AMX Series

SINGLE AND THREE PHASE AC POWER SOURCES

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500 VA
TO
12,000 VA

PACIFIC
POWER SOURCE

A **Thermo Voltek** Company

TAKE CONTROL OF YOUR AC TEST POWER

The AMX Series is a family of High Performance Linear AC power sources covering the power range from 500 VA to 12 kVA. The product line offers both single and three phase models. Units are conservatively designed and output power ratings are based on the most severe combination of input line, output voltage, power factor, and temperature. This approach to product design allows the AMX Series to excel when delivering the high peak load currents demanded in the AC test environment. Great emphasis has been placed on low acoustic noise, ease of installation, and maximum power per cubic inch of rack space. Control and operating features provide a high degree of application versatility and ease of use for the test engineer. Applications range from simple, manually controlled frequency conversion to harmonic testing and sophisticated bus programmable transient simulation.

An exceptionally broad bandwidth (50 kHz small signal) combined with peak/RMS current of 4-6:1 give the AMX Series the ability to produce high quality, low distortion output power into the most dynamic loads.

Pacific Model 308AMX with UPC Controller

KEY FEATURES PROVIDE APPLICATION VERSATILITY

- IEEE-488.2 or RS-232C with SCPI compatibility
- LabVIEW for Windows®/LabWindows® drivers
- Waveform Creation by Harmonic Synthesis
- Graphical Analysis (Voltage and Current)
- Harmonic Analysis (Voltage and Current)
- Metering of RMS and Peak Values
- Continuous Self Calibration (CSC)
- Line Sync Option
- 6:1 Peak Current Capability

- Low Impedance for IEC555 Testing
- Programmable Output Impedance
- Up to 0-300 VAC Direct Coupled Out
- 1 Phase / 3 Phase Switch Selectable
- 20-5000 Hz Full Power Bandwidth
- Power Levels from 500 VA to 12 kVA
- Externally Referenced Meter Calibration
- CE and ETL Mark available

DESIGN PROVIDES TOTAL CONTROL OF AC POWER

- All AMX Series power source models may be equipped with either a digitally programmable Oscillator/Controller (UPC type) or a manually controlled Oscillator (UMC type).

- Single phase power source models may be controlled to operate on either a 0-135 VAC range or a

0-270 VAC range. Three phase models are additionally switchable to 3ø/1ø output power form.

- Total control of the output power form and the selection of either the direct output or the optional transformer output is available from the front panel or the bus.

- All operating functions may be controlled from either the front panel or from a remote RS-232 or IEEE 488.2/ SCPI BUS. LabVIEW for Windows® and LabWindows® Instrument Drivers are available.

SPECIAL AMX SERIES OPERATING FEATURES

CONTINUOUS SELF CALIBRATION

Provides for exceptional accuracy of the AC output Voltage. When enabled, accuracy improves to ±0.03% referenced to the power source internal voltmeter.

PROGRAMMABLE DYNAMIC OUTPUT IMPEDANCE (OPTIONAL)

Provides positive or negative output impedance. The output voltage waveform at the right is flattened as a result of a high peak load current drawn by an electronic load at the peak of the sinewave.

Engaging the dynamic output impedance (Z°) feature dynamically compensates, as shown at the right, for the distribution or transformer losses up to ±10% of the output voltage.

WAVEFORM LIBRARY

Up to 99 different waveforms may be stored in the waveform library for execution as part of a steady state test program or for substitution in any output phase as part of a transient test program. Memory location #1 is a non-editable high resolution sine wave. Locations 2-16 are editable and may be substituted in any output phase. Locations 19-99 are factory stored, non editable waveforms that may be copied to 2-16 for edit and execute.

WAVEFORM LIBRARY

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WAVEFORM EDIT

Provides the ability to modify a stored waveform by specifying the waveform amplitude desired at each specific phase angle. This method can be used to quickly create spikes, dropouts, notches and other sub-cycle wave conditions. The resulting modified waveform can be stored for execution.

WAVEFORM ANALYSIS (OPTIONAL)

Provides both a graphic and numeric display of the harmonic structure of a voltage or current waveform. The waveform is sampled at 512 samples per cycle using a 12 bit A/D converter. The resulting high fidelity waveform is analyzed for its harmonic structure up through the 51st harmonic. Data presented includes the magnitude of each harmonic in %, the total harmonic distortion, and the odd and even harmonic distortion in %.

