

### Overview

- **High Power AC Power Source**

Programmable AC power for frequency conversion and product test applications

- **Expandable Power Levels**

Available output power of 30, 45, 75, and 90 kVA per unit and multi-unit configurations for power requirements of 150 and 180 kVA

- **Remote Control**

Standard IEEE-488 (GPIB), RS232C & USB along with optional LAN Interfaces are available for automated test applications

#### Introduction

The BPS Series consists of multiple high-power AC power systems that provide controlled AC output for ATE and product test applications.

This high-power AC test system covers a wide spectrum of AC power applications at an affordable cost. Using state-of-the-art PWM switching techniques, the BPS series combines compactness, robustness, and functionality in a compact floor-standing chassis, no larger than a typical office copying machine. This higher power density has been accomplished without the need to resort to elaborate cooling schemes or additional installation wiring. Simply roll the BPS unit to its designated location (using included casters), plug it in, and the BPS series is ready to work for you.

#### Simple Operation

The BPS Series can be operated completely from its menu driven front panel controller. A backlit LCD display shows menus, setup data, and read-back measurements. IEEE-488, RS232C, USB, and optional LAN remote control interfaces and instrument drivers for popular ATE programming environments are available. This allows the BPS Series to be easily integrated into an automated test system.



## 150-400 V

## 0-400A/ Phase

208	230	380
400	480	

ETHERNET

#### Configurations

The BPS series can deliver 30, 45, 75, 150 or 180 kVA of AC power. The BPS30 and BPS45 models come as dedicated single or three phase output, while the BPS75, BPS90, BPS150, and BPS180 are dedicated three phase outputs.

#### Product Evaluation and Test

Increasingly, manufacturers of high-power equipment and appliances are required to fully evaluate and test their products over a wide range of input line conditions.

Output voltage options, such as the -333 option, allow testing of high voltage 480VAC L-L products at 120% of nominal as required by IEEE 1547 (Table 1) "Interconnection system response to abnormal voltages".

The built-in output transient generation and read-back measurement capability of the BPS Series offers the convenience of a powerful, and easy to use, integrated test system.

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**AMETEK®**  
**PROGRAMMABLE POWER**

**Avionics**

With an output frequency range to 819 Hz., the BPS Series is well suited for aerospace applications. Precise frequency control and accurate load regulation are key requirements in these applications. The available IEEE-488 remote control interface and SCPI command language provide for easy integration into existing ATE systems. The BPS Series eliminates the need for several additional pieces of test equipment, saving cost and space. Instrument drivers for popular programming environments such as National Instruments LabView™ are available to speed up system integration.

**Choice of Voltage Ranges**

The BPS Series includes 0 - 150V & 0 - 300V or optionally, 0 - 166V & 0 - 333V line to neutral. These models provide a maximum 3 phase output capability of 260 Vac & 520 Vac or 287 & 576V line to line respectively. For applications requiring more than 333 V L-N (or 576 V L-L), the optional -HV output transformer provides an additional 0 - 400 V L-N and 0 - 693 V L-L output range for use in AC mode only. For custom applications the XV option is available and is user defined and offers up to 600VL-N (1,038VL-L)

**High Crest Factor**

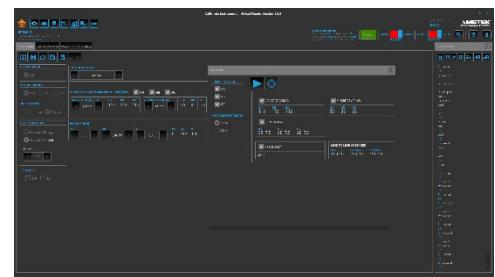
With support for high crest factor loads, the BPS Series AC source can drive difficult nonlinear loads with ease. Since many modern products use switching power supplies, they tend to pull high repetitive peak currents. The BPS30 with a crest factor rating of 4.5 for example, can deliver up to 300 Amps of repetitive peak current (150 V AC range) per phase to handle three phase loads. Refer to the specifications for peak repetitive currents for each model.

**Remote Control**

Standard RS232C, USB, and IEEE-488(GPIB), along with optional LAN remote control interfaces allow programming of all instrument functions from an external computer. The popular SCPI command protocol is used for programming.

