

# Precision Power Analyzers

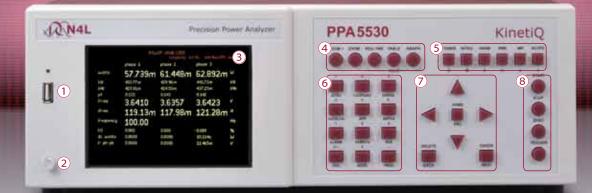


Leading wideband accuracy	Basic 0.02% (PPA5500) plus class leading high frequency performance
Wide frequency range	DC, 10mHz to 2MHz PPA5500 (30Arms) and PPA5500-LC (10Arms)
Wide frequency range	DC, 10mHz to 1MHz PPA5500-HC (50Arms), PPA1500 (20Arms) and PPA1500-HC (30Arms)
Fast sample rate and No-Gap	2.2M samples/s (PPA5500) 1M samples/s (PPA1500)
Fast sample rate and No-Gap	High accuracy is maintained even with noisy or distorted power applications
Leading phase accuracy	0.005 Degrees plus 0.01 degrees per kHz (PPA5500)
Built in high precision current shunt	30Arms (PPA5500), 10Arms (PPA5500-LC), 50Arms (PPA5500-HC), 20A/30Arms (PPA1500/HC)
	All models also support external shunt resistors or current transformers
Versatile interfaces	RS232, USB, GPIB (PPA5500 option), LAN (option), Torque and Speed (PPA5500)
Range of PC software options	Remote control and monitoring of real time data, tables and graphs plus export of
Kange of PC software options	measured data into various PC formats

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# PPA5530 Precision Power Analyzer

# FRONT VIEW



## **① FRONT USB PORT**

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

## **2 POWER BUTTON**

## **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 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

# REAR VIEW



### **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 PPA1500: 300Apk (20Arms) direct current input, PPA1500-HC: 1000Apk (30Arms)

### **10 SYNC CONNECTOR**

All PPA models can offer 6 phase analysis using the PPA dual data log PC program Additionally two PPA5530's can be connected via the extension port and sync BNC connector to form a 6 phase analyzer when a PC is not available (PPA5500 only)

## **11 EXTERNAL SENSOR INPUTS**

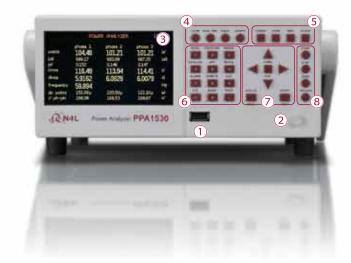
+/-10V or pulsed input from torque and speed sensors provides direct measurement of mechanical power + Analogue output (PPA5500 only)

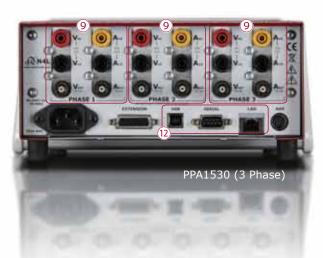
#### 12 PC INTERFACE CONNECTIONS

Standard interfaces RS232 + USB + LAN (Optional) + GPIB (Optional on PPA5500 only)

### **13 LOW NOISE EFFICIENT 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

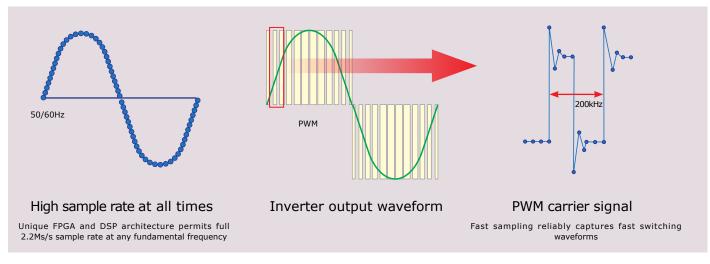




# FEATURES

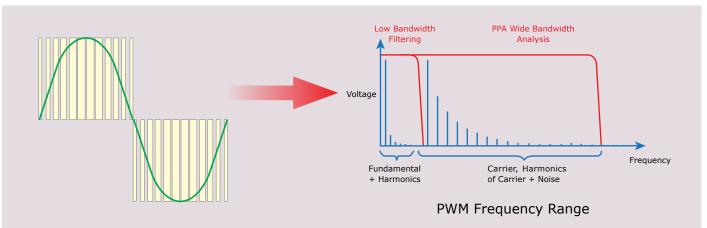
# High Speed Power Measurement PPA5500

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 \*PPA1500 sample rate 1MS/s



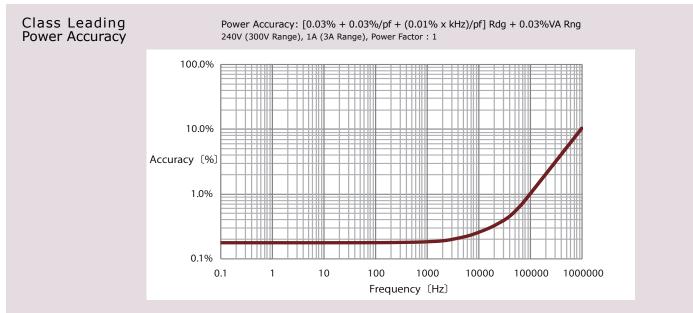
# 2MHz Wideband Frequency Response PPA5500

