

# California Instruments RP Series

800–2000 VA

## General purpose AC power sources

150–300 V

- Portable Power, Low Cost.
- 800 VA, 1250 VA and 2000 VA Output Power
- Front and Rear Outputs
- 16 Hz to 5000 Hz Frequency Range
- High Peak Current Capability
- Remote Control Options
- Single or Three Phase Output



3–45 A



208

230



115

230



### Compact AC Power

With European and US outlet sockets to connect the load, the RP Series programmable AC power sources are ideal for a wide variety of applications.

A built in current measurement function eliminates the need for an external current shunt or transformer. Load current of the UUT (Unit Under Test) can be read directly on the large LCD display to 0.1 A. For additional protection, a current limit function can be set from zero to the maximum current rating.

### Easy To Use Controls

Front panel digital rotary encoders are used to set voltage and frequency. These controls have an analog feel, with the precision and reliability of digital circuits. Settings are read directly on the large high contrast LCD displays.

Dual output voltage ranges provide maximum current at the required voltage.

The output frequency can be varied from 16 Hz up to 5000 Hz to cover both avionics and utility power applications.

### Quality Control

For product quality test applications, the RP Series can be used to simulate line conditions found anywhere in the world. This ensures products destined for export will operate as designed.

### Avionics Applications

As an affordable and reliable source of 400 Hz AC power, both units are well suited for commercial and defense avionics applications. Both unit can easily be integrated into avionics ATE systems.

### Functional Design

The small form factor and low weight of these units make them convenient to use in a variety of locations. Removable rubber feet protect the work surface if the unit is used in a bench top mode. The 3.5 inch height saves valuable rack space when compared to conventional AC power sources at this power level.

Distributed by:  
[www.SignalTestInc.com](http://www.SignalTestInc.com)  
 1529 Santiago Ridge Way  
 San Diego, CA 92154 USA.  
[Sales@SignalTestInc.com](mailto:Sales@SignalTestInc.com)

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# RP Series : Product Specifications

## Extensive Transient Control<sup>1</sup>

With the addition of the remote control interface option, the RP units are capable of producing transients with a high degree of user programmability. Setting up transient programs is facilitated by a Windows Graphical User Interface program that allows amplitude, frequency and event duration to be programmed from a PC. Time resolution is 10 ms (0.010 sec) with a minimum time interval of 10 ms, depending on the transient type. Transient programming allows the effects of common line disturbances such as voltage surges, sags, drop-outs and frequency fluctuations on the unit under test to be evaluated.

## Remote or Local Operation

For automated test equipment (ATE) applications, the RP Series units can be outfitted with both IEEE-488 and RS232C options. A front panel lock out mode is supported on both models if operator interaction with the AC source is not required or desired.

## SCPI Protocol Programming Commands

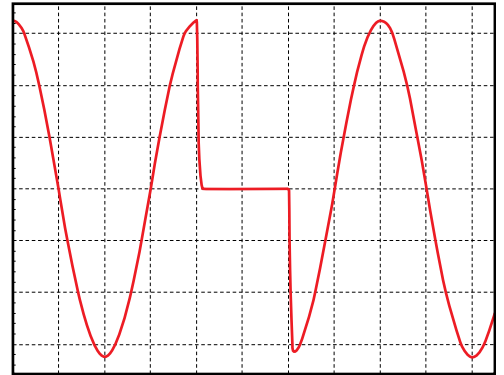
All functions of the RP Series are completely programmable over the IEEE-488 or RS232C bus. For example, the following tasks can be performed over the bus:

- Set voltage to any level
- Change frequency
- Generate 1 ms or longer voltage dropouts at 90 °, 180 °, 270 ° or 0 °
- Measure rms current, voltage and apparent power
- Recall eight complete instrument setups from non-volatile memory with a single SCPI command
- Reset the instrument
- Adjust current limit value
- Lock the front panel to prevent operator interference
- Switch between high and low voltage range
- Turn output on and off

