

RPS – 5000

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: 30 kVA – 225 kVA
- Output Voltage: 0–350 V; 0–400 V (optional)
- Frequency: DC, 30–150 Hz
- Maximum current increased by 35%
- Key component cooling efficiency + 20%
- Modular built-in DSP for rapid self-calibration
- Parallel connection for high power capacity
- Flexible Phase Outputs: Single-phase, three-phase, or split-phase outputs (up to 200% of output voltage)
- Three Operating Modes: Constant voltage, constant current, 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
- Regulatory Compliance Testing: LVRT, phase variation, frequency variation, harmonic injection, and more
- 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, RS-232, GPIB, CAN, and Std I/O

Applications:

- EV chargers, BOBC, V2G, V2H, V2X, EV charging cables and components
- Solar PV inverters, grid-connected inverters, wind energy systems, Industrial energy storage systems (ESS), power conversion systems (PCS)
- UPS systems, power distribution units (PDUs)
- High-power industrial equipment, military, aviation, and maritime systems
- Regulatory Standards: UL 1741, IEEE 1547, IEC 62116, GB/T 18487.1-2015, QC/T 895-2011, and IEC 61851-1:2001 requirements.

Application

The RPS-5000 is a power simulation and testing system specifically designed for the renewable energy industry. It features a full four-quadrant regenerative AC/DC power, allowing it to operate as a regenerative AC/DC current source or load, as shown in Figure 1.

This system enables precise and reliable testing while

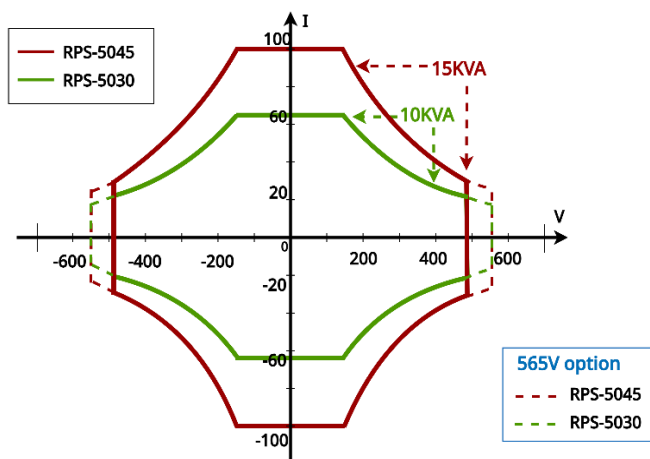


Figure 1: RPS-5000 4-Quadrant Source & Load

feeding energy generated during the testing process back to the grid, significantly reducing power consumption and cooling costs. The RPS-5000 meets the R&D and testing needs of various industries, including Model G – a bidirectional regenerative grid simulator, Model L – a regenerative AC/DC load, and Model S – a high-performance programmable power supply.

EV & Renewable Energy Testing Solutions

The RPS-5000 Model G is well-suited for simulating grid characteristics, making it ideal for testing power conversion systems such as PV inverters, PCS, and ESS that require bidirectional regenerative grid connectivity. It feeds energy back into the grid during testing. Additionally, it features comprehensive waveform selection and advanced

arbitrary waveform editing capabilities, supporting performance and compliance validation from R&D to production phases. This includes testing for EVSE (electric vehicle supply equipment) and onboard chargers (OBC), as shown in Figure 2

Using the RPS-5000 Model L's AC/DC load function and power line disturbance (PLD) simulation capabilities, the series also meets the testing requirements for bidirectional on-board charger (BOBC) loads.

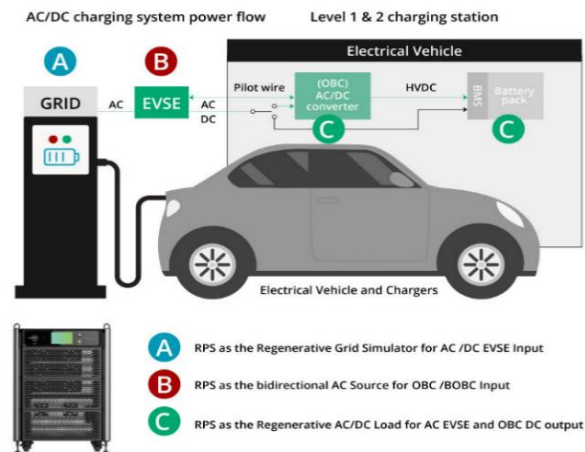


Figure 2: EV Charging & OBC

Constant Power and High Current output

The RPS-5000 utilizes next-generation SiC MOS technology, supporting voltages up to 400 VL-N, and for higher voltage applications such as wind power systems, line voltages up to 690 VL-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-5000 provides seamless operation for real-world applications.

