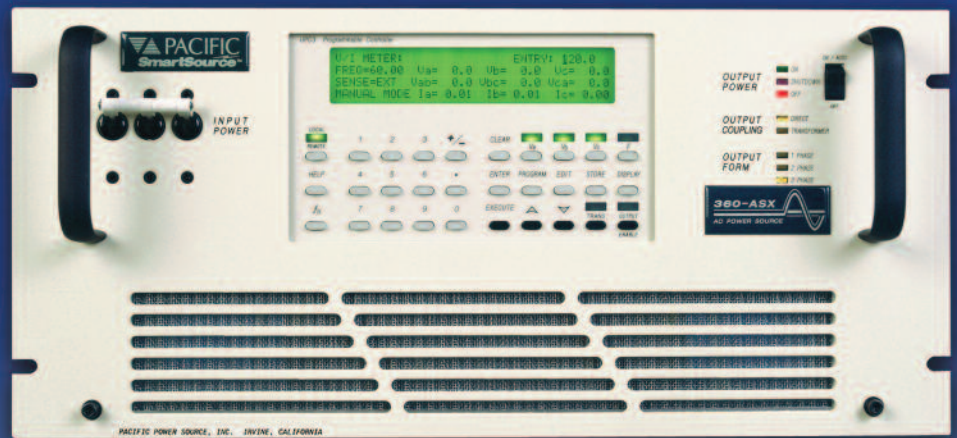


# ASX Series

High-Density AC Test Power

Single and Three Phase Switchmode AC Power Sources



*Models from 1,500 VA to 12,000 VA*

*The Power of Expertise*



[www.pacificpower.com](http://www.pacificpower.com)



# ASX Series AC Power Sources

The ASX Series is Pacific Power Source's family of High Performance AC Power Sources ranging from 1.5kVA to 12kVA. Power conversion within the ASX Series is achieved by high frequency pulse width modulation, resulting in cool, quiet, and efficient operation.



## Applications

### AC Test Power

The ASX Series Power Source is equipped with a powerful microcontroller to create a fully integrated test system. It supplies a variety of power conditions to the device under test and meters/analyzes all output performance parameters.

### Frequency/Voltage Conversion

The ASX Series is an excellent source of stable AC voltage over the frequency range of 15 to 1,200 Hz. The output frequency is quartz-crystal stabilized. Output voltages up to 600 VAC are provided.

### Phase Conversion

With the ability to provide single and three-phase outputs, the ASX Series is the perfect choice to provide 1 Phase to 3 Phase or 3 Phase to 1 Phase conversion.

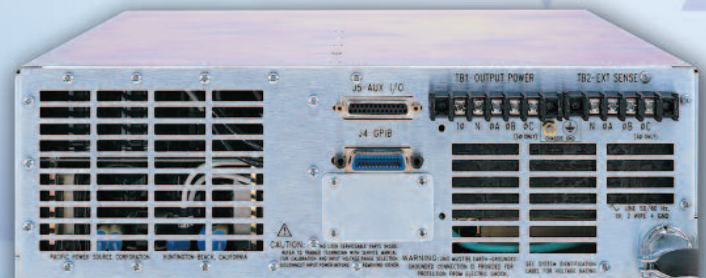
### Standard Features of each system include:

- 22 Waveform Library – Arbitrary Waveform Generator.
- 15 to 1,200 Hz Operation – 5,000 Hz Bandwidth.
- Precision Voltage Programming – 0.05% with Continuous Self-Calibration (CSC) engaged.
- Precision True-RMS metering of volts, amps, and power for displays and reporting.
- RS-232 Interface with SCPI.
- 1 Phase/3 Phase Switch Selectable Output from front panel or bus command.
- 99 stored programs for both static and dynamic Transient Testing.

### Available options of each system include:

- GPIB (IEEE-488.2) Interface with SCPI.
- Programmable Output Impedance.
- Harmonic Analysis (FFT) and Waveform Synthesis.
- Load Surge Analysis and Waveform Capture.
- LabView for Windows™ and LabWindows™ Instrument Drivers.
- UPC Manager Compiled Software Suite.
- Wide range of Output Magnetics for world-wide testing.

Other controllers are available for applications where the ASX Series would be used as a manually controlled laboratory instrument, or a fixed parameter OEM frequency converter.





