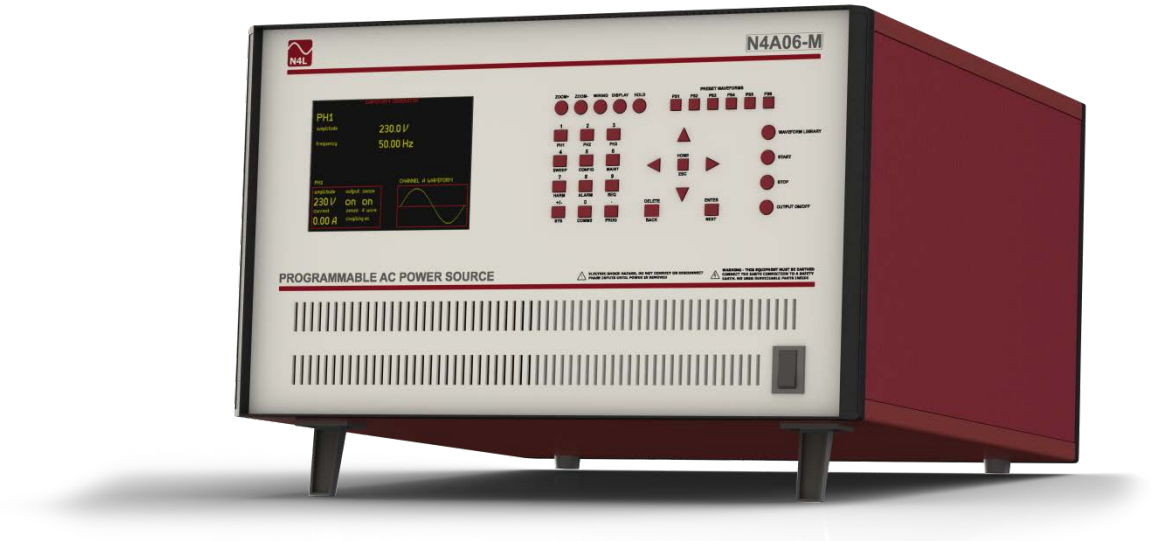
Newtons4th Ltd

N4Axx Series

Programmable
AC Power Sources.

USER MANUAL



Version 1.01

04th August 2015

DANGER OF ELECTRIC SHOCK

Only qualified personnel should install this equipment, after reading and understanding this user manual. If in doubt, consult your supplier.

RISQUE D'ELECTROCUTION

L'installation de cet équipement ne doit être confiée qu'à un personnel qualifié ayant lu et compris le présent manuel d'utilisation. Dans le doute, s'adresser au fournisseur.

GEFAHR VON ELEKTRISCHEM SCHOCK

Nur entsprechend ausgebildetes Personal ist berechtigt, diese Ausrüstung nach dem Lesen und Verständnis dieses Anwendungshandbuches zu installieren. Falls Sie Zweifel haben sollten, wenden Sie sich bitte an Ihren Lieferanten.

RISCHIO DI SCARICHE ELETTRICHE

Solo personale qualificato può installare questo strumento, dopo la lettura e la comprensione di questo manuale. Se esistono dubbiconsultate il vostro rivenditore.

PELIGRO DE DESCARGA ELÉCTRICA

Solo personal cualificado debe instalar este instrumento, después de la lectura y comprensión de este manual de usuario. En caso de duda, consultar con su suministrador.

IMPORTANT SAFETY INSTRUCTIONS

This product can generate lethal voltages. Observe all safety instructions.

This equipment is designed to comply with BSEN 61010-1 (Safety requirements for electrical equipment for measurement, control, and laboratory use) – observe the following precautions:

- The 3-phase inputs need to be wired into the connector on the rear of the unit. Use caution and ensure that the 3-phase supply is not live when connecting or disconnecting from the unit.

- For mains powered instruments ensure that the supply voltage agrees with the rating of the instrument printed on the back panel ***before*** connecting the mains cord to the supply.

- This appliance ***must*** be earthed. Ensure that the instrument is powered from a properly grounded supply.

- **The two main output terminals are NOT grounded and should not be grounded under any circumstance.**

- **The maximum output from the unit is 300V AC. Switch off the amplifier and ensure that the output current has fallen to zero before connecting or disconnecting anything to / from the outputs of the unit.**

- Keep the ventilation holes on the front and rear free from obstruction.

- Do not operate or store under conditions where condensation may occur or where conducting debris may enter the case.

- There are no user serviceable parts inside the instrument – do not attempt to open the instrument, refer service to the manufacturer or his appointed agent.

Note: Newtons4th Ltd. shall not be liable for any consequential damages, losses, costs or expenses arising from the use or misuse of this product however caused.

DECLARATION OF CONFORMITY

Manufacturer: Newtons4th Ltd.
Address: 1 Bede Island Road.
Leicester.
Leicestershire.
LE2 7EA.

We declare that the product:

Description: Programmable AC Power Source
Product name: N4A
Model: N4Axx Family

Conforms to the requirements of Council Directives:

2004/108/EC relating to electromagnetic compatibility:
EN 61326:2006

2006/95/EC relating to safety of laboratory equipment:
EN 61010-1:2010

August 2015

Eur Ing Allan Winsor BSc CEng MIEE
(Director Newtons4th Ltd.)

WARRANTY

This product is guaranteed to be free from defects in materials and workmanship for a period of 12 months from the date of purchase.