WAVEFORM SYNTHESIS (OPTIONAL)

Provides the ability to quickly create virtually any AC Test Waveform that may be required by building it out of harmonics. The process is as simple as keying in the harmonic multiple, the amplitude, and the phase angle for each desired harmonic up through the 51st. If desired, waveforms may also be created in the time domain by making entries from the front panel or by downloading from a host PC.

TIME BASED TRANSIENTS

Provide the ability to create and execute on command, transients that occur linearly over a specified time segment to modify output voltage or frequency.

CYCLE BASED TRANSIENTS

Provide the ability to create and execute, on command, transients that substitute a selected waveform in the output for 1 to 100 cycles. The waveform being substituted can be selected and/or modified from the waveform library. Substitution is for an integer number of cycles, regardless of frequency.
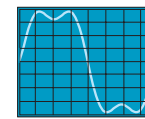

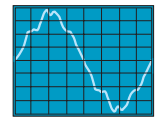Oscillograph of voltage and current waveform at load due to distribution losses. THD=6.6%

Same conditions with programmable Zo engaged. THD=0.25%
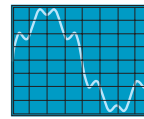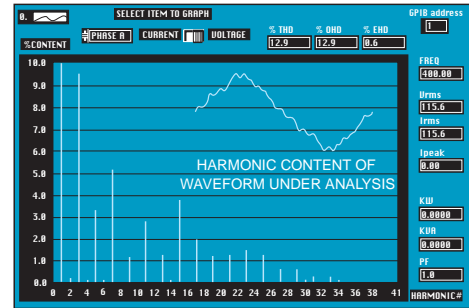

THD=8.7% THD=22.2% THD=18.1%


```
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%
```
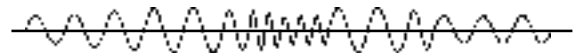
WAVEFORM EDIT

HARMONIC CONTENT OF


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

WaAVEFORM SYNTHESIS

TIME BASED TRANSIENTS

CYCLE BASED TRANSIENTS

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=2-22
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=17.8EHD=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.
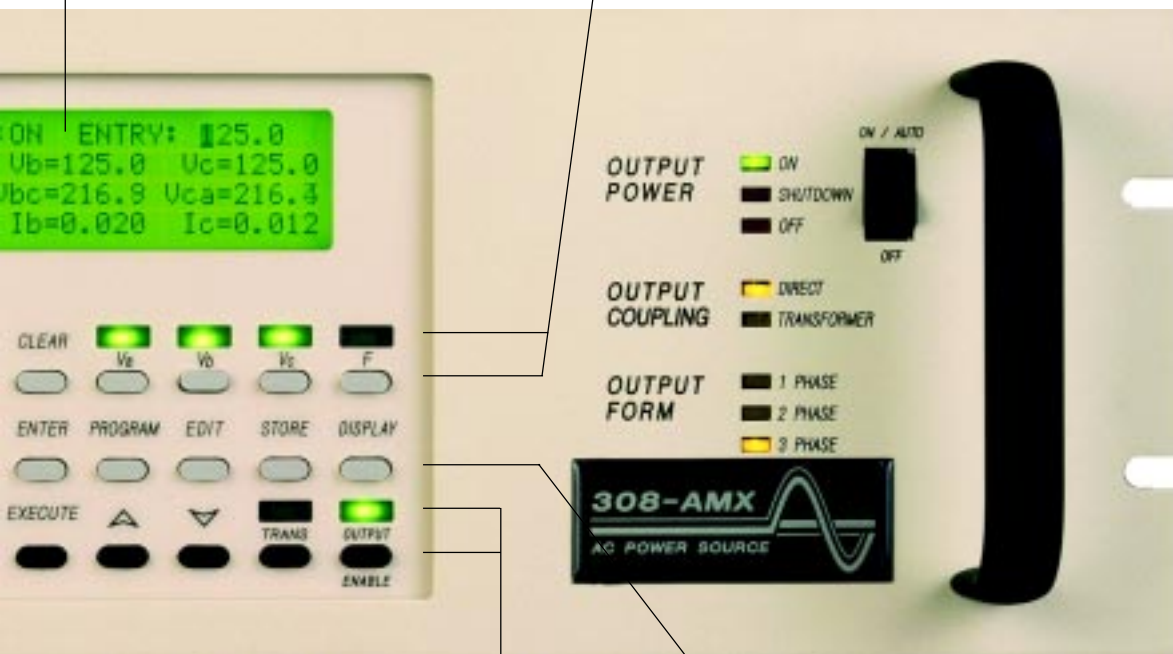
EXECUTE KEY
Instantly executes a stored program that has been selected with the program key.

