

SL1800A Series Scienlab Regenerative DC Emulator

High-Power Series – Up to 300 kW¹

SL1810A

SL1820A

SL1830A

SL1840A



¹ Maximum output power capability was increased for all models with serial numbers DE62550000 and greater

Systems With an Output Power Range of 100 kW up to 300 kW

Highly efficient test of high-power DC applications with a small footprint.

The Keysight's Scienlab Regenerative DC Emulator - High-Power Series with new silicon carbide (SiC) technology is a highly efficient system based on state-of-the-art technology. It allows the user to realistically emulate the electric vehicle battery in charging test applications, such as high-power DC fast charging, when paired with the SL1047A Scienlab Charging Discovery System – High-Power Series. Learn more about the SL1047A at www.keysight.com/find/SL1047A.

The switching frequency of silicon carbide transistors is greater than 10X when compared to IGBTs. This results in a significantly higher efficiency reducing costs by reducing heat dissipation (lower cooling costs), and lower energy consumption (lower electricity bill). Higher switching frequencies also enable the use of smaller components resulting in a system with a smaller footprint requiring less of your valuable floor space.

Highlights

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

Specifications

In the following, a distinction is made in the technical data between specifications and supplemental characteristics. Unless otherwise noted, specifications are warranted over the ambient temperature range of 5 to 40 °C after a 30-minute warm-up period.

	SL1810A	SL1820A	SL1830A		SL1840A		
Power stages	1	1	2		3		
Power options	100 kW	100 kW	200 kW		300 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						
Voltage	1000 V		1200 V		1500 V		
Voltage accuracy ²	±0.03% of measured value, ±150 mV (offset)						
Current accuracy	300 A		600 A		900 A		
Current accuracy ³	±0.03% of measured value, ±150 mA (offset)						

¹ Parallel connection of several systems possible to achieve higher currents. If two or more systems are connected in parallel, all output stages are supplied equally regardless of the actual current class of the individual systems. In this case, the cross-sections of the DC cables must be designed accordingly. Achieve up to 1.62 MW (3600 A) with a parallel connection of up to six systems e.g., by connecting the individual DC cables to a remote power terminal (RPT) or a power switch terminal (PST).

² Measurement and programming accuracy; measurement with Number of Power-Line-Cycles (NPLC) = 100; valid for 1 year.

