

# AC SOURCE 330/360/390

**combinova**



## PROGRAMMABLE AC POWER SOURCE MODELS 330/360/390

The global AC power testing requirements demand a more sophisticated AC Power Source capable of simulating a wide variety of AC line conditions together with accurate power measurements and analysis. The Combinova AC SOURCE 330/360/390 series deliver the right solution for simulation of all kinds of normal/abnormal input conditions and at the same time measure critical characteristics of the product under test.

AC SOURCES 330/360/390 can be used at maximum rated power for any output voltages up to 500VAC (360) and at any frequency between 15 and 2000Hz (330). They are suitable for commercial applications (45-65Hz), for avionic, marine and military applications at 400Hz or higher. Other applications include electric motor and air conditioner measurements. All models generate very clean sine or square waveforms with a typical distortion of less than 0.5%.

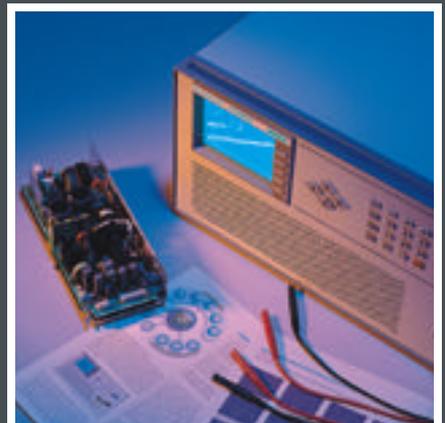
AC SOURCES 330/360/390 have built-in Direct Digital Synthesis enabling them to generate, in real time, complex waveforms and conditions.

Built-in 16-bit precision measurement circuitry offers high speed measurements. The instruments are also designed to be an integral part of the Combinova Power Measurement System. By adding the ANALYZER 300 Power Analyzer, it becomes a complete system for IEC 1000-3-2 harmonics and IEC 1000-3-3 flicker testing.

AC SOURCES 330/360/390 are very easy to operate from the front panel keypad or by remote control using the GPIB, RS-232 or APG (Analog Programming) interfaces.

### Key Features:

- Output Ratings:
  - Power:
    - 3000VA, 1 $\Phi$  (330)
    - 6000VA, 1 $\Phi$  (360)
    - 9000VA, 1 $\Phi$  or 3 $\Phi$  (390)
  - Voltage:
    - 0-150V/0-300V/Auto (330)
    - 0-150V/0-300V (parallel 360)
    - 0-300V/0-500V (series 360)
    - 0-150V/0-300V (390)
- Programmable Sine, Square or Clipped Sine waveform output.
- Programmable voltage, current limit, frequency, phase and distortion.
- Power line disturbances simulation capability.
- 30 factory installed harmonic waveforms.
- User programmable sequential output waveforms for auto-execution.
- Powerful measurement of VRMS, IRMS, Ipk+, Ipk-, power, frequency, crest factor, power factor, inrush current, VA, VAR.
- Built-in power factor correction circuit provides input power factor of over 0.98 to meet IEC regulations.
- Supported by Analyzer 300.
- Temperature controlled fan.
- Built-in isolation relays.
- User definable power-on state.
- Analog Programming Interface for ATE applications.
- GPIB and RS-232 interfaces.
- National Instrument LabView™ drivers available.
- List mode transient power line disturbances simulation for Voltage dips & Variations to meet parts of IEC 1000-4-11.



# AC SOURCE 330/360/390

AC SOURCE 330, AC SOURCE 360 and AC SOURCE 390 are members of a new generation of AC power sources offering outstanding performance. The use of solid-state output stages not only makes the classical transformer-based design obsolete but also eliminates many of the penalties such as weight and stability.

## 1. Advanced PWM Technology

The input AC to DC stage in the AC Source incorporates modern power factor correction circuits to increase the input power factor to more than 0.98. This meets current IEC regulations, reduces input current requirements and raises efficiency to over 80%. Using the isolation provided by the DC to DC stage, the final DC to AC output stage eliminates the large output transformer used in more conventional designs, reducing the weight to less than 30kgs. The AC SOURCE 330, packaged in a 222mm height rack mountable unit, delivers its full 3000VA output at both 110VAC or 220VAC.