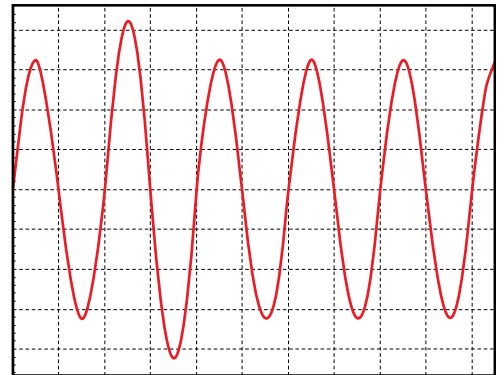
## Application Software

Windows 98™ or Windows 2000™ application software is included with the remote control interface option. This easy to use graphical interface program provides complete control over all instrument functions using either the RS232C or IEEE-488 interface. With enhanced capabilities such as data logging to file and Dynamic Data Exchange to other Windows programs, many applications can be addressed without the need for writing custom code.

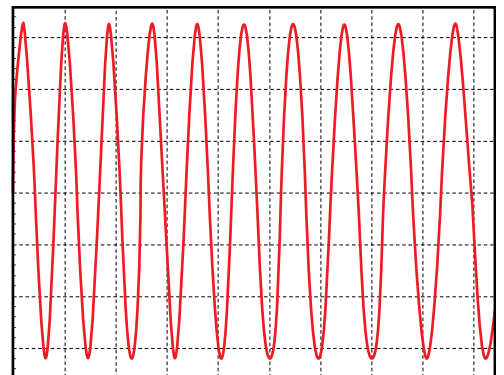
<sup>1</sup> Note: Transient control does not apply to output phase angle



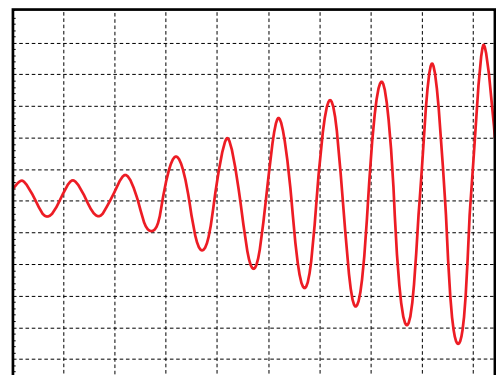
Drop transient causes output voltage to drop to zero for a user specified period



Voltage Surge transient causes output voltage to surge.



Frequency Sweep transient at a user specified rate.