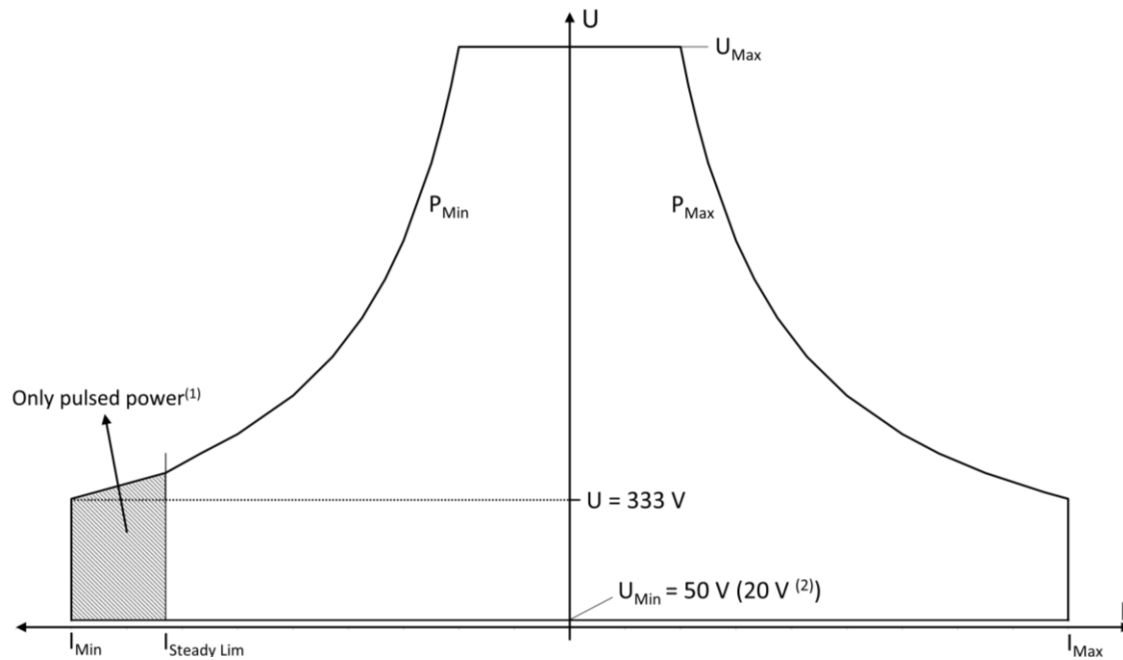


Figure 1. Output characteristics of the DC emulator.

All systems are power-limited and depending on the selected options the maximum voltage and current are varying. The limits are listed in Tables 1 and 2 below.

Table 1. Normal operation mode and limits

Systems	U_{Max}	I_{Max}	$I_{Steady Lim}$	I_{Min}	P_{Max}	P_{Min}
SL1810A	1000 V 1200 V 1500 V	300 A	-240 A	-300 A	100 kW	-100 kW
SL1820A		300 A	-240 A	-300 A	100 kW	-100 kW
SL1830A		300 A	-300 A	-300 A	200 kW	-200 kW
		600 A	-480 A	-600 A		
SL1840A	300 A	-300 A	-300 A	300 kW	-300 kW	
	600 A	-600 A	-600 A			
	900 A	-720 A	-900 A			

¹ The area below the current limit $I_{Steady Lim}$ is only allowed to be used for a short amount of time. A recovery period is necessary before the system can be reused.

Tabel 2. Pulsed power and allowed maximum durations

Current							
Voltage		20 V					
SL1810A/ SL1820A	-240 A	-250 A	-260 A	-270 A	-280 A	-290 A	-300 A
SL1830A	-480 A	-500 A	-520 A	-540 A	-560 A	-580 A	-600 A
SL1840A	-720 A	-750 A	-780 A	-810 A	-840 A	-870 A	-900 A
Max Duration¹	379 s	138 s	52 s	30 s	23 s	18 s	15 s

Current							
Voltage		330 V					
SL1810A/ SL1820A	-240 A	-250 A	-260 A	-270 A	-280 A	-290 A	-300 A
SL1830A	-480 A	-500 A	-520 A	-540 A	-560 A	-580 A	-600 A
SL1840A	-720 A	-750 A	-780 A	-810 A	-840 A	-870 A	-900 A
Max Duration¹	Unlimited	676 s	216 s	102 s	46 s	28 s	21 s

¹ Maximum allowed duration, after exceeding a recovery period of 20 s is required.

Supplemental Characteristics

Supplemental characteristics are not warranted but are descriptions of performance determined by design or type testing. Supplemental characteristics are typical unless otherwise noted and apply at the DUT in compliance with the specified load line length and the sense terminals connected to the output terminals (local sensing).

Voltage	1000 V	1200 V	1500 V
Typical accuracy¹	<100 mV	<120 mV	<150 mV
Ripple ²	Typical: 100 mV _{eff} @ 600 kHz bandwidth Maximum: 550 mV _{eff} @ 9.67 MHz bandwidth		
Current	300 A	600 A	900 A
Typical accuracy¹	<100 mA		
Ripple	<1.0 A _{eff}		
Rise and fall time ³	-300 → +300 A	-600 → +600 A	-900 → +900 A
	<1 ms @ 300 V DC measured from -90 → +90% ⁴		

Data acquisition

Resolution	Single-precision floating-point
Sample rate	Max. 1 kHz
	SL1810A/SL1820A SL1830A SL1840A

Output capacitance	9.2 μF	18.3 μF	27.51 μF
Load stability ⁵	Typical: <40 V and <3 ms @ 300 V		Typical: <50 V and <5 ms @ 300 V
	Load jump: 0 → ±250 A < 1 ms	Load jump: 0 → ±500 A < 1 ms	Load jump: 0 → ±800 A < 1 ms

¹ Typical accuracy under full scale.

