

Compliant Testing In Accordance with:

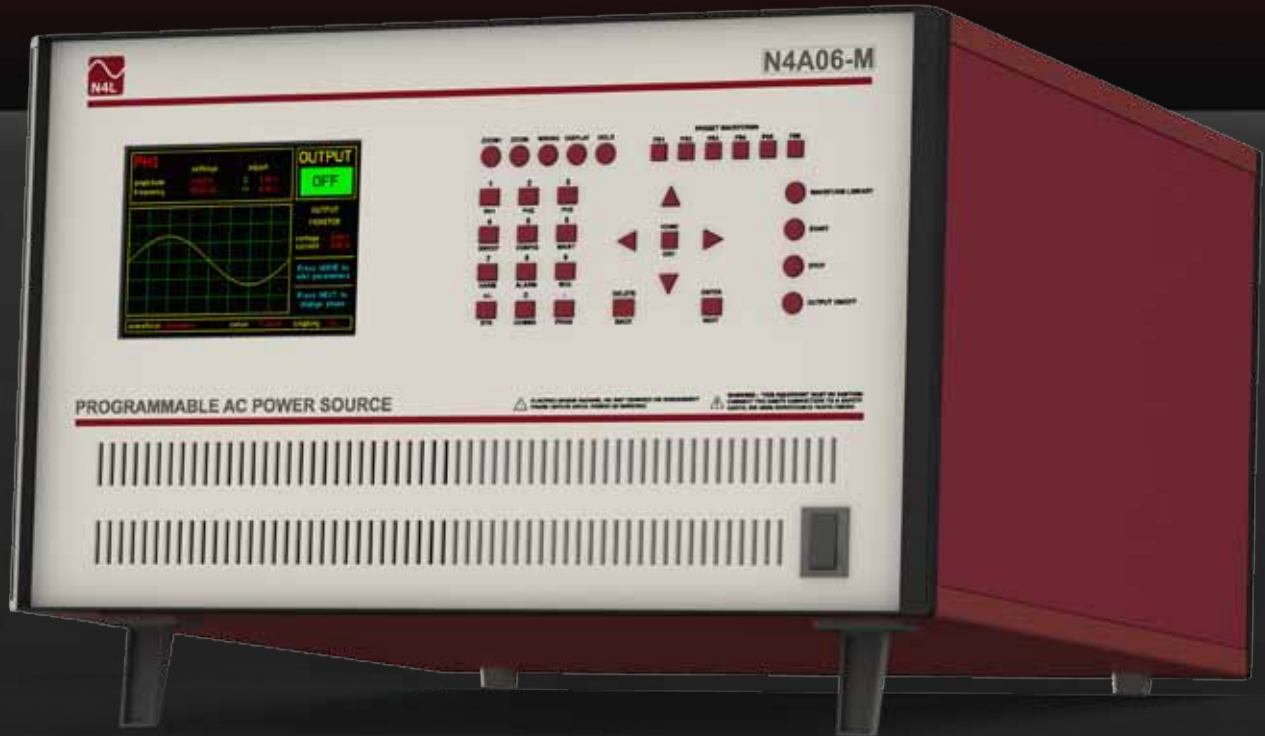
IEC/EN61000-3-2

IEC/EN61000-3-3

IEC/EN61000-3-11

IEC/EN61000-3-12

N4A DC+AC Power Sources
N4A03 - 3kVA Single Phase
N4A06 - 6kVA Single Phase
N4A18 - 18kVA Three Phase
N4A30 - 30kVA Three Phase
N4A67 - 67kVA Three Phase



Product Overview

Low THD	<0.3% (0.1% typical)
DC+AC Output	DC-1kHz (10kHz small signal bandwidth)
Single Phase and 3 Phase	Single Phase and 3 Phase systems available
EMC Compliance	IEC61000-3-2/3/11/12, IEC61000-4-11/13/17/29
Market Leading Inrush	2x Continuous Output for 3 seconds
Fast Switch on Time	Proprietary Design
Versatile interfaces	RS232, USB, LAN
Arbitrary Waveform	Custom Arbitrary Waveform, Sequencing and More
Pre Set Waveforms	Stored in Hardware for Fast Recall
High Efficiency	>80%
Up to 67kVA Available	67kVA 3 Phase Solutions
Compact Design	High Power Density

