



Compliant Testing In Accordance with:

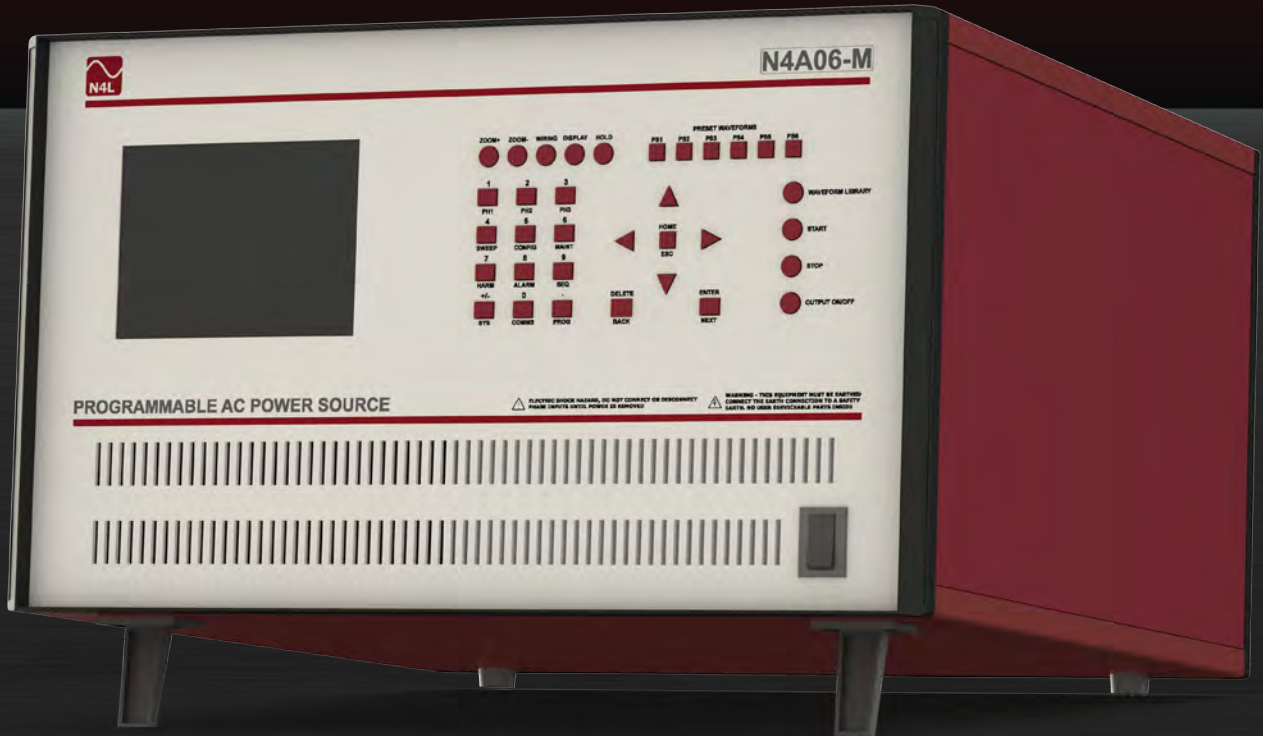
IEC/EN61000-3-2

IEC/EN61000-3-3

IEC/EN61000-3-11

IEC/EN61000-3-12

N4A06 - 6kVA Single Phase
N4A18 - 18kVA Three Phase
N4A30 - 30kVA Three Phase
Higher Power Systems also Available



Product Overview	
High Efficiency	>80%
Low THD	<0.3%
DC+AC Output	DC-1kHz (10kHz small signal bandwidth)
Single Phase and 3 Phase	Single Phase and 3 Phase systems available
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
>30kVA Available	>30kVA 3 Phase Solutions

■ **Product Overview** N4A06 N4A18 N4A30

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 to provide the user with simultaneous harmonic generation, frequency sweeping and long sequencing capabilities. A proprietary generator technique utilises 12 bit vertical resolution and up to 16,384 points in a periodic cycle together with dual channel waveform mixing and a sequence mode. This permits custom waveform sequences to be produced without the reduction in total waveform resolution that is typical in conventional systems. There is also an internal storage function for custom waveforms, featuring intuitive library menus that display the waveform graphically on the display.