² Test condition: Load capacitance of 400μF is used.

³ No switching times within power stage or channel at transition from positive to negative current and vice versa.

⁴ 2x 10 m load lines, 185 mm² cable-cross section.

⁵ Test condition: Load capacitance of 400μF is used.

System cabinet

	SL1810A	SL1820A	SL1830A	SL1840A
Weight	980 kg	1350 kg	1600 kg	1850 kg
Dimensions (H ¹ x W x D ²)	2.15 x 1.51 x 0.6 m	2.15 x 2.41 x 0.6 m		
Protection class	Class I, IP 54			
Heat dissipation	Max. 1 kW			
Ambient temperature	5 to 40 °C			
Relative humidity	max. 80 % (non-condensing) for temperatures up to 31 °C decreasing linearly to 50 % (non-condensing) at 40 °C			
Cabinet color	RAL 7035			

Note: A magnetic signal lamp with a height of 40 cm can be mounted variably at the cabinet and therefore does not necessarily have an influence on the system height.

Safety features

- Power contactors on the mains side ensure voltage-free operation
- Output contactors capable of disconnecting at full load current
- Emergency stop push button with redundant emergency stop chain
- Discharge of all internal high-voltage sources with regard to service
- Integration into Test Bench Software (ESD) and Test Bench Guard (TBG)
- Insulation resistance: $\geq 30 \text{ M}\Omega$
- Inherent safety against overheating, overpower, short-circuit
- Reverse polarity protection
- Signal light with magnetic mounting
 - Red: Error; Yellow: Active, Green: Ready

¹ Rollers increase the height by 4 cm.

² Depth incl. (emergency stop) push buttons

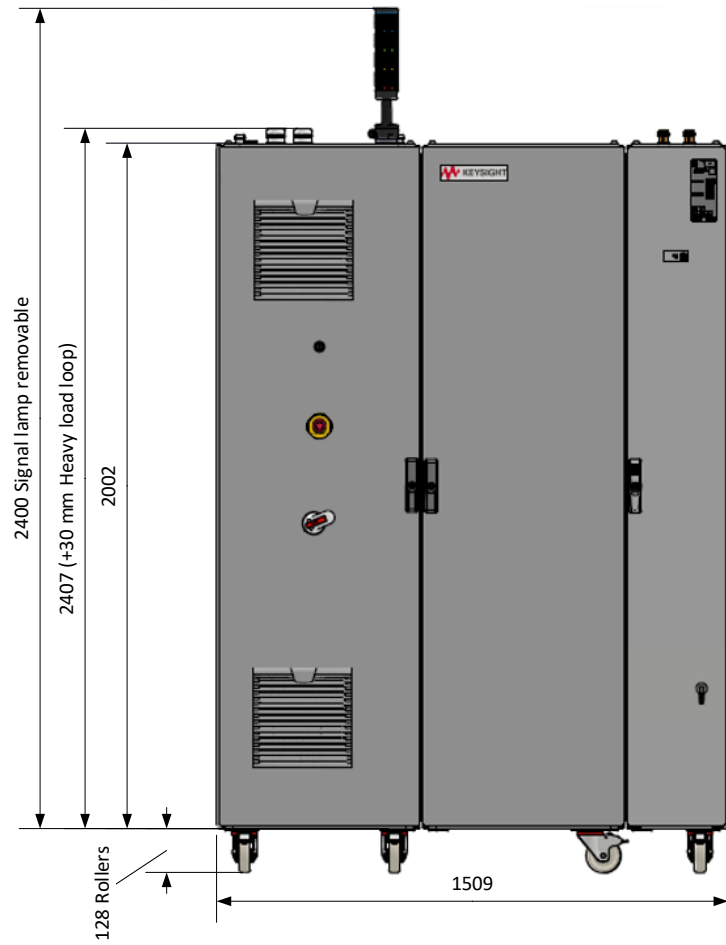


Figure 2. 100 kW System – front view including dimensions in mm.

