**PPA4500** Series
**PPA5500** Series

**UPDATE!**
Apr 2017 PPA5500:
Leading High Freq
POWER ACCURACY
**PPA5500-HF**

FEB 2016 PPA5500:
Transformer Edition
**PPA5500-TE**

| Product Overview | |
|---|---|
| Leading wideband accuracy | Basic 0.01%(PPA5500) with class leading high frequency performance |
| Wide frequency range | DC, 10mHz to 2MHz |
| Fast sample rate and No-Gap | 2.2M samples/s |
| Leading phase accuracy | 0.005 Degrees plus 0.01 degrees per kHz  (0.003 Degrees - Transformer Edition) |
| Built in high precision current shunt | 10Arms, 30Arms or 50Arms with up to 1000Apk direct plus a wide range of external sensors |
| Versatile interfaces | RS232, USB, LAN, GPIB as standard (PPA5500) plus direct Torque and speed |
| Range of PC software options | Remote control, monitoring and recording of real time data, tables and graphs |
| PWM Motor Drive Measurements | Highest performance Analyzer on the market for PWM Motor Drive Evaluation |
| External Voltage BNC Connector | Unique External BNC connector with high sensitivity to interface with external High Voltage Probes |
| HF + TE Accuracy | Increased High Frequency and Low Power factor as standard, -HF and -TE certification optional |

# PPA5530 Precision Power Analyzer
## FRONT VIEW
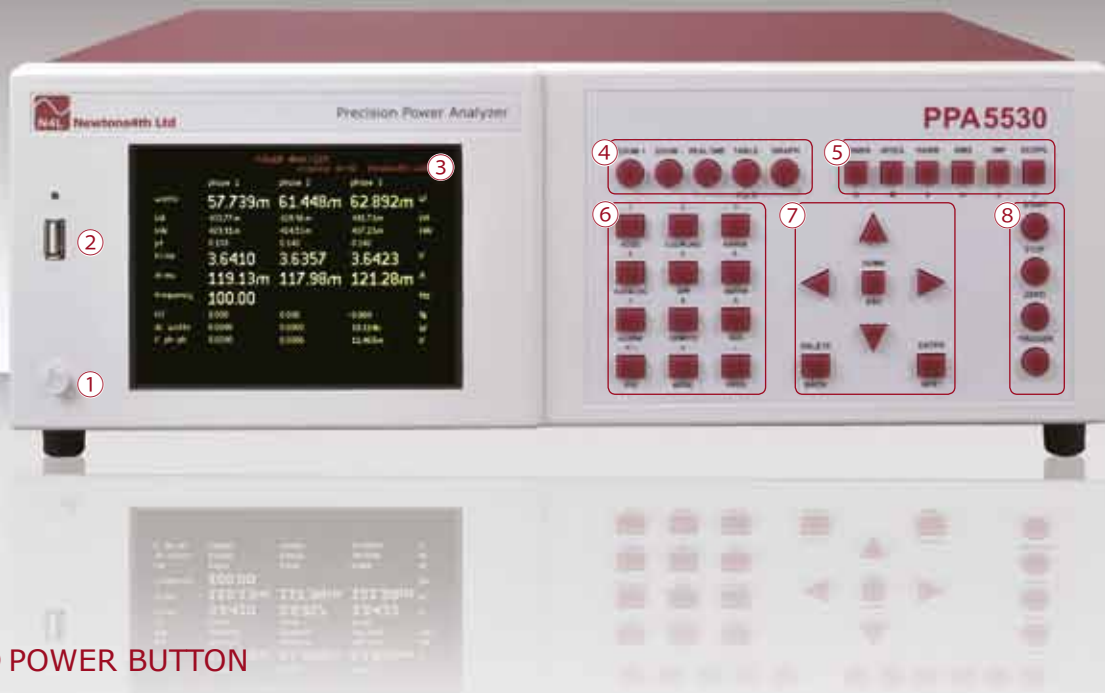


① **POWER BUTTON**

② **FRONT USB PORT**

USB memory port allows data or screendumps to be saved directly to a USB pen drive

③ **DISPLAY SCREEN**

White LED backlight colour TFT display with high contrast and wide viewing angle

④ **SCREEN DISPLAY OPTIONS**

Zoom, Real time, Table and Graph options

⑤ **MEASUREMENT FUNCTION SELECTION BUTTONS**

- POWER ANALYZER
- POWER INTEGRATOR
- HARMONIC ANALYZER
- TRUE RMS VOLTMETER and AMMETER
- IMPEDANCE METER
- OSCILLOSCOPE



Measurement Mode Control

⑥ **MEASUREMENT SETTINGS BUTTONS**

Acquisition settings - Sets wiring configuration,

Smoothing and data logging

Coupling - Set coupling to AC, DC or AC+DC, also set bandwidth

Range - Internal or external attenuator, autoranging settings, scale factors

Application mode - PWM, ballast, inrush current, power transformer, standby power, IEC61000 (PPA5500)

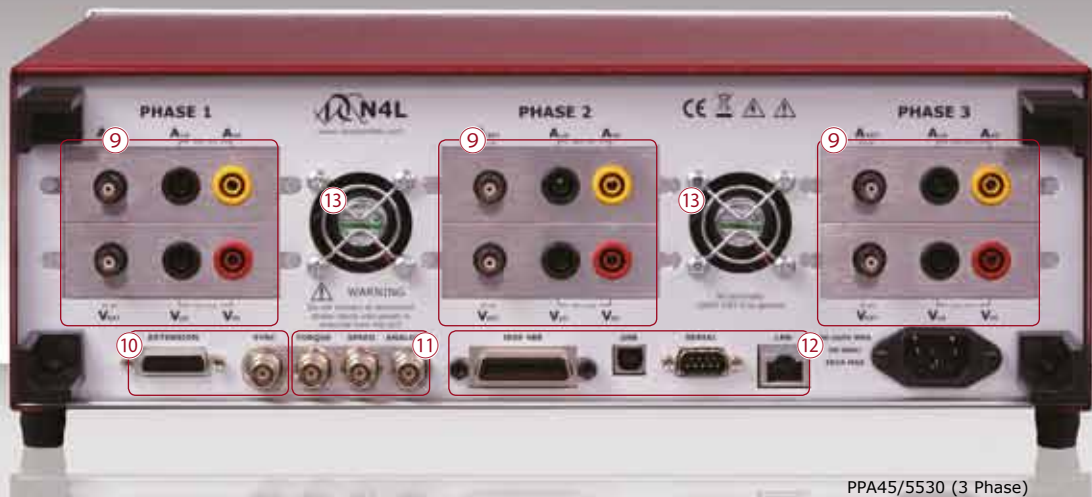Plus direct configuration of - Alarm, Auxiliary, Remote, System and Program functions

⑦ **MENU SELECTION AND CURSOR CONTROL**

⑧ **START, STOP, ZERO AND TRIGGER**

Trigger button refreshes measurement, Zero resets datalog or allows an offset trim

Start and Stop buttons provide manual control of a measurement period

PPA45/5530 (3 Phase)

## ⑨ PHASE INPUTS

Direct voltage Input: 3kVpk (1kVrms) in 9 ranges*

Direct current Input: 300Apk (30Arms) Standard Model, 30Apk (10Arms) Low Current Model, 1000Apk (50Arms) High Current Model

External voltage and current sensor inputs to 3Vpk in 9 ranges* - BNC Connector

## ⑩ SYNC CONNECTOR

All PPA models can offer up to 12 phase analysis using the PPALoG PC program Additionally two PPA45/5530's can be connected via the extension port and sync BNC connector to form a 6 phase analyzer when a PC is not available

## ⑪ EXTERNAL SENSOR INPUTS

+/-10V or pulsed input from torque and speed sensors provides direct measurement of mechanical power + analogue output

## ⑫ PC INTERFACE CONNECTIONS

Standard interfaces RS232 + USB + LAN + GPIB (Standard on PPA5500, GPIB optional on PPA4500)

## ⑬ LOW NOISE COOLING FANS

Air bearing low noise fans are utilized to ensure minimum audible and electrical noise while maintaining a stable operating temperature for the high precision low inductance internal current shunts
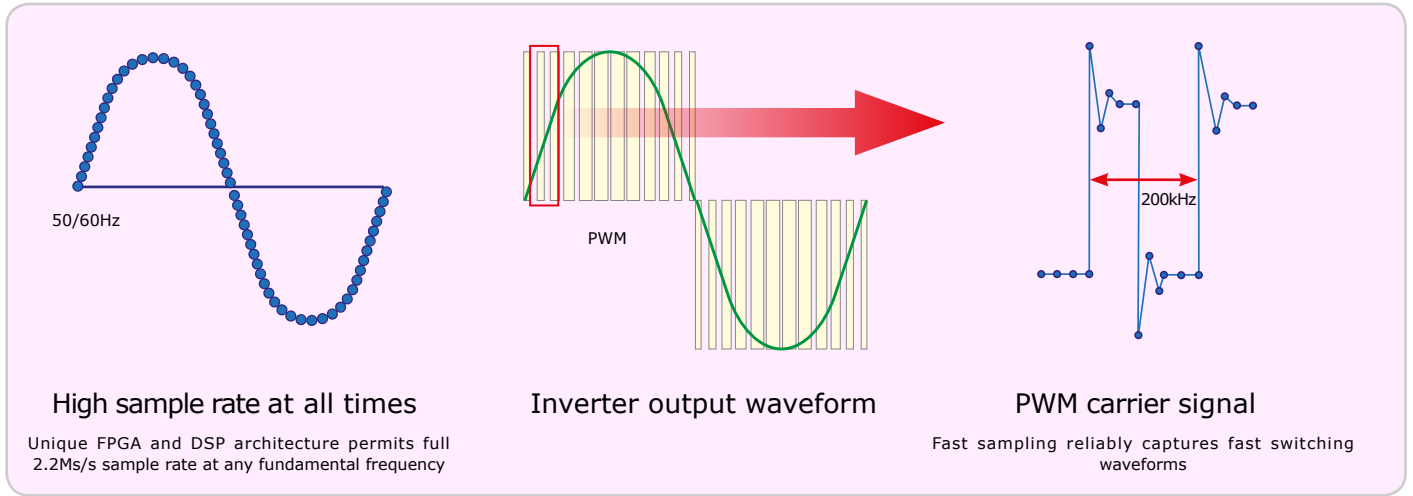
*PPA4500 - 8 ranges

# FEATURES

## ■ High Speed Power Measurement - 2ms* Datalog Interval `PPA5500` `PPA4500`
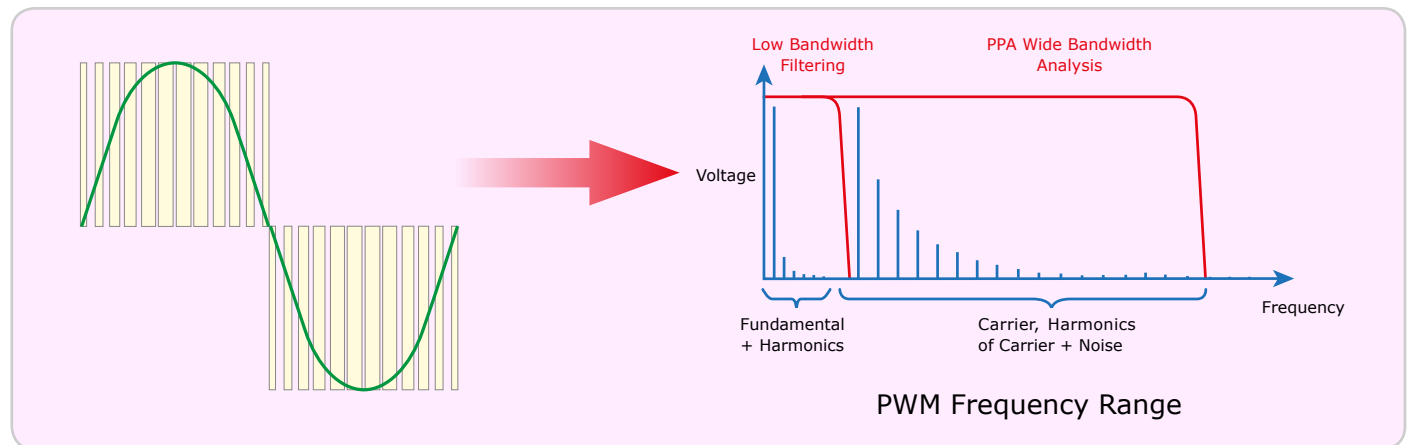
Measurements include all frequency components in power waveforms for example, fundamental, harmonics of the fundamental and the carrier of a PWM inverter output by maintaining 2.2Ms/s sampling at any drive frequency

※PPA4500 10ms datalog interval

50/60Hz

PWM

200kHz

### High sample rate at all times
Unique FPGA and DSP architecture permits full 2.2Ms/s sample rate at any fundamental frequency

### Inverter output waveform

### PWM carrier signal
Fast sampling reliably captures fast switching waveforms

## ■ 2MHz Wideband Frequency Response `PPA5500` `PPA4500`

With 2MHz bandwidth and exceptionally flat response, the PPA provides precision analysis of total power in applications such as lighting ballasts or PWM drives that involve a wide range of frequency components. Proprietary to N4L, a digital process called Expanded Nyquist Sampling ensures no alias components
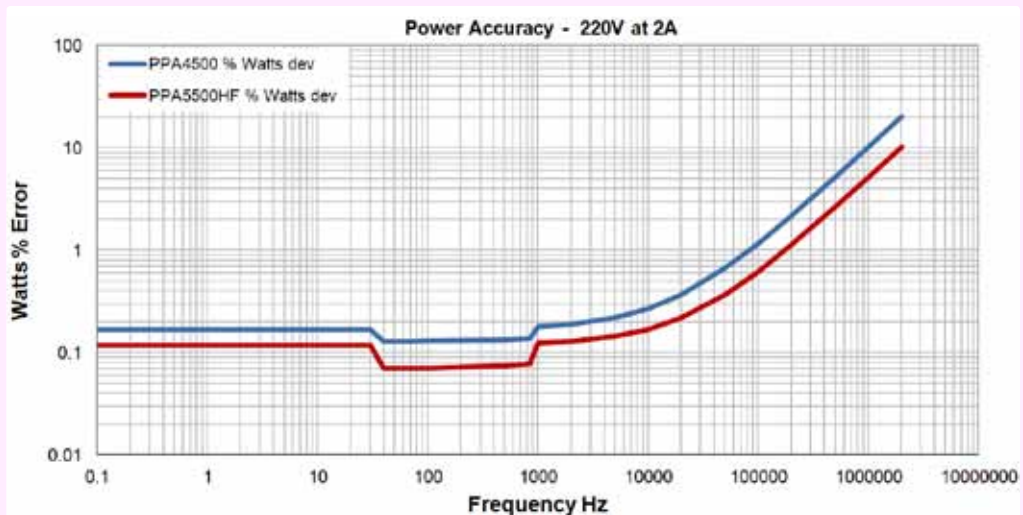
Low Bandwidth Filtering