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

In the past, low distortion wide bandwidth power sources have been restricted to the use of linear output stage topologies. While linear designs are certainly strong in this respect, drawbacks include poor low power factor performance, reduced output power capability when the output voltage is less than rail voltage', and increased size and weight. N4L's proprietary switching design offers the benefits normally associated only with a linear design, without the associated drawbacks. It is also a very cost effective way to achieve this level of performance.

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

N4L Advanced Power Source	Traditional Linear Power Source
Market leading current overload via extended double output power capability - 2x Rated current for 3 seconds at full working voltage	Linear designs usually offer only short duration inrush current capability and usually require "over rating" when used in applications such as motor/compressor start-up
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%
Instantaneous full load output current control enabling indefinite short circuit protection	Linear power sources are not always able to drive into a short circuit indefinitely due to internal heat dissipation.
Intelligent IGBT output modules exhibit exceptional reliability, facilitated via integrated protection on Si wafer.	Si wafer protection is less common in linear designs and higher internal power dissipation creates a more demanding challenge
Very low THD equivalent to high performance linear amplifiers. 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. More susceptible to damage

*According to N4L research, Oct 2014

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

All N4A AC Power Sources feature 3 second, x2 VA output power overload capability. This feature supports the start up power demand of devices with high inrush current, such as compressors and motors. As a result, there is no requirement to over size an Amplifier for start up demand or burst power demand in normal use.

Power Overload Capability (300Vrms)

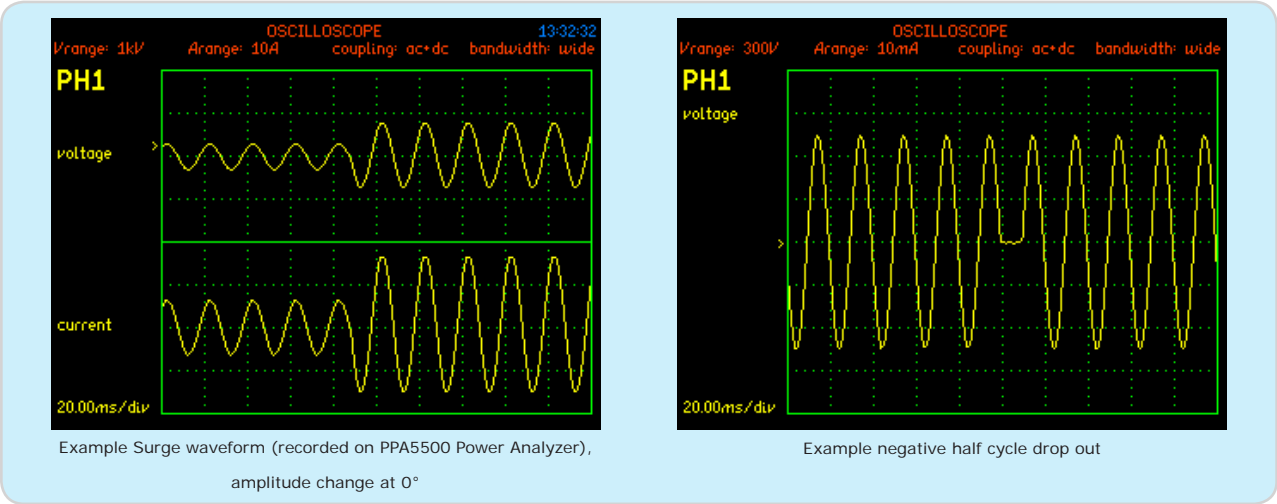


■ Low THD equivalent to Linear Power Sources N4A06 N4A18 N4A30

N4A Power Amplifiers feature proprietary noise suppression analogue electronics known as "6 leg modulation", which produces an output waveform during high loads with less than 0.1% THD. This level of distortion has previously been the reserve of linear power source technology, which has until now been the only realistic choice. However, developments in amplifier design that are incorporated in the N4A source provide a low distortion power solution combined with the benefits of switching technology. This low distortion DC+AC source represents a breakthrough in switching power design, providing a competitive alternative to traditional techniques.

