Voltech

PM1000+

Precision Power Analyzer

Versatile, Accurate, Fully Featured and Easy-to-Use

- Easy to use.
- 0.1% basic accuracy.
- Special standby power, inrush, and W-hr integration modes.
- Comprehensive high-speed interfacing for automated use.
- Ideal for the design and test of all electrical products.

The No Compromise Power Analyzer

Driven by consumer demand and energy efficiency legislation, tomorrow's electrical and electronic products must operate with ever-greater efficiency and employ increasingly complex control methods such as a low-power standby operation. The accurate measurement of electrical power has never been more important than it is today.

The Voltech PM1000+ is the first power analyzer to combine bench instrument accuracy with sophisticated energy consumption features and low-power standby measurements at an affordable price. The PM1000+ measures power consumption from milliwatts to megawatts, providing accurate power and harmonic data on products ranging from the tiniest cell phone charger to the latest electric hybrid bus.

Designed and built using over 20 years of Voltech know-how. The PM1000+ is the most powerful, accurate, no-compromise power and energy analysis tool for the design and test of tomorrow's products.

Features and benefits…

- Direct connection – no CT errors
- Accurate up to Crest Factors of 20 – no compromise specification on distorted waveforms
- Rugged analog design-stands overloads up to 5kV
- Discrete Fourier Transform provides harmonics more accurately than FFT
- Voltech proprietary frequency detection avoids problems with zero crossing detection
- Built with low power standby in mind- no special accessories or channels required
- High sample rate captures all the data and avoids aliasing problems
- Full color clear and versatile display
- Great interfacing USB, IEEE, RS232

1986 The world's first digital power analyzer, the Voltech PM1000.

When you really want to be sure, you can trust Voltech.

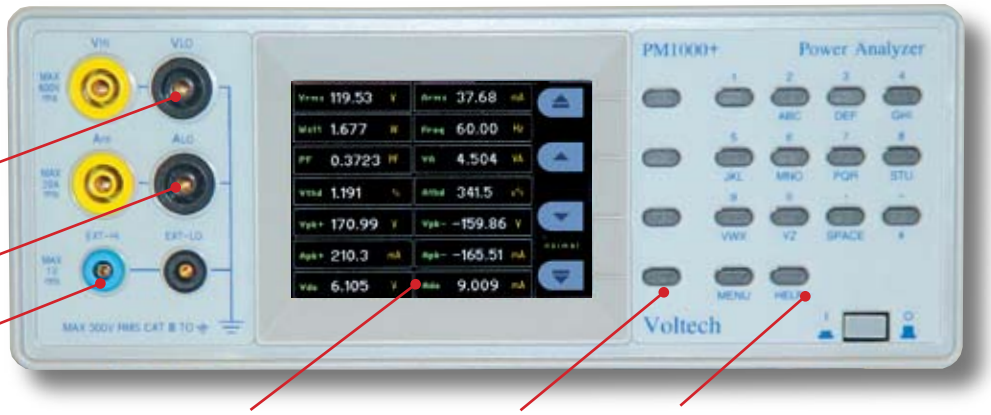
For more information or to request a no-obligation trial of a PM1000+, please see our website at www.voltech.com

Measurement Functions - *Selectable From Menu*

Direct Input Ratings

660Vrms. 1500Vpk

20Arms, 100Apk



External Shunt Input
Ideal for current transducers with a voltage output as well as resistive shunts

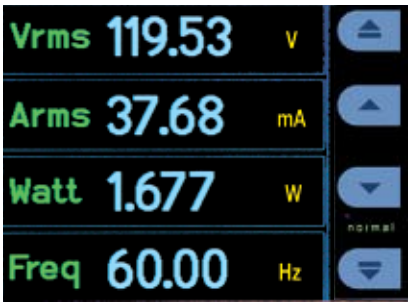
Bright 320 X 240 color display

Easy-to-use menu keys

On-board help and character entry

Volts	0 to 600 RMS & +/-1500V Peak Direct Input
Current	0 to 20A RMS & +/-100A Peak Direct Input
Power Watts	0 to 90kW Direct Input
Apparent Power	0 to 90kW Direct Input
Reactive Power	90kW Direct Input
Frequency	DC + 10Hz to 1MHz
Power Factor	0 to +/-1.000
Crest Factor	0 to 20.00
Ballast Mode	(50/60/400Hz) Selectable
Harmonics **THD**	50 Voltage 50 Current
Energy Whr	
Inrush Current	
Low Power Standby **Impedance**	
Resistance	
Reactance	