In the unlikely event of any problem within this guarantee period, first contact Newtons4th Ltd. or your local representative, to give a description of the problem. Please have as much relevant information to hand as possible – particularly the serial number and release numbers (press SYSTEM then LEFT).

If the problem cannot be resolved directly then you will be given an RMA number and asked to return the unit. The unit will be repaired or replaced at the sole discretion of Newtons4th Ltd.

This guarantee is limited to the cost of the instrument itself and does not extend to any consequential damage or losses whatsoever including, but not limited to, any loss of earnings arising from a failure of the product or software.

In the event of any problem with the instrument outside of the guarantee period, Newtons4th Ltd. offers a full repair and re-calibration service – contact your local representative. It is recommended that the instrument is re-calibrated annually. Users can perform re-calibration of the N4A if they have access to a N4L Precision Power Analyzer. Alternatively, the instrument can be returned to us for re-calibration.

ABOUT THIS MANUAL

This manual describes the general features, usage and specifications of the N4A range of Programmable AC power sources.

The N4A Power Source Range is:

N4A03 -240V ac mains input, 6KVA Single Phase Output
N4A06 -Three phase input, 6KVA Single Phase Output
N4A18 -Three phase input, 18KVA Three Phase Output
N4A30 -Three phase input, 30KVA Three Phase Output
N4A67 -Three phase input, 67KVA Three Phase Output

Firmware version v1_10 was used for the preparation of this User Manual.

Document Version 1.01

CONTENTS

APPENDICES

1 Introduction – general principles of operation

The N4A range of self contained Programmable AC power sources has a number of modes and functions that share common resources such as the keyboard and display.

The instruments are normally supplied with 3-phase inputs with a choice of models that have single phase or 3-phase outputs. There is also a single phase “mains” input, single phase output version.

On single phase units, output and sense are accessed via four 4mm safety terminal. 3-phase units are provided with screw terminals.

The frequency range of the generator is from 1Hz to 10KHz. The output voltage range is 0V to 300Vrms at a frequency up to 1KHz. Above 1KHz the maximum voltage available reduces with the increase in frequency.

The output waveform type is also selectable and can be set to Sinewave, Squarewave and Triangular waveform.

Software commands are available to control the generator output from a PC using N4L software programs such as CommView2, N4ASoft and IECSoft.

Harmonic, Sequence and Sweep modes are also available. The settings for these modes are user selectable.

Accordingly, this manual first describes the general features and specification of the instrument as a whole; and then describes the individual functions in detail.

Each function is described in turn, in its own chapter, with details of the principles on which it is based, how to use it, the options available, display options, specifications etc.

2 Getting started

The N4A is supplied calibrated and requires no further action by the user before operating the unit.

2.1 Unpacking

Inside the carton there should be the following items:

Single Phase Units:

one N4A unit
one 6” BNC to BNC cable
one null modem cable
one USB cable
one User / Communications manual.

3-Phase Units:

one N4A 3-phase unit
one null modem cable
one USB cable
one User / Communications manual.

Having verified that the entire above list of contents is present, it is recommended to verify that your N4A has not been damaged in transit and operates correctly.

2.2 Connecting the Input supply to the N4A unit.

With the exception of the mains powered N4A03, the unit requires a 3-phase supply of either 400VAC±10%, 480VAC±10% or 200VAC±10%.

Power is supplied to the N4A03 and N4A06 units through the black input connector on the rear of the unit. All units with 3-phase outputs are powered via screw terminals located on the rear.

A flat head screwdriver or similar tool must be inserted into the two tabs at the bottom of the black input connector lid to gain access. The small ‘bridge’ piece can then be removed to allow the supply cable to be inserted.

CAUTION: Ensure the supply cable is removed from its socket at the inlet end and can be seen to avoid the possibility of an electric shock.

The connector should be wired as:

1. Live 1
2. Live 2
3. Live 3
4. Neutral
5. Neutral
6. Safety Earth

Once these wires have been securely fastened replace the bridge piece and close the lid.

2.3 N4A Power Up sequence.

Ensure the rocker switch on the front of the unit is set to position 0. Switch on the 3-Phase input to the N4A by setting the rotary “Power” switch on the rear of the unit to position 1.

Power to the instrument is now controlled by the rocker switch on the front panel. Switch on the N4A.

The instrument display should illuminate for a few seconds displaying the model name and the firmware version whilst it performs some initial tests. The display will then default to the output summary screen and after a few seconds amplifier status data will start being received and displayed on the display.

Note that the switch on message can be personalised – see the User Data section under System Options.

The N4Axx-M contains a 3-phase waveform generator unit. Outputs of the generator are located at the back of the instrument and are labelled “Generator Output – PH1, PH2, PH3”. The reference input to the power amplifier is located below the outputs and is labelled “PH1 IN”. The 6 inch BNC cable must be connected between the PH1 output and PH1 input for any signal to be present at the main amplifier output.

The generator is off by default so the display may read some random values due to noise pick up.

2.4 Amplifier Output.

It should be noted that the two main output terminals on the amplifier are NOT grounded and should not be grounded under any circumstances.

Although the output terminals are not the conventional high and low, for clarity the left hand (BLACK) terminal can be considered as the positive and the right hand (BLUE) as the negative terminal.

In the event of any problem with this procedure, please contact customer services at Newtons4th Ltd. or your local authorised representative: contact addresses and telephone numbers are given in the appendix at the back of this manual.