■ **Product Overview** N4A03 N4A06 N4A18 N4A30 N4A67

The N4A range of Programmable AC Power Sources offer complete flexibility for a wide range of applications. All N4A sources feature dual channel arbitrary waveform generators utilising direct digital synthesis providing the user with simultaneous multiple harmonic generation, frequency sweeping and long sequencing capabilities. The metrology of the arbitrary generator permits long custom waveform sequences to be produced without a reduction in the resolution of each individual waveform. The N4A AC Source also features 10 bit vertical resolution and a maximum waveform resolution of 16,384 points to produce a single periodic waveform. There is also an internal storage function for imported custom waveforms featuring user intuitive library menus that display the waveform graphically on the display.

■ **Key Technical Advantages over traditional Linear Topologies** N4A03 N4A06 N4A18 N4A30 N4A67

In the past, low distortion power sources have been restricted to the use of linear based output stage topologies. Whilst this approach offered low levels of distortion, it came with drawbacks such as poor low power factor performance, lower output power capability when the output voltage is less than "rail voltage", increased size and many more. N4L's proprietary switching design offers all of the benefits of a linear supply without the drawbacks, further to this, the cost of all N4A AC Power Sources is lower than that of an equivalent low distortion linear design.

Comparison between N4L "6 Leg Modulation" and traditional linear topology*

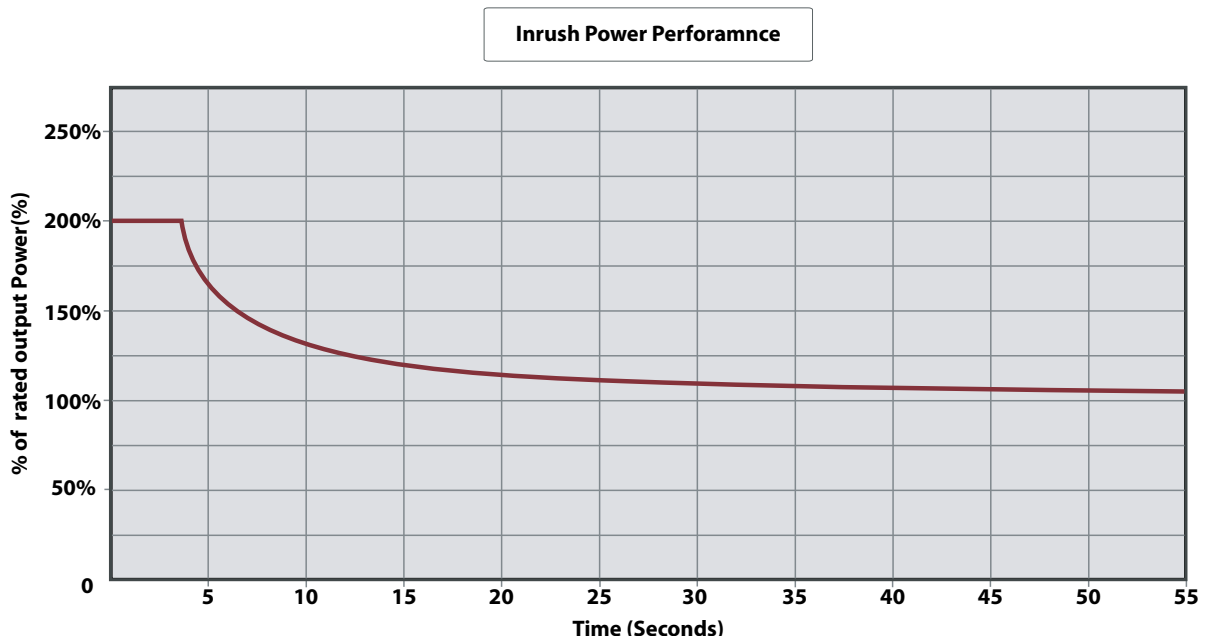
N4L Advanced Power Source	Traditional Linear Power Source
Market leading Inrush Current capability - 2x Rated current for up to 3 seconds	Linear designs do not typically have any significant inrush current capability and usually require "over rating" when used in applications such as motor development
Able to drive into loads exhibiting high crest factors	Output power capacity is often reduced at high crest factors
Able to drive into loads with very low power factor at full current over complete voltage range	Output power capacity is often reduced at low power factors due to heating effects within linear output section
Efficiency of better than 80% irrespective of type of load	Linear power sources offer lower efficiencies of around 60%
Intelligent IGBT output modules exhibit superior reliability, facilitated via integrated protection on Si wafer.	Traditional designs often do not feature integrated Si wafer protection
Very low THD equivalent to the highest performing linear amplifiers on the market, 6 leg modulation topology extends the equivalent switching frequency of the inverter	Low THD is no longer a differentiator between the linear designs and N4L 6 leg modulation approach
Extremely robust design as a result of power filters situated in between the active power section and the EUT	Expensive output stage is susceptible to damage

