

The next generation in precision power analysis

**Watts, Volts, Amps, VA, VArS, Vdc, Adc, Vac, Aac, Vpk, Apk, Asurge, pf, frequency, phase, impedance, datalog, integration, fundamentals, harmonics**

- 0.02% basic accuracy
- Frequency range dc and 10mHz to 2MHz
- High precision internal shunts
- 1000Vrms - 3000Vpk direct voltage input
- Up to 50Arms - 1000Apk direct current input
- 5 millidegree basic phase accuracy
- 1, 2 or 3 phase versions
- Master - slave configuration for 6 phase operation
- High speed sampling on all channels
- 1GB internal flash memory
- Easy to use - Single button access to all measurement modes
- True no-gap measurement
- Real time Digital, Tabular, Graphic and Oscilloscope displays
- Real time datalog and integration
- Simple BNC connection of N4L shunts for high current applications
- RS232, IEEE488, USB, LAN, Torque, Speed and Extension ports
- Rack mounting option
- USB Memory port

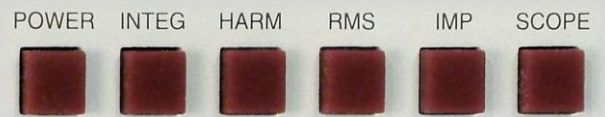
# Precision Power Analysis for today's applications



Today's designers of electronic devices ranging from power supplies and lighting ballasts to microwaves and motor drives face continued pressure to develop smaller and more efficient products. This push for greater efficiency results in an ever increasing frequency of power conversion techniques and with these new techniques comes the need for power measurement instruments with much greater high frequency accuracy.

Responding to this growing need, N4L has combined years of experience in high frequency measurement instrumentation with innovative developments in analog and digital design to produce a new generation of class leading precision power analyzers called the PPA5500 series. In common with many advances in technology, the PPA5500 series not only excels in performance but it achieves this at an exceptionally competitive price, putting high performance power analysis within the reach of all those who need it.

As with our PSM range of Phase Sensitive Multimeters, our priority when designing the user interface of the PPA5500 was to combine great flexibility with ease of use. The result is an instrument providing a greater range of functions than any competitive product and yet all primary measurements can be seen instantly by pressing just one of six mode keys.



## Power analyzer



By providing all primary measurement functions within the default display, users instantly see every function without the need to enter a separate menu.

Using the zoom buttons, functions of particular interest can be enlarged without losing other data.



In the three phase mode, all primary power functions can be viewed simultaneously on all three phases.

DC power and a selected harmonic are also displayed for all phases giving instant information on the dc and harmonic power content.

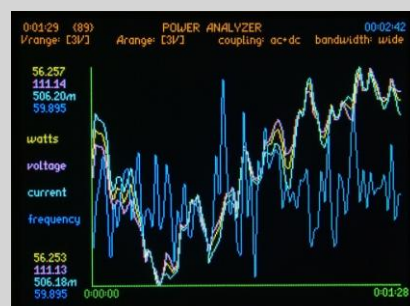
Power Analyzer mode displaying all primary power functions with both total and fundamental values plus the phase relationship to phase 1 voltage.



Measurement functions selected with zoom can be enlarged even further for easy viewing.

Here, the default zoom functions on phase 1 are shown and users can select any functions they wish to see, presented in any order.

## Datalog



When measurements over time are of interest, up to four selected functions can be viewed in datalog mode.

Datalog periods can be set with no gap so that no information is missed during datalog capture and the display is updated during datalog with real time, tabular or graphic display.



## Integrator

POWER INTEGRATOR			
	phase 1	phase 2	phase 3
W hours	252.12m	559.03m	596.89m
VA hours	1.7265	1.0355	3.8639
VAh hours	1.7080	871.67m	3.8175
pf avrg	0.146	0.540	0.155
V avrg	113.22	111.12	111.48
A hours	15.249m	9.3194m	34.660m

When the INTEG mode is selected, true and fundamental values of all integrated values are presented. Using the NEXT and BACK buttons, any individual phase or the sum value of all phases can be viewed.