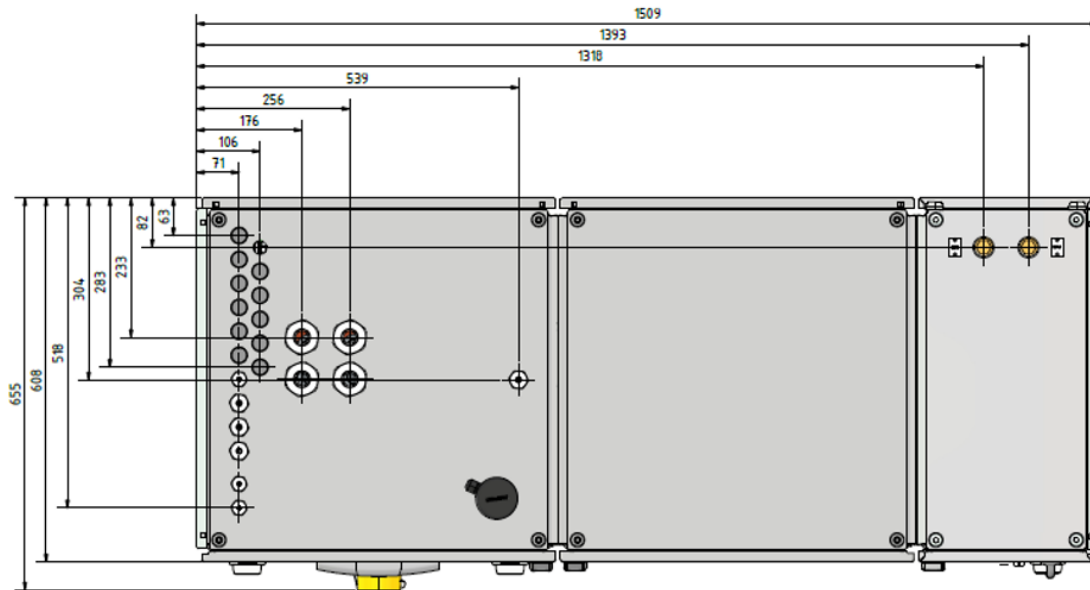


Figure 3. 100 kW System – top view including dimensions in mm.