*According to N4L research, Oct 2014

■ **True Multiple Cycle Inrush Current Capability** N4A03 N4A06 N4A18 N4A30

N4A AC Power Sources feature 3 second 200% current output overload capability (N4A67 133%), this feature is extremely useful when supplying power to devices with high inrush current such as compressors and motors. As a result there is no requirement to over size an Amplifier for short inrush currents.

Power Overload Capability (300Vrms)

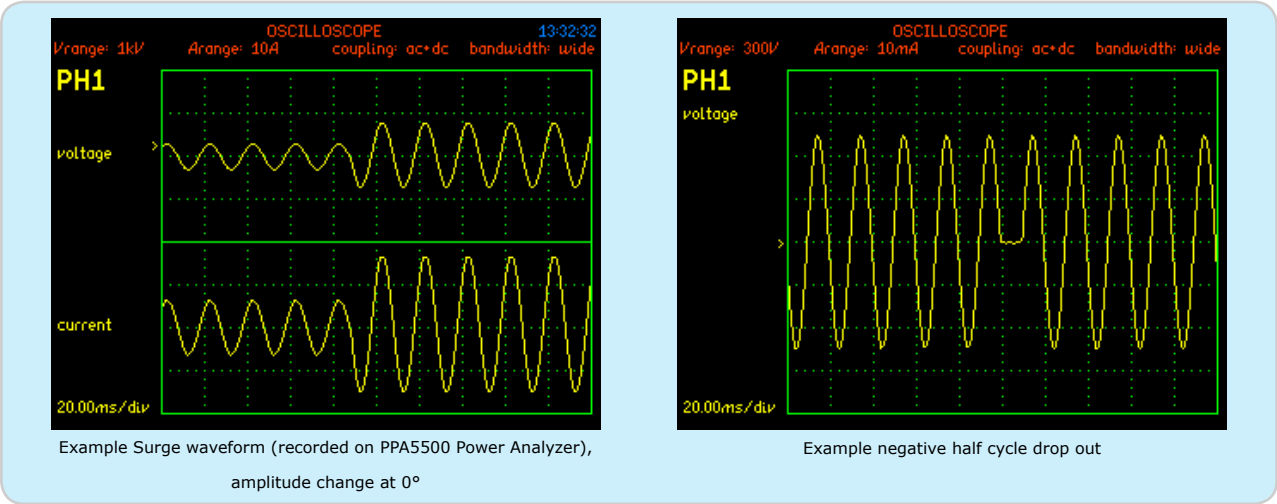


■ **Low THD equivalent to Linear Power Sources** N4A03 N4A06 N4A18 N4A30 N4A67

N4A Advanced Power Amplifiers feature proprietary noise suppression analogue electronics known as "6 leg modulation" topology which produces an output waveform during high loads with less than 0.1% THD. This level of distortion has only previously been possible with linear power sources. Due to modern developments in amplifier design we can now offer excellent distortion in a smaller package, with higher efficiency. The ability to generate DC+AC at a lower cost than the equivalent Linear Amplifiers on the market is a breakthrough in power source design.