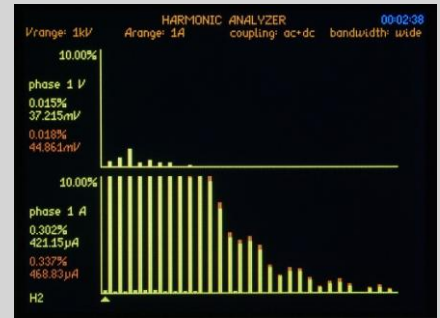
For convenience and flexibility, other measurement modes can be viewed while integration continues to operate in the background.

## Harmonics analyzer

Real time harmonic analysis to the 100th harmonic is made simultaneously on both voltage and current inputs.

THD computation with either series or difference formula can be selected plus TIF, THF, TRD and TDD computation is included as standard.

HARMONIC ANALYZER			
V	phase 1	phase 2	phase 3
1	111.0V 100.0%	110.9V 100.0%	111.3V 100.0%
2	3.345mV 0.003%	2.923mV 0.003%	2.203mV 0.002%
3	36.99V 33.34%	36.99V 33.34%	37.11V 33.33%
4	5.032mV 0.005%	4.881mV 0.004%	4.332mV 0.004%
5	22.19V 20.00%	22.19V 20.00%	22.26V 20.00%
6	7.383mV 0.007%	6.998mV 0.006%	6.631mV 0.006%
7	15.86V 14.30%	15.86V 14.30%	15.91V 14.29%
8	9.513mV 0.009%	8.323mV 0.008%	8.065mV 0.007%
9	12.32V 11.09%	12.32V 11.11%	12.38V 11.10%
10	11.48mV 0.010%	9.740mV 0.009%	9.890mV 0.009%
11	10.10V 9.104%	10.10V 9.104%	10.13V 9.099%
12	11.93mV 0.011%	11.54mV 0.010%	11.23mV 0.010%
13	8.534V 7.690%	8.532V 7.691%	8.560V 7.689%
14	13.86mV 0.012%	12.48mV 0.011%	11.80mV 0.011%
15	7.999V 6.667%	7.998V 6.666%	7.421V 6.666%
16	14.59mV 0.013%	13.12mV 0.012%	11.86mV 0.011%
17	6.337V 5.691%	6.336V 5.691%	6.556V 5.889%
18	14.98mV 0.014%	18.06mV 0.016%	19.87mV 0.018%
19	5.830V 5.254%	5.830V 5.255%	5.849V 5.254%



At the press of a button, the display can be switched between graphical, tabular or real time displays while measurements are made and without loss of any data.

To the left, a square wave signal has been applied illustrating the accuracy and resolution of harmonic measurements.

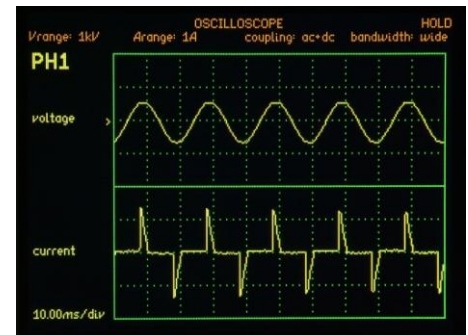
## RMS Multimeter

TRUE RMS VOLTMETER			
V	phase 1	phase 2	phase 3
rms	113.22	111.12	111.48
dc	21.668	791.81m	824.35m
ac	111.13	111.11	111.48
peak	178.7	148.2	158.3
cf	1.58	1.33	1.42
surge	178.7	157.6	158.5
mean	100.3	100.1	100.4
ff	1.129	1.111	1.110
frequency	59.895		

In addition to the true rms value of voltage and current on any measurement channel, RMS mode also provides real time analysis of dc, ac, peak, crest factor, surge, mean and form factor.

With a three phase display as shown above, all values can be seen on all phases for easy phase to phase comparisons.

## Oscilloscope



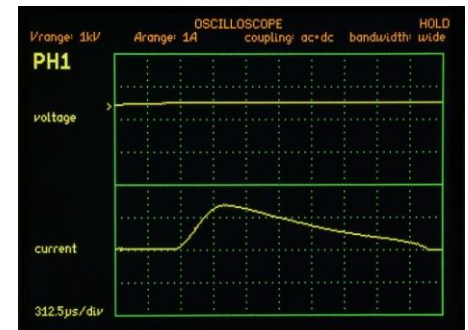
While a precise measurement in power applications generally requires the use of a numeric presentation, the SCOPE mode provided by the PPA5500 is a valuable aid to development and test.