3 Using the menus

The N4A is a very versatile instrument with many configurable parameters. These parameters are accessed from the front panel via a number of menus.

Each of the main menus may be accessed directly from a specific key.

PH1	PH1 generator output settings
PH2	See PH1, Available on 3-phase versions only.
PH3	See PH1, Available on 3-phase versions only.
SWEEP	This option is not presently available
CONFIG	Sense, coupling and amplitude / frequency adjustment settings
MAINT	Time since last maintenance of each phase
HARM	Harmonic mode
ALARM	This option is not presently available
SEQ	Sequence mode
SYS	General system options such as Language, display brightness and keyboard beep etc.
COMMS	Communications options (USB / LAN / Serial)
PROG	Recall / store and delete non-volatile programs.

Each menu starts with the currently set parameters visible but no cursor. In this condition, pressing the menu key again or the HOME key aborts the menu operation and reverts back to normal operation.

To scroll through parameters, press the UP or DOWN key to move the cursor through the menu. Pressing ENTER or using the numerical keypad allows the user to edit the parameter highlighted by the cursor. In this condition the keys take on their secondary function such as numbers 0-9, multipliers n-G etc.

Pressing the HOME key once removes the cursor from the display. Pressing the HOME key a second time exits the current menu and reverts back to the summary display.

Parameters can also be altered from the main summary display screen. To change a parameter, first press the HOME key to bring up the cursor. Scroll through parameters by using the UP and DOWN arrow keys and edit by pressing ENTER or a numerical key. Remove the cursor with the HOME key, at this point a voltage or frequency step can be performed by using the arrow keys. The UP and DOWN arrow keys step the output voltage up or down by the multiplier parameter displayed. Frequency can also be stepped up or down by using the LEFT and RIGHT arrow keys.

To abort the menu sequence, press the HOME key twice.

There are three types of data entry:

- selection from a list
- numeric
- text

3.1 Numeric data entry

Frequency and Voltage parameters are entered as real numbers.

Real numbers are entered using the number keys, decimal point key, or +/- key (if signed value is permitted). When the character string has been entered, pressing the ENTER key sets the parameter to the new value. Until the ENTER key is pressed, pressing the HOME key aborts the data entry and restores the original number.

If a data value is entered that is beyond the valid limits for that parameter then a warning is issued and the parameter set as close to the requested value as possible. For example, the maximum frequency of the N4A source is 10 KHz; if a value of 15 KHz is entered, a warning will be given and the frequency set to the maximum of 10 KHz.

When the parameter is first selected there is no character cursor visible – in this condition, a new number may be entered directly and will overwrite the existing number.

To edit a data value rather than overwrite it, press the RIGHT ARROW key and a cursor will appear. The cursor can be moved using the LEFT ARROW and RIGHT ARROW keys. New characters are inserted at the cursor position as the keys are pressed, or the character before the cursor position can be deleted with the DELETE key.

Data values are always shown in engineering notation to at least 5 digits (1.0000-999.99 and a multiplier).

3.2 Text entry

There are occasions where it is useful to enter a text string; for example, a non-volatile program may have some text as a title.

Text is entered by selecting one of 9 starting characters using the Operating mode keys / Numeric keypad, then stepping forwards or backwards through the alphabet with the UP and DOWN keys.

Keys 2 to 9 and +/- provide starting letters A,D,G,J,M,P,T,W and space.

Numbers can also be inserted using the number keys.

The UP and DOWN keys step forward and backward using the ASCII character definitions – other printable characters such as # or ! can be obtained by stepping on from the space. The available character set is given in the Appendix.

When entering alphabetic characters, the PROG/. key selects upper and lower case respectively for the character preceding the cursor and the next characters to be entered.

The editing keys, RIGHT, LEFT, DELETE and ENTER operate in the same way as for numeric entry.

4 Using remote control

The N4A is fitted with RS232, USB serial and LAN communication ports as standard. All the interfaces use the same ASCII protocol.

	Rx expects	Tx sends
RS232 USB	carriage return (line feed ignored)	carriage return and line feed
LAN	carriage return (line feed ignored)	carriage return and line feed

All the functions of the N4A can be programmed via either interface, and results read back.

The commands are not case sensitive and white space characters are ignored (e.g. tabs and spaces). Replies from the N4A are always upper case, delimited by commas, without spaces.

Only the first six characters of any command are important – any further characters will be ignored. For example, the command to set the generator frequency is FREQUE but the full word FREQUENCY may be sent as the redundant NCY at the end will be ignored.

Fields within a command are delimited by comma, multiple commands can be sent on one line delimited with a semi-colon e.g.

AMPLIFIER,SENSE,WIRE2

Mandatory commands specified in the IEEE488.2 protocol have been implemented, (e.g. *IDN? *RST) and all commands that expect a reply are terminated with a question mark.

The N4A maintains an error status byte consistent with the requirements of the IEEE488.2 protocol (called the standard event status register) that can be read by the mandatory command *ESR? (See section 4.1).

The N4A also maintains a status byte consistent with the requirements of the IEEE488.2 protocol, that can be read either with the IEEE488 serial poll function or by the mandatory command *STB? Over RS232 or IEEE or LAN (see section 5.2).

The IEEE address defaults to 23 and can be changed via the COMMS menu.

The keyboard is disabled when the instrument is set to “remote” using the IEEE. Press HOME to return to “local”.