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



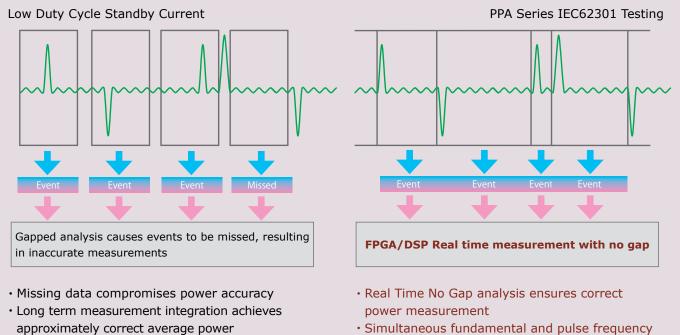
# High Accuracy PPA5500

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



## DFT Real Time No Gap Analysis PPA5500 PPA1500

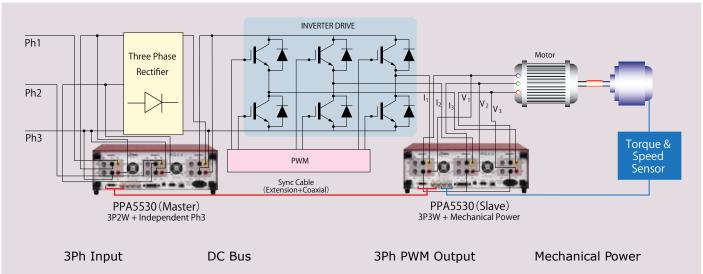
Many power applications have fast changing asynchronous current pulses which are not suited to fixed data length FFT analysis. The PPA series combine a real time DFT (Discrete Fourier Transform) technique with variable window no gap analysis to ensure the optimum speed and accuracy at all times



• Simultaneous fundamental and pulse frequency synchronization quickly obtains the correct power

## Up to 6 Phase Analysis PPA5500

Master/Slave mode enables two PPA5530'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



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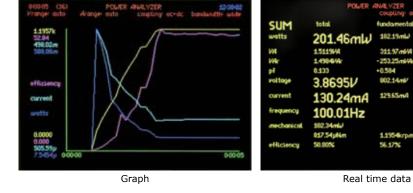
# **FUNCTIONS**

# Input Torque and Speed Sensor PPA5500

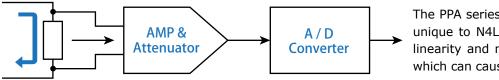
Direct measurement of torque and speed from dedicated inputs that are fully synchronized with the voltage and current channels permits true real time power conversion efficiency to be evaluated



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



# Built in Amplifier and Unique Shunt Resistor PPA5500 PPA1500



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

11954

Model	Low Current Model	Standard Model	High Current Model
PPA5500	9 ranges: 3mApk - 30Apk (10Arms)	9 ranges: 30mApk - 300Apk (30Arms)	9 ranges: 100mApk - 1000Apk (50Arms)
PPASSUU	100mΩ Shunt	10mΩ Shunt	3 mΩ Shunt
		8 ranges: 100mApk - 300Apk (20Arms)	8 ranges: 300mApk - 1000Apk (30Arms)
PPA1500	-	10mΩ Shunt	3mΩ Shunt
		x10 Mode - 10mApk - 30Apk	x10 Mode - 30mApk - 100Apk

## External shunt options

 $(DC \sim 1MHz, 0.1\% Accuracy, Inductance < 1nH)$ 

	2, 0.1 % Accuracy	, inductance 1			
Model	Maximun	n Current	Bandwidth	JON4L	
Model	Rated A	Peak	Danuwiuun	Information Constant Sector	
HF500	500Arms	5000Apk		Control from Control for	<b>O</b> .
HF200	200Arms	2000Apk		Contraction of the second	
HF100	100Arms	1000Apk	DC $\sim 1$ MHz	CE	100 Mar 100 Mar 100 Mar
HF020	20Arms	200Apk			
HF006	6Arms	60Apk			
HF003	3Arms	30Apk		HF003	HF500



Utilising external shunt resistors

# MEASUREMENT DISPLAY

# Power Analysis PPA5500 PPA1500

	POWER	ANALYZER	16:26:42	2	zoom function	
Vrange: 300V PH1 watts VA VAr pf voltage	Arange: 30A total 3.2513kW 3.2513kVA 1.0000VAr 1.000 111.13V	coupling: ac+dc fundamental 3.2510kW 3.2510kVA 3.1755mVAr -1.000 111.13V	bandwidth: wid-	Vrange: 300V PH1 total watts	Aranger 30A coupling ac+dc 3.2513k 111.13	16-26-42 bandwidth: wide
current frequency H3 dc watts V ph-ph	29.257A 59.895Hz -252.97nW 148.76mW 157.15V	29.256A -0.000% 15.831mV	-360.00* -000.24*	rms current frequency	29.257 59.895	A Hz

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

Any parameters can be enlarged with the

	POW	ER ANALYZER coupling: ac	10 +dc bandwidth:	5:26:44 wide
	phase 1	phase 2	phase 3	
watts	3.2514k	3.2566k	3.2 <b>74</b> 8k	ω
VA	3.2514k	3.2566k	3.2748k	VA
VAr	1.7321	1.7321	2.0000	VAr
pf	1.000	1.000	1.000	
Vrms	111.13	111.11	111.48	V
Arms	29.257	<b>29.30</b> 9	29.376	A
frequency	59.895			Hz
H3	-0.000	0.000	0.000	*
dc watts	148.52m	147.88m	150.44m	ω
V ph-ph	157.15	157.40	157.41	ν

All power measurement and RMS values are computed simultaneously allowing any measured value 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 all electrical or electrical to mechanical systems

