**UPDATE! AUG 2019**

**NEW IMPROVED VOLTAGE ATTENUATOR DESIGN**

**Precision Power Analyzers**

**PPA4500 Series**

**PPA5500 Series**

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**Product Overview**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>Leading wideband accuracy</td>
<td>Basic 0.01% (PPA5500) with class leading high frequency performance</td>
</tr>
<tr>
<td>New Voltage Attenuator Design</td>
<td>3.3Mohm, Low burden and heat dissipation, Maintaining excellent frequency response and Linearity</td>
</tr>
<tr>
<td>Wide frequency range</td>
<td>DC, 10mHz to 2MHz</td>
</tr>
<tr>
<td>Fast sample rate and No-Gap</td>
<td>2.2M samples/s</td>
</tr>
<tr>
<td>Leading phase accuracy</td>
<td>0.005 Degrees plus 0.01 degrees per kHz (0.003 Degrees - Transformer Edition)</td>
</tr>
<tr>
<td>Built in high precision current shunt</td>
<td>10Arms, 30Arms or 50Arms with up to 1000Apk direct plus a wide range of external sensors</td>
</tr>
<tr>
<td>Versatile interfaces</td>
<td>RS232, USB, LAN, GPIB as standard (PPA5500) plus direct torque and speed</td>
</tr>
<tr>
<td>Range of PC software options</td>
<td>Remote control, monitoring and recording of real time data, tables and graphs</td>
</tr>
<tr>
<td>PWM Motor Drive Measurements</td>
<td>Highest performance Analyzer on the market for PWM Motor Drive Evaluation</td>
</tr>
<tr>
<td>External Voltage BNC Connector</td>
<td>Unique External BNC connector with high sensitivity to interface with external High Voltage Probes</td>
</tr>
<tr>
<td>HF + TE Accuracy</td>
<td>Increased High Frequency and Low Power factor as standard, -HF and -TE certification optional</td>
</tr>
</tbody>
</table>
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
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
**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

**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

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

**PC INTERFACE CONNECTIONS**
Standard interfaces RS232 + USB + LAN + GPIB (Standard on PPA5500, GPIB optional on PPA4500)

**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

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

![High sample rate at all times](image)

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](image)

Inverter output waveform

Fast sampling reliably captures fast switching waveforms

![PWM carrier signal](image)

PWM carrier signal

■ 2MHz Wideband Frequency Response

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

![PWM Frequency Range](image)

PWM Frequency Range

■ High Accuracy

Unique voltage and current analogue card design ensures high accuracy for both power and harmonic analysis

![Class Leading Power Accuracy](image)

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*]
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

DFT Real Time No Gap Analysis
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.

- 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
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.

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.

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

■ 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.

<table>
<thead>
<tr>
<th>Model</th>
<th>Low Current Model</th>
<th>Standard Model</th>
<th>High Current Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>PPA5500</td>
<td>9 ranges: 3mApk - 30Apk (10Arms) 100mΩ Shunt</td>
<td>9 ranges: 30mApk - 300Apk (30Arms) 10mΩ Shunt</td>
<td>9 ranges: 100mApk - 1000Apk (50Arms) 3 mΩ Shunt</td>
</tr>
<tr>
<td>PPA4500</td>
<td>8 ranges: 10mApk - 30Apk (10Arms) 100mΩ Shunt</td>
<td>8 ranges: 100mApk - 300Apk (30Arms) 10mΩ Shunt</td>
<td>8 ranges: 300mApk - 1000Apk (30Arms) 3mΩ Shunt</td>
</tr>
</tbody>
</table>

External shunt options
(DC ~ 1MHz, 0.1% Accuracy, Inductance<1nH)

<table>
<thead>
<tr>
<th>Model</th>
<th>Maximum Current</th>
<th>Bandwidth</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rated A</td>
<td>Peak</td>
</tr>
<tr>
<td>HF500</td>
<td>500Arms</td>
<td>5000Apk</td>
</tr>
<tr>
<td>HF200</td>
<td>200Arms</td>
<td>2000Apk</td>
</tr>
<tr>
<td>HF100</td>
<td>100Arms</td>
<td>1000Apk</td>
</tr>
<tr>
<td>HF020</td>
<td>20Arms</td>
<td>200Apk</td>
</tr>
<tr>
<td>HF006</td>
<td>6Arms</td>
<td>60Apk</td>
</tr>
<tr>
<td>HF003</td>
<td>3Arms</td>
<td>30Apk</td>
</tr>
</tbody>
</table>

Utilising external shunt resistors

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

Small battery powered equipment

HF003

HF500

HF003

Selected Shunt

Selected Shunt

Current Detection

Current Detection

Shunt output

Shunt output

HF500

HF003

Current Detection

Current Detection

Selected Shunt

Selected Shunt

Utilising external shunt resistors
Power Analysis

**PPA5500**

**PPA4500**

**MEASUREMENT DISPLAY**

Any parameters can be enlarged with the zoom function.