**Application Software**

- Windows® application software (\*) is included. This software provides easy access to the power source's capabilities without the need to develop any custom code. The following functions are available through this GUI program:
  - \* Requires PC running Windows™ 7, 8.x, or 10
- Steady state output control (all parameters)
- Create, run, save, reload, and print transient programs
- Measure and log standard measurements
- Display IEEE-488, RS232C, USB, and LAN bus traffic to and from the AC Source to help you develop your own test programs.



Virtual Panels GUI Software

**Simple transition from R&D to Manufacturing.**

The California Instruments MX and RS Series are high performance, feature rich Research and Development solutions. That level of advanced performance is not always required in production and lab environments. Since the BPS shares a common code structure and performance characteristics with the MX and RS series, the BPS is ideally suited to easily transition into cost effective production solutions.

**BPS Series - AC Transient Generation**

The BPS Series controller has a powerful AC transient generation system that allows complex sequences of voltage, frequency and waveshapes to be generated. This further enhances the BPS's capability to simulate AC line conditions and disturbances. Transient generation is controlled independently yet time synchronized on all three phases. Accurate phase angle control and synchronized transient list execution provide unparalleled accuracy in positioning AC output events.

Transient programming is easily accomplished from the front panel where clearly laid out menu's guide the user through the transient definition process.

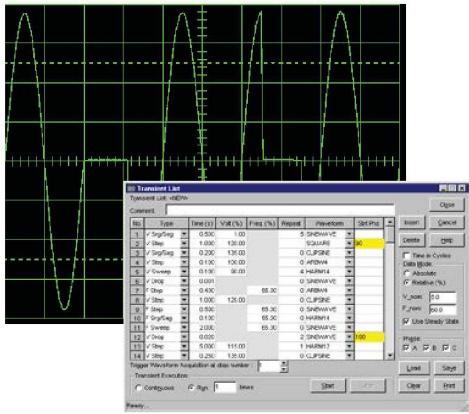
The front panel provides a convenient listing of the programmed transient sequence and allows for transient execution Start, Stop, Abort and Resume operations. User defined transient sequences can be saved to non-volatile memory for instant recall and execution later. The included Graphical User Interface program supports transient definitions using a spreadsheet-like data entry grid. A library of frequently used transient programs can be created on disk using this GUI program



VOLTAGE/FREQUENCY SWEEP/STEP SETUP

DURATION =5.000S END DELAY =2.000S  
 END VOLT =135.0 FUNCTION =SINE  
 END FREQ =200.0 REPEAT =10  
 PREVIOUS SCREEN EVENT # =1

Transient List Data Entry from the front panel.



Transient List Data Entry in GUI program.

**BPS Series - Measurement and Analysis**

The BPS Series is much more than a programmable AC power source. It also incorporates an advanced digital signal processor-based data acquisition system that continuously monitors all AC source and load parameters. This data acquisition system forms the basis for all measurement and analysis functions. These functions are accessible from the front panel and the remote-control interface for the BPS Series

**Conventional Measurements**

Common AC measurement parameters are automatically provided by the data acquisition system. These values are displayed in numeric form on the front panel LCD display. The following measurements are available: Frequency, Vrms, Irms, Ipk, Crest Factor, Real Power (Watts), Apparent Power (VA) and Power Factor.

<b>Model</b>		<b>Standard Model Options</b>
<b>Refer to table shown for model numbers and configurations</b>		-333 Configured for 166VAC and 333V AC L-N output ranges
<b>Supplied with</b>		-ES Emergency Shut Off with Key Release
User/Programming Manual and Software on CD ROM. RS232C serial cable.		-LF Limits maximum frequency to 500 Hz..
<b>Input Voltage Settings</b>		-FC Modifies output frequency control to $\pm 0.25\%$
Specify input voltage (L-L) setting for each BPS system at time of order:		-LAN Ethernet Interface.
208	Configured for 208 V $\pm 10\%$ L-L, 4 wire input.	-HV Adds 400 V L-N AC-only output range.
230	Configured for 230 V $\pm 10\%$ L-L, 4 wire input.	-HVC Adds 0-400VAC L-N AC only output range with constant power mode.
380	Configured for 380V $\pm 10\%$ L-L, 4 Wire Input	-XV Adds other AC-only output range. Consult factory for details.
400	Configured for 400 V $\pm 10\%$ L-L, 4 wire input.	-XVC Adds other AC only output range with constant power mode. Consult Factory for details
480	Configured for 480 V $\pm 10\%$ L-L, 4 wire input	
<b>Packaging and Shipment</b>		All BPS systems are packaged in reusable protective wooden crates for shipment.