## Controller Selection Guide

Four controller models are available with the ASX-Series. They include 1 Phase and 3 Phase models for both manual and programmable control.

- UPC-1M 1 Phase Manual Control 15 Hz to 1,200 Hz.
- UPC-3M 3 Phase Manual Control 15 Hz to 1,200 Hz.
- UPC-1 1 Phase Programmable Control 15 Hz to 1,200 Hz.
- UPC-3 3 Phase Programmable Control 15 Hz to 1,200 Hz.

All controllers provide manual operation from the front panel. Programmable Controllers may be programmed from the front panel or from a remote interface. RS-232 Interface is standard. IEEE-488 interface is optional.

## Programmable Output Impedance (optional)

This feature creates positive, negative, or zero output impedance (Z<sub>0</sub>).

- Compensates for line distribution or transformer losses.
- Simulates a soft power line for product testing.

Compensation range is  $\pm 10\%$  of the output voltage.

## Transient Generation

### Time Based Transients

Create and execute transients that occur over a specified time segment to modify the output waveform, voltage, and frequency for any or all phases. An output trigger is provided for synchronizing external test equipment to the actual transient event.

### Cycle Based Transients

Create and execute transients that substitute a waveform in any or all phases for 1 to 100 cycles. The waveform being substituted can be selected and/or modified from the waveform library.

## Arbitrary Waveform Generation and Analysis

### Waveform Edit

A full-featured editor permits modification of a stored waveform in both time and frequency domains. This method can be used to quickly create spikes, dropouts, notches and other sub-cycle wave conditions. The resulting modified waveform is stored for execution in steady-state or transient programs.

### Waveform Library

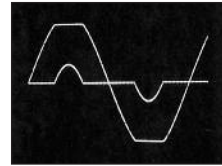
Up to 22 different waveforms can be stored in the waveform library for execution as part of a steady state program or for substitution in any output phase as part of a transient test program. Memory location #1 is a noneditable high resolution sine wave. Locations 2-22 are editable and can be substituted in any output phase.

### Waveform Harmonic Synthesis (optional)

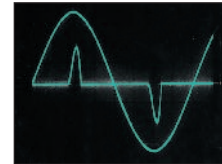
Quickly create virtually any AC test waveform by building it out of harmonics. The process is as simple as keying in the magnitude and phase angle of each desired harmonic up through the 51<sup>ST</sup>. Additionally, waveforms can be created by downloading from a host PC.

### Waveform Analysis (optional)

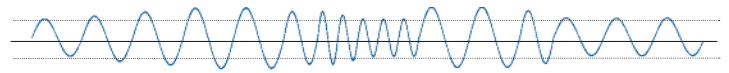
Provides both graphic (using LabView for Windows™) and numeric displays of the harmonic structure of a voltage or current waveform. Each waveform is analyzed for its harmonic content, up to the 51<sup>ST</sup> harmonic. Amplitude and phase are reported to the local display. UPC Manager displays numeric values as well as a graphic summary of the harmonic spectrum.



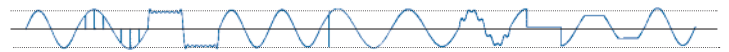
Oscilloscope of voltage and current waveform at load due to distribution losses. THD=6.6%



Same conditions as above with programmable Z<sub>0</sub> engaged. THD=0.25%



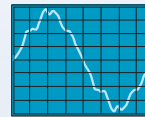
TIME BASED TRANSIENTS



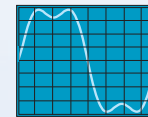
CYCLE BASED TRANSIENTS

EDIT WAVEFORM: NUMBER=16	RANGE=2-16
STARTING PHASE ANGLE=0	0-359.5°
ENDING PHASE ANGLE=0	0-359.5°
VOLTAGE IN PERCENT=-100	(+/-)0-100%

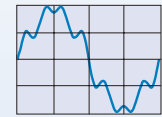
WAVEFORM EDIT



THD=8.7%



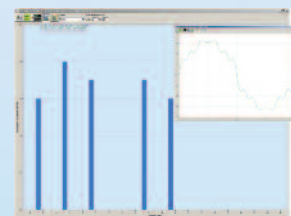
THD=22.2%



THD=18.1%

WAVEFORM SYNTHESIS:	WAVEFORM #2
HARMONIC:	2nd 3rd 4th 5th 6th
CONTENT:	.1% 0% 0% 0% 0%
Ø ANGLE:	0° 0° 0° 0° 0°

WAVEFORM SYNTHESIS



HARMONIC CONTENT OF METERED WAVEFORM

## Metering

V/I METER: ENTRY: 120.0  
 FREQ=60.00 Va=120.0 Vb=120.0 Vc=120.0  
 SENSE=INT Vab=208.0 Vbc=208.0 Vca=208.0  
 MANUAL MODE Ia=06.00 Ib=06.22 Ic=06.15