RS232 data format is: start bit, 8 data bits (no parity), 1 stop bit. Flow control is RTS/CTS (see section 5.2); baud rate is selectable via the COMMS menu. When connecting to a PC use the supplied null modem cable.

A summary of the available commands is given in the Appendix. Details of each command are given in the communication command manual.

Commands are executed in sequence except for two special characters that are immediately obeyed:

Control T (20) – reset interface (device clear)

Control U (21) – warm restart

To maintain compatibility with some communication systems, there is an optional “protocol 2” which requires a space between the command and any arguments.

4.1 Standard event status register

PON		CME	EXE	DDE	QYE		OPC

bit 0 OPC (operation complete)
cleared by most commands
set when data available or sweep complete
bit 2 QYE (unterminated query error)
set if no message ready when data read
bit 3 DDE (device dependent error)
set when the instrument has an error
bit 4 EXE (execution error)
set when the command cannot be executed
bit 5 CME (command interpretation error)
set when a command has not been recognised
bit 7 PON (power on event)
set when power first applied or unit has reset

The bits in the standard event status register except for OPC are set by the relevant event and cleared by specific command (*ESR? *CLS, *RST). OPC is also cleared by most commands that change any part of the configuration of the instrument (such as MODE or START).

4.2 Serial Poll status byte

		ESB	MAV		FDV	SDV	RDV

bit 0 RDV (result data available)
set when results are available to be read as enabled by

DAVER

bit 1 SDV (sweep data available)
set when sweep results are available to be read as enabled by DAVER

bit 2 FDV (fast data available (streaming))
set when data streaming results are available to be read as enabled by DAVER

bit 4 MAV (message available)
set when a message reply is waiting to be read

bit 5 ESB (standard event summary bit)
set if any bit in the standard event status register is set as well as the corresponding bit in the standard event status enable register (set by *ESE).

4.3 RS232 connections

The RS232 port on the N4A uses the same pinout as a standard 9 pin serial port on a PC or laptop (9-pin male ‘D’ type).

Pin	Function	Direction
1	DCD	in (+ weak pull up)
2	RX data	in
3	TX data	out
4	DTR	out
5	GND	
6	DSR	not used
7	RTS	out
8	CTS	in
9	RI	not used

The N4A will only transmit when CTS (pin 8) is asserted, and can only receive if DCD (pin 1) is asserted. The N4A constantly asserts (+12V) DTR (pin 4) so this pin can be connected to any unwanted modem control inputs to force operation without handshaking. The N4A has a weak pull up on pin 1 as many null modem cables leave it open circuit. In electrically noisy environments, this pin should be driven or connected to pin 4.

To connect the N4A to a PC, use a 9 pin female to 9 pin female null modem cable:

1 & 6	-	4
2	-	3
3	-	2
4	-	1 & 6
5	-	5
7	-	8
8	-	7

5 Keyboard Functions

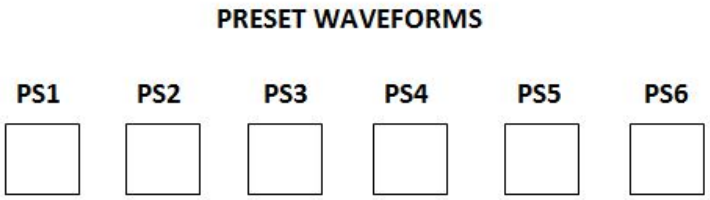
The keyboard is divided into 5 blocks of keys:

Preset Waveforms keys (6 keys top right)
Menu control keys (7 centre keys)
Display Control keys (5 keys top left)
Operating mode / Numerical keypad (12 keys lower left)
Control keys (4 keys lower right)

In normal operation, the cursor keys give one-touch adjustment of the frequency and voltage parameters without having to access the menu system. The left / right cursor keys adjust the frequency whilst the up / down cursor keys adjust the voltage levels.

The Operating mode keys provide access to the menus and are used for numeric data entry.

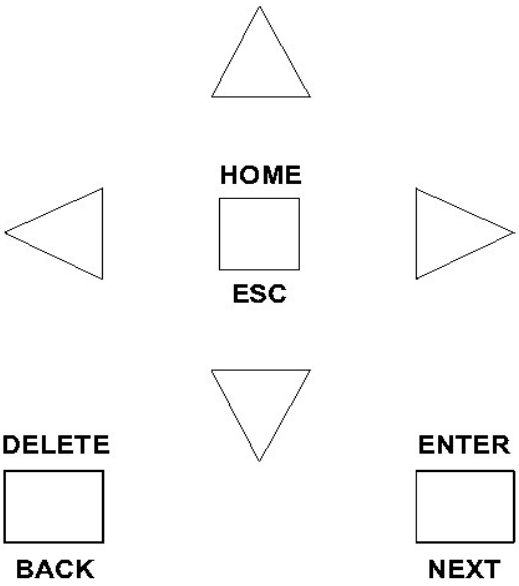
5.1 Preset Waveform Keys



It will be possible to save customised waveforms that can be recalled by selecting one of these options. The user will be able to set the amplitude, frequency, number of half cycles and harmonic content of the stored waveforms.

These keys are currently non operational. This function will be added at a later date.

5.2 Menu Control Keys



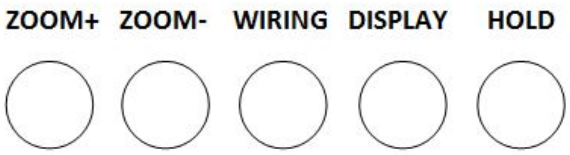
ENTER / NEXT confirms your selection or parameter value/data entry.

