

# SL1041B Scienlab Dynamic DC Emulator

Mid-Power Series – up to 50 kW



# System Overview

The Scienlab Dynamic DC Emulator (DCE) Mid-Power Series from Keysight provides up to five power stages, called Regenerative Power Systems (RP79xx Series). It is a family of bi-directional, regenerative DC power supplies. The regenerative capability enables the energy normally consumed to be returned to the power grid cleanly, saving costs associated with energy consumption and cooling.

Additionally, by combining the seamless source and load functionality into a compact 3U-high package, not only do you save energy but also floor space and integration time. The Scienlab Dynamic DC Emulator Mid-Power Series with up to five RP79xx units delivers the fastest, most accurate, integrated regenerative power system:

- Up to 950 V, up to  $\pm 100$  A, up to 50 kW
- Create up to 150 kW power ( $\pm 300$  A) or loading through easy paralleled connections of three racks
- Operate in two-quadrant mode as power source and regenerative electronic load
- Maximize throughput with fast output speed and sub-millisecond command-processing time
- Reduce cost for cooling and electricity with eco-friendly, regenerative design

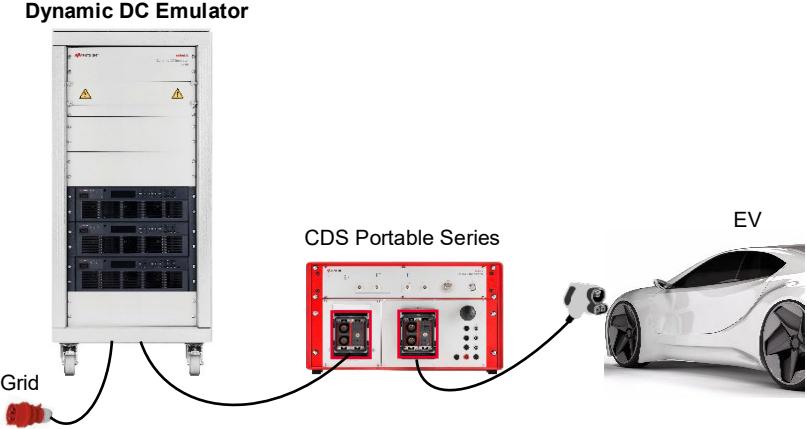
The integrated RP79xx is a part of Keysight's HEV/EV Power Converter Test Solutions that gives you confidence to deploy high-voltage, high-power solutions to meet the fast paced, high-growth demands of the Hybrid-Electric/Electric Vehicle (HEV/EV) market.

This emulator can be used in combination with the Scienlab Charging Discovery System (CDS) to act as a DC power source (Electric Vehicle Supply Equipment (EVSE) emulation) or to act as an electronic load, replacing a battery pack and feed energy back to the power grid (EV emulation).

# Use Cases in Combination with SL1040A Scienlab Charging Discovery System

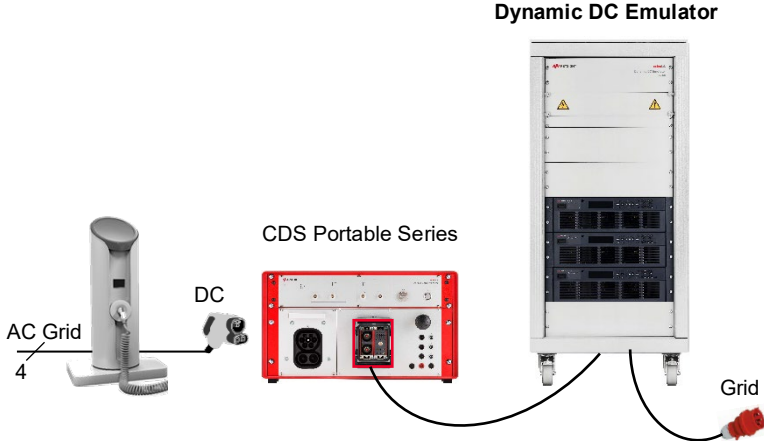
## Example 1: EVSE emulation

Adding the Scienlab Dynamic DC Emulator Mid-Power Series to the CDS to perform EVSE emulation, enables conformance and interoperability testing (EV test cases) of the DC charging interface.



## Example 2: EV emulation

Adding the Scienlab Dynamic DC Emulator Mid-Power Series to the CDS to perform EV emulation, enables conformance and interoperability testing (EVSE test cases) of the DC charging interface.