PPA Wide Bandwidth Analysis

Voltage

Fundamental + Harmonics

Carrier, Harmonics of Carrier + Noise

Frequency

### PWM Frequency Range

## ■ High Accuracy `PPA5500` `PPA4500`

Unique voltage and current analogue card design ensures high accuracy for both power and harmonic analysis
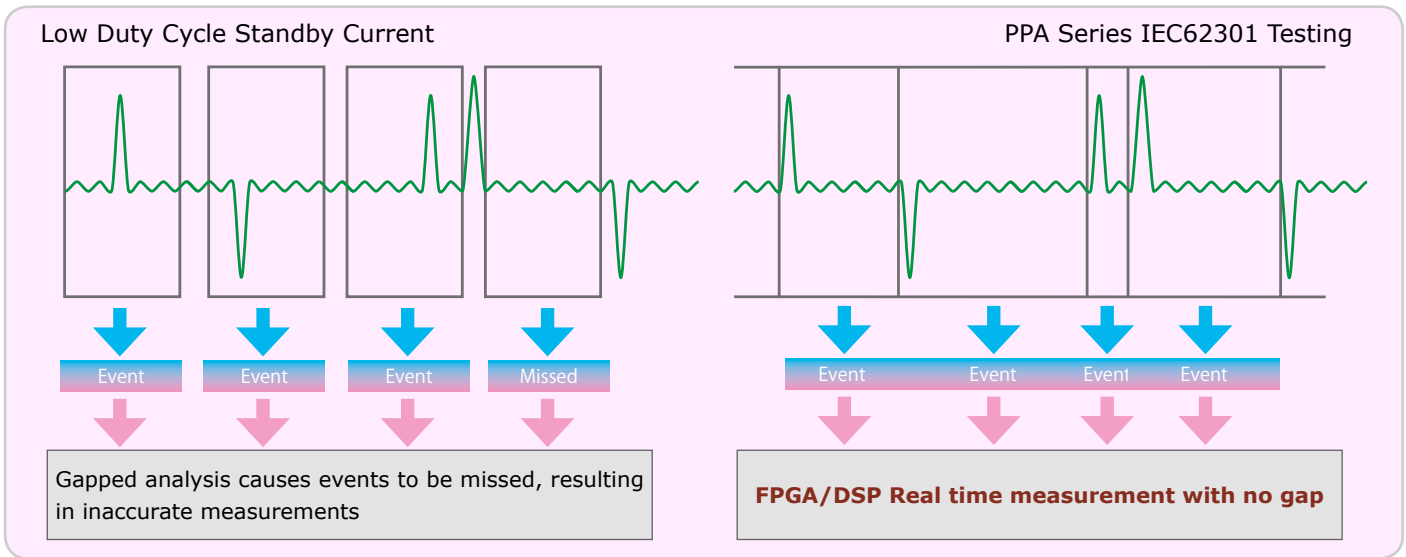
### Class Leading Power Accuracy

PPA5500-HF Power Accuracy: [0.03% + 0.03%/pf + (0.005% x kHz)/pf] Rdg + 0.03%VA Rng*
@ 220V (300V Range), 2A (3A Range), Power Factor 1          [40-850Hz 0.01%VA Rng*]

**Power Accuracy - 220V at 2A**

- PPA4500 % Watts dev
- PPA5500HF % Watts dev

Watts % Error

Frequency Hz

# ■ DFT Real Time No Gap Analysis  PPA5500  PPA4500

Many power applications have fast changing asynchronous current pulses which are not suited to fixed data length FFT analysis. The PPA series combine a real time DFT (Discrete Fourier Transform) technique with variable window no gap analysis to ensure the optimum speed and accuracy at all times
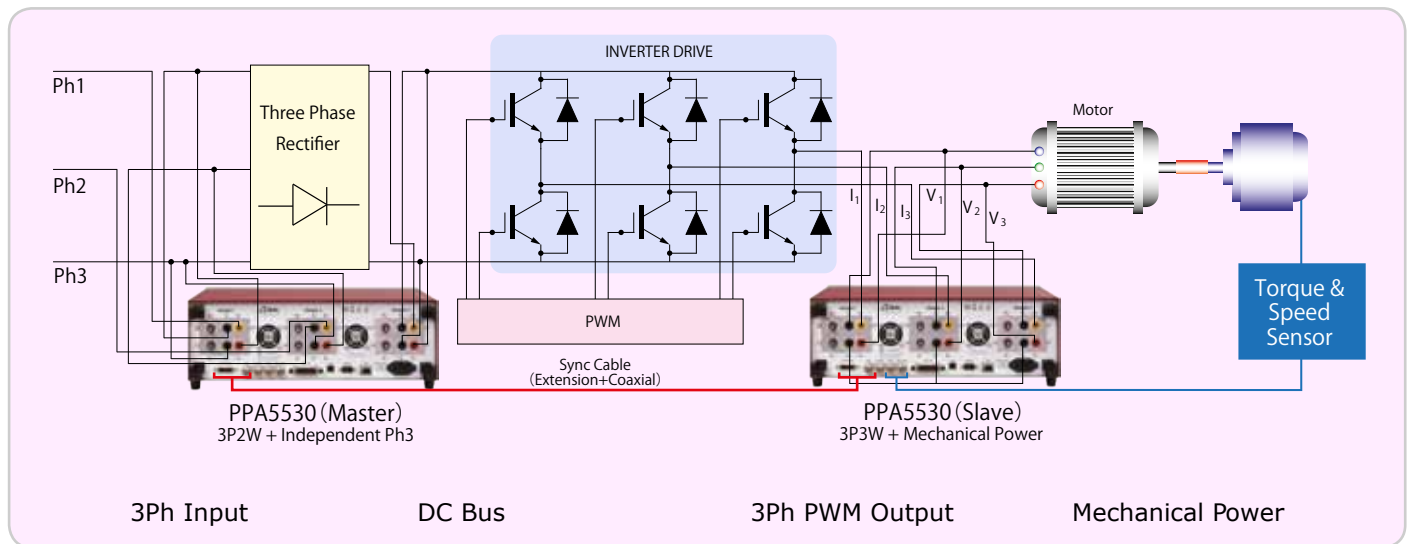


Low Duty Cycle Standby Current

PPA Series IEC62301 Testing

Event | Event | Event | Missed

Event | Event | Event | Event

Gapped analysis causes events to be missed, resulting in inaccurate measurements

**FPGA/DSP Real time measurement with no gap**

· Missing data compromises power accuracy
· Long term measurement integration achieves approximately correct average power

· Real Time No Gap analysis ensures correct power measurement
· Simultaneous fundamental and pulse frequency synchronization quickly obtains the correct power

# ■ Up to 6 Phase Analysis  PPA5500  PPA4500

Master/Slave mode enables two PPA45/5530's to be fully synchronized into a single 6 phase measurement system
※4 or more phase measurements provided via N4L PC software or master slave mode



INVERTER DRIVE

Ph1

Three Phase Rectifier

Ph2

Ph3

PWM

$I_1$ $I_2$ $I_3$   $V_1$ $V_2$ $V_3$

Motor

Torque & Speed Sensor

Sync Cable (Extension+Coaxial)

PPA5530（Master）
3P2W + Independent Ph3

PPA5530（Slave）
3P3W + Mechanical Power

3Ph Input          DC Bus          3Ph PWM Output          Mechanical Power

Advantages of Dual PPA vs Single instrument
· Twice the processing power as one unit
· Flexibility between different applications
· Units fully synchronized giving single point of control

Measurement parameter examples
· Input/Output power measurement
· Efficiency of the inverter
· Inverter output voltage harmonics
· Motor drive characteristics

# FUNCTIONS

## ■ Input Torque and Speed Sensor  `PPA5500`  `PPA4500`

Direct measurement of torque and speed from dedicated inputs that are fully synchronized with the voltage and current channels permits true real time power conversion efficiency to be evaluated
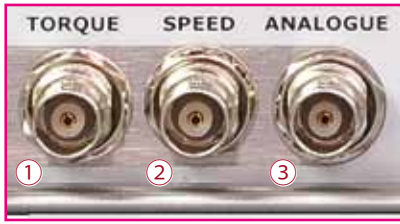


①TORQUE    Bipolar±10V / pulsed
②SPEED      Bipolar±10V / pulsed
③ANALOGUE  Analogue output of
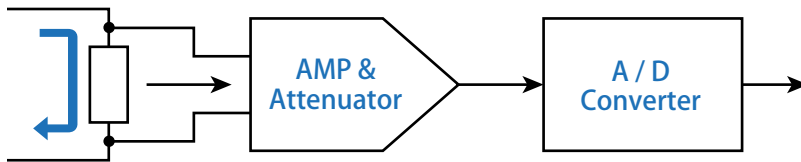                 selected function ±10V
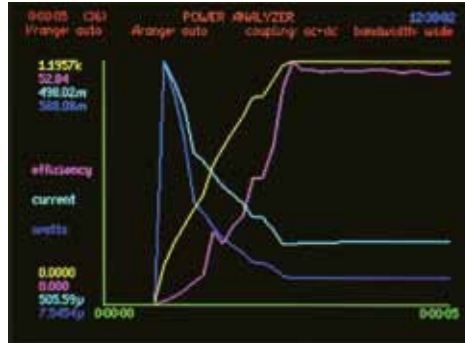

Graph


Real time data

## ■ Built in Amplifier and Unique Shunt Resistor  `PPA5500`  `PPA4500`



The PPA series use a single shunt resistor unique to N4L that combines exceptional linearity and no need for relay switching which can cause measurement errors

| Model | Low Current Model | Standard Model | High Current Model |
|---|---|---|---|
| PPA5500 | 9 ranges: 3mApk - 30Apk (10Arms) 100mΩ Shunt | 9 ranges: 30mApk - 300Apk (30Arms) 10mΩ Shunt | 9 ranges: 100mApk - 1000Apk (50Arms) 3 mΩ Shunt |
| PPA4500 | 8 ranges: 10mApk - 30Apk (10Arms) 100mΩ Shunt | 8 ranges: 100mApk - 300Apk (30Arms) 10mΩ Shunt | 8 ranges: 300mApk - 1000Apk (30Arms) 3mΩ Shunt |

### External shunt options

(DC ∼ 1MHz, 0.1% Accuracy, Inductance<1nH)

| Model | Maximum Current | | Bandwidth |
|---|---|---|---|
| | Rated A | Peak | |
| HF500 | 500Arms | 5000Apk | |
| HF200 | 200Arms | 2000Apk | |
| HF100 | 100Arms | 1000Apk | DC ∼ 1MHz |
| HF020 | 20Arms | 200Apk | |
| HF006 | 6Arms | 60Apk | |
| HF003 | 3Arms | 30Apk | |


HF003


HF500



Measured Current exceeds capacity of internal shunt (such as EV motors)

Selected Shunt

Current Detection

HF500

Shunt output

Shunt output

Selected Shunt

HF003

Current Detection

Small battery powered equipment

Utilising external shunt resistors

## ■ Power Analysis  PPA5500  PPA4500
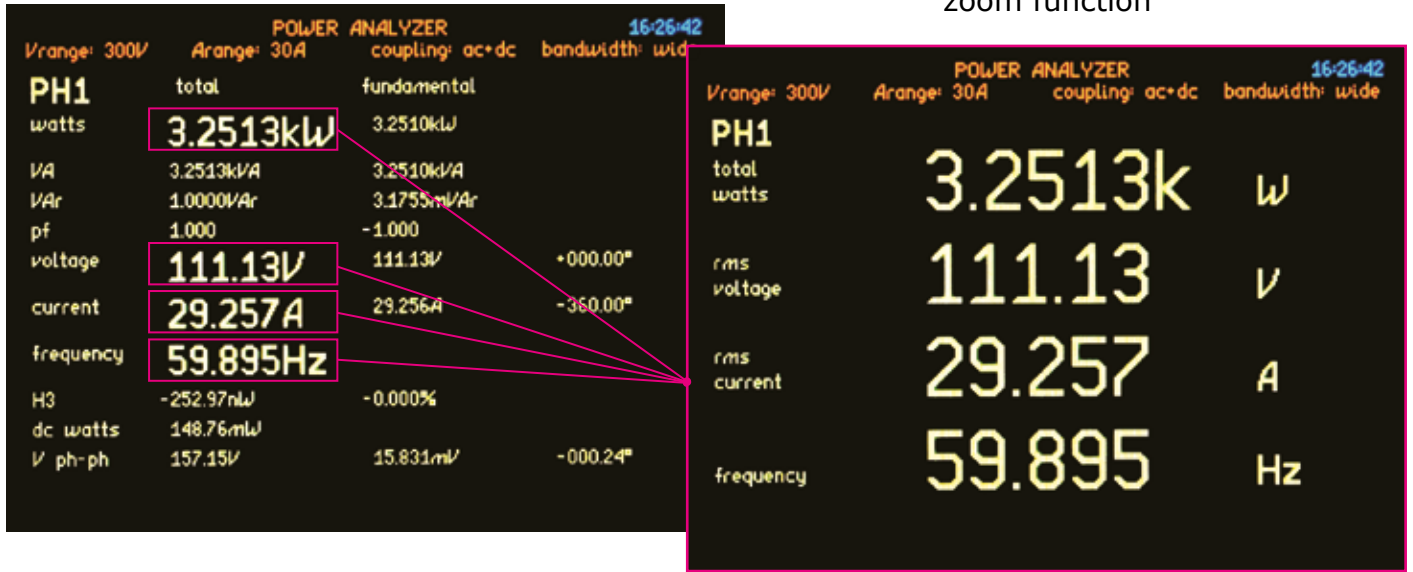
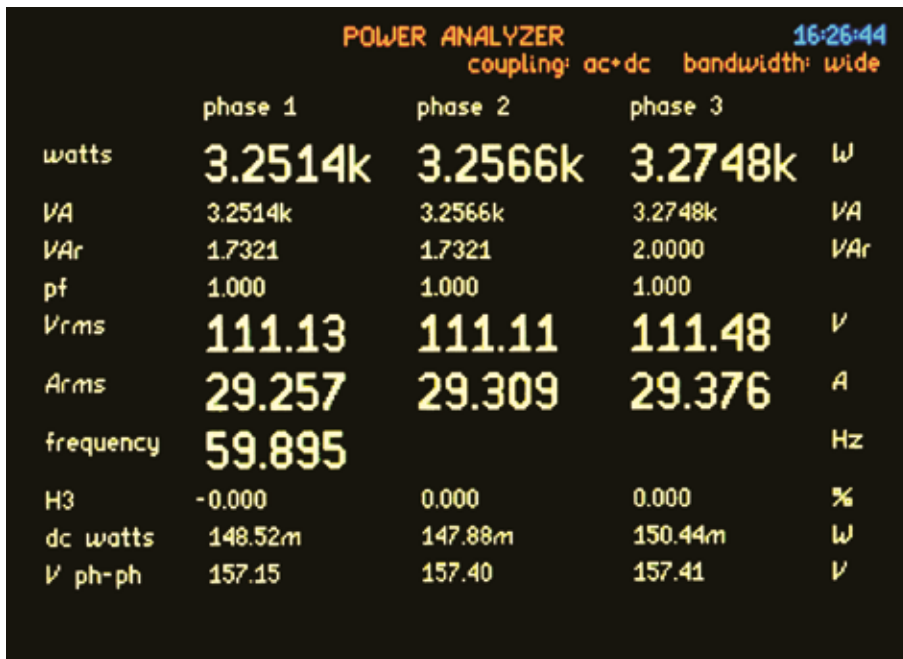### Any parameters can be enlarged with the zoom function