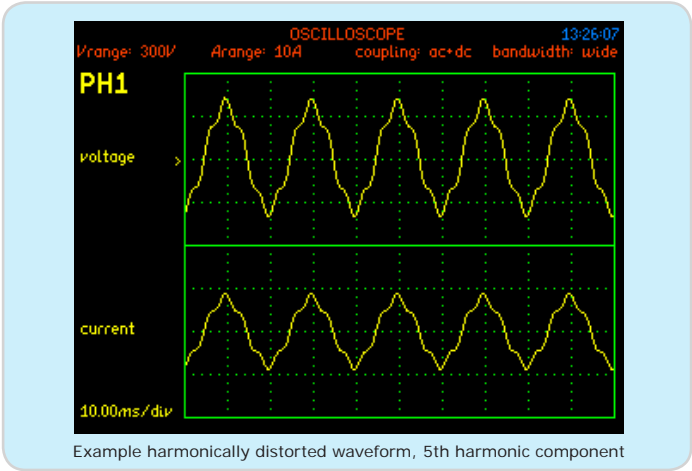
■ Programmable Surge/Sag and Drop out N4A06 N4A18 N4A30

An innovative generator design includes programmable surge/sag capability, enabling the user to set both surge and sag magnitudes together with the phase angle at which to switch to the programmed value. There is also the ability to 'drop out' selected portions of a waveform.



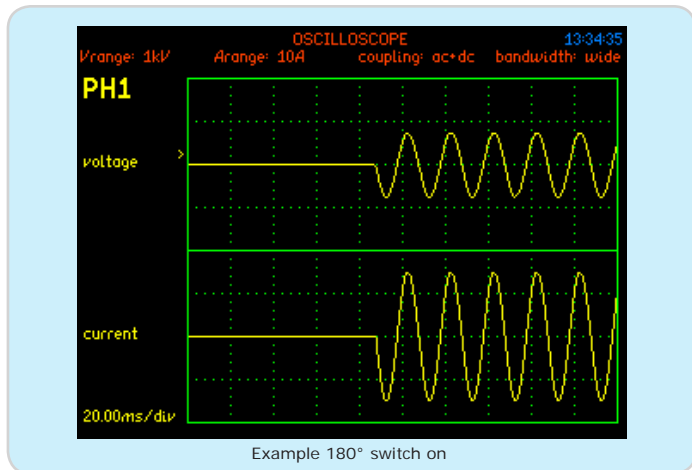
■ Programmable Harmonic Synthesis N4A06 N4A18 N4A30

Harmonic synthesis is performed digitally, permitting excellent flexibility with respect to waveform distortion synthesis.



■ Specified Phase Angle Switch On N4A6010 N4A6030 N4A30

A phase programmable 'switch on' feature is provided that enables precise control of DUT power up conditions. This is of particular significance when testing phase sensitive capacitive or inductive loads. Combined with an N4L Precision Power Analyzer, the N4A power source provides an excellent solution for inrush current measurements.



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

The 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 (N4A06) and three phase (N4A18 + N4A30) outputs.

Programmable Controller Unit Specification

PCU Generator	
Output	
Memory	8Mb Internal Flash, 100 Sequences
External Data Upload	Ability to upload external waveform capture
Amplitude Control Resolution	4 digit
Phase Control Resolution	4 digit
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	255
Sequence Step Time	10ms ~ 650 seconds
Sequencing Editable Parameters	AC + DC, Phase Jump, Start and Stop Angle, Single Shot, Continuous Loop
Sequency Control	Start, Stop, Hold, Resume
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** N4A06 N4A18 N4A30

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

■ **Output Monitoring** N4A06 N4A18 N4A30

Real time monitoring of the output voltage and current is provided independantly on each phase. For applications requiring high measurement precision or a wide range of power analysis functions, the N4A can be used in conjunction with any of the latest PPA series Precision Power Analyzers.