3 Phase analysis display selectable in both Total and Fundamental values

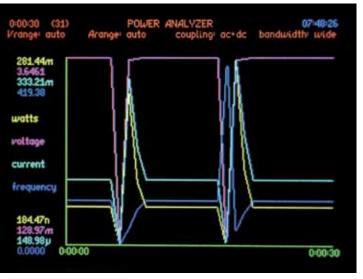
#### MEMORY

Large 1GB (PPA5500 series) internal memory, data logging from 10ms intervals with synchronization to the fundamental frequency and no gap between measurements

Datapoint storage up to 10M in the PPA5500 series and 16k in the PPA1500 series

Alternatively the data can be stored in an external USB pen drive or directly to PPA Dual Data Logger PC software

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



Trend analysis

# MEASUREMENT MODES

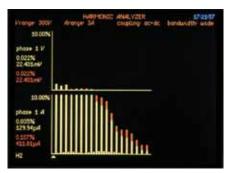
# Power Integrator (power consumption) Mode, RMS Meter Mode and Impedance Meter Mode PPA5500 PPA1500

00544	phore 1	phone 2 3.1055m	phane 3		Pranger 2002 PH1	TRUE RHS HOLT Annyi 14 colat Holtage	MITTER 170446 Engracida bandusativ usde covient		Dist.	DANCE METER Chiefling o phase 2	ordo bandunia phone 3	17/25/51 The US De
We hours We hours pl aing if aing if hours	15.790m 15.46m 0.190 1591	3.1055m 15.862m 35356m 0.196 35885 4.4203m	16.477m 31.095s 0.201 15975	ine.	nns tc sc poli crist foctor runge rectilied mean form factor frequency	104.25V 27.025.45V 294.25V 147 148 246.0V 10.36V 1.310 50.0564z	550.07mA 78237p4 50007m4 333 20984 20637 2067	 gedonce sizionce ochance sise equency	343.9 2048 -7654 -61220 41304	108.9k 108.9 -15.49 -00005 -15.49 -00005 -15.49	92.22 -84.33 -97.27 -20130 178704	a aa. 2
	Power In	tegrator m	node		R	MS Voltmeter	mode	I	mpedanc	e meter n	node	

#### 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 PPA1500



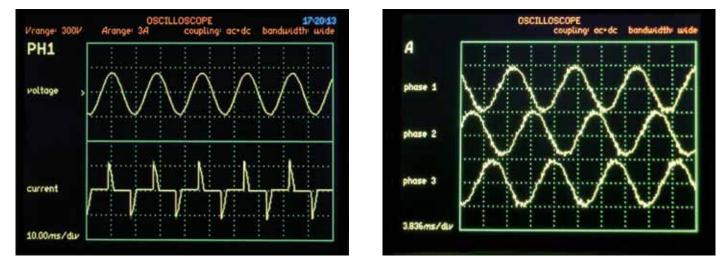
Harmonic analyzer (Bar graph)

PH1         rollage           fundamental         103.97/           harmanic res         203.99/           THO         1.701%           H3         1.0405/	Carrent 256.11m4 500.41m4 128.25
Киндалията harmanic rms 103.97/ THD 1.701% HD 1.004%	500.45.muF
THD 1.701%	
H0 1.000%	1282N
H0 10435/	67.5156
	312.32m4
H0 -102.9*	-128.3*
frequency 50.025kg	
wotts 35.45%	34.009
H0 -226.56mb/	-0.83556
dc wotte 25.404pW	

Harmonic analyzer summary page

Viorge 30	W Arange		ANALYZER COUBLING SC+SC	bandwidthy usde
PH1	and b	998	DALL	mbs
1	104.00/	100.0%	361.81/44	100.0%
¥2	66-942/mil	0.06-04	1.0017/104	0.250%
3	1.06961/	1.027%	315.02/144	90.05%
	60.454.16/	0.056%	1.2036/64	0.035%
	814.66/16/	0.78356	243.55m4	83.14%
÷.	59.87 Juni/	0.058%	1.7168/m4	0.443%
1	11144	10715	254.54 14	70.85%
5	48.725mb 264.27mb	0.047%	12627 mA 97 590 mA	0.595%
40	45.601/16	0.0445	1000 miles	0.70806
11	455.45.45	m 400%44	1.2786.m4 65.228m4	42.165
12	29.432.44	0.028%	11443.m4	0.740%
\$2	363.67 mb	0.350%	62,921/64	29,115
54	17.176.mb	0.057%	10905m4	0.705%
35	29574/4	0.275%	60.000	20.20%
55	18.224 Hz	0.05856	14858m4	0.626%
17	228.83.44	0.220%		15.015
14133	16.63344	0.016%	1,9957 m4 37,549 m4	0.55356

Harmonic analyzer table



Oscillosope - Voltage and Current display, Phase 1,2 and 3

#### Note

In Harmonic Analyzer Mode, the PPA1500 provides up to 50 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 375 for aerospace applications and also includes an FFT spectrum mode for analysis of interharmonics

