RPS – 7000

4-Quadrant AC/DC Source
Regenerative AC/DC Load
Regenerative Grid Simulator

Regenerative | Easy Use | Compliance | High Range | Constant Power | High Current

KEY FEATURES

- Output Power: 6 kVA – 18 kVA
- Output Voltage: 0 – 350 V; 0 – 400 V (Optional)
- Frequency: DC, 15– 100 Hz; 15 – 1500 Hz (Optional)
- Maximum current increased by 35%
- Key component cooling efficiency + 20%
- Parallel connection for high power capacity
- Output Modes: Single-phase, three-phase, or split-phase (up to 200% of rated voltage)
- Three Operating Modes: Constant Voltage, Constant Current, and Constant Power
- LIST, STEP, PULSE, and TRANSIENT modes
- Arbitrary Waveform Editing & Power Line Disturbance (PLD) Simulation
- Harmonic disturbance/waveform superposition
- Harmonic Analysis: Voltage and current measurements up to the 50th harmonic
- Compliant with Grid Connection Standards such as LVRT, Phase Shift, Frequency Variation, Harmonic Injection
- Standards Compliance: IEC 61000 -3-2/-3-3/-3-11/-3-12/-4-11/-4-13/-4-14/-4-28/-4-34 testing
- Interfaces Supported: USB, LAN, GPIB, CAN, and Std I/O

Applications:

- AI server, Data center, and HDVC applications
- EV chargers, BOBC, V2G, V2H, V2X, EV charging cables and components
- Solar PV inverters, grid-connected inverters, and wind power systems
- Industrial and residential Energy Storage Systems (ESS), Power Conversion Systems (PCS)
- Uninterruptible Power Supplies (UPS) and Power Distribution Units (PDUs)
- Regulatory Testing: IEEE 1547, UL 1741, IEC 62116, etc.
- Micro-grid Testing, PHIL (Power Hardware-in-the-Loop), and Anti-Islanding Protection.

Introduction

The RPS-7000 is a high-performance power simulation and testing system for the new energy industry. It features a full four-quadrant regenerative AC/DC power source that can operate as a current source or load (Figure 1). With 6kVA/kW to 18kVA/kW per unit, up to three systems can be paralleled for

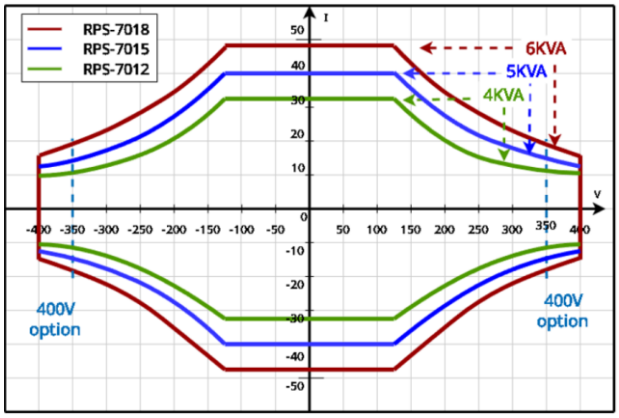


Figure 1: RPS-7000 Series Four-Quadrant Output Power Curve

54kVA/kW. It delivers precise and reliable testing while feeding energy back to the grid, reducing power and cooling costs. Configurations include Model G – Regenerative Grid Simulator, Model L – AC/DC Load, and Model S – Programmable Power Supply.

Applications

The RPS-7000 Series provides comprehensive testing support for modern power electronics R&D and production. In the renewable energy sector, it serves as a critical tool for testing Solar PV inverters, Power Conversion Systems (PCS), and Energy Storage Systems (ESS), enabling precise grid anomaly simulation and efficient energy recovery. Its 4-quadrant operation is also ideal for verifying the bidirectional charging and discharging performance of On-board Chargers (OBC/BOBC) and various V2G, V2H, and V2X equipment.