Zoom function enabled on total watts, rms voltage, rms current and frequency



3 Phase analysis display selectable in both Total and Fundamental values

All power measurement and RMS values are computed simultaneously allowing measured values to be selected and viewed during analysis

Here, three phase total power is selected with all primary power functions in each phase plus frequency, a selected harmonic, dc watts and phase to phase voltage

Mechanical power, Maths and Efficiency functions can also be added to this screen giving real time analysis of electrical or electrical to mechanical systems

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### MEMORY

Large 1GB (PPA5500 series) internal memory, data logging from 2ms intervals with synchronization to the fundamental frequency and no gap between measurements

Datapoint storage up to 10M in the PPA5500 series

Alternatively the data can be stored in an external USB pen drive or directly to PPALoG PC software

### Voltage, Current, Frequency and Power - Examples of graph mode
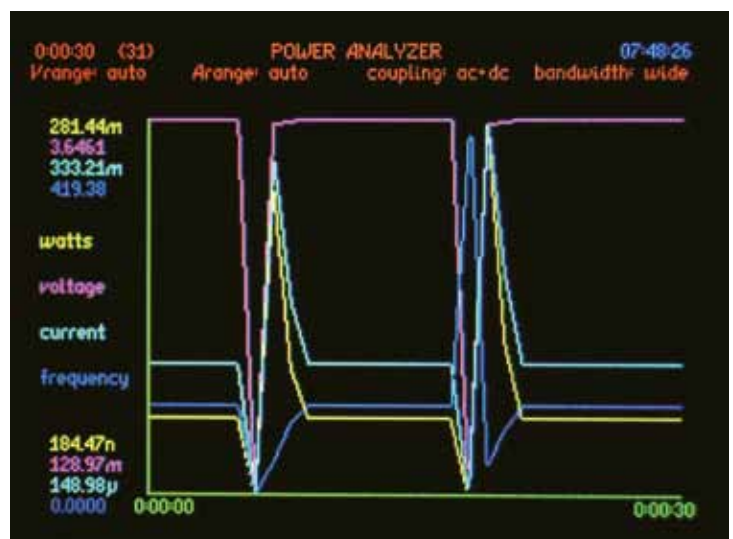


Trend analysis

# MEASUREMENT MODES

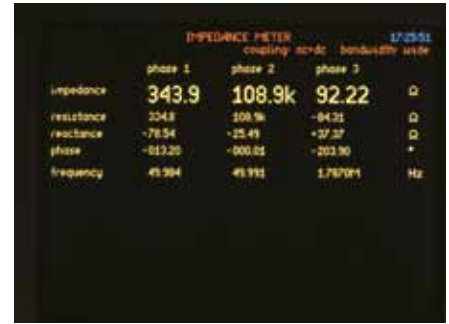## ■ Power Integrator (power consumption) Mode, RMS Meter Mode and Impedance Meter Mode `PPA5500` `PPA4500`
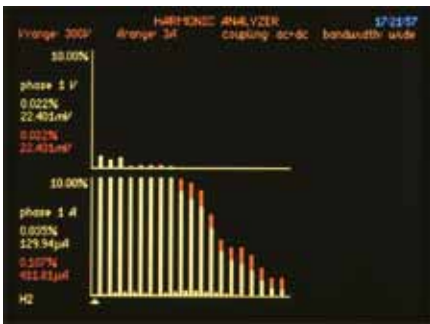


Power Integrator mode



RMS Voltmeter mode



Impedance meter mode

| Note |
| --- |

In addition to detailed measurements of the phase power parameters, you can check the balance of power between the phases and observe computed neutral current when 3 phase 4 wire connection is selected
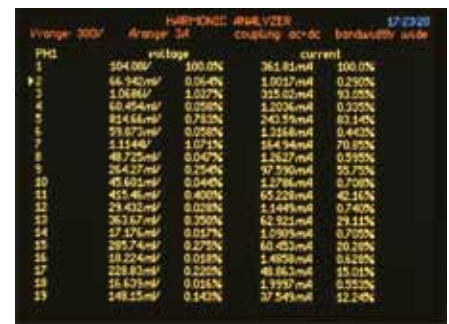
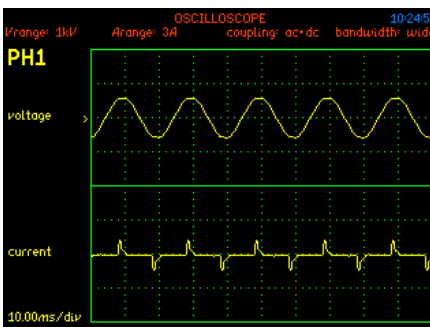## ■ Harmonic Analyzer and Oscilloscope `PPA5500` `PPA4500`
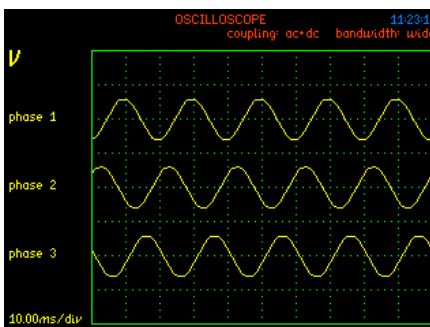


Harmonic analyzer (Bar graph)



Harmonic analyzer summary page



Harmonic analyzer table



Oscillosope - Voltage and Current display



Three phase display of voltage or current
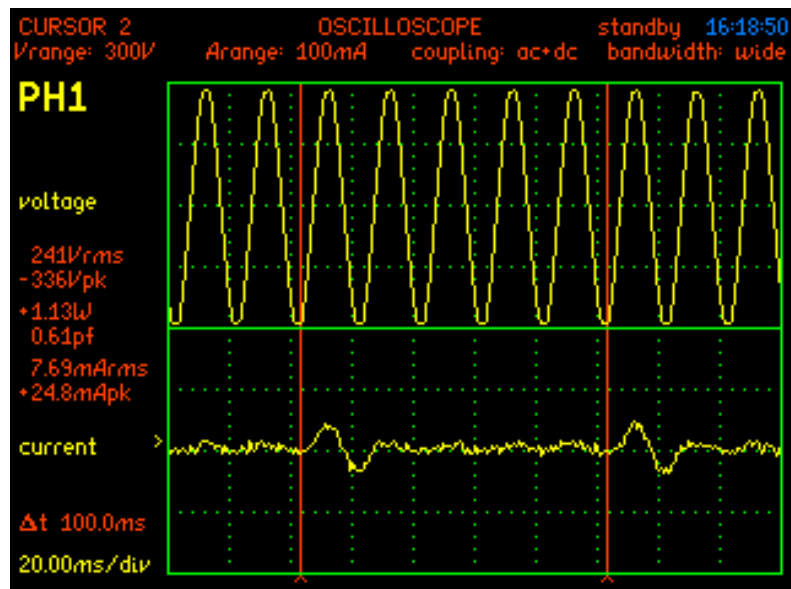


Oscillosope Cursors - Enable cursors and display Vrms, Vpk, Watts, Power Factor, Arms and Apk

| Note |
| --- |

In Harmonic Analyzer Mode, the PPA4500 provides up to 100 Harmonics with real time, table or bar graph presentation. Measurements are in absolute magnitude and percentage of fundamental with harmonic phase also available. The PPA5500 extends the harmonic range to 417 for aerospace applications and also includes a DFT based interharmonic analysis mode for aircraft standards testing (TVF105)

# ACQUISITION SETTINGS

## ■ Auto-Ranging, Range Up Only or Manual `PPA5500` `PPA4500`

Range modes are selectable

①Auto-Ranging    Performs automatic switching of voltage and current ranges up and down depending on the level of the measured value with all inputs linked or ranged independently to ensure optimum accuracy

②Range up only    Performs automatic ranging when the input is 120% of range, ranging up only

③Manual    No automatic ranging, user specifies the range in which to operate
(used when input voltages and currents are known) or during inrush current testing
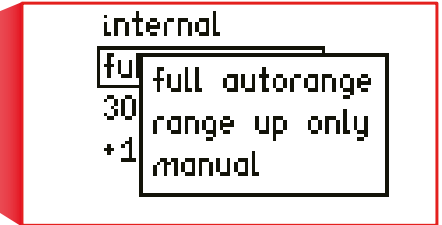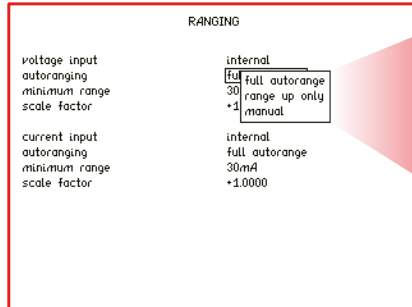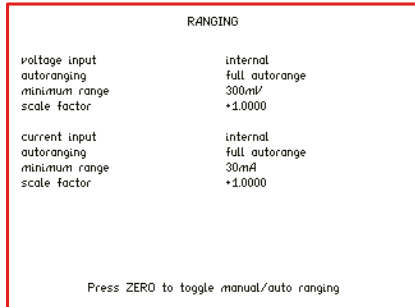


## ■ Independently Set Input Coupling `PPA5500` `PPA4500`

Independently set input coupling so different methods of sensing can be implemented. Such as a CT on phase 1 and shunt sensing on phases 2 + 3
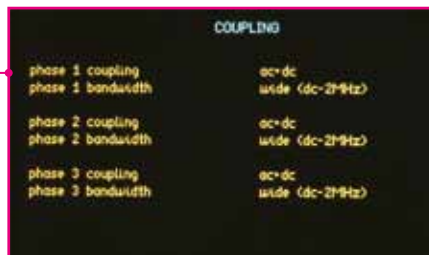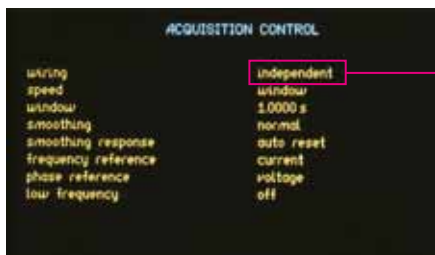


## ■ Wiring Settings `PPA5500` `PPA4500`



Various wiring arrangement settings to satisfy a complete range of setups found in power analysis



1 Phase 1 Wattmeter       2 Phase 2 Wattmeter       3-phase 3 Wattmeter(Reference to neutral)
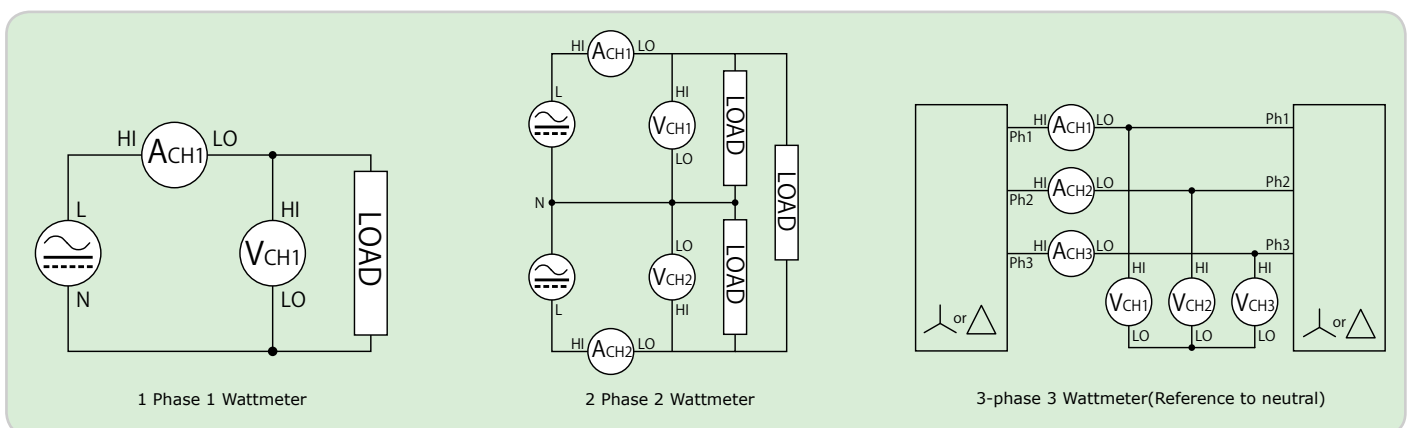
# ACQUISITION SETTINGS

## ■ Bandwidth Settings PPA5500 PPA4500

DC(DC-5Hz)  DC measurements up to 5Hz
Low(DC-200kHz)  Basic power (50/60Hz) including harmonics of the fundamental while rejecting high frequency noise
Wide(DC-2MHz)  Wideband applications such as PWM inverter drives including all power components for true total power


Example of independent wiring configuration showing 3 phase individual coupling settings

**Note**

The PPA45/5500 series includes a programmable digital filter that allows users to set a preferred bandwidth

## ■ Display Settings, Smoothing Response and Frequency Reference PPA5500 PPA4500
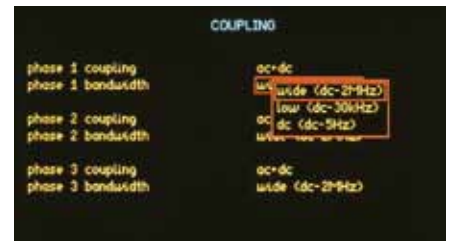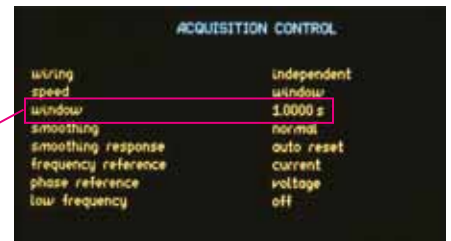
①Display update rate

Various settings for the display update rate (2ms ~ 100s) which also increases the smoothing when used together with the smoothing option. A 'window' option permits direct control of the measurement window size (Note: Minimum window size for PPA4500 - 10ms)



Example of setting the window, eg (50Hz set to 20ms)

②Smoothing settings

Working in conjunction with the speed setting, a smoothing filter can then be applied to the measurements. Normal and slow options are available which apply an increasing time constant to the output of the measurement window
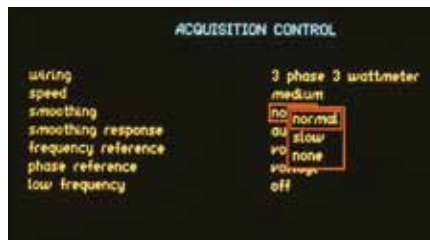


| speed | update rate | normal time constant | slow time constant |
|---|---|---|---|
| Very Fast | 1/80s | 0.05s | 0.2s |
| fast | 1/20s | 0.2s | 0.8s |
| medium | 1/3s | 1.5s | 6s |
| slow | 2.5s | 12s | 48s |
| very slow | 10s | 48s | 192s |