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

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.

**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

• 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

• Harmonic analyzer (Bar graph)
• Harmonic analyzer summary page
• Harmonic analyzer table
• Oscilloscope - Voltage and Current display
• Three phase display of voltage or current

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)
Auto-Ranging, Range Up Only or Manual

Range modes are selectable

1. Auto-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.

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

3. Manual: 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

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

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

■ Bandwidth Settings

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

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

■ Display Settings, Smoothing Response and Frequency Reference

1. Display 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)

2. Smoothing 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.

■ Frequency Reference

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.

Example of independent wiring configuration showing 3 phase individual coupling settings.

Note:

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

1:5 cycle (10Hz standby current period)

Power measurements synchronized to low duty cycle current pulses of a power supply in standby mode.

1:5 duty cycle standby power measurement cycle

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

- **Application Modes**
  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

- **Inductance Loss Analysis**
  An example of analysis of dynamic inductance losses
APPLICATIONS

■ 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.

Newton4th are the only Power Analyzer Manufacturer in the world* to provide ISO17025 calibration certificates on all new Power Analyzers as standard. Our ISO17025 Schedule of Accreditation includes Voltage, Current, Phase, Power, Harmonics and Flicker. With traceable certification 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.

*According to N4L research August 2019
**Power Transformer Loss Testing**

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**

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.
**Solar Inverter Performance Analysis**

The PPA5500 and PPA4500 provide a highly accurate solar inverter analysis and evaluation solution, featuring independent frequency detection. N4L Power Analyzers exhibit the ability to synchronize to the 50/60Hz output signal along 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.

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**Inrush Current**

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 utilize 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.

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**Applications**

- **AC Source**

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

Newton4th are an accredited UKAS Calibration laboratory, all PPA4500 and PPA5500 Power Analyzers are supplied with an ISO17025 UKAS Calibration Certificate 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*. 

**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.

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<table>
<thead>
<tr>
<th>Signal Amplitude</th>
<th>Frequency Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage Sine Amplitude</td>
<td>1V to 1008V</td>
</tr>
<tr>
<td>Voltage Harmonic Amplitude</td>
<td>0V to 302V</td>
</tr>
<tr>
<td>Current Sinewave Amplitude</td>
<td>10mA to 48A</td>
</tr>
<tr>
<td>Current Harmonic Amplitude</td>
<td>0A to 15A</td>
</tr>
<tr>
<td>Current to Voltage Phase Angle</td>
<td>-180° to +180°</td>
</tr>
<tr>
<td>Apparent Power (VA Product)</td>
<td>100mVa to 48.4kVA</td>
</tr>
<tr>
<td>AC Power</td>
<td>0W to 48.4kW</td>
</tr>
<tr>
<td>AC Power - Calorimetry (New for 2017)</td>
<td>0W to 5W</td>
</tr>
<tr>
<td>Current Harmonic Amplitude to IEC61000-4-7</td>
<td>0A to 6A</td>
</tr>
</tbody>
</table>

Flicker to IEC61000-4-15

- Pinst(Sinusoidal Modulation)
- Pinst(Rectangular Modulation)
- Pat
- Frequency Changes
- Distorted Voltage with Multiple Zero Crossings
- Harmonics with Sidebands
- Phase Jumps
- Rectangular Changes with Duty Cycle
- d(t)

IEC61000-4-15 Impedance Networks

- Resistance, Reactance
- 33 mΩ to 400 Ω

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**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 available 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.

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* 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
Auto Peak Ranging Ensures Complete Waveform Analysis

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

Waveform within red hashed area is clipped by an RMS ranging system and fixed crest factor setting

Modern Peak Ranging System, implemented on all N4L Power Analyzers

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 original PPAcomm program plus multiple instrument control for 4-12 phase applications and data export to Text file, Excel, Bitmap or Clipboard

- Real time results can be displayed as latest value, table or graph
- Datalogging results are then saved in the selected format

Data Export options

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

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.

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

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

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**
  The PPA55xx series Power Analyzers provide fully compliant ISO17025 certified Harmonics and Flicker testing, Newtons4th provide fully integrated software featuring real time and graphical user interfaces as well as excel and pdf exporting functionality.