HOME / ESC returns to the original entry or to your previous action.

DELETE / BACK removes a previous selection or value, or returns to your previous action.

ARROW KEYS (Up, Down, L, R) to move around menu options, make incremental/decremental changes etc.

5.3 Display Control Keys



Zoom+ and Zoom-

These keys are currently non operational.

Wiring

1-phase is displayed on a single phase instrument.

On a 3-phase instrument 1-phase or 3-phase options will be available.

Display:

This will allow the user to display the output on all 3-phases at once for a 3-phase instrument. This button is not used on single phase instruments.

This key is currently non operational. This function will be added at a later date.

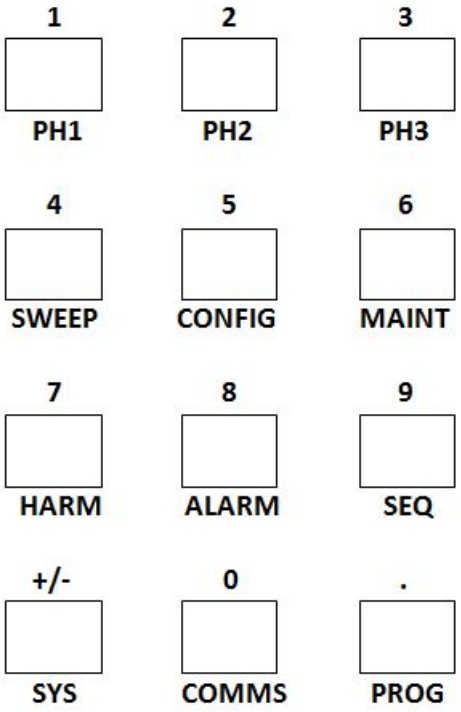
Hold:

This allows the user to toggle between continuous display readings and holding an instantaneous reading on screen.

No HOLD message is displayed but the screen and remaining keys will remain locked until the “HOLD” button is pressed again.

Note: measurements will continue to be taken even when display is in Hold.

5.4 Operating Mode Keys / Numeric Keypad



NUMERIC ENTRY

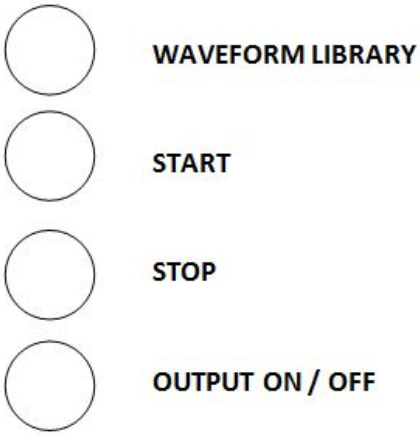
Use ***ENTRY KEYS for*** number, multiplier, decimal point, or +/– to enter parameter value.

Press ENTER (***MENU CONTROL KEYS)*** to set value.

Press HOME (***MENU CONTROL KEYS)*** to abort data entry, restore original.

(Values may be overwritten, or edited by use of the R, L and DELETE keys)

5.5 Control Keys



Waveform Library:

This key displays the different waveforms that are available. One of the options can be selected using the < > keys to highlight the required waveform. Press enter to select this waveform.

This key is currently non operational. This function will be added at a later date.

Start:

Press this key to start the sequence.

Stop:

Press this key to stop the sequence.

Output on / off:

To turn on the generator output press and hold this button until the output switches on. Press and release this key to switch off the generator output.

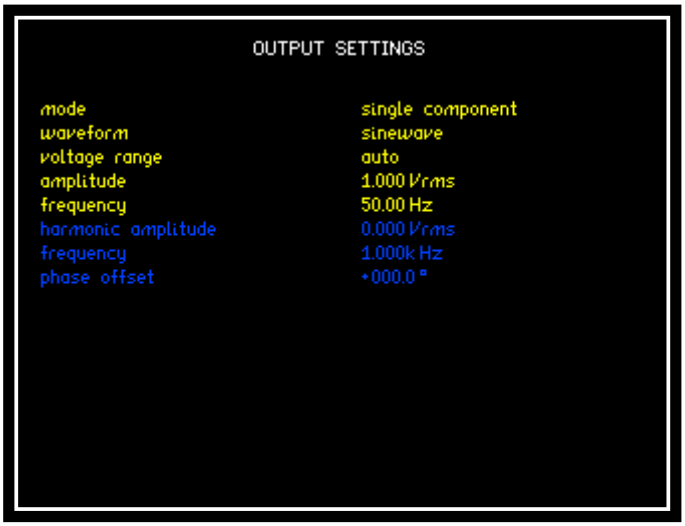
6 Operating Mode Keys.

Generator Settings

The N4A-M is a self contained single phase AC power source. This section describes the setting of the generator for basic operation controlling the single phase output.

To enter the output settings menu press the *PH1* key.

6.1 PH1



Voltage setting

The N4A will by default output a sinusoidal voltage. To change the RMS value of this voltage, select *PH1* using the arrow keys, enter the desired value with the keypad and then press enter. Values between 0 and 300Vrms can be entered.

Frequency setting

The frequency setting is accessed in the same way as voltage, through the PH1 menu. Values between 1Hz and 10 KHz can be entered.