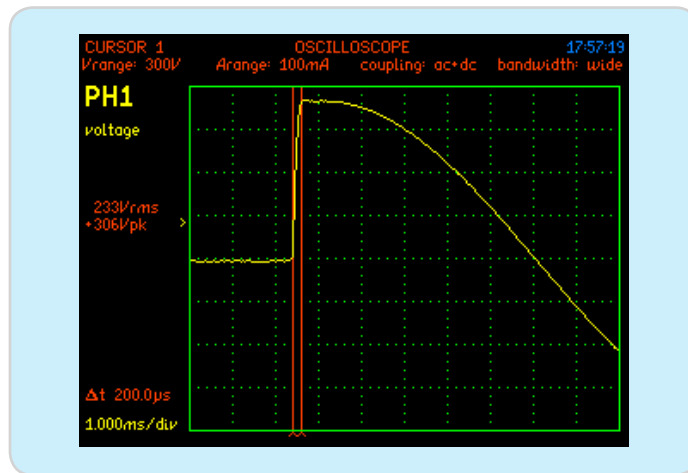
The N4A18 PCU is housed in the Master unit which controls the two slave units. Isolation and EMC filtering is provided at an earlier stage in the system to ensure the optimum dynamic performance.



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

Innovative "6 leg" output topology in 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

All N4A Advanced AC Power Sources offer full compliance to the IEC61000-3-2/12 and IEC61000-3-3/11 Harmonic and Flicker standards. Featuring very low distortion (<0.1% THD) and very low output impedance, the N4A range of power amplifiers can be supplied as a stand alone AC power source, integrated into a third party test system or offered as part of a test system supplied directly from N4L. A complete N4L test system comprises of the N4A AC Power Source, an N4L IMP161, IMP163, IMP323 or IMP753 Impedance Network and a PPA55x1 Harmonics and Flicker Analyzer. N4L are currently the only Harmonics and Flicker test system manufacturer in the world* to hold its own ISO17025 (UKAS) Accreditation for the calibration of Harmonics and Flicker Analyzers to the latest IEC61000-3-2/12 and IEC61000-3-3/11 standards.

*According to N4L research November 2014

■ **Waveform Sequencing** N4A06 N4A18 N4A30

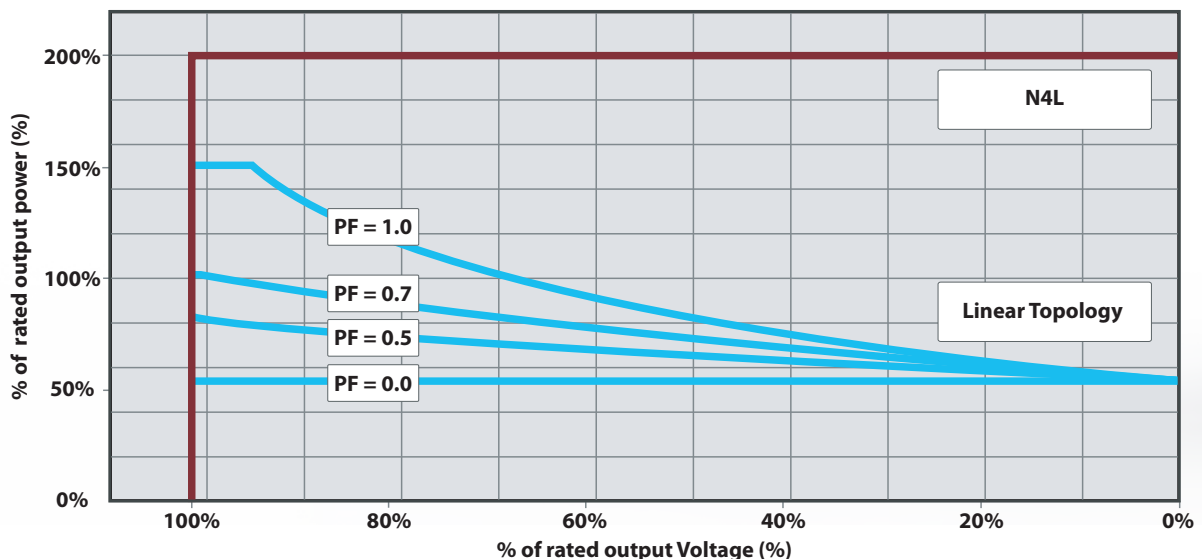
The PCU generator features a proprietary 'Sequencing Mode' that allows the user to build a table of parameters through which the generator will step in sequence. Each entry in the table is specified with the related Voltage, Frequency and Time before stepping through to the next entry in the sequence 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 1 day.