  ![Frequency chart]

  Flicker tests are automatically evaluated against the IEC/BSEN or JIS limits and a pdf/excel report is generated indicating PASS/FAIL.

  ![Graphical display]

  Both graphical and real time displays are available when testing to IEC61000-3-2/3/11/12. The graphs are colour coded to assist the test engineer.

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

  ![Connection diagram]

- **Data Logging**
  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]

  Datalog menu, interval set to 10ms
## SPECIFICATION

<table>
<thead>
<tr>
<th><strong>PPA4500</strong></th>
<th><strong>PPA5500</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Frequency Range</strong></td>
<td><strong>Frequency Range</strong></td>
</tr>
<tr>
<td>DC¹, 10mHz ~ 2MHz - PPA4500-LC(10 Arms), PPA4500-Std(30 Arms)</td>
<td>DC¹, 10mHz ~ 2MHz - PPA5500-LC(10 Arms), PPA5500-Std(30 Arms)</td>
</tr>
<tr>
<td>DC¹, 10mHz ~ 1MHz - PPA4500-HC(50 Arms)</td>
<td>DC¹, 10mHz ~ 1MHz - PPA5500-HC(50 Arms)</td>
</tr>
<tr>
<td><strong>Voltage Input</strong></td>
<td><strong>Voltage Input</strong></td>
</tr>
<tr>
<td><strong>Internal Range</strong></td>
<td><strong>External Range</strong></td>
</tr>
<tr>
<td>1Vpk ~ 3000Vpk (1000Vrms) in 8 ranges</td>
<td>300mVpk ~ 3000Vpk (1000Vrms) in 9 ranges</td>
</tr>
<tr>
<td>(2400rms within 3000Vpk range, using 20% overrange)</td>
<td>(2400rms within 3000Vpk range, using 20% overrange)</td>
</tr>
<tr>
<td><strong>Accuracy</strong></td>
<td><strong>Accuracy</strong></td>
</tr>
<tr>
<td>0.03% Rdg + 0.04% Rng (0.004% × kHz) Rdg + 500µA</td>
<td>0.01% Rdg + 0.038% Rng (0.004% × kHz) Rdg + 50µA</td>
</tr>
<tr>
<td><strong>Impedance</strong></td>
<td><strong>Impedance</strong></td>
</tr>
<tr>
<td>3Mohm in parallel with SpF - Common mode capacitance to chassis 90pF</td>
<td>3Mohm in parallel with SpF - Common mode capacitance to chassis 90pF</td>
</tr>
<tr>
<td><strong>Current Input</strong></td>
<td><strong>Current Input</strong></td>
</tr>
<tr>
<td><strong>Internal</strong></td>
<td><strong>External</strong></td>
</tr>
<tr>
<td>10 Arms Low Current (PPA5500-LC) 4mm safety connectors</td>
<td><strong>BNC Connector (Max input 3Vpk)</strong></td>
</tr>
<tr>
<td>Ranges</td>
<td>Ranges</td>
</tr>
<tr>
<td>10mApk ~ 30Apk(10 Arms) in 8 ranges</td>
<td>1Vpk ~ 3Vpk in 8 ranges</td>
</tr>
<tr>
<td><strong>Accuracy</strong></td>
<td><strong>Accuracy</strong></td>
</tr>
<tr>
<td>0.03% Rdg + 0.04% Rng (0.004% × kHz) Rdg + 30µA</td>
<td>0.01% Rdg + 0.038% Rng (0.004% × kHz) Rdg + 30µA</td>
</tr>
<tr>
<td><strong>Impedance</strong></td>
<td><strong>Impedance</strong></td>
</tr>
<tr>
<td>3Mohm in parallel with SpF, 40pF - Common mode capacitance to chassis 90pF</td>
<td>300µVpk in 3Vpk in 9 ranges (BNC connector 3Vpk max input)</td>
</tr>
<tr>
<td><strong>Power Accuracy</strong></td>
<td><strong>Power Accuracy</strong></td>
</tr>
<tr>
<td><strong>10mHz-2MHz</strong></td>
<td><strong>10mHz-2MHz</strong></td>
</tr>
<tr>
<td>LC/Std</td>
<td>[0.04% + 0.05% ×pf(0.01% + kHz)/pf] Rdg + 0.004% Vdk Rng</td>
</tr>
<tr>
<td>HC</td>
<td>[0.04% + 0.05% ×pf(0.01% + kHz)/pf] Rdg + 0.06% Vdk Rng</td>
</tr>
<tr>
<td>40-850Hz</td>
<td><strong>40-850Hz</strong></td>
</tr>
<tr>
<td>[0.03% + 0.04% ×pf(0.01% + kHz)/pf] Rdg + 0.003% Vdk Rng</td>
<td>[0.02% + 0.03% ×pf(0.005% + kHz)/pf] Rdg + 0.003% Vdk Rng</td>
</tr>
<tr>
<td>16-450Hz Low PF</td>
<td><strong>16-450Hz Low PF</strong></td>
</tr>
<tr>
<td>0.005deg + (0.01deg × kHz)</td>
<td>See PPA5500-TE Brochure</td>
</tr>
</tbody>
</table>