POWER METER:	PHASE A	PHASE B	PHASE C
KVA	0.720	0.746	0.738
KW	0.720	0.746	0.738
PF	1.000	1.000	1.000

AMPS METER:	PHASE A	PHASE B	PHASE C
RMS	0.720	0.746	0.738
PEAK	1.044	1.119	1.383
CREST FACTOR	1.45	1.50	1.90

## Waveform Control/Analysis

EDIT WAVEFORM: NUMBER=16 RANGE=2-16  
 STARTING PHASE ANGLE=0 0-359.5°  
 ENDING PHASE ANGLE=0 0-359.5°  
 VOLTAGE IN PERCENT=-100 (+/-)0-100%

WAVEFORM SYNTHESIS:	WAVEFORM #2				
HARMONIC:	2nd	3rd	4th	5th	6th
CONTENT:	.1%	0%	0%	0%	0%
ØANGLE:	0°	0°	0°	0°	0°

ØA CURRENT THD=17.8 % OHD=17.8 EHD=0.3%					
HARMONIC:	2nd	3rd	4th	5th	6th
CONTENT:	.1%	17.8%	0%	0%	0%
ØANGLE:	0°	0°	0°	0°	0°



## Function Key Provides Access to Special Functions

SETUP: PRESS 1 FOR PROGRAM SETUP  
 2 FOR WAVEFORM SETUP  
 3 FOR GENERAL SETUP  
 4 FOR CALIBRATION MENU

### Program Setup

- Copy a program.
- Delete a program.
- Erase all memory, reset CPU.

### Waveform Setup

- Edit a waveform.
- Copy a waveform.
- Waveform synthesis.

### General Setup

- UPC setup.
- LCD setup.
- UPC status.
- Power source status.
- Range control.
- Slew rate setup.

### Calibration Menu

- Execute externally referenced calibration.
- View calibration constants.

## Special Functions Accessed Through

- **Current Protect** Opens power source output when operator defines a current limit.
- **Sense** Establishes either local or remote sense for metering and control.
- **CSC** Continuous self calibration – provides for exceptional voltage regulation.
- **Program Z.** Programmable output impedance dynamically compensates for cable and load losses. Can simulate a soft power grid.
- **Transition Time** Permits control of the transition time when changing programs.
- **Frequency Limits** Sets min and max programmable frequency limits.
- **Voltage Limits** Sets min and max programmable voltage limits.
- **Initial Voltage** Sets power on voltage as zero volts or last executed program.
- **Keyboard Lock** Enable/disable front panel controls.

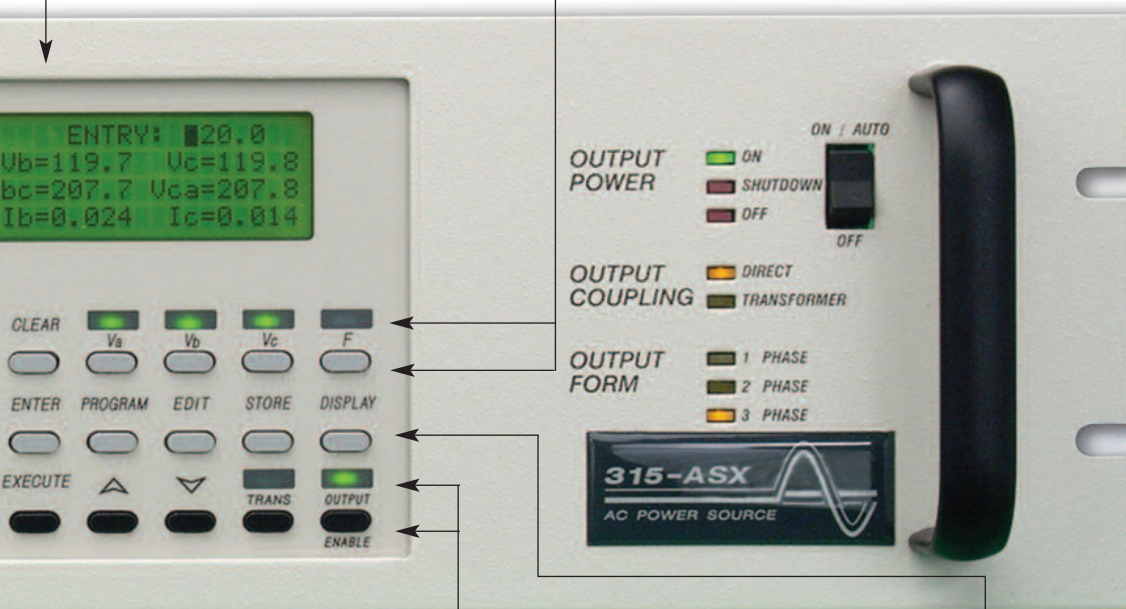
# Total Control, Metering, and Analysis of AC Power. Simple, Intuitive Operation.