# ACQUISITION SETTINGS

# Auto-Ranging, Range Up Only or Manual PPA5500 PPA1500

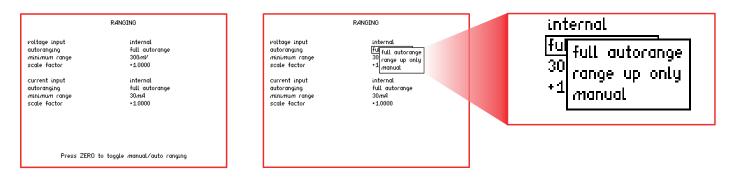
## Range modes are selectable

①Auto-Ranging

2Range up only3Manual

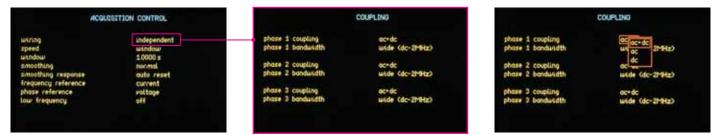
Performs automatic switching of voltage and current ranges up and down depending on the level of the measured value with all inputs linked or ranged independently to ensure optimum accuracy Performs automatic ranging when the input is 120% of range, ranging up only No automatic ranging, user specifies the range in which to operate

(Used when input voltages and currents are known)



# Independently Set Input Coupling PPA5500

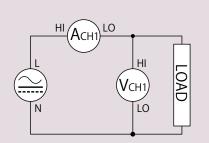
Independently set input coupling so different methods of sensing can be implemented. Such as a CT on phase 1 and shunt sensing on phases 2 + 3



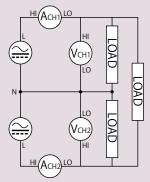
## Wiring Settings PPA5500 PPA1500

wiring speed smoothing smoothing response frequency reference phase reference low frequency	ine single phase 1 me 2 phase 2 wattmeter no 3 phase 2 wattmeter au 3 phase 3 wattmeter vo single phase 2 vo single phase 3 of 3 phase 2 wattmeter + PH3 independent

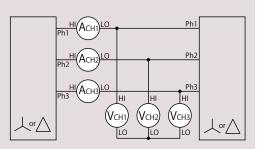
Various wiring arrangement settings to satisfy a complete range of setups found in power analysis



1 Phase 1 Wattmeter







3-phase 3 Wattmeter(Reference to neutral)

# ACQUISITION SETTINGS

# Bandwidth Settings PPA5500

DC(DC-5Hz) Low(DC-30kHz)

Wide(DC-2MHz)

### DC measurements up to 5Hz Basic power (50/60Hz) including harmonics of the fundamental while rejecting high frequency noise 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 PPA5500 series includes a programmable digital filter that allows users to set a preferred bandwidth

# Display Settings, Smoothing Response and Frequency Reference PPA5500 PPA1500

### ①Display update rate

Various settings for the display update rate (12.5ms  $\sim$  10s) which also increases the smoothing when used together with the smoothing option. A 'window' option permits direct control of the measurement window size

ACOUT	SITION CONTROL
Wiring speed window smoothing smoothing response frequency reference phase reference low frequency	independent if stow no medium ou fast cu very fast ro window of window

ACQU	ISITION CONTROL
wiring	independent
window	1.0000 s
smoothing smoothing response frequency reference phase reference low frequency	normat auto reset current voltage off

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

ACQUI	ISITION CONTROL
wiring	3 phase 3 wattmeter
speed	medium
smoothing	noinormal
smoothing response	a y slow
frequency reference	vo none
phase reference	vorrage
low frequency	off

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 PPA1500

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 PPA5500 series also provides fully independent frequency detection an all phase inputs

Wining	3 phase 3 wattmeter
speed	medium
smoothing	normal
smoothing response	auto reset
frequency reference	PO Poltoge
phase reference	Current
low frequency	of speed input
	oc line

/range= 1kl/	Aranger		coupling		stand bandwidt	
PH1		- 1-	14	11	- [3	1
voltage	ΛΛ	$\wedge$	W	M	M	Λ
					-	
current	man	$\sim$	÷	www	$\sim$	
20.00ms/dr	2777					

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

/range: 3000/	Aranger 100mA	ANALVZER coupling: ac+d	c bandwidth wide
PH1	total.	fundamental	
watts	1.3360W	1.3323W	
104	2.0951W4	1.332364	
V9Ar	1.6138Wer	2.6926ml/Ar	
pf	0.638	-1.000	
voltage	244,764	244.534/	+000.00*
current	8.5597mA	5.4486mA	-059.88*
frequency	50.071Hz	- 524	10.014Hz
H3	211.88yW	0.015%	
dc watts	-2.1145µW		

1:5 duty cycle standby power measurement cycle

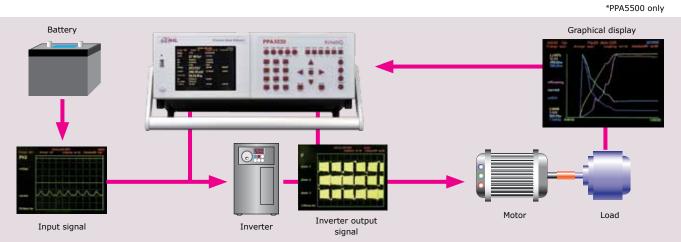
/range: 3000/	Aranger 100mA	euquing ac*	dc bandwidth wide
PH1	total.	fundamental	
watts	628.64mW	626.74mW	
144	926.50mi/4	626.75m9/A	
VAc.	680.53mi/Ar	2.0889/m8/Ar	
pf	0.679	-1.000	
voltage	244.56/	244.434	+000.00*
current	3.7884mA	2.5642mA	-359.81*
frequency	50.105Hz		1.0021Hz
H3	93.046 pW	0.015%	
dc watts	-601.00mld		

