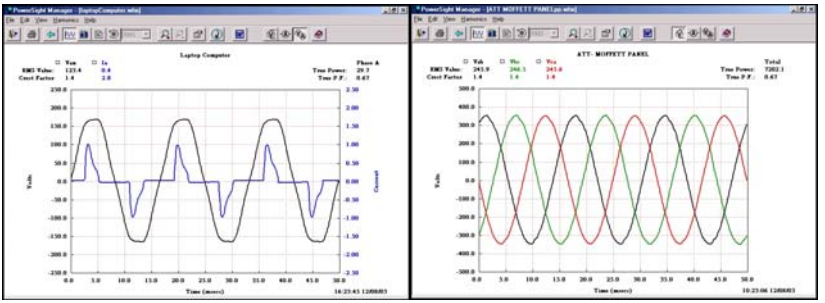
User's Manual for PowerSight® PS4000

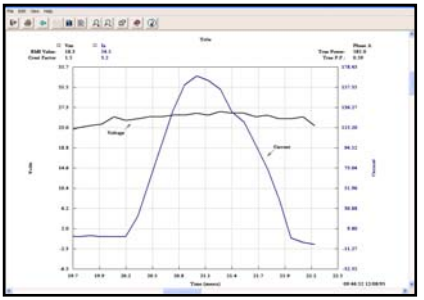
Summit Technology, Inc.
Walnut Creek, CA 94597
Tel: 1-925-944-1212
Fax: 1-925-944-7126
support@summitTechnology.com
http://www.summitTechnology.com

Rev for FW 3.[illegible] SW 3.1X

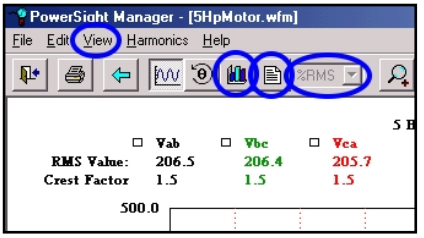
Table of Contents



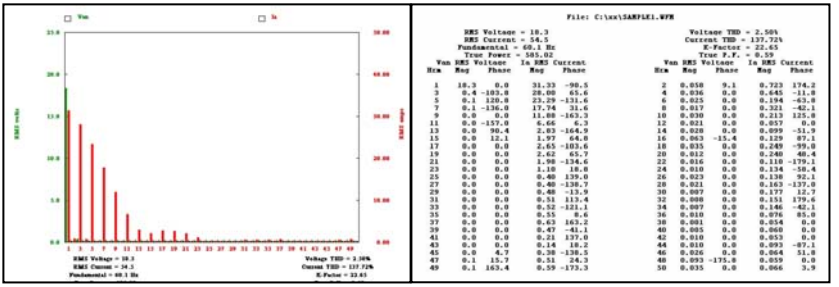
There is a wealth of features related to viewing and analyzing waveforms. Voltage and current can be viewed together and multiple phases of signals can be viewed together.