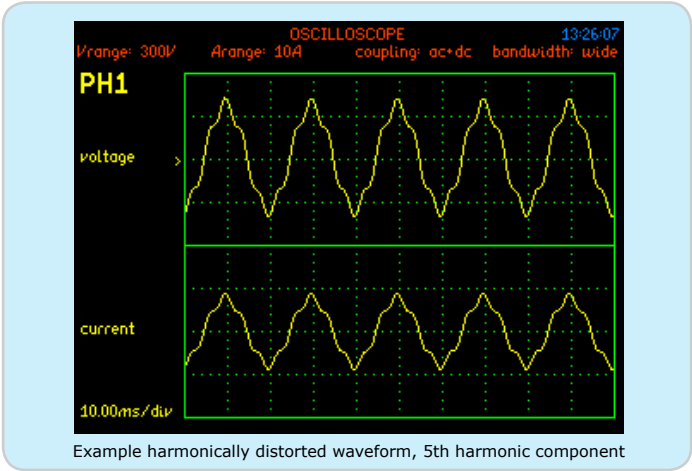
■ **Programmable Surge/Sag and Drop out** N4A03 N4A06 N4A18 N4A30 N4A67

The N4A Advanced Power Amplifier features a surge/sag capability, enabling the user to set both surge/sag magnitudes as well as the phase angle at which to switch to the programmed value. There is also the ability to drop out portions of a waveform.



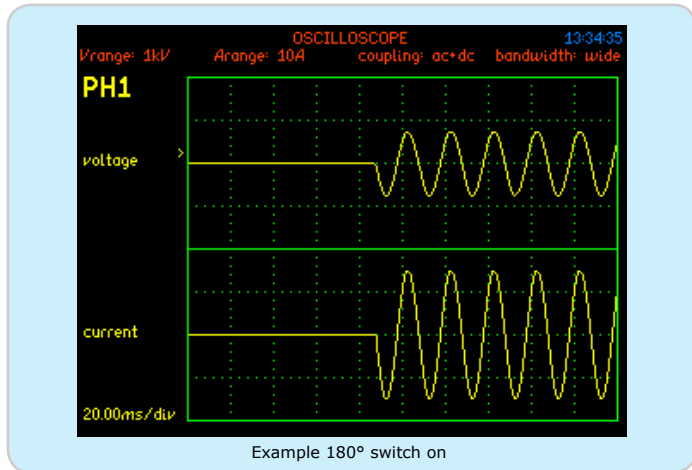
■ **Programmable Harmonic Synthesis** N4A03 N4A06 N4A18 N4A30 N4A67

Harmonic synthesis is performed digitally permitting excellent flexibility with respect to waveform distortion synthesis at high accuracy.



■ **Specified Phase Angle Switch On** N4A03 N4A06 N4A18 N4A30 N4A67

The N4A Advanced AC Power Sources feature a programmable "switch on" feature that enables testing of phase sensitive capacitive/inductive loads. The N4A combined with one of N4L's Precision Power Analyzers provides an excellent solution for inrush current measurements.



■ **N4A PCU (Programmable Controller Unit)** N4A03 N4A06 N4A18 N4A30 N4A67

The N4A PCU provides a wide range of output waveforms, from Harmonic synthesis to waveform sequencing. The N4A range of Advanced AC Power Sources are available with single phase (N4A03 + N4A06) and three phase (N4A18, N4A30 + N4A67) outputs.

Programmable Controller Unit Specification

PCU Generator	
Output	
Memory Depth	128k Data Points
External Data Upload	Ability to upload external waveform capture via oscilloscope
Amplitude Control Resolution	Normal = 0.1Vrms ±10 = 0.01Vrms
Phase Control Resolution	0.1 deg
Maximum Output Frequency (Fundamental)	1kHz
Maximum Output Frequency (Harmonic)	10kHz
Min Slew Rate (at output of amplifier)	3V/us
No of outputs	All Master units (N4A06-M, N4A18-M and N4A30-M) feature 3 outputs, providing future upgrade path to a 3 Phase system
Output DAC Resolution	12 bit
Output Connector	BNC (Connects directly to inverter stage at rear of instrument, can be used as low voltage trigger output)
Waveform Run Modes	Continuous, Triggered, Sequence, Sweep
Sequence Length	50
Easy to Use	Intuitive user interface facilitates quick operation and fast learning time
Communications	
Interfaces	RS232, LAN, USB
Maximum Baud Rate	19200

■ **Wide Bandwidth To 10kHz for Small Signal Distortion Generation** N4A03 N4A06 N4A18 N4A30 N4A67

The N4A series Programmable AC Power Sources offer unity gain to 1kHz and small signal bandwidth to 10kHz. With an equivalent bandwidth of 10kHz, the N4A can generate square wave signals at 300V to above 500Hz fundamental frequency.

