

### Intrinsic safety

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

### Manual parallel operation

- Manual parallel operation of two output stages possible
- Output contacts including sense circuit have to be interconnected by the customer
- 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

## System cabinet

Basic dimensions depending on amount of test channels:

Number of Test Channels Regarding Overall Dimensions	
0.42 m x 0.45 m x 0.5 m (H x D x W)	up to 16 (tabletop device)
2.4 m x 0.8 m x 0.8 m (H x D x W)	60 to 96 (system cabinet)

**Note:** Height includes rollers (system cabinet only). Width and depth without accessories such as switches, etc.

- Protection type IP 54 (system cabinet), IP43 (tabletop device)
- 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



SL1005A System cabinet (96 channels 5 A)



SL1004A Tabletop device (12 channels 5 A)

### **Mains supply (system cabinet)**

- 3, N, PE 400V (+10 %/-5 %), 50 Hz ( $\pm 0,2$  Hz)
- Functional Earth (FE)

### **System cooling (system cabinet)**

- Cooling of amplifiers
- Water/air heat exchanger
  - Heat transfer: max. 10 % of total output power\*
  - Intake:  $\frac{3}{4}$  ", 6 to 25 °C
  - Return:  $\frac{3}{4}$  ", max. 30 °C
  - Maximum inlet pressure 6 bar, without pressure impact, pressure difference > 1 bar

\*e.g. total output power 96 kW, max. heat transfer 9.6 kW

### **Mains supply (tabletop device)**

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

### **System cooling (tabletop device)**

- Cooling of amplifiers
- Blower

### **Safety (system cabinet only)**

- Emergency stop switch / main switch (red/yellow) for all-pole disconnection
- Fast stop push button (black)
- Door hinge mounted on the right side
- Door handles: comfort handles with safety lock
- Signal light with magnetic mounting
- Red: error; yellow: running, green: ready for operation

### **Documentation**

- Operating instructions in English
- 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 mm<sup>2</sup>.

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

## System Options

### Cabinet base option class

Only available for SL1005A Cabinet Version.

#### SL1005A-701 Base Stand

Cell test system is placed on top of 15 cm high base stand (reduces cabinet height by 10 cm).

#### SL1005A-702 Rollers

Cell test system is placed on top of high rollers and can be moved flexible.

## 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 requirements and goals of the customer. Keysight offers the following services to secure a successful project execution and to reduce the ramp-up time for our customers.

### PS-XPS-100 Project Management and Technical Consulting

Keysight recommends Project Management and Technical Consulting for each test bench project. By ordering the Project Management Service, an experienced project manager is dedicated to your project and acts as direct communication interface from Keysight to the customers project management team.

The project manager takes over the responsibility:

- To observe internal project progress and secure that project schedule/ project milestones are kept.
- That any unscheduled project events are immediately communicated and discussed with the customer.
- To provide complete and accurate project documentation to the customer.

### R9001A-201 Installation Service

The scope of the Installation Service depends on the customer's facility. Share all relevant information and requirements regarding test bench components that require installation, such as connection to the local grid and to the local water supply, with your local field engineer so that scope of service personnel and material costs for installation can be calculated.

**Note:** Installation can also be executed by the customer.

### R9001A-202 Commissioning Service

The Commissioning Service is offered to guide the customer during first usage of the test bench after installation. Commissioning Service is recommended for each test bench project. It includes:

- Local presence of experienced test bench engineer during first usage of the test bench
- Consulting of customer personnel with regards to intended usage of the test bench (e.g. initial test with customer specimen)
- Review of executed hardware installation of Keysight products
- Review and consulting to software settings of operation software if ordered
- Travel expenses

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



## HS0002A-100 Productivity Support Service

The Productivity Support Service is offered to support, consult and train the customer's operation 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 Support Service 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 trouble shoot
- Software and programming support and consulting

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

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