For digital infrastructure, the RPS-7000 is an optimized power solution for AI servers, Data Centers, and High-Voltage Direct Current (HVDC) applications. Supporting AC, DC, and AC+DC modes, it accurately simulates the voltage ripples and load transients of high-voltage DC buses, ensuring the power stability of high-density computing hardware. Furthermore, the built-in regulatory waveform library automates compliance testing for IEEE 1547 and UL 1741, facilitating everything from basic performance verification to advanced Power Hardware-in-the-Loop (PHIL) simulations.

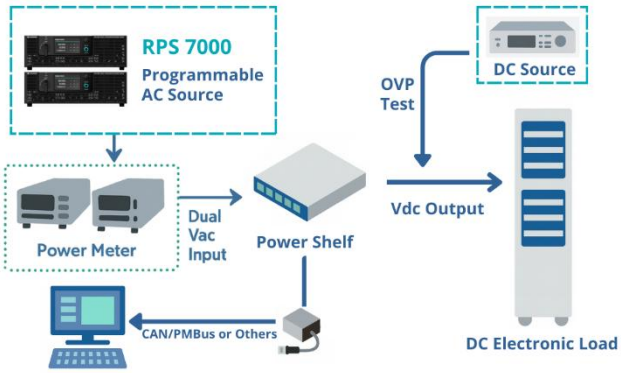


Figure 2: Power Shelf Test Architecture

Constant Power and High Current output

The RPS-7000 utilizes next-generation SiC MOS technology, supporting voltages up to 400 V_{L-N}, and for higher voltage applications such as wind power systems, line voltages up to 690 V_{L-L}. Its constant power output capability ensures high current at low output voltages and low current at high output voltages, eliminating the need for manual switching between high and low voltage ranges. Compared to traditional systems that experience output interruptions during range transitions, the RPS-7000 provides seamless operation for real-world applications.

Compared to floor-standing products (such as the RPS-5000 series), which have advantages in volume, thermal management, and system architecture cost, the rack-mounted version of the RPS-7000 offers benefits in terms of power density, compactness, and standard rack compatibility. It is suitable for laboratory and medium-to-low power applications. Compared to commercial 3U products, the RPS-7000 can deliver up to 18 kVA per unit. Addressing the limitation of insufficient current output at low voltage, it improves current output by 15%, covering a wider range of testing requirements (as shown in Figure 3).

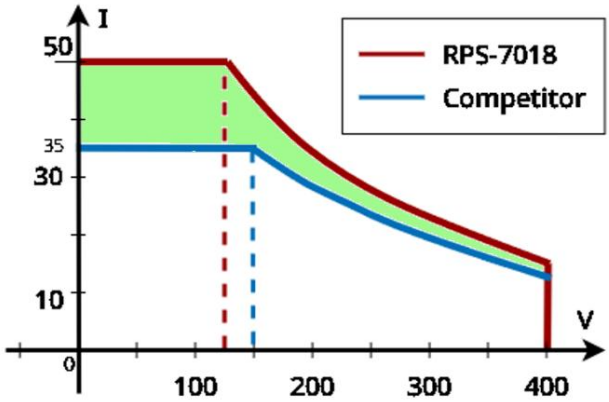


Figure 3: RPS-7000 Constant Power & High Current

Parallel Connection for High Power

The RPS-7000 supports multi-unit parallel operation to increase power output rating, meeting a wide range of testing requirements. Using real-time active current-sharing technology powered by a Digital Signal Processor (DSP) and high-speed communication, the system can achieve up to 54 kVA of total power. When operating in parallel, all functionalities and precision remain unaffected. Additionally, the units can be connected with a single cable, and upon enabling the parallel mode, the system automatically configures itself without requiring complex additional setup.

Intuitive Control & Advanced Analysis

The RPS-7000 features a 5-inch touchscreen paired with a physical rotary knob, providing an intuitive interface for seamless switching between waveform editing, real-time measurements, and regulatory configurations. This user-friendly design allows for rapid system familiarization and efficient operation across diverse testing environments.