While rack-mounted products (e.g., the RPS-7000

series) excel in power density, floor-standing models like the RPS-5000 offer advantages such as simplified power stage components, improved thermal dissipation, larger single-capacity modules, and greater structural stability. Compared to conventional floor-standing models, the RPS-5000 reduces size by up to 50% and increases low-voltage current output by 35% (as shown in Figure 3), effectively meeting a broader range of testing requirements.

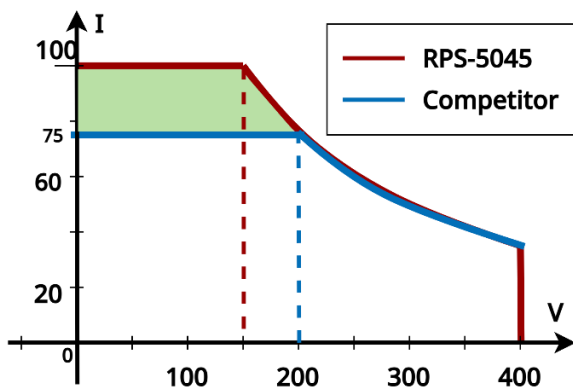


Figure 3: RPS-5000 Constant Power & High Current

Parallel Connection for High Power

The RPS-5000 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 225 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 and Clear UI Interface

The RPS-5000 features a 7-inch touchscreen combined with a rotary knob, offering an intuitive

user interface that allows users to quickly familiarize themselves with system operations. Multiple display modes enable seamless switching between waveform editing, measurement data display, and regulatory parameter settings, ensuring efficient and user-friendly configuration, as shown in Figure 4.

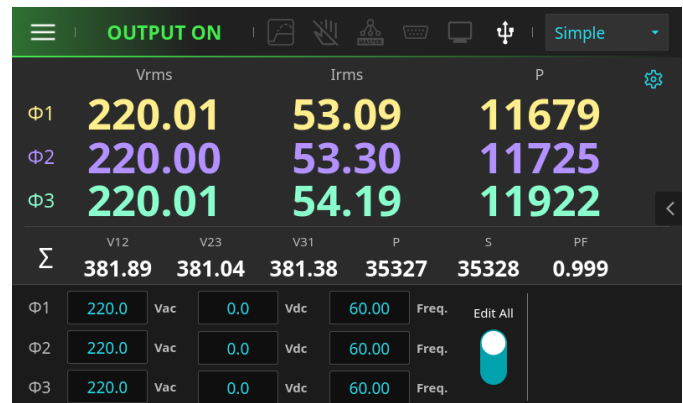


Figure 4: Real Time Measurement Display

Intuitive and Clear UI Interface

Waveform monitoring and harmonic analysis are essential design tools for optimizing the performance and quality of power products. The RPS-5000 can simultaneously capture three-phase voltage and current waveforms, as shown in Figure 5.

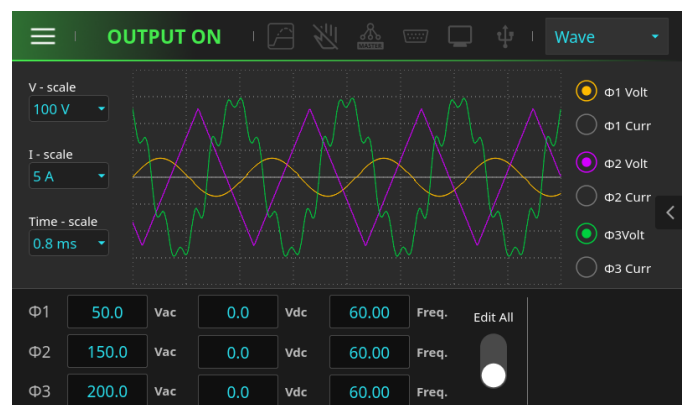


Figure 5: Waveform Monitoring Function

With its built-in waveform monitoring function, R&D and testing personnel can observe precise voltage and current waveforms in real-time without

requiring external instruments.