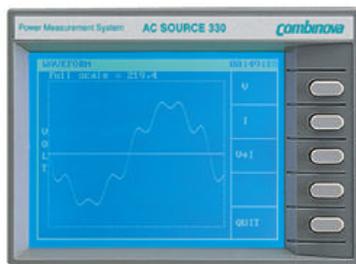
## 2. State-of-the-art DDS Waveform Generator

The Combinova AC SOURCE 330/360/390 series has a built-in powerful Direct Digital Synthesis (DDS) waveform generator to provide low distortion (0.5%) sine or square waveforms over a maximum frequency range of 15 - 2000Hz. The DDS technology makes it possible to create special output signal cases. For example, a clipped sine wave with 0 to 43% distortion and 0 to 100% amplitude can easily be produced using the front panel.

## 3. Comprehensive Waveform Library

Up to 30 different distortion waveforms including line conditioner, line filter, triangle wave, pulse wave, peak spike, etc., are stored in the waveform library. Waveforms can be previewed on the display and edited by specifying the amplitude for each specific phase angle.

Testing for compliance to AC line harmonic immunity standards can easily be achieved.



Sine waves with harmonic contents specified by IEC 1000 standards can be recalled, downloaded into memory and then generated as needed.

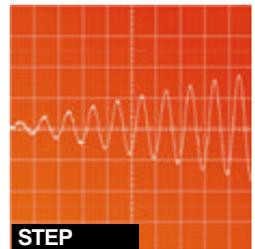
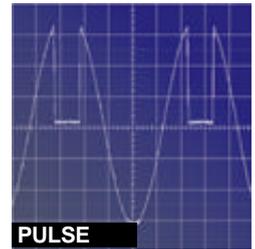
AC SOURCES 330/360/390 also offer six user-defined arbitrary waveform buffers. Waveforms can be created on a host PC and downloaded to the instrument using the GPIB or RS-232 interface.



AC SOURCE 360 - 6kVA

## 4. Power Line Disturbance Simulation

AC SOURCES 330/360/390 provide powerful tools for simulation of power line disturbance conditions. The Step and Pulse modes offer an easy method of producing single step or continuous output changes. The output voltage amplitude, frequency, phase angle and waveform shape can be controlled in response to triggers generated from an internal or external source. By using these modes, power line disturbances such as cycle drop-outs, transients, brown-outs and ramps can be simulated for testing a unit's behavior when being switched on at a 90 degree phase angle or during input transients.



The List mode is another powerful tool for generation of more complex waveforms. Up to 40 sequences of output settings can be executed in response to a trigger or paced by programmed dwell time without computer intervention. Output triggers can be generated at the beginning and end of each List loop to synchronize external events and to simulate power line disturbances for Voltage Dip and Variations according to IEC 1000-4-11 (within AC source specifications).

## 5. Powerful Measurement

AC SOURCES 330/360/390 have built-in 16 bit precision measurement circuitry to measure steady and transient states of true RMS voltage, true RMS current, true power, power factor, frequency, peak repetitive current, inrush current, current crest factor, apparent power and reactive power. Each can also show the measured voltage and current as a wave form on the display for transient state analysis without the need of a scope.

## 6. Versatile Operation

AC SOURCES 330/360/390 are easy to operate using the instrument front panel or by remote control. The printer interface can also be used for printing instrument conditions or measurement readings. For remote control applications, the GPIB, RS-232 or Analog Programming interfaces can be used.