· Display update speed settings
· Setting the filter (normal/slow)

## ■ Frequency Reference PPA5500 PPA4500

When making a precision measurement of ac power, correct synchronization with the fundamental frequency is essential. The PPA series provides a solution to frequency synchronization in a wide range of applications including Standby Power, Variable Speed Drives, Electronic Ballasts and DC to AC Inverters with the option to select voltage, current, speed or ac line input as the frequency reference. The PPA45/5500 series also provide fully independent frequency detection an all phase inputs
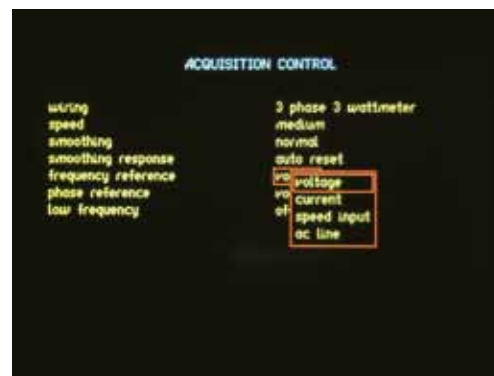

Frequency Reference
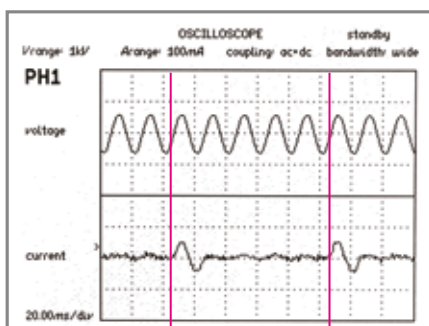

1:5 cycle (10Hz standby current period)
Power measurements synchronized to low duty cycle current pulses of a power supply in standy mode
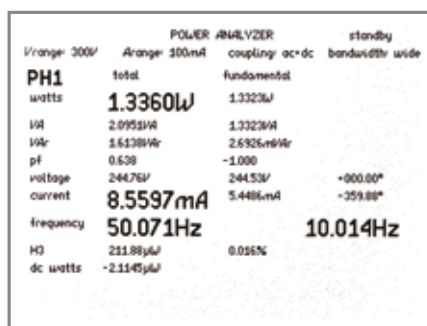

1:5 duty cycle standby power measurement cycle
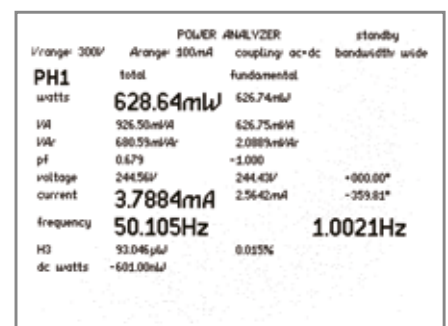

1:50 low duty cycle (1Hz) power measurement

10

## Application Modes `PPA5500` `PPA4500`

In addition to the usual power measurements, various modes are pre programmed into the instrument including "PWM motor drive", "ballast lighting system", "inrush current", "power transformer", "Harmonics and Flicker*", "TVF105*" and "standby power"

*PPA5500 only



Example setup when measuring inverter output with respect to load



• Mode Selection

• PWM torque and speed sensor selection
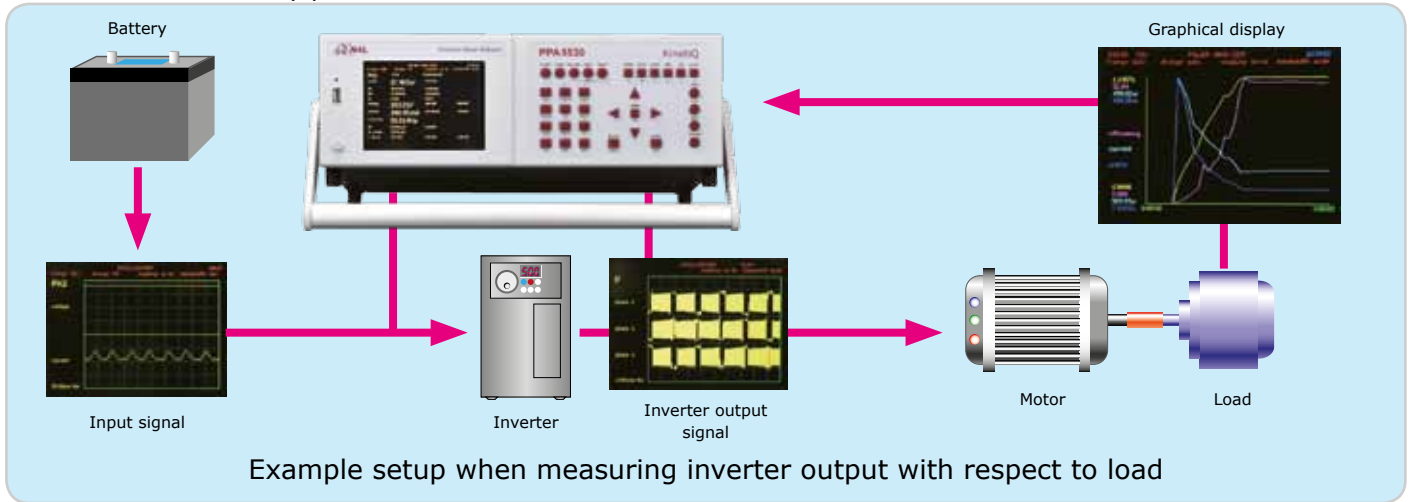
Scale factor of analogue speed and torque inputs

## Inductance Loss Analysis `PPA5500` `PPA4500`

An example of analysis of dynamic inductance losses



Real time data

## ■ PWM Motor Drive Evaluation `PPA5500` `PPA4500`

The PPA5500 is the perfect solution for Inverter Drive evaluation and analysis. Utilising proprietary digital filtering algorithms, the N4L power analyzer range offers unrivalled performance. The PPA5500 can be used in conjunction with external current sensors such as the WR5000 - a 1MHz 5000A Rogowski Coil in high current applications. Inverter efficiency is available via either 3 Phase 2 Wattmeter method + CH3 (utilising CH3 for the DC Bus measurement). Alternatively a second single phase PPA can be connected to the DC Bus and the two analyzers are configured in a Master Slave arrangement, all data is available via N4L Software.
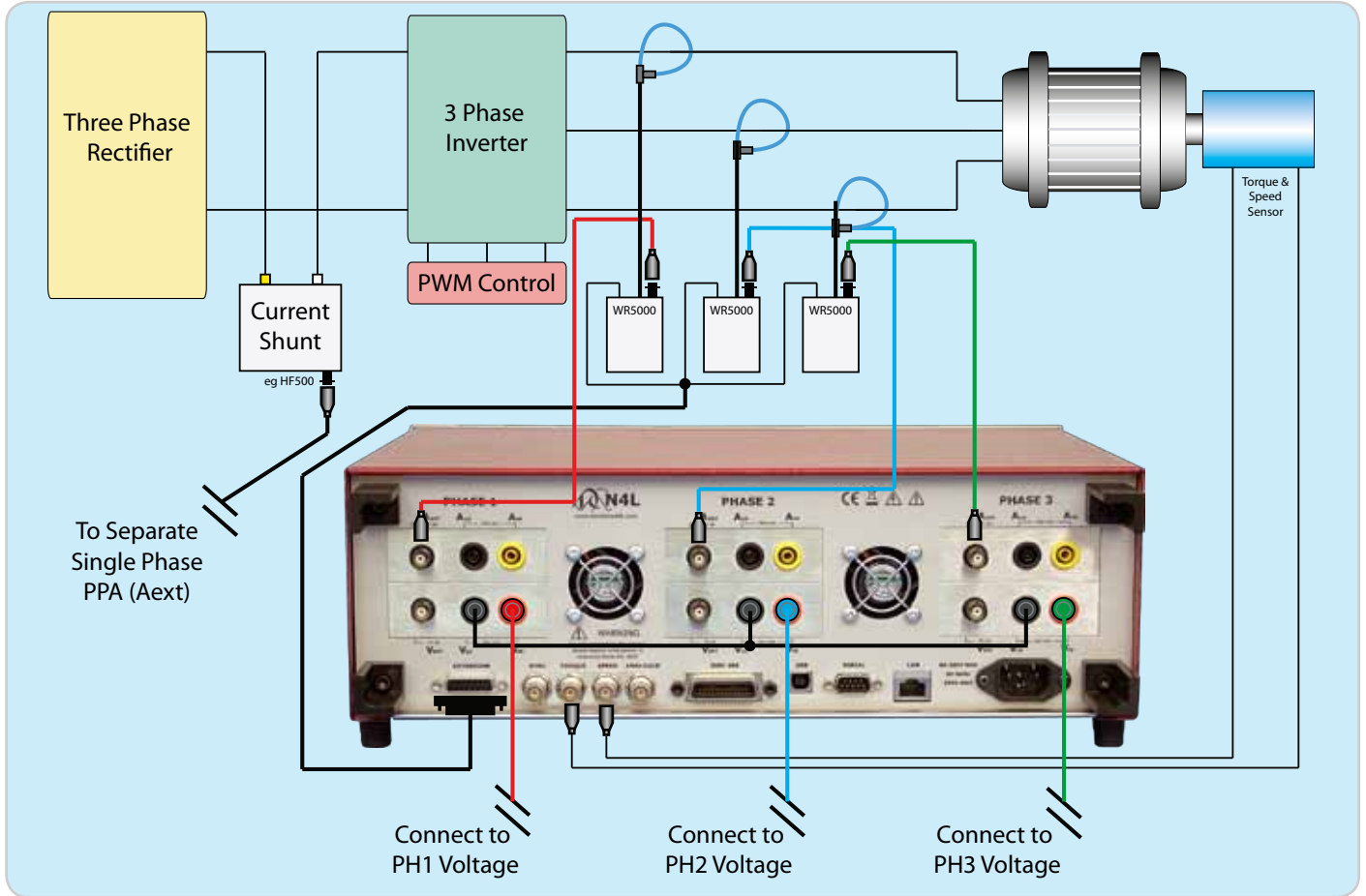


## ■ High Speed Analysis `PPA5500`

The PPA5500 features the fastest signal processing on the market, this enables high speed tracking of changing inverter drive frequencies and power parameters during ramp up and ramp down conditions, for example in electric vehicle applications. N4L's free to download software package (PPALoG) offers datalog intervals down to 5ms, providing fast, no-gap real-time data direct to software.

Rapid ramp up analysis
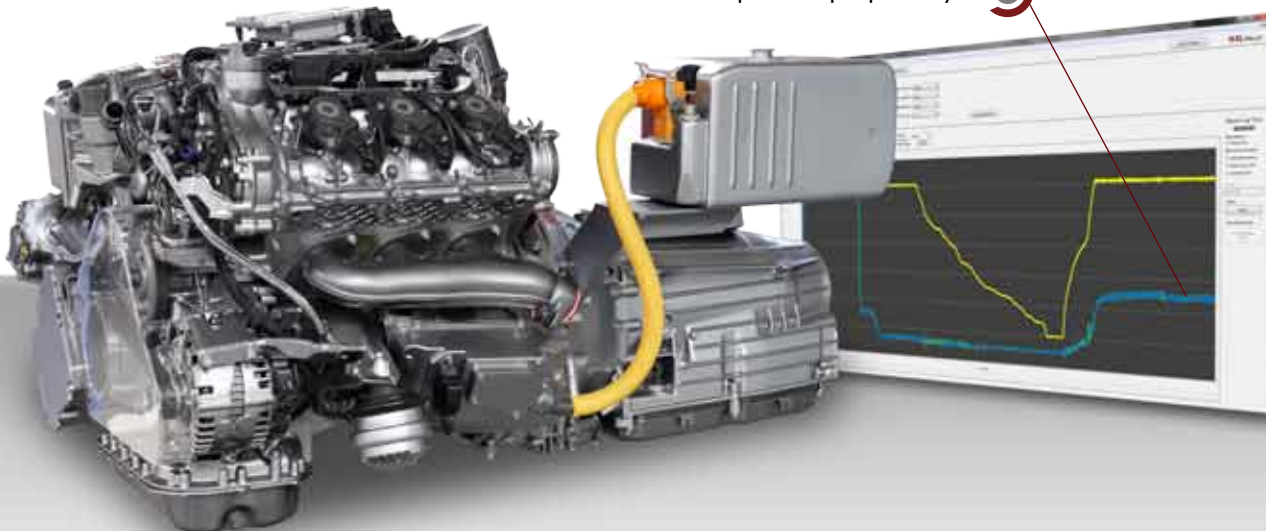
# APPLICATIONS

## ■ Standby Power (IEC62301 Ed 2.0) `PPA5500` `PPA4500`

The PPA4520 and PPA5520 units offer unrivalled dynamic range which enables the user to comply with IEC62301 and Energy Star testing standards. Utilising "Standby Power Mode" the PPA employs proprietary standby power signal processing algorithms to provide accurate no gap analysis of high crest factor (CF) signals, importantly the entire N4L power analyzer range benefit from a guaranteed accuracy specification up to a crest factor of 20.
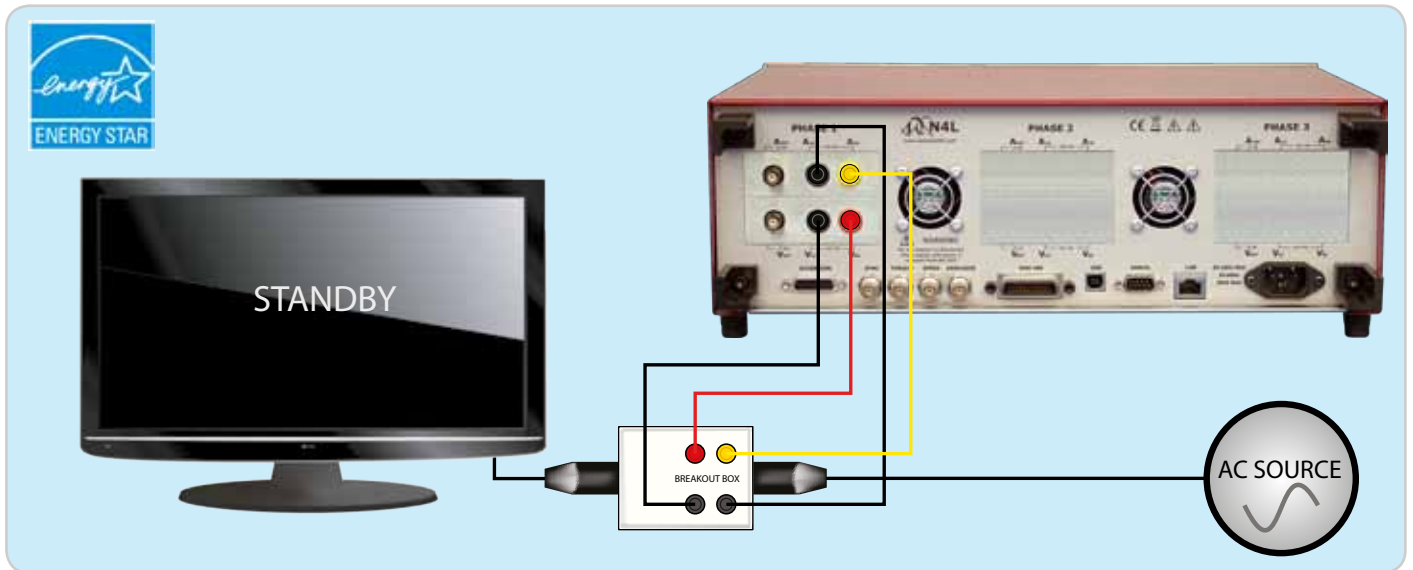


## ■ Guaranteed Accuracy up to Crest Factor 20 `PPA5500` `PPA4500`

As stated in IEC62301, typical standby power current waveform crest factors can exceed values of 10. In such cases it is important for the Power Analyzer to guarantee accuracy at crest factors expected of the application under test.