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)

AMX POWER SOURCE MODELS

MODEL	RATED P0WER (VA)	OUTPUT VOLTS MAX (V_RMS) (Note 2)	OUTPUT FORM (Note 1)	OUTPUT AMPS (A_RMS) (Note 3)	OUTPUT AMPS (A_PK)	INPUT POWER FORM (Note 4)	PANEL HEIGHT (IN.)	WEIGHT (LBS.)
105AMX	500	1Ø	135/270	4/2	40/20	1Ø	5 1/4	65
108AMX	750	1Ø	135/270	6/3	40/20	1Ø	5 1/4	65
112AMX	1200	1Ø	150/300	10/5	40/20	1Ø	5 1/4	65
125AMX	2500	1Ø	150/300	20/10	90/45	3Ø	10 1/2	110
140AMX	4000	1Ø	135/270	32/16	140/70	3Ø	14	170
305AMX	500	3Ø	135/270 135 L-N	4/2 1.5/Ø	45/15 15/Ø	1Ø	5 1/4	65
308AMX	750	3Ø	135/270 135 L-N	6/2 2/Ø	45/15 15/Ø	1Ø	5 1/4	65
312AMX	1200	3Ø	150/300 150 L-N	10/3.3 3.3/Ø	45/15 15/Ø	1Ø	5 1/4	70
318AMX	1800	3Ø	135/270 135 L-N	15/5 5/Ø	60/20 20/Ø	3Ø	8 3/4	100
320AMX	2000	3Ø	135/270 135 L-N	18/6 6/Ø	60/20 20/Ø	3Ø	8 3/4	100
330AMX	3000	3Ø	135/270 135 L-N	24/12 8/Ø	150/50 50/Ø	3Ø	14	162
345AMX	4500	3Ø	135/270 135 L-N	36/12 12/Ø	165/55 55/Ø	3Ø	14	177
360AMX	6000	3Ø	135/270 135 L-N	48/16 16/Ø	210/70 70/Ø	3Ø	14	185
390AMX	9000	3Ø	135/270 135 L-N	72/24 24/Ø	330/110 110/Ø	3Ø	28 2 each x 14	175 x 2
3120AMX	12000	3Ø	135/270 135 L-N	96/32 32/Ø	420/140 140/Ø	3Ø	28 2 each x 14	185 x 2

Notes:
1. All single phase units are operable with dual voltage ranges as listed. All three phase units are operable as single phase with dual voltage range capability or as three phase. Output voltage ranges and 1f / 3f conversions are selected by front panel or bus command.
2. Output voltage ranges listed are for standard units. VMAX is achievable with nominal input voltage at full load. Other voltage ranges are available with the output magnetics option.
3. Current ratings at 125 VRMS output.
4. Input power frequency is 47-63 Hz. Single Phase: 100, 110, 120, 200, 208, 220, 230, 240, VAC ± 10%. Three phase: 208, 220, 240, 380, 416 VAC ± 10%.

POWER SOURCE SPECIFICATIONS

Output Frequency: 20 to 5000 Hz. Full Power

Line Regulation: 0.1% max for a 10% line change

Load Regulation: 0.25% 20 to 2000 Hz.
0.5% 2000 to 5000 Hz.
Can be improved to less than 0.03% with CSC engaged.

Output Distortion: 0.1% THD from 20 to 1000 Hz
0.25% THD from 1000 to 5000 Hz

Ripple and Noise: -72 dB

Response Time: 5μsec. typical to a step load change. Small signal band-width is 5 Hz. to 50 kHz, typical.

MECHANICAL SPECIFICATIONS

All models are designed for operation in 19 inch equipment racks. Models above 1800 VA 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: Will not exceed 24 inches from the front panel to the rear of the chassis, including connectors, handles and cabling.

Cooling: Forced air, front or side intakes, rear exhaust with auto fan speed control for low acoustic noise operation.

POWER SOURCE SPECIFICATIONS

AMX 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 5000 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. Consult the factory for additional information regarding special output ranges not listed.

UPC CONTROLLER SPECIFICATIONS

The UPC controller is essentially a 3f AC arbitrary waveform generator and Precision AC metering   system. Each waveform stored in the UPC is encoded with 12 bit amplitude and 10 bit time resolution for each cycle. The waveform for each phase may be independently selected and may be independently varied in amplitude and phase angle with respect to phase A.