The RPS-5000 series features advanced harmonic analysis capabilities, including voltage and current harmonic measurements. It can measure total harmonic distortion (THD) for both voltage and current, as well as the amplitude and phase difference of individual harmonics relative to the fundamental frequency (as shown in Figure 6). The system supports component analysis up to the 50th harmonic, enabling users to identify specific harmonic components and take appropriate measures to mitigate harmonic interference.

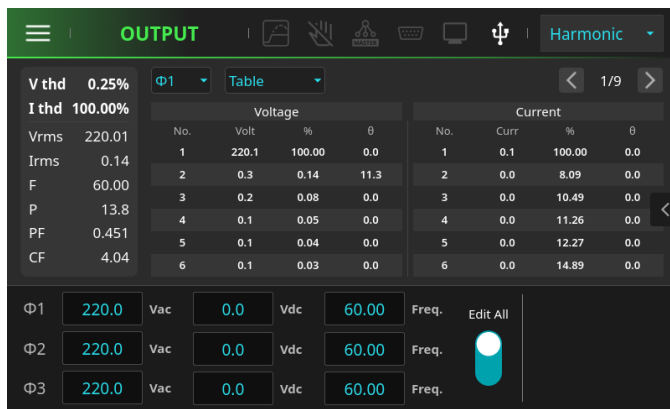


Figure 6: Harmonic Real-time Analysis List

AC/DC Load Simulation

The RPS-5000 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 7. 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.

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-5000 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.

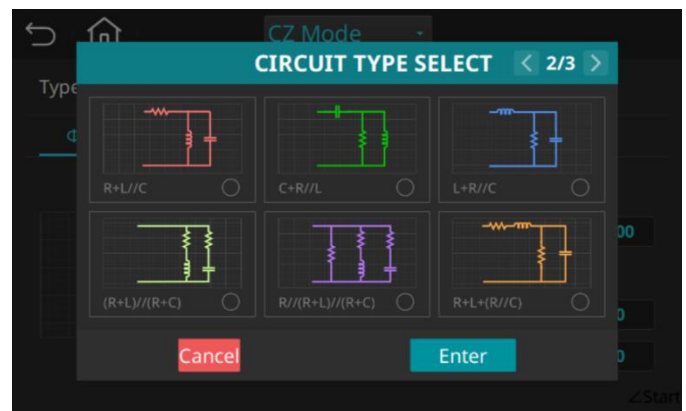


Figure 7: Multi-Mode Load Simulation

Arbitrary waveform Editing

RPS-5000 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.

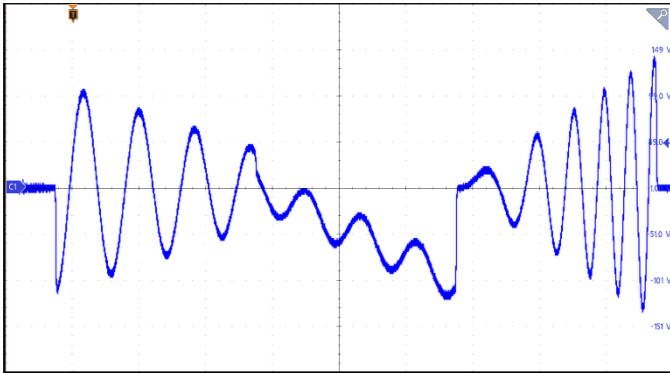


Figure 8: List Mode Waveform

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.

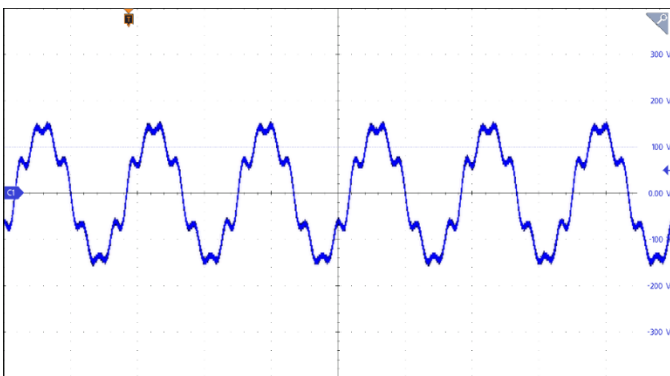


Figure 9: Synthesis Mode Waveform

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-5000 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, 4-17, and 4-28. This enables users to operate the system according to regulation-defined parameters, ensuring compliance with various international standards (as shown in Figure 10).