■ **Power Output Monitoring** N4A03 N4A06 N4A18 N4A30 N4A67

The N4A Advanced AC+DC Power Source provides real time monitoring of the output voltage and current on each phase. For the highest of power measurement accuracy and market leading harmonic analysis our Precision Power analyzer range offers an excellent measurement solution in combination with the N4A Power Source.

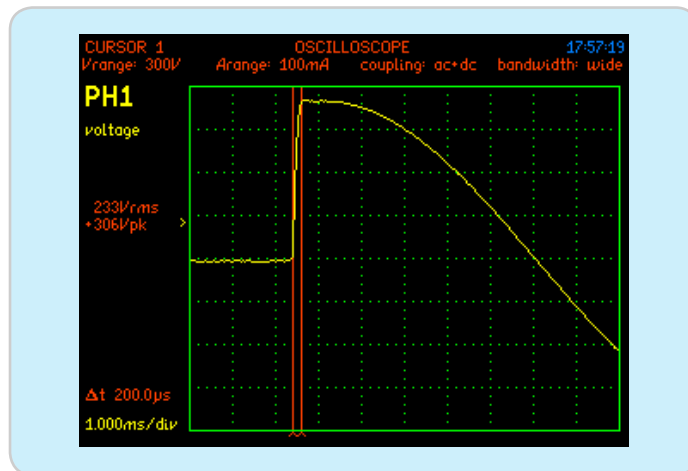
The N4A18 PCU is housed in the Master unit, this then controls the two slave units. Isolation and EMC filtering is provided at an earlier stage in the system.



■ **Rapid Switch on Times** N4A03 N4A06 N4A18 N4A30 N4A67

Due to an innovative "6 leg" output topology the N4A Advanced Power Amplifiers offer rapid switch on times as seen in the oscilloscope screenshot below.

Rapid Switch on Times



■ **IEC61000-3-2/12 and IEC61000-3-3/11 Harmonics and Flicker** N4A06 N4A18 N4A30 N4A67

N4A Advanced AC Power Sources offer full compliance to IEC61000-3-2/12 and IEC61000-3-3/11 (N4A06/18/30/67). Featuring very low distortion (<0.1% THD typical) and very low output impedance, the N4A range of power amplifiers can be supplied as a stand alone AC power source to be integrated into another test system or as a standalone power source supplied with racking system direct from N4L. Alternatively, the N4A AC Power Source can be supplied along with the N4L PPA55x1 Harmonics and Flicker Analyzer and N4L IMP161, IMP163, IMP323 or IMP753 Impedance Network integrated into one complete test system. N4L are currently the only Harmonics and Flicker test system manufacturer in the world* to hold our own ISO17025 (UKAS) Accreditation for the calibration of Harmonics and Flicker Analyzers to IEC61000-3-2/12 and IEC61000-3-3/11.