## Informative 160 Character LCD Display

- Soft green backlight.
- Adjustable.

## Parameter Select Keys

Select phase voltages and operating frequency when manual control is desired. The selected parameter is indicated by the LCD display. The clear key erases entries and keeps erasing with repeated pressing until the basic V/I screen is displayed.




## High UPC Setup Menu

ed limits are exceeded.  
 CSC.  
 e accuracy.  
 ensates for output transformer or line distribution  
 ging the output voltage and frequency.  
 mits.  
 ed.

### Execute Key

Instantly executes a stored program that has been selected with the program key.

### Slew Keys

Smoothly change  the designated voltage or frequency parameters. Rates are separately programmable.

### Transient (Trans) Key

Turns time based or cycle based transients On or Off. Indicator is On when transient is executed.

### Output Enable Key

Turns the output contactor of the power source On or Off. Indicator is On when the contactor is closed.

### Enter Key

Stores new parameter data that has been keyed in.

### Program Key

Selects 1 of 99 programs for edit or execution.

### Edit Key

Selects the program edit mode and prompts for new entry.

### Store Key

Stores a program upon completion of editing.

### Display Key

Sequences through each metering screen:

- V/I Meter.
- Power Meter.
- AMPS Meter.
- Waveform Analysis (option).



# ASX Series – Power Sources

MODEL	RATED POWER (VA)	OUTPUT FORM <sup>(Note 2)</sup>	OUTPUT VOLTS MAX <sup>(Note 3)</sup> (V <sub>RMS</sub> )	OUTPUT AMPS MAX <sup>(Note 6)</sup> (A <sub>RMS</sub> )	OUTPUT AMPS <sup>(Note 4)</sup> (A <sub>PK</sub> )	OUTPUT MAGNETICS	INPUT POWER FORM <sup>(Note 5)</sup>	PANEL HEIGHT (IN. + U)	WEIGHT (LBS.)
115ASX	1,500	1Ø	132	16	35	INT.	1Ø 47 to 63 Hz	5¼-3U	65
120ASX	2,000	1Ø	150/300	20/14	90/45	N/A	1Ø 47 to 63 Hz	5¼-3U	75
140ASX	4,000	1Ø	135/270	32/16	90/45	EXT.	3Ø 47 to 63 Hz	8¾-5U	120
315ASX	1,500	1Ø 3Ø	132/264 132 V <sub>L-N</sub>	12/6 4/Ø	69/23 23/Ø	INT.	1Ø 47 to 63 Hz	5¼-3U	75
320ASX	2,000	1Ø 3Ø	150/300 150 V <sub>L-N</sub>	20/12 7/Ø	69/23 23/Ø	N/A	1Ø 47 to 63 Hz	5¼-3U	85
345ASX	4,500	1Ø 3Ø	135/270 135 V <sub>L-N</sub>	36/12 12/Ø	100/40 40/Ø	EXT.	3Ø 47 to 63 Hz	8¾-5U	145
360ASX	6,000	1Ø 3Ø	132/264 132 V <sub>L-N</sub>	48/16 16/Ø	120/45 45/Ø	EXT.	3Ø 47 to 63 Hz	8¾-5U	145
3120ASX	12,000	1Ø 3Ø	135/270 135 V <sub>L-N</sub>	96/48 32/Ø	300/100 100/Ø	EXT.	3Ø 47 to 63 Hz	15¾-9U	215