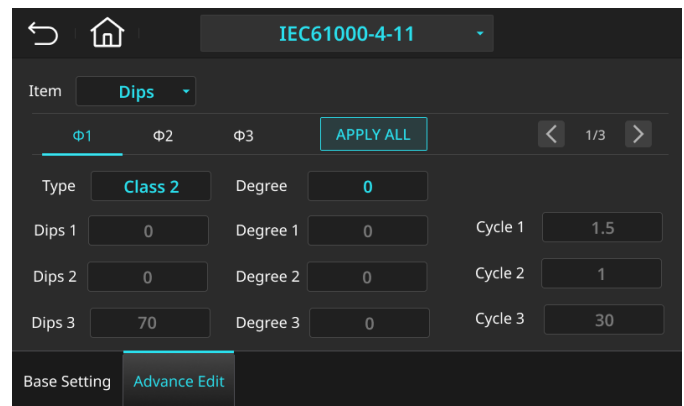


Figure 10: IEC61000-4-11 Dips Setting

Standard SCPI & LabVIEW driver support

The RPS-5000 supports the SCPI standard protocol, enabling seamless integration into existing test systems via RS-232, GPIB, LAN, or External IO interfaces using compatible SCPI commands without requiring complex modifications. Additionally, the RPS-5000 includes support for LabVIEW, a widely used graphical programming tool for testing, measurement, and control systems. This software development kit allows users to effortlessly integrate, design, and develop various test applications.

Technical Specifications

Item		RPS-5030	RPS-5045	RPS-5090 (Coming soon)		
AC INPUT	Phase	3Ø3W+PE				
	Voltage	200 - 220 VL-L ± 10% / 380 - 400 VL-L ± 10% / 440 - 480 VL-L ± 10%				
	Frequency	47 - 63Hz				
	Max. Current	126A/phase (200 - 220 VL-L ± 10%)	188A/phase (200 - 220 VL-L ± 10%)	376A/phase (200 - 220 VL-L ± 10%)		
		66A/phase (380 - 400 VL-L ± 10%)	99A/phase (380 - 400 VL-L ± 10%)	198A/phase (380 - 400 VL-L ± 10%)		
57A/phase (440 - 480 VL-L ± 10%)		86A/phase (440 - 480 VL-L ± 10%)	172A/phase (440 - 480 VL-L ± 10%)			
Power Factor(*1)	0.98(Typical)					
AC OUTPUT	Phase Modes	3Ø, 1Ø or Split phase selectable				
	Max. Power	30kVA/20kVA(Split phase)	45kVA/30kVA(Split phase)	90kVA/60kVA(Split phase)		
	Per Phase/Channel	10kVA	15kVA	30kVA		
AC VOLTAGE	Range	0 - 350VL-N, 0 - 606VL-L, 0-700VL-L(Split phase) Option : 0 - 400VL-N, 0 - 692VL-L, 0-800VL-L(Split phase)				
	Resolution	0.1V				
	Setting Accuracy	± (0.1% of setting + 0.2% F.S.)				
	Total Harmonic Distortion (THD)(*2)	<0.4% @ 50/60Hz <0.9% @ 30-150Hz				
	Line Regulation (*3)	± 0.1%				
	Load Regulation (*4)	± 0.2%				
	Phase Angle	Range	0 - 359.9°			
Resolution		0.1°				
MAX. AC CURRENT	RMS(*5)	200A(1Ø) 66.7A(3Ø/Split phase)	300A(1Ø) 100A(3Ø/ Split phase)	600A(1Ø) 200A(Split phase)		
	Peak	550A(1Ø) 183A(3Ø/ Split phase)	825A(1Ø) 275A(3Ø/ Split phase)	1650A(1Ø) 550A(3Ø/ Split phase)		
	Crest Factor	2.75		2.75		
FREQUENCY	Range	30Hz - 150Hz				
	Resolution	0.01Hz				
	Accuracy(*6)	± 0.01% F.S				
DC OUTPUT	Max. Power	30kW/20kW (Split phase)	45kW/30kW (Split phase)	90kW/60kW(Split phase)		
	Per Phase/Channel	10kW	15kW	30kW		
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	200A(1Ø)/66.7A(3Ø/Split)	300A(1Ø)/100A(3Ø/Split)	600A(1Ø)/200A(3Ø/Split)		
HARMONIC SYNTHESIS FUNCTION	up to 50 Harmonic orders @ 50/60Hz fundamental frequency					
REGENERATIVE FUNCTION	Current Total Harmonic Distortion (iTHD)(*7)	<7%(Typical)	<5%(Typical)	<5%(Typical)		
	Power Factor(*8)	>0.97(Typical)				
CURRENT LIMIT FUNCTION	Setting	Range	1Ø	0.1 - 200.0A	0.1 - 300.0A	0.1 - 600.0A
		3Ø/Split phase	0.1 - 66.7A	0.1 - 100.0A	0.1 - 200.0A	
	Resolution	0.1A				
	Accuracy	± (2.0% of setting + 0.5% F.S.)				
Response Time	< 0.5s					
MEASUREMENT	Voltage (AC)	Range	0 - 350VL-N, 0 - 606VL-L, 0 - 700VL-L(Split) Option : 0 - 400VL-N, 0 - 692VL-L, 0 - 800VL-L(Split)			
		Resolution	0.01V			
		Accuracy	± (0.1% of reading + 0.2% F.S.) at Voltage > 5V			