Waveform setting

Waveforms currently available are sine, triangle and square. These are also accessed through the “PH1” menu.

6.2 PH2

See PH1 description in section 6.1. Only available on 3-phase instruments.

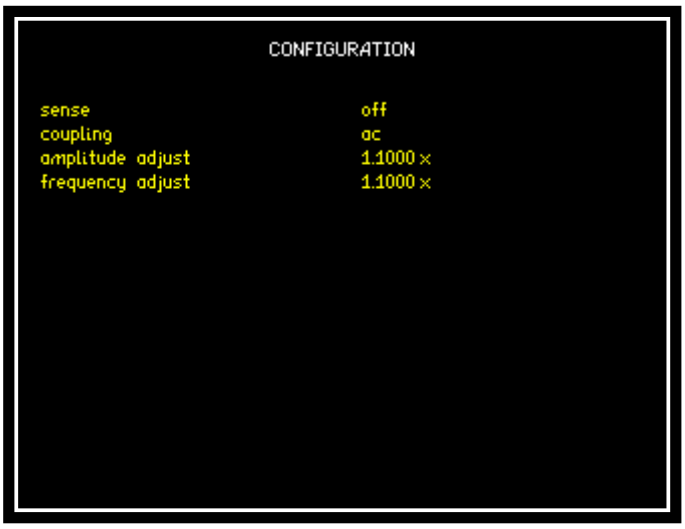
6.3 PH3

See PH1 description in section 6.1. Only available on 3-phase instruments.

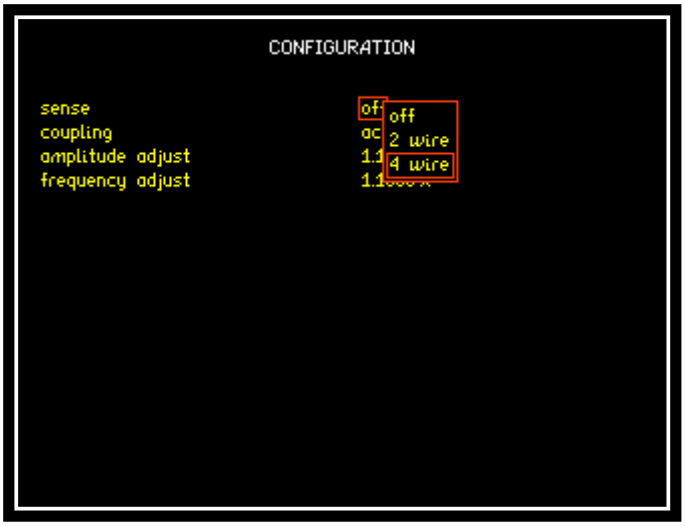
6.4 Sweep

This key is currently non operational. This function will be added at a later date.

6.5 Configuration settings (CONFIG)



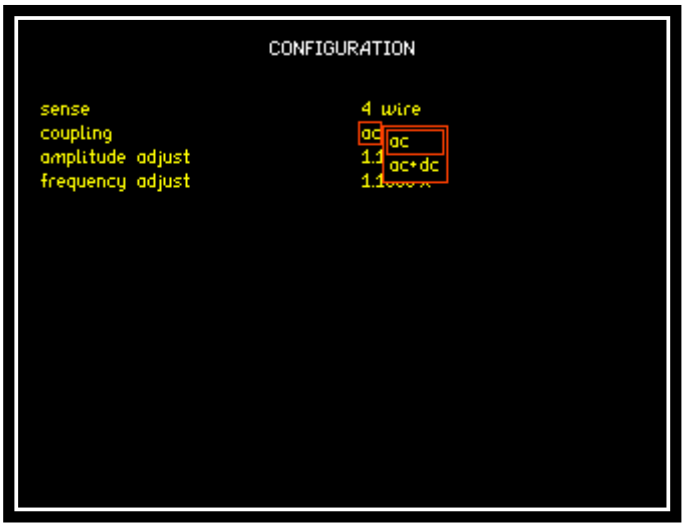
Sense terminals



During flicker tests it is recommended that the sense terminals of the amplifier be used to compensate for any loss in the cabling between the source and impedance network.

To achieve this, 4mm safety cables should be connected from the sense terminals to the impedance network voltage input. Sense can then be activated by using the CONFIG menu, setting *sense* to *4-wire*. There is also the option to select 2-wire sense in the menu. Either of the sense options is switched off by selecting off in the CONFIG menu.

AC and DC coupling



The output coupling can also be set in the CONFIG menu to AC or AC+DC.

Note: this coupling is performed on the signal after the *PH1 IN* BNC terminal, meaning any DC offset monitored at *Generator Out PH1* will not be present at the output terminals with AC coupling only.

Amplitude adjust

Manually enter a value by which the amplitude will increase / decrease in relation to pressing the up and down arrows.

Frequency adjust

Manually enter a value by which the frequency will increase / decrease in relation to pressing the left and right arrows.

6.6 Maintenance Information (Maint)

This option will display the time since the last service. For 3-phase instruments the time for each phase will be displayed.

6.7 Harmonic mode (HARM)

The Harmonic settings menu can be accessed through the HARM key.

Use the Up or Down arrow keys to highlight “press ENTER here to turn on”.