### General
- **Crest Factor**: 20 (Voltage and Current)
- **Sample Rate**: 2.2Ms/s on all channels, No-Gap
- **IEC Modes**: IEC62301 Standby Power
- **Application Modes**: 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 x 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)

### 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
- **USB**
  - USB 2.0 and 1.1 compatible
  - Bipolar ±10V (BNC)
- **Sync**
  - 4 ~ 6 Phase measurement (Master/Slave)
  - 4 ~ 6 Phase (Master/Slave) + Auxiliary

### Standard Accessories
- **Leads**: Power, RS232, USB
- **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 alligator 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

### Optional Accessories
- **Mechanical/Environmental**
  - **Input Impedance**
    - Voltage Attenuator 3MΩ || SpF
    - External Inputs 1MΩ || 40pF
    - Common mode capacitance to chassis 90pF
- **Display**
  - 320 x 480 dot full colour TFT, White LED Backlight
- **Dimensions**
  - 130H x 400W x 315D mm excluding feet
- **Weight**: 5.4Kg (1 Phase), 6Kg (3 Phase)
- **Safety Isolation**: 1000Vrms or DC(CATIII), 600Vrms or DC(CATII)
- **Power supply**: 90 ~ 265Vrms, 50 ~ 60Hz, 40VA max
- **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

¹DC Specification available separately
**SPECIFICATION**

**PPA500**

<table>
<thead>
<tr>
<th>Harmonic Specification</th>
<th>PPA5500</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bandwidth</td>
<td>DC, 10MHz - 2 MHz - PPA5000-LC(10 Arms), PPA5000-Std (30 Arms)</td>
</tr>
<tr>
<td></td>
<td>DC, 10MHz - 1 MHz - PPA5000-HC (50 Arms)</td>
</tr>
<tr>
<td>No. of Harmonics</td>
<td>100</td>
</tr>
<tr>
<td>Sampling Frequency</td>
<td>2Ms/s</td>
</tr>
<tr>
<td>Signal Processing</td>
<td>DFT (Discrete Fourier Transform)</td>
</tr>
<tr>
<td>Crest Factor</td>
<td>20</td>
</tr>
<tr>
<td>Power Factor</td>
<td>0 to 1</td>
</tr>
</tbody>
</table>

**Harmonic Accuracy**

- Voltage: 0.03% Rdg + 0.04% Rng + (0.004% kHz Rdg) + 5mV
- Current: PPA5000-LC 0.03% Rdg + 0.04% Rng + (0.004% kHz Rdg) + 10uA
- PPA5000-Std 0.03% Rdg + 0.04% Rng + (0.004% kHz Rdg) + 300uA
- PPA5000-HC 0.03% Rdg + 0.04% Rng + (0.004% kHz Rdg) + 900uA

**Cycle by Cycle Analysis direct to PC - 2Ms/s sample rate**

- Data Rate: 10ms
- Data Rate: 10ms
- Voltage Attenuator Overload Capability: 4.2kVpk (3kVrms)
- Minimum Current Measurement at Full Accuracy: 45uArms

**STANDARD ACCESSORIES AND DOCUMENTS**

<table>
<thead>
<tr>
<th>Type</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>36A Connection lead set</td>
<td>1.5 Meter - 36A lead set with 4mm stackable safety terminals 1x Red, 1x Yellow and 2x Black per phase plus alligator clips</td>
</tr>
<tr>
<td>36A 4mm to spade (Option)</td>
<td>1.5 Meter - 36A lead set with 4mm to spade for 36A terminals</td>
</tr>
<tr>
<td>RS232 cable</td>
<td>RS232 9pin serial cable</td>
</tr>
<tr>
<td>USB cable</td>
<td>USB 2 Meter A male to 8 male</td>
</tr>
<tr>
<td>USB to 9-pin RS232 (Option)</td>
<td>USB ~ 9-pin RS232 Serial Converter</td>
</tr>
<tr>
<td>GPIB Cable (PPA5000)</td>
<td>GPIB Interface cable</td>
</tr>
</tbody>
</table>