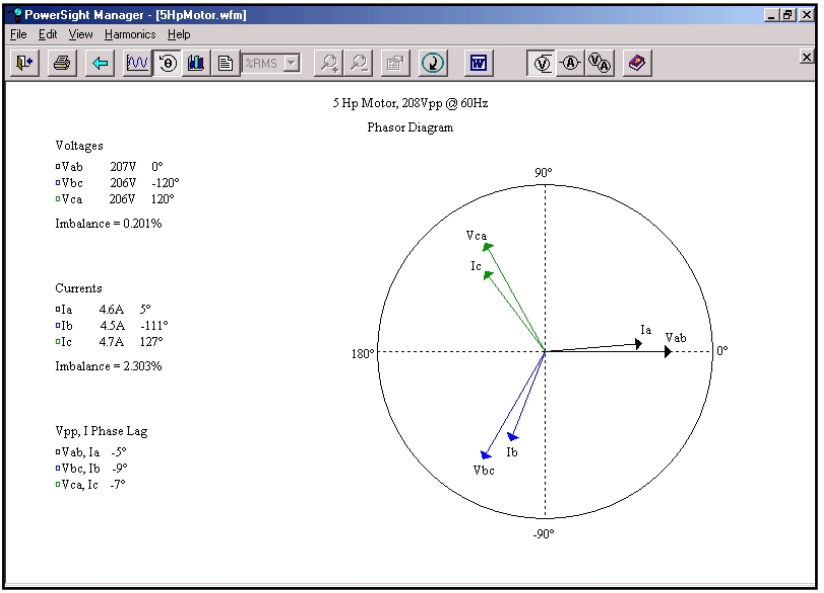


Portions of waveforms can be zoomed into and panned left/right or up/down. Refer to the Working with Graphs and Wavefoms section to learn more about available presentation and analysis features.

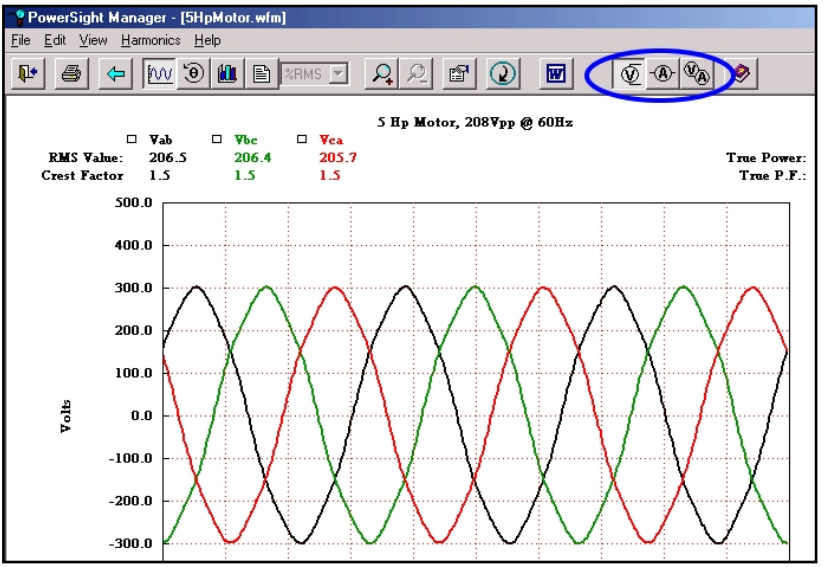


You can easily transform any waveform into either a graph of harmonic data or a view the raw data for each harmonic and K factor. To convert a waveform ("time domain" representation) into a harmonic graph ("frequency domain" representation), click on the



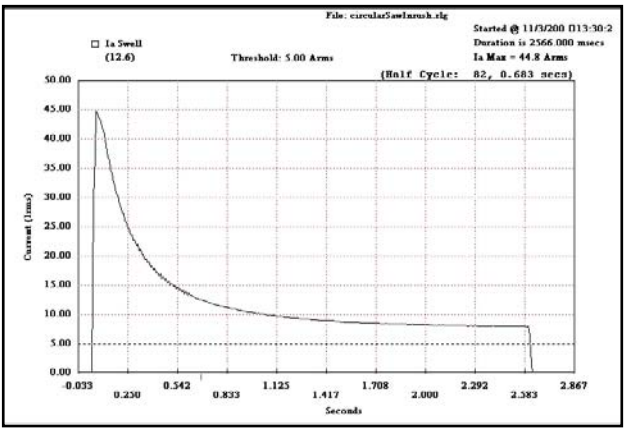


Another convenient analysis feature are the signal selection icons. Clicking on these icons allow you to simply cycle through the individual voltages, currents, or phases. The order of presentation as you click on the icon is A, B, C, and then ABC together.



Swell/Dip RMS Graph Log

Each record of the Swell/Dip RMS graph log is a recording of the RMS level of the signal starting 2 cycles before the trigger threshold is passed and continuing for 48 cycles or until the first ½ cycle that did not exceed the trigger threshold and was followed by 1 second of not passing the trigger threshold. The record has timestamp and the RMS levels of each ½ cycle during the duration of the event. These records are typically not too data intensive, so they do not require an excessive amount of memory.