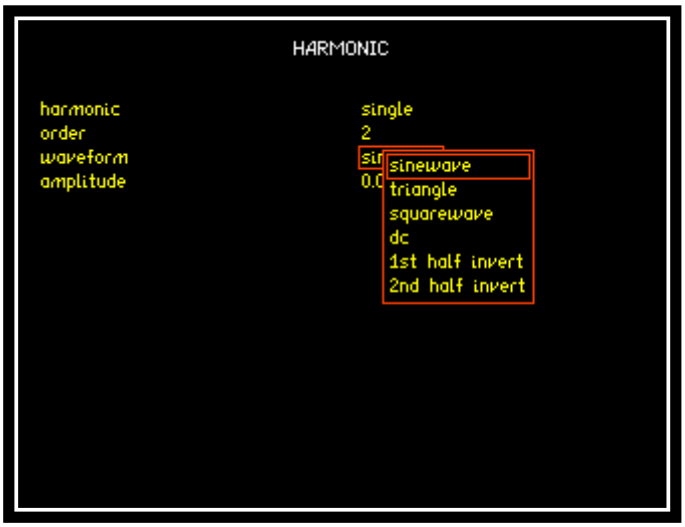
Press the Enter/Next key to activate Harmonics mode and display the Harmonics options menu.

The harmonics menu then allows harmonic order, waveform type and harmonic amplitude to be set.

Harmonic order can be set between 1 and 100.

The waveform type can be selected from the list of options in the screen shot below.

Harmonic Amplitude can be set between 0.000Vrms and 300.0V rms.

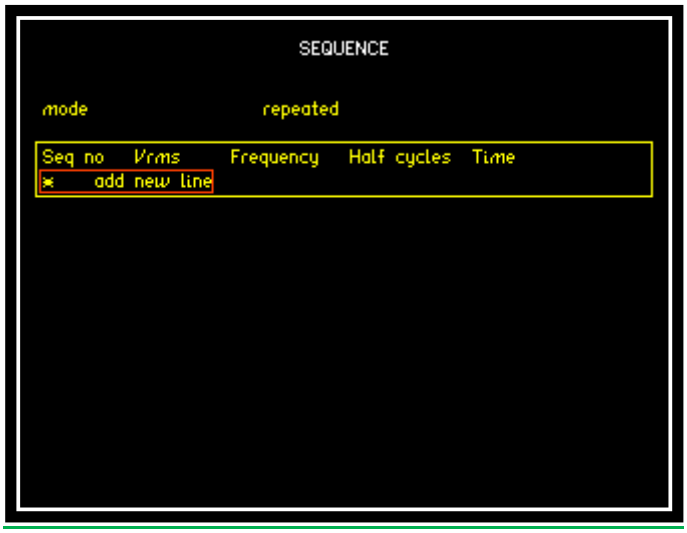


When harmonic tests have been completed, press the *PH1* key and change the *mode option* back to Single component to turn harmonics off.

6.8 Alarm

This key is currently non operational. This function will be added at a later date.

6.9 Sequencing mode (SEQ)



Sequence mode enables the user to generate a table of output voltage and frequency values and to specify the time each entry is output for. This table of entries can be executed once or cycled through continuously. Each menu item is explained below and a simple example given to clarify operation.

- *Mode:* Set the sequence to run through once (single shot) or run continuously (Repeated) until the stop button is pressed.

- *Seq no:* Set the number of table entries to be executed. Selectable from 2 – 50.

- *Vrms:* Set the amplitude for the specified sequence number in the table. Selectable from 0.00Vrms to 300.00Vrms.

- *Frequency:* Set the frequency for the specified step number in the table. Selectable from 1.0Hz to 10.000KHz.

- *Half cycles:* Select the required number of half cycles. Selectable from 1 to 999.

- *Time:* The value displayed here is calculated using the selected frequency and number of half cycles.

  For example, at 50Hz the time period of each half cycle is 10mS. So if a time period of 30mS is required at a frequency of 50Hz then 3 half cycles would need to be selected.

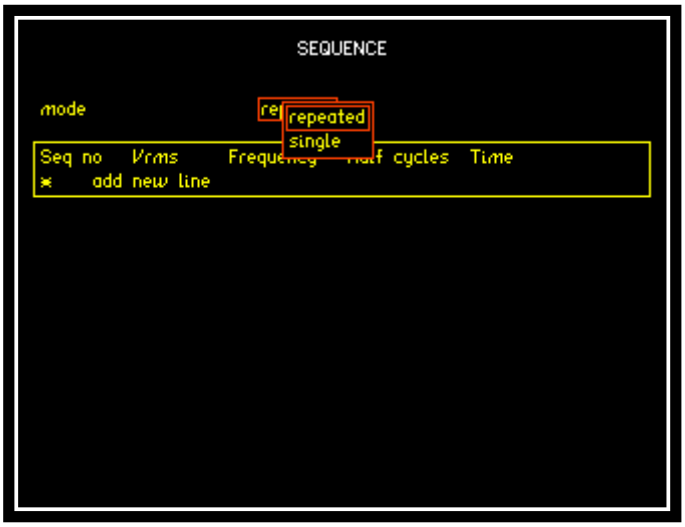
- *Add new Entry:* This is the method used to enter the individual values for each parameter into the sequence. The up and down arrow keys are used to move the cursor between each of the parameters. The numeric keypad is used to enter the value for each of the parameters.

Once each line of the sequence is complete it can be saved by moving the curser to “Save” and pressing the Enter key. My selecting “Add new entry” again another line in the sequence can be added. It is also possible to insert a new line in the middle of the sequence and to delete lines within the sequence.