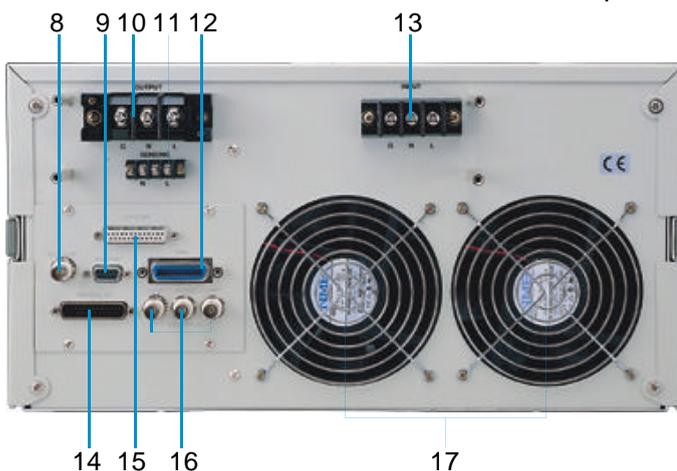
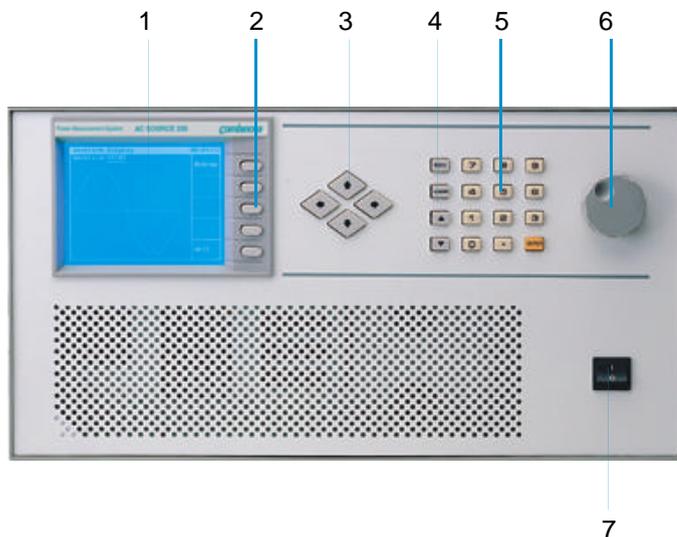
The instrument is suitable for all kinds of installations. The temperature controlled fans provide ample cooling for the most demanding industry applications but are also quiet enough for low power office use. The large display is easy to read, making editing and every day operation comfortable. Soft-keys makes the instrument intuitive to use and minimizes front panel cluttering. A rotary knob can be used to adjust almost every parameter for maximum convenience.

## 7. IEC 1000 Compliance Testing

The AC Sources are designed to be an integral part of the Power Measurement System series. By adding the Combinova ANALYZER 300 Power Analyzer, it becomes a complete system for Voltage and Current Harmonics compliance testing according to IEC 555-2, EN60555-2, IEC 1000-3-2 and Flicker (voltage fluctuations) compliance testing according to the IEC 555-3, EN60555-3 and IEC 1000-3-3 international standards.



AC SOURCE 330 and ANALYZER 300



## 8. Self Diagnosis and Protection

AC SOURCES 330/360/390 have built-in self diagnosis to calibrate and monitor its performance and assist in trouble shooting of field failure. It is protected against over voltage, over load, over current, over power, over temperature, etc., to guarantee quality and performance of the instrument for all kinds of applications in R&D, QA, Production and field services.



AC SOURCE 390 - 9kVA

### Front Panel

- 1. Display**  
320x240 graphic LCD display
- 2. Softkeys**  
Context sensitive function keys
- 3. Cursor Keys**  
Cursor movement and field selection
- 4. Edit Keys**  
Instrument and menu mode selection
- 5. Numerical Keys**  
Data entry
- 6. Rotary knob**  
Data entry
- 7. Power Switch**

### Rear Panel

- 8. External U Reference**
- 9. RS-232C Interface**
- 10. Output Terminals**
- 11. Remote Sense**
- 12. GPIB Interface**
- 13. Input Terminals**
- 14. Special I/O Port**
- 15. Printer Interface**
- 16. System I/O Port**
- 17. Cooling Fans**