# BPS Series Specifications

30-180 kVA

AC Input													
Input Voltage		Must be specified at time of order. All inputs are L-L, 3Ø, 3 wire + Gnd. 208 ± 10% VAC, 230 ± 10% VAC, 380V ± 10% VAC, 400 ± 10% VAC, 480 ± 10% VAC, 480 ± 10% VAC.											
		<b>BPS30</b>	<b>BPS45</b>	<b>BPS75</b>	<b>BPS90</b>	<b>BPS150 *</b>	<b>BPS180 *</b>						
Input Line Current (per phase) Steady State at full power load and Low line input	208	116 ARMS @ 187VLL	175 ARMS # 187 VLL	285 ARMS @ 187 VLL	350 ARMS @ 187 VLL	570 ARMS @ 187 VLL	700 ARMS @ 187 VLL						
	230	105 ARMS @ 207 VLL	157 ARMS @ 207 VLL	256 ARMS @ 207 VLL	314 ARMS @ 207 VLL	512 ARMS @ 207 VLL	624 ARMS @ 207 VLL						
	380	62 ARMS @ 342 VLL	95 ARMS @ 342 VLL	154 ARMS @ 342 VLL	177 ARMS @ 342 VLL	292 ARMS @ 342 VLL	354 ARMS @ 342 VLL						
	400	60 ARMS @ 360 VLL	90 ARMS @ 360 VLL	147 ARMS @ 360 VLL	180 ARMS @ 360 VLL	294 ARMS @ 360 VLL	360 ARMS @ 360 VLL						
	480	50 ARMS @ 432 VLL	75 ARMS @ 432 VLL	122 ARMS @ 432 VLL	150 ARMS @ 432 VLL	244 ARMS @ 432 VLL	300 ARMS @ 432 VLL						
NOTE: BPS150 and BPS180 are comprised of two chassis, (BPS150 is 2 x BPS75, BPS180 is 2 x BPS90) each require a separate AC Line service													
Distortion		< 8% at full power, <20% below 35% of power											
Line Frequency		47 - 63 Hz.											
Efficiency		85 % typical											
Power Factor		0.95 typical											
AC Service													
Inputs/Outputs	BPS30/45: Front and side access, cables routed through rear panel, exit in back. BPS75/90/150/180 Rear Access												
Regulatory	IEC/EN 61010-1												
EMI	CISPR 11 / EN 55011, Class A, , EN 61326-1, CE EMC (400 V Input models only -400 Option)												
Connectors	AC Input & Output terminal block behind front cover. Rear Panel Connections: IEEE-488 (GPIB) connector Option, 9 pin Sub-D RS232C connector*, Remote voltage sense terminal block , System Interface Connector, DB-37, Ethernet connector Option. *RS232 DB9 to DB9 cable supplied												
Physical Dimensions / Environmental													
BPS30/45 Dimensions	Height: 50.0" Width: 28.75" Depth: 34.5"	(1270 mm) (731 mm) (876 mm)											
BPS30/45 Weight	1150 lbs.	522 Kg											
BPS30/45 Shipping Weight	1231 lbs	560 Kg,											
BPS75/90 Dimensions	Height: 74.5" Width: 30.3" Depth: 38.3"	1892.3 mm 769.6 mm 972.8 mm											
BPS75/90 Weight	2150 lbs / 975 Kg approximately 2475 lbs / 1123 Kg approximately including -HV or -XV option												
BPS75/90 Shipping Weight	2450 lbs / 1111 Kg approximately 2775 lbs / 1258 Kg approximately including -HV or -XV option												
Chassis	Individual cabinets: Casters and forklift openings.												
Vibration and Shock	Designed to meet NSTA project 1A transportation levels. Units are shipped in wooden crate with forklift slots												
Air Intake/Exhaust	Forced air cooling, front air intake, rear exhaust												
Operating Humidity	0 to 95 % Relative Ambient Humidity, non-condensing												
Temperature	Operating 0 to 40° C (30° max in CP mode), Storage: -20 to +85° C												