Each record of the swell/dip RMS graph log can be graphed for overall viewing of the event. Key data is listed above the graph. The time at which the trigger occurred, the duration, the signal name, and the magnitude are all listed. The graph displays RMS values of each ½ cycle for the entire length of the event. The graph can be zoomed-in on and can be printed.

The swell/dip event RMS data log is recorded as tab delimited text, so it can be imported into Excel for custom analysis.

Swell/Dip Event Waveforms

Swell/Dip Waveforms are detailed records of the waveform of a swell/dip event. They start 2 cycles before the event and continue for 10 cycles. These files are very data intensive and therefore a limited number of them should be recorded.

Monitoring High-speed Transient Events

Introduction

The three general areas of power quality analysis are in investigating on-going harmonic content, analyzing temporary changes in RMS voltage and current levels, and in analyzing instantaneous high-speed (non-RMS) voltage and current transients.

High-speed transients are voltages or currents unrelated to the fundamental frequency of the power being used. They may be due to lightning strikes, sudden shorts or opens, or switching of power sources, loads, and correction equipment. They may be large enough or last long enough to affect the RMS value of a cycle and thereby trigger a swell or a dip, but they are categorized by their peak level and their width rather than their RMS value and duration.

Transients are captured when the instantaneous voltage or current level exceeds the trigger level set by the user. Trigger levels can be set for an “absolute value” and for a “relative value”.

When a trigger is set to an absolute value, such as 180V, anytime the waveform reaches +180V or -180V, the event is captured. The event continues until the level goes slightly below the trigger level again.

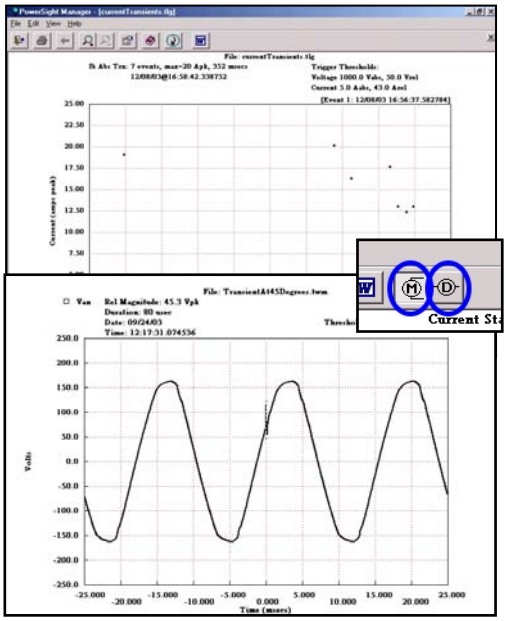
When a trigger is set to a relative level, such as 20V, the underlying periodic waveform is removed from consideration and the remaining, transient, signal is examined to see if it exceeds the relative trigger level (in this case, above +20V or below -20V).

There are two types of recordings of high-speed transient events that may be used:

- Transient Event log
- Transient Event waveforms.

The “timestamp” records the date and the time that the event began, to the nearest microsecond. The “signal affected” is simply the name of the signal that had was triggered, such as “Van”. The “peak value” is the highest (or lowest) instantaneous value that was reached. The “duration” is how long, in milliseconds, the event lasted, starting with the moment when the signal exceeded the trigger threshold and ending when the transient returned below the trigger level.

The placement of magnitude vs calendar timeframe allows spotting times of day that events occur, and noticing if events are of similar magnitudes. To view transient magnitude vs. time, click on the magnitude icon. To view transient duration vs. time, click on the duration icon.



Transient Event Waveforms

Transient event waveforms are detailed records of the waveform of a transient event. They last 50 msec, starting one cycle before the transient event occurred. These files are very data intensive and therefore a limited number of them should be recorded.