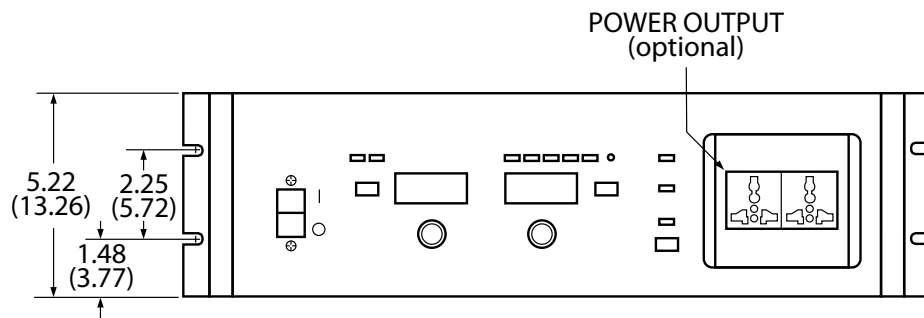
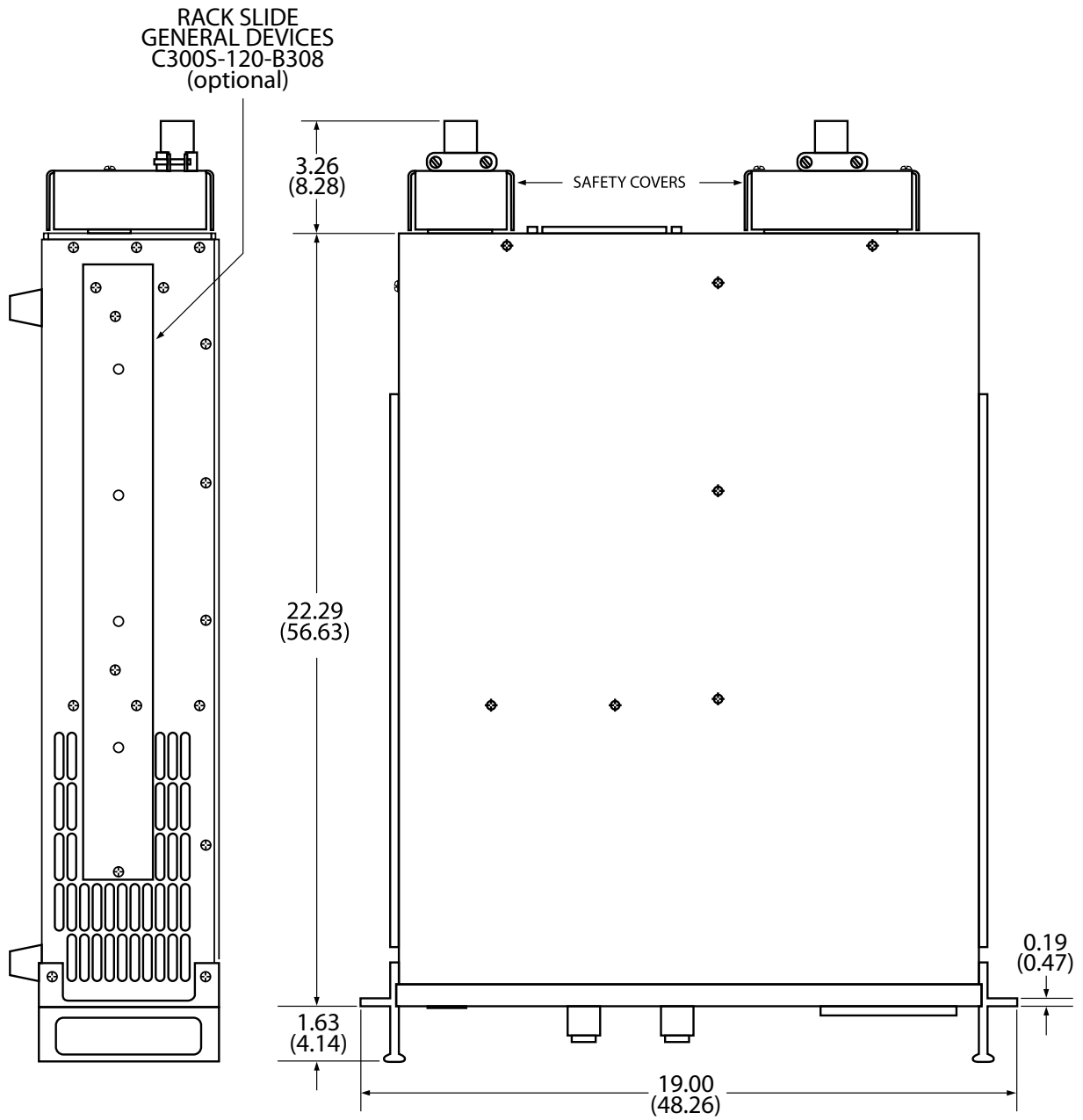
Voltage Sweep transient causes output voltage to change at a programmed rate.

