Keysight NS-4 Class Expert ATE Power Supplies

RP5900 Series Regenerative DC Power Supplies

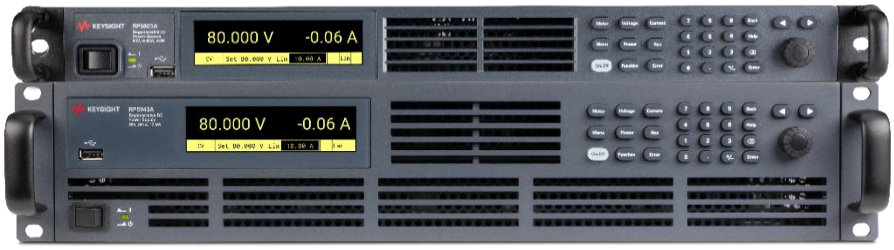
High-Power, High-Density Regenerative DC Power Supplies with Integrated Electronic Load

Introducing the Keysight RP5900 Series of midrange, bidirectional DC power supplies with integrated electronic load capability. These single-output, programmable power supplies are available in compact 1U and 2U sizes, with output power ranging from 1.7 kW to 12 kW. With regenerative capabilities, they efficiently return the energy they consume to the grid, reducing energy costs and minimizing cooling needs. The integrated electronic load capability also contributes to cost and space savings and reduces integration time that would otherwise be necessary.

The RP5900 Series is equipped with system-ready features, including multiple I/O interfaces, built-in voltage and current measurements, and output voltage (10 V to 1500 V) and current (12 A to 1020 A), accelerating the testing of your power products, whether in the lab or on the production floor.

RP5900 Series models:

- 1.7 kW to 2 kW Family: RP5911A-RP5914A
- 3.4 kW to 4 kW Family: RP5921A-RP5926A
- 5.1 kW to 6 kW Family: RP5931A-RP5937A
- 10.2 kW to 12 kW Family: RP5941A-RP5947A



KEYSIGHT

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Introduction

In the global marketplace, demand for midrange power solutions to address the power requirements of today's innovative higher power devices is increasing. While initial capital investments often command attention, operating expenses can play an even more critical role in the total cost of ownership. Effectively managing that cost can give your business a significant competitive advantage.

A reliable midrange power solution with the right features and a low cost of ownership can minimize your high-power test costs by reducing floor space requirements, cutting heat dissipation, and maximizing uptime. The Keysight RP5900 Series regenerative power supply delivers these benefits, helping you improve efficiency while keeping costs under control.

Our Solution

The Keysight RP5900 Series is a family of bidirectional, regenerative DC power supplies with an integrated regenerative electronic load. Its regenerative design returns energy to the grid cleanly, reducing energy consumption and cooling costs. Available in compact 1U and 2U form factors, the RP5900 Series helps cut energy costs, floor space requirements, and integration time. It delivers trusted performance with flexible features in a single, space-efficient solution.

The RP5900 Series enables you to do the following:

- Deliver a complete regenerative power supply and electronic load solution for versatile testing needs.
- Provide voltage options of 10 V, 32 V, 80 V, 300 V, 500 V, 800 V, and 1500 V, with current up to ±1020 A for broad application coverage.
- Offer a wide 1.7 kW to 12 kW power range to address applications ranging from low-power electronics to high-power energy systems.
- Operate seamlessly in two-quadrant mode to function as both a power source and regenerative load.
- Maximize rack efficiency with industry-leading compact 1U and 2U form factors.
- Save valuable rack space with stackable parallel operations of up to 16 units.
- Cut operational costs by regenerating power back to the grid.
- Accelerate battery and power electronics testing with a built-in waveform generation function.
- Connect easily through LAN, USB, CAN, and optional GPIB and RS-232 interfaces.
- Gain deeper insights with Keysight PathWave Advanced Power Suite, integrated for power analysis, battery emulation, and profiling applications.

Reduce Costs for Cooling and Electricity with an Eco-Friendly Regenerative Design

The RP5900 returns 95% of the energy consumed to the grid cleanly, saving costs from energy consumption and cooling while not interfering with grid performance. When sinking current, the RP5900 automatically returns excess power to the grid, with no programming required. To safeguard your Device Under Test (DUT), the RP5900 automatically senses that the grid is live, detects phase voltage and frequency in real time, and synchronizes safely before regenerating power to the grid.

With efficiency of more than 85%, the RP5900 lowers electricity use when sourcing or sinking and reduces heat dissipation when sinking, cutting air conditioning requirements. Additionally, these efficiencies reduce carbon emissions and their environmental impact.

Bidirectional Source and Independent Electronic Load

The RP5900 can continuously sink up to 100% of its rated current. It offers both a bidirectional power supply and an independent regenerative electronic load in a single unit. The two-quadrant, bidirectional sourcing and sinking capability of the DC power supply allows for seamless switching between sourcing and sinking current.

Autoranging Output Does the Job of Multiple Power Supplies

The RP5900 power supply features an autoranging output that expands the power curve, providing more voltage and current combinations from a single unit. Unlike power supplies with rectangular output characteristics, which deliver full power at only one voltage-current point, the RP5900 adapts across a wide range. It is like having many rectangular power supplies in one.

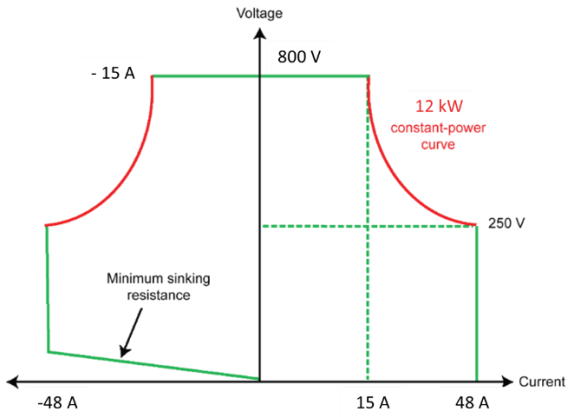


Figure 1. Autoranging output characteristic of the 12 kW RP5946A

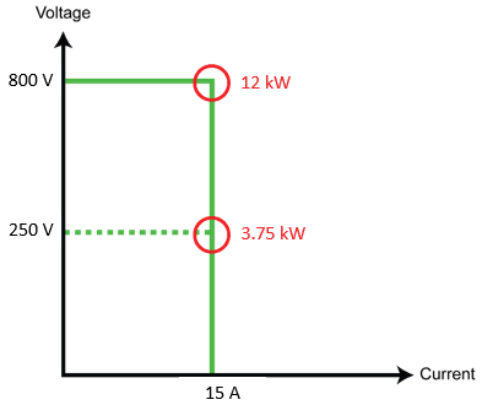


Figure 2. Rectangular output characteristic of a conventional 12 kW supply

Emulate a High-Power Battery from the Front Panel

With its battery emulation feature, the RP5900 Series enables you to test your devices under realistic power conditions. Emulating the battery is essential when characterizing battery operating life and detecting early product failures. The RP5900's bidirectional design and variable output impedance make it easy for users to set voltage, capacity, internal resistance, and State of Charge (SOC) to define battery characteristics quickly from the front panel, and to simulate the charge and discharge characteristics of a battery.

Accurately Characterize Your DUT's Power Profile with Advanced Measurements

The RP5900 provides simultaneous voltage and current measurement capabilities. You can measure using two main modes: averaged or digitized. In average mode, the RP5900 delivers accurate voltage and current measurements. The digitizing capability allows you to select the type of measurement returned and fine-tune the measurement quality.

In addition to voltage and current measurement capabilities, the RP5900 Series regenerative power system offers built-in power, amp-hour, and watt-hour calculations. These measurements simplify your power efficiency and storage calculations.

Avoid Damage to Your DUT

When testing costly DUTs, integrating power protection measures into the test system is critical. Instruments with built-in or integrated protection respond faster than software-based safeguards, detecting and addressing error conditions quickly to reduce the risk of serious damage. The RP5900 provides built-in overvoltage, overcurrent, overpower, and undervoltage protection to help safeguard your DUT.

Generate Voltage and Current Transients

DUTs operating in rugged environments, such as automotive electronics and avionics, can often experience transient behavior from the power source, such as voltage dropouts or surges. To ensure your DUT stands up to these real-world transients, you must simulate worst-case power transient conditions during testing. The RP5900 provides three functions for simulating either voltage or current transients for testing:

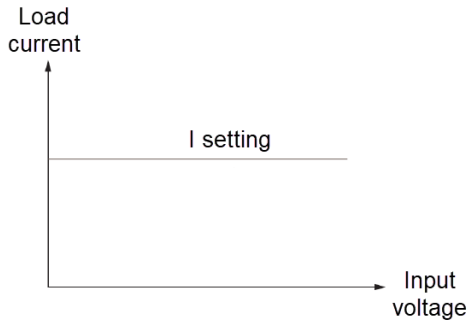
- **Step**: A one-time event steps the output voltage or current up or down in response to a triggered event.
- **Constant dwell arbitrary waveforms**: An arbitrary waveform generator (ARB) allows you to generate complex user-defined voltage or current waveforms of up to 65,535 data points. One dwell setting applies for the entire ARB, from 1 ms to 3,600 s.
- **List**: A list can consist of up to 200 steps, each with a unique dwell time, which specifies how many seconds the list will remain at that step before advancing. Lists can also be trigger-paced, advancing one step for each trigger received.

Properly Powering Your DUT On and Off

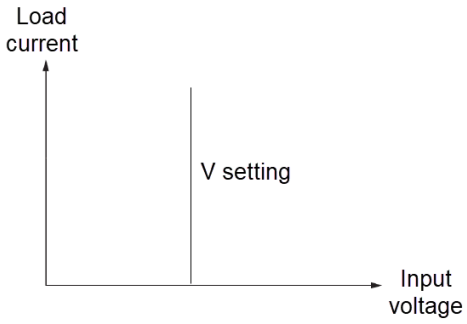
If you work with DUTs with multiple power supply inputs, you often need to sequence on or off for each power supply at precise, repeatable times to prevent current surges and latch-up conditions. In addition, you may need to control the ramp rate of each supply at turn-on or turn-off. These requirements add significant hardware and software complexity to an automated test equipment system. The RP5900 simplifies this process with built-in sequencing across multiple supplies, providing a clean, low-complexity way to properly power on or off your DUT during testing.

