

**The PowerSight models to choose from:** the PS4500 Power Quality Analyzer, the PS4000 Power Quality Analyzer, the PS3000 Energy Analyzer, and the PS250 Power Monitor.

- The PS4500 offers the features of the PS4000 plus removable memory card, wireless communications, improved safety and “feel” etc.
- The PS4000 provides complete analysis in power quality applications (swell / dip / inrush / transient / harmonic detection) in addition to supplying exact measurements of all common power quantities. It also has more specialty options.
- The PS3000 is oriented toward complete power analysis and reporting with helpful power quality capabilities. Thousands in service all over the world.
- The PS250 provides basic power analysis and is best suited for large site surveys or for those with a limited budget.

**No matter what your needs or budget, there is probably a PowerSight model that is right for you.**

**Our models offer combinations of price, performance, size, and ease of use that are unequalled in the industry. Our technical support is second to none.**

### Comparison Table between PowerSight models\*\*

The following table lists key features and how they apply to each model. Features that end with an asterisk (“\*”) have explanatory notes in the next section. Cells that are in bold and highlighted in **green** are key features that distinguish the model from the others. Cells that are highlighted in **red** are features that compare less favorably with the others.

Basic measurement abilities	PS250	PS3000	PS4500/4000
Basic sampling rate*	16usec	16usec	<b>8usec</b>
Samples per cycle (@ 60Hz)	130	130	<b>2083</b>
Basic RMS measurement rate*	once per second	once per second	<b>every cycle of every channel</b>
True 3-phase*	Yes, 7 channels	Yes, 7 channels	Yes, 7 channels
Setup of power configuration	automatic	automatic	automatic
Single phase measurements	Yes	Yes	Yes
Two phase measurements	Yes	Yes	Yes
Three phase wye and delta	Yes	Yes	Yes



## Choosing the Right PowerSight Model



<b>4 wire delta measurements</b>	Yes	Yes	Yes
<b>Open delta measurements</b>	Yes	Yes	Yes
<b>2CT/2PT metering measurements (2 wattmeter approach)</b>	Yes	Yes	Yes
<b>AC/DC voltage and current measurement*</b>	Yes	Yes	Yes
<b>400 Hz system measurements</b>	Yes	Yes	Yes

<b>Logging</b>	<b>PS250</b>	<b>PS3000</b>	<b>PS4500/4000</b>
<b>Logging capability</b>	standard	with LOG option	standard
<b>Logging variables</b>	68 maximum	68 maximum	68 maximum
<b>Logging rate (set by user)</b>	1second-99minutes	1second-99minutes	1second-99minutes
<b>Start/Stop at programmed time</b>	Yes	Yes	Yes
<b>Auto-start logging when power present</b>	<b>Yes</b>	no	no
<b>Max/Min/Ave/Present value of V,A,W, etc</b>	Yes	Yes	Yes

<b>Harmonics</b>	<b>PS250</b>	<b>PS3000</b>	<b>PS4500/4000</b>
<b>Harmonics analysis capability</b>	1-50th on PC, 1-25th on unit with HAO option	1-50th on PC, 1-25th on unit with HAO option	<b>1-65th on PC, 50th on unit, to the 31st at 400Hz</b>
<b>Harmonics direction</b>	Yes, in software	Yes, in software	Yes, in software
<b>THD calculation</b>	4 seconds/channel	4 seconds/channel	<b>every cycle of every channel</b>
<b>K factor</b>	Yes, in software	Yes, in software	Yes, in software
<b>Crest factor</b>	Yes for V and A	Yes for V and A	Yes for V and A

<b>Swell/Dip/Sag/Surge/Inrush</b>	<b>PS250</b>	<b>PS3000</b>	<b>PS4500/4000</b>
<b>Swell (surge) triggering/capture*</b>	check each second	check each second	<b>Check every 1/2 cycle of every input</b>
<b>Dip (sag) triggering/capture*</b>	check each second	check each second	<b>Check every 1/2 cycle of every input</b>
<b>Inrush current capture*</b>	check each second	check each second	<b>Check every 1/2 cycle of every input</b>