Basic Accuracy 0.1% Reading +0.1% of Range



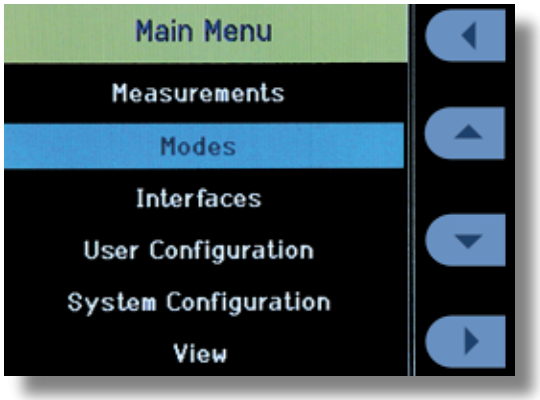
4 Parameter Measure Mode

14 Parameter Measure Mode

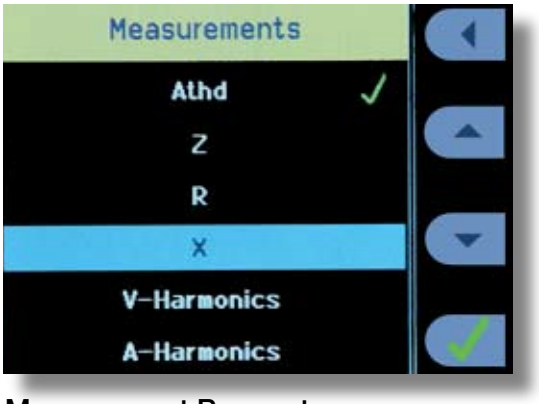
Measurement Selection

Modes of Operation - *Applications*

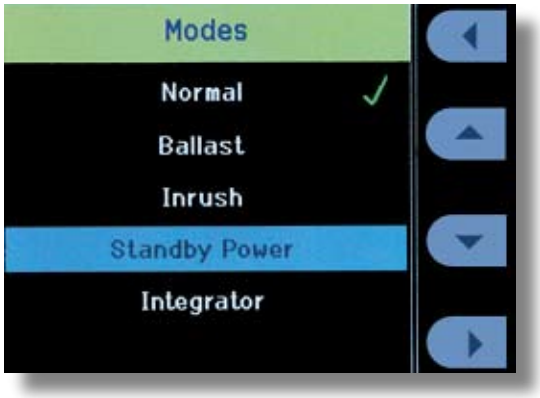
- **Harmonics Display**
- **Energy Integrator**
- **Wave Form Display**
- **Standby Power**
- **Lighting Ballast**
- **Normal**
- **Inrush Current**



Main menu, with modes selected



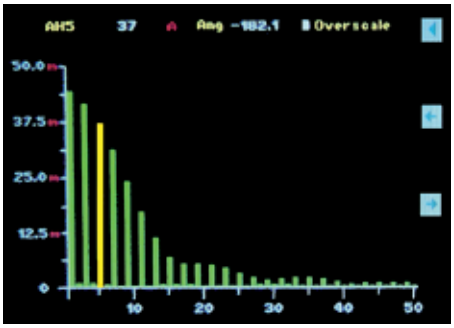
Measurement Parameter



Modes with standby selected

Harmonics and Distortion

- Up to the 50th harmonic
- Amplitude and phase from trouble-free DFT
- THD Total Harmonic Distortion
- Accurate DC measurements in the presence of AC
- 450kHz bandwidth for harmonics
- Harmonic bargraph display with cursor selection



Harmonic barchart

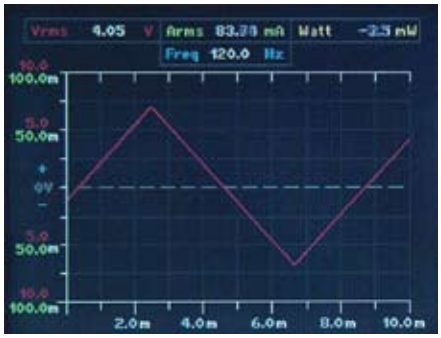
Modes of Operation - *Applications*

Energy Measurement

The power consumption of everyday home and office electrical appliances is of importance to consumers and generators of electricity alike.