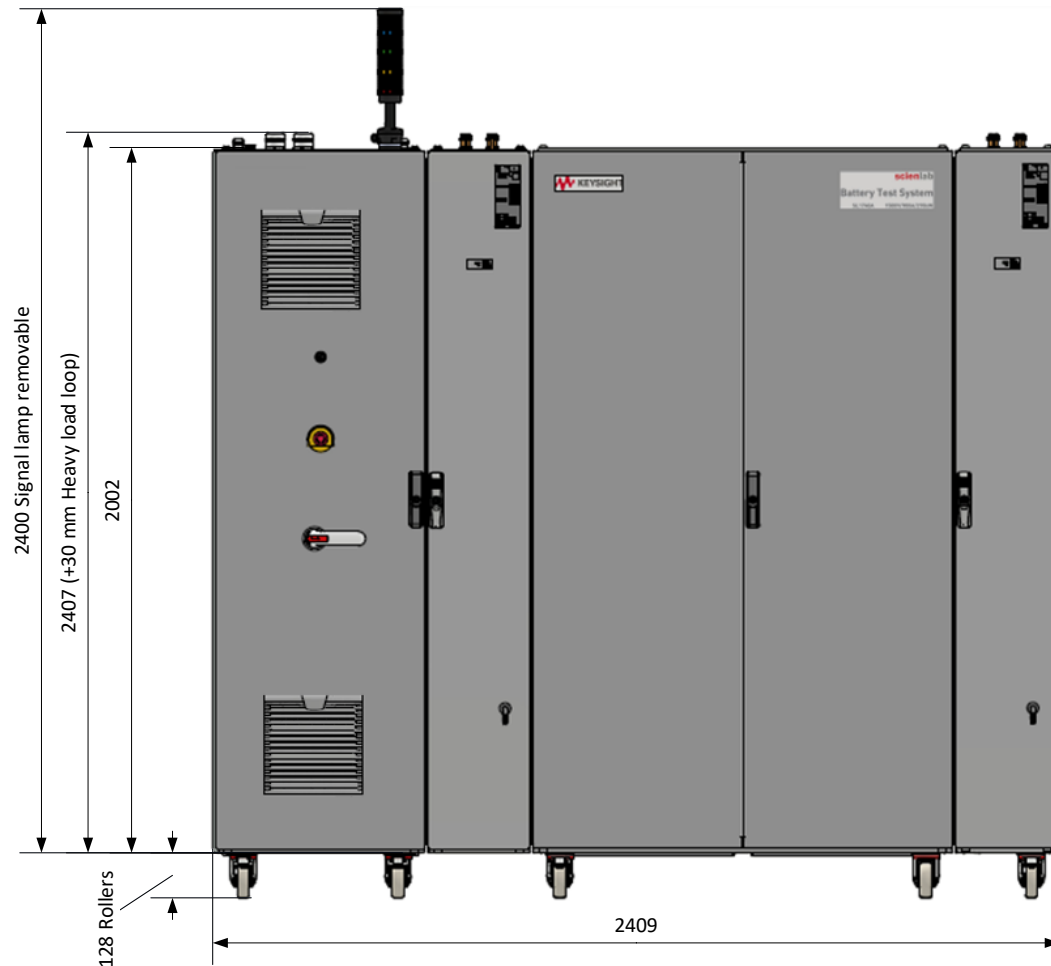


Figure 4. 300 kW System – front view including dimensions in mm.

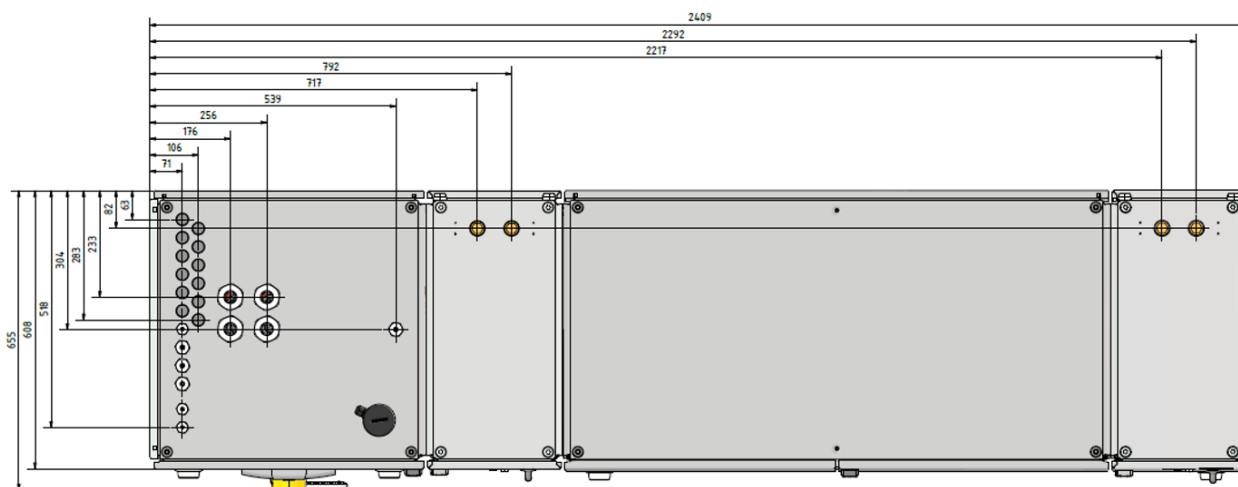


Figure 5. 300 kW System – top view including dimensions in mm.