## Notes:

- Rated output power is based on a combination of output voltage, current and load power factor. Values stated represent the maximum capabilities of a given model. Consult factory for assistance in determining specific unit capabilities as they might apply to your application.
- All single phase output units (Model 115 ASX excepted) are operable with dual voltage ranges as listed. Three phase units are operable as single phase with dual voltage range capability or as three phase. Output voltage ranges and 1Ø/3Ø conversions are selected by front panel or bus commands.
- Output voltage ranges listed are for standard units. VMAX is output voltage with nominal input and full rated load applied. Other voltage ranges are available with the output magnetics options below.
- Peak Repetitive Pulse Current.
- Single phase input: 100, 110, 120, 208, 220 and 240 VAC ±10%. Three phase input: 208, 220, 240, 380 and 416 VAC ± 10%. (480 V input and 400 Hz input are each available as a cost option.)
- Available current will vary with output voltage and power factor.

## Power Source Specifications

(V<sub>out</sub> > 25% F.S.)

<b>Output Frequency</b>	15 to 1,200 Hz. Full Power.
<b>Line Regulation</b>	0.1% max for a ±10% line change.
<b>Load Regulation</b> (Typ. 3 phase direct coupled)	0.25% 15 to 400 Hz. 0.50% 400 to 1,200 Hz. Improves to less than 0.1% with external sense and CSC enabled.
<b>Output Distortion</b>	0.25% THD <sub>AVG</sub> 15 to 200 Hz. 0.50% THD <sub>AVG</sub> 200 to 1,200 Hz.
<b>Ripple and Noise</b>	-66 dB
<b>Response Time</b>	60 microseconds typical, 10-90% load step.

## Mechanical Specifications

	All models are designed for operation in 19-inch equipment racks. Models 4 kVA and higher have side handles for ease of handling.
<b>Mounting</b>	Standard 19-inch rack. Slide rails are available as an option for all models.
<b>Height</b>	See model table above for panel height.
<b>Depth</b>	Approximately 24-inch, from the front panel to the rear of the chassis.
<b>Cooling</b>	Front or side forced air intake with rear exhaust. Automatic Fan Speed Control for low acoustic noise and extended fan life.

## Dual Range Output Magnetism Options

ASX Series Power Sources can be equipped with output transformers to provide an alternate output voltage range. Selection of direct or transformer coupled range is performed by the controller via front panel or bus command. The standard frequency range for transformer coupled outputs is 45 to 1,200 Hz. Standard output ratios are 1.5:1, 2.0:1, and 2.5:1. Transformer outputs are supplied internally or externally via a Magnetism Module as listed in the above table. Consult the factory for additional information regarding special output ranges not listed above.

# UPC Series Controller Specifications

The standard UPC Controllers offered with the ASX-Series Power Sources are the UPC-1M, UPC-3M, UPC-1, and UPC-3. The UPC Controller is a modular component of the ASX Series and is available in four configurations ranging from 1 Phase to 3 Phase and Manual Control to Programmable Control. The table below lists each model according to key features.

All UPC Controllers include precise metering functions with data displayed via a 160 character LCD display. This, along with the 30-key front panel, provides the industry's most powerful and user-friendly controller.

The UPC-1 and UPC-3 controllers are available with either the RS-232 or GPIB remote interface. Commands are structured in accordance with SCPI (Standard Commands for Programmable Instruments). The RS-232 serial port operates up to 38.4 Bps. The GPIB interface is compatible with the IEEE-488.2.

CONTROLLER MODEL	OUTPUT MODES	WAVEFORM LIBRARY	TRANSIENT FUNCTIONS	PROGRAM LIBRARY	PROG. I LIMIT	PHASE ANGLE	CSC <sup>(1)</sup>	REMOTE INTERFACE	WAVEFORM SYNTHESIS/ ANALYSIS	PROG. OUTPUT IMPEDANCE
UPC - 1M	1Ø	Sine	NO	NO	NO	N/A	YES	NO	NO	NO
UPC - 3M	1Ø & 3Ø	Sine	NO	NO	NO	Fixed ØB = 120° ØC = 240°	YES	NO	NO	NO
UPC - 1	1Ø	Sine + 21 Editable	YES	99 Programs	YES	N/A	YES	RS-232, std. or GPIB, opt.	OPTIONAL	OPTIONAL
UPC - 3	1Ø & 3Ø	Sine + 21 Editable	YES	99 Programs	YES	Prog. 0 to 360°	YES	RS-232, std. or GPIB, opt.	OPTIONAL	OPTIONAL