Newtons4th are the only Power Analyzer Manufacturer in the world* to provide ISO17025 calibration certficates on all new Power Anlayzers as standard. Our ISO17025 Schedule of Accredition includes Voltage, Current, Phase, Power, Harmonics and Flicker. With traceable certifcation of power accuracy down to 0.5W, N4L offer the ideal measurement solution for certified standby power measurement.

## ■ LED Driver Efficiency `PPA5500` `PPA4500`

The PPA4520 and PPA5520 offer an ideal solution for LED driver efficiency measurements, dimming techniques such as reverse phase control are easily analyzed by the N4L Power Analyzers.
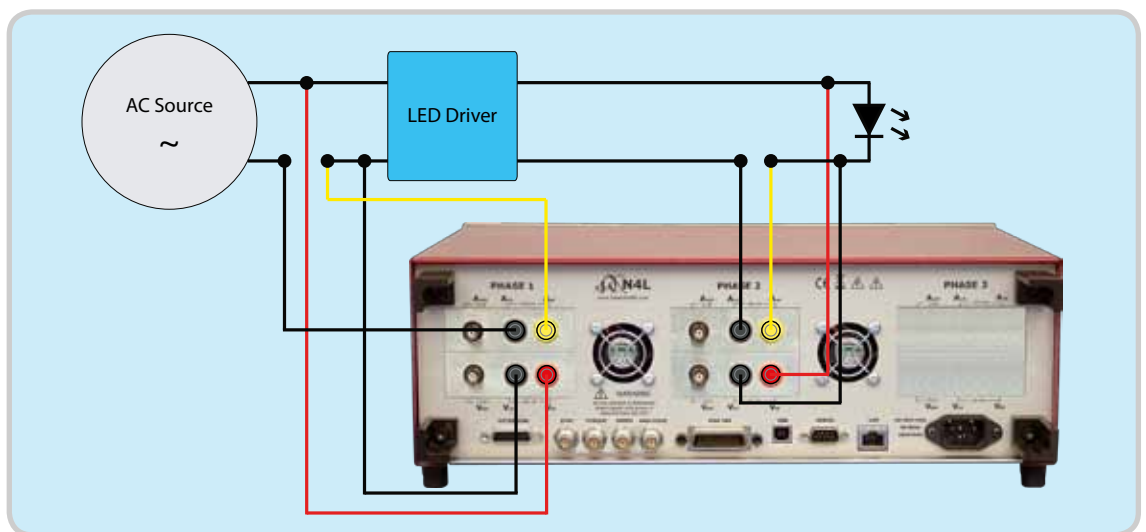


Efficiency can be viewed either directly on the PPA display using the "Phase/Next Phase" efficiency option or calculated in PPALoG software.

## ■ Power Transformer Loss Testing `PPA5500` PPA5500-TE Transformer Edition

Both the PPA4500 and PPA5500 series Power Analyzers incorporate a unique analogue input design and proprietary digital signal processing techniques that exhibit a market leading standard phase accuracy of 0.005°. This inherent phase accuracy is optimised further within the new PPA5500-Transformer Edition to provide an ideal transformer core loss testing solution in accordance with the IEC60076-8 standard. See our separate PPA5500-TE brochure for full specification details including UKAS ISO17025 accredited certification and extended calibration interval.
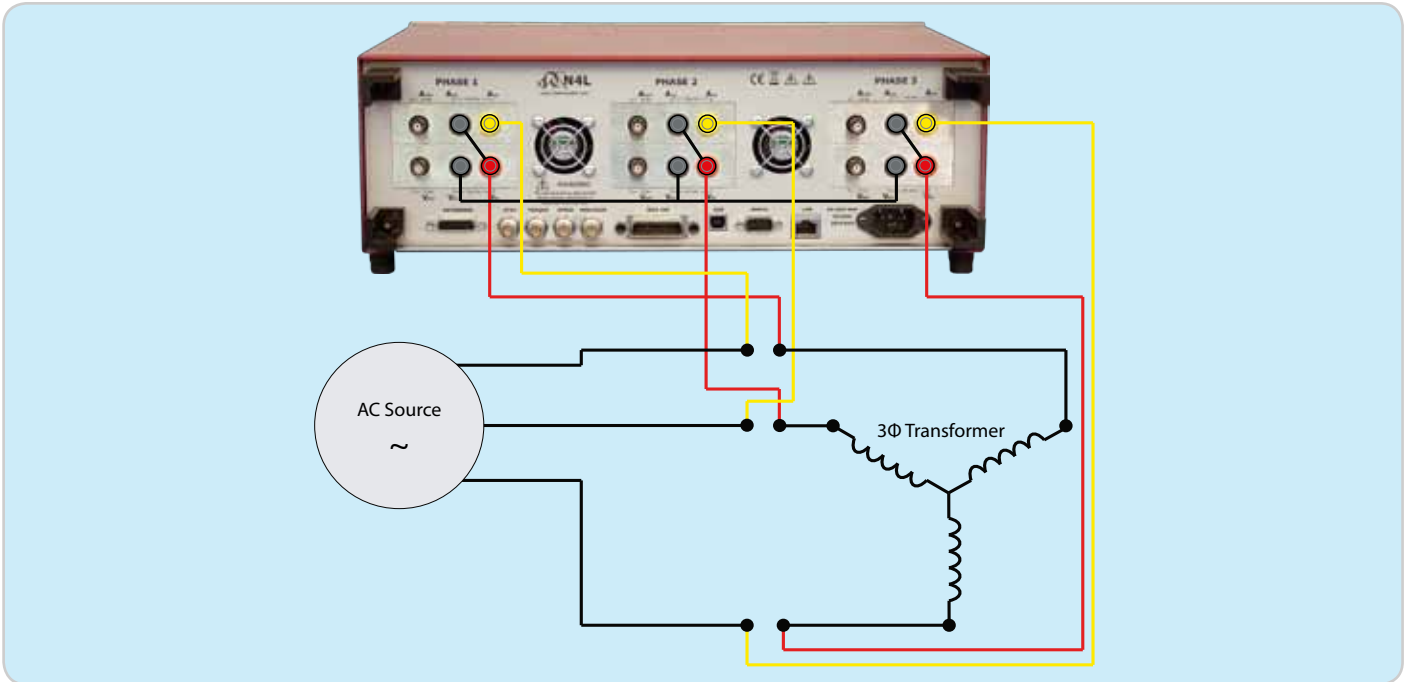


## ■ Aircraft Avionics Industry - 417 Harmonics + Interharmonics `PPA5500`

The PPA5500, featuring high speed FPGA and DSP processors is able to compute up to 417 Harmonics and also meet interharmonic measurement requirements of ABD0100.1.8. The Harmonic Analyzer mode and special TTVF105 Interharmonic mode in the PPA5500 offer the Avionics Engineer an accurate, simple to use solution.
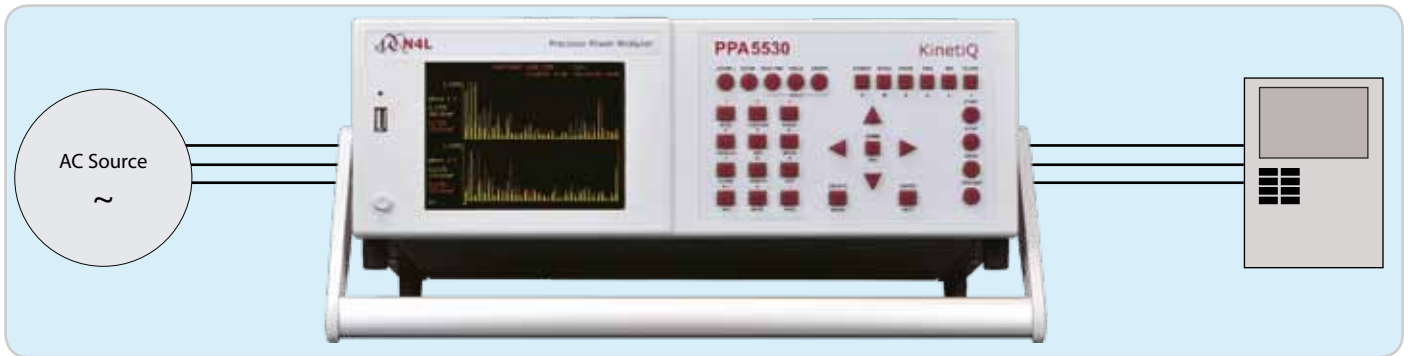


Example ABD0100.1.8 Interharmonic Results, up to 150kHz (Sample Waveform analyzed for illustration)
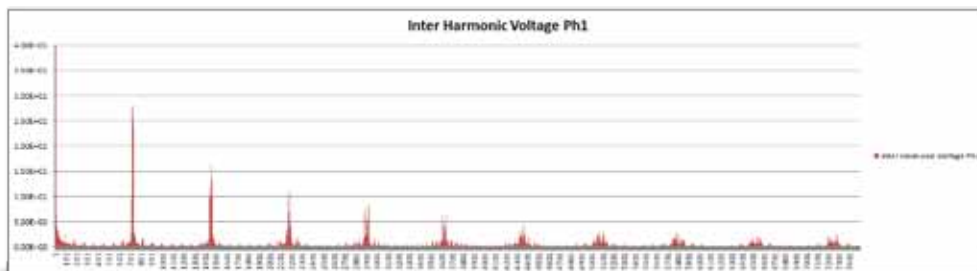


Note: PPA4500 up to 100 Harmonics

# APPLICATIONS

## ■ Solar Inverter Performance Analysis  PPA5500  PPA4500

The PPA5500 and PPA4500 provide a highly accurate solar inverter analysis and evaluation solution, featuring independant frequency detection N4L Power Analyzers exhibit the ability to synchronise to the 50/60Hz output signal along with with the DC input signal from the solar array. Both efficiency of the inverter, quality of the AC output and many other performance parameters can be recorded.
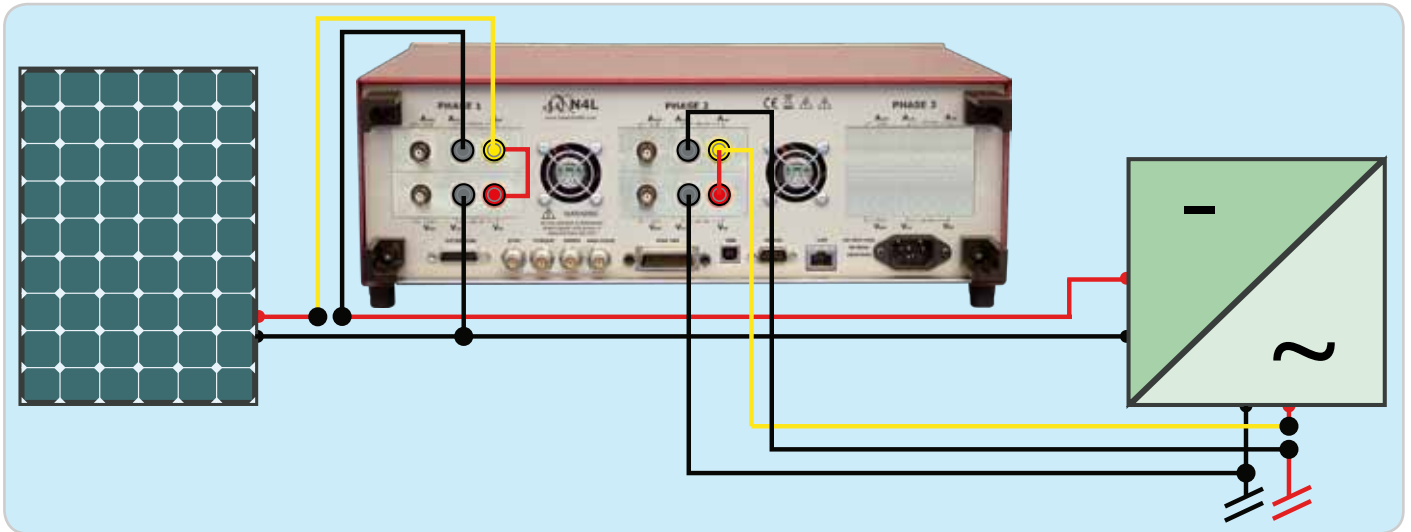


## ■ Inrush Current  PPA5500  PPA4500

Accurate inrush current measurements rely upon two factors aside from fundamental measurement accuracy, these are gapless measurement and a high sampling rate;

   1. Gapless Measurement - Inrush waveforms by their nature are transient; gapless measurement is vitally important in order to ensure that inrush waveform data is not missed.

   2. High Sampling Rate - When working with mains frequencies, many power analyzers have low sample rates due to the computation of measured values from a data block of finite size. The PPA4500 and PPA5500 utilise a proprietary real time signal processing technique that maintains full 2.2Ms/s sample rate irrespective of the measured load frequency, ensuring that high frequency events are captured without aliasing.



Example Inrush current data, datalogging at nominally 20ms intervals directly to PPALoG
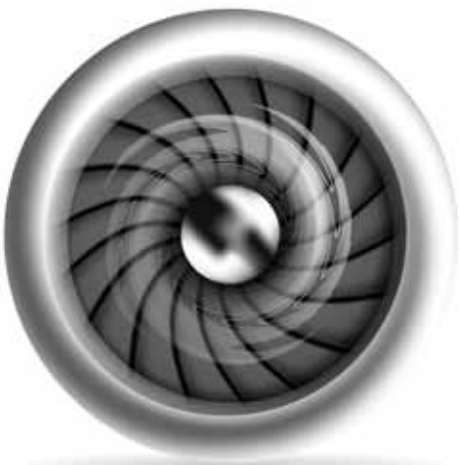
## ■ UKAS  `PPA5500` `PPA4500`

Newtons4th are an accredited UKAS Calibration laboratory, all PPA4500 and PPA5500 Power Analyzers are supplied with an ISO17025 UKAS Calibration Certifcate as standard. Calibration of N4L Power Analyzers is an integral and important part of our service to our clients, we offer quick turnaround times at a competitive price. Re-Calibration is also available at our international offices and various distributors throughout the world*.