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

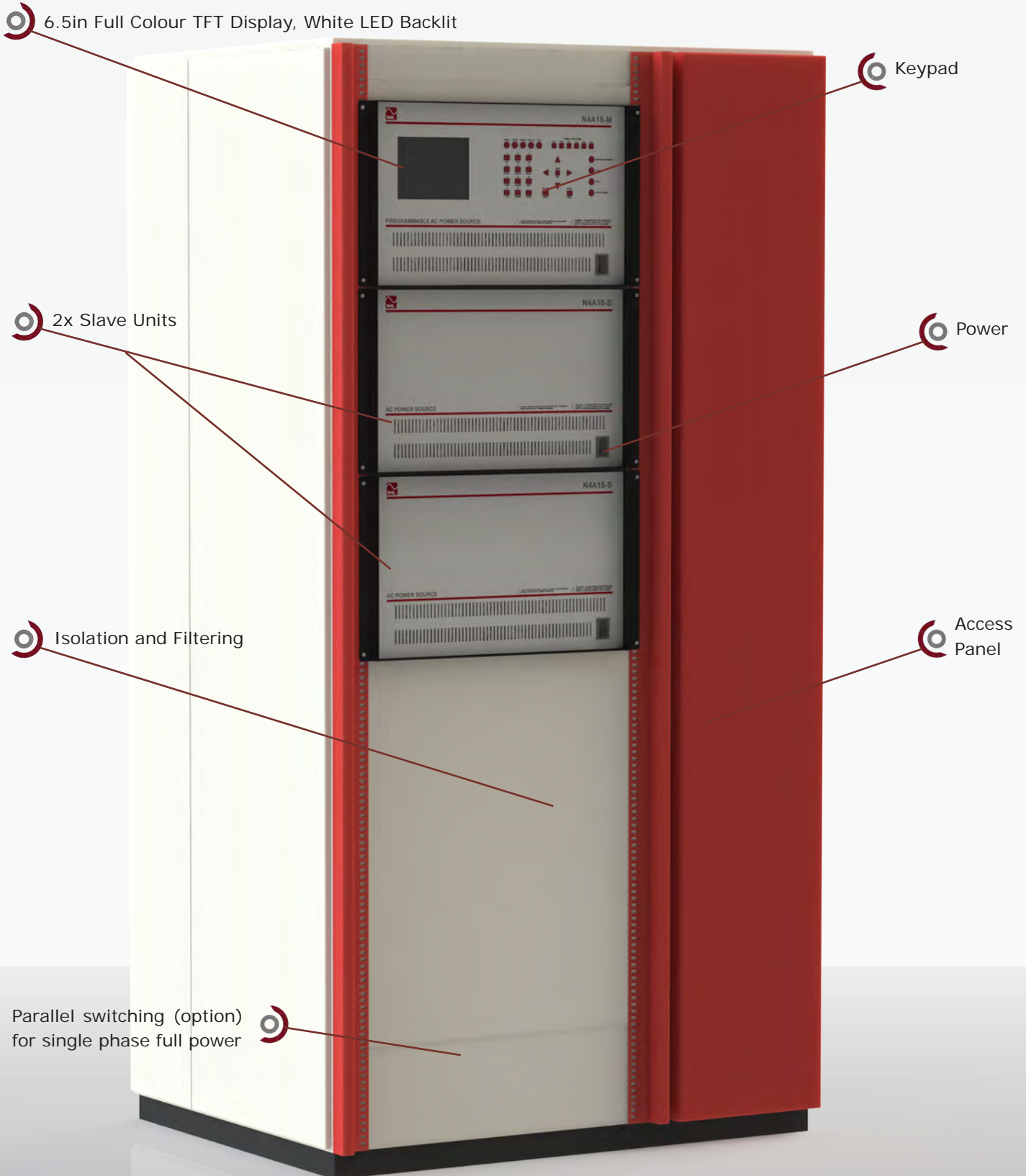
The proprietary switching topology not only provides excellent THD performance, it also enables the source to maintain up to 200% output current for up to 3 seconds and then 100% output current continuously at any power factor. This is due to significantly lower heat loss in the output switching devices, solving an unavoidable limitation for linear output techniques.