# System Configuration

## System characteristics

Dimensions H x W x D (with wheels)	1300 x 600 x 1030 mm
Weight (without power stages)	Approximately 160 kg
Protection class	IP20

## Specifications

Item numbers	SL1041B-S10	SL1041B-S11	SL1041B-S12	SL1041B-S13	SL1041B-S14
No. of RPS units (= N)	1	2	3	4	5
DC output voltage	0 to 950 V				
DC output power	0 to $\pm N \times 10$ kW				
DC output current	0 to $N \times \pm 20$ A				
AC input voltage	3 ~ 400 V; N, PE (+10 %/-5 %), 50 Hz ( $\pm 0.2$ Hz)				
AC input current per phase	17.3 A	34.6 A	51.9 A	69.2 A	86.5 A
Approx. total weight	191 kg	223 kg	255 kg	287 kg	319 kg

### Current

Current programming and measurement accuracy:  $0.1\% + N \times 12$  mA

At 25 °C ( $\pm 5$  °C) after a 30-minute warm-up; measurement NPLC<sup>1</sup> = 1; valid for one year

Measurement points	0 A, 5 A, 10 A, 20 A	0 A, 5 A, 20 A, 40 A	0 A, 5 A, 30 A, 60 A	0 A, 5 A, 40 A, 80 A	0 A, 5 A, 50 A, 100 A
--------------------	-------------------------	-------------------------	-------------------------	-------------------------	--------------------------

### Voltage

Voltage programming and measurement accuracy:  $0.03\% + 160$  mV

At 25 °C ( $\pm 5$  °C) after a 30-minute warm-up; measurement NPLC<sup>1</sup> = 1; valid for one year

Measurement points	0 V, 50 V, 250 V, 500 V, 750 V, 950 V
--------------------	---------------------------------------

1. NPLC = Number of Power Line Cycles

## Supplemental characteristics

### Output ripple and noise

CV peak to peak	1000 mV [from 20 Hz to 20 MHz (-3 dB bandwidth) with resistive load, terminals ungrounded, or either terminal grounded]
CV rms	200 mV [from 20 Hz to 10 MHz (-3 dB bandwidth) with resistive load, terminals ungrounded, or either terminal grounded]
<b>Load regulation</b>	
Voltage	60 mV
Current <sup>1</sup>	N x 9 mA
<b>Transient response</b>	
Recovery time	500 $\mu$ s
Settling band	2.375 V

1. N = Number of RPS units

## Safety functionality

The Scienlab Dynamic DC Emulator Mid-Power Series provides several safety functions. These functions are described below:

- Emergency stop button to disconnect in- and output of the Scienlab Dynamic DC Emulator Mid-Power Series (system option)
- Integration of an insulation monitoring device (IMD) to monitor the insulation resistance between DC+/- to PE. The IMD is integrated into the emergency stop chain to ensure safe disconnection in case of an insulation fault (system option)

**Note:** The integration of an emergency stop button and an IMD is offered as one system option (SL1041B-IMD: IMD / E-Stop Option). When using the Scienlab Dynamic DC Emulator Mid-Power Series in direct physical connection with the CDS, the SL1041B does not require this option. When using the SL1041B with an external automation (e.g. Hardware in the Loop), this option is recommended.

# Interfaces

## Description

Digital interfaces	
Interface to Charging Discovery System	RJ45 socket, Ethernet
Interface for parallel mode of up to three DC emulators	RJ45 socket
Power connections	
AC power supply connection	
Connection type	125 A CEE (IEC 60309) socket
DC output connection	
Voltage	Maximum 950 V
Current	Maximum 300 A <sup>1</sup>
Connection type	Pre-assembly of configured CDS cable <sup>2</sup>

1. In case of parallel connection of three SL1041B-S14.

2. When using the emulator in combination with the CDS for EVSE emulation, "Plug-in for EVSE Emulation" with item number "SL1049A-106" is additionally necessary.