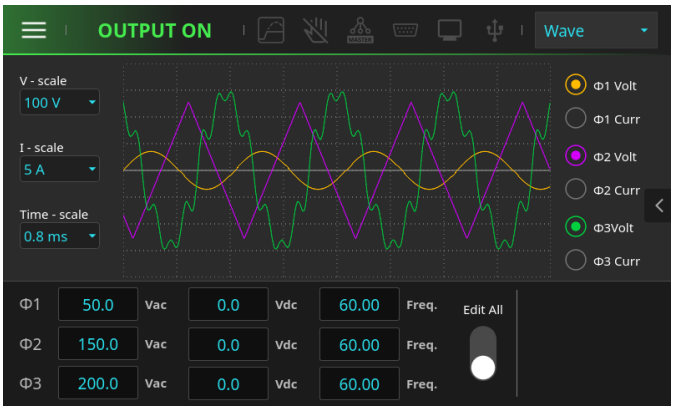


Figure 4: Waveform Monitoring Function

For optimized product design, the RPS-7000 integrates real-time waveform monitoring and high-precision harmonic analysis, eliminating the need for external oscilloscopes. It can simultaneously capture and display three-phase voltage and current waveforms, providing immediate visibility into system performance.

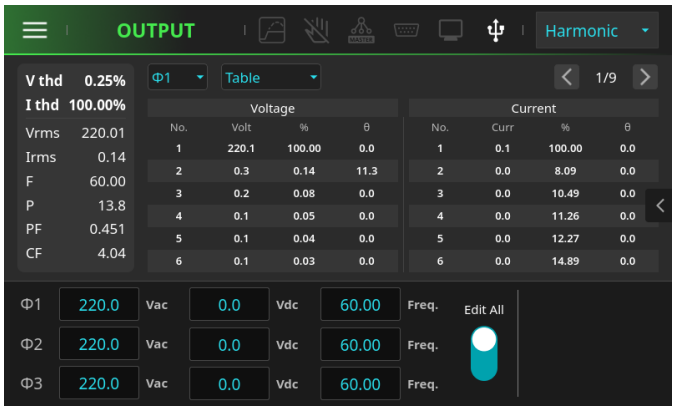


Figure 5: Harmonic Real-time Analysis List

The series also offers advanced diagnostic capabilities, including total harmonic distortion (THD)

measurement and detailed analysis up to the 50th harmonic. By providing precise amplitude and phase data for individual harmonic components, the RPS-7000 empowers engineers to accurately identify and mitigate interference, ensuring the highest level of power quality and compliance.

AC/DC Load Simulation

The RPS-7000 Model L regenerative electronic load is suitable for a wide range of renewable energy testing applications. In addition to basic functions such as constant current, constant power, and constant impedance, it supports advanced load simulation capabilities, including inductive and capacitive load emulation, as shown in Figure 6. Users can simulate complex load scenarios to accurately test device performance under varying voltage and current conditions, including load angles, load removal, and cycle settings.

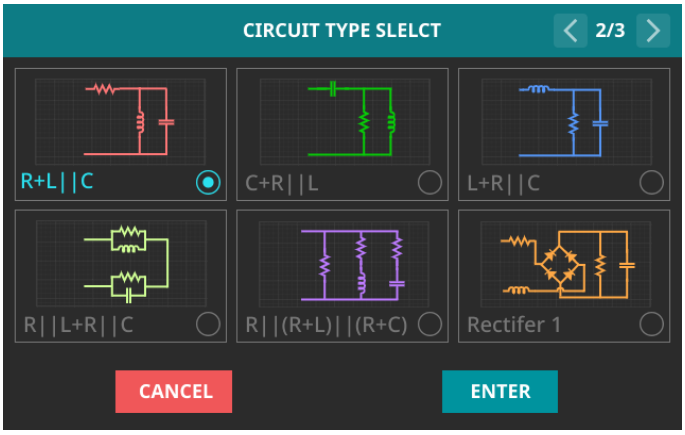


Figure 6: Multi-Mode Load Simulation

Moreover, its unique integrated harmonic and disturbance simulation can generate various harmonic components to evaluate the power supply's capability to handle diverse harmonic loads.