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

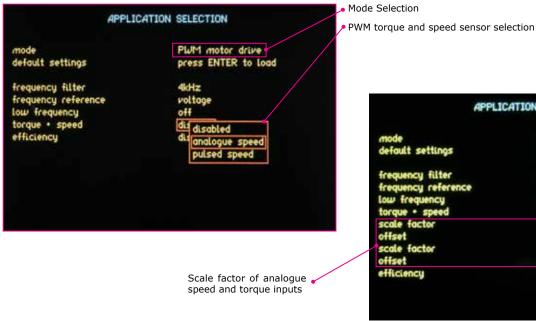
# APPLICATIONS

# Application Modes PPA5500 PPA1500

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\*" and "standby power"



Example setup when measuring inverter output with respect to load



# APPLICATION SELECTION

current

+0.0000 V

-0.0000V

IO rp

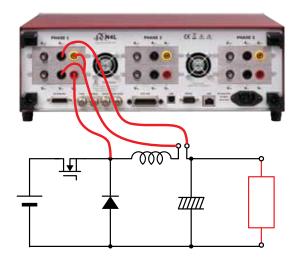
PWM motor drive press ENTER to load

ogue speed

mechanical / sum

# Inductance Loss Analysis PPA5500 PPA1500

An example of analysis of dynamic inductance losses

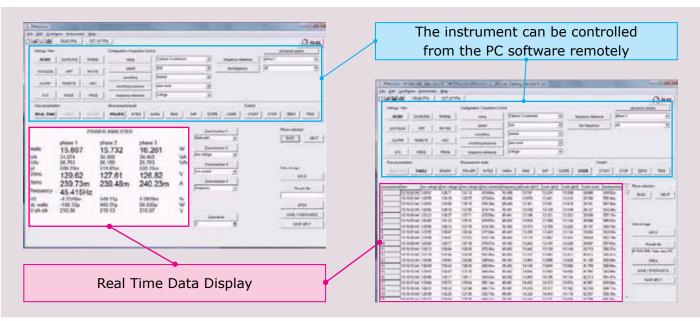


Vrange 304	Arange 300mA	coupling ac+dc	bandwidth wide
PH1	total	fundamental	
watts	23.813mW	11.320mW	
VA	325.76ml/A	193.59ml/A	
VAr	324.89ml/Ar	-193.26ml/Ar	
pf	0.073	•0.058	
voltage	3.6878V	2.28991/	+000.00*
current	88.335mA	84.539mA	-086.65*
frequency	30.000kHz		
H3	4.9618mW	43.83%	
dc watts	68.838 July		

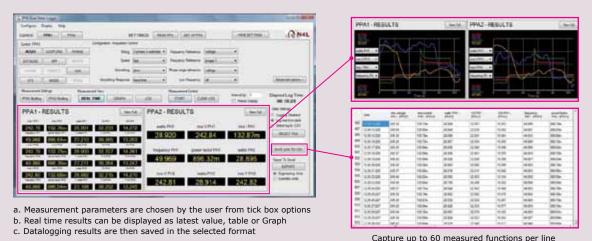
Real time data

## PC Software PPA5500 PPA1500

Analysis carried out by the instrument can easily be transferred to a PC via USB, RS232 or LAN ① **PPAcomm** PC control, data storage and print



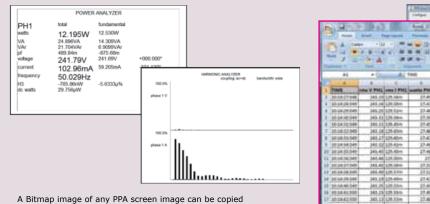
② **PPA Dual Data Logger** Exceptional flexibility and ease of use with all the primary functions of PPAcomm plus master/slave mode for 4-6 phase applications and data/image export to Text file, Excel, Bitmap or Clipboard



Simultaneous display of master and slave units

Real time Datalog

#### Data Export options



to clipboard or imported directly into documents

		A PERSONAL PROPERTY.	-						1.4.1
		failine in	-						
- U	1.13	Barris Vine	10.00	a.a.1   60	and have		and it is not	L. MARTING.	13.84
I non Ul	Direct Page Lawrence	- Parment	144		time internet				
	mentandly		100	A	Same.	1 97 B			
				-	Same .	M BARR. PARTS.	24		
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	ma V FML ress I FML						CE INNIE V PHER		C Ingen Balan
1 10:14:27:948	345.29 125.56%	17,499		23.391		1872.58m	345.17	Siller Field	8 (generate
3 30.04,28,949	343.38 125.38+	37.479	11.400	13.186		\$11.49m	341.14	15574	1. Distribute (B)
4 10-14-04-040	241.25 128.124	27.468	11,354	21.2%	40.941	#73.48m	346.25	wats PHC	C. Married
1 10-14-10-549	343.11 129.30m	17,004	11,125	15.475		415.4hm	343,254		Competition (1)
4 1014101949	341.11(128.40m)	17.494	<b>PLAP</b>	23.379		AND AND	34134	27,415	[are services]
T-30.04.02.548	341.18 L29 41m	17,464	31.48	13.381		ET2.46m	341.54	1996 L 1996	Part in sec.
8 38:54.83.545	241.2712540m	27.472	15.410	11.293		(K72,38m	343,71	129, 54	arrest
9 303434549	245.52 125.42%	27,489	31.450	25.4	45,943	812.2%s	245.5	1. wats PHT	That Barrent
20.76.24.32.245	245.40 127.40+	17,485	24.242	23,427		(E72.38m)	341.42	27.353	and the second
11 10 14 16 149	241.46 125.30%	25.5	51.528	25.41		STL Jahre	345.64		
17.10124117345	241.41 125.38%	- 27.347	11,741	23.401		APLANUE	343,41		
12.30.79.742	381.86 131.134	11,642	11,145	23-428		CLT2 18to	341.47		
10.04.09.040	343.28 125.49+	17.472	11.411	15.294		\$15.29m	341.17		
10 10 14 40 140	345.74 (26.35m)	11.445	11,717	25,967		(420,56m)			
18 10 14 41 500	343.23 125.35%	17.444	11.33	23.395		872.53%	341.71		
17.70.04142.000	345.13(126.55m	37.465	31,494	13.394		0672.58m	240.11		
18 18 54 43 350	246.54(125.55m	-17.467	31.496	15-362		\$72.45m	345.527		
17 10:24/44,300	241.01 L21.48m	27.445	81.422	23.357		1873,73m	345.12		
28-28-28-28-255									