Item		RPS-5030	RPS-5045	RPS-5090		
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 - 200.00A	0.00 - 300.00A	0.00 - 600.00A
			3Ø/Split phase	0.00 - 66.70A	0.00 - 100.00A	0.00 - 200.00A
		Resolution	0.01A			
	Peak Current	Range	1Ø	0.0 - 550.0Apk	0.0 - 825.0Apk	0.0 - 1650.0Apk
			3Ø/Split phase	0.0 - 183.0Apk	0.0 - 275.0Apk	0.0 - 550.0Apk
		Accuracy	± (0.4% of reading + 0.3% F.S.)			
	Power (AC,DC)	Range	1Ø	0.0W - 30kW	0.0W - 45kW	0.0W - 90kW
			3Ø	0.0W - 10kW	0.0W - 15kW	0.0W - 30kW
			Split phase	0.0W - 20kW	0.0W - 30kW	0.0W - 60kW
		Resolution	0.1W at 0.0 - 9999.9W / 1W at Power ≥10000W			
	Power Apparent (VA)	Range	1Ø	0.0W - 30kVA	0.0W - 45kVA	0.0W - 90kVA
			3Ø	0.0W - 10kVA	0.0W - 15kVA	0.0W - 30kVA
			Split phase	0.0W - 20kVA	0.0W - 30kVA	0.0W - 60kVA
	Resolution	0.1VA at 0.0 - 9999.9VA / 1VA at Power ≥10000VA				
	Accuracy	± (0.4% of reading + 0.4% F.S.)				
	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, RS232, LAN, External I/O(DB25),GPIB Option: CAN Bus				
	Display	Full Color, Touch LCD Display, 7" 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)(with casters)	1004 x 704 x 910 mm / 39.53 x 27.72 x 35.83 inch	RPS-5045 2units			
	Weight	550kg / 1212.542 lbs	1100kg / 2425.084 lbs			
ENVIRONMENTAL	Cooling	Variable speed fan cooled, front intake, rear exhaust				
	Operating Temperature	0 to 40°C (32°F to 104°F)				
	Storage Temperature	-20 to 70°C (-4°F to 158°F)				
	Altitude	2000m (6500 feet)				
	Operating Humidity(*10)	0% to 95% RAH				
REGULATORY COMPLIANCE	Safety	Low Voltage Directive 2014/35/EU, EN 61010-1:2010 + A1:2019				
	EMC	CE marked for EMC Directive 2014/30/EU per EN 61326-1:2021 Class A				
	CE Mark LVD Categories	Installation Overvoltage Category: II; Pollution Degree: 2; indoor use only.				