Multiple Operating Modes

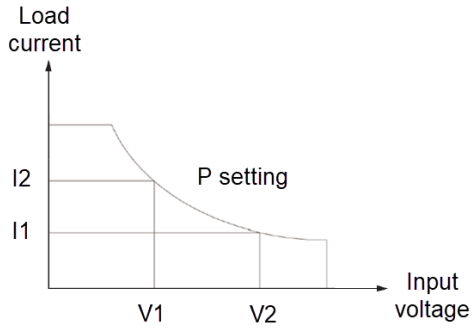
The RP5900 Series provides voltage priority mode (CV), current priority mode (CC), resistance priority mode (CR), and power priority mode (CP) under the Load mode:



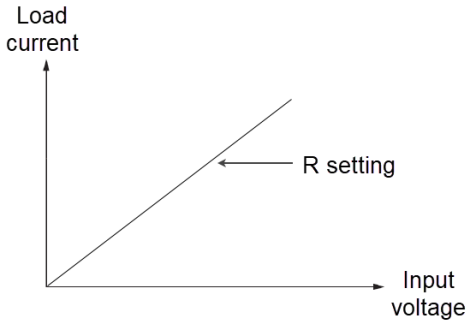
Current Priority (CC mode)



Voltage Priority (CV mode)

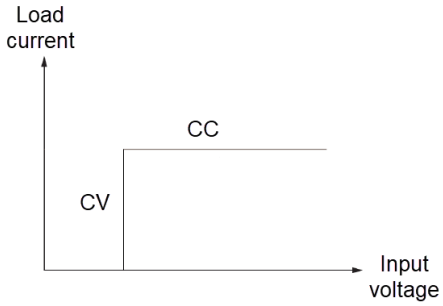


Power Priority (CP mode)

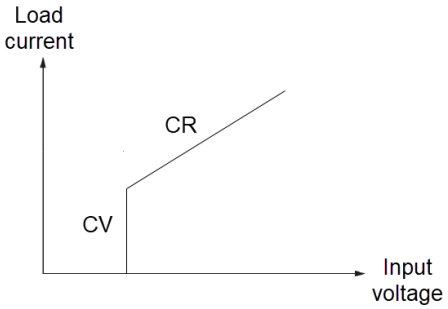


Resistance Priority (CR mode)

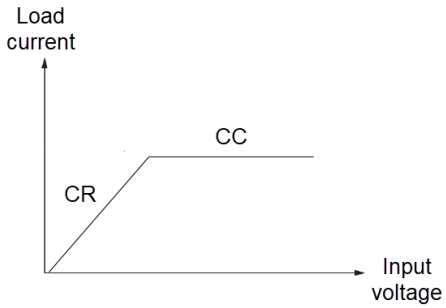
The RP5900 Series also has four complex modes under the Load mode operation:



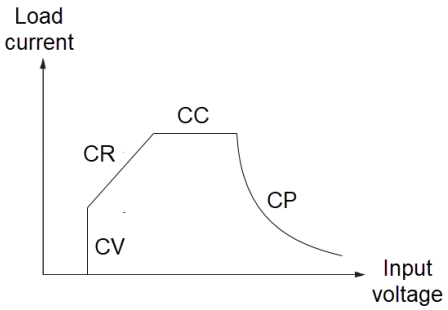
CV+CC mode



CV+CR mode



CC+CR mode



CC+CV+CP+CR mode (AUTO)

Add Power Flexibility to Your Test System by Paralleling Multiple Power Supplies

Paralleling multiple power supplies together is a great way to add power flexibility to your test system. Conventional power supplies often cannot maintain the desired Constant Voltage (CV) or Constant Current (CC) mode when parallel. For instance, when trying to operate in CV mode with two parallel supplies, one will typically source the bulk of the current and operate in CC mode, and the other supply will source only a fraction of the current and operate in CV mode. This imbalance can significantly degrade certain power supply performance specifications, such as transient response. The RP5900 eliminates this issue with a built-in paralleling capability to ensure that each supply equally shares the load current, so they all remain in the desired mode — CV or CC.

The RP5900 also supports primary / secondary mode, which enables you to configure and program the paralleled units as a single supply of up to 192 kW of total power; there is no need to program each supply individually. The RP5900 Series regenerative power system gives you the flexibility to easily parallel up to 16 units for greater output current. Parallel connection of mixed models with identical voltage rating is only applicable for 6kW and 12kW models with the same firmware version. All other models require the same models of the same firmware to be paralleled.



Figure 3. Parallel operation for more power

Simplify System Connection

The RP5900 Series power supplies come standard with Ethernet / LAN, USB 2.0, CAN IO interfaces, and optional GPIB, analog, and RS-232 IO interfaces, giving you the flexibility to use your I/O interface of choice today and safeguard your test setup for the future. The RP5900 is compliant with 1.5 LXI Device Specification 2016 and includes a built-in web interface. This enables you to control the RP5900 remotely by using a web browser via LAN connection.

AC Input

The RP5900 Series features a fully bidirectional three-phase AC input inverter that enables seamless bidirectional power flow between the AC mains and the DC output terminals.

RP5911A, RP5912A, RP5913A, RP5914A, RP5915A, RP5916A, RP5921A, RP5922A, RP5923A, RP5924A, RP5925A, and RP5926A models operate from a nominal three-phase AC input range of 200 to 480 VAC, 50/60 Hz.

RP5931A, RP5932A, RP5933A, RP5934A, RP5935A, RP5936A, RP5937A, RP5941A, RP5942A, RP5943A, RP5944A, RP5945A, RP5946A, and RP5947A models require a nominal three-phase AC input range of 380 to 480 VAC, 50/60 Hz to achieve maximum rated current and power.

The 6 kW and 12 kW models can be operated from 200 VAC to 208 VAC AC mains input; however, the current and power ratings are reduced by approximately 35%.

The RP5900 Series uses a three-phase AC input with AC mains connections: L1, L2, L3, and PE.

Digital Control Port

The rear panel of every RP5900 power supply features a digital control port containing seven user-configurable I/O pins that provide access to various control functions. Each pin is user-configurable. Table 1 describes the possible pin configuration for the digital port functions.

Pin Function	Available Configuration Pins
Digital I/O and digital in	Pins 1 through 7
Protection status	Pins 2
External trigger in / out	Pin 4
Inhibit in	Pins 5
Output couple	Pins 6 and 7
Common (connected to ground)	Pins 8

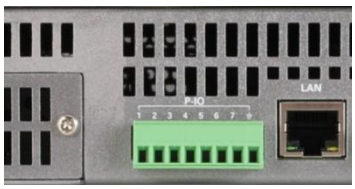


Figure 4. Digital control port on the rear panel

Rack-Mount Kits

You can easily rack mount the RP5900 Series (EL4900 DC loads RP5900 supplies) using the following kits:

- RP5904C for 1U models

- RP5905C for 2U models

PW9252A PathWave Advanced Power Control and Analysis Application

The PW9252A PathWave Advanced Power Control and Analysis application provides fast and easy access to the sourcing and measurement functionality of your RP5900 Series regenerative power supply without any programming. PW9252A allows flexibility on the number of instrument connections by just purchasing the number of licenses based on the number of connecting instruments. They are flexible tools for any application and allow you to control any RP5900 Series model via LAN, GPIB, and USB interface. The software can also control other Keysight power supplies, including the popular N6700 modules, the N6705 DC power analyzer, N7900 advanced power supplies, and the RP7900 regenerative power systems.

PW9252A enables you to do the following:

- Control and analyze up to 10 RP5900 Series systems simultaneously.
- Create complex waveforms effortlessly, enter formulas, choose from built-in patterns, or import your data, for precise DUT stimulation or load simulation.
- Enhance productivity with intuitive PC-style controls and a large, easy-to-read display.
- Log measurement data directly to your PC for fast storage, review, and reporting.
- Perform detailed CCDF statistical analysis to gain deeper insights into power-consumption patterns.
- Integrate seamlessly into your existing programming environment using the API for complete automation flexibility.



Figure 5. PW9252A interface with 4 channels connected

PW9253A PathWave Advanced Battery Test and Emulation Application

The Keysight PW9253A PathWave Advanced Battery Test and Emulation application provides a test environment for running battery tests, generating battery models, and performing battery emulation using one or more Keysight two-quadrant power supplies. Its emulation function enables you to quickly output the desired battery operation conditions, covering various test scenarios without waiting for a real battery to charge or discharge to a specific condition. The software also offers flexibility. Just purchase the number of licenses you need based on the number of connected instruments. The software controls other Keysight power supplies, including the popular N6700 modules, the N6705 DC power analyzer, N7900 advanced power supplies, and the RP7900 regenerative power system.

PW9253A enables you to do the following:

- Test and emulate batteries up to 600 kW and up to 2,000 V, depending on the maximum rating of the instrument.
- Choose from four modes of operation: emulation, profiler, discharge / charge, and cycler.
- Create custom battery models.
- Use API functions to facilitate integration into your programming environment.
- Provides advanced control capabilities — capacity rating, state of charge, constant or dynamic level selection, pulse width control.
- Accurately capture voltage, current, and capacity from seconds to days.
- Create custom dynamic loading characteristics for discharging.
- Import battery models.

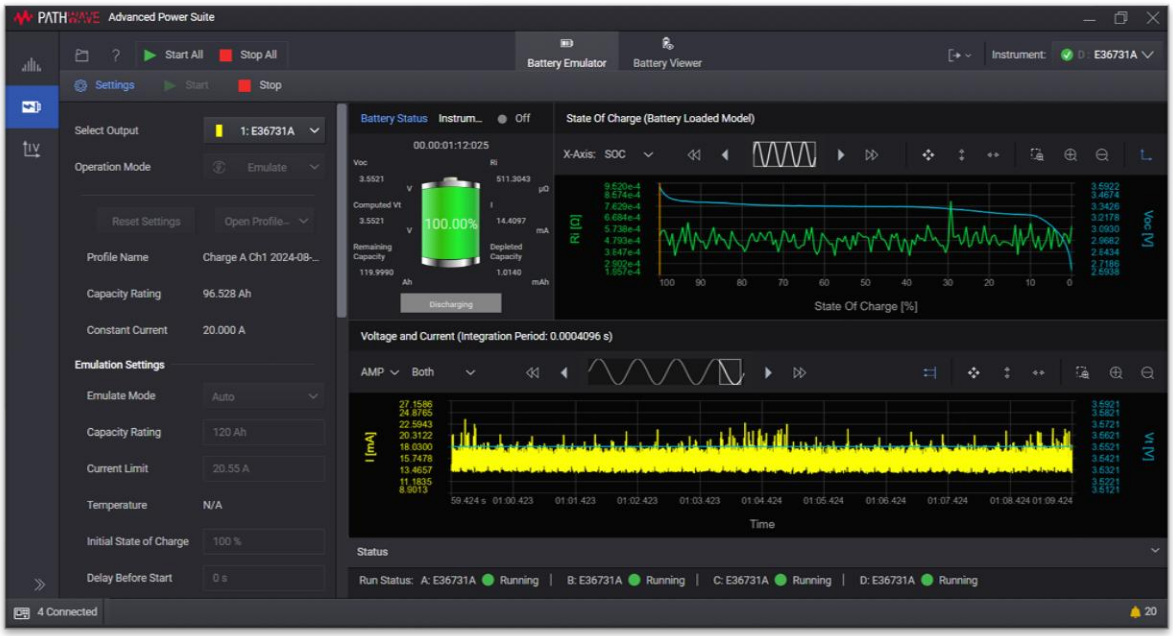


Figure 6. PW9253A connected to a two-quadrant power supply

Specifications – RP591xA

Unless otherwise noted, specifications are warranted over the ambient temperature range of 0 to 40 °C after a 30-minute warm-up period. Specifications apply at the output terminals, with the sense terminals connected to the output (local sensing) terminals.