<b>Swell/Dip/Inrush capacity</b>	view consumption log	view consumption log	<b>Up to 15000 records, standard</b>
<b>Swell/Dip/Transient triggered waveform capture</b>	no	no	<b>Up to 100 graphs of 12 cycles, standard</b>
<b>RMS graph of swell/dip by 1/2 cycle</b>	no	no	<b>Up to 2000 graphs of 100 cycles, standard</b>
<b>Simultaneous measurement of power / harmonics / swell / dip / transients*</b>	no	no	<b>Yes</b>

	<b>PS250</b>	<b>PS3000</b>	<b>PS4500/4000</b>
<b>High speed transient capture*</b>	no	accumulate on 1 channel	<b>Record every 8usec on every input</b>
<b>Transient capacity</b>	none	999 summary	<b>Up to 15000 in log, 100 wavesets</b>

<b>Voltage measurement</b>	<b>PS250</b>	<b>PS3000</b>	<b>PS4500/4000</b>
<b>Provision for input ratios for PTs/CTs*</b>	Yes	Yes	Yes
<b>Direct measure of phase-neutral voltage</b>	1-600Vrms	1-600Vrms	1-600Vrms
<b>Direct measure of phase-phase voltage</b>	3-1040Vrms	3-1040Vrms	3-1040Vrms
<b>Peak voltage measurement</b>	2400V	2400V	1000V
<b>DC voltage</b>	1-600Vdc	1-600Vdc	1-600Vdc
<b>Voltage measurement with accessories*</b>	1-15,000 Vrms	1-15,000 Vrms	1-15,000 Vrms
<b>Voltage measurement with input ratios</b>	0.5-999MVrms	0.5-999MVrms	0.5-999MVrms
<b>Voltage measurement accuracy*</b>	+/-0.5%	+/-0.5%	<b>+/-0.1%</b>
<b>Display resolution (100-400V)</b>	1V	0.1V	0.1V

<b>Current measurement</b>	<b>PS250</b>	<b>PS3000</b>	<b>PS4500/4000</b>
<b>AC/DC current measurement*</b>	Yes	Yes	Yes
<b>Neutral current measurement</b>	Yes	Yes	Yes



## Choosing the Right PowerSight Model



Amp measurement with accessories*	1ma-5000Arms	1ma-5000Arms	1ma-5000Arms
Amp measurement with input ratios	1ma-999MArms	1ma-999MArms	1ma-999MArms
Current measurement accuracy*	+/-0.5%	+/-0.5%	<b>+/-0.1%</b>
Display resolution (100-400A)	1A	0.1A	0.1A
Automatic current probe identification and scaling	Yes	Yes	Yes
Flex, DC, and all other probes do not require batteries	Yes	Yes	Yes

Power related	PS250	PS3000	PS4500/4000
True power measurement (W)	Yes	Yes	Yes
Apparent power measurement (VA)	Yes	Yes	Yes
Reactive power measurement (VAR)	Yes	Yes	Yes
Power measurement accuracy*	+/-1.0%	+/-1.0%	<b>+/-0.25%</b>
True power factor (TPF)	Yes	Yes	Yes
Displacement power factor (DPF)	Yes, via PC	Yes	Yes
Peak demand period, peak demand, peak ave. KVA	Yes, via software report	Yes, via keypad and software report	Yes, via keypad and software report
Phase angle (V-A, V-V, A-A)	Yes	Yes	Yes
Phasor diagram display	Yes	Yes	Yes
Phase imbalance (V and A)	Yes	Yes	Yes
Energy measurement (KWH)	Yes, via PC	Yes	Yes
Cost measurement	Yes, via PC	Yes	Yes

Other measurements	PS250	PS3000	PS4500/4000
Fundamental frequency measurement*	45-66, 360-440Hz	45-66, 360-440Hz	<b>22-200Hz, 360-440Hz</b>
Duty cycle / on-off cycles*	Yes, via PC	Yes	Yes

