ASX Series

**AC Power Sources
1 - 12 kVA
1 / 3 Phase**

**Manual or
Programmable
Control**

PACIFIC
POWER SOURCE

ASX SERIES AC POWER SOURCES

ASX Series equipment is Pacific's latest addition to its SMARTSOURCE™ line of AC Power Sources. 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 singe 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 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
- 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. RS232 Interface is standard. IEEE 488 interface is optional.

PROGRAMMABLE OUTPUT IMPEDANCE (OPTIONAL)

This feature creates positive, negative, or zero output impedance (Z_0).
- Compensates for line distribution or transformer losses.
- Simulates a soft power line for product testing.

Compensation range is ±10% of the output voltage.

Oscillograph of voltage and current waveform at load due to distribution losses. THD=6.6%
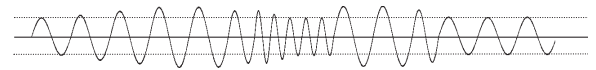
Same conditions with programmable Z_0 engaged. THD=0.25%
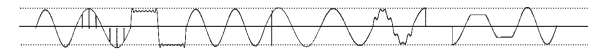
TRANSIENT GENERATION

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.

TIME BASED TRANSIENTS

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.
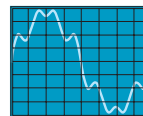

CYCLE BASED TRANSIENTS

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.


```
EDIT WAVEFORM: NUMBER=16    RANGE=2-22
STARTING PHASE ANGLE=0      0-359.5°
ENDING PHASE ANGLE=0        0-359.5°
VOLTAGE IN PERCENT=-100     (+/-)0-100%
```
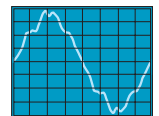
WAVEFORM EDIT
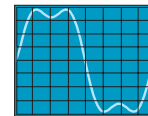
WAVEFORM LIBRARY

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.

THD=8.7%   THD=22.2%   THD=18.1%

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 51ST. Additionally, waveforms can be created by downloading from a host PC.


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

WAVEFORM SYNTHESIS

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 51ST harmonic. Amplitude and phase are reported to the local display. The LabVIEW™ instrument driver displays numeric values as well as a graphic summary of the harmonic spectrum.
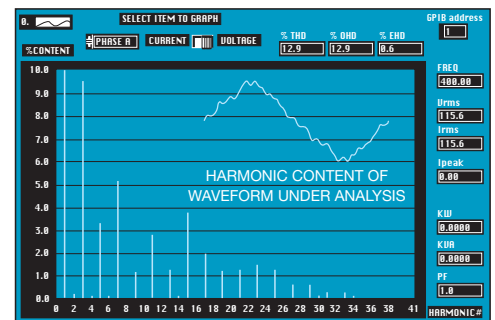
HARMONIC CONTENT OF METERED WAVEFORM