Refer to the Keysight RP5900 Series documentation for the setup conditions for all performance specifications.

For more detailed specifications, refer to the RP5900 Series user manual.

	RP5911A		RP5912A		RP5913A	
Specification	**Source**	**Load**	**Source**	**Load**	**Source**	**Load**
DC Ratings						
Voltage	0 to 10 V	0 to 10 V	0 to 32 V	0 to 32 V	0 to 80 V	0 to 80 V
Current	-120A to 170A	2 to 120 A	0 to ±80 A	0 to 80 A	0 to ± 40 A	0 to 40 A
Power	-1.2kW to 1.7 kW	20 to 1.2 kW	0 to ±2 kW	0 to 2 kW	0 to ± 2 kW	0 to 2 kW
Output Ripple and Noise[3]						
CV peak-to-peak [1]	≤ 160 mVp-p	-	≤ 160 mVp-p	-	≤ 200 mVp-p	-
CV rms[2]	≤ 10 mVrms	-	≤ 30 mVrms	-	≤ 80 mVrms	-
Load Effect (Load Regulation) [3]						
Voltage	4 mV	4 mV	12.8 mV	12.8 mV	16 mV	16 mV
Current	170 mA	120 mA	80 mV	80 mA	40 mA	40 mA
Programming Accuracy [3]						
Voltage	0.08% + 8 mV		0.05% + 22 mV		0.03% + 24 mV	
Current	0.3% + 510 mA		0.1% + 200 mA		0.1% + 40 mA	
Power	0.5% + 8.5 W		0.5% + 10 W		0.5% + 10 W	
Measurement Accuracy [3]						
Voltage	0.08% + 8 mV		0.05% + 22 mV		0.03% + 24 mV	
Current	0.3% + 510 mA		0.1% + 200 mA		0.1% + 60 mA	
Power	0.5% + 8.5 W		0.5% + 10 W		0.5% + 10 W	
Load Transient Recovery Time [3,4]						
Recovery time	≤ 100 ms	-	≤ 1 ms	-	≤ 1 ms	-
Settling band	0.1 V	-	0.32 V	-	0.8 V	-

	RP5914A		RP5915A		RP5916A	
Specification	**Source**	**Load**	**Source**	**Load**	**Source**	**Load**
DC Ratings						
Voltage	0 to 300 V	0 to 300 V	0 to 500 V	0 to 500 V	0 to 800 V	0 to 800 V
Current	0 to ±20 A	0 to 20 A	0 to ± 12 A	0 to 12 A	0 to ± 8 A	0 to 8 A
Power	0 to ±2 kW	0 to 2 kW	0 to ± 2 kW	0 to 2 kW	0 to ± 2 kW	0 to 2 kW
Output Ripple and Noise[3]						
CV peak-to-peak [1]	≤ 900 mVp-p	-	≤ 1,500 mVp-p	-	≤ 2,400 mVp-p	-
CV rms[2]	≤ 120 mVrms	-	≤ 300 mVrms	-	≤ 800 mVrms	-
Load Effect (Load Regulation) [3]						
Voltage	60 mV	60 mV	100 mV	100 mV	160 mV	160 mV
Current	20 mA	20 mA	12 mA	12 mA	8 mA	8 mA
Programming Accuracy [3]						
Voltage	0.03% + 90 mV		0.03% + 150 mV		0.03% + 240 mV	
Current	0.1% + 30 mA		0.1% + 12 mA		0.1% + 8 mA	
Power	0.5% + 10 W		0.5% + 10 W		0.5% + 10 W	
Measurement Accuracy [3]						
Voltage	0.03% + 90 mV		0.03% + 150 mV		0.03% + 240 mV	
Current	0.1% + 30 mA		0.1% + 12 mA		0.1% + 8 mA	
Power	0.5% + 10 W		0.5% + 10 W		0.5% + 10 W	
Load Transient Recovery Time [3,4]						
Recovery time	≤ 1 ms	-	≤ 1 ms	-	≤ 1 ms	-
Settling band	3 V	-	5 V	-	8 V	-

1. From 20 Hz to 20 MHz (-3 dB bandwidth) with resistive load, terminals ungrounded, or terminal grounded.
2. From 20 Hz to 10 MHz (-3 dB bandwidth) with resistive load up to 400V, terminals ungrounded, or terminal grounded.
3. Percent of value + offset; at 23 °C ± 5 °C after a 30-minute warm-up; measurement NPLC=1; valid for 1 year.
4. Time to recover within the settling band following a step change from 25% to 90% of full load

Supplemental Characteristics – RP591xA

Supplemental characteristics are not warranted but are descriptions of performance determined by design or type testing. All supplemental characteristics are typical unless otherwise noted.

	RP5911A		RP5912A		RP5913A	
Characteristic	**Source**	**Load**	**Source**	**Load**	**Source**	**Load**
Voltage Programming						
Range	0 to 10 V		0 to 32 V		0 to 80 V	
Resolution	1 mV		1 mV		1 mV	
Current Programming						
Range	-120 to 170 A	2 to 120 A	-80 to 80 A	0 to 80 A	−40 to 40 A	0 to 40 A
Resolution	10 mA	100 mA	10 mA	10 mA	10 mA	10 mA
Resistance Programming						
Series resistance range	0 to 0.01 Ω	-	0 to 0.04 Ω	-	0 to 0.3 Ω	-
Load resistance range	0.009 to 30 Ω		0.012 to 1200 Ω		0.03 to 2,400 Ω	
Resolution	1 mΩ		1 mΩ		1 mΩ	
Accuracy	9 mΩ		12 mΩ		3 mΩ	
Voltage Programming Speed, No Load						
Rise / fall time 10% to 90% of step	50 ms / 100 ms	-	30 ms / 60 ms	-	15 ms / 30ms	-
Voltage Programming Speed, Full Load						
Rise / fall time 10% to 90% of step	100 ms / 50 ms	-	100 ms / 30 ms	-	30 ms / 15 ms	-
Source Effect (Line Regulation)						
Voltage	≤ 2 mV	≤ 2 mV	≤ 6.4 mV	≤ 6.4 mV	≤ 16 mV	≤ 16 mV
Current	≤ 102 mA	≤ 72 mA	≤ 48 mA	≤ 48 mA	≤ 24 mA	≤ 24 mA
Protection Capability						
Overvoltage	10.5 V	11 V	33 V	35 V	82 V	85 V
Overcurrent	-121.2 A / +171.7 A	121.2 A	±80.8 A	80.8 A	±42 A	42 A
Overpower	-1,224 W / +1,734 W	1,224 W	±2,040 W	2,040 W	±2,040 W	2,040 W

	RP5914A		RP5915A		RP5916A	
Characteristic	**Source**	**Load**	**Source**	**Load**	**Source**	**Load**
Voltage Programming						
Range	0 to 300 V		0 to 500 V		0 to 800 V	
Resolution	10 mV	1 mV	10 mV		10 mV	
Current Programming						
Range	-20 to 20 A	0 to 20 A	–12 to 12 A	0 to 12 A	–8 to 8 A	0 to 8 A
Resolution	1 mA	10 mA	1 mA	1 mA	1 mA	1 mA
Resistance Programming						
Series resistance range	0 to 0.4 Ω	-	0 to 1 Ω	-	0 to 1 Ω	-
Load resistance range	0.09 to 9000 Ω		0.3 to 15,000 Ω		0.45 to 22,500 Ω	
Resolution	10 mΩ	1 mΩ	10 mΩ		10 mΩ	
Accuracy	90 mΩ		10 mΩ		10 mΩ	
Voltage Programming Speed, No Load						
Rise / fall time 10% to 90% of step	30 ms / 30 ms	-	30 ms / 30ms	-	30 ms / 30ms	-
Voltage Programming Speed, Full Load						
Rise / fall time 10% to 90% of step	60 ms / 15 ms	-	60 ms / 30 ms	-	60 ms / 30 ms	-
Source Effect (Line Regulation)						
Voltage	≤ 60 mV	≤ 60 mV	≤ 100 mV	≤ 100 mV	≤ 160 mV	≤ 160 mV
Current	≤ 12 mA	≤ 12 mA	≤ 7.2 mA	≤ 7.2 mA	≤ 4.8 mA	≤ 4.8 mA
Protection Capability						
Overvoltage	303 V	330 V	505 V	530 V	808 V	835 V
Overcurrent	±20.2 A	±20.2 A	±12.5 A	12.5 A	±8.4 A	8.4 A
Overpower	±2,040 W	±2,040 W	±2,040 W	2,040 W	±2,040 W	2,040 W

Specifications – RP592xA

Unless otherwise noted, specifications are warranted over the ambient temperature range of 0 to 40 °C after a 30-minute warm-up period. Specifications apply at the output terminals, with the sense terminals connected to the output (local sensing) terminals.

Refer to the Keysight RP5900 Series documentation for the setup conditions for all performance specifications.

Supplemental characteristics are not warranted but are descriptions of performance determined by design or type testing. All supplemental characteristics are typical unless otherwise noted.

For more detailed specifications, refer to the RP5900 Series user manual.

	RP5921A		RP5922A		RP5923A	
Specification	**Source**	**Load**	**Source**	**Load**	**Source**	**Load**
DC Ratings						
Voltage	0 to 10 V	0 to 10 V	0 to 32 V	0 to 32 V	0 to 80 V	0 to 80 V
Current	-240A to 340A	4 to 240 A	0 to ±160 A	0 to 160 A	0 to ±80 A	0 to 80 A
Power[5]	-2.4kW to 3.4 kW	40 to 2.4 kW	0 to ±4 kW	0 to 4 kW	0 to ±4 kW	0 to 4 kW
Output Ripple and Noise [3]						
CV peak-to-peak [1]	≤ 160 mVp-p	-	≤ 80 mVp-p	-	≤ 200 mVp-p	-
CV rms[2]	≤ 10 mVrms	-	≤ 30 mVrms	-	≤ 80 mVrms	-
Load Effect (Load Regulation) [3]						
Voltage	4 mV	4 mV	12.8 mV	12.8 mV	16 mV	16 mV
Current	340 mA	240 mA	160 mA	160 mA	80 mA	80 mA
Programming Accuracy [3]						
Voltage	0.08% + 8 mV		0.05% + 22 mV		0.03% + 24 mV	
Current	0.3% + 1.02A		0.1% + 400 mA		0.1% + 80 mA	
Power	0.5% + 17 W		0.5% + 20 W		0.5% + 20 W	
Measurement Accuracy [3]						
Voltage	0.08% + 8 mV		0.05% + 22 mV		0.03% + 24 mV	
Current	0.3% + 1.02A		0.1% + 400 mA		0.1% + 120 mA	
Power	0.5% + 17 W		0.5% + 20 W		0.5% + 20 W	
Load Transient Recovery Time [3,4]						
Recovery time	≤ 100 ms	-	≤ 1 ms	-	≤ 1 ms	-
Settling band	0.1 V	-	0.32 V	-	0.8 V	-

1. From 20 Hz to 20 MHz (-3 dB bandwidth) with resistive load, terminals ungrounded, or terminal grounded.
2. From 20 Hz to 10 MHz (-3 dB bandwidth) with resistive load up to 400V, terminals ungrounded, or terminal grounded.
3. Percent of value + offset; at 23 °C ± 5 °C after a 30-minute warm-up; measurement NPLC=1; valid for 1 year.
4. Time to recover within the settling band following a step change from 25% to 90% of full load.
5. The maximum power will be capped at 3897W when the three-phase input AC voltage (V) is 200VAC.