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

### ③ PPA Standby Power. Full compliance testing to IEC62301

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

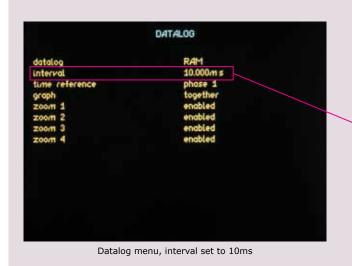
## Connection Interface PPA5500 PPA1500

RS232 (standard), USB (standard), LAN (optional), GPIB (option for PPA5500 series)



### Data Logging PPA5500 PPA1500

Utilizing sophisticated frequency detection techniques, synchronization with the fundamental ac waveform is automatically achieved. Datalog intervals can be set from 10ms with measurements saved to a PC or internal memory



A     B     B     B     C     F       10	ЭĤ	1	181	Arrit	1 20	7-2	12 83	71-0		- 0	-
A     H     H     E     F     0.     H     F        25     amounting auto newt            25     amounting auto newt            26     amounting auto newt            27     amounting auto newt            27     amounting Auto newt            28     amount evelded            28     amount evelded            20     amount evelded            29     amount evelded            29     amount evelded            20     amount evelded            20     amount evelded            20     amount evelded			- mi093	1 in	@1 2:18	5.020 Frank	a zooch	10 10 10 10 10 10 10 10 10 10 10 10 10 1	+ f1-7	11-12	
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# SPECIFICATION