<b>Output</b>				
Model	801RP	1251RP	2001RP	2003RP
Phases	1	1	1	3 (A,B,C)
Phase Angles				A=0°, B=240°, C=120°
AC Power	800VA	1250VA	2000VA	675VA Max per phase
Load Connection Floating neutral (option)	Rear panel terminal block	Rear panel terminal block	Rear panel terminal block / optional Universal front panel sockets	Rear panel terminal block
<b>Output : Voltage</b>				
High range / Low Range	0-270 / 0-135 V (L-N)	0-270 / 0-135 V (L-N)	0-300 / 0-150 V RMS (except -AV and -LZ options)	0-270/0-135 V RMS (Except AV option)
Accuracy	± 1 %FS @ 50/60 Hz	± 1 %FS @ 50/60 Hz	± 0.1 %FS @ 16Hz-100 Hz	± 0.1 %FS @ 16Hz-100 Hz
Accuracy	± 2 %FS @ 400 Hz	± 2 %FS @ 400 Hz	± 0.2%FS @ 100Hz-5000Hz	± 0.2%FS @ 100Hz-5000Hz
Resolution	0.1 V	0.1 V	0.1 V	0.1 V
Line & Load Regulation High V range	± 0.5 %FS	± 0.5 %FS		
Line & Load Regulation Low V range	± 1 %FS	± 1 %FS		
Load Regulation	± 1 %FS	± 1 %FS	remote sense ± 0.1% FS	remote sense, 16-500Hz ± 0.1 %FS <sup>2</sup>
Line Regulation 10 % Line change	± 0.1 %FS	± 0.1 %FS	± 0.02%FS	± 0.02%FS
T.H.D	0.5 typical % @ 50/60 Hz	0.5 typical % @ 50/60 Hz	16-100Hz 0.5 typ./1.0 max.% (into a resistive load)	16-100Hz 0.5 typ./1.0 max.% 100-2000Hz 1.0 typ./2.0 max.%
Output Noise	< 0.1 V typical	< 0.1 V typical	< 0.1 V RMS typ.	< 0.1 V RMS typ.
Note 2: Specifications apply over freq. ranges shown and above 5 % of V range.				
<b>Output : Frequency (specifications valid from 45 Hz to 500 Hz)</b>				
Range	16 - 500Hz	16 - 500Hz	16 - 5000Hz	16 - 5000Hz
Accuracy	± 0.02%	± 0.02%	± 0.02%	± 0.02%
Resolution below 100 Hz	0.1Hz	0.1Hz		
Resolution above 100 Hz	1 Hz	1 Hz		
Resolution			16.0Hz-80.0Hz 0.01 Hz 80.1Hz-800.0Hz 0.1 Hz 800Hz-5000Hz 1Hz	16.0Hz-80.0Hz 0.01 Hz 80.1Hz-800.0Hz 0.1 Hz 800Hz-5000Hz 1Hz
<b>Output : Current</b>				
Steady State Current High V range	3.0 A rms	4.6 A rms	6.7 A rms	2.5 A rms / Ø
Steady State Current Low V range	6.0 A rms	9.2 A rms	13.4 A rms	5.0 A rms / Ø
Peak Current High V range	13.8 A peak	13.8 A peak	22.2 A peak	7.5 A peak / Ø
Peak Current Low V range	27.6 A peak	27.6 A peak	44.5 A peak	15.0 A peak / Ø
<b>Input</b>				
Model	801RP	1251RP	2001RP	2003RP
Line Voltage <sup>1</sup> 2 wire + GND	100-240 V rms Maximum operating range 85 - 265 V rms	100-240 V rms Maximum operating range 85 - 265 V rms	107/115V or 208/230V ± 10% V RMS (set by jumper)	107/115V or 208/230V ± 10% V RMS (set by jumper)
Line Current (fused)	< 15 A rms	< 15 A rms	<35@96V, <30@115V, <15@230V A RMS	<30@115V,<15@230V A RMS
Line Frequency	47 - 63 Hz	47 - 63 Hz	47 - 440 Hz	47 - 440 Hz
Holdup Time	20 ms	20 ms	10 ms	10 ms
Power Factor	> 0.95 typical	> 0.95 typical	0.7	0.7
Isolation Input/output to Chassis	1350 V / 2200 V	1350 V / 2200 V	1350 V / 2200 V	1350 V / 2200 V