	RP5924A		RP5925A		RP5926A	
Specification	**Source**	**Load**	**Source**	**Load**	**Source**	**Load**
DC Ratings						
Voltage	0 to 300 V	0 to 300 V	0 to 500 V	0 to 500 V	0 to 800 V	0 to 800 V
Current	0 to ±40 A	0 to 40 A	0 to ±24 A	0 to 24 A	0 to ±16 A	0 to 16 A
Power[5]	0 to ±4 kW	0 to 4 kW	0 to ±4 kW	0 to 4 kW	0 to ±4 kW	0 to 4 kW
Output Ripple and Noise [3]						
CV peak-to-peak [1]	≤ 600 mVp-p	-	≤ 1,000 mVp-p	-	≤ 1,600 mVp-p	-
CV rms[2]	≤ 90 mVrms	-	≤ 150 mVrms	-	≤ 300 mVrms	-
Load Effect (Load Regulation) [3]						
Voltage	60 mV	60 mV	100 mV	100 mV	160 mV	160 mV
Current	40 mA	40 mA	24 mA	24 mA	16 mA	16 mA
Programming Accuracy [3]						
Voltage	0.03% + 90 mV		0.03% + 150 mV		0.03% + 240 mV	
Current	0.1% + 60 mA		0.1% + 24 mA		0.1% + 16 mA	
Power	0.5% + 20 W		0.5% + 20 W		0.5% + 20 W	
Measurement Accuracy [3]						
Voltage	0.03% + 90 mV		0.03% + 150 mV		0.03% + 240 mV	
Current	0.1% + 60 mA		0.1% + 24 mA		0.1% + 16 mA	
Power	0.5% + 20 W		0.5% + 20 W		0.5% + 20 W	
Load Transient Recovery Time [3,4]						
Recovery time	≤ 1 ms	-	≤ 1 ms	-	≤ 1 ms	-
Settling band	3 V	-	5 V	-	8 V	-

1. From 20 Hz to 20 MHz (-3 dB bandwidth) with resistive load, terminals ungrounded, or terminal grounded.
2. From 20 Hz to 10 MHz (-3 dB bandwidth) with resistive load up to 400V, terminals ungrounded, or terminal grounded.
3. Percent of value + offset; at 23 °C ± 5 °C after a 30-minute warm-up; measurement NPLC=1; valid for 1 year.
4. Time to recover within the settling band following a step change from 25% to 90% of full load.
5. The maximum power will be capped at 3897W when the three-phase input AC voltage (V) is 200VAC.

Supplemental Characteristics – RP592xA

Supplemental characteristics are not warranted but are descriptions of performance determined by design or type testing. All supplemental characteristics are typical unless otherwise noted.

	RP5921A		RP5922A		RP5923A	
Characteristic	**Source**	**Load**	**Source**	**Load**	**Source**	**Load**
Voltage Programming						
Range	0 to 10 V		0 to 32 V		0 to 80 V	
Resolution	1 mV		1 mV		1 mV	
Current Programming						
Range	-240 to 340 A	4 to 240 A	-160 to 160 A	0 to 160 A	–80 to 80 A	0 to 80 A
Resolution	100 mA	100 mA	10 mA	10 mA	10 mA	10 mA
Resistance Programming						
Series resistance range	0 to 0.01 Ω	–	0 to 0.04 Ω	–	0 to 1 Ω	-
Load resistance range	0.006 to 20 Ω	0.006 to 2.5 Ω	0.006 to 600 Ω		0.015 to 1,200 Ω	
Resolution	1 mΩ		1 mΩ		1 mΩ	
Accuracy	6 mΩ		6 mΩ		3 mΩ	
Voltage Programming Speed, No Load						
Rise / fall time 10% to 90% of step	50 ms / 100 ms	-	30 ms / 60 ms	-	15 ms / 30ms	-
Voltage Programming Speed, Full Load						
Rise / fall time 10% to 90% of step	100 ms / 50 ms	-	100 ms / 30 ms	-	30 ms / 15 ms	-
Source effect (Line Regulation)						
Voltage	≤ 2 mV	≤ 2 mV	≤ 6.4 mV	≤ 6.4 mV	≤ 16 mV	≤ 16 mV
Current	≤ 204 mA	≤ 144 mA	≤ 96 mA	≤ 96 mA	≤ 48 mA	≤ 48 mA
Protection Capability						
Overvoltage	10.5 V	11 V	33 V	35 V	82 V	85 V
Overcurrent	-242.4 A / +343.4 A	242.4 A	±161.6 A	161.6 A	±84 A	84 A
Overpower	-2,448 W / +3,468 W	2,448 W	±4,080 W	4,080 W	±4,080 W	4,080 W

	RP5924A		RP5925A		RP5926A	
Characteristic	**Source**	**Load**	**Source**	**Load**	**Source**	**Load**
Voltage Programming						
Range	0 to 300 V		0 to 500 V		0 to 800 V	
Resolution	10 mV	1 mV	10 mV		10 mV	
Current Programming						
Range	-40 to 40 A	0 to 40 A	–24 to 24 A	0 to 24 A	–16 to 16 A	0 to 16 A
Resolution	1 mA	10 mA	1 mA	1 mA	1 mA	1 mA
Resistance Programming						
Series resistance range	0 to 0.4 Ω	-	0 to 1 Ω	-	0 to 1 Ω	-
Load resistance range	0.065 to 4500 Ω		0.15 to 7,500 Ω		0.22 to 11,250 Ω	
Resolution	10 mΩ	1 mΩ	10 mΩ		10 mΩ	
Accuracy	65 mΩ		10 mΩ		10 mΩ	
Voltage Programming Speed, No Load						
Rise / fall time 10% to 90% of step	30 ms / 30 ms	-	30 ms / 30ms	-	30 ms / 30ms	-
Voltage Programming Speed, Full Load						
Rise / fall time 10% to 90% of step	60 ms / 15 ms	-	60 ms / 30 ms	-	60 ms / 30 ms	-
Source effect (Line Regulation)						
Voltage	≤ 60 mV	≤ 60 mV	≤ 100 mV	≤ 100 mV	≤ 160 mV	≤ 160 mV
Current	≤ 12 mA	≤ 12 mA	≤ 14.4 mA	≤ 14.4 mA	≤ 9.6 mA	≤ 9.6 mA
Protection Capability						
Overvoltage	303 V	330 V	505 V	530 V	808 V	835 V
Overcurrent	±40.4 A	40.4 A	±25 A	25 A	±16.8 A	16.8 A
Overpower	±4,080 W	4,080 W	±4,080 W	4,080 W	±4,080 W	4,080 W

Specifications – RP593xA

Unless otherwise noted, specifications are warranted over the ambient temperature range of 0 to 40 °C after a 30-minute warm-up period. Specifications apply at the output terminals, with the sense terminals connected to the output (local sensing) terminals.

Refer to the Keysight RP5900 Series documentation for the setup conditions for all performance specifications.

Supplemental characteristics are not warranted but are descriptions of performance determined by design or type testing. All supplemental characteristics are typical unless otherwise noted.

For more detailed specifications, refer to the RP5900 Series user manual.

	RP5931A		RP5932A		RP5933A	
Specification	**Source**	**Load**	**Source**	**Load**	**Source**	**Load**
DC Ratings						
Voltage	0 to 10 V	0 to 10 V	0 to 32 V	0 to 32 V	0 to 80 V	0 to 80 V
Current	-360A to 510 A	6 to 360 A	0 to ±240 A	0 to 240 A	0 to ±120 A	0 to 120 A
Power	-3.6kW to 5.1 kW	60W to 3.6 kW	0 to ±6 kW	0 to 6 kW	0 to ±6 kW	0 to 6 kW
Output Ripple and Noise [3]						
CV peak-to-peak [1]	≤ 160 mVp-p	-	≤ 80 mVp-p	-	≤ 200 mVp-p	-
CV rms[2]	≤ 10 mVrms	-	≤ 30 mVrms	-	≤ 80 mVrms	-
Load Effect (Load Regulation) [3]						
Voltage	4 mV	4 mV	12.8 mV	12.8 mV	16 mV	16 mV
Current	510 mA	360 mA	240 mA	240 mA	120 mA	1200 mA
Programming Accuracy [3]						
Voltage	0.08% + 8 mV		0.05% + 22 mV		0.03% + 24 mV	
Current	0.3% + 1.53A		0.1% + 600 mA		0.1% + 120 mA	
Power	0.5% + 25.5 W		0.5% + 30 W		0.5% + 30 W	
Measurement Accuracy [3]						
Voltage	0.08% + 8 mV		0.05% + 22 mV		0.03% + 24 mV	
Current	0.3% + 1.53A		0.1% + 600 mA		0.1% + 200 mA	
Power	0.5% + 25.5 W		0.5% + 30 W		0.5% + 30 W	
Load Transient Recovery Time [3,4]						
Recovery time	≤ 100 ms	-	≤ 1 ms	-	≤ 1 ms	-
Settling band	0.1 V	-	0.32 V	-	0.8 V	-

1. From 20 Hz to 20 MHz (-3 dB bandwidth) with resistive load, terminals ungrounded, or terminal grounded.
2. From 20 Hz to 10 MHz (-3 dB bandwidth) with resistive load up to 400V, terminals ungrounded, or terminal grounded.
3. Percent of value + offset; at 23 °C ± 5 °C after a 30-minute warm-up; measurement NPLC=1; valid for 1 year.
4. Time to recover within the settling band following a step change from 25% to 90% of full load.