**7949**

## ■ Schedule of Accreditation  `PPA5500` `PPA4500`

N4L's schedule of accreditation to ISO17025 is wide ranging and an overview of the schedule is detailed below, for more specific information, please see the UKAS website to view the full accreditation schedule.

| ISO17025 UKAS Accreditation Schedule | | |
|---|---|---|
| | Signal Amplitude | Frequency Range |
| Voltage Sine Amplitude | 1V to 1008V | 16Hz to 850Hz |
| Voltage Harmonic Amplitude | 0V to 302V | 16Hz to 6kHz |
| Current Sinewave Amplitude | 100mA to 48A | 16Hz to 850Hz |
| Current Harmonic Amplitude | 0A to 15A | 16Hz to 6kHz |
| Current to Voltage Phase Angle | $-180°$ to $+180°$ | 16Hz to 850Hz |
| Apparent Power (VA Product) | 100mVa to 48.4kVA | 16Hz to 850Hz |
| AC Power | 0W to 48.4kW | 16Hz to 850Hz |
| **AC Power – Calorimetry    [New for 2017]** | **1W to 5W** | **45Hz to 2MHz** |
| Current Harmonic Amplitude to IEC61000-4-7 | 0A to 6A | 16Hz to 6kHz |
| Flicker to IEC61000-4-15 | Pinst(Sinusoidal Modulation) | As per IEC61000 |
| | Pinst(Rectangular Modulation) | |
| | Pst | |
| | Frequency Changes | |
| | Distorted Voltage with Multiple Zero Crossings | |
| | Harmonics with Sidebands | |
| | Phase Jumps | |
| | Rectangular Changes with Duty Cycle | |
| | d(t) | |

## ■ Additional Calibration Options - IEC61000 / TE / HF  `PPA5500`

By including with every PPA45/55 instrument both our 2MHz** wideband calibration detailed below and also ISO17025 accredited calibration, N4L assure compliance with our complete specification including the enhanced detail associated with IEC61000, TE and HF specifications. For those who require separate ISO17025 accredited certification of Harmonics, Flicker, Low PF Phase or High Frequency Power accuracy, these are avalaible as calibration options.

Due to the specialist nature of Power Measurement Instrumentation Calibration, N4L utilise both commercially available calibration equipment (such as the Fluke 6105A for UKAS Certification) along with N4L bespoke designed signal generation equipment in order to calibrate our instruments over the full frequency range (up to 2MHz). Calibration over the full frequency range is uncommon given that such signal generation equipment is not commercially available. When supplied with an N4L analyzer, all customers will receive a calibration certificate covering the complete frequency range.

* UKAS Calibration is available from N4L UK HQ only, details for calibration performed at other locations is subject to local accreditation, please contact your local office for more details.
** 1MHz for 50A versions

# Ranging Principles

## ■ 9 Stage Solid State Ranging System - `PPA5500` `PPA4500`

Combining highly linear voltage attenuator and current shunt designs with a proprietary 9 stage (PPA5500) or 8 stage (PPA4500) solid state ranging system on every phase input, the PPA series achieve a uniquely wide dynamic range, with no need to switch between voltage attenuators or current shunts when ranging up or down.



**N4L Noise Cancellation Op Amp Gain Circuit**

To Device Under Test

To Device Under Test
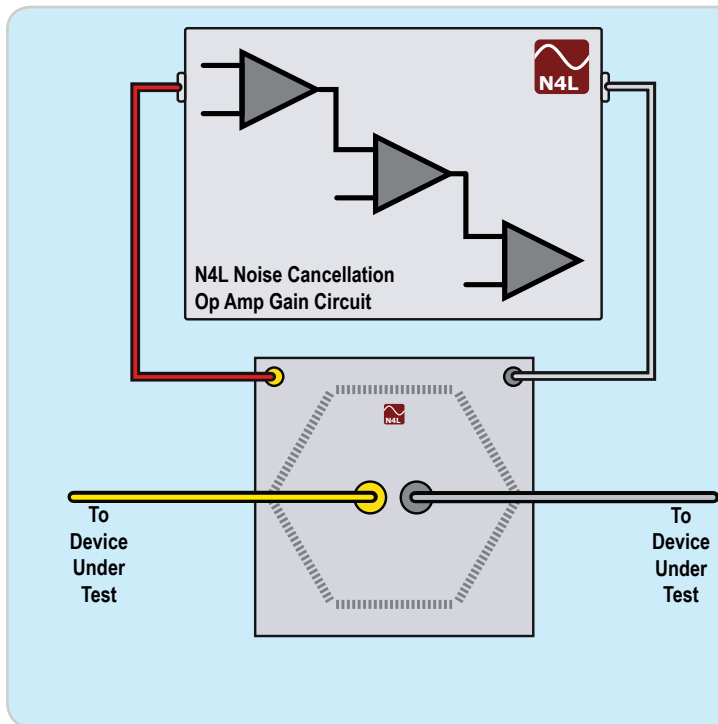
### Design features:
Single attenuator on each voltage input
    High impedance low capacitance
Single shunt on each current input
    Low impedance low inductance
Auto peak detect
High speed solid state ranging
High Noise rejection
Auto DC offset trimming

### Benefits:
Overload protected on any range
Low shunt affect on voltage connections
Low voltage burden on current connections
Market leading phase accuracy
Peak detect ranging ensures no signal clipping
Low attenuator/shunt operating temparature
Fast range switching
Constant frequency response on all ranges
Signal can be applied with instrument powered off

## ■ Auto Peak Ranging Ensures Complete Waveform Analysis `PPA5500` `PPA4500`

It is often overlooked that for an instrument to correctly calculate power parameters, the entire waveform must be digitised for analysis. The Peak Ranging system employed by all N4L Power Analyzers ensures that the entire waveform is digitised and the correct power parameters are calculated.

Example RMS Ranging system, commonly used in older instrument designs

Modern Peak Ranging System, implemented on all N4L Power Analyzers





Waveform within red hashed area is clipped by an RMS ranging system and fixed crest factor setting
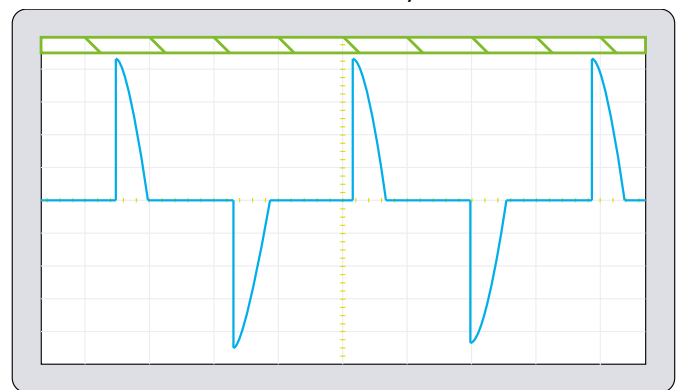
Peak Ranging system auto-detects the peak of the input signal and selects the ideal range

### Note

An RMS Ranging system requires the user to have prior knowledge of the crest factor which in many applications is not practical, either because the user cannot reasonably be expected to know this value before a measurement, or because the crest factor is changing during a measurement period. The ideal ranging system is therefore based upon peak detection which does not require the user to be concerned with a crest factor setting. While many RMS ranging systems are only guaranteed to support a Crest Factor of 6, all N4L Power Analyzers guarantee to auto-range with any crest factor and maintain full accuracy with a CF of at least 20.
While waveforms with a true CF above 20 are very unusual, 'auto range up' or 'manual' ranging combined with a market leading range sensitivity enables the PPA to achieve a dynamic range equal to a CF >300.

# PC CONTROL AND DATA ACQUISITION

## ■ PC Software  `PPA5500`  `PPA4500`

Analysis carried out by the instrument can easily be transferred to a PC via USB, RS232 or LAN

① **PPALoG**   Exceptional flexibility and ease of use with all the functions included in the orginal PPAcomm program plus multiple instrument control for 4-12 phase applications and data export to Text file, Excel, Bitmap or Clipboard



Simultaneous display of master and slave units

Real time Datalog

a. Measurement parameters are chosen by the user from tick box options
b. Real time results can be displayed as latest value, table or graph
c. Datalogging results are then saved in the selected format

Capture up to 60 measured functions per line

### Data Export options



A Bitmap image of any PPA screen image can be copied to clipboard or imported directly into documents

Measurement tables generated by the data logging function can be exported directly to Excel

② **PPA Standby Power**   Full compliance testing to IEC62301. Meets or exceeds the requirements and methodology of U.S. EPA (Energy Star), U.S.DOE, California Energy Commission (CEC), among others.



Standby power test screen with real time update of IEC62301 criteria

On completion of the standby test, a full test report can be exported directly to a spreadsheet

# PC CONTROL AND DATA ACQUISITION

## ■ Fully Compliant IEC61000-3-2/3-3 Harmonics and Flicker Testing `PPA5500`

The PPA55xx series Power Analyzers provide fully compliant ISO17025 certified Harmonics and Flicker testing, Newtons4th offer the ability to display the results of many tests within the instrument and all tests to PC software.
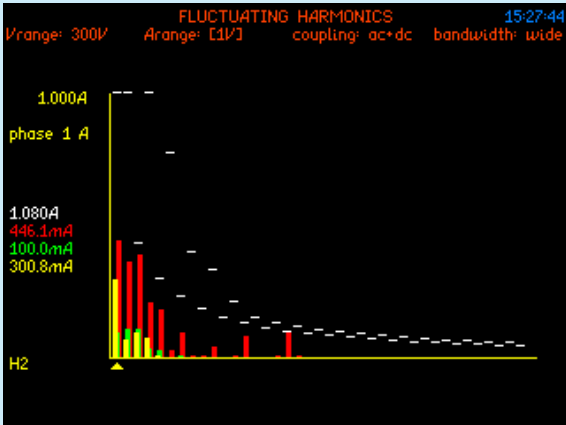


Limits are shown in the graph mode where current, average and max values are updated. The class of the device under test (Harmonics) can be selected in the application menu.



After the test is complete, the unit will display a Pass or Fail message. A screen shot can be downloaded to software, alternatively the test can be controlled and monitored in software.

More information is available in a separate IEC61000 Harmonics and Flicker brochure. Dedicated models called the PPA5511 and PPA5531 include low impedance shunts (see ** on page 20) and adjusted filter response for full compliance testing.

## ■ Connection Interface `PPA5500` `PPA4500`

RS232 (standard), USB (standard), LAN (standard on PPA5500), GPIB (standard on PPA5500)
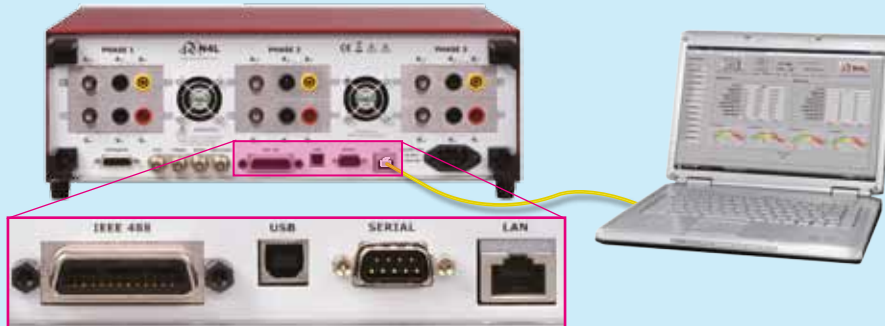


## ■ Data Logging `PPA5500` `PPA4500`

Utilizing sophisticated frequency detection techniques, synchronization with the fundamental AC waveform is automatically achieved. Datalog intervals can be set from 2ms with measurements saved to a PC or internal memory.