When the power consumption varies over time, then integration of the power (W-hr integration) is required.
The PM1000+ provides comprehensive integration features suitable for Energy Star measurements and for low-power measurements in accordance with international directives, eg. IEC 62301 which also requires crest factor measurements up to 8 and 50 harmonics.

- Precision Graphical Watt-Hour and VA-Hour Measurements
- Clock



Waveform Display

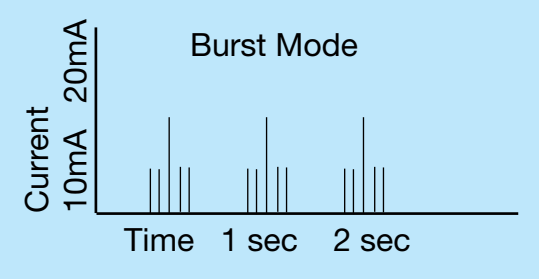
- **Display voltage & current waveforms**
- **Cursor readout: Volts RMS & Amps RMS**

Modes of Operation - *Applications*

Low-Power Standby

The first power analyzer developed with low power measurements built-in as standard.

- Accurate low power measurements without special input channels or transducers.
- Special mode averages and captures power supplies in burst mode to provide accurate measurements in the shortest possible time
- Current Range: From 10mA to 20A fully autoranging
- Crest Factor: (peak/rms) up to 20



Lighting Ballasts

Special operating mode measures the output of electronic ballasts. For 50Hz, 60Hz, 400Hz lighting systems

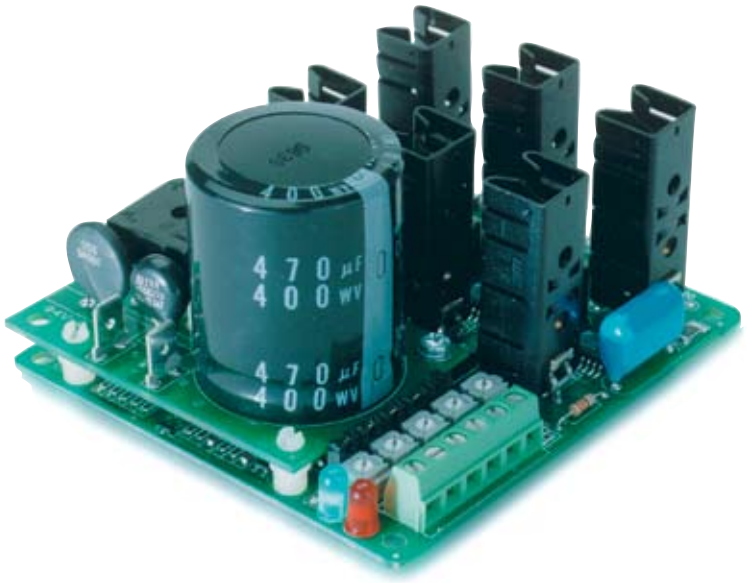
Voltech Ballast Current Transformer

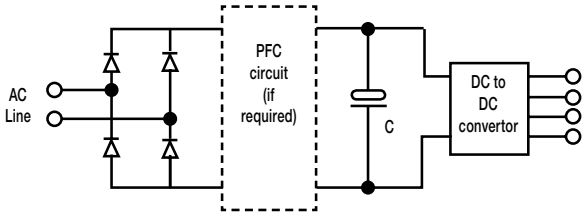
- Isolates common mode switching voltages
- 5mA to 1A RMS in 2 ranges
- 5kHz to 1MHz bandwidth
- Accuracy (70 kHz to 500kHz) 1%
- Current phase better than 1^0
- Voltage phase better than 3^0