	RP5934A		RP5935A		RP5936A	
Specification	**Source**	**Load**	**Source**	**Load**	**Source**	**Load**
DC Ratings						
Voltage	0 to 300 V	0 to 300 V	0 to 500 V	0 to 500 V	0 to 800 V	0 to 800 V
Current	0 to ±60 A	0 to 60 A	0 to ±36 A	0 to 36 A	0 to ±24 A	0 to 24 A
Power	0 to ±6 kW	0 to 6 kW	0 to ±6 kW	0 to 6 kW	0 to ±6 kW	0 to 6 kW
Output Ripple and Noise [3]						
CV peak-to-peak [1]	≤ 300 mVp-p	-	≤ 500 mVp-p	-	≤ 1,000 mVp-p	-
CV rms[2]	≤ 60 mVrms	-	≤ 100 mVrms	-	≤ 160 mVrms	-
Load Effect (Load Regulation) [3]						
Voltage	60 mV	60 mV	100 mV	100 mV	160 mV	160 mV
Current	60 mA	60 mA	36 mA	36 mA	32 mA	32 mA
Programming Accuracy [3]						
Voltage	0.03% + 90 mV		0.03% + 150 mV		0.03% + 240 mV	
Current	0.1% + 90 mA		0.1% + 36 mA		0.1% + 24 mA	
Power	0.5% + 30 W		0.5% + 30 W		0.5% + 30 W	
Measurement Accuracy [3]						
Voltage	0.03% + 90 mV		0.03% + 150 mV		0.03% + 240 mV	
Current	0.1% + 90 mA		0.1% + 36 mA		0.1% + 24 mA	
Power	0.5% + 30 W		0.5% + 30 W		0.5% + 30 W	
Load Transient Recovery Time [3,4]						
Recovery time	≤ 1 ms	-	≤ 1 ms	-	≤ 1 ms	-
Settling band	3 V	-	5 V	-	8 V	-

1. From 20 Hz to 20 MHz (-3 dB bandwidth) with resistive load, terminals ungrounded, or terminal grounded.
2. From 20 Hz to 10 MHz (-3 dB bandwidth) with resistive load up to 400V, terminals ungrounded, or terminal grounded.
3. Percent of value + offset; at 23 °C ± 5 °C after a 30-minute warm-up; measurement NPLC=1; valid for 1 year.
4. Time to recover within the settling band following a step change from 25% to 90% of full load.

	RP5937A	
Specification	**Source**	**Load**
DC Ratings		
Voltage	0 to 1500 V	0 to 1500 V
Current	0 to ±12 A	0 to 12 A
Power	0 to ±6 kW	0 to 6 kW
Output Ripple and Noise [3]		
CV peak-to-peak [1]	≤ 1500 mVp-p	-
CV rms[2]	≤ 300 mVrms	-
Load Effect (Load Regulation) [3]		
Voltage	300 mV	300 mV
Current	12 mA	12 mA
Programming Accuracy [3]		
Voltage	0.03% + 900 mV	
Current	0.2% + 24 mA	
Power	0.5% + 30 W	
Measurement Accuracy [3]		
Voltage	0.03% + 900 mV	
Current	0.2% + 24 mA	
Power	0.5% + 30 W	
Load Transient Recovery Time [3,4]		
Recovery time	≤ 1 ms	-
Settling band	15 V	-

1. From 20 Hz to 20 MHz (-3 dB bandwidth) with resistive load, terminals ungrounded, or terminal grounded.
2. From 20 Hz to 10 MHz (-3 dB bandwidth) with resistive load up to 400V, terminals ungrounded, or terminal grounded.
3. Percent of value + offset; at 23 °C ± 5 °C after a 30-minute warm-up; measurement NPLC=1; valid for 1 year.
4. Time to recover within the settling band following a step change from 25% to 90% of full load.

Supplemental Characteristics – RP593xA

Supplemental characteristics are not warranted but are descriptions of performance determined by design or type testing. All supplemental characteristics are typical unless otherwise noted.

	RP5931A		RP5932A		RP5933A	
Characteristic	**Source**	**Load**	**Source**	**Load**	**Source**	**Load**
Voltage Programming						
Range	0 to 10 V		0 to 32 V		0 to 80 V	
Resolution	1 mV		1 mV		1 mV	
Current Programming						
Range	-360 to 510 A	6 to 360 A	-240 to 240 A	0 to 240 A	–120 to 120 A	0 to 120 A
Resolution	100 mA	100 mA	10 mA	10 mA	10 mA	10 mA
Resistance Programming						
Series resistance range	0 to 0.01 Ω	-	0 to 0.04 Ω	-	0 to 0.3 Ω	-
Load resistance range	0.003 to 10 Ω		0.005 to 400 Ω		0.01 to 800 Ω	
Resolution	1 mΩ		1 mΩ		1 mΩ	
Accuracy	3 mΩ		5 mΩ		3 mΩ	
Voltage Programming Speed, No Load						
Rise / fall time 10% to 90% of step	50 ms / 100 ms	-	30 ms / 60 ms	-	15 ms / 30ms	-
Voltage Programming Speed, Full Load						
Rise / fall time 10% to 90% of step	100 ms / 50 ms	-	100 ms / 30 ms		30 ms / 15 ms	-
Source Effect (Line Regulation)						
Voltage	≤ 2 mV	≤ 2 mV	≤ 6.4 mV	≤ 6.4 mV	≤ 16 mV	≤ 16 mV
Current	≤ 153 mA	≤ 216 mA	≤ 144 mA	≤ 144 mA	≤ 72 mA	≤ 72 mA
Protection Capability						
Overvoltage	10.5 V	11 V	33 V	35 V	82 V	85 V
Overcurrent	-363.6 A / +515.1 A	363.6 A	±242.4 A	242.4 A	±126 A	126 A
Overpower	-3,672 W / +5,202 W	3,672 W	±6,120 W	6,120 W	±6,120 W	6,120 W

	RP5934A		RP5935A		RP5936A	
Characteristic	**Source**	**Load**	**Source**	**Load**	**Source**	**Load**
Voltage Programming						
Range	0 to 300 V		0 to 500 V		0 to 800 V	
Resolution	10 mV		10 mV		10 mV	
Current Programming						
Range	-60 to 60 A	0 to 60 A	–36 to 36 A	0 to 36 A	–24 to 24 A	0 to 24 A
Resolution	1 mA	10 mA	1 mA	1 mA	1 mA	1 mA
Resistance Programming						
Series resistance range	0 to 0.4 Ω	-	0 to 1 Ω	-	0 to 1 Ω	-
Load resistance range	0.05 to 3000 Ω		0.1 to 5,000 Ω		0.15 to 7,500 Ω	
Resolution	10 mΩ		10 mΩ		10 mΩ	
Accuracy	50 mΩ		10 mΩ		10 mΩ	
Voltage Programming Speed, No Load						
Rise / fall time 10% to 90% of step	30 ms / 30 ms	-	30 ms / 30ms	-	30 ms / 30ms	-
Voltage Programming Speed, Full Load						
Rise / fall time 10% to 90% of step	60 ms / 15 ms	-	60 ms / 30 ms	-	60 ms / 30 ms	-
Source Effect (Line Regulation)						
Voltage	≤ 60 mV	≤ 60 mV	≤ 100 mV	≤ 100 mV	≤ 160 mV	≤ 160 mV
Current	≤ 36 mA	≤ 36 mA	≤ 28.8 mA	≤ 28.8 mA	≤ 14.4 mA	≤ 14.4 mA
Protection Capability						
Overvoltage	303 V	330 V	505 V	530 V	808 V	835 V
Overcurrent	±60.6 A	60.6 A	±37.5 A	37 A	±25.2 A	25.2 A
Overpower	±6,120 W	6,120 W	±6,120 W	6,120 W	±6,120 W	6,120 W

	RP5937A	
Characteristic	**Source**	**Load**
Voltage Programming		
Range	0 to 1500 V	
Resolution	10 mV	
Current Programming		
Range	-12 to 12 A	0 to 12 A
Resolution	1 mA	1 mA
Resistance Programming		
Series resistance range	0 to 1 Ω	-
Load resistance range	0.5 to 7500 Ω	
Resolution	10 mΩ	
Accuracy	500 mΩ	
Voltage Programming Speed, No Load		
Rise / fall time 10% to 90% of step	30 ms / 30 ms	-
Voltage Programming Speed, Full Load		
Rise / fall time 10% to 90% of step	60 ms / 15 ms	-
Source Effect (Line Regulation)		
Voltage	≤ 300 mV	≤ 300 mV
Current	≤ 7.2 mA	≤ 7.2 mA
Protection Capability		
Overvoltage	1515 V	1590 V
Overcurrent	±12.12 A	12.12 A
Overpower	±6,120 W	6,120 W

Specifications – RP594xA

Unless otherwise noted, specifications are warranted over the ambient temperature range of 0 to 40 °C after a 30-minute warm-up period. Specifications apply at the output terminals, with the sense terminals connected to the output (local sensing) terminals.

Refer to the Keysight RP5900 Series documentation for the setup conditions for all performance specifications.

Supplemental characteristics are not warranted but are descriptions of performance determined by design or type testing. All supplemental characteristics are typical unless otherwise noted.

For more detailed specifications, refer to the RP5900 Series user manual.

	RP5941A		RP5942A		RP5943A	
Specification	**Source**	**Load**	**Source**	**Load**	**Source**	**Load**
DC Ratings						
Voltage	0 to 10 V	0 to 10 V	0 to 32 V	0 to 32 V	0 to 80 V	0 to 80 V
Current	-720 to ±1020 A	12 to 720 A	0 to ±480 A	0 to 480 A	0 to ±240 A	0 to 240 A
Power	-7.2kW to 10.2 kW	120W to 7.2 kW	0 to ±12 kW	0 to 12 kW	0 to ±12 kW	0 to 12 kW
Output Ripple and Noise [3]						
CV peak-to-peak [1]	≤ 160 mVp-p	-	≤ 80 mVp-p	-	≤ 200 mVp-p	-
CV rms[2]	≤ 10 mVrms	-	≤ 30 mVrms	-	≤ 80 mVrms	-
Load Effect (Load Regulation) [3]						
Voltage	4 mV	4 mV	12.8 mV	12.8 mV	16 mV	16 mV
Current	1020 mA	720 mA	480 mA	480 mA	240 mA	240 mA
Programming Accuracy [3]						
Voltage	0.08% + 8 mV		0.05% + 22 mV		0.03% + 24 mV	
Current	0.3% + 3.06 A		0.1% + 1.2 A		0.1% + 240 mA	
Power	0.5% + 51 W		0.5% + 60 W		0.5% + 60 W	
Measurement Accuracy [3]						
Voltage	0.08% + 8 mV		0.05% + 22 mV		0.03% + 24 mV	
Current	0.3% + 3.06 A		0.1% + 1.2 A		0.1% + 380 mA	
Power	0.5% + 51 W		0.5% + 60 W		0.5% + 60 W	
Load Transient Recovery Time [3,4]						
Recovery time	≤ 100 ms	-	≤ 1 ms	-	≤ 1 ms	-
Settling band	0.1 V	-	0.32 V	-	0.8 V	-

1. From 20 Hz to 20 MHz (-3 dB bandwidth) with resistive load, terminals ungrounded, or terminal grounded.
2. From 20 Hz to 10 MHz (-3 dB bandwidth) with resistive load up to 400 V, terminals ungrounded, or terminal grounded.
3. Percent of value + offset; at 23 °C ± 5 °C after a 30-minute warm-up; measurement NPLC=1; valid for 1 year.
4. Time to recover within the settling band following a step change from 25% to 90% of full load.