# RP Series : Product Specifications

<b>Controller</b>				
Model	801RP	1251RP	2001RP	2003RP
Type	Programmable	Programmable	Programmable	Programmable
Controls	Digital Encoders	Digital Encoders	Digital Encoders	Digital Encoders
Readouts	dual 4 digit LCD's	dual 4 digit LCD's	dual 4 digit LCD's	dual 4 digit LCD's
Non Volatile Setups	8 (with -IF option)	8 (with -IF option)	1 (8) (with -OP1 option)	1 (8) (with -OP1 option)
<b>Protection</b>				
Current limit Mode	Programmable trip level : Output trips off	Programmable trip level : Output trips off	Const. Current or Const. Volt	Const. Current or Const. Volt
Programmable Current Limit Resolution	0.1 A rms	0.1 A rms	0.1 A rms	0.1 A rms
Over Temperature	Output shut off	Output shut off	Output shut off	Output shut off
Over Voltage	Output shut off	Output shut off	Output shut off	Output shut off
<b>Measurements (* Requires Option -OP1 or -IF)</b>				
Current Range (RMS steady state)	0.0 - 10.0 A rms Accuracy $\pm 0.2$ A rms Resolution 0.1 A	0.0 - 10.0 A rms Accuracy $\pm 0.2$ A rms Resolution 0.1 A	0.00-4.00 / 0.00-15.00 A RMS Accuracy 0.2 % FS + 0.3 % rdng Resolution 0.001 / 0.01 A RMS	0.00-4.00 / 0.00-6.00 A RMS Accuracy 0.2 % FS + 0.3 % rdng Resolution 0.001 / 0.01 A RMS
Peak Current*			Range Low/High 12.00 / 50.0A Accuracy 0.5% FS + 0.5% rdng Resolution 0.01 / 0.1A	Range Low/High 0.00-12.00 / 0.0-20.0 A Accuracy 0.5% FS + 0.5% rdng Resolution 0.01 / 0.1 A
Voltage*	Range 0 - 278 V Resolution 1 V (below 250 V)	Range 0 - 278 V Resolution 1 V (below 250 V)	Range 0 - 300 V RMS Accuracy 0.1% FS + 0.05% rdng Resolution 0.1 V RMS	Range 0 - 300 V RMS Accuracy 0.1% FS + 0.05% rdng Resolution 0.1 V RMS
Power*			Range Low/High 800/2000 W Accuracy 0.5% FS Resolution 0.2 W	Range 0.0-800.0 W Accuracy 0.5 % FS Resolution 0.2 W
Power Factor*			Range 0.00 - 1.00 Resolution 0.01	Range 0.00 - 1.00 Resolution 0.01
<b>Remote Control Options</b>				
Remote Control Options	option -IF RS232C and IEEE-488 IEEE-488 Address 0-31 IEEE Functions SH1, AH1, T8, L3, RL2, SRQ0, PPO RS232C settings 9600,8,n,1 Command Language SCPI	option -IF RS232C and IEEE-488 IEEE-488 Address 0-31 IEEE Functions SH1, AH1, T8, L3, RL2, SRQ0, PPO RS232C settings 9600,8,n,1 Command Language SCPI	RS232C and IEEE-488 IEEE Functions SH1, AH1, T8, L3, RL2 RS232C settings 19200,8,n,1 Command Language SCPI (Requires Option -OP1)	RS232C and IEEE-488 IEEE Functions SH1, AH1, T8, L3, RL2 RS232C settings 19200,8,n,1 Command Language SCPI (Requires Option -OP1)
Remote Inhibit (Requires Option -OP1)			Output shut down TTL in, active low BNC	Output shut down TTL in, active low BNC
Function Strobe (Requires Option -OP1)			On V or F change TTL out, active low BNC	On V or F change TTL out, active low BNC
<b>Physical</b>				
Regulatory	CE	CE	CE	CE
Dimensions HxWxD	3.5 x 16.8 x 22 in 89 x 427 x 560 mm	3.5 x 16.8 x 22 in 89 x 427 x 560 mm	5.25 x 19 x 22 in 133 X 483 X 560 mm	5.25 x 19 x 22 in 133 X 483 X 560 mm
Weight (net)	34 / 15.4 lbs / kg	34 / 15.4 lbs / kg	73 / 33 lbs / kg	85 / 38.3 lbs / kg
Vibration and Shock	Designed to meet NSTA-1A	Designed to meet NSTA-1A	Designed to meet NSTA-1A	Designed to meet NSTA-1A
Temperature	Operating 0 to 40 ° C Storage -40 to +85° C	Operating 0 to 40 ° C Storage -40 to +85° C	Operating 0 to 40 ° C Storage -40 to +85° C	Operating 0 to 40 ° C Storage -40 to +85° C