The waveforms can be graphed in order to better understand the transient event. Important information is at the top. The

Report Generator Software

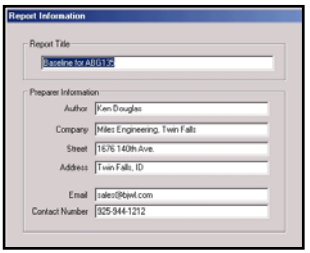
Introduction

PSM comes with a Report Generator Software program. The Report Generator software provides concise reports to summarize and document findings. Comparison reports are excellent for presenting before/after comparisons of power usage and projected cost. Separate logs can be compared or sections of the same log can be compared for this analysis. Summary reports summarize the data of a log or a designated section of the log. The reports can be data only, or can combine data and graphs.

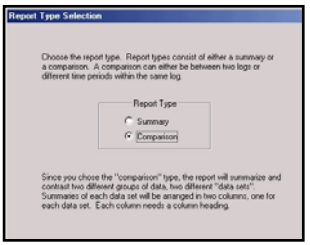
Generating a Report

To generate a report, either click “File” and then “New Report” at the main menu of PSM or run the program “Report.exe” located in the same directory of your computer that psm.exe is installed in.

The “Report Information” screen will now be displayed. This screen allows you to enter general information that will be printed on the report, such as the title of the report and contact information about the preparer of the report, so the reader can contact him. When you are done entering the information, click on “Next”.

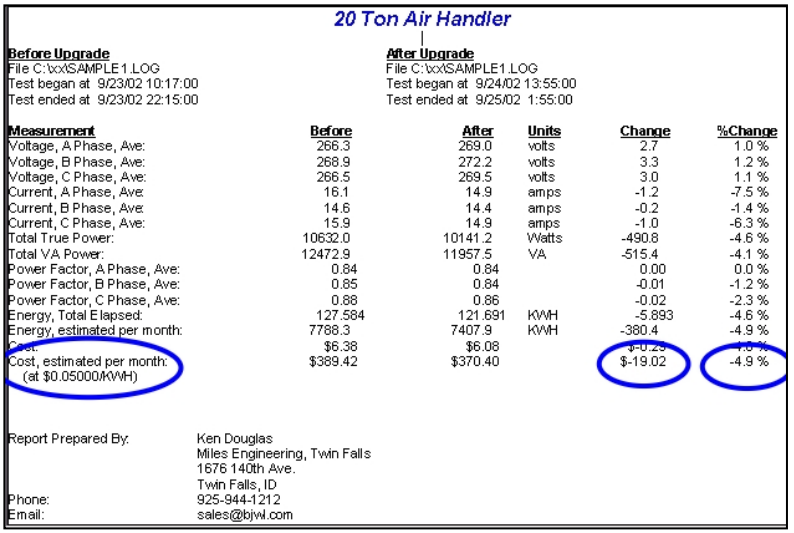


The “Report Type Selection” screen will now be displayed. You must choose between doing a summary report or a comparison report. A summary report



provides a concise summary value would be for one month if the "before" data continued for the entire month.

After the "Before" column, is the "After" column. This provides the summaries for the measurement types during the timeframe of



20 Ton Air Handler

Before Upgrade
File C:\xx\SAMPLE1.LOG
Test began at 9/23/02 10:17:00
Test ended at 9/23/02 22:15:00

After Upgrade
File C:\xx\SAMPLE1.LOG
Test began at 9/24/02 13:55:00
Test ended at 9/25/02 1:55:00