Combined with the versatility of AC/DC load simulation, the RPS-7000 Model L meets diverse application needs, such as testing electric vehicle supply equipment (EVSE), onboard chargers (OBC), and uninterruptible power supplies (UPS). Its regenerative design eliminates the energy wastage and cooling requirements typical of traditional resistive loads, significantly enhancing efficiency.

Arbitrary waveform Editing

RPS-7000 series offers advanced programmable simulation capabilities designed to meet the performance and regulatory certification requirements of R&D and laboratory environments. In addition to basic output functionality, it supports modes such as List, Step, Pulse, Synthesis, Inter-Harmonic and Transient. These advanced features enable independent phase configuration, providing customized solutions for diverse testing scenarios while ensuring compliance with standards such as IEC-61000-4-3, IEC-61000-4-11, UL-1741SA, IEEE-1547, and IEC-62116. The advanced modes include List mode, which allows users to customize a sequence of voltage and frequency settings to simulate various operating conditions.

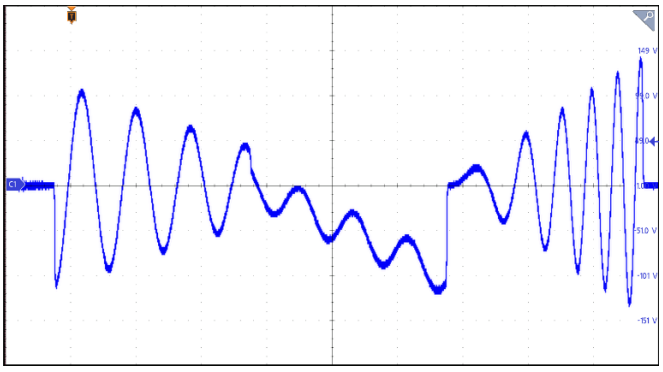


Figure 7: List Mode Waveform

Step mode, which incrementally adjusts voltage or frequency to evaluate the device's response under different conditions. Pulse mode, which generates short-duration high-voltage or high-current pulses for surge testing. Additionally, the Inter-Harmonic mode simulates harmonic disturbances in power systems to assess the device's tolerance to harmonic

interference, while the Transient mode replicates instantaneous power system responses to test the device's ability to handle rapid changes effectively. Synthesis mode provides flexible custom waveform design functions.

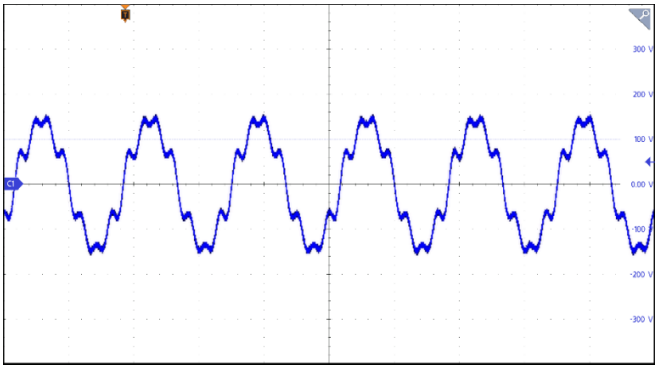


Figure 8: Synthesis Mode Waveform

Users can use the intuitive programming interface to accurately adjust the amplitude and phase of each harmonic order to generate a multi-order harmonic composite waveform. This mode supports up to 50th order harmonic components, helping testers simulate non-sinusoidal power environments to meet different testing needs.

PowerVUE for Remote Control

The RPS-7000 is equipped with PC-based software, PowerVUE, which allows users to operate the device directly from their PC. With PowerVUE, users can easily adjust parameters, monitor performance, quickly create test programs, and generate reports. The software also provides pre-configured test modes for standards such as IEC 61000-4-11, 4-13, 4-14, 4-28, and 4-34. This enables users to operate the system according to regulation-defined parameters, ensuring compliance with various international standards (as shown in Figure 9).