Datalog menu, interval set to 10ms

# SPECIFICATION

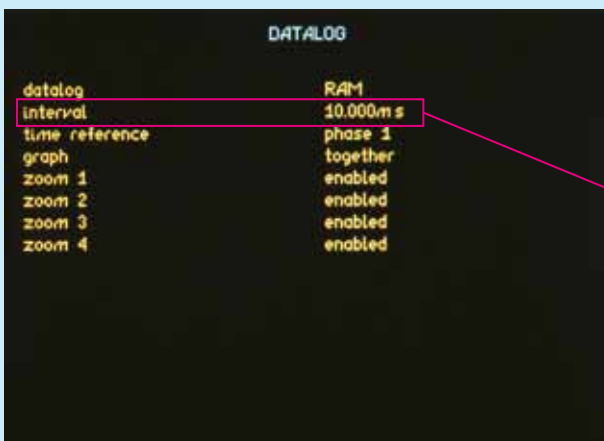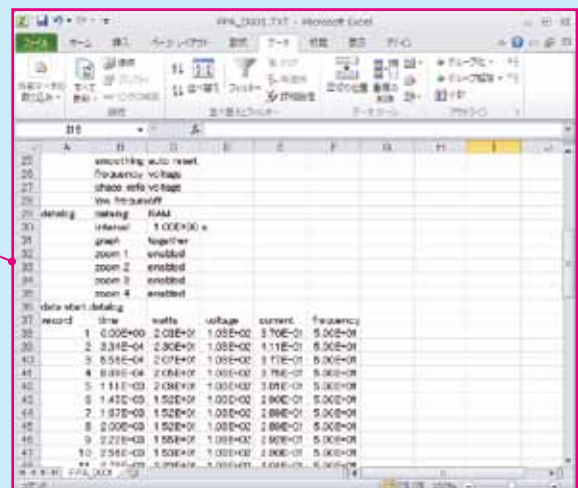| | | | PPA4500 | | PPA5500 | |
|---|---|---|---|---|---|---|
| **Frequency Range** | | | | | | |
| | | | DC#,10mHz～2MHz - PPA4500-LC(10Arms), PPA4500-Std(30Arms) DC#,10mHz～1MHz - PPA4500-HC(50Arms) | | DC#,10mHz～2MHz - PPA5500-LC(10Arms), PPA5500-Std(30Arms) DC#,10mHz～1MHz - PPA5500-HC(50Arms) | |
| **Voltage Input** | | | | | | |
| Internal | Range | | 1Vpk～3000Vpk(1000Vrms) in 8 ranges (240Vrms within 300Vpk range, using 20% overange) | | 300mVpk～3000Vpk(1000Vrms) in 9 ranges (240Vrms within 300Vpk range, using 20% overange) | |
| | Accuracy | | 0.03% Rdg+0.04% Rng+(0.004%×kHz Rdg)+5mV | | 0.01% Rdg+0.038% Rng+(0.004%×kHz Rdg)+5mV | |
| | Impedance | | 3Mohm in parallel with 5pF - Common mode capacitance to chassis 90pF | | | |
| External | Range | | 1mVpk～3Vpk in 9 ranges【BNC connector 3Vpk max input】 | | 300µVpk～3Vpk in 9 ranges【BNC connector 3Vpk max input】 | |
| | Accuracy | | 0.03%Rdg+0.04%Rng+(0.004%×kHz Rdg)+3µV | | 0.01%Rdg+0.038%Rng+(0.004%×kHz Rdg)+3µV | |
| | Impedance | | 1Mohm in parallel with 40pF - Common mode capacitance to chassis 90pF | | | |
| **Current Input** | | | | | | |
| Internal | 10Arms Low Current (PPA5500-LC) 4mm safety connectors | Ranges | 10mApk～30Apk(10Arms) in 8 ranges | Ranges | 3mApk～30Apk(10Arms) in 9 ranges | |
| | | Accuracy | 0.03% Rdg+0.04% Rng+(0.004%×kHz Rdg)+ 30µA | Accuracy | 0.01% Rdg+0.038% Rng+(0.004%×kHz Rdg)+ 30µA | |
| | 30Arms Current (PPA5500-Std) 4mm safety connectors | Ranges | 100mApk～300Apk(30Arms) in 8 ranges | Ranges | 30mApk～300Apk(30Arms) in 9 ranges | |
| | | Accuracy | 0.03% Rdg+0.04% Rng+(0.004%×kHz Rdg)+ 300µA | Accuracy | 0.01% Rdg+0.038% Rng+(0.004%×kHz Rdg)+ 300µA | |
| | 50Arms High Current (PPA5500-HC) ** | Ranges | 300mApk～1000Apk(50Arms) in 8 ranges | Ranges | 100mApk～1000Apk(50Arms) in 9 ranges | |
| | | Accuracy | 0.03% Rdg+0.04% Rng+(0.004%×kHz Rdg)+ 900µA | Accuracy | 0.01% Rdg+0.038% Rng+(0.004%×kHz Rdg)+ 900µA | |
| External input (External shunt Current sensor) | BNC Connector (Max input 3Vpk) | Ranges | 1mVpk～3Vpk in 8 ranges | Ranges | 300µVpk～3Vpk in 9 ranges | |
| | | Accuracy | 0.03% Rdg+0.04% Rng+(0.004%×kHz Rdg)+ 3µV | Accuracy | 0.01% Rdg+0.038% Rng+(0.004%×kHz Rdg)+ 3µV | |
| **Phase Accuracy** | | | | | See PPA5500-TE brochure for TE specification | |
| | | | 0.005deg+(0.01deg×kHz)【PPA45/5500-LC(10Arms), PPA45/5500(30Arms)】 0.01deg+(0.02deg×kHz)【PPA45/5500-HC(50Arms)】 | | | |
| **Power Accuracy** | | | | | | |
| 10mHz-2MHz | LC/Std | | [0.04%+0.05%/pf+(0.01%×kHz)/pf] Rdg+0.04%VA Rng | | [0.03%+0.03%/pf+(0.005%×kHz)/pf] Rdg+0.03%VA Rng | |
| | HC | | [0.04%+0.05%/pf+(0.01%×kHz)/pf] Rdg+0.06%VA Rng | | [0.03%+0.03%/pf+(0.01%×kHz)/pf] Rdg+0.03%VA Rng | |
| 40-850Hz | | | [0.03%+0.04%/pf+(0.01%×kHz)/pf] Rdg+0.03%VA Rng | | [0.02%+0.03%/pf+(0.005%×kHz)/pf] Rdg+0.01%VA Rng | |
| 16-450Hz Low PF | | | | | See PPA5500-TE Brochure | |
| **General** | | | | | | |
| Crest Factor | | | 20(Voltage and Current) | | | |
| Sample Rate | | | 2.2Ms/s on all channels, No-Gap | | | |
| IEC Modes | | | IEC62301 Standby Power | | IEC61000 Harmonics and Flicker, IEC62301 Standby Power | |
| Application Modes | | | PWM Motor Drive, Ballast, Inrush, Power Transformer, Standby Power | | PWM Motor Drive, Ballast, Inrush, Power Transformer, Standby Power, Fluctuating Harmonics, Flicker Meter, TVF105 Interharmonics | |
| **CMRR - Common Mode Rejection Ratio** | | | | | | |
| | | | 250V @ 50Hz - ≥ 1mA (150dB) | | | |
| | | | 100V @ 100kHz - ≥ 3mA (130dB) | | | |
| **Measurement Parameters** | | | | | | |
| | | | W ,VA ,Var ,pf ,V & A - rms ,rectified mean ,AC ,DC ,Peak ,Surge ,Crest Factor ,Form Factor ,Star to Delta Voltage, +ve Pk, -ve Pk | | | |
| | | | Frequency (Hz), Phase (deg), Fundamentals, Impedance | | | |
| | | | Harmonics, THD, TIF, THF, TRD, TDD | | | |
| | | | Integrated Values, Datalog, Sum and Neutral values | | | |
| **Datalog - Up to 4 user selectable measurement functions (30 with optional PC software)** | | | | | | |
| Datalog Window | | | No-Gap analysis, Minimum window 10ms | | No-Gap analysis, Minimum window 2ms | |
| Memory | | | 16,000 records | | 10M records into flash RAM (Non-Volatile) | |
| **Communication Ports** | | | | | | |
| RS232 | | | Baud rate up to 38.4kbps,RTS/CTS flow control | | | |
| LAN | | | (Option L) 10/100 Base-T Ethernet auto sensing | | (Fitted as standard) 10/100 Base-T Ethernet auto sensing | |
| GPIB | | | (Option G) IEEE488.2 Compatible | | (Fitted as standard) IEEE488.2 Compatible | |
| USB | | | USB 2.0 and 1.1 compatible | | | |
| Analogue O/P | | | Bipolar ±10V(BNC) | | | |
| Speed & Torque I/P | | | BNC Bipolar±10V or Pulse count 1Hz to 1MHz 0.01% Rdg | | | |
| Sync | | | 4～6 Phase measurement (Master/Slave) | | | |
| Extension | | | 4～6 Phase (Master/Slave) + Auxilary | | | |
| **Standard Accessories** | | | | | | |
| Leads | | | Power, RS232, USB | | Power, RS232, USB, GPIB | |
| Connection Cables | | | 36A 1.5m long 4mm stackable terminals: 1x red, 1x yellow and 2x black per phase (1x red, 1x black with HC version) | | | |
| Connection Clips | | | 4mm terminated aligator clips - 1x red, 1x yellow and 2x black per phase (1x red and 1x black per phase with PPA5500-HC version) | | | |
| CD-ROM | | | CommView2 (RS232/USB/LAN), Command line, Script based communication software | | | |
| Documents | | | User manual, Communications manual, Calibration certificate, Quick start guide | | | |
| **Mechanical/Environmental** | | | | | | |
| Input Impedance | | | Voltage Attenuator 3MΩ || 5pF    External Inputs 1MΩ || 40pF    Common mode capacitance to chassis 90pF | | | |
| Display | | | 320×240 dot full colour TFT, White LED Backlit | | | |
| Dimensions | | | 130H×400W×315D mm excluding feet | | | |
| Weight | | | 5.4kg(1 Phase), 6kg(3 Phase) | | | |
| Safety Isolation | | | 1000Vrms or DC(CATII), 600Vrms or DC(CATIII) | | | |
| Power supply | | | 90～265Vrms, 50～60Hz, 40VAmax | | | |
| Operating Conditions | | | 23°C ± 5°C Ambient Temperature (or air intake temperature when rack mounted), 20-90% Non-Condensing Relative Humidity. Temperature coefficient ±0.01% per °C of reading at 5-18°C and 28-40°C | | | |

# SPECIFICATION

| | PPA4500 | PPA5500 |
|---|---|---|
| **Harmonic Specification** | | |
| Bandwidth | DC#,10mHz∼2MHz - PPA4500-LC(10Arms), PPA4500-Std(30Arms) <br> DC#,10mHz∼1MHz - PPA4500-HC(50Arms) | DC#,10mHz∼2MHz - PPA5500-LC(10Arms), PPA5500-Std(30Arms) <br> DC#,10mHz∼1MHz - PPA5500-HC(50Arms) |
| No. of Harmonics | 100 | 417 |
| Sampling Frequency | 2Ms/s | |
| Signal Processing | DFT ( Discreet Fourier Transform) | |
| Crest Factor | 20 | |
| Power Factor | 0 to 1 | |
| **Harmonic Accuracy** | | |
| Voltage | 0.03% Rdg+0.04% Rng+(0.004%×kHz Rdg)+5mV | 0.01% Rdg+0.038% Rng+(0.004%×kHz Rdg)+5mV |
| Current | PPA4500-LC 0.03% Rdg+0.04% Rng+(0.004%×kHz Rdg)+10uA <br> PPA4500-Std 0.03% Rdg+0.04% Rng+(0.004%×kHz Rdg)+300uA <br> PPA4500-HC 0.03% Rdg+0.04% Rng+(0.004%×kHz Rdg)+900uA | PPA5500-LC 0.01% Rdg+0.038% Rng+(0.004%×kHz Rdg)+10uA <br> PPA5500-Std 0.01% Rdg+0.038% Rng+(0.004%×kHz Rdg)+300uA <br> PPA5500-HC 0.01% Rdg+0.038% Rng+(0.004%×kHz Rdg)+900uA |
| | Harmonic Accuracy (above) still applies with Frequency Filter set | |
| **IEC61000 Harmonic Accuracy** | | |
| Voltage | - | 0.2% Rdg+0.038% Rng+(0.004%×kHz Rdg)+5mV |
| Current | - | PPA5500-LC 0.2% Rdg+0.038% Rng+(0.004%×kHz Rdg)+10uA <br> PPA5500-Std 0.2% Rdg+0.038% Rng+(0.004%×kHz Rdg)+300uA <br> PPA5500-HC 0.2% Rdg+0.038% Rng+(0.004%×kHz Rdg)+900uA |
| **Cycle by Cycle Analysis direct to PC - 2Ms/s sample rate (Window setting)** | | |
| Data Rate | 10ms | 5ms |
| **Cycle by Cycle Analysis direct to Internal RAM - 2Ms/s sample rate** | | |
| Data Rate | 10ms | 2ms |
| **Voltage Attenuator Overload Capability** | | |
| 20ms | 4.2kVpk (3kVrms) | 4.2kVpk (3kVrms) |
| 5s | 3.1kVpk (2.2kVrms) | 3.1kVpk (2.2kVrms) |
| Continuous | 3kVpk (1.5kVrms) | 3kVpk (1.5kVrms) |
| **Minimum Current Measurement at Full Accuracy** | | |
| PPA5500-LC | 45uArms | 45uArms |
| PPA5500-Std | 220uArms | 220uArms |
| PPA5500-HC | 700uArms | 700uArms |

#DC Specification available separately

## STANDARD ACCESSORIES AND DOCUMENTS

| Leads and Interfacing | |
|---|---|
| **Type** | **Specification** |
| 36A Connection lead set | 1.5 Meter - 36A lead set with 4mm stackable safety terminals <br> 1x Red, 1x Yellow and 2x Black per phase plus alligator clips |
| 36A 4mm to spade (Option) | 1.5 Meter - 36A lead set with 4mm to spade for HC terminals |
| RS232 cable | RS232 9pin serial Cable |
| USB cable | USB 2 Meter A male to B male |
| USB to 9-pin RS232 (Option) | USB ∼ 9-pin RS232 Serial Converter |
| Master-Slave cable (Option) | Leads for connecting 2x PPA5500 in master/slave mode |
| GPIB Cable (PPA5500) | GPIB Interface Cable |

| Documents | |
|---|---|
| **Type** | **Specification** |
| Test, Inspection & Calibration | PPA Certificate of Calibration - Full bandwidth verification |
| UKAS ISO17025 Certificate | UKAS ISO17025 Certificate of Calibration - 40 to 850 Hz |
| Manuals | Quick Start manual & Communications manual |

## OPTIONAL CALIBRATION

| Additional calibration options - ISO17025 Accredited | |
|---|---|
| **Type** | **Specification** |
| IEC61000 | Harmonics and Flicker certification to IEC61000 standards |
| System Calibration | Combined PPA + External Current Sensor 'system' certification |
| TE - Transformer Edition | Certified compliance to TE specification |
| HF - High Frequency | Certified compliance to PPA High frequency specification |

## PC SOFTWARE - FREE DOWNLOAD

| PC Software - Free to Download from Newtons4th.com (CD Copy is a charged option) | |
|---|---|
| **Type** | **Specification** |
| PPALoG | PC control and data acquisition of 1 ∼ 12 phases with selectable Real Time data, Graphing, Datalog and versatile export options |
| PPAcomm | Basic PC Control, Data storage, Print features |
| PPA Standby Power | Standby power measurements and reporting to IEC62301 |
| PPAsoft PC software | LabView based software, PC Control, Data storage and Print |
| IECSoft | IEC61000 Testing Software |

## HARDWARE OPTIONS

| Interface | |
|---|---|
| **Type** | **Specification** |
| PPA-LAN interface | Option L - LAN Interface (Standard on 55 series) |
| PPA-GPIB interface | Option G - GPIB(IEEE488)Interface (Standard on 55 series) |

| Rack Mount Kit | |
|---|---|
| **Type** | **Specification** |
| Rack Mount brackets | PPA26/5500 19in rack mount brackets (model specific) |
| Rack Mount panel | PPA2500 19in rack fascia panel |

| Connection and extension port accessories | |
|---|---|
| **Type** | **Specification** |
| Breakout box | Simple analyzer connection between source and DUT |
| PCIS | 10Arms 300Apk rated Phase Controlled Inrush Switch |
| GPIB Communication Cable | GPIB Communication Cable Option (Port Fitted as standard on PPA5500) |


Breakout Box

| Carry cases | |
|---|---|
| **Type** | **Specification** |
| Soft carrying case | Black nylon with shoulder strap |
| Hard flight case | Hard case with moulded lining suitable for shipping |


PPA Series Hard Carrying Case

## PPA500/1500 MODELS

For more details see separate brochure

| Phases | Model | Specification |
|---|---|---|
| 1 Ph | PPA1510/510* | DC, 10mHz∼1MHz 100mApk∼300Apk (20Arms) |
| 2 Ph | PPA1520/520* | |
| 3 Ph | PPA1530/530* | |
| 1 Ph | PPA1510/510-HC* | DC, 10mHz∼1MHz 300mApk∼1000Apk (30Arms) |
| 2 Ph | PPA1520/520-HC* | |
| 3 Ph | PPA1530/530-HC* | |