3

METERING

WAVEFORM CONTROL/ANALYSIS

```
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
```

```
EDIT WAVEFORM: NUMBER=16        RANGE=2-22
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 UPC SETUP MENU

- **SENSE** — Establishes either local or external sense for metering and CSC.

- **CSC** — Continuous Self Calibration – provides for exceptional voltage accuracy.

- **PROGRAM Z。** — Programmable output impedance dynamically compensates for output transformer or line distribution losses. Can simulate a soft power grid.

- **TRANSITION TIME** — Permits control of the transition time when changing the output voltage and frequency.

- **FREQUENCY LIMITS** — Sets min and max programmable frequency limits.

- **VOLTAGE LIMITS** — Sets min and max programmable voltage limits.

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 VI screen is displayed.

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:
- VI Meter
- Power Meter
- AMPS Meter
- Waveform Analysis (option)

ASX SERIES – POWER SOURCES

MODEL	RATED POWER (VA)	OUTPUT FORM[1]	OUTPUT VOLTS MAX[2] (V_{RMS})	OUTPUT AMPS MAX[5] (A_{RMS})	OUTPUT AMPS[3] (A_{PK})	OUTPUT MAGNETICS	INPUT POWER FORM[4]	PANEL HEIGHT (IN.)	WEIGHT (LBS.)
115ASX	1,500	1Ø	132	16	35	INT.	1Ø 47 to 440 Hz	5 1/4	65
120ASX	2,000	1Ø	150/300	20/14	90/45	N/A	1Ø 47 to 63 Hz	5 1/4	75
140ASX	4,000	1Ø	135/270	32/16	90/45	EXT.	3Ø 47 to 440 Hz	8 3/4	120
315ASX	1,500	1Ø 3Ø	132/264 132 V_{L-N}	12/6 4/0	69/23 23/0	INT.	1Ø 47 to 440 Hz	5 1/4	75
320ASX	2,000	1Ø 3Ø	150/300 150 V_{L-N}	20/12 7/0	69/23 23/0	N/A	1Ø 47 to 63 Hz	5 1/4	85
345ASX	4,500	1Ø 3Ø	135/270 135 V_{L-N}	36/12 12/0	100/40 40/0	EXT.	3Ø 47 to 440 Hz	8 3/4	125
360ASX	6,000	1Ø 3Ø	132/264 132 V_{L-N}	48/16 16/0	120/45 45/0	EXT.	3Ø 47 to 440 Hz	8 3/4	125
3120ASX	12,000	1Ø 3Ø	135/270 135 V_{L-N}	96/48 32/0	300/100 100/0	EXT.	3Ø 47 to 440 Hz	15 3/4	185

Notes:

1. 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.

2. Output voltage ranges listed are for standard units. V_{MAX} is output voltage with nominal input and full rated load applied. Other voltage ranges are available with the output magnetics options below.

3. Peak Repetitive Pulse Current.

4. Single phase input: 100, 110, 120, 208, 220 and 240 VAC ±10%. Three phase input: 208,220,240,380,416 and 480 VAC ± 10%. (480 V input and 400 Hz input are each available as a cost option.)

5. Current may vary with Power Factor.

POWER SOURCE SPECIFICATIONS

OUTPUT FREQUENCY: 15 to 1,200 Hz. Full Power

LINE REGULATION: 0.1% max for a ±10% line change.

LOAD REGULATION: 0.25% 15 to 400 Hz.
0.50% 400 to 1,200 Hz.
With external sense enabled.
Improves to less than 0.1% with external sense and CSC enabled.

OUTPUT DISTORTION: 0.25% THD   15 to 200 Hz.
0.50% THD   200 to 1,200 Hz.

RIPPLE AND NOISE: -66 dB

RESPONSE TIME: 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.

MOUNTING: Standard 19 inch rack. Slide rails are available as an option for all models.

HEIGHT: See model table above for panel height.

DEPTH: Approximately 24 inch, from the front panel to the rear of the chassis.

COOLING: Front or side forced air intake with rear exhaust. Automatic Fan Speed Control for low acoustic noise and extended fan life.

DUAL RANGE OUTPUT MAGNETICS 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 Magnetics 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 latest additions to Pacific's SMARTSOURCE™ family of UPC Controllers 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[1]	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

FREQUENCY:

Range: 15 to 1,200 Hz

Resolution: 4 significant digits, eg. 50.00, 400.0, etc.

Accuracy: ±0.01%, 15 to 1,200 Hz

VOLTAGE:

Range: 0 to V_{MAX} in 0.1 VAC steps

Accuracy: Executive voltage is within ±50 mVAC (0.05%) of command voltage referenced to the internal voltmeter with CSC engaged.

PROGRAMMABLE OUTPUT IMPEDANCE:

Dynamic output impedance (Z_o) is programmable, ± $Z_{o, MAX}$ in 0.1% steps. Z_o 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)

PHASE ANGLE:

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.

PROGRAMMABLE CURRENT LIMIT:

Programmable Current limit is provided on the UPC-1 and the UPC-3 controllers. Programmable range is from 0 to $I_{PEAK, MAX}$ of the power source.

Accuracy is ± 3.0%

Resolution is ± 0.05%

WAVEFORM LIBRARY:

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.

WAVEFORM SYNTHESIS:

Provides waveform creation by entering the magnitude (% of fundamental) and phase angle for the 2ND through the 51ST harmonics. (optional UPC-1 and UPC-3)

WAVEFORM ANALYSIS:

Reports voltage and waveform harmonic content as a % of the fundamental and phase angle for the 2ND through the 51ST harmonics. Harmonic distortion (THD, EHD, and OHD) displayed in %. (optional on the UPC-1 and UPC-3)

OUTPUT VOLTMETER:

The Output Voltmeter is true RMS reading and each phase is measured independently. Line to neutral and line to line voltages are displayed.

Range: 0-354 VAC_{L-N}, 0-708 VAC_{L-L}.

Resolution: 0.1 VAC to front panel, 0.001 VAC to remote interface.

Accuracy: ±0.2% of range + cal. ref.

OUTPUT AMMETER:

Output Ammeter is true RMS reading and each phase is measured independently. RMS and peak currents along with Crest factor are displayed.

Range: 300% of system current rating.

Resolution: 0.01 A_{AC} to front panel, 0.001 A_{AC} to remote interface.

Accuracy: ±0.2% of range + cal ref.

POWER:

Measures True Power (kW), Apparent Power (kVA) and power factor.

Range: Based on ammeter.

Resolution: 1.0 watts or VA to front panel. 1.0 watts or VA to remote interface.

POWER FACTOR: Calculated and displayed to three significant digits.

CREST FACTOR: Calculated and displayed to three significant digits.

EXTERNAL INPUTS: Each phase is algebraically summed with UPC waveform and amplified 25x to the direct coupled output.

AM INPUTS: ±10 VDC input for each phase modulates the output voltage ±100%.

SYNC OUTPUTS: 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 which is a multiple of the fundamental output frequency used to synchronize sub-cycle events.

EXPANDING THE AC POWER SOURCE INTO AN AUTOMATED TEST SYSTEM

Pacific's line of **SMARTSOURCE**™ AC Power Sources enable the engineer to simply automate his testing by using Lab VIEW for Windows™ or LabWindows™. An extensive list of Virtual Instruments (VIs) are offered for Pacific's ASX Series Power Sources.

Harmonic Synthesis

This VI provides a graphical interface for synthesizing waveforms. The magnitude and phase angle is entered for each required harmonic. The VI screen updates in real time as each harmonic is entered. Adds insight and understanding that only this dynamic approach can offer.

Harmonic Analysis

This VI displays the harmonic spectrum (1st-51st) of any output voltage or current vector. Both graphical and empirical data are displayed.

Metered Waveform

This VI presents one cycle of the output voltage and current. Allows user to visually analyze input characteristics of the UUT. Also calculates and displays V_{RMS}, I_{RMS}, I_{PEAK}, Crest Factor, True Power (kW), Apparent Power (kVA) and Power Factor.

Waveform Library

This VI shows the **SMARTSOURCE**™ waveform library. Twenty-two standard and custom waveforms can be edited and selected for execution. Additional waveforms can easily be uploaded or downloaded from your hard drive to the library.

CALL FOR TECHNICAL AND APPLICATION ASSISTANCE

For Application Engineering Assistance

Contact the factory directly

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