			F	PA5500				PPA1500	
General									
Crest Fac					e and Current)				
Sample F		2.	2Ms/s on a	Il channels, No-Gap	1Ms/s on all channels, No-Gap				
Standby	Power on Modes	DWM Motor Drive R	allact Inru	sh, Power Transformer, Standby Power	1 Compliance Ballast, Inrush, Standby Power				
	cy Range	PWM Motor Drive, B		sh, rower mansionner, standby rower		Ballast, Inrush, Standby Power			
riequein	cy Range				Normal	DC,10mH	$1_7 \sim 1 MH$	7	
		DC,10mHz ~ 2MHz - PF DC,10mHz ~ 1MHz - PP		(10Arms), PPA5500(30Arms) (50Arms)					
			A3300-IIC	(304(1115)	x10	DC,10mH	$z \sim 100$	<hz< th=""></hz<>	
Voltage :	Input	200m\/n	k a. 2000V	pk(1000Vrms) in 9 ranges	Normal	1)/pk a. 2		1000Vrms) in 8 ranges	
<b>.</b>	Range			k range, using 20% overange)	x10			pk in 8 ranges	
Internal	Accuracy			Rng+(0.004%×kHz)+1mV	Normal	0.05% R	dg+0.1%	Rng+(0.005%×kHz)+5mV	
					x10			Rng+(0.01%×kHz)+1mV	
External	Range Accuracy			s [BNC connector 3Vpk max input] Rng+(0.004%×kHz)+1µV	1mVpk ~ 3Vpk in 8 ranges [BNC connector 3Vpk max input] 0.05%Rdg+0.1%Rng+(0.005%×kHz)+5µV				
Current		0.02701	ug+0.05 /	Kiig+(0.00+/0×kiiz)+1µv		0.05	/intug+0	11/0Klig+(0.005/0×kli2)+5µV	
	input	10Arms Low Current	Ranges	3mApk $\sim$ 30Apk(10Arms) in 9 ranges	20Arms		Normal	100mApk $\sim$ 300Apk(20Arms) in 8 ranges	
		(PPA5500-LC)	Ranges	0.02% Rdg+0.03% Rng+(0.004%×kHz)+	(PPA1500)	Ranges	x10	10mApk ~ 30Apk in 8 ranges	
		4mm safety connectors	Accuracy	10µA	Shunt 4mm Safety			0.05% Rdg+0.1% Rng+(0.005%×kHz)+500µA	
		30Arms Current	Ranges	30mApk ~ 300Apk(30Arms) in 9 ranges	Connectors	Accuracy	x10	0.05% Rdg+0.1% Rng+(0.01%×kHz)+100µA	
Internal		(PPA5500)		0.02% Rdg+0.03% Rng+(0.004%×kHz)+	30Arms		Normal	300mApk ~ 1000Apk(30Arms) in 8 ranges	
		4mm safety connectors	Accuracy	100µA	(PPA1500-HC)	Ranges	x10	30mApk $\sim$ 100Apk in 8 ranges	
		50Arms High Current	Ranges	100mApk $\sim$ 1000Apk(50Arms) in 9 ranges	Shunt 4mm Safety	Accuracy	Normal	0.05% Rdg+0.1% Rng+(0.005%×kHz)+1mA	
		(PPA5500-HC)	Accuracy	0.03% Rdg+0.06% Rng+(0.004%×kHz)+	Connectors	Accuracy	x10	0.05% Rdg+0.1% Rng+(0.01%×kHz)+300µA	
		Touch proof screw terminal	liceuracy	100µA	BNC convert	Darra	10-16		
External		BNC Connector (Max	Ranges	300µVpk $\sim$ 3Vpk in 9 ranges	BNC connector (Max input	Ranges	TWAK	$\sim$ 3Vpk in 8 ranges	
(External		input 3Vpk)	A	0.02% Rdg+0.03% Rng+(0.004%×kHz)+	3Vpk)	A	0.050/ 1		
Current s	sensor)		Accuracy	1μV		Accuracy	0.05%	Rdg+0.1% Rng+(0.005%×kHz)+5µV	
Phase Ad	ccuracy				1	1			
		0.005dea+(0.01dea×kHz	z) 【PPA550	0-LC(10Arms), PPA5500(30Arms)】	Normal	0.01deg+	+(0.01de	g×kHz)	
		0.01deg+(0.02mdeg×kH			×10	0.01 dog	(0.02da		
					x10	0.01deg-	F(0.02de	g×knz)	
Power A	ccuracy				1				
		[0.03%+0.03%/pf+(0.01	1%×kHz)/p	f] Rdg+0.03%VA Rng	Normal			(0.01%×kHz)/pf] Rdg+0.1%VA Rng	
	_		,,,		x10	[0.1%+0	0.1%/pf+	(0.02%×kHz)/pf] Rdg+0.1%VA Rng	
CMRR -	Common	Mode Rejection Ratio		250/ @ 504-	Tunical 1mA (15				
				250V @ 50Hz - 100V @ 100kHz -					
Measure	ment Para	ameters			,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,				
		Total Power (W), App	parent Pow	er (VA), Reactive Power (Var), Power Fact	or (pf), Voltage	e (V) & Cu	rrent (A)	- rms, rectified mean, AC, DC, Peak, Surge	
				Crest Factor, Form Fa	,		·		
				Frequency (Hz), Phase (de Harmonics, THD			dance		
				Integrated Values, Data			lues		
Datalog	- Up to 4	user selectable measure	ement fund	tions (30 with optional PC software)	5,				
Datalog \	Window			No-Gap analysis,	Minimum windo	w 10ms			
Memory			cords into	flash RAM (Non-Volatile)			RAM	up to 16,000 records	
	nication P	orts							
RS232					4kbps,RTS/CTS flow control Ethernet auto sensing				
LAN(Opti GPIB(Opt			IFFF48	3.2 Compatible					
USB			100		Ind 1.1 compatible				
USB					nemory port				
Analogue	e Output		Bipola	r ±10V(BNC)				-	
Speed In	iput	Analogu	-	10V or Pulse count(BNC)				_	
Torque			· · · ·	r ±10V(BNC)				_	
Sync				surement (Master/Slave)				-	
Extension	n d Accesso		mase (M	aster/Slave) + Auxilary				Auxilary Port	
Leads				Power.	RS232, USB				
	on Cable	36A 1.	.5m long 4	mm stackable terminals	-	rsion) or	30A (HC	version) 1.5m long 4mm stackable terminals	
	on Cables	1x red, 1x yellow and 2	2x black pe	er phase (1x red, 1x black with HC version)		1x r	ed, 1x ye	llow and 2x black per phase	
Connecti	· · ·	4mm term	ninated alig	ator clips - 1x red, 1x yellow and 2x black					
CD-ROM				CommView2 (RS232/USB/LAN), Comma	nd line, Script b	ased com	municati	on software	
Instructio Manual	UII			User manual, Co	mmunications n	nanual			
-	cuments			Calibration certifi	cate, Quick star	t guide			
General									
Display		320×240	dot full co	our TFT, White LED Backlit		480×27	72 dot fu	ll colour TFT, White LED Backlit	
Dimensio	ons			15D mm excluding feet		92			
					92H×215W×312D mm excluding feet				
Weight			5.4kg(1 Ph	ase), 6kg(3 Phase)	3.3kg(1 Phase), 4kg(3 Phase)				
Weight Safety Is Power su			5.4kg(1 Ph	ase), 6kg(3 Phase) 1000Vrms or DC(CAT) 90 ~ 265Vrms,					

## MODELS

PPA5500 Series

Dha

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

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

Touchproof 50A screw connectors used on PPA5500-HC and PPA2600-HC versions



#### PPA1500 Series

Phases	Model	Specification	
1 Ph	PPA1510	DC,	
2 Ph	PPA1520	$10$ mHz $\sim$ 1MHz 100 mApk $\sim$ 300 Apk	
3 Ph	PPA1530	(20Arms)	
1 Ph	PPA1510-HC	DC,	
2 Ph	PPA1520-HC	$10$ mHz $\sim$ 1MHz 300 mApk $\sim$ 1000 Apk	
3 Ph	PPA1530-HC	(30Arms)	





PPA5500 3 Phase model





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





PPA1500 3 Phase model

#### Accessories

Leads and Interfacing			
Туре	Specification		
36A Connection lead set	1.5 Meter - 36A lead set with 4mm stackable safety terminals 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		

Interface (Optional)			
Туре	Specification		
PPA-LAN interface	Option L - LAN Interface		
PPA-GPIB interface	Option G - GPIB(IEEE488)Interface - PPA25/26 and 55 series		

# PC Software (Optional) Type Specification PPA Dual Data Logger PC control and data acquisition of 1 to 6 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

Connection and extension port accessories (Optional)			
Type Specification			
Breakout box	Simple analyzer connection between source and DUT		
PCIS	10Arms 300Apk rated Phase Controlled Inrush Switch		