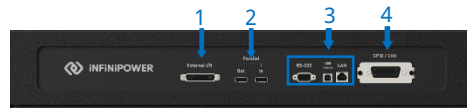
Note.

- *1 Tested on input voltage 400Vac with full output power
- *2 Maximum distortion is tested on output voltage 350Vac with full output power under linear load, and response setting value is greater than or equal to 12
- *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 150V

- *6 When the output voltage is greater than 40V
- *7 Current total harmonic distortion is tested on input voltage 400Vac with full output power
- *8 Power factor is tested on input voltage 400Vac with full output power
- *9 Efficiency is tested on input voltage 400ac and output voltage 250Vac with full output power under linear load
- *10 In the state of non-condensing

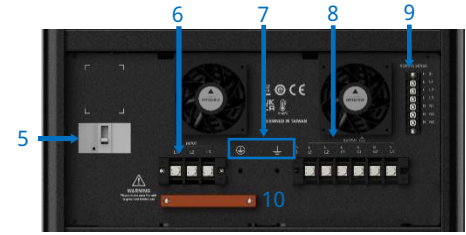
The above specifications are subject to change without prior notice.

RPS-5000 Dimensions



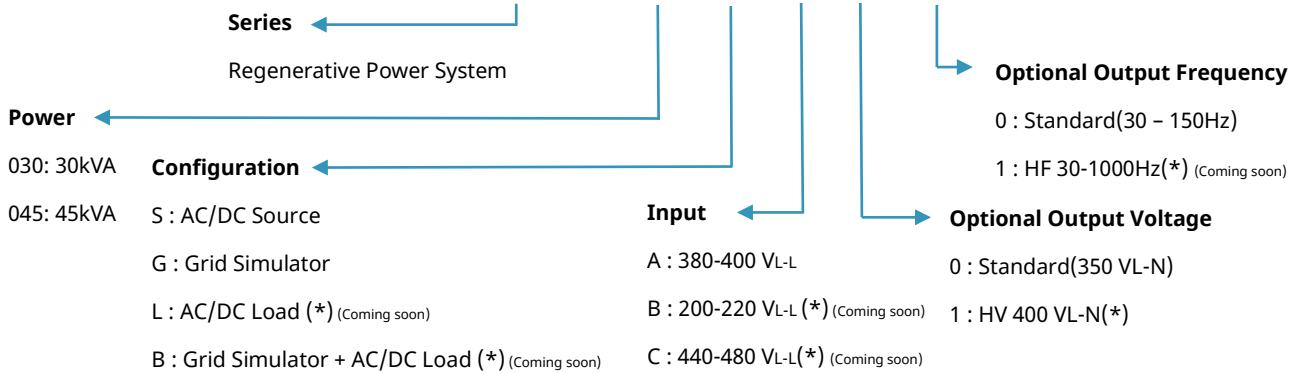
- 1 External I/O (AC_ON, FAULT-OUT, Ext-ON/OFF, etc.).
- 2 Parallel Communication Interface
- 3 RS-232, Type-B USB, Network control interface
- 4 GPIB/CAN Optional Card

- 8 Power Output Terminal
- 9 Remote Sensing Terminal
- 10 Power Input Cable Fixing Clamp



Ordering Information

RPS - 5045 G - A - 0 - 0



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

Accessories list

Typical Delivery Items	Optional accessories
<ul style="list-style-type: none"> ■ Regenerative Power System ■ Test Report ■ USB cable (Type A to Type B) (1.5m) ■ LAN cable CAT5E(2m) ■ DB25 adapter board (for I/O signal) ■ Output shorting adapter (for single phase mode) ■ RPS-5000 series input power cable (3m) 	<ul style="list-style-type: none"> ■ Parallel cable (Display port) (1.2m) ■ GPIB cable(1.5m) ■ RS-232 cable(Female to Male)(1.8m) ■ DB25 (male to male) adapter ■ DB9(RS-232)(male to male) adapter ■ Output voltage calibration fixture(Remote sense cable)

* 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 and produces products in world-class smart factories to ensure high quality, stability, and reliability. Committed to precision and innovation, we empower our customers to focus on product development and safety validation.



Contact: sales@infinipowertech.com