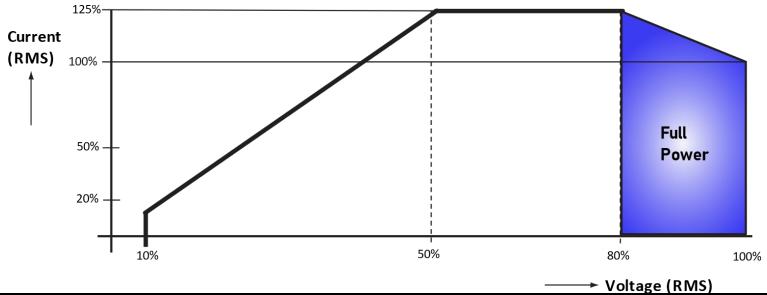
## Output Voltage Ranges

				Voltage Ranges		
Model	AC Output Power	Phase Outputs*		AC V Low/V high	-HV Opt	333 Opt AC V Low/V high
BPS30	30kVA	1 & 3		150/300	400 VAC	166 / 333
BPS45	45 kVA	1 & 3		150/300	400 VAC	166 / 333
BPS75	75 kVA	3		150/300	400 VAC	166 / 333
BPS90	90 kVA	3		150/300	400 VAC	166 / 333
BPS150	150 kVA	3		150/300	400 VAC	166 / 333
BPS180	180kVA	3		150/300	400 VAC	166 / 333

\* Phase mode switching available on BPS30 and BPS45.

## -MB Option

Model	AC Output Power	Phase Outputs	Controller
BPS150-3-MB	150 kVA	3	Dual BPS45
BPS180-3-MB	180 kVA	3	Dual BPS90

Operating Modes														
All Models: Models AC only														
AC Mode Output														
Frequency	Range: 16.00-819.0 Hz., -LF Option: 16.00-500.0 Hz.). Resolution: 0.01 Hz.: 16.00 - 81.91 Hz., 0.1 Hz.: 82.0 Hz. - 819.1 Hz.													
Phase Outputs	BPS30/45: 1 or 3 phase selected at time of order, BPS75/90/150/180 3 phase; Neutral: Floating; Coupling: AC													
Total Power	BPS30: 30 kVA, BPS45: 45 kVA, BPS75: 75kVA BPS90: 90 kVA, BPS150: 150 kVA, BPS180: 180kVA													
Load Power Factor	0 to unity at full output current													
AC Mode Voltage														
Voltage Ranges (Std Unit has 150 and 300VAC, 333 Option has 166 and 333VAC)	Range	V Low	V High		Regulation									
	AC	0-150 / 0-166V	0-300 /0-333 V		Load Regulation < 0.25 % FS DC to 100 Hz., < 0.5 % FS 100 Hz. to 819 Hz.									
					Line Regulation < 0.1% FS for a 10 % line change									
External Sense	Voltage drop compensation (5% Full Scale)													
Harmonic Distortion (Linear)	Less than 0.5% from 16 - 66 Hz.; Less than 1% from 66 - 500 Hz.; Less than 1.5% above 500 Hz.													
DC Offset	< 20 mV													
Load Regulation	0.25% FS @ DC - 100 Hz., 0.5% FS > 100 Hz.													
External Amplitude Modulation	Depth: 0 - 10 %, Frequency: DC - 2 KHz.													
Voltage slew rate	200 $\mu$ s for 10% to 90% of full-scale change into resistive load, 0.5V / $\mu$ Sec													
AC Mode Current														
Steady State AC Current @ FS V (Std Unit has 150 and 300VAC -333 Option has 166 and 333VAC)	Model / Option Low Range / High Range	BPS30 3Ph / 1 Ph	BPS45 3 Ph / 1 Ph	BPS75 3 Ph	BPS90 3 Ph	BPS150 3 Ph	BPS180 3 Ph							
	Standard	150	66.6 A/ $\phi$ / 200 A	100 A/ $\phi$ / 300 A	166 A/ $\phi$	200 A/ $\phi$	332 A/ $\phi$							
		300	33.3 A/ $\phi$ / 100 A	50 A/ $\phi$ / 150 A	83 A/ $\phi$	100 A/ $\phi$	166 A/ $\phi$							
	-333 Option	166	60 A/ $\phi$ /180.1 A	90.1 A/ $\phi$ / 270.3	150 A/ $\phi$	180.2 A/ $\phi$	300 A/ $\phi$							
		333	30 A/ $\phi$ / 90.1 A	45 A/ $\phi$ / 135 A	75 A/ $\phi$	90.1 A/ $\phi$	150 A/ $\phi$							
Note: Constant power mode provides increased current at reduced voltage. See chart below														
Peak Repetitive AC Current	BPS30 up to 4.5 / BPS75 and BPS150 up to 3.6. / BPS45, BPS90, and BPS180 up to 3.0. (x rms current at full scale voltage)													
Programming Accuracy	Voltage (rms): $\pm$ 0.3 Vrms, Frequency: $\pm$ 0.01 % of programmed value, Current Limit: - 0 % to + 5 % of programmed value + 1A, Phase: <0.5°+0.2°/100Hz. with balanced load													
Programming Resolution	Voltage (rms): 100 mV, Frequency: 0.01 Hz. from 16 - 81.91 Hz., 0.1 Hz. from 82.0 - 819 Hz., Current Limit: 0.1A, 3 phase mode, 1.0A, 1 phase mode, Phase: 0.1°													
Current Limit	Programmable from 0 A to max. current for selected range													
Constant Power AC Mode - Available Max. AC Current														
														