Output Performance



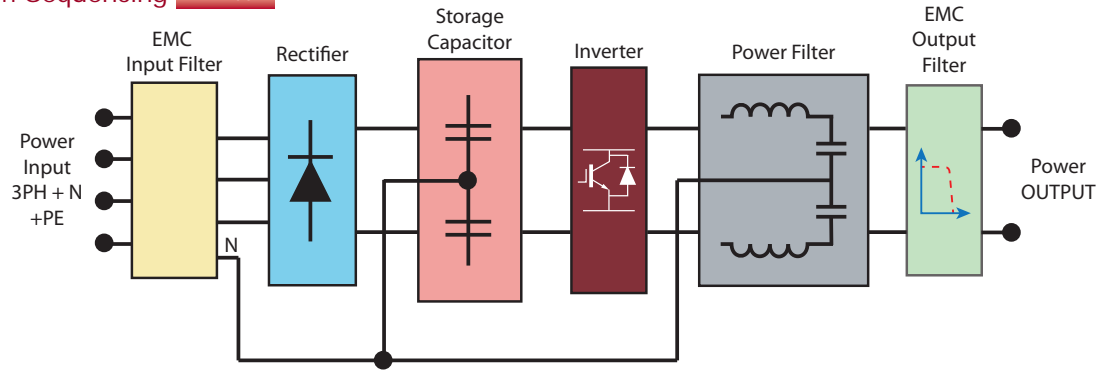
■ 3 Phase AC Power Sources up to 30kVA N4A18 N4A30

N4A Advanced AC Power Sources are available in both single phase and three phase configurations. Three phase systems feature a master unit (N4A18-M pictured below) and two slave units (N4A18-S pictured below), installed within a rack system that includes EMC filtering and isolation. This modular approach benefits both product flexibility and cost of ownership, since the master and slave units can be disconnected from the system, reducing potential down time and cost of shipping. While ongoing maintenance is an important consideration for any product, inherent robustness is achieved with an intelligent IGBT module and innovative power filter design.

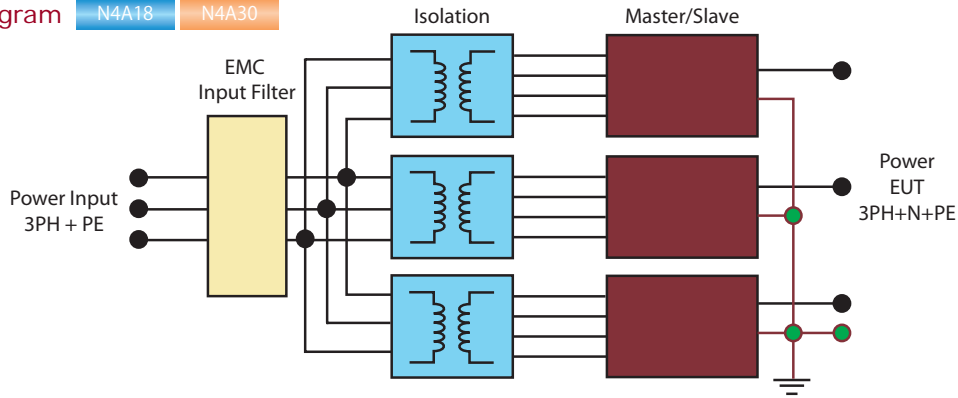


N4A18 3 Phase AC+DC Power Source, 18kVA (6kVA per phase)