*According to N4L research November 2014

■ **Waveform Sequencing** N4A03 N4A06 N4A18 N4A30 N4A67

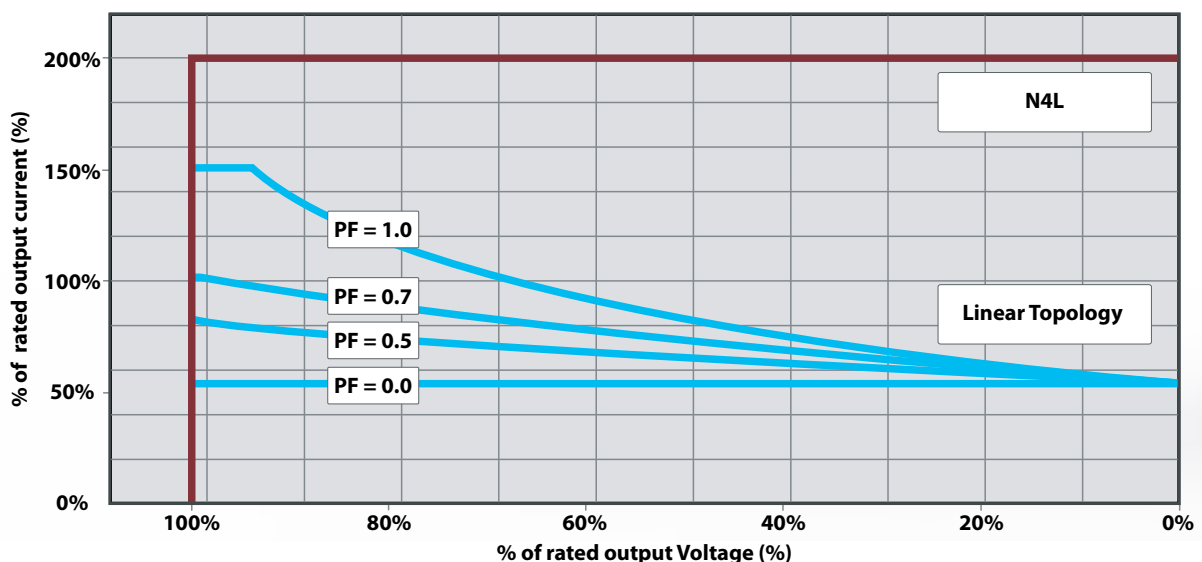
The PCU generator features a proprietary "Sequencing Mode", this mode allows the user to enter a table of parameters of which the generator will step through in sequence. Each entry in the table is specified with the related Voltage, Frequency and time before stepping through to the next entry in the sequence table.

The generator can be programmed to continuously cycle through the sequence, cycle once upon an external trigger (via comms or TTL signal level) or cycle continuously upon trigger. The minimum time period at each step in any sequence is 40ms, whilst the maximum time period at each step is 12 hours.

■ **200% Output Current Capability at any Power Factor** N4A03 N4A06 N4A18 N4A30

N4L's proprietary switching topology not only provides excellent THD performance, the N4A power sources can also provide 200% output current for 3 seconds (N4A67 133%) and then 100% output current continuously at any power factor. This is due to significantly lower heat loss in the output switching devices, solving an unavoidable bottleneck for linear output stages.

Output Performance



■ 3 Phase AC Power Sources up to 67kVA

N4A18

N4A30

N4A67

N4A Advanced AC Power Sources are available in 3 phase configurations as well as single phase configuration. Three phase systems feature a master unit (N4A18-M pictured below) and two slave units (N4A18-S pictured below), the N4A three phase configurations offer a convenient solution when servicing is required as only the master and slave units themselves need to be shipped, offering significant savings on shipment costs. All N4A three phase systems feature fully isolated outputs, very low harmonic distortion even under heavy load and the ability to source x2 current for 3 seconds.

6.5in Full Colour TFT Display, White LED Backlit

Keypad

2x Slave Units

Power

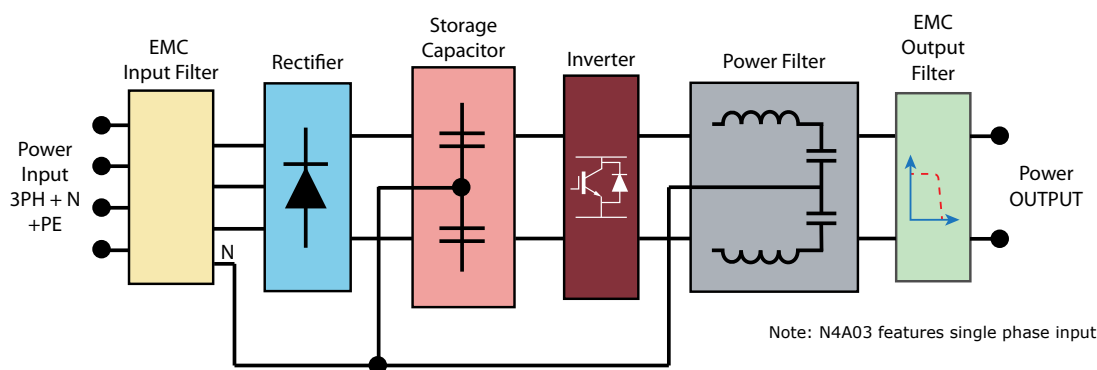
Access Panel



N4A18 3 Phase AC+DC Power Source, 18kVA (6kVA per phase)