**documents**

- 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
- 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 HF high frequency specification

**PC SOFTWARE - FREE DOWNLOAD**

- PC Software - Free to Download from Newtons4th.com (CD Copy is a charged option)
  - Type: PPAsoft
  - Specification: 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

**PPA500/1500 MODELS**

For more details see separate brochure

**PPA500 3 Phase model**

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**HARDWARE OPTIONS**

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

- **Rack Mount Kit**
  - Type: Rack Mount brackets
  - Specification: PPA250/550 19" rack mount brackets (model specific)
  - Type: Rack Mount panel
  - Specification: PPA250 19" rack fascia panel

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

- **Breakout Box**
  - Type: PPA Series Hard Carrying Case
  - Specification: Black nylon with shoulder strap

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

High Performance Voltage Attenuating Probes

<table>
<thead>
<tr>
<th>Model</th>
<th>Voltage Range</th>
<th>Frequency Range</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>TT-HV250</td>
<td>2500Vpk</td>
<td>300MHz</td>
<td>High Voltage Probe (Passive) 2.5kVpk 100:1</td>
</tr>
<tr>
<td>TVHV250</td>
<td>1500Vpk</td>
<td>50MHz</td>
<td>High Voltage Probe (Passive) 15kVpk 1000:1</td>
</tr>
<tr>
<td>ATT10</td>
<td>30Vpk</td>
<td>30MHz</td>
<td>10:1 Voltage Attenuator Box (For use in conjunction with HV Probes when output voltage of probe is &gt;3Vpk, BNC Input/BNC Output)</td>
</tr>
<tr>
<td>ATT20</td>
<td>60Vpk</td>
<td>30MHz</td>
<td>20:1 Voltage Attenuator Box (For use in conjunction with HV Probes when output voltage of probe is &gt;3Vpk, BNC Input/BNC Output)</td>
</tr>
<tr>
<td>ULCP</td>
<td>3000Vpk</td>
<td>2MHz</td>
<td>1000:1 Ultra Low Capacitance Probe (Active), For use in applications such as Ballast Testing (&lt;1pF Capacitance)</td>
</tr>
</tbody>
</table>

High Performance External Current Measurement Options

<table>
<thead>
<tr>
<th>Model Number</th>
<th>Measuring Range</th>
<th>Frequency Range</th>
<th>Basic Accuracy</th>
<th>Phase Accuracy</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>HF003</td>
<td>3Arms - 30Apk</td>
<td>DC - 2MHz</td>
<td>470μΩ (±0.1%)</td>
<td>0.0001° / kHz</td>
<td>3Arms External Current Shunt, BNC Output (Use with PPA External Input)</td>
</tr>
<tr>
<td>HF006</td>
<td>6Arms - 60Apk</td>
<td>DC - 2MHz</td>
<td>100μΩ (±0.1%)</td>
<td>0.001° / kHz</td>
<td>6Arms External Current Shunt, BNC Output (Use with PPA External Input)</td>
</tr>
<tr>
<td>HF020</td>
<td>20Arms - 200Apk</td>
<td>DC - 2MHz</td>
<td>10μΩ (±0.1%)</td>
<td>0.01° / kHz</td>
<td>20Arms External Current Shunt, BNC Output (Use with PPA External Input)</td>
</tr>
<tr>
<td>HF100</td>
<td>100Arms - 1000Apk</td>
<td>DC - 2MHz</td>
<td>1μΩ (±0.1%)</td>
<td>0.05° / kHz</td>
<td>100Arms External Current Shunt, BNC Output (Use with PPA External Input)</td>
</tr>
<tr>
<td>HF200</td>
<td>200Arms - 2000Apk</td>
<td>DC - 2MHz</td>
<td>0.5μΩ (±0.1%)</td>
<td>0.1° / kHz</td>
<td>200Arms External Current Shunt, BNC Output (Use with PPA External Input)</td>
</tr>
<tr>
<td>HF500</td>
<td>500Arms - 5000Apk</td>
<td>DC - 2MHz</td>
<td>0.2μΩ (±0.1%)</td>
<td>0.1° / kHz</td>
<td>500Arms External Current Shunt, BNC Output (Use with PPA External Input)</td>
</tr>
</tbody>
</table>