## Impedance analyzer

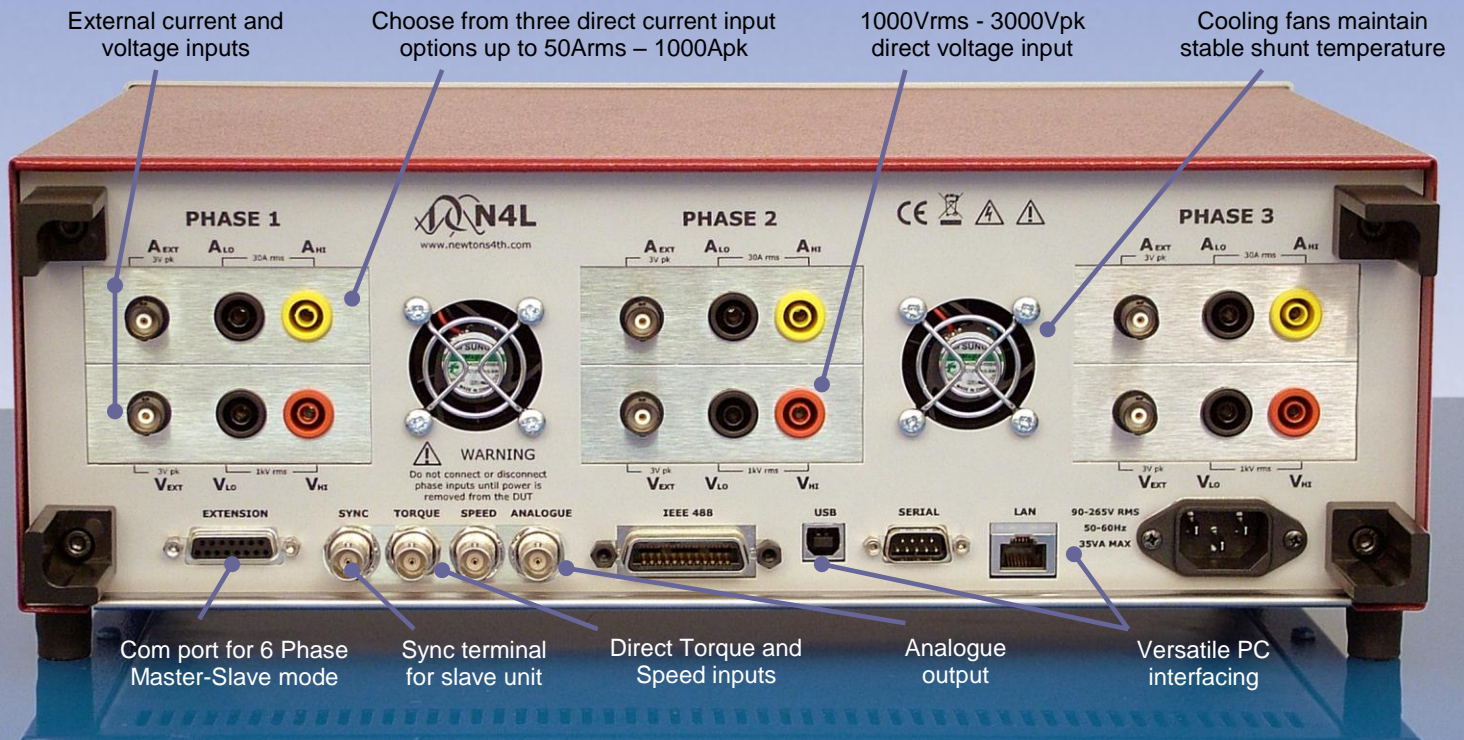
IMPEDANCE METER			
	phase 1	phase 2	phase 3
impedance	219.5	219.1	219.3
resistance	219.5	219.1	219.3
reactance	+553.6μ	+150.3μ	+137.5μ
phase	-360.00	-360.00	-360.00
frequency	59.895	59.895	59.895

Utilising true real time DFT analysis, the PPA5500 provides precision impedance measurements on any individual phase or a simultaneous display of all three phases as shown here.

Resistive and reactive components of the total impedance are presented along with the phase angle of each phase impedance and the fundamental frequency.



