

# Three-Phase Power Quality Analyzer PowerPad™ Model 3945



Wouldn't it be nice if you could look inside your electrical system and see what's going on? Troubleshooting would be so much easier if you could see the volts, amps and harmonic content in real time and take pictures to document and analyze. Now you can do just that and more with AEMC's PowerPad. The full color graphical display lets you see and analyze each signal clearly. Its high speed sample rate, at 256 samples per cycle, provides excellent fidelity in reproducing waveforms and capturing transients that happen as fast as 62.5 $\mu$ s.

PowerPad's 4MB of memory is conveniently partitioned to let you store four different types of data, synchronized or independent of each other. You can store up to 12 screen snapshots, up to 50 captured transients that contain four cycles for each active input, and 4096 alarm events. You can also record trend data for days, weeks or even months.

Six direct access function buttons quickly let you see:

**Waveforms** – Display Volts, Amps, THD and Crest Factor by phase or for all phases. You can display all the voltage inputs on one screen, phase-to-phase or phase-to-neutral. Real-time phasor

diagrams can be displayed for volts and amps, also by phase or for all phases.

**Harmonics** – Display Harmonics out to the 50<sup>th</sup> for Volts, Amps and VA. Individual Harmonics are displayed as a percentage and in real value. Harmonic direction and sequencing can also be displayed.

**Transients** – Set, capture and display transients. You select the threshold and the number of transients to capture. PowerPad then captures four waveforms for each transient; the triggering waveform as well as one pre- and two post-triggered waveforms. As many as 1200 waveforms can be captured.

**Alarms** – Configure, capture and display up to 4096 alarm events based on up to ten different trigger variables. Each captured alarm event will show the phase, the variable and the value as well as the time and duration.

**Record** – Set up and record trend data at selectable rates from one sample/second to one sample every 15 minutes on as many as 22 different variables for all phases. See the recorded data on screen, zoom in and out and scroll the time axis to analyze the data.

**Power & Energy** – Display Watts, VARs and VA by phase and total. Accumulate totals and see whether the energy is inductive or capacitive.

If you're not convinced yet, consider these other functions and features:

- PowerPad uses current probes that auto configure the instrument's current channel for range and scale.
- PowerPad comes with an online help system that gives you clear information about the functions and buttons for each screen.
- PowerPad comes with all options and accessories needed to capture, display, download, analyze and store data. No add-on accessories are required that increase your cost. PowerPad is supplied with AEMC's DataView® Professional graphing/analysis software package at no

additional cost (a \$395.00 value). The software lets you completely configure and capture data in real time on your computer. You can download all stored data from PowerPad and print reports from a library of pre-designed templates or create your own custom templates and reports.

In addition to all of this, PowerPad speaks six different languages. At the press of a button, information can be displayed in English, Spanish, French, Portuguese, Italian and German.

Arrange for a demonstration today!



Tilt-out bail facilitates bench top operation for convenient viewing of display.



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## Features

- True RMS single-, two- and three-phase measurements at 256 samples/cycle, plus DC
- Real-time color waveforms
- Easy-to-use on-screen setup
- Automatic current probe recognition and scaling
- True RMS voltage and current measurement
- Measures DC volts, amps and power
- Display and capture voltage, current and power harmonics to 50<sup>th</sup> order, including direction, in real time
- Capture transients down to 1/256<sup>th</sup> of a cycle
- Phasor diagram display
- Peak voltage and current
- Nominal frequency from 40 to 70Hz
- VA, VAR and W per phase and total
- kVAh, VARh and kWh per phase and total
- Neutral current display for three-phase
- Crest factors for current and voltage
- Transformer K-factor display
- Power Factor, displacement PF display
- Captures up to 50 transients
- Short-term flicker display
- Phase unbalance (current and voltage)
- Harmonic Distortion (total and individual) from 1<sup>st</sup> to 50<sup>th</sup>
- Alarms, surges and sags
- Records date and characteristics of disturbances
- Immediate printout directly to a printer
- Screen snapshot function captures waveforms or other information on the display
- Optically isolated RS-23 communication port
- Includes DataView® Professional software for data storage, real-time display, analysis and report generation
- EN 61010, 600V Cat. III

## Applications

- Verification of power distribution circuits
- Measurement and recording of power system quality (kW, VA, VAR)
- Energy metering (kVAh, VARh, kWh)
- In plant troubleshooting of power distribution panels and individual machinery
- Monitor pad mount transformers
- Determine harmonic problems originating from source or load
- Monitor phase unbalances
- Determine transformer K-factor
- And much, much more

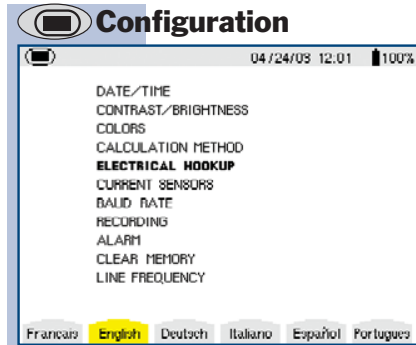


Power quality analysis on a three-phase panel using the AmpFlex™ flexible current probes.