Probe/Current Clamp Transformer: AC

<table>
<thead>
<tr>
<th>Model Number</th>
<th>Measuring range</th>
<th>Frequency range</th>
<th>Accuracy</th>
<th>Details</th>
<th>Clamp diameter</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>M3 50A-1V</td>
<td>100mA ~ 50A</td>
<td>40Hz ~ 5kHz</td>
<td>1%</td>
<td>100mA to 50A AC Current Clamp</td>
<td>15mm x 17mm</td>
<td>600V CATIII</td>
</tr>
<tr>
<td>M3 U 100A-1V</td>
<td>1A ~ 100A</td>
<td>40Hz ~ 5kHz</td>
<td>1%</td>
<td>1A to 100A AC Current Clamp</td>
<td>15mm x 17mm</td>
<td>600V CATIII</td>
</tr>
<tr>
<td>S UE 200A-1V</td>
<td>1A ~ 200A</td>
<td>40Hz ~ 5kHz</td>
<td>1%</td>
<td>1A to 200A AC Current Clamp</td>
<td>50mm ø</td>
<td>600V CATIII</td>
</tr>
<tr>
<td>S UE 250 5001000A-1V</td>
<td>1A ~ 250A/500A/1000A</td>
<td>40Hz ~ 5kHz</td>
<td>1% (250A) 0.5% (500A/1000A)</td>
<td>1 A to 250/500/1000A AC Current Clamp</td>
<td>50mm ø</td>
<td>600V CATIII</td>
</tr>
<tr>
<td>U S UE 1000A-1V</td>
<td>1A ~ 1000A</td>
<td>40Hz ~ 5kHz</td>
<td>1%</td>
<td>1A to 1000A AC Current Clamp</td>
<td>43mm ø</td>
<td>600V CATIII</td>
</tr>
<tr>
<td>SM UE 1000A-1V</td>
<td>0.5A ~ 1000A(1%)</td>
<td>15Hz ~ 15kHz</td>
<td>1%</td>
<td>0.5A to 1000A AC Current Clamp</td>
<td>54mm ø</td>
<td>600V CATIII</td>
</tr>
<tr>
<td>SM UE 1000A-1V</td>
<td>0.5A ~ 1000A(0.5%)</td>
<td>15Hz ~ 15kHz</td>
<td>0.5%</td>
<td>0.5A to 1000A AC Current Clamp</td>
<td>54mm ø</td>
<td>600V CATIII</td>
</tr>
<tr>
<td>P32 UE 1000A-1V</td>
<td>5A ~ 1000A</td>
<td>40Hz ~ 5kHz</td>
<td>1%</td>
<td>5 A to 1000A AC Current Clamp</td>
<td></td>
<td>83mm ø</td>
</tr>
<tr>
<td>P32 UE 3000A-1V</td>
<td>5A ~ 3000A</td>
<td>40Hz ~ 5kHz</td>
<td>1%</td>
<td>5 A to 3000A AC Current Clamp</td>
<td></td>
<td>83mm ø</td>
</tr>
</tbody>
</table>
**Probe / Current Clamp (Hall effect): AC + DC**

<table>
<thead>
<tr>
<th>Model number</th>
<th>Measuring range</th>
<th>Frequency range</th>
<th>Accuracy</th>
<th>Details</th>
<th>Clamp diameter</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>SC 2C 100A-1V</td>
<td>1A ~ 100A</td>
<td>DC ~ 5kHz</td>
<td>2%</td>
<td>1A to 100A AC+DC Current Clamp</td>
<td>50mm ø</td>
<td>600V CATIII</td>
</tr>
<tr>
<td>SC 3C 100A-1V</td>
<td>1A ~ 100A</td>
<td>DC ~ 2kHz</td>
<td>1%</td>
<td>1A to 1000A AC+DC Current Clamp</td>
<td>83mm ø</td>
<td>600V CATIII</td>
</tr>
<tr>
<td>P20 3C 2000A-2V</td>
<td>40A ~ 2000A</td>
<td>DC ~ 2kHz</td>
<td>1%</td>
<td>40A to 2000A AC+DC Current Clamp</td>
<td>83mm ø</td>
<td>600V CATIII</td>
</tr>
<tr>
<td>P40 3C 4000A-2V</td>
<td>40A ~ 4000A</td>
<td>DC ~ 2kHz</td>
<td>1.5%</td>
<td>40A to 4000A AC+DC Current Clamp</td>
<td>83mm ø</td>
<td>600V CATIII</td>
</tr>
<tr>
<td>P50 3C 5000A-2V</td>
<td>50A ~ 5000A</td>
<td>DC ~ 2kHz</td>
<td>1.5%</td>
<td>50A to 5000A AC+DC Current Clamp</td>
<td>83mm ø</td>
<td>600V CATIII</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Model number</th>
<th>Measuring range</th>
<th>Frequency range</th>
<th>Nominal Accuracy</th>
<th>Details</th>
<th>Coil/Through Hole Circumference</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>SC 2C 100A-1V</td>
<td>1A ~ 100A</td>
<td>DC ~ 5kHz</td>
<td>2%</td>
<td>1A to 100A AC+DC Current Clamp</td>
<td>50mm ø</td>
<td>600V CATIII</td>
</tr>
<tr>
<td>SC 3C 100A-1V</td>
<td>1A ~ 100A</td>
<td>DC ~ 2kHz</td>
<td>1%</td>
<td>1A to 1000A AC+DC Current Clamp</td>
<td>83mm ø</td>
<td>600V CATIII</td>
</tr>
<tr>
<td>P20 3C 2000A-2V</td>
<td>40A ~ 2000A</td>
<td>DC ~ 2kHz</td>
<td>1%</td>
<td>40A to 2000A AC+DC Current Clamp</td>
<td>83mm ø</td>
<td>600V CATIII</td>
</tr>
<tr>
<td>P40 3C 4000A-2V</td>
<td>40A ~ 4000A</td>
<td>DC ~ 2kHz</td>
<td>1.5%</td>
<td>40A to 4000A AC+DC Current Clamp</td>
<td>83mm ø</td>
<td>600V CATIII</td>
</tr>
<tr>
<td>P50 3C 5000A-2V</td>
<td>50A ~ 5000A</td>
<td>DC ~ 2kHz</td>
<td>1.5%</td>
<td>50A to 5000A AC+DC Current Clamp</td>
<td>83mm ø</td>
<td>600V CATIII</td>
</tr>
</tbody>
</table>