	RP5944A		RP5945A		RP5946A	
Specification	**Source**	**Load**	**Source**	**Load**	**Source**	**Load**
DC Ratings						
Voltage	0 to 300 V	0 to 300 V	0 to 500 V	0 to 500 V	0 to 800 V	0 to 800 V
Current	0 to ±120 A	0 to 120 A	0 to ±72 A	0 to 72 A	0 to ±48 A	0 to 48 A
Power	0 to ±12 kW	0 to 12 kW	0 to ±12 kW	0 to 12 kW	0 to ±12 kW	0 to 12 kW
Output Ripple And Noise [3]						
CV peak-to-peak [1]	≤ 300 mVp-p	-	≤ 500 mVp-p	-	≤ 1,000 mVp-p	-
CV rms[2]	≤ 60 mVrms	-	≤ 100 mVrms	-	≤ 160 mVrms	-
Load Effect (Load Regulation) [3]						
Voltage	60 mV	60 mV	100 mV	100 mV	160 mV	160 mV
Current	120 mA	120 mA	72 mA	72 mA	64 mA	64 mA
Programming Accuracy [3]						
Voltage	0.03% + 90 mV		0.03% + 150 mV		0.03% + 240 mV	
Current	0.1% + 180 mA		0.1% + 72 mA		0.1% + 48 mA	
Power	0.5% + 60 W		0.5% + 60 W		0.5% + 60 W	
Measurement Accuracy [3]						
Voltage	0.03% + 90 mV		0.03% + 150 mV		0.03% + 240 mV	
Current	0.1% + 180 mA		0.1% + 72 mA		0.1% + 48 mA	
Power	0.5% + 60 W		0.5% + 60 W		0.5% + 60 W	
Load Transient Recovery Time [3,4]						
Recovery time	≤ 1 ms	-	≤ 1 ms	-	≤ 1 ms	-
Settling band	3 V	-	5 V	-	8 V	-

1. From 20 Hz to 20 MHz (-3 dB bandwidth) with resistive load, terminals ungrounded, or terminal grounded.
2. From 20 Hz to 10 MHz (-3 dB bandwidth) with resistive load up to 400 V, terminals ungrounded, or terminal grounded.
3. Percent of value + offset; at 23 °C ± 5 °C after a 30-minute warm-up; measurement NPLC=1; valid for 1 year.
4. Time to recover within the settling band following a step change from 25% to 90% of full load.

	RP5947A	
Specification	**Source**	**Load**
DC Ratings		
Voltage	0 to 1500 V	0 to 1500 V
Current	0 to ±24 A	0 to 24 A
Power	0 to ±12 kW	0 to 12 kW
Output Ripple And Noise [3]		
CV peak-to-peak [1]	≤ 1500 mVp-p	-
CV rms[2]	≤ 300 mVrms	-
Load Effect (Load Regulation) [3]		
Voltage	300 mV	300 mV
Current	24 mA	24 mA
Programming Accuracy [3]		
Voltage	0.03% + 900 mV	
Current	0.2% + 48 mA	
Power	0.5% + 60 W	
Measurement Accuracy [3]		
Voltage	0.03% + 900 mV	
Current	0.2% + 48 mA	
Power	0.5% + 60 W	
Load Transient Recovery Time [3,4]		
Recovery time	≤ 1 ms	-
Settling band	15 V	-

1. From 20 Hz to 20 MHz (-3 dB bandwidth) with resistive load, terminals ungrounded, or terminal grounded.
2. From 20 Hz to 10 MHz (-3 dB bandwidth) with resistive load up to 400 V, terminals ungrounded, or terminal grounded.
3. Percent of value + offset; at 23 °C ± 5 °C after a 30-minute warm-up; measurement NPLC=1; valid for 1 year.
4. Time to recover within the settling band following a step change from 25% to 90% of full load.

Supplemental Characteristics – RP594xA

Supplemental characteristics are not warranted but are descriptions of performance determined by design or type testing. All supplemental characteristics are typical unless otherwise noted.

	RP5941A		RP5942A		RP5943A	
Characteristic	**Source**	**Load**	**Source**	**Load**	**Source**	**Load**
Voltage Programming						
Range	0 to 10 V		0 to 32 V		0 to 80 V	
Resolution	1 mV		1 mV		1 mV	
Current Programming						
Range	-720 to 1020 A	12 to 720 A	-480 to 480 A	480 to 480 A	−240 to 240 A	0 to 240 A
Resolution	100 mA	100 mA	10 mA	10 mA	10 mA	10 mA
Resistance Programming						
Series resistance range	0 to 0.005 Ω	-	0 to 0.02 Ω	-	0 to 0.15 Ω	-
Load resistance range	0.0015 to 5 Ω	0.0015 to 0.83 Ω	0.004 to 200 Ω		0.005 to 400 Ω	
Resolution	1 mΩ		1 mΩ		1 mΩ	
Accuracy	1.5 mΩ		4 mΩ		3 mΩ	
Voltage Programming Speed, No Load						
Rise / fall time 10% to 90% of step	50 ms / 100 ms	-	30 ms / 60 ms	-	15 ms / 30ms	-
Voltage Programming Speed, Full Load						
Rise / fall time 10% to 90% of step	100 ms / 50 ms	-	100 ms / 30 ms	-	30 ms / 15 ms	-
Source Effect (Line Regulation)						
Voltage	≤ 2 mV	≤ 2 mV	≤ 6.4 mV	≤ 6.4 mV	≤ 16 mV	≤ 16 mV
Current	≤ 612 mA	≤ 432 mA	≤ 288 mA	≤ 288 mA	≤ 144 mA	≤ 144 mA
Protection Capability						
Overvoltage	10.5 V	11 V	33 V	35 V	82 V	85 V
Overcurrent	-727.2 A / +1030.2 A	727.2 A	±484.8 A	484.8 A	±252 A	252 A
Overpower	-7,344 W / +10,710 W	7,344 W	±12,240 W	12,240 W	±12,240 W	12,240 W

	RP5944A		RP5945A		RP5946A	
Characteristic	**Source**	**Load**	**Source**	**Load**	**Source**	**Load**
Voltage Programming						
Range	0 to 300 V		0 to 500 V		0 to 800 V	
Resolution	10 mV	1 mV	10 mV		10 mV	
Current Programming						
Range	-120 to 120 A	0 to 120 A	–72 to 72 A	0 to 72 A	–48 to 48 A	0 to 48 A
Resolution	1 mA	10 mA	10 mA	10 mA	10 mA	10 mA
Resistance Programming						
Series resistance range	0 to 0.2 Ω	-	0 to 1 Ω	-	0 to 1 Ω	-
Load resistance range	0.1 to 1500 Ω		0.05 to 2,500 Ω		0.08 to 3,750 Ω	
Resolution	10 mΩ	1 mΩ	10 mΩ		10 mΩ	
Accuracy	100 mΩ		10 mΩ		10 mΩ	
Voltage Programming Speed, No Load						
Rise / fall time 10% to 90% of step	30 ms / 30 ms	-	30 ms / 30ms	-	30 ms / 30ms	-
Voltage Programming Speed, Full Load						
Rise / fall time 10% to 90% of step	60 ms / 15 ms	-	60 ms / 30 ms	-	60 ms / 30 ms	-
Source Effect (Line Regulation)						
Voltage	≤ 60 mV	≤ 60mV	≤ 100 mV	≤ 100 mV	≤ 160 mV	≤ 160 mV
Current	≤ 72 mA	≤ 72 mA	≤ 57.6 mA	≤ 57.6 mA	≤ 28.8 mA	≤ 28.8 mA
Protection Capability						
Overvoltage	303 V	330 V	505 V	530 V	808 V	835 V
Overcurrent	±121.2 A	121.2 A	±75 A	75 A	±50.4 A	50.4 A
Overpower	±12,240 W	12,240 W	±12,240 W	12,240 W	±12,240 W	12,240 W

	RP5947A	
Characteristic	**Source**	**Load**
Voltage Programming		
Range	0 to 1500 V	
Resolution	10 mV	
Current Programming		
Range	-24 to 24 A	0 to 24 A
Resolution	1 mA	1 mA
Resistance Programming		
Series resistance range	0 to 0.5 Ω	-
Load resistance range	0.25 to 3750 Ω	
Resolution	10 mΩ	
Accuracy	250 mΩ	
Voltage Programming Speed, No Load		
Rise / fall time 10% to 90% of step	30 ms / 30 ms	-
Voltage Programming Speed, Full Load		
Rise / fall time 10% to 90% of step	60 ms / 15 ms	-
Source Effect (Line Regulation)		
Voltage	≤ 300 mV	≤ 300 mV
Current	≤ 14.4 mA	≤ 14.4 mA
Protection Capability		
Overvoltage	1515 V	1590 V
Overcurrent	±24.24 A	24.24 A
Overpower	±12,240 W	12,240 W

Common Characteristics – All Models

Common Characteristic	All Models
Command processing time	≤ 0.1 ms from receipt of command to start of output change. Applies to simple setting commands over the GPIB interface
Parallel capability	Up to 16 units can be connected in primary / secondary mode.
Computer Interfaces	
LXI	1.5 LXI Device Specification 2016
LAN	10 Mb, 100 Mb, 1 Gb LAN
USB	USB 2.0 (USB-TMC488 protocol)
GPIB	SCPI - 1993, IEEE 488.2 compliant interface
CAN	CAN 2.0A and CAN 2.0B compatible (CANopen protocol)
Analog	0 to 10 V full scale
Web Server	Support remote control, transfer screen, screenshot, upgrade program, and so on
Constant Dwell ARBs	
Number of points	Up to 65,535
Dwell range	One dwell setting applies for the entire ARB, from 1 ms to 3,600 s
Regulatory Compliance	
EMC	Complies with European EMC Directive for test and measurement products
	Complies with Australian standard and carries C-Tick mark
	This ISM device complies with Canadian ICES-001
	Cet appareil ISM est conforme à la norme NMB-001 du Canada
Safety	Complies with European Low Voltage Directive and carries the CE mark
	Conforms to US and Canadian safety regulations
	Declarations of Conformity for this product may be downloaded from the Web. Go to http://www.keysight.com/go/conformity and click on "Declarations of Conformity"
Output Terminal Isolation	
For 10 VDC models – RP59x1A	No output terminal may be more than ±60 VDC from any other terminal or chassis ground
For 32 VDC models – RP59x2A	No output terminal may be more than ±60 VDC from any other terminal or chassis ground
For 80 VDC models – RP59x3A	No output terminal may be more than ± 300 VDC from any other terminal or chassis ground
For 300 VDC models – RP59x4A	No output terminal may be more than ±300 VDC from any other terminal or chassis ground
For 500 VDC models – RP59x5A	No output terminal may be more than ±800 VDC from any other terminal or chassis ground
For 800 VDC models – RP59x6A	No output terminal may be more than ±1000 VDC from any other terminal or chassis ground
For 1500 VDC models – RP59x7A	No output terminal may be more than ±1500 VDC from any other terminal or chassis ground
AC Input	
Connections	L1, L2, L3, PE
Nominal AC input range and frequency	RP5911A, RP5912A, RP5914A, RP5921A, RP5922A, RP5923A, RP5924A, RP5925A, RP5926A: 3-phase; 200 – 480 VAC, 50 / 60 Hz RP5931A, RP5932A, RP5933A, RP5934A, RP5935A, RP5936A, RP5937A, RP5941A, RP5942A, RP5943A, RP5944A, RP5945A, RP5946A, RP5947A: 3-phase; 380 – 520 VAC, 50 / 60 Hz