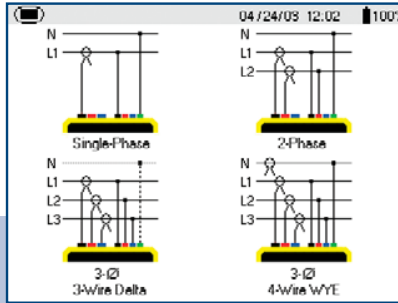


Measure all three phases of voltage and current simultaneously.

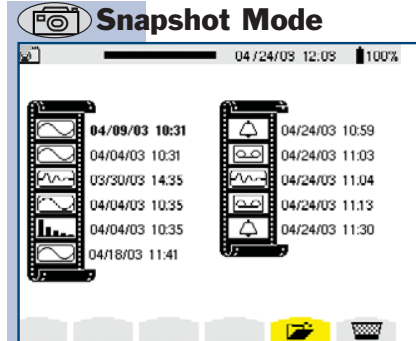
# Functional Displays



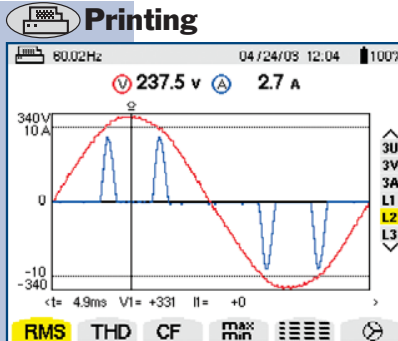
Configuration is simple and straightforward. Simply press the setup button and select the function you wish to configure. For example, to configure the input, select the desired hookup from the graphical choices for single-, two- and three-phase. Neutral current is calculated in the 4-wire hookup.



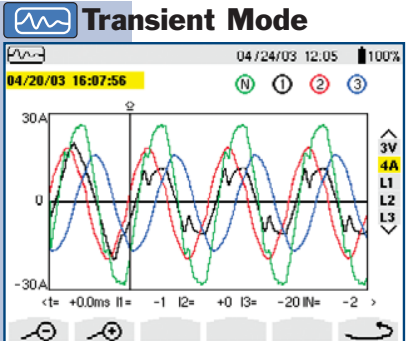
PowerPad's direct access system lets you see the important information you need at the press of a button. Quickly review waveforms, harmonics, transients, alarms and recorded data on screen. Setup is straightforward using a combination of graphic and text prompts to quickly configure PowerPad for the job site.



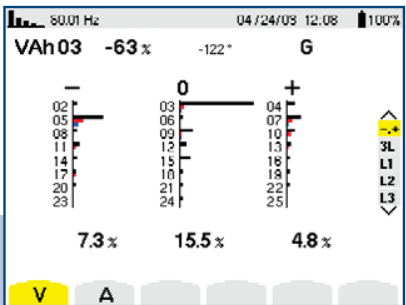
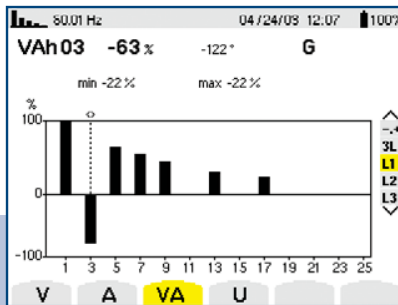
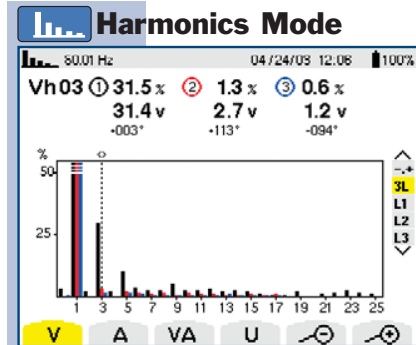
You can store up to 12 screen snapshots simply by pressing the camera button while the desired information from any of the instrument's modes is on the display. Any of the stored snapshots can be selected and displayed by selecting it from the list.



Information on screen (real-time or stored data) can be sent to a printer using the serial interface by simply pressing the print button.