The UPC output metering samples the output volts and amps at 512 samples per measurement using a 12 bit A/D converter. This technique provides exceptional metering accuracy and resolution (20 bits), and delivers a high-fidelity waveform back to a host computer for analysis.

The UPC includes a remote GPIB interface compatible with IEEE 488.2 and SCPI. An available option is an RS-232 serial port that operates up to 38.4 kBaud.

Frequency:	20.00 to 5000 Hz ±0.01%
Voltage: Direct	Programmable, 0-VMAX, in 0.1 volt steps (see table on page 6)
Voltage: Transformer	Multi-range units are equipped with output transformers. When alternate range is selected, voltage at transformer output is programmable in steps of 0.5 volts.
Accuracy: Command Voltage	Executive voltage is within ±50 mv (0.03%) of command voltage, referenced to the internal voltmeter with CSC engaged.
Accuracy:	± 0.01%, 20-5000 Hz
Output Zo: (Optional)	Dynamic output impedance (Zo) is programmable, 0 to ± Zo max. in 0.1% steps. Zo value in milliohms varies with different models but usually results in a ± 10% change in output voltage at maximum load amps.
Phase: Angle	Phase Angle (f) of Phases B and C relative to Phase A is programmable from 0-359° in 1° increments ± 0.5°.
Current: Limit	Current limit is programmable from 0 to Ipeak maximum of the power source. Accuracy is ± 1%, resolution ± 0.05%.
Library: Steady State Programs	Stores up to 99 steady state parameter sets consisting of waveform, voltage, frequency, f angle and current limit. Can be executed by program number from the front panel or the bus.
Library: Transient Programs	Stores up to 99 transient programs - one associated with each steady state program. Allows for changes in volts and frequency vs. time, or waveform changes by cycle count.
Library: Waveform	Stores up to 99 waveforms that can be edited and executed in any manner and in any output phase.

Voltmeter:	Range -	0-354 volts L-N 0-708 volts L-L
	Resolution -	0.10VAC to front panel 0.001VAC to remote interface
	Accuracy -	± 0.25% of reading ± 0.1% of range (50-500Hz)
Ammeter:	Range -	300% of system current rating
	Resolution -	0.01AAC to front panel 0.001AAC to remote interface
	Accuracy -	± 0.25% of reading ± 0.1% of range (50-500Hz)
Power Meter:	Range -	Based on ammeter range
	Resolution -	1.0 watts or VA to front panel 0.001 Watts or VA to remote interface
	Accuracy -	± 1% of Full Scale

Power Factor: & Crest Factor	Calculated and displayed to three significant digits.
Ext. Input:	Each phase is algebraically summed with UPC waveform and amplified 25X to the direct output.
Amplitude: Mod. Input	±10 volt input for each phase modulates the output ± 100%
Sync Outputs:	1) Zero crossing, Phase A 2) Transient start-stop 3) True when Transient is enabled 4) Clock - 1024 times the output freq.
Command: Response Time	Average time to start of parameter change from bus command (end of string character) is 50 ms. Ramp transition time to final value is settable from 250 μs to 300 sec.
Waveform : Synthesis	Permits waveform creation by entering % amplitude and phase angle for the 2nd through the 51st harmonics.
Waveform: Analysis	Reports voltage and current waveform harmonic content in % and phase angle for the 2nd through the 51st harmonics. Displays THD, OHD, EHD in %.

MANUAL CONTROL OF AC POWER

Provide easy manual control with Pacific's UMC-31 Manual AC Power Controller.

UMC-31 Manual Controller

The UMC-31 provides operational control and high quality oscillator signals for both single and three phase Power Sources.

- Obtain precision frequency and phase conversion for manufacturing and test.
- Provide high quality, general purpose lab power where test versatility is required.
- Achieve low cost and power form flexibility for power supply tests.

SPECIFICATIONS UMC-31 CONTROLLER

Phase: Select single, split, or three phase operation by internal jumper. Phase angles are fixed at 120° and 240° for three phase operation.

Frequency: Select 50, 60, or 400 Hz fixed or a variable frequency mode of 45 to 500 Hz.

Voltage: 0-VMAX via 10 turn potentiometer on the front panel.

Metering: Autoranging Volts, Amps, and Frequency.

For additional data sheets or technical application assistance, please call or fax Pacific Power Source, attn.: Sales Department.

Authorized Representative