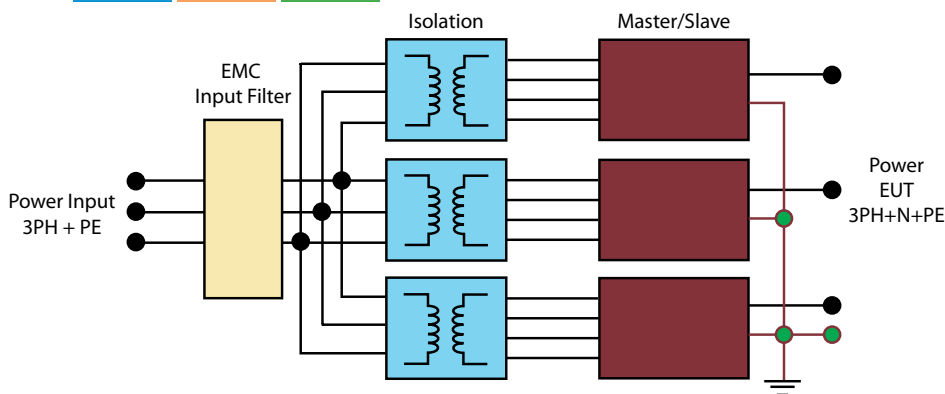
■ Schematic Diagram

N4A03 N4A06



■ Schematic Diagram

N4A18 N4A30 N4A67



IEC61000 Harmonics and Flicker Test Systems

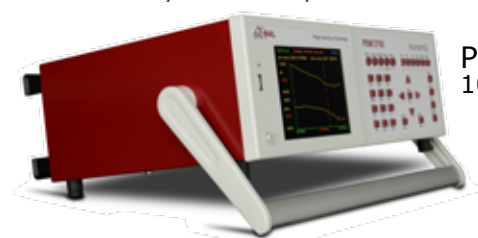
Example IEC61000 Test Systems			
System Configuration			
Overall System Description	Single Phase 16A Harmonics and Flicker Test System	Single+Three Phase 16A Harmonics and Flicker Test System	Single+Three Phase up to 75A Harmonics and Flicker Test System
Compliant Standards (Limits)	IEC61000-3-2:2014 (Single Phase) IEC61000-3-3:2013 (Single Phase) IEC61000-4-11:2004 (Single Phase) IEC61000-4-13:2009 (Single Phase) IEC61000-4-17:2009 (Single Phase) IEC61000-4-29:2001 (Single Phase)	IEC61000-3-2:2014 (Single/Three Phase) IEC61000-3-3:2013 (Single/Three Phase) IEC61000-4-11:2004 (Single/Three Phase) IEC61000-4-13:2009 (Single/Three Phase) IEC61000-4-17:2009 (Single/Three Phase) IEC61000-4-29:2001 (Single/Three Phase)	IEC61000-3-2:2014 (Single/Three Phase) IEC61000-3-3:2013 (Single/Three Phase) IEC61000-3-12:2005 (Single/Three Phase) IEC61000-3-11:2000 (Single/Three Phase) IEC61000-4-11:2004 (Single/Three Phase) IEC61000-4-13:2009 (Single/Three Phase) IEC61000-4-17:2009 (Single/Three Phase) IEC61000-4-29:2001 (Single/Three Phase)
Compliant Measurement Standards	IEC61000-4-7 IEC61000-4-15	IEC61000-4-7 IEC61000-4-15	IEC61000-4-7 IEC61000-4-15
Output Power	6kVA	18kVA	67kVA
Power Source	N4A06	N4A18	N4A67
Impedance Network	IMP161 Single Phase 16A Impedance Network	IMP163 Three Phase 16A Impedance Network	IMP753 Three Phase 75A Impedance Network
Software Included	IECSOft IEC61000 Test Suite		
Harmonics and Flicker Analyzer	N4L PPA5511 Combined Harmonics and Flicker + Power Analyzer	N4L PPA5531 Combined Harmonics and Flicker + Power Analyzer	N4L PPA5531 Combined Harmonics and Flicker + Power Analyzer
Power Measurement Parameters	W, VA, Var, pf, V & A - rms, rectified mean, AC, DC, Peak, Surge, Crest Factor, Form Factor, Star to Delta Voltage Frequency (Hz), Phase (deg), Fundamentals, Impedance Harmonics, THD, TIF, THF, TRD, TDD Integrated Values, Datalog, Sum and Neutral values		
ISO17025 UKAS Cetification	Optional - Power Analyzer and Impedance Network Calibration	Optional - Power Analyzer and Impedance Network Calibration	Optional - Power Analyzer and Impedance Network Calibration
Integration of Equipment	Analyzer + Impedance Network fully integrated into rack system		