*PPA500 DC, 10mHz∼500kHz


PPA1500 3 Phase model

# ACCESSORIES

| High Performance Voltage Attenuating Probes | | | |
|---|---|---|---|
| Model | Voltage Range | Frequency Range | Details |
| TT-HV250 | 2500Vpk | 300MHz | High Voltage Probe (Passive) 2.5kVpk 100:1 |
| TTV-HVP | 1500Vpk | 50MHz | High Voltage Probe (Passive) 15kVpk 1000:1 |
| ATT10 | 30Vpk | 30MHz | 10:1 Voltage Attenuator Box (For use in conjunction with HV Probes when output voltage of probe is >3Vpk, BNC Input/BNC Output) |
| ATT20 | 60Vpk | 30MHz | 20:1 Voltage Attenuator Box (For use in conjunction with HV Probes when output voltage of probe is >3Vpk, BNC Input/BNC Output) |
| ULCP | 3000Vpk | 2MHz | 1000:1 Ultra Low Capacitance Probe (Active), For use in applications such as Ballast Testing (<1pF Capacitance) |



TT-HV250 2.5kVpk Probes



TT-HVP 15kVpk Probes



ATT10



ULCP

| High Performance External Current Measurment Options | | | | | |
|---|---|---|---|---|---|
| Model Number | Measuring Range | Frequency Range | Basic Accuracy | Phase Accuracy | Details |
| HF003 | 3Arms - 30Apk | DC - 2MHz | 470mΩ (±0.1%) | 0.0001° / kHz | 3Arms External Current Shunt, BNC Output (Use with PPA External Input) |
| HF006 | 6Arms - 60Apk | DC - 2MHz | 100mΩ (±0.1%) | 0.001° / kHz | 6Arms External Current Shunt, BNC Output (Use with PPA External Input) |
| HF020 | 20Arms - 200Apk | DC - 2MHz | 10mΩ (±0.1%) | 0.01° / kHz | 20Arms External Current Shunt, BNC Output (Use with PPA External Input) |
| HF100 | 100Arms - 1000Apk | DC - 2MHz | 1mΩ (±0.1%) | 0.05° / kHz | 100Arms External Current Shunt, BNC Output (Use with PPA External Input) |
| HF200 | 200Arms - 2000Apk | DC - 2MHz | 0.5mΩ (±0.1%) | 0.1° / kHz | 200Arms External Current Shunt, BNC Output (Use with PPA External Input) |
| HF500 | 500Arms - 5000Apk | DC - 2MHz | 0.2mΩ (±0.1%) | 0.1° / kHz | 500Arms External Current Shunt, BNC Output (Use with PPA External Input) |



External Shunt HF-003



External Shunt HF-100



External Shunt HF-200



External Shunt HF-500

| Probe/Current Clamp Transformer: AC | | | | | | |
|---|---|---|---|---|---|---|
| Model Number | Measuring range | Frequency range | Accuracy | Details | Clamp diameter | Category |
| M3 UB 50A-1V | 100mA ～ 50A | 40Hz ～ 5kHz | 1% | 100mA to 50A AC Current Clamp | 15mm×17mm | 600V CATIII |
| M3 U 100A-1V | 1A ～ 100A | 40Hz ～ 5kHz | 1% | 1A to 100A AC Current Clamp | 15mm×17mm | 600V CATIII |
| S UE 200A-1V | 1A ～ 200A | 40Hz ～ 5kHz | 1% | 1 A to 200A AC Current Clamp | 50mm ø | 600V CATIII |
| S UE 250 500 1000-1V | 1A ～ 250A/500A/1000A | 40Hz ～ 5kHz | 1%(250A) 0.5%(500+1000A) | 1 A to 250/500/1000A AC Current Clamp | 50mm ø | 600V CATIII |
| US UE 1000A-1V | 1A ～ 1000A | 40Hz ～ 5kHz | 1% | 1A to 1000A AC Current Clamp | 43mm ø | 600V CATIII |
| SM UE 1000A-1V | 0.5A ～ 1000A(1%>100A) | 15Hz ～ 15kHz | 1% | 0.5A to 1000A AC Current Clamp | 54mm ø | 600V CATIII |
| SM UB 1000A-1V | 0.5A ～ 1000A(0.5%>10A) | 15Hz ～ 15kHz | 0.5% | 0.5A to 1000A AC Current Clamp | 54mm ø | 600V CATIII |
| P32 UE 1000A-1V | 5A ～ 1000A | 40Hz ～ 5kHz | 1% | 5 A to 1000A AC Current Clamp | 83mm ø (125mm×47mm or 100m m×58mm) | 600V CATIII |
| P32 UE 3000A-1V | 5A ～ 3000A | 40Hz ～ 5kHz | 1% | 5 A to 3000A AC Current Clamp | 83mm ø | 600V CATIII |



Current Clamp M3-UB 50A-1V



Current Clamp S-UE 200A-1V



Current Clamp SM-UB 1000A-1V



Current Clamp P32-UE 1000A-1V

| Probe / Current Clamp (Hall effect): AC + DC | | | | | | |
|---|---|---|---|---|---|---|
| Model number | Measuring range | Frequency range | Accuracy | Details | Clamp diameter | Category |
| SC 2C 100A-1V | 1A～100A | DC～5kHz | 2% | 1A to 100A AC+DC Current Clamp | 50mm ø | 600V CATIII |
| SC 3C 1000A-1V | 1A～1000A | DC～2kHz | 1% | 1A to 1000A AC+DC Current Clamp | 59mm ø | 600V CATIII |
| P20 3C 2000A-2V | 40A～1000/2000A | DC～2kHz | 1% | 40A to 2000A AC+DC Current Clamp | 83mm ø | 600V CATIII |
| P40 3C 4000A-2V | 40A～2000/4000A | DC～2kHz | 1.5% | 40A to 4000A AC+DC Current Clamp | 83mm ø | 600V CATIII |
| P50 3C 5000A-2V | 50A～2000/5000A | DC～2kHz | 1.5% | 50A to 5000A AC+DC Current Clamp | 83mm ø | 600V CATIII |


Current Clamp SC 2C 100A-1V


Current Clamp SC 3C 1000A-1V


Current Clamp P20 3C 2000A-2V


Current Clamp P50 3C 5000A-2V

| Rogowski Current Transducer: AC / Zero Flux Current Transducer: AC+DC | | | | | | |
|---|---|---|---|---|---|---|
| Model number | Measuring range | Frequency range | Accuracy | Details | Coil/Through Hole Circumference | Category |
| WR5000 Rogowski | 1A～5000A | 1Hz～1MHz | 0.05% | 1A to 5000A AC Rogowski Coil | 600mm | 600V CATIII |
| WR10000 Rogowski | 1A～10000A | 1Hz～1MHz | 0.05% | 1A to 5000A AC Rogowski Coil | 600mm | 600V CATIII |
| Zero Flux Current Transducer | 0A～200A | DC～250kHz | 0.01% | 200A Zero Flux Current Transducer | 27.6mm | 600V CATIII |
| Zero Flux Current Transducer | 0A～600A | DC～250kHz | 0.01% | 600A Zero Flux Current Transducer | 27.6mm | 600V CATIII |


WR5000 Rogowski Coil


Danisense DS600

# PPA5500 SERIES MODELS

| Phases | Model | Specification |
|---|---|---|
| 1 Ph | PPA5510-LC | DC, 10mHz～2MHz 3mApk～30Apk (10Arms) |
| 2 Ph | PPA5520-LC | |
| 3 Ph | PPA5530-LC | |
| 4 Ph | PPA5540-LC | |
| 5 Ph | PPA5550-LC | |
| 6 Ph | PPA5560-LC | |

| Phases | Model | Specification |
|---|---|---|
| 1 Ph | PPA5510-Std | DC, 10mHz～2MHz 30mApk～300Apk (30Arms) |
| 2 Ph | PPA5520-Std | |
| 3 Ph | PPA5530-Std | |
| 4 Ph | PPA5540-Std | |
| 5 Ph | PPA5550-Std | |
| 6 Ph | PPA5560-Std | |

Touchproof 50A screw connectors used on PPA5500-HC versions

| Phases | Model | Specification |
|---|---|---|
| 1 Ph | PPA5510-HC | DC, 10mHz～1MHz 100mApk～1000Apk (50Arms) |
| 2 Ph | PPA5520-HC | |
| 3 Ph | PPA5530-HC | |
| 4 Ph | PPA5540-HC | |
| 5 Ph | PPA5550-HC | |
| 6 Ph | PPA5560-HC | |

# PPA4500 SERIES MODELS

| Phases | Model | Specification |
|---|---|---|
| 1 Ph | PPA4510-LC | DC, 10mHz～2MHz 10mApk～30Apk (10Arms) |
| 2 Ph | PPA4520-LC | |
| 3 Ph | PPA4530-LC | |
| 4 Ph | PPA4540-LC | |
| 5 Ph | PPA4550-LC | |
| 6 Ph | PPA4560-LC | |

| Phases | Model | Specification |
|---|---|---|
| 1 Ph | PPA4510-Std | DC, 10mHz～2MHz 100mApk～300Apk (30Arms) |
| 2 Ph | PPA4520-Std | |
| 3 Ph | PPA4530-Std | |
| 4 Ph | PPA4540-Std | |
| 5 Ph | PPA4550-Std | |
| 6 Ph | PPA4560-Std | |

Touchproof 50A screw connectors used on PPA4500-HC versions

| Phases | Model | Specification |
|---|---|---|
| 1 Ph | PPA4510-HC | DC, 10mHz～1MHz 300mApk～1000Apk (50Arms) |
| 2 Ph | PPA4520-HC | |
| 3 Ph | PPA4530-HC | |
| 4 Ph | PPA4540-HC | |
| 5 Ph | PPA4550-HC | |
| 6 Ph | PPA4560-HC | |


PPA5500 3 Phase model


PPA5500 units in Master/Slave mode, synchronised for 4-6 Phase measurements

# PRODUCT COMPARISON

| | PPA500 | PPA1500 | PPA3500 | PPA4500 | PPA5500 |
|---|---|---|---|---|---|
| **Basic Accuracy** | | | | | |
| V, A rdg error | 0.05% | 0.05% | 0.05% | 0.03% | 0.01% |
| Power rdg error | 0.10% | 0.10% | 0.06% | 0.04% | 0.02% |
| **Phase Options** | | | | | |
| Internal | 1～3 | 1～3 | 1～6 | 1～3 | 1～3 |
| Master/Slave operation | — | — | — | 4～6 | 4～6 |
| **Bandwidth** | | | | | |
| 20 & 30A Shunt | DC ～ 500kHz | DC ～ 1MHz | DC ～ 1MHz | — | — |
| 10 & 30A Shunt | — | — | — | DC ～ 2MHz | DC ～ 2MHz |
| 50A Shunt | — | — | — | DC ～ 1MHz | DC ～ 1MHz |
| **Voltage Input** | | | | | |
| Max input voltage | 2500Vpk | 2500Vpk | 2500Vpk | 3000Vpk | 3000Vpk |
| No. of ranges | 8 | 8 | 10 | 8 | 9 |
| **Direct Current Input** | | | | | |
| 10Arms model | — | — | — | ◎ | ◎ |
| 20Arms model | ◎ | ◎ | ◎ | — | — |
| 30Arms model | ◎ | ◎ | ◎ | ◎ | ◎ |
| 50Arms model | — | — | — | ◎ | ◎ |
| No. of ranges | 8 | 8 | 10 | 8 | 9 |
| **Features** | | | | | |
| Scope and Graph Modes | — | ◎ | ◎ | ◎ | ◎ |
| USB Memory port | ◎ | ◎ | ◎ | ◎ | ◎ |
| LAN Port | ◎ | ◎ | ◎ | ◎ | ◎ |
| GPIB Port | ◎ | ◎ | ◎ | ◎ | ◎ |
| RS232 Port | ◎ | ◎ | ◎ | ◎ | ◎ |
| Real time clock | ◎ | ◎ | ◎ | ◎ | ◎ |
| 19in Rack mount option | ◎ | ◎ | ◎ | ◎ | ◎ |
| Torque and Speed | — | — | ◎ | ◎ | ◎ |
| IEC61000 Mode | — | — | — | — | ◎ |
| PWM Motor Drive Mode | — | Limited Functionality | ◎ | ◎ | ◎ |
| Oscilloscope | — | ◎ | ◎ | ◎ | ◎ |
| Transformer Mode | — | — | ◎ | ◎ | ◎ TE version |
| PWM Filter Options | — | 2 | 7 | 7 | 7 |
| Speed/Harmonics/Sec | 300/sec | 300/sec | 300/sec | 600/sec | 1800/sec |
| Internal Datalogging | 4 Parameters | 4 Parameters | 32 Parameters | 16 Parameters | 16 Parameters |
| Datalog Records | 16000 | 16000 | 5M | 5M | 10M |
| ABD0100.1.8 Mode | — | — | - | — | ◎ |
| Internal Memory | 192kB | 192kB | 500MB | 500MB | 1GB |
| Harmonics | 50 | 50 | 100 | 100 | 417 |
| Minimum Window Size | 10ms | 5ms | 5ms | 2ms | 2ms |
| Dimensions - Excl. Feet H x W x D (mm) | 92 x 215 x 312 | 92 x 215 x 312 | 87.5H x 400W x 347D mm | 130 x 400 x 315 | 130 x 400 x 315 |
| Weight | 3.3 - 4kg | 3.3 - 4kg | 5 - 7kg | 5.4 - 6kg | 5.4 - 6kg |

— Not Applicable    ◎ Option    ◎ Standard

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

The N4L product range also includes Frequency Response and Impedance Analyzers, Selective Level Meters and Laboratory Power Amplifiers
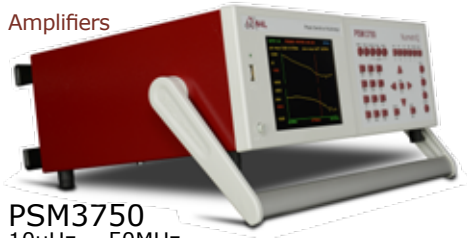
**PSM3750**
10µHz ～ 50MHz

**PSM17xx**
10µHz ～ 35MHz

## Applications

Newtons4th Ltd N4L

- Power supply phase margin and gain margin (FRA)
- Inductance, Capacitance and Resistance (LCR)
- Analysis of mechanical vibration (HARM)
- Phase Angle Voltmeter (PAV)

Contact your local N4L Distributor for further details

## Newtons4th

Newtons4th Ltd (abbreviated to N4L) was established in 1997 to design, manufacture and support innovative electronic equipment to a world-wide market, specialising in sophisticated test equipment particularly related to phase measurement. The company was founded on the principle of using the latest technology and sophisticated analysis techniques in order to provide our customers with accurate, easy to use instruments at a lower price than has been traditionally associated with these types of measurements. Flexibility in our products and an attitude to providing the solutions that our customers really want has allowed us to develop many innovative functions in our ever increasing product range.

Newtons4th Ltd are ISO9001 registered, the internationally recognised standard for the quality management of businesses

THE QUEEN'S AWARDS FOR ENTERPRISE: INNOVATION 2010

In recognition of the technical innovation and commercial success of the PPA series, N4L received the "Innovation 2010" Queen's award for enterprise

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