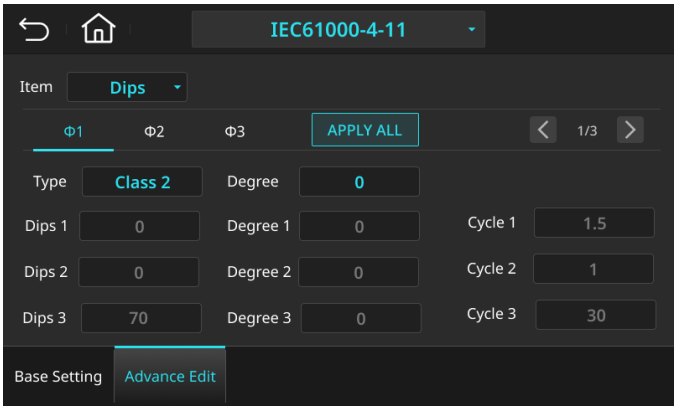


Figure 9: IEC61000-4-11 Dips Setting

Standard SCPI & LabVIEW driver support

The RPS-7000 supports the SCPI standard protocol, enabling seamless integration into existing test systems via GPIB, LAN, or External IO interfaces using compatible SCPI commands without requiring complex modifications. Additionally, the RPS-7000 includes support for LabVIEW, a widely used graphical programming tool for testing, measurement, and control systems.

AIoT Intelligent Predictive Diagnostics

PowerSense AI enables real-time health monitoring and Predictive Preventive Service (PPS), analyzing subtle behavioral deviations to identify hidden risks before failure. It increases equipment availability to 95%+ and safeguards critical R&D schedules.

Figure 10: PowerSense Predictive Diagnostics

Technical Specifications

Item				RPS-7012	RPS-7015	RPS-7018
AC INPUT	Phase			3Ø3W		
	Voltage			200 - 240 V_{L-L} ± 10% 380 - 400 V_{L-L} ± 10% 440 - 480 V_{L-L} ± 10%		
	Frequency			47 - 63Hz		
	Max. Current			47A/phase (200 - 240 VL-L ± 10%) 25A/phase (380 - 480 VL-L ± 10%)	58A/phase (200 - 240 VL-L ± 10%) 31A/phase (380 - 480 VL-L ± 10%)	70A/phase (200 - 240 VL-L ± 10%) 38A/phase (380 - 480 VL-L ± 10%)
	Power Factor(*1)			0.99(Typical)		
AC OUTPUT	Phase Modes			3Ø, 1Ø or Split phase selectable		
	Max. Power			12kVA/8kVA(Split phase)	15kVA/10kVA(Split phase)	18kVA/12kVA(Split phase)
	Per Phase/Channel			4kVA	5kVA	6kVA
AC VOLTAGE	Range			0 - 350V_{L-N}, 0 - 606V_{L-L}, 0-700V_{L-L}(Split phase) Option : 0 - 400V_{L-N}, 0 - 692V_{L-L}, 0-800V_{L-L}(Split phase)		
	Resolution			0.1V		
	Setting Accuracy			± (0.1% of setting + 0.2% F.S.)		
	Total Harmonic Distortion (THD)(*2)			<0.5% @ 50/60Hz <1% @ 30-1000Hz		
	Line Regulation (*3)			± 0.1%		
	Load Regulation (*4)			± 0.2%		
	Phase Angle	Range		0 - 359.9°		
		Resolution		0.1°		
MAX. AC CURRENT	RMS(*5)			105A(1Ø)/35A(3Ø/Split)	120A(1Ø)/40A(3Ø/Split)	144A(1Ø)/48A(3Ø/Split)
	Peak			315A(1Ø)/105A(3Ø/Split)	360A(1Ø)/120A(3Ø/Split)	432A(1Ø)/144A(3Ø/Split)
	Crest Factor			3	3	3
FREQUENCY	Range			DC, 15.00 – 100.0 Hz Option : DC, 15.00 - 1500.0 Hz		
	Resolution			0.01Hz		
	Accuracy(*6)			± 0.01% F.S		
DC OUTPUT	Max. Power			12kW/8kW (Split phase)	15kW/10kW(Split phase)	18kW/12kW(Split phase)
	Per Phase/Channel			4kW	5kW	6kW
DC VOLTAGE	Range			±495VDC, ±990VDC(Split phase) Option : ±565VDC, ±1130VDC(Split phase)		
	Resolution			0.1V		
	Setting Accuracy			± (0.1 % of setting + 0.2% F.S.)		
MAX. DC CURRENT	Range			78.75A(1Ø)/26.25A(3Ø/Split)	90A(1Ø)/30A(3Ø/Split)	108A(1Ø)/36A(3Ø/Split)
HARMONIC SYNTHESIS FUNCTION	up to 50 Harmonic orders @ 50/60Hz fundamental frequency					
REGENERATIVE FUNCTION	Current Total Harmonic Distortion (iTHD)(*7)			<6%(Typical)	<5%(Typical)	<5%(Typical)
	Power Factor(*8)			>0.97(Typical)		
CURRENT LIMIT FUNCTION	Setting	Range	1Ø	0.1 - 105A	0.1 - 120.0A	0.1 - 144.0A
			3Ø/Split phase	0.1 - 35A	0.1 - 40.0A	0.1 - 48.0A
		Resolution		0.1A		
		Accuracy		± (2.0% of setting + 0.5% F.S.)		
	Response Time			< 0.5s		
MEASUREMENT	Voltage (AC)	Range		0 - 350V_{L-N}, 0 - 606V_{L-L}, 0 – 700V_{L-L}(Split) Option : 0 - 400V_{L-N}, 0 - 692V_{L-L}, 0 – 800V_{L-L}(Split)		
		Resolution		0.01V		
		Accuracy		± (0.1% of reading + 0.2% F.S.) at Voltage > 5V		