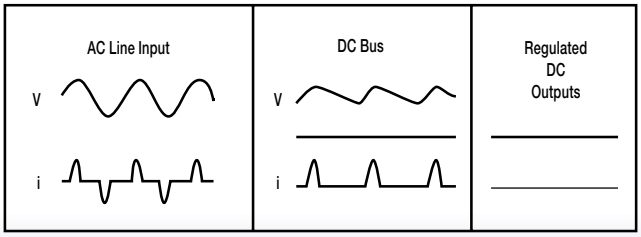
Modes of Operation - *Applications*

Power Supplies

Ideal for measurements on power supplies, from wall chargers to UPS and high-power converters, the PM1000+ makes accurate measurements on all waveforms including those heavily distorted by the rectification and smoothing at power supply inputs.

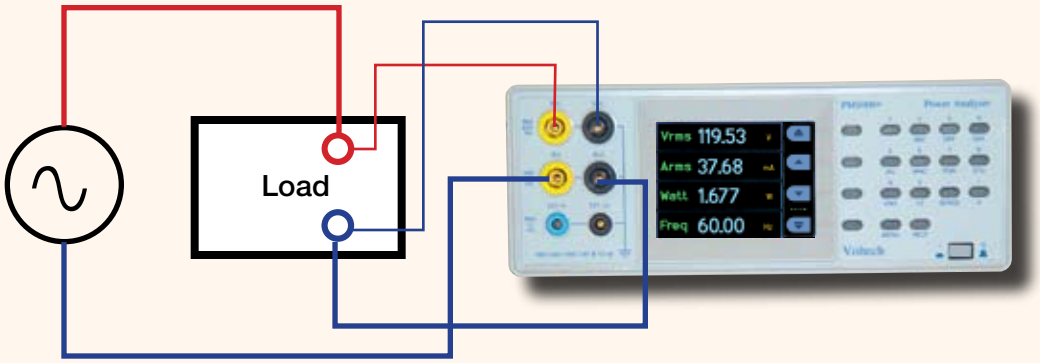




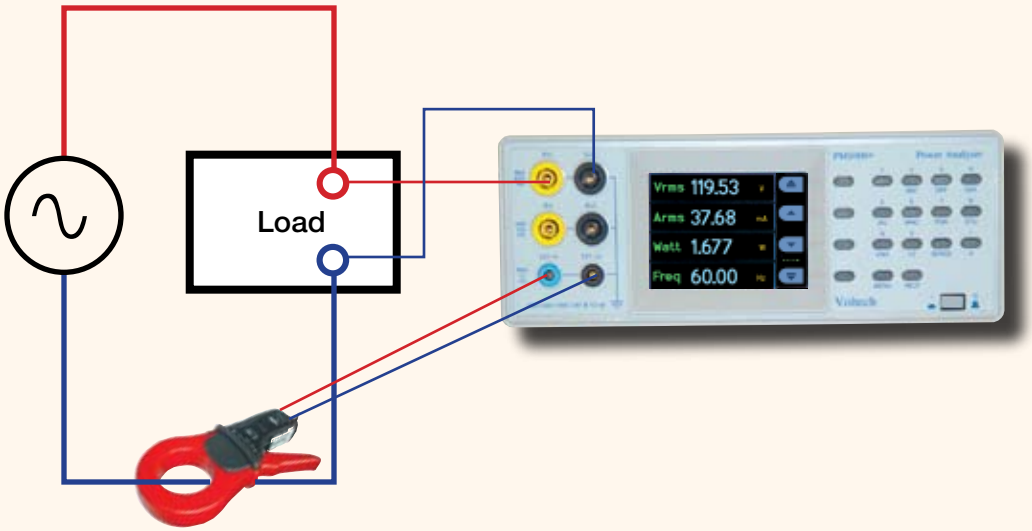


Measurements	
W	Input and Output power
Vrms	Line regulation, drop-out voltage, testing power fail circuits
Arms	Conductor and fuse rating
VA	Apparent power for supply rating
Apk MAX	Inrush Current Verification of inrush limiting circuit design Qualified fuse rating
PF	Power Factor (W/ VA) for verification of power factor control circuits
A harm	Amps harmonics for testing to harmonic standards
A THD	Distortion of input current
V THD	Distortion of supply or AC output
Integrator	Low-power standby measurements