System AC power and system cooling

System AC power				
Efficiency	Up to 96%			
Mains supply	3 ~, Protective Earth, 380/400/440/480 V ($\pm 10\%$), 50/60 Hz			
Reactive power compensation	$\cos \varphi > 0,99$ (under load) for $P > 0,5 * P_{max}$			
Input current In / Mains supply fuse provided on site¹¹	100 kW	200 kW	300 kW	
380 VAC	175 A / 200 A gG	340 A / 355 A gG	510 A / 630 A gG	
400 VAC	165 A / 200 A gG	325 A / 355 A gG	480 A / 500 A gG	
440 VAC	150 A / 160 A gG	300 A / 315 A gG	440 A / 500 A gG	
480 VAC	135 A / 160 A gG	270 A / 315 A gG	400 A / 400 A gG	
System cooling	SL1710A	SL1720A	SL1730A	SL1740A
Cooling type	Water/air heat exchanger			
Max. heat transfer @ ≥ 800 V	4 kW	4 kW	8 kW	12 kW
Cooling unit per system	1	2		
Cooling water temperature	Internal thread, inlet	$\frac{3}{4}$ ", 7 to 19 °C		
	Internal thread, outlet	$\frac{3}{4}$ ", max. 24 °C		
Max. flow rate per cooling unit	0.29 l/s	0.14 l/s	0.29 l/s	0.43 l/s
Inlet pressure	6 bar			
Pressure difference	>1 bar			

¹¹ Values recommendation for European Union (EU); consider country-specific standards.