# Specifications:

Model	AC SOURCE 330	AC SOURCE 360	AC SOURCE 390
<b>OUTPUT PHASE</b>	1	1 (parallel or series)	1 or 3 (parallel or series)
<b>OUTPUT RATINGS</b>			
<b>Output Power</b>	3000VA	6000VA (2x3kVA)	9000VA (3x3kVA)
<b>Voltage</b>			
Range/Phase	150V/300V/Auto	150V/300V (parallel) 300V/500V (series)	150V/300V
Accuracy	0.5% of Full Scale (15-45Hz) 0.2% of Full Scale (45-2000Hz)	0.2% of Full Scale	0.2% of Full Scale
Resolution	0.1V	0.1V	0.1V
Distortion <sup>1</sup>	1% (15-45Hz) 0.5% (45-500Hz) 1% (500-1000Hz) 2% (1000-2000Hz)	1% (45-1000Hz)	1% (45-1000Hz)
Line Regulation	0.1%	0.1%	0.1%
Load Regulation <sup>2</sup>	0.1%	0.2% (series) 0.8% (parallel)	0.2%
Temp. Coefficient	0.02% per °C	0.02% per °C	0.02% per °C
<b>Max. Current/Output</b>			
RMS	30/15A (150V/300V)	60/30A (150V/300V parallel) 30/15A (300V/500V series)	90/45A (150V/300V parallel) 30/15A (150V/300V series)
peak	90/45A (15-100Hz) 70/38A (100-1000Hz) 60/30A (1000-2000Hz)	180/90A (45-100Hz parallel) 90/45A (45-100Hz series) 150/75A (100-1000Hz parallel) 75/38A (100-1000Hz series)	225/112A (45-100Hz parallel) 90/45A (45-100Hz series) 175/95A (100-1000Hz parallel) 70/38A (100-1000Hz series)
<b>Frequency</b>			
Range	15-2000Hz	45-1000Hz	45-1000Hz
Accuracy	0.15%	0.15%	0.15%
Resolution	0.01Hz (15-99.9Hz) 0.1Hz (100-999.9Hz) 0.2Hz (1000-2000Hz)	0.01Hz (45-99.9Hz) 0.1Hz (100-999.9Hz)	0.01Hz (45-99.9Hz) 0.1Hz (100-999.9Hz)
<b>INPUT RATINGS</b>			
<b>Voltage Range</b>	190-250V, 1Φ	190-250V, 3Φ	190-250V, 3Φ
<b>Frequency Range</b>	47-63Hz	47-63Hz	47-63Hz
<b>Current</b>	23A Max.	35A Max./Phase	35A Max./Phase
<b>Power Factor</b>	0.98 Min. Under Full Load	0.98 Min. Under Full Load	0.98 Min. Under Full Load
<b>MEASUREMENT</b>			
<b>Voltage</b>			
Range	0-150V/0-300V	0-150V/0-300V	0-150V/0-300V
Accuracy (RMS)	0.1% of Full Scale + 0.25%	0.1% of Full Scale + 0.25%	0.1% of Full Scale + 0.25%
Resolution	0.1V	0.1V	0.1V
<b>Current</b>			
Range	0-140A	0-140A	0-140A
Accuracy (RMS)	0.1% of Full Scale + 0.4%	0.1% of Full Scale + 0.4%	0.1% of Full Scale + 0.4%
Accuracy (peak)	0.2% of Full Scale + 0.4%	0.2% of Full Scale + 0.4%	0.2% of Full Scale + 0.4%
Resolution	0.01A	0.01A	0.01A
<b>Power/Phase</b>			
Accuracy	1% of Full Scale (CF < 6)	1% of Full Scale (CF < 6)	1% of Full Scale (CF < 6)
Resolution	0.01W	0.01W	0.01W
<b>Frequency</b>			
Range	15-2000Hz	45-1000Hz	45-1000Hz
Accuracy	0.01% + 2 Count	0.01% + 2 count	0.01% + 2 count
Resolution	0.01Hz	0.01Hz	0.01Hz
<b>OTHER</b>			
<b>Efficiency</b>	80% Typ.	80% Typ.	80% Typ.
<b>Protection</b>	Over Voltage, Over Current, Over Power, Over Load, Over Temperature and Fan Fail Protection		
<b>Temperature</b>			
Operating	0 - 40°C	0 - 40°C	0 - 40°C
Storage	-40 - +85 °C	-40 - +85 °C	-40 - +85°C
<b>Safety&amp;EMC</b>	CE (including LVD and EMC requirements)		
<b>Dimensions (WxHxD)</b>	425x222x620mm	546x845x700mm	546x1065x700mm
<b>Weight</b>	27kgs (59.5 lbs)	108kgs (238 lbs)	145kgs (320 lbs)

1. Test under output voltage from half to full range. 2. Test with sine wave and with remote sense.

All specifications subject to change without notice. All references to standards are assuming operation within instrument specifications.

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