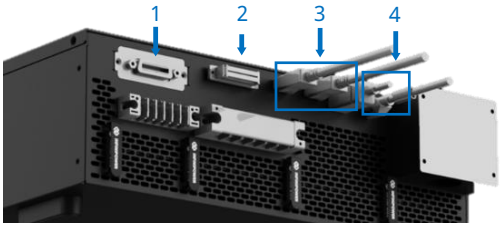
Item				RPS-7012	RPS-7015	RPS-7018
MEASUREMENT	Voltage (DC)	Range		±495VDC, ±990VDC (Split phase) / Option : ±565VDC, ±1130VDC (Split phase)		
		Resolution		0.01V		
		Accuracy		± (0.1 % of reading + 0.2% F.S.) at Voltage > 5V		
	Current (AC,DC)	Range	1Ø	0.00 - 105.00A	0.00 - 120.00A	0.00 - 144.00A
			3Ø/Split phase	0.00 - 35.00A	0.00 - 40.00A	0.00 - 48.00A
		Resolution		0.01A		
		Accuracy		± (0.4% of reading + 0.3% F.S.)		
	Peak Current	Range	1Ø	0.0 - 315.0Apk	0.0 - 360.0Apk	0.0 - 432.0Apk
			3Ø/Split phase	0.0 - 105.0Apk	0.0 - 120.0Apk	0.0 - 144.0Apk
		Resolution		0.1A		
		Accuracy		± (0.4% of reading + 0.6% F.S.)		
	Power (AC,DC)	Range	1Ø	0.0W - 12kW	0.0W - 15kW	0.0W - 18kW
			3Ø	0.0W - 4kW	0.0W - 5kW	0.0W - 6kW
			Split phase	0.0W - 8kW	0.0W - 10kW	0.0W - 12kW
		Resolution		0.1W at 0.0 - 9999.9W / 1W at Power ≧10000W		
		Accuracy		± (0.4% of reading + 0.4% F.S.)		
	Power Apparent (VA)	Range	1Ø	0.0W - 12kVA	0.0W - 15kVA	0.0W – 18kVA
			3Ø	0.0W – 4kVA	0.0W – 5kVA	0.0W - 6kVA
			Split phase	0.0W – 8kVA	0.0W – 10kVA	0.0W – 12kVA
		Resolution		0.1VA at 0.0 - 9999.9VA / 1VA at Power ≧10000VA		
		Accuracy		V×A, Calculated value		
	Power Factor	Range		0 -1.000		
		Resolution		0.001		
		Accuracy		W / VA ,Calculated and displayed to three significant digits		
	Crest Factor	Range		0 - 10.00		
		Resolution		0.01		
		Accuracy		Ap / A ,Calculated and displayed to two significant digits		
GENERAL	Interface			USB, Ethernet, External I/O(DB25), Option: GPIB, CAN Bus		
	Display			Full Color, Touch LCD Display, 5” Diagonal size, 800 x 400 Pixels resolution		
	Protection			OCP, OVP, OPP, OTP, SHORT, FAN		
	V Sense			Yes		
	Efficiency (*9)			90% (Typical)		
	Dimension(H x W x D)			132.8 x 432 x 718 mm		
	Weight			60kg		
ENVIRONMENTAL	Cooling			Variable speed fan cooled, front intake, rear exhaust		
	Operating Temperature			0 to 40°C		
	Storage Temperature			-40 to 85°C		
	Altitude			2000m (6500 feet)		
	Operating Humidity(*10)			0% to 95% RAH		
REGULATORY COMPLIANCE	Safety			Low Voltage Directive 2014/30/EU, EN 61010-1:2017		
	EMC			CE marked for EMC Directive 2014/30/EU per EN 61326-1:2013 Class A		
	CE Mark LVD Categories			Installation Overvoltage Category: II; Pollution Degree: 2; indoor use only.		