**Rogowski Current Transducer: AC / Zero Flux Current Transducer: AC+DC**

<table>
<thead>
<tr>
<th>Model number</th>
<th>Measuring range</th>
<th>Frequency range</th>
<th>Nominal Accuracy</th>
<th>Details</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>WR5000 Rogowski</td>
<td>1A ~ 5000A</td>
<td>1Hz ~ 1MHz</td>
<td>0.05%</td>
<td>1A to 5000A AC Rogowski Coil</td>
<td>600mm</td>
</tr>
<tr>
<td>WR10000 Rogowski</td>
<td>1A ~ 10000A</td>
<td>1Hz ~ 1MHz</td>
<td>0.05%</td>
<td>1A to 10000A AC Rogowski Coil</td>
<td>600mm</td>
</tr>
<tr>
<td>LEM IT 60-S</td>
<td>0A ~ 60A DC/ pk (42Arms)</td>
<td>DC ~ 800kHz</td>
<td>0.1%</td>
<td>60A Zero Flux Current Transducer</td>
<td>26mm</td>
</tr>
<tr>
<td>LEM IT 65-S</td>
<td>0A ~ 60A DC / 85A pk (60Arms)</td>
<td>DC ~ 800kHz</td>
<td>0.1%</td>
<td>60A Zero Flux Current Transducer</td>
<td>26mm</td>
</tr>
<tr>
<td>LEM IT 200-S</td>
<td>0A ~ 200A DC/ pk (141Arms)</td>
<td>DC ~ 500kHz</td>
<td>0.1%</td>
<td>200A Zero Flux Current Transducer</td>
<td>26mm</td>
</tr>
<tr>
<td>LEM IT 205-S</td>
<td>0A ~ 200A DC / 283A pk (200Arms)</td>
<td>DC ~ 1kHz</td>
<td>0.1%</td>
<td>200A Zero Flux Current Transducer</td>
<td>26mm</td>
</tr>
<tr>
<td>LEM IT 400-S</td>
<td>0A ~ 400A DC/ pk (282Arms)</td>
<td>DC ~ 500kHz</td>
<td>0.1%</td>
<td>400A Zero Flux Current Transducer</td>
<td>26mm</td>
</tr>
<tr>
<td>LEM IT 405-S</td>
<td>0A ~ 400A DC/ 566A pk (400Arms)</td>
<td>DC ~ 300kHz</td>
<td>0.1%</td>
<td>400A Zero Flux Current Transducer</td>
<td>30mm</td>
</tr>
<tr>
<td>LEM IT 700S</td>
<td>0A ~ 700A DC/ pk (495Arms)</td>
<td>DC ~ 100kHz</td>
<td>0.1%</td>
<td>700A Zero Flux Current Transducer</td>
<td>30mm</td>
</tr>
<tr>
<td>LEM IT 1000S</td>
<td>0A ~ 1000A DC/ pk (707Arms)</td>
<td>DC ~ 500kHz</td>
<td>0.1%</td>
<td>1000A Zero Flux Current Transducer</td>
<td>30mm</td>
</tr>
<tr>
<td>LEM IT 60S</td>
<td>0A ~ 600A DC/ 849A pk (600Arms)</td>
<td>DC ~ 300kHz</td>
<td>0.1%</td>
<td>600A Zero Flux Current Transducer</td>
<td>30mm</td>
</tr>
<tr>
<td>LEM IT 600S</td>
<td>0A ~ 600A DC/ pk (425Arms)</td>
<td>DC ~ 300kHz</td>
<td>0.1%</td>
<td>600A Zero Flux Current Transducer</td>
<td>30mm</td>
</tr>
<tr>
<td>LEM ITN 900S</td>
<td>0A ~ 900A DC/ (636Arms)</td>
<td>DC ~ 300kHz</td>
<td>0.1%</td>
<td>900A Zero Flux Current Transducer</td>
<td>30mm</td>
</tr>
<tr>
<td>LEM ITN 1000S</td>
<td>0A ~ 1000A DC/ pk (707Arms)</td>
<td>DC ~ 300kHz</td>
<td>0.1%</td>
<td>1000A Zero Flux Current Transducer</td>
<td>30mm</td>
</tr>
<tr>
<td>LEM IN 1000-S</td>
<td>0A ~ 1000A DC/ 1500Apk (1000Arms)</td>
<td>DC ~ 440kHz</td>
<td>0.1%</td>
<td>1000A Zero Flux Current Transducer</td>
<td>38.2mm</td>
</tr>
<tr>
<td>LEM IN 2000-S</td>
<td>0A ~ 2000A DC/ 3000Apk (2000Arms)</td>
<td>DC ~ 140kHz</td>
<td>0.1%</td>
<td>2000A Zero Flux Current Transducer</td>
<td>70mm</td>
</tr>
</tbody>
</table>