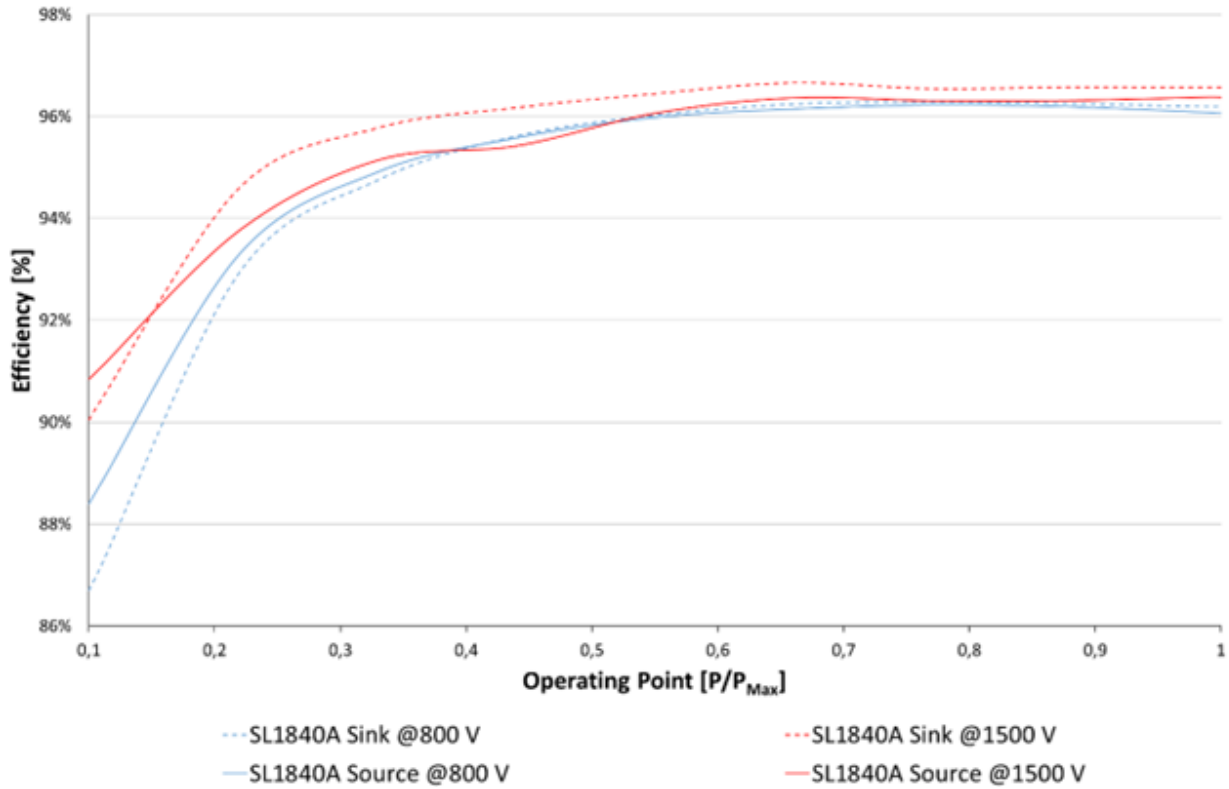


Figure 5. Efficiency curve of SL1840A at 367 V, 800 V, and 1500 V.

Documentation

- Operating instructions in English
- CE Declaration of Conformity
- UL Declaration of Conformity
- KC Declaration 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 Options

Standard power options¹

SL1810A-P10 / SL1820-P10 Output Power – 100 kW

SL1830A-P20 Output Power – 200 kW

SL1804A-P30 Output Power – 300 kW

Legacy power options²

SL1810A-P01 / SL1820-P01 Output Power – 90 kW

SL1830A-P02 Output Power – 180 kW

SL1840A-P03 Output Power – 270 kW

Cabinet base options

SL18X0A-C01 Base stand

DC Emulator is placed on top of the base stand.

SL18X0A-C02 Rollers

DC Emulator is placed on top of heavy-duty rollers and can be moved flexibly.

¹ Applies to serial numbers DE62550000 and greater

² No longer available; Applies to serial numbers less than DE62550000

Additional cabinet options

SL18X0A-C03 Mirrored cabinet layout

To provide a higher flexibility for the lab design a mirrored cabinet layout is available. The modular hardware design enables due to front access and easy positioning of the systems side-by-side or back-to-back. Benefit from a faster, less expensive installation incl. less cables.



Figure 6. Mirrored design and standard design (from left to right), front view.

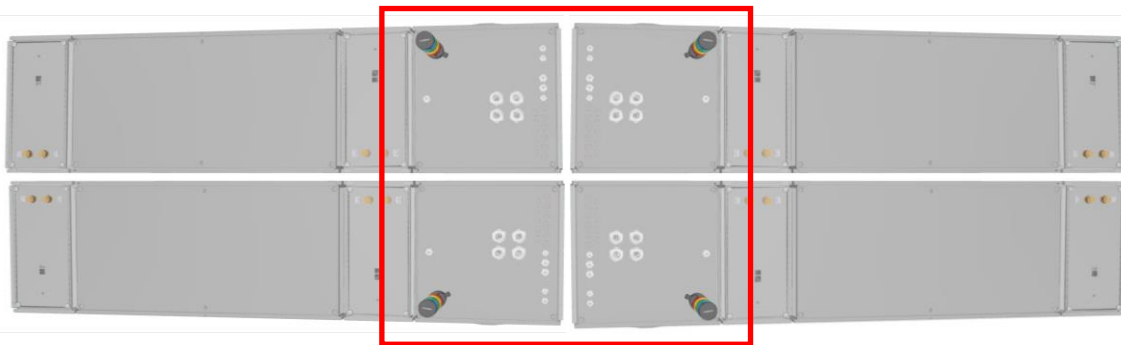


Figure 7. Mirrored design and standard design (from left to right), top view.

SL18X0A-C04 Halogen-free cables

Cabling inside the system cabinet with halogen-free material.

SL18X0A-C05 Cabinet interior lighting

Illumination of the output terminals in the control cabinet.