Display transients that were captured – each transient consisting of one pre-triggered cycle, the triggered cycle and two post-triggered cycles. All inputs are stored when a transient is captured. Up to 50 transients can be stored, each consisting of four cycles and up to six inputs for a total of 1200 transient waveforms.



Voltage, current and power harmonics can be displayed in real time, in bargraph and text form, and stored in memory. Individual harmonics can be analyzed by moving the horizontal cursor to that harmonic. Harmonic direction (source-to-load or load-to-source) can be displayed for power harmonics. Harmonic sequencing (negative, zero and positive) can be displayed for volts or amps for all phases.



# Specifications

MODEL	3945		
<b>ELECTRICAL</b>			
Sampling Frequency	256 samples per cycle		
Data Storage	4MB partitioned for waveforms, transients, alarms and trend recording		
Voltage (TRMS)	Phase-to-Phase: 960V		Phase-to-Neutral: 480V
Current (TRMS)	MN Clamp: 0 to 6A/120A or 0 to 240A MR Clamp: 0 to 1200AAC, 0 to 1400ADC		SR Clamp: 0 to 1200A AmpFlex™: 0 to 6500A <sup>1</sup>
<b>MEASUREMENT</b>	<b>RANGE</b>	<b>RESOLUTION</b>	<b>ACCURACY</b>
Single-Phase RMS Voltages	15 to 480V	0.1V	±0.5% ± 2cts
Phase-to-Phase RMS Voltages	15 to 960V	0.1V	±0.5% ± 2cts
DC Voltage Component	15 to 680V	0.1V	±1% ± 2cts
Single-Phase Peak Voltages	15 to 680V	1V	±(1% + 5cts)
Phase-to-Phase Peak Voltages	15 to 1360V	1V	±(1% + 5cts)
Frequency (Hz)	40 to 69Hz	0.01Hz	±0.01Hz
Current Probes (Arms)			
MN Clamp	0 to 240A	0.1A	±(0.5% + 2cts)
SR Clamp	0 to 1200A	0.1A; 1A ≥ 1000A	±(0.5% + 2cts)
AmpFlex™ Probe	10 to 6500A	0.1A; 1A ≥ 1000A	±(0.5% + 1A)
Active (Real) Power (kW)	0 to 9999kW	4 digits (10,000ct)	±1% ± 1ct @ PF ≥ 0.8
Reactive Power (kVAR)	0 to 9999kVAR	4 digits (10,000ct)	±1% ± 1ct @ PF ≤ 0.8
Apparent Power (kVA)	0 to 9999kVA	4 digits (10,000ct)	±1% ± 1ct
Power Factor (PF & DPF)	-1.000 to 1.000	0.001	±(1.5% + 0.01)
Active Energy (kWh)	0 to 9999MWh	4 digits (10,000ct)	±1% ± 1ct @ PF ≥ 0.8
Reactive Energy (kVARh)	0 to 9999MVARh	4 digits (10,000ct)	±1% ± 1ct @ PF ≤ 0.8
Apparent Energy (kVAh)	0 to 9999MVAh	4 digits (10,000ct)	±1% ± 1ct
Unbalance (V & A)	0 to 100%	0.1%	±1% ± 1ct
Phase Angle (V-A, A-A, V-V)	-179° to +180°	1°	±2° ± 1ct
Harmonics (1 <sup>st</sup> to 50 <sup>th</sup> ) F = 40 to 69Hz (V ≥ 50V, A > Inom/100)	0 to 999%	0.1%	±1% + 5cts
Total Harmonic Distortion (V & A)	0 to 999%	0.1%	±1% + 5cts
K-factor (A <sub>kf</sub> )	1 to 99.99	0.01	±5% ± 1ct
Flicker (P <sub>st</sub> )	0.00 to 9.99	0.01	-
Power Source	9.6V NiMH rechargeable battery pack AC supply: 110/230VAC ±20% (50/60Hz)		
Battery Life	≥8 hrs with display on; ≤35 hrs with display off (record mode)		
<b>MECHANICAL</b>			
Dimensions	9.5 x 7 x 2" (240 x 180 x 55mm)		
Weight	4.6 lbs (2.1kg)		
<b>DISPLAY</b>			
Display Type	1/4 VGA (320 x 240) color LCD		
<b>ENVIRONMENTAL</b>			
Operating Temperature	32° to 122°F (0° to 50°C)		
Storage Temperature	-4° to +122°F (-20° to +50°C)		
<b>SAFETY</b>			
Safety Rating	EN 61010-1, 600V Cat. III, Pollution Degree 2		
Double Insulation <input type="checkbox"/>	Yes		
CE Mark	Yes		

<sup>1</sup>Crest Factor at 6500A = 1



All models include three color-coded current probes (MN93 example shown), four color-coded 10 ft voltage leads, four color-coded alligator clips, RS-232 DB9F optically coupled serial cable, NiMH battery, US 120V power cord, DataView® Professional software, carrying bag, soft carrying pouch and user manual.