	NOTE: 6 kW and 12 kW models can be operated at 200 VAC – 208 VAC AC mains input, with the condition that the current and power ratings are reduced by approximately 35%.
Input VA	Max. Apparent Power: RP5911A: 1.85 kVA RP5912A, RP5914A: 2.25 kVA RP592xA Models: 4.5 kVA RP593xA Models: 6.5 kVA RP5941A: 11 kVA RP5942A, RP5943A, RP5944A, RP5945A, RP5946A, RP5947A: 13 kVA
	Max. AC Current: R591xA, RP592xA, RP593xA Models: 12.5 A RP594xA Models: 25 A
	Max Efficiency: RP5911A: 86%, RP5921A: 88.5%, RP5931A: 89%, RP5941A: 89% RP5912A: 87%, RP5922A: 89.5%, RP5932A: 90%, RP5942A: 90% RP5913A: 89%, RP5923A: 91.5%, RP5933A: 92%, RP5943A: 92% RP5914A: 90%, RP5924A: 92.5%, RP5934A: 93%, RP5944A: 93% RP5915A: 90%, RP5925A: 92.5%, RP5935A: 93%, RP5945A: 93% RP5916A: 90%, RP5926A: 92.5%, RP5936A: 93%, RP5946A: 93% RP5937A: 93%, RP5947A: 93%
Power factor	0.99 at nominal input and rated power
Environmental	
Operating environment	Indoor use, installation category II (for AC Input), pollution degree 2
Operating temperature range	0 – 40 °C
Programming temperature coefficient	Voltage: ≤ 30 ppm / °C Current: ≤ 50 ppm / °C
Measurement temperature coefficient	Voltage: ≤ 30 ppm / °C Current: ≤ 50 ppm / °C
Relative humidity	20% to 80% relative humidity (non-condensing)
Altitude	Up to 2,000 meters
Storage temperature	-10 °C to 70 °C
Acoustic statement (European Machinery Directive)	Acoustic noise emission 1U Models: LpA ≤ 69.2 dB at Operating position; LpA ≤ 66.7 dB at Bystander position; LpA ≤ 74.3 dB at Worst-case fan speed 2U Models: LpA ≤ 78.5 dB at Operating position; LpA ≤ 75.1 dB at Bystander position; LpA ≤ 75.4 dB at Worst-case fan speed Normal operating mode per ISO 7779
ESD immunity	Up to ±8 kV contact discharge Up to ±12 kV air-gap discharge
Digital Port	
Max voltage rating	5V
Typical Weight	
	RP591xA: 26.5 lbs. (12 kg)
	RP592xA: 29.8 lbs. (13.5 kg)
	RP593xA: 33.1 lbs. (15 kg)
	RP594xA: 66.2 lbs. (30 kg)
Dimensions	
RP591xA, RP592xA, RP593xA models	1U, full rack width (see Outline Diagrams for details)
RP594xA models	2U, full rack width (see Outline Diagrams for details)

Output Quadrants

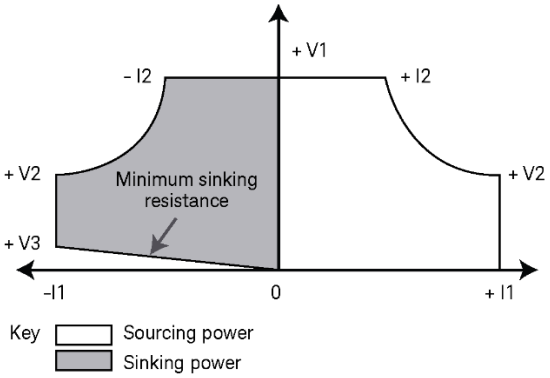
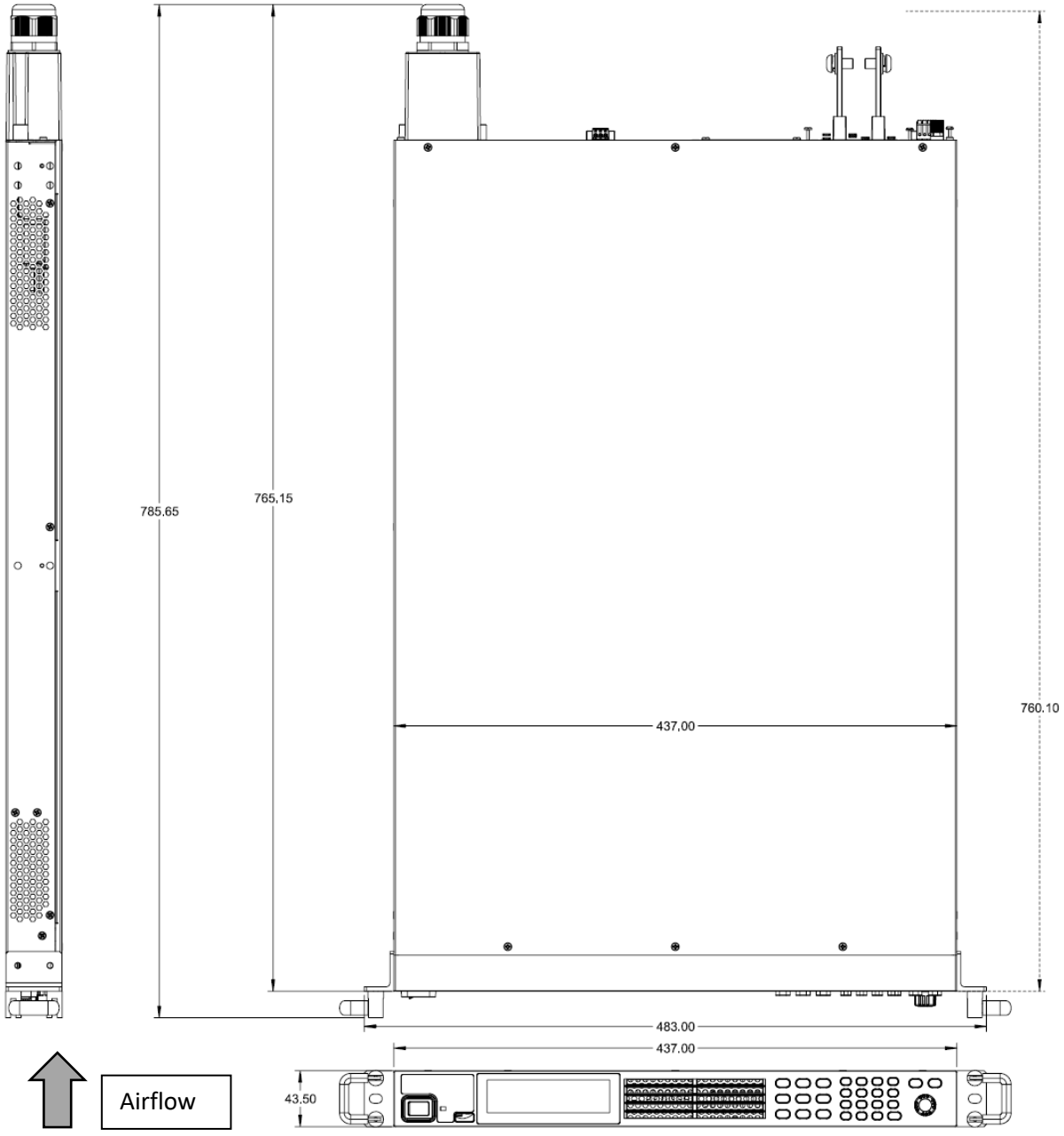


Figure 7. RP5900 output characteristic

Model	+ V1	+ V2	+ V3	± I1	± I2	Minimum Sink Resistance
RP5911A	10 V	10 V	0.6 V	-120 A / +170 A	-120 A / +170 A	9 mΩ
RP5912A	32 V	25 V	0.5 V	80 A	63 A	12 mΩ
RP5913A	80 V	50 V	0.8 V	40 A	25 A	20 mΩ
RP5914A	300 V	100 V	3 V	20 A	7 A	90 mΩ
RP5915A	500 V	167 V	2.5 V	12 A	4 A	208 mΩ
RP5916A	800 V	250 V	4 V	8 A	2.5 A	500 mΩ
RP5921A	10 V	10 V	0.6 V	-240 A / +340 A	-240 A / +340 A	6 mΩ
RP5922A	32 V	25 V	0.5 V	160 A	125 A	6 mΩ
RP5923A	80 V	50 V	0.8 V	80 A	50 A	10 mΩ
RP5924A	300 V	100 V	3 V	40 A	13 A	65 mΩ
RP5925A	500 V	167 V	2.5 V	24 A	8 A	104 mΩ
RP5926A	800 V	250 V	4 V	16 A	5 A	250 mΩ
RP5931A	10 V	10 V	0.6 V	-360 A / +510A	-360 A / +510A	3 mΩ
RP5932A	32 V	25 V	0.5	240 A	188 A	5 mΩ
RP5933A	80 V	50 V	0.8 V	120 A	75 A	6.7 mΩ
RP5934A	300 V	100 V	3 V	60 A	20 A	50 mΩ
RP5935A	500 V	167 V	2.5 V	36 A	12 A	70 mΩ
RP5936A	800 V	250 V	4 V	24 A	7.5 A	166 mΩ
RP5937A	1500 V	500 V	7.5 V	12 A	4 A	500 mΩ
RP5941A	10 V	10 V	0.6 V	-720 A / +1020 A	-720 A / +1020 A	1.5 mΩ
RP5942A	32 V	25 V	0.5 V	480 A	375 A	4 mΩ
RP5943A	80 V	50 V	0.8 V	240 A	150 A	3.3 mΩ
RP5944A	300 V	100 V	3 V	120 A	40 A	100 mΩ
RP5945A	500 V	167 V	2.5 V	72 A	24 A	250 mΩ
RP5946A	800 V	250 V	4 V	48 A	15 A	83 mΩ
RP5947A	1500 V	500 V	7.5 V	24 A	8 A	250 mΩ