Waveform Sequencing N4A06



Schematic Diagram N4A18 N4A30



IEC61000 Harmonics and Flicker Test Systems

IEC61000 Harmonics and Flicker Test System Options			
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)	IEC61000-3-2:2014 (Single/Three Phase) IEC61000-3-3:2013 (Single/Three Phase)	IEC61000-3-12:2005 IEC61000-3-11:2000
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	Contact N4L For Details
Description	Single Phase 16A Compliant Harmonics and Flicker Test System	Three Phase 16A Compliant Harmonics and Flicker Test System	Three Phase 75A Compliant Harmonics and Flicker Test System
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		
Impedance Network	IMP161 Single Phase 16A Impedance Network	IMP163 Three Phase 16A Impedance Network	IMP753 Three Phase 75A Impedance Network

Configuring your IEC61000 Harmonics and Flicker Test System

Example IEC61000 Harmonics and Flicker Test System Configurations				
Compliance Requirement	AC Power Source	Impedance Network	Harmonics and Flicker (Power) Analyzer	Accreditation
IEC61000-3-2 + IEC61000-3-3 (Single Phase)	N4A06 (Single Phase, 6kVA)	IMP161 (Single Phase 16A)	PPA5511	Optional UKAS ISO17025 IEC61000 Harmonics and Flicker Certification of PPA5511
IEC61000-3-2 + IEC61000-3-3 (Single + Three Phase)	N4A18 (Three Phase, 18kVA)	IMP163 (Single + Three Phase 16A/Phase)	PPA5531	Optional UKAS ISO17025 IEC61000 Harmonics and Flicker Certification of PPA5531
IEC61000-3-11 + IEC61000-3-12 (Three Phase)	Contact N4L for details	IMP753 (Three Phase 75A/Phase)	PPA5531	Optional UKAS ISO17025 IEC61000 Harmonics and Flicker Certification of PPA5531

SPECIFICATION

	N4A06 (1 Phase)	N4A18 (3 Phase/6kVA per Phase)	N4A30 (3 Phase/10kVA per Phase)
Nominal Output Power	6,000VA	18,000VA	30,000VA
Output			
Output Voltage (AC)	0-300Vrms	0-300Vrms	0-300Vrms
Output Voltage (DC)	0-425V DC	0-425V DC	0-425V DC
Maximum Continuous Output Power (AC)	6000VA	18,000VA	30,000VA
Maximum Inrush (3 Second) Output Power (DC)	12,000VA	36,000VA	60,000VA
Maximum Output Current (Continuous)	20Arms	20Arms (Per Phase)	33Arms (Per Phase)
Maximum Output Current (Inrush)	40Arms	40Arms (Per Phase)	66Arms (Per Phase)
Output Frequency	DC - 1kHz	DC - 1kHz	DC - 1kHz
Min Slew Rate	3V/us	3V/us	3V/us
Output Voltage Stability	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%
THD	Better than 0.3%* (typical 0.1%)	Better than 0.3%* (typical 0.1%)	Better than 0.3%* (typical 0.1%)
Recovery Time of Output Waveform	Better than 50us	Better than 50us	Better than 50us
Max Compensated drop on wires (w.r.t voltage setting)	5%	5%	5%
Recovery Time of Drop on Wires	Less than 200ms	Less than 200ms	Less than 200ms
Maximum Crest Factor Output at Full Load (Current)	2.82	2.82	2.82
Maximum Crest Factor	Maximum Inrush Current*1.41/Load Current	Maximum Inrush Current*1.41/Load Current	Maximum Inrush Current*1.41/Load Current
General			
Dimensions	281mm x 471mm x 513mm	1670mm x 920mm x 625mm	1670mm x 920mm x 625mm
Weight	45kg	730kg	740kg
Input Voltage	400V AC +/- 10% 3PH + N	400V AC +/- 10% 3PH + N	400V AC +/- 10% 3PH + N
Input Frequency	45-65Hz	45-65Hz	45-65Hz
Operating Temperature	0-35degC	0-35degC	0-35degC
Input Current	16Arms per Phase / 27A Neutral	80Arms per Phase	80Arms per Phase
Efficiency	Better than 80%	Better than 80%	Better than 80%

*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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