Note.

*1 Tested on input voltage 380Vac with full output power
*2 Maximum distortion is tested on output voltage 350Vac with full output power under linear load
*3 With respect to changes in the rated range of input voltage.
*4 Load regulation is tested by sine wave and remote sense
*5 At working voltage 125V
*6 When the output voltage is greater than 40V
*7 Current total harmonic distortion is tested on input voltage 220Vac with full output power
*8 Power factor is tested on input voltage 220Vac with full output power
*9 Efficiency is tested on input voltage 380V and output voltage 250Vac with full output power under linear load
*10 In the state of non-condensing

The above specifications are subject to change without prior notice.

RPS-7000 Dimensions



1 GPIB/CAN Optional Card
2 External I/O (AC_ON, FAULT-OUT, Ext-ON/OFF, etc.).
3 Parallel Communication Interface
4 Type-B USB, Network control interface

Ordering Information

RPS – 7018 G – D – 0 – 0

Series

Regenerative Power System

Power

012: 12kVA

015: 15kVA

018: 18kVA

Configuration

S : AC/DC Source

G : Grid Simulator

L : AC/DC Load

B : Grid Simulator + AC/DC Load

Input

D: Universal AC Input

Optional Output Voltage

0 : Standard(350 VL-N)

1 : HV 400 VL-N(*)

Optional Output Frequency

0 : Standard(30 – 150Hz)

1 : HF 30-1000Hz(*)

* Special specifications, please contact the INFINIPOWER Tech. office or your local distributor

Accessories list

Typical Delivery Items	Optional accessories
■ Regenerative Power System	■ Parallel cable (Display port) (1.2m)
■ USB cable (Type A to Type B) (1.5m)	■ CAN Bus interface card / CAN Bus cable(1.5m)
■ LAN cable CAT5E(2m)	■ GPIB cable(1.5m)
■ DB25 adapter board (for I/O signal)	■ DB25 (male to male) adapter
■ Test Report	■ RPS-7000 series input power cable (3m)
■ Certificate of Compliance	■ Output voltage calibration fixture(Remote sense cable)
■ Output shorting adapter (for single phase mode)	

* Special specifications, please contact the INFINIPOWER Tech. office or your local distributor

About INFINIPOWER

With over 20 years of expertise in power testing solutions, Infinipower partners with leading global manufacturers to deliver world-class quality and reliability. As a strategic investment partner of the Delta Electronics ecosystem, we leverage top-tier industrial resources and smart factory manufacturing to ensure maximum product stability. Committed to precision and innovation, we empower our customers to focus on product development and safety validation with absolute confidence.

iNFiNiPOWER
Powering Trust, Driving Innovation

Contact: sales@infinipowertech.com