Other key features	PS250	PS3000	PS4500/4000
Internal memory	4M, compressed	4M compressed	<b>4M (PS4000), or 8M (PS4500, or 16M with MEM1 option)</b>



## Choosing the Right PowerSight Model



Removable memory	no	no	yes (PS4500), SD/MMC card up to 2GB
Detection of errors in connections and wiring*	SureStart® errors in plain English	via 6-step sequence	SureStart® errors in plain English (PS4500)
On-Line predictive motor maintenance option	no	no	Yes, with AMD option
High frequency spectrum analysis	no	no	5KHz - 100KHz, FAO option
Firmware update via email	no	no	Yes
Data into Excel Spreadsheet	one step	one step	one step

Input/Output	PS250	PS3000	PS4500/4000
Analysis software	PSM included	PSM included	PSM included
Report generating software	included	included	included
Display	text, hi res graphics on PC	text, hi res graphics on PC	Backlit Text (PS4500), hi res graphics on PC
Screen update rate	1 second	1 second	1 second
Scope Mode	No	No	No
Manual waveform capture*	via PC	14 or 56 via keypad and PC	Up to 448 via keypad and PC
Screen snapshot mode	unlimited via software	unlimited via software	unlimited via software
Printing	Yes, via PC	Yes, via PC	Yes, via PC
Communications	RS232	RS232	Bluetooth wireless (PS4500), RS232 (PS4000)
Communications speed*	9600 bps	9600 bps	up to 115.2Kbps
USB connection	via optional adapter	Yes, optional	via optional adapter
Internet connection	via optional adapter	Yes, optional	via optional adapter (PS4000)
Integration with automated systems	Yes	Yes	Yes
Multi-lingual	No	Yes	Option
Keyboard	1 button	Yes, 24 keys	Yes, 24 keys
Real-time clock	Yes	Yes	Yes

Included

PS250

PS3000

PS4500/4000



## Choosing the Right PowerSight Model



<b>accessories</b>			
<b>Voltage probes*</b>	4 included, deluxe plunger type	optional deluxe plunger type or fused	4 included, deluxe plunger type
<b>Current probes</b>			
<b>Carrying case*</b>	<b>soft case included</b>	many options	many options
<b>Communications cable</b>	RS232	RS232	<b>none required (PS4500), RS232 (PS4000)</b>
<b>Wall charger</b>	barrel-type included	pin-type included	barrel-type included

<b>Power requirements</b>	<b>PS250</b>	<b>PS3000</b>	<b>PS4500/4000</b>
<b>Rechargeable battery capacity</b>	8-10 hours	8-10 hours	<b>10-12 hours (PS4500), 8 hours (PS4000)</b>
<b>Rechargeable battery type</b>	Ni-Cad	Ni-Cad	Li-ion
<b>Display of battery capacity</b>	no	no	Yes
<b>Power requirement</b>	12VDC @ 100ma	12VDC @ 100ma	12VDC @ 500ma
<b>Power itself from the line</b>	with Line-to-DC option	Yes, with Line-to-DC option	Yes, with Line-to-DC option

<b>Environmental/Safety</b>	<b>PS250</b>	<b>PS3000</b>	<b>PS4500/4000</b>
<b>Size</b>	4" x 7.75" x 1.75"	4" x 7.75" x 1.75"	3.85" x 7.6" x 1.60" to 2.07" (PS4500)
<b>Weight</b>	1 lb (0.5KG)	1 lb (0.5KG)	1 lb (0.5KG)
<b>Operating temperature</b>	0 - 50 C (32 - 122 F)	0 - 50 C (32 - 122 F)	0 - 50 C (32 - 122 F)
<b>Operating humidity limit</b>	70% non-condensing	70% non-condensing	70% non-condensing
<b>Environmental operation</b>			
<b>voltage input impedance</b>	4Mohm line-line	4Mohm line-line	4Mohm line-line
<b>Designed to meet</b>	EN 61010-1 Cat II	EN 61010-1 Cat II	<b>EN 61010-1 Cat IV, 600V (PS4500)</b>