ORDERING INFORMATION	CATALOG NO.
<b>PowerPad™ Model 3945 w/MN93</b>	<b>Cat. #2130.75</b>
Includes set of three color-coded 240A MN93 probes with 10 ft leads, four 10 ft color-coded voltage leads, four color-coded alligator clips, RS-232 DB9F optically coupled serial cable, NiMH battery, US 120V power cord, DataView® Professional Software, carrying bag, soft carrying pouch and user manual	
<b>PowerPad™ Model 3945 w/SR193</b>	<b>Cat. #2130.76</b>
Includes set of three color-coded 1200A SR193 probes with 10 ft leads, four 10 ft color-coded voltage leads, four color-coded alligator clips, RS-232 DB9F optically coupled serial cable, NiMH battery, US 120V power cord, DataView® Professional Software, carrying bag, soft carrying pouch and user manual	
<b>PowerPad™ Model 3945 w/24" AmpFlex™ 193-24</b>	<b>Cat. #2130.77</b>
Includes set of three color-coded 6500A 24" AmpFlex™ 193-24 probes with 10 ft leads, four 10 ft color-coded voltage leads, four color-coded alligator clips, RS-232 DB9F optically coupled serial cable, NiMH battery, US 120V power cord, DataView® Professional Software, carrying bag, soft carrying pouch and user manual	
<b>PowerPad™ Model 3945 w/36" AmpFlex™ 193-36</b>	<b>Cat. #2130.78</b>
Includes set of three color-coded 6500A 36" AmpFlex™ 193-36 probes with 10 ft leads, four 10 ft color-coded voltage leads, four color-coded alligator clips, RS-232 DB9F optically coupled serial cable, NiMH battery, US 120V power cord, DataView® Professional Software, carrying bag, soft carrying pouch and user manual	
<b>PowerPad™ Model 3945 w/MR193</b>	<b>Cat. #2130.79</b>
Includes set of three color-coded 1000Aac/1400Aac MR193 probes with 10 ft leads, four 10 ft color-coded voltage leads, four color-coded alligator clips, RS-232 DB9F optically coupled serial cable, NiMH battery, US 120V power cord, DataView® Professional Software, carrying bag, soft carrying pouch and user manual	
<b>PowerPad™ Model 3945 w/MN193</b>	<b>Cat. #2130.80</b>
Includes set of three color-coded 6A/120A MN193 probes with 10 ft leads, four 10 ft color-coded voltage leads, four color-coded alligator clips, RS-232 DB9F optically coupled serial cable, NiMH battery, US 120V power cord, DataView® Professional Software, carrying bag, soft carrying pouch and user manual	
<b>Accessories (Optional)</b>	
Set of three color-coded MN93 probes (240A) with 10 ft leads	Cat. #2140.09
Set of three color-coded SR193 probes (1200A) with 10 ft leads	Cat. #2140.10
Set of three color-coded 24" AmpFlex™ 193-24 probes (6500A) with 10 ft leads	Cat. #2140.11
Set of three color-coded 36" AmpFlex™ 193-36 probes (6500A) with 10 ft leads	Cat. #2140.12
Set of three color-coded MR193 probes (1000Aac/1400Aac) with 10 ft leads	Cat. #2140.13
Set of three color-coded MN193 probes (6A/120A) with 10 ft leads	Cat. #2140.14
5A Adapter box	Cat. #2140.17
Set of four color-coded 30 ft voltage leads	Cat. #2140.23
Set of three color-coded MN93-30 probes (200A) with 30 ft leads	Cat. #2140.24
Set of three color-coded SR193-30 probes (1200A) with 30 ft leads	Cat. #2140.25
Set of three color-coded 24" AmpFlex™ 193-24-30 probes (6500A) with 30 ft leads	Cat. #2140.26
Set of three color-coded 36" AmpFlex™ 193-36-30 probes (6500A) with 30 ft leads	Cat. #2140.27
MR193-BK probe (black connector) (1000Aac/1400Aac)	Cat. #2140.28
Set of three color-coded MN193-30 probes (5A/100A) with 30 ft leads	Cat. #2140.29
Set of three color-coded MR193-30 probes (1000Aac/1400Aac) with 30 ft leads	Cat. #2140.30