## Included in the scope of delivery

- 19-inch rack aluminum housing on wheels
- Up to five integrated RPS units, depending on configuration
- Integrated circuit breaker (Siemens C20A) and RCD (Siemens 5SV3 RCCB)
- Operating instructions, CE declaration of conformity
- Output adapter cable compatible with CDS

## Available options

- AC input cable
  - 63 A CEE plug [SL1041B-01] **or**
  - 125 A CEE plug [SL1041B-02]

# 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.

# 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 <sup>1</sup>	Onsite Upgrade R-55U-005-X <sup>1</sup>	Onsite Upgrade R-55V-006-X <sup>1</sup>
<b>Solution technical support (SW<sup>2</sup> &amp; HW)</b>			
Keysight Support Portal & Knowledge Center, 24x7	•	•	•
Remote technical support response time <sup>3</sup>	2 business days	4 business hours	2 business hours
Onsite Technical Support <sup>4</sup>		•	•
<b>Solution hardware support</b>			
Repair service coverage	Onsite	Onsite	Onsite
Onsite response time	No commitment	12 business days response time <sup>6</sup>	5 business days response time <sup>6</sup>
Solution calibration <sup>7</sup>			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 <sup>5</sup>			•
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.



# Extend the Capabilities of your Test Solution

## Meet the RP7900 Series regenerative power system

The Keysight RP7900 Series regenerative power system is a family of bi-directional, regenerative DC power supplies with highly integrated safety features that protect both your people and your device under test. The regenerative capability enables the energy normally consumed to be returned to the grid cleanly, saving costs associated with energy consumption and cooling.

Find out more about the [RP7900 Series](#).



Figure 1. RP7900 Series Regenerative Power System.

## Meet the SL1040A Scienlab Charging Discovery System Series

The Scienlab Charging Discovery System Series from Keysight enables you to test charging interfaces of electric vehicles (EVs) and EV supply equipment (EVSE). Thanks to its modular and innovative design, you can configure the CDS to customers' specific needs and replace multiple real EV/EVSE with one test solution to ensure an optimal price-performance ratio.

- Automated functional, conformance, interoperability and quality testing for R&D, end-of-line (EOL) and Electromagnetic Compatibility (EMC) applications.
- Time synchronous measurement and decoding of communication and power signals.
- Scalable and futureproof hardware design according to CharIN e.V. CCS Test System.
- CE, UL and KC-Mark conformance certified by CSA Group.
- Extensive Test Case Library for automated conformance testing of CCS, CHAdeMO and GB/T standard.

Find out more about the [SL1040A Scienlab CDS Series](#).

## Meet the SL1047A Scienlab Charging Discovery System – High-Power Series

The Scienlab Charging Discovery System – High-Power Series (CDS HP Series) from Keysight enables you to test charging interfaces of electric vehicles (EVs) and EV supply equipment (EVSE) during high-power charging up to 1,500 V DC and  $\pm 600$  A DC. With the CDS can perform all necessary conformance and interoperability tests according to worldwide charging standards. Our new solution, which features the separate Scienlab Cooling Unit with interchangeable liquid-cooled charging adapters, also enables a high-power upgrade of the SL1040A Scienlab Charging Discovery System – Portable Series.

- Automated functional, conformance, interoperability and quality testing for R&D and EOL applications.
- Time synchronous measurement and decoding of communication and power signals.
- Scalable and future-proof hardware design according to CharIN e. V. CCS Test System.
- CE, UL, and KC-mark conformance.
- Extensive Test Case Library for automated conformance testing of CCS, CHAdeMO, and GB/T standard.

Find out more about the [SL1047A Scienlab CDS HP Series](#).



**Figure 2.** From left to right: SL1040A CDS – EMC Series, SL1040A CDS – Portable Series and SL1047A CDS – High-Power Series.

## Meet the SL1093A Scienlab Charging Discover test software

The Scienlab Charging Discover test software controls the Scienlab Charging Discovery System (CDS). With this up-to-date, user-friendly software, you can operate the system, visualize measured values, record test sequences, and generate reports for trusted insights.

- Live and synchronized views of recorded measurements
- Test editor for creating individual test cases
- Powerful graph view for analyzing recorded traces
- Export of measured values (for example, MDF)
- Remote functionality for Hardware in the Loop test benches

Find out more about the [SL1093A Scienlab Charging Discover Test Software](#).



**Figure 3.** SL1093A Scienlab Charging Discover test software controls the CDS.

## Meet the Scienlab Test Case Library

The Scienlab Test Case Library provides complete test case libraries for all important charging conformance and interoperability standards. Each library is developed according to official specification and carefully verified with all CDS hardware configurations and every software release version. Hence, it is the quickest and most simple way to get valid test results out of the box.

Find out more about the [SL14XXA Scienlab Test Case Library – TTCN-3](#).

Find out more about the [SL1300A Scienlab Test Case Library – Charging Discover](#).