## Choosing the Right PowerSight Model



Cost	PS250	PS3000	PS4500/4000
Comparable system cost*	US\$1980	US\$4050	US\$5525 (PS4000) US\$5925 (PS4500) with 3 current probes

### Notes and Explanations of the Comparison Table\*\*

**Basic sampling rate.** This is the basic rate at which inputs are sampled. However, most samples are unnecessary for most measurements so many are not used, depending on the model. The PS250 and PS3000 use samples sufficient to do RMS measurements of voltage and current including the components of the first 25 harmonics. All models use samples sufficient to analyze harmonics to the 50<sup>th</sup> harmonic of a 60 Hz fundamental when creating waveforms. The PS3000 uses its highest rate of 16 usec when detecting transients. The PS4500/4000 continuously uses its 8 usec rate to simultaneously measure transients, swells, dips, harmonics, and power measurements on all channels, using over 2000 samples per cycle on its measurements.

**Basic RMS measurement rate.** The PS250 and PS3000 look at 2 cycles of each channel every second and do complete measurements of relevant parameters during normal operating modes. Thus one measurement is generated every second, regardless of the recording rate. The PS4500/4000 does complete measurements of every cycle of every channel, regardless of the recording rate. Therefore, the PS4500/4000 misses nothing in its measurements and every measurement is inherently more accurate. All models are inherently more accurate than competing products that only do measurements when they are about to create a new record in their log.

**True 3-phase.** Unlike other instruments of this size, PowerSight is a true 3-phase meter. This means that all three phases and totals are accurately measured. Voltage, current, power, and power factor are not estimated. Instruments with only one voltage and one current channel cannot measure 3-phase power without making assumptions that are usually not true in the real world.

**Works with all power systems.** PowerSight models are meant to be used on any power system anywhere in the world. They can accurately measure single phase, two phase, three phase, 3- ½ phase, DC, 2CT/2PT, 3CT/3PT, regenerative, 50Hz, 60Hz, 400Hz, DC, variable frequency, phase-phase, phase-neutral, 69/120V, 120/208V, 200V, 240V, 277/480V, 600V systems. Accessories are available for direct connection to voltages as high as 15,000V, to bus bars, and multiple cable pairs.

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**Voltage measurement accuracy.** Accuracy for PS250 and PS3000 is stated as a percent +/- 0.2V between 0.5-399.9V, +/-2V between 400-3,999V. Accuracy for the PS4500/4000 is stated as a percent of reading +/-0.3V.

**Current measurement accuracy.** Accuracy for PS250 and PS3000 is stated as a percent +/- 0.2A between 0.1-399.9A, +/-2A between 400-3,999A for an HA1000. Add to the stated accuracy the percentage for any other probe that is used. Accuracy for the PS4500/4000 is stated as a percent of reading +/- the accuracy of the probe (other than an HA1000).

**Power measurement accuracy.** Add to the stated accuracy the percentage for any probe used, other than the HA1000.

**Swell (surge) triggering/capture.** Swells are detected by PS250 and PS3000 as part of the normal 1 second measurement interval. The PS4500/4000 detects swells lasting as little as ½ cycle and measures every ½ cycle of every channel. When detected, the swell can be recorded to a file, can have its RMS profile captured and graphed for every ½ cycle for the length of the swell, and/or can have 12 cycles of the waveform captured for the swell.

**Dip (sag) triggering/capture.** Dips are detected by PS250 and PS3000 as part of the normal 1 second measurement interval. The PS4500/4000 detects any dip lasting as little as ½ cycle while it measures every ½ cycle of every channel. When detected, the dip can be recorded to a file, can have its RMS profile captured and graphed for every ½ cycle for the length of the dip, and/or can have 12 cycles of the waveform captured for the dip.

**Inrush current capture.** Inrush current is measured by PS250 and PS3000 as part of the normal 1 second measurement interval. The PS4500/4000 detects inrush current lasting as little as ½ cycle as it measures every ½ cycle of every channel. When detected by the PS4500/4000, the inrush can be recorded to a file, can have its RMS profile captured for every ½ cycle for the length of the inrush, and/or can have 12 cycles of the waveform captured for the inrush.