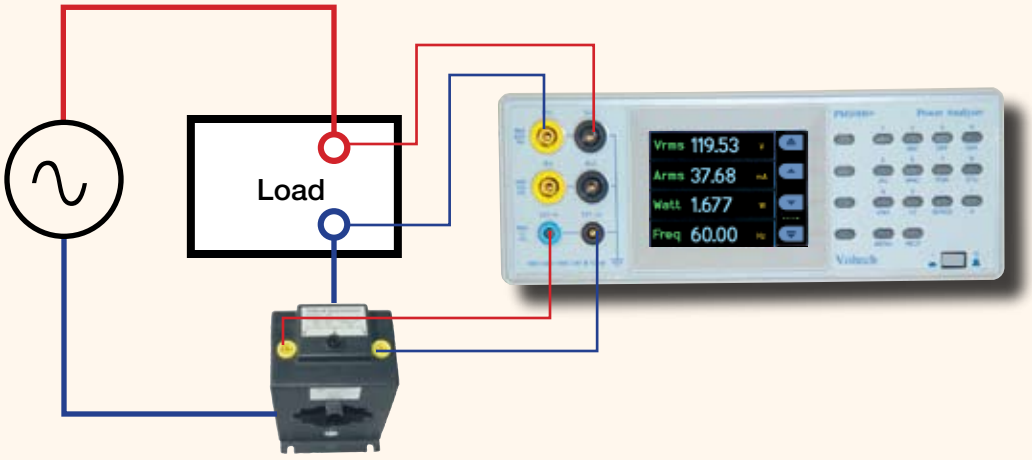
Wiring Connections



Single Phase Direct Connection up to 20Arms



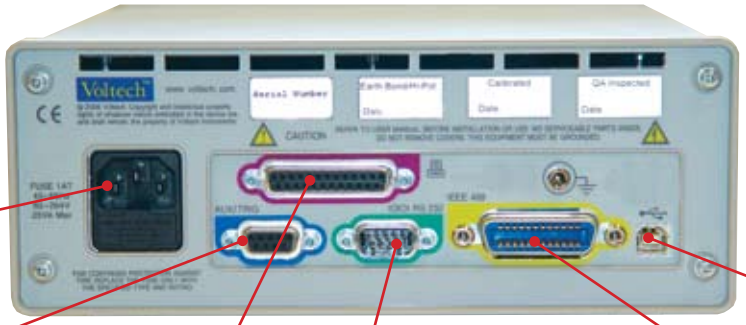
Single Phase Current Clamp Connection up to 3000Arms



Single Phase with Current Transformer Connection up to 1000 Arms

Connectivity/Accessories

All interface options are standard features



Universal Power Input
85-264 VAC
45-65Hz
25VA

Aux/Trigger Port
(future release)

Printer Port
25 Pin D Sub
Connector

RS232
9600, 38400, 19200
Baud Rates

IEEE 488.2

USB Peripheral

Accessories

Clamp-on Current Transformers

- Accuracy better than 1%
- Connect to the PM1000+ via safety leads and 1A shunt
- CL100 100A:1A ratio: 1A to 100VA rms range
- CL1000 1000A:1A ratio: 1A to 1000VA rms range
- CL3000 ratio: 1A to 3600VA rms range

CT1000 –Dual Ratio Precision Current Transformer

- Accuracy (23°C ± 5°C): ± 0.2% of specified ratio
- Frequency range: 45Hz to 1kHz
- Current range: 100:1 ratio: 10A to 120A rms 1000:1 ratio: 100A to 1200A rms
- Maximum input current: 1000A continuous 2000A for 1 hour
- Phase error (23°C ± 5°C): Better than ± 0.1° at 50Hz

PS1000 - Inrush Switch

Solid-state switch for energizing loads (up to 200Apk) at either the peak or the zero crossing of AC voltage. Ideal for inrush current testing.

Ballast CT

Purposely designed for lighting applications, this device overcomes problems that are usually found when using conventional or Hall effect CTs.