Measurement	Before	After	Units	Change	%Change
Voltage, A Phase, Ave:	266.3	269.0	volts	2.7	1.0 %
Voltage, B Phase, Ave:	268.9	272.2	volts	3.3	1.2 %
Voltage, C Phase, Ave:	266.5	269.5	volts	3.0	1.1 %
Current, A Phase, Ave:	16.1	14.9	amps	-1.2	-7.5 %
Current, B Phase, Ave:	14.6	14.4	amps	-0.2	-1.4 %
Current, C Phase, Ave:	15.9	14.9	amps	-1.0	-6.3 %
Total True Power:	10632.0	10141.2	Watts	-490.8	-4.6 %
Total VA Power:	12472.9	11957.5	VA	-515.4	-4.1 %
Power Factor, A Phase, Ave:	0.84	0.84		0.00	0.0 %
Power Factor, B Phase, Ave:	0.85	0.84		-0.01	-1.2 %
Power Factor, C Phase, Ave:	0.88	0.86		-0.02	-2.3 %
Energy, Total Elapsed:	127.584	121.691	KWH	-5.893	-4.6 %
Energy, estimated per month:	7788.3	7407.9	KWH	-380.4	-4.9 %
Cost:	$6.38	$6.08		$-0.29	-4.9 %
Cost, estimated per month: (at $0.05000/KWH)	$389.42	$370.40		$-19.02	-4.9 %

Report Prepared By: Ken Douglas
Miles Engineering, Twin Falls
1676 140th Ave.
Twin Falls, ID
Phone: 925-944-1212
Email: sales@bjwl.com

the "after" data. The next column is a statement of the units associated with the "before" and "After" columns. For instance, the "Units" for voltage measurement types is "volts".
The next column is the "Change" in the value of the "After" column from the data in the "Before" column. The values of this column use the same units as the "Before" and "After" columns (such as "volts"). At the far right is the "%Change" column. This presents what percent the "before" data has changed in going from "before" to "after". A negative number represents a decrease. Therefore the example shows an estimated cost savings of 4.9%, which represents a project savings of $19.02 per month for this one system.

Following the main body of the report is the information about how to contact the preparer of the report for follow-up.

Specifications*

Size

4” Wide × 8” Long × 1.75” Deep

Weight

Less than 2 pounds

Operating Range

0 - 50 degrees C (32 - 122 degrees F)
Relative humidity to 70% (non-condensing)

Power Requirement

12 VDC @ 500 ma, wall mount power supply included
Internal Li-ion operates up to 8 hours after 4 hours charge.

Voltage

Input Range: 1 - 600 Vrms steady-state (direct input),
or 600 – 5,000 Vrms with 5KVP probes,
or 600 – 15,000 Vrms with 15KVP probes.
Display Range: 1 - 6 megavolts (using input ratios)
Accuracy: 0.1% of reading +/- 0.3 Vrms
Measure Rate: Measure every cycle of every input.

Frequency Response: No de-rating of accuracy for harmonics through 4500 Hz)

Current

Input Range: 0.01 - 5000 Amps, AC or DC with the proper current probe attached
With HA5: 0.02 - 5 Amps
With HA100: 0.1 - 100 Amps
With HA1000: 1 - 1000 Amps
With FX3000: 10 – 3000 Amps
With FX5000: 100 - 5000 Amps
With DC600: 5 - 600 Amps DC
6 autoranges
Display Range: 1ma - 6 megamps (using input ratios)
Accuracy: 0.1% of reading plus accuracy of probe
Measure Rate: Measure every cycle of every input.
Frequency Response: dependent on current probe attached

With HA1000: no de-rating of accuracy for harmonics through 4500 Hz)

Frequency

Range: DC, 22 - 200 Hz, 360 – 440 Hz fundamental frequency
DC and 22 - 4500 Hz included in RMS
22 - 3900 Hz for harmonic measurements

Accuracy: 0.25%

Power, Energy, Cost, Power Factor

Display Range: 1 watt - 60 megawatts (using input ratios)

Accuracy: 0.5% plus accuracy of current probe

Measure Rate: Measure every cycle of every input.

Harmonic Distortion:

Range: Display of THD and individual harmonics through 25th (1800 Hz) of all signals
With PowerSight Manager software, display of harmonics through 63rd (3900 Hz)

Accuracy: To within 1% of fundamental

Measure Rate: Measure every cycle of every input.

Swell/Dip Detection:

Measure Rate: Measured every ½ cycle of every input.

High-speed Transient Detection:

Measure Rate: Measured every 8usec on every input.

Captured Waveforms

Quantity: set by user allocation of memory

* These specifications are subject to change without notice.