**High speed transient capture.** High speed transient capture is done in limited fashion in the PS3000 as part of the Disturbance Monitoring mode of operation. Only one channel is monitored during this mode. The transient threshold can be set roughly, in approximately 24V increments. Transients are detected when they exceed an absolute value of voltage that includes the fundamental sine wave. When detected, the transient is “accumulated”. This means that it is added to a running total of transients that have occurred on the channel since disturbance monitoring began. The worst transient that is detected has the following information available on the meter: the time/date that it occurred, the

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peak absolute value of the transient, the length of time it lasted, and its rise time. Transients of at least 32 usec can be detected and measured in 16usec increments.

The PS4500/4000 detects transients on all channels simultaneously, while doing all other measurement functions simultaneously. The transient threshold can be set in 1V increments and can be set to detect absolute values (as with the PS3000) or relative values (where the fundamental periodic waveform is removed). When a transient is detected, the transient information of time/date, maximum value, and duration can be added to a log and waveform can be captured to a file. Transients of at least 16 usec can be detected and measured in 8usec increments.

### **Simultaneous measurement of power / harmonics / swell / dip / transients.**

The PS3000 performs power measurement and limited swell and dip measurement on all channels simultaneously. It pauses to do harmonics and it operates in a special mode to detect transients. The PS4500/4000 performs power, harmonic, swell, dip, and transient analysis simultaneously on all channels.

**AC/DC voltage and current measurement.** All PowerSight models use the same probes interchangeably. This includes AC and DC current measurement and direct voltage measurement up to 15,000 Vrms with the 15KVP.

**Fundamental frequency measurement.** All models can operate in fixed 50Hz, fixed 60Hz, and fixed 400Hz modes. The PS250 and PS3000 can also track frequencies between 45 and 66 Hz and between 360 and 440 Hz. The PS4500/4000 can track frequencies between 20 and 70 Hz for tracking the output of a variable speed drive. It also can track from 360 to 440 Hz. In one of the 400 Hz modes, the PS4500/4000 calculates harmonics to the 31<sup>st</sup>.

**Duty cycle / on-off cycles.** The PS3000, PS4000, and PS4500 can determine the duty cycle of operation. This is the proportion of time that a unit under test is “on”. The user sets the value of current considered to be the “on” value. In addition, estimates of number of on-off cycles per hour, per week, and per month are continually estimated during monitoring.

**Provisions for input ratios for PTs and CTs.** PowerSight automatically identifies each current probe when it is connected and assigns the correct input ratios for correct measurements. In addition, the user can enter ratios to be used for specific measurement sessions. These ratios can be entered via our PSM software or entered directly using the keypad with the PS4500/4000/3000.



## Choosing the Right PowerSight Model



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**Voltage measurement with accessories.** Special high voltage probes can be used for direct measurement of voltages to 15,000Vrms. However, these probes require the user to enter an input ratio.

**Current measurement with accessories.** A wide range of current probes are available for measuring any current. They are interchangeable and self-identifying so no input ratio needs to be entered into the meter. New current probes are added as the need arises.

**Detection of errors in connection.** The PS3000 and PS4000 have our Checkout Connections feature whereby the customer proceeds through a 6 step process to help the user determine that the connections are all correct. The PS250 and PS4500 have the powerful SureStart™ Logging feature that uses artificial intelligence to analyze the connections, wiring, and setup parameters in order to report what problems are likely to exist before you begin monitoring.

**Carrying cases.** There are various carrying case options including soft cases, hard cases, and weather-resistant. The meter may be operated and carried in the weather-resistant carrying case and in the SCAS2 soft case.

**Comparable system cost.** This is a cost comparison of similar systems. Actual systems may cost more or less than shown, depending on the options chosen. The PS250 system is a PS250 with 3 HA1000 probes and without the Harmonics Option. The PS3000 system is a PK313M with 3 HA1000 current probes and a CAS3 hard shell carrying case. The PS4400/4000 system combines a meter with 3 HA1000 current probes and a CAS3 hard shell carrying case.

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