- Convenient: No need to feed cables through a CT core.
- Better than 1% accuracy: Trifilar wound toroidal core.
- 5kHz to 1MHz bandwidth .
- 5mA to 1A measurement range

Specification

VOLTAGE RMS	RANGES	900, 215, 46, 10 Vpk
Vrms + VDC	Frequency range	10Hz to 1MHz
	Peak continuous	1500 Vpk
	Peak < 1 second	5000 Vpk
	Input Impedance	1 MΩ
	Display	4.5 Digits
	Crest Factor	20 (Peak/RMS)
	Accuracy	0.1% of Reading + 0.1%of range + 5mV + 0.02%/kHz
VDC	Accuracy	0.1% of Reading + 0.2% of range + 5mV + 0.02%/kHz
VOLTAGE +/- PEAK	Accuracy	0.5% of Reading + 0.5% of Range + 0.02%/kHz
CURRENT	RANGES	100, 25, 6.25, 1.6, 0.4, 0.1 Apk
RMS	Frequency range	10Hz to 1MHz
ARMS	Peak continuous	20Arms
	Peak < 1 second	Apk
	Input resistance	12.5 mΩ
	Crest Factor	20 (Peak/RMS)
	Accuracy	0.1% of Reading + 0.1% of range + 1mA + 0.02%/kHz
ADC	Accuracy	0.1% of Reading + 0.2% of range + 1mA + 0.02%/kHz
CURRENT +/- PEAK	Accuracy	0.5% of Reading + 0.5% of range + 0.02%/kHz
WATTS	RANGES	1Wpk to 90kW
	Frequency range	10Hz to 1MHz
	Accuracy	0.2% of Reading + 0.1% of range + 5mW + (0.05/PF)%/kHz
VA	RANGES	1 VA to 90VA
	Frequency range	10Hz to 1MHz
	Accuracy	0.2% Reading + 0.1 % of range +5mVA + 0.05%/kHz
VAr	RANGES	1 VA to 90VAr
	Frequency range	10Hz to 1MHz
	Accuracy	0.2 of Reading + 0.1% of range + 5mVAr + (0.05/1-PF)%/kHz
POWER FACTOR	Range	+/- 0.000 to 1.000
	Accuracy	+/-(0.002+/-(0.001/PF)/kHz)
		+ indicates leading PF and - indicates lagging PF
FREQUENCY	Range	DC and 10Hz to 1MHz
	Accuracy	0.1%

Specification

VOLTAGE CREST FACTOR	RANGE	1.00 to 20.0
	Accuracy	%Vpk error + % Vrms error
CURRENT CREST FACTOR	RANGE	1.00 to 20.0
	Accuracy	%Apk error + % Arms error
PEAK INRUSH CURRENT	RANGE	100Apk
	Accuracy	2% of range +/- 20mA
HARMONIC ANAYLSIS	Number of Voltage & Current Harmonics	50
	Maximum Harmonics Frequency	450kHz
	Accuracy	0.2% of Reading + 0.1% of Range +0.04% per kHz of Harmonics
	Frequency Range	10Hz to 450kHz
THD		
Total Harmonic Distortion	Range & Accuracy	Range 0-999% Accuracy 0.4% + 0.1%/kHz
	Formula	$thd = \frac{\sqrt{H2^2 + H3^2 + H4^2 + H5^2 + ... + H50^2}}{H1}$
STANDBY POWER	Time Window	1-300 sec
	Resolution	1 second
IMPEDANCE	Range	0.005Ω to 1MΩ
	Accuracy	0.2% of Reading +0.1% of range +5mΩ + (0.05/PF)%/kHz 0.2% of Reading +0.1% of range
RESISTANCE	Range	0.005Ω to 1MΩ
	Accuracy	0.2% of reading + 0.1% of range +5mΩ + (0.05/PF)%/kHz
REACTANCE	Range	0.005Ω to 1MΩ
	Accuracy	0.2% of Reading + 0.1% of range +5mΩ + (0.05/1-PF)%/kHz
EXTERNAL SHUNT	Input Range	+/- 1250 mVpk
Scaling		0.0001 to 100000
MECHANICAL CE		1/2 rack size. Rack height 85mm W = 224mm. Height including feet 103mm D = 285mm. Weight 3.21Kg (7lbs.)

Voltech

www.voltech.com

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