Rack Mount Kit (Optional)			
Туре	Specification		
Rack Mount brackets	PPA26/5500 19in rack mount brackets (model specific)		
Rack Mount panel	PPA2500 19in rack facia panel		

Carry cases (Optional)				
Туре	Specification			
Soft carrying case	Black nylon with shoulder strap			
Hard flight case	Hard case with moulded lining suitable for shipping			

Documents (Standard)			
Туре	Specification		
Calibration/Test & Inspection certificate	PPA Certificate of calibration		
Spare set of manuals	User manual		
	Comms manual		

#### PRODUCT COMPARISON

	PPA1500	PPA2500/PPA2600	PPA5500		
Basic Accuracy					
V, A rdg error	0.05%	0.04%	0.02%		
Power rdg error	0.10%	0.05%	0.03%		
Phase					
Internal	1~3				
Master/Slave operation	-	4~6			
Voltage Input					
Max input voltage	2500Vpk	3000Vpk			
No. of ranges	8	8	9		
Direct Current Input	Direct Current Input				
10Arms model	-	0	0		
20Arms model	0	-	-		
30Arms model	0	0	0		
50Arms model	_	only PPA2600	0		
No. of ranges	8	8	9		

	PPA1500	PPA2500/PPA2600	PPA5500		
Frequency Band	Frequency Band				
20A & 30A Shunt	$DC \sim 1 MHz$	-	-		
10A & 30A Shunt	-	$DC \sim 2MHz$	$DC \sim 2MHz$		
50A Shunt	-	$DC \sim 1 MHz$	$ m DC{\sim}1 m MHz$		
Features					
USB Memory port	0	-	0		
Real time clock	ne clock O		0		
19in Rack mount option	-	only PPA2600	0		
Other features	Other features				
Speed-Harmonics/sec	300	300	1,800		
Non-volatile memory	192kB	192kB	1GB		
Internal data logging	4	4	16(4 X 4)		
Torque and speed Input	-	0	0		
Dimensions - Excl. Feet H x W x D (mm)	92 x 215 x 312	125 x 355 x 250 125 x 430 x 250	130 x 400 x 315		
Weight	3.3 - 4kg	5 - 6kg	5.4 - 6kg		

#### 15

Accessories

Probe/Clamp Current Transformer: AC

Probe / Current Clamp (Hall effect): AC + DC

Model number

M3 UB 50A-1V

M3 U 100A-1V

S UE 200A-1V

S UE 250 500

SM UE 1000A-1V

SM UB 1000A-1V

P32 UE 1000A-1V

P32 UE 3000A-1V

ATT10 probes

probe

TT-HV15 High Voltage

Model number

1000-1V UE UE 1000A-1V

External Shunt Resistor (DC ~ 1MHz)				
Model	Basic accuracy	Phase accuracy	Maximum current	
number		Phase accuracy	Continuous	Peak
HF500	0.2mΩ (±0.1%)	0.1° / kHz	500Arms	5000Apk
HF200	0.5mΩ (±0.1%)	0.1°/ kHz	200Arms	2000Apk
HF100	1.0mΩ (±0.1%)	0.05° / kHz	100Arms	1000Apk
HF020	10mΩ (±0.1%)	0.01° / kHz	20Arms	200Apk
HF006	100mΩ (±0.1%)	0.001° / kHz	6Arms	60Apk
HF003	470mΩ (±0.1%)	0.0001°/kHz	3Arms	30Apk

Measuring range

 $100 \text{mA} \sim 50 \text{A}$ 

 $1A \sim 100A$ 

 $1A \sim 200A$ 

1A~250A/500A/1000A

 $1A \sim 1000A$ 

0.5A~1000A(1%>100A)

0.5A~1000A(0.5%>10A)

 $5A \sim 1000A$ 

 $5A \sim 1000A$ 

15kVpk

Measuring range



Category

CATIII

CATIII

CATIII

CATIII

CATIII

CATIII

CATIII

CATIII

CATIII

Category



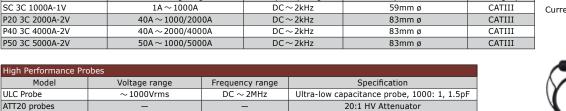
External Shunt HF-003



Current Clamp SC 3C 1000A-1V



Current Clamp P20 3C 2000A-2V



Frequency range

Frequency range

 $40 \text{Hz} \sim 5 \text{kHz}$ 

40Hz  $\sim$  5kHz

 $40 \text{Hz} \sim 5 \text{kHz}$ 

 $40 Hz \sim 5 kHz$ 

 $40 \text{Hz} \sim 5 \text{kHz}$ 

 $15 \text{Hz} \sim 15 \text{kHz}$ 

 $15 Hz \sim 15 kHz$ 

 $40 Hz \sim 5 kHz$ 

 $40 \text{Hz} \sim 5 \text{kHz}$ 

10:1 HV Attenuator TT-HVP 15HF , 1000:1 HV Probe TT-HV15

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

Clamp diameter

15mm×17mm

15mm×17mm

50mm ø

50mm ø

43mm ø

54mm ø

54mm ø

83mm ø (125mm×47mm or 100m m×58mm)

83mm ø

Clamp diameter

The N4L product range includes Frequency Response and Impedance Analyzers, Selective Level Meters and Laboratory Power Amplifiers Phase Sensitive Multimeters



### Applications

- Power supply phase margin and gain margin (FRA)
- Inductance, Capacitance and Resistance (LCR)
- Analysis of mechanical vibration (HARM)
- Phase meter calibration (VVM)

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



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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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