Display of voltage and current on a single phase or all three phase waveforms can be selected with user control of trigger level, pre trigger, timebase and cursors.



## Specification

### Measurements

W, VA, VArS, pf, V & A – rms, ac, dc, pk, cf and surge  
 Frequency, phase, fundamentals and impedance  
 Harmonics, THD, TIF, THF, TRD and TDD  
 Integrated values  
 Datalog  
 Sum and Neutral values

### Frequency Range

DC and 10mHz to 2MHz (10Arms or 30Arms versions)  
 DC and 10mHz to 1MHz (50Arms version)

### Voltage Input

Ranges – 300mVpk to 3000Vpk (1000Vrms) in 9 ranges  
 20% over-range ability maintains 300Vpk range with 240Vrms  
 Accuracy – 0.02% Rdg + 0.04% Rng + (0.004% x kHz) + 1mV\*  
 External sensor input to 3Vpk – BNC connector

### Current Input

The PPA is fitted with either 10, 30 or 50Arms internal shunts  
 10Arms Shunt (4mm safety type connection terminals)  
 Ranges – 3mApk to 30Apk (10Arms) in 9 ranges  
 Accuracy – 0.02% Rdg + 0.04% Rng + (0.004% x kHz) + 10uA\*  
 30Arms Shunt (4mm safety type connection terminals)  
 Ranges – 30mApk to 300Apk (30Arms) in 9 ranges  
 Accuracy – 0.02% Rdg + 0.04% Rng + (0.004% x kHz) + 100uA\*  
 50Arms Shunt (Touch Proof screw type connection terminals)  
 Ranges – 100mApk to 1000Apk (50Arms) in 9 ranges  
 Accuracy – 0.02% Rdg + 0.04% Rng + (0.004% x kHz) + 100uA\*  
 External shunt input to 3Vpk – BNC connector

### Phase Accuracy

5 millidegrees + (10 millidegrees x kHz)  
 10 millidegrees + (20 millidegrees x kHz) (50Arms shunt)

### Watts Accuracy

[0.03% + 0.03%/pf + (0.01% x kHz)/pf] Rdg + 0.05%VA Rng

### Common Mode Rejection

Total Common Mode and Noise effect on current channels  
 Applied 250V @ 50Hz – Typical 1mA (150dB)  
 Applied 100V @ 100kHz – Typical 3mA (130dB)

### Datalog

Up to 4 user selectable measurement functions (30 with optional PC software)  
 Datalog window From 10ms with no gap between each log  
 Memory RAM or non-volatile up to 10,000,000 records

### General

Crest factor Voltage and Current - 20  
 Sample rate Real time no gap - 2.2Ms/s on all channels  
 Low power accuracy Compliant with IEC62301 using internal shunt  
 Refer to low power measurement application note  
 Remote operation Full capability, control and data

### Ports

RS232 Baud rate to 38400 – RTS/CTS flow control  
 LAN (option L) 10/100 base-T Ethernet auto sensing RJ45  
 GPIB (option G) IEEE488.2 compatible  
 USB USB device – 2.0 and 1.1 compatible  
 Analogue Bipolar +/- 10V  
 Speed Analog bipolar +/- 10V or pulse count  
 Torque Analog bipolar +/- 10V  
 Sync Measurement synchronization for 6 phase mode  
 Extension Master slave control and N4L accessory port

### Standard Accessories

Leads Power, RS232, USB  
 Connection cables # 36A rated 1.5 meter long leads with 4mm – stackable terminals  
 1x Red, 1x Yellow and 2x Black per phase  
 Connection clips # 4mm terminated alligator clips – 1x Red, 1x Yellow and 2x Black per phase  
 Note # No Connection cables or clips supplied with 50Arms version  
 Documentation Calibration Certificate, User manual and quick start guide

### Physical

Display 320 x 240 dot Full colour TFT – white LED backlight  
 Size 135H x 400W x 250D mm – excluding feet  
 Weight 5.5kg – 1 phase 6kg – 3 phase  
 Rack Mounting Front panel bracket option -Rear support or shelf required  
 Safety isolation 1000V rms or dc – category II  
 Power supply 90-265 rms 50-60Hz 35VA max

\* measured fundamental value

All specifications at 23°C +/- 5°C. These specifications are quoted in good faith but Newtons4th Ltd reserves the right to amend any specification at any time without notice