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## 2001/2003 RP

# RP Series

Models	
801RP	800 VA rack-mount AC source - single phase
1251RP	1250 VA rack-mount AC Source - single phase
2001RP	2000 VA rack-mount AC Source - single phase
2003RP	2000 VA three phase, rack-mount AC Source
801RP and 1251RP Model Options	
Option Code	Description
-FN	Floating Neutral output.
-IF	IEEE-488 and RS232C Interface
-ISS	International Socket Strip
-ISR	Rack mounted ISS
-L22	Locking knobs
-RI	Remote Inhibit Input (Req. -IF)
-RMS	Rack Slides (P/N 210367)
2001RP Model Options	
Option Code	Description
-AV	Avionics version. All specifications equal to standard 2001RP with the following exceptions: <ul style="list-style-type: none"> <li>• Voltage ranges: 0-115 / 0-230 VRMS</li> <li>• Frequency range: 360 - 5000 Hz</li> <li>• Current: 17.4 / 8.7 ARMS 58 / 29 APK</li> <li>• THD: 1.0+1.0/KHz % above 1 KHz</li> <li>• Weight: 67 lbs. / 30 Kg</li> </ul>
-L22	Locking knobs
-LZ	Low output impedance version, All specifications equal to standard 2001RP with the following exceptions: <ul style="list-style-type: none"> <li>• Zo &lt; 100 mΩ</li> <li>• Voltage ranges: 0-135 / 0-270 VRMS</li> <li>• Frequency range: 16 - 500 Hz</li> <li>• Current: 14.8 / 7.4 ARMS 49.4 / 24.7 APK</li> </ul>
-OP1	Option package 1: <ul style="list-style-type: none"> <li>• Measurements</li> <li>• IEEE-488 / RS232C Interface and GUI software</li> <li>• Remote Inhibit input</li> <li>• Function Strobe output</li> </ul>
-SKT	Universal front panel mounted output socket
-RMS	Rack Mount Slides
2003RP Model Options	
Option Code	Description
-AV	Avionics version. All specifications equal to standard 2003RP with the following exceptions: <ul style="list-style-type: none"> <li>• Voltage ranges: 0-115 / 0-230 VRMS</li> <li>• Frequency range: 360 - 5000 Hz</li> <li>• Current: 17.4 / 8.7 ARMS 58 / 29 APK</li> <li>• THD: 1.0+1.0/KHz % above 1 KHz</li> <li>• Weight: 67 lbs. / 30 Kg</li> </ul>
-L22	Locking knobs
-LF	Low Frequency option. Limits output frequency to 550 Hz max.
-OP1	Option package 1: <ul style="list-style-type: none"> <li>• Measurements</li> <li>• IEEE-488 / RS232C Interface and GUI software</li> <li>• Remote Inhibit input</li> <li>• Function Strobe output</li> </ul>
-RMS	Rack Mount Slides
Supplied with	
801RP and 1251RP	
North American Line Power Cord	
USA and European line output mating connector-	
Instruction Manual- Windows™ Graphical User	
Interface and RS232C cable (with -IF option)	
2001RP	
User and Programming Manual on CD ROM	
Windows™ Graphical User Interface (with -OP1 option)	
RS232C Serial Cable (with - OP1 option)	
2003RP	
Instruction / Programming Manual	
Windows™ Graphical User Interface (with -OP1 option)	
RS232C Serial Cable (with -OP1 option)	