**LEM Interfaces**

<table>
<thead>
<tr>
<th>Model number</th>
<th>Description</th>
<th>Compatibility</th>
<th>Nominal Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>LEM6/X Interface</td>
<td>Combined PSU + Configurable Load Resistor interface for connecting up to 6 LEM transducers to PPA.</td>
<td>All LEM transducers listed above except IT 1000-S, ITN 1000-S, IN 1000-S and IN 2000-S</td>
<td>0.1%</td>
</tr>
<tr>
<td>LEM-1 Interface</td>
<td>Combined PSU + Load Resistor interface for connecting LEM transducer to PPA.</td>
<td>All LEM transducers listed above</td>
<td>0.1%</td>
</tr>
</tbody>
</table>
The N4L product range also includes Frequency Response and Impedance Analyzers, Selective Level Meters and Laboratory Power Amplifiers.

**Applications**

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

**PPA5000**

- **Basic Accuracy**
  - V, A rdg error: 0.05%
  - Power rdg error: 0.10%

- **Phase Options**
  - Internal: 1 ~ 3

- **Bandwidth**
  - 20 & 30A Shunt: DC ~ 500kHz

- **Voltage Input**
  - Max input voltage: 2500Vpk

**PPA1500**

- **Basic Accuracy**
  - V, A rdg error: 0.05%
  - Power rdg error: 0.10%

- **Phase Options**
  - Internal: 1 ~ 3

- **Bandwidth**
  - 20 & 30A Shunt: DC ~ 1MHz

- **Voltage Input**
  - Max input voltage: 2500Vpk

**PPA3500**

- **Basic Accuracy**
  - V, A rdg error: 0.05%
  - Power rdg error: 0.06%

- **Phase Options**
  - Internal: 1 ~ 6

- **Bandwidth**
  - 10 & 30A Shunt: DC ~ 1MHz

- **Voltage Input**
  - Max input voltage: 2500Vpk

**PPA4500**

- **Basic Accuracy**
  - V, A rdg error: 0.03%
  - Power rdg error: 0.04%

- **Phase Options**
  - Internal: 1 ~ 6

- **Bandwidth**
  - 10 & 30A Shunt: DC ~ 2MHz

- **Voltage Input**
  - Max input voltage: 3000Vpk

**PPA5500**

- **Basic Accuracy**
  - V, A rdg error: 0.01%
  - Power rdg error: 0.02%

- **Phase Options**
  - Internal: 1 ~ 6

- **Bandwidth**
  - 10 & 30A Shunt: DC ~ 2MHz

- **Voltage Input**
  - Max input voltage: 3000Vpk

---

**Applications**

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

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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