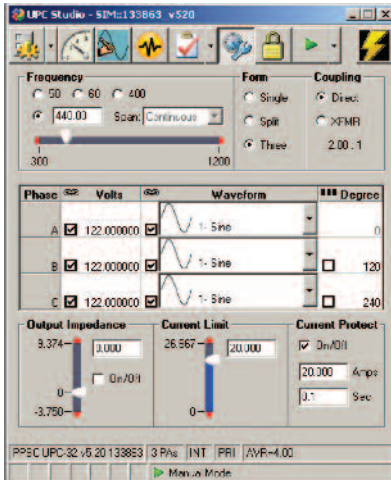
1. CSC refers to Continuous Self Calibration.

<b>Frequency</b>	<b>Range</b>	15 to 1,200 Hz.	<b>Output Voltmeter</b>	The Output Voltmeter is true RMS reading and each phase is measured independently. Line to neutral and line to line voltages are displayed.
	<b>Resolution</b>	4 significant digits, e.g. 50.00, 400.0, etc.	<b>Range</b>	0–354 VAC <sub>L-N</sub> , 0–708 VAC <sub>L-L</sub> .
	<b>Accuracy</b>	±0.01%, 15 to 1,200 Hz.	<b>Resolution</b>	0.1 VAC to front panel, 0.001 VAC to remote interface.
<b>Voltage</b>	<b>Range</b>	0 to V <sub>MAX</sub> in 0.1 VAC steps.	<b>Accuracy</b>	±0.2% of range + cal. ref.
	<b>Accuracy</b>	Executive voltage is within ±50 mVAC (0.05%) of command voltage referenced to the internal voltmeter with CSC engaged.	<b>Output Ammeter</b>	Output Ammeter is true RMS reading and each phase is measured independently. RMS and peak currents along with crest factor are displayed.
<b>Programmable Output Impedance</b>	Dynamic output impedance (Z <sub>o</sub> ) is programmable, ± Z <sub>o,MAX</sub> in 0.1% steps. Z <sub>o</sub> value in milliohms and range varies with the different models but usually results in a ±10% change in output voltage at maximum rated load current. (Optional on UPC-1, UPC-3).		<b>Range</b>	300% of system current rating.
<b>Phase Angle</b>	Phase Separation of Phases B and C are programmable 0° to 360° relative to phase A on the UPC-3 controller. Phase separation is fixed at 120° and 240°, respectively, on the UPC-3M controller.		<b>Resolution</b>	0.01 A <sub>AC</sub> to front panel, 0.001 A <sub>AC</sub> to remote interface.
<b>Programmable Current Limit</b>	Programmable Current Limit is provided on the UPC-1 and the UPC-3 controllers. Programmable range is from 0 to I <sub>PEAK,MAX</sub> of the power source.  Accuracy is ±3.0%, F.S.  Resolution is ±0.05%.		<b>Accuracy</b>	±0.2% of range + cal ref.
<b>Waveform Library</b>	The UPC-1 and UPC-3 controllers contain waveform libraries which store 22 executable waveforms in Non-Volatile RAM. Waveforms are editable via the front panel or bus command.		<b>Power</b>	Measures True Power (kW), Apparent Power (kVA) and power factor.
<b>Waveform Synthesis</b>	Provides waveform creation by entering the magnitude (% of fundamental) and phase angle for the 2 <sup>nd</sup> through the 51 <sup>st</sup> harmonics. (optional UPC-1 and UPC-3).		<b>Range</b>	Based on ammeter.
<b>Waveform Analysis</b>	Reports voltage and waveform harmonic content as a percentage of the fundamental and phase angle for the 2 <sup>nd</sup> through the 51 <sup>st</sup> harmonics. Harmonic distortion (THD, EHD, and OHD) displayed in percentage. (optional on the UPC-1 and UPC-3).		<b>Resolution</b>	1.0 watts or VA to front panel. 1.0 watts or VA to remote interface.
			<b>Power Factor</b>	Calculated and displayed to three significant digits.
			<b>Crest Factor</b>	Calculated and displayed to three significant digits.
			<b>External Inputs</b>	Each phase is algebraically summed with UPC waveform and amplified 25× to the direct coupled output.
			<b>Am Inputs</b>	±10 VDC input for each phase modulates the output voltage ±100%.
			<b>Sync Outputs</b>	TTL signals are provided to synchronize external test equipment to the power source output.  1. Zero Crossing, Phase A.  2. Transient Pedestal – gate signal which is true during the entire transient event.  3. DRM – High-speed clock that is a multiple of the fundamental output frequency used to synchronize sub-cycle events.