Upgrade options

Power upgrades

Extension of the SL1820A or SL1830A system with an additional 90 kW or 100 kW/300 A power stage.

- SL1800AU-PB1 Power upgrade (SL1820A to SL1830A)
- SL1800AU-PB2 Power upgrade (SL1820A to SL1840A)
- SL1800AU-PB3 Power upgrade (SL1830A to SL1840A)

Voltage upgrades

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

- SL1800AU-VB1 Voltage upgrade (1000 V to 1200 V)
- SL1800AU-VB2 Voltage upgrade (1000 V to 1500 V)
- SL1800AU-VB3 Voltage upgrade (1200 V to 1500 V)

Current upgrades

Increase the output current of a system. If the maximum achievable current 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).

- SL1800AU-CB1 Current upgrade (300 A to 600 A)
- SL1800AU-CB2 Current upgrade (300 A to 900 A)
- SL1800AU-CB3 Current upgrade (600 A to 900 A)

Project Management, Commissioning, and Engineering Services

The following services are offered by Keysight to ensure a smooth laboratory delivery, installation, commissioning, and reduce ramp-up time for our customers. Exact definition of services depends on the facilities, customer expertise, and overall scope of the project. Please work with your Keysight sales representative to discuss your specific needs.

PS-XPM-100-SL Project Management Services

Keysight recommends project management services, which provide an experienced project manager who is dedicated to your project and acts as a direct communication interface from Keysight to your project management team.

The project manager takes over the responsibility to:

- Define and control project schedule, critical path and follow project milestones
- Consult with customer to progress through relevant design, installation, safety, installation, commissioning, and acceptance planning phases
- Communicate project status regularly and ensure any unscheduled project events or project deviations are communicated and promptly discussed with the customer project team
- Coordinate applicable delivery, installation, and commissioning on site
- Provide complete and accurate project documentation to the customer

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 upon between Keysight and the customer.

This service includes:

- Inspection of hardware/laboratory after installation
- Validation of software/network communication at test benches
- Validation of electrical installation, system connections to applicable associated workcell hardware, and complete commissioning checklist
- Validation of applicable safety and system interlocks matrix
- Verification of system performance without DUT connection
- Support in commissioning the test system and instructions on how to use it
- Presence of experienced test bench engineer during first usage of the test bench

PS-XENG-100-SL Engineering Services

Project engineering services provide specialized engineering services for factory planning and industrialization 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:

- Facilities and lab layout
- Special power requirements
- Electrical design for system infrastructure
- Cabling to test benches
- Preparation and design of cable assemblies
- Necessary IT and LAN integration to manage test bench control

HS0002A-108 Preliminary Acceptance (Factory Acceptance Testing)

Factory Acceptance Test is an optional service and can be carried out for the first unit of each Keysight solution variant at Keysight premises. The Factory Acceptance Test includes:

- System assembly composed of Keysight Battery tester
- System review, inspection and check for connections and communication
- Testing the connections and overall systems

Keysight will notify when the equipment is ready for initial inspection and testing for the purpose of identifying any defects.

If any defects are identified in the equipment during the Factory Acceptance Testing, Keysight shall correct and report.

Factory Acceptance Test service will be performed on respective equipment. Typically does not include a full system performance check with other workcell equipment or customer DUT. Does not include installation of cable penetrations between power electronics and test fixture (done on site during site build-up).

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 (SW² & 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](#).

Extend the Capabilities of your Scienlab Regenerative DC Emulator

Keysight's Scienlab Charging Discovery System Series (CDS) is a breakthrough solution for holistic test of all AC and DC charging interfaces of electric vehicles (EV) and electric vehicle supply equipment (EVSE). You can get further information to the Scienlab Charging Test Solutions below.



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

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 ± 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](#).



Keysight enables innovators to push the boundaries of engineering by quickly solving design, emulation, and test challenges to create the best product experiences. Start your innovation journey at www.keysight.com.

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