SPECIFICATION

	N4A03 (1 Phase)	N4A06 (1 Phase)	N4A18 (3 Phase)	N4A30 (3 Phase)	N4A67 (3 Phase)
Nominal Output Power	3,000VA	6,000VA	18,000VA	30,000VA	67,500kVA
Output					
Output Voltage (AC)	0-300Vrms	0-300Vrms	0-300Vrms	0-300Vrms	0-300Vrms
Output Voltage (DC)	0-425V DC	0-425V DC	0-425V DC	0-425V DC	0-425V DC
Maximum Continuous Output Power (AC)	3000VA	6000VA	18,000VA (6,000VA/phase)	30,000VA (10,000VA/phase)	67,500VA (22,500VA/phase)
Maximum Inrush (3 Second) Output Power	6000VA	12000VA	36,000VA	60,000VA	90,000VA
Maximum Output Current (Continuous)	10Arms	20Arms	20Arms (Per Phase)	33Arms (Per Phase)	75Arms (Per Phase)
Maximum Output Current (Inrush)	20Arms	40Arms	40Arms (Per Phase)	67Arms (Per Phase)	100Arms (Per Phase)
Output Frequency	DC - 1kHz	DC - 1kHz	DC - 1kHz	DC - 1kHz	DC - 1kHz
Min Slew Rate	3V/us	3V/us	3V/us	3V/us	3V/us
Output Voltage Stability	Better than 0.1%	Better than 0.1%	Better than 0.1%	Better than 0.1%	Better than 0.1%
Output Voltage Accuracy	Better than 0.5%	Better than 0.5%	Better than 0.5%	Better than 0.5%	Better than 0.5%
THD	Better than 0.3%*	Better than 0.3%*	Better than 0.3%*	Better than 0.3%*	Better than 0.3%*
Output Noise	<500mVrms	<500mVrms	<500mVrms	<500mVrms	<500mVrms
Recovery Time of Output Waveform	Better than 50us	Better than 50us	Better than 50us	Better than 50us	Better than 50us
Max Compensated drop on wires (w.r.t voltage setting)	5%	5%	5%	5%	5%
Recovery Time of Drop on Wires	Less than 200ms	Less than 200ms	Less than 200ms	Less than 200ms	Less than 200ms
Maximum Crest Factor Output (Current)	[Inrush Imax*1.41]/RMS Load Current	[Inrush Imax*1.41]/RMS Load Current	[Inrush Imax*1.41]/RMS Load Current	[Inrush Imax*1.41]/RMS Load Current	[Inrush Imax*1.41]/RMS Load Current
General					
Dimensions	281mm x 471mm x 513mm	281mm x 471mm x 513mm	1785mm x 930mm x 755mm	1785mm x 930mm x 755mm	1800mm x 1200mm x 800mm
Weight	30kg	45kg	740kg	740kg	1300kg
Input Voltage	230V AC +/- 10% 1PH	400V AC +/- 10% 3PH	400V AC +/- 10% 3PH	400V AC +/- 10% 3PH	400V AC +/- 10% 3PH
Input Frequency	45-65Hz	45-65Hz	45-65Hz	45-65Hz	45-65Hz
Operating Temperature	0-35degC	0-35degC	0-35degC	0-35degC	0-35degC
Input Current	24Arms	16Arms Phase / 27A Neutral	60A continuous 120A inrush / Phase	80A continuous 160A inrush / Phase	160A continuous 220A inrush / Phase

*At Nominal Voltage with Linear Load

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



PSM3750
10μHz ~ 50MHz



PSM17xx
10μHz ~ 35MHz



Newton's4th

Newton's4th 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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