# Simplify and Automate

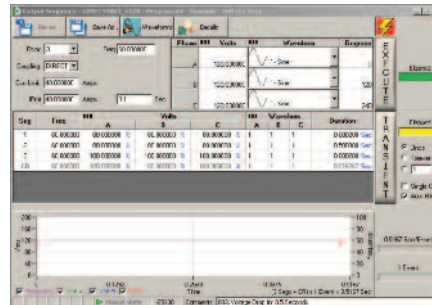
UPC Studio makes it easy and convenient to take full advantage of the advanced features installed in your Pacific AC Power Source. Whether it's a quick test at a new voltage, frequency or waveform using your 3060-MS, or the application of a new power line disturbance test using your AMX Series-based test system, UPC Studio is the answer.

## Easy-To-Use UPC Studio Control Panel



UPC Studio provides quick and easy control over the basic functions of a Pacific Power AC Power Source. Presets for 50, 60 and 400 Hz are provided for most common applications. Form, Coupling, Current Limit, Voltage and Waveforms are all easily accessed from this single easy-to-use soft panel.

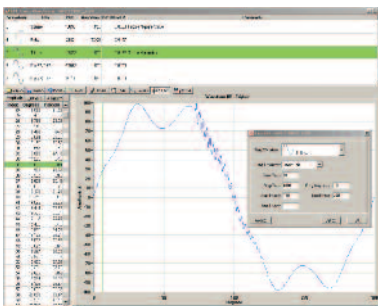
## Write, Evaluate and Execute Output Sequences from a Single Window



UPC Studio's Output Sequence Editor provides a comprehensive view of all Power Source Output parameters. Steady State conditions, waveforms and associated transients are displayed. Transient

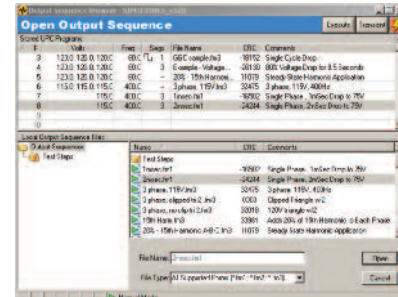
values are entered as discrete values or a percentage from nominal with transient timing stated in seconds or cycles. Output graph shows envelope results of selected output transient.

## Enhanced Waveform Editor



UPC Studio's Waveform Editor allows you to view all waveforms stored on your PC or within your UPC. With the Waveform Editor almost any waveform may be produced. Import waveforms captured on external instruments, Freehand draw, enter harmonic and phase angle content, create ringwaves, random noise, clipping and other custom waveshapes.

## Browse Output Sequences



UPC Studio's Output Sequence Browser provides the ability to easily view and transfer annotated Output Sequences (programs) between the UPC Controller and the host computer.

# The Leader in Power Technology

As a privately held, leading manufacturer of high-quality AC Power Conversion Equipment, Pacific Power Source, Inc. offers standard catalog products that range in power from 500 VA to >625 kVA. Low-power products include line conditioners, frequency converters and Programmable AC Power Sources. High-power systems include programmable power test equipment, power line conditioners, frequency converters and uninterruptible AC Power Sources.

Founded in 1971, the Irvine, California, company was an early pioneer in the development of linear solid-state power conversion for use in high-reliability applications. The company now manufactures both advanced linear and broadband switching types of AC Power Sources.

## For Application Engineering Assistance

Contact the factory directly



17692 Fitch, Irvine, CA 92614 USA

Call direct: +1 949-251-1800 • Fax: +1 949-756-0756

US: 800-854-2433

E-mail: sales@pacificpower.com • www.pacificpower.com

Consult your local PPS Representative