Chassis Dimensions														
BPS30 and BPS45				BPS75, BPS90, BPS150 and BPS180										

Measurement																		
Measurements - Standard (AC Measurements)	Parameter	Frequency	RMS Voltage	RMS Current	Peak Current	Crest Factor	Real Power	Apparent Power	Power Factor	Phase								
	Range	16-100 Hz. 100-820 Hz.	400 V	0-160 A	0-400 A	0.00- 6.00	0-15 kW	0-15 kVA	0.00- 1.00	0.0- 360.0								
	Accuracy* (±)	0.01% + 0.01 Hz.	0.05 V + 0.02% 0.1V + 0.02%	0.15 A + 0.02% 0.3 A + 0.02%	0.15 A + 0.02% 0.3 A + 0.02%	0.05 0.05	30 W + 0.1% 60W + 0.1%	30 VA + 0.1% 60VA + 0.1%	0.01 0.02	2.0° 3.0°								
	Resolution*	0.01 Hz. / 0.1 Hz.	10 mV	10 mA	10 mA	0.01	10 W	10 VA	0.01	0.1°								
* Measurement system bandwidth = DC to 6.7 kHz.. Accuracy specifications are valid above 100 counts. Current and Power Accuracy and Range specifications are times three for BPS75, BPS90, BPS150, BPS180 or BPS30/45 in single phase mode. PF accuracy applies for PF > 0.5 and VA > 50 % of range																		
Measurements - Harmonics	Parameter	Frequency Fundamental Harmonics		Phase	Voltage			Current										
	Range	16.00-1000.0 Hz. / 32.00 Hz. - 16 kHz.		0.0 - 360.0°	Fundamental Harmonics 2-50			Fundamental Harmonics 2-50										
	Accuracy* (±)	0.03% + 0.03 Hz. / 0.01 Hz.		2° typ.	750 mV 0.3% + 750 mV+0.3% /1 kHz.			0.5 A / 0.3% + 150 mA +0.3% /1 kHz.										
	Resolution	0.01 Hz.		0.5°	10 mV / 10 mV			100 mA / 100 mA										
* Accuracy specifications are valid above 100 counts. Accuracy specifications are for three phase mode. Harmonics frequency range for BPS30/45 in single phase mode is 32Hz.- 48kHz.																		
Protection																		
Overload	Constant Current or Constant Voltage mode																	
Over Temperature	Automatic shutdown																	
Storage																		
Non-Volatile Mem. Storage	16 instrument setups.																	
Waveforms																		
Waveform Types	Sine																	
System Interface																		
Inputs	Remote shutdown, External Sync, Clock/Lock																	
Outputs	Function Strobe / Trigger out, Clock/Lock																	
Remote Control																		
IEEE-488 Interface	IEEE-488 (GPIB) talker listener. Subset: AH1, C0, DC1, DT1, L3, PPO, RL2, SH1, SR1, T6, IEEE-488.2 SCPI Syntax																	
RS232C Interface	9 pin Sub-D connector (Supplied with RS232C cable)																	
LAN (-LAN Opt.)	Ethernet Interface: 10BaseT, 100BaseT, RJ45																	
USB	Version: USB 1.1; Speed: 460 Kb/s maximum																	
Output Relay	Push button controlled or bus-controlled output relay																	

Note: Specifications are subject to change without notice. Specifications are warranted over an ambient temperature range of  $25^{\circ}\pm 5^{\circ}$

C. Unless otherwise noted, specifications are per phase for a sinewave with a resistive load and apply after a 30 minute warm-up period. For three phase configurations, all specifications are for L-N. Phase angle specifications are valid under balanced load conditions only.

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