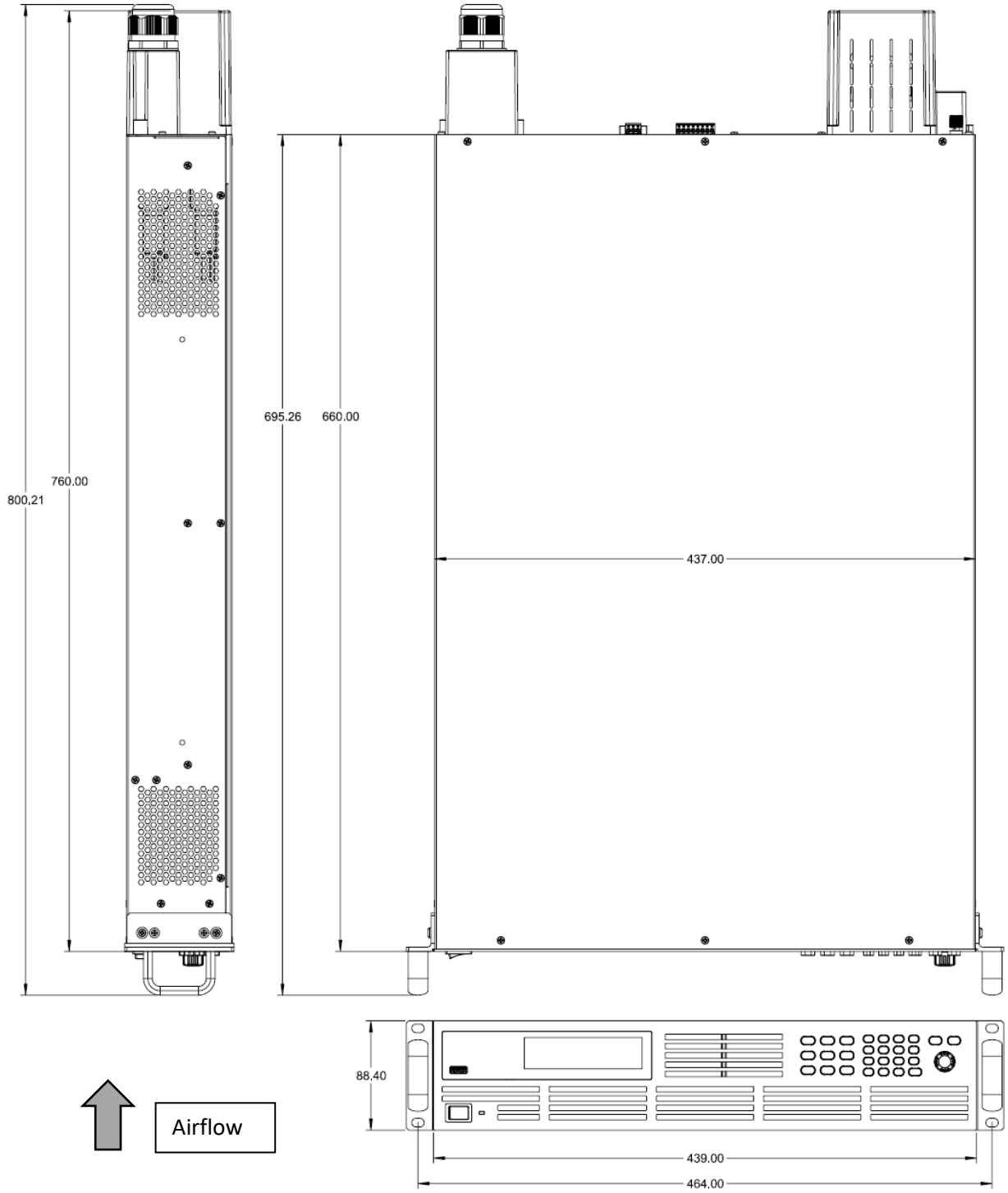
Outline Diagrams – 1U Models

RP591xA, RP592xA, RP593xA



Outline Diagrams – 2U Models

RP594xA



Ordering Information

Available Models

Regenerative Power System Models

RP5911A	Regenerative DC power supply	10 V, ±170 A, 1.7 kW
RP5912A	Regenerative DC power supply	32 V, ±80 A, 2 kW
RP5913A	Regenerative DC power supply	80V, ±40 A, 2 kW
RP5914A	Regenerative DC power supply	300 V, ±20 A, 2 kW
RP5915A	Regenerative DC power supply	500V, ±12 A, 2 kW
RP5916A	Regenerative DC power supply	800 V, ±8 A, 2 kW
RP5921A	Regenerative DC power supply	10 V, ±340 A, 3.4 kW
RP5922A	Regenerative DC power supply	32 V, ±160 A, 4 kW
RP5923A	Regenerative DC power supply	80 V, ±80 A, 4 kW
RP5924A	Regenerative DC power supply	300 V, ±40 A, 4 kW
RP5925A	Regenerative DC power supply	500 V, ±24 A, 4 kW
RP5926A	Regenerative DC power supply	800 V, ±16 A, 4 kW
RP5931A	Regenerative DC power supply	10 V, ±510 A, 5.1 kW, 380/480 VAC
RP5932A	Regenerative DC power supply	32 V, ±240 A, 6 kW, 380/480 VAC
RP5933A	Regenerative DC power supply	80 V, ±120 A, 6 kW, 380/480 VAC
RP5934A	Regenerative DC power supply	300 V, ±60 A, 6 kW, 380/480 VAC
RP5935A	Regenerative DC power supply	500 V, ±36 A, 6 kW, 380/480 VAC
RP5936A	Regenerative DC power supply	800 V, ±24 A, 6 kW, 380/480 VAC
RP5937A	Regenerative DC power supply	1500 V, ±12 A, 6 kW, 380/480 VAC
RP5941A	Regenerative DC power supply	10 V, ±1020 A, 10.2 kW, 380/480 VAC
RP5942A	Regenerative DC power supply	32 V, ±480 A, 12 kW, 380/480 VAC
RP5943A	Regenerative DC power supply	80 V, ±240 A, 12 kW, 380/480 VAC
RP5944A	Regenerative DC power supply	300 V, ±120 A, 12 kW, 380/480 VAC
RP5945A	Regenerative DC power supply	500 V, ±72 A, 12 kW, 380/480 VAC
RP5946A	Regenerative DC power supply	800 V, ±48 A, 12 kW, 380/480 VAC
RP5947A	Regenerative DC power supply	1500 V, ±24 A, 12 kW, 380/480 VAC

Line Cords and Terminations (Plugs)

Due to the number of different line cords and terminations around the world, the RP5900 power supplies do not come with line cords or terminations. Users will need to supply their own, depending on the local laws and codes of the country / region where the power supply will be used.

Accessories

Accessories

PW9252A	PathWave Advanced Power Control and Analysis application
PW9253A	PathWave Advanced Battery Test and Emulation application
RP5901C	GPIB interface board for EL4900 Series DC loads and RP5900 Series supplies
RP5902C	Analog / RS-232 interface board for EL4900 Series DC loads and RP5900 Series supplies
RP5903C	Parallel kit — Fiber optics cable and transmitter module
RP5904C	Rack-mount kit 1U for EL4900 Series DC loads and RP5900 Series supplies
RP5905C	Rack-mount kit 2U for EL4900 Series DC loads and RP5900 Series supplies

Keysight Support Services

Accelerate your learning curve, enhance your test uptime, and confidently guarantee your instrument accuracy with Keysight Support Services. Keysight Services are here to support your test needs with expert technical support, instrument repair and calibration, training, alternative acquisition program options, and more.

A KeysightCare agreement provides dedicated, proactive support through a single point of contact for an extensive group of instruments, software, and solutions to ensure optimal uptime, with fast response times and resolution. Explore the services that are right for you.

Keysight Services

Offering	Benefits
KeysightCare 	KeysightCare provides elevated support for Keysight instruments and software, with access to technical support experts who respond within a specified time and ensure committed repair and calibration turnaround times (TAT). KeysightCare offers multiple service agreement tiers, including KeysightCare Assured, Enhanced, and Application Software Support. See the KeysightCare data sheet for details.
KeysightCare Assured	KeysightCare Assured provides a commitment to respond to your engineer's technical needs quickly. When unexpected repairs are necessary, you can count on a committed repair service turnaround time to get you back up and running.
KeysightCare Enhanced	KeysightCare Enhanced includes all the benefits of KeysightCare Assured plus Keysight's accurate and reliable Calibration Services, accelerated and committed TAT, and technical response.
Keysight Support Portal and Knowledge Center	All KeysightCare tiers include access to the Keysight Support Portal, where you can manage support and service resources related to your assets, such as service requests and status, or browse the Knowledge Center.
Education Services	Build confidence and gain new skills to make accurate measurements, with flexible Education Services developed by Keysight experts, including Start-up Assistance.
Alternative Acquisition Options	
KeysightAccess	Reduce budget challenges with a lease-based subscription service that offers low monthly payments, enabling you to get the instruments, software, and technical support you want for your test needs.

Recommended Services

Maximize your instrument uptime and confidently make accurate measurements by securing technical support, repair, and calibration services with committed response and turnaround times. High-performance instruments include 1 year of KeysightCare Assured. Obtain multi-year KeysightCare upfront to eliminate the need for lengthy and tedious paperwork and yearly requests for maintenance budget. Plus, you benefit from secured service for 2, 3, or 5 years.

Service	Function
KeysightCare Enhanced*	**Includes Tech Support, Warranty, and Calibration**
R-55B-001-1	KeysightCare Enhanced – Upgrade 1 year
R-55B-001-2	KeysightCare Enhanced – Extend to 2 years
R-55B-001-3	KeysightCare Enhanced – Extend to 3 years (Recommended)
R-55B-001-5	KeysightCare Enhanced – Extend to 5 years (Recommended)
KeysightCare Assured	**Includes Tech Support and Warranty**
R-55A-001-2	KeysightCare Assured – Extend to 2 years
R-55A-001-3	KeysightCare Assured – Extend to 3 years
R-55A-001-5	KeysightCare Assured – Extend to 5 years
Start-Up Assistance	
PS-S40-01	Included – instrument fundamentals and operations starter
PS-S40-04	Recommended – instrument fundamentals and operations starter
PS-S40-02	Optional, technology and measurement science standard learning

*Available in select countries. For details, please see the datasheet. R-55B-001-2/3/5 must be ordered with R-55B-001-1.

Definitions

Specification (spec)

The warranted performance of a calibrated instrument that has been stored for a minimum of two hours within the operating temperature range of 0 to 55 ºC and after a one-hour warm-up period. All specifications account for the effects of measurement and calibration-source uncertainties and were created in compliance with ISO-17025 methods. Data published in this document are specifications (spec) only where specifically indicated.

Typical (typ)

The characteristic performance that 80% or more of manufactured instruments will meet. This data is not warranted, does not include measurement or calibration-source uncertainty, and is valid only at room temperature (approximately 23 ºC).

Nominal (nom)

The mean or average characteristic performance, or the value of an attribute that is determined by design, such as a connector type, physical dimension, or operating speed. This data is not warranted and is measured at room temperature (approximately 23 ºC).

Measured (meas)

An attribute measured during product development for the purpose of communicating expected performance. This data is not warranted and is measured at room temperature (approximately 23 ºC)

TCAL

The temperature at which the instrument was calibrated.

For More Information

Visit www.keysight.com/find/RP5900

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