Simple example of a sequence

This example will run through the process of creating a simple 4 step voltage repeating sequence:

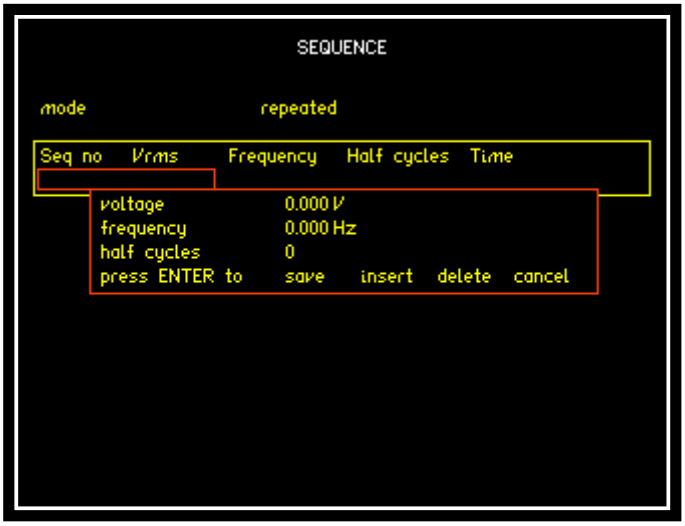
Enter the sequence menu by pressing the SEQ key.



Use the up and down arrow keys to highlight the mode options and then use the right arrow keys to list the options. Use the up and down arrow to highlight “Repeated” and then press the enter key to save the selection.

Use the up or down arrow keys to highlight “Add new line”

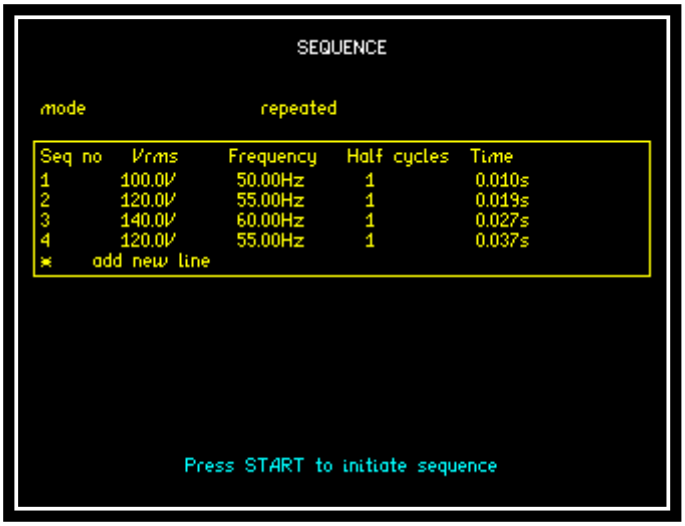
Press the Enter key.



The voltage setting will be highlighted by the cursor.
Enter the required voltage using the numeric keypad and press the Enter key.
Use the down arrow key to move the cursor to highlight the frequency setting, enter the required frequency value and press the enter key.
Use the down arrow key to move the cursor to highlight the Half Cycles value, enter the required number of half cycles and press the enter key.
Use the down arrow key to move the cursor above the time setting. Enter the required time duration and press the enter key.
Use the up and down arrow keys to position the cursor to highlight “Save” and press the Enter key.

The first line of the sequence should now be complete as shown in the following screenshot.

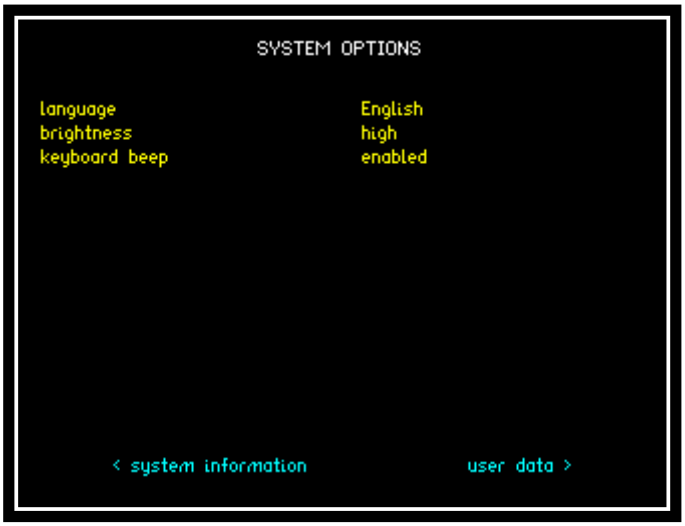
Use the above procedure to enter the next three lines in the sequence. The completed sequence will then look like this:



To run the sequence:

Press the HOME button twice and then hold down OUTPUT until the amplifier turns on.
Press the SEQ key to go back to the sequence menu.
Press the START key to start the sequence.
Press the STOP key to complete the sequence.

6.10 System Options (SYS)



Language: This option will allow a choice of languages. At present English is the only option.

Brightness: There is a choice of screen brightness – “high” suits most typical environments but “low” may cause less eye strain in low light conditions.

Keypad Beep: Each key press is normally accompanied by an audible ‘beep’ as well as the tactile ‘click’. The ‘beep’ can be disabled for quiet environments if the feel of the key is sufficient feedback.

User Data

The N4A can be personalised by entering up to 3 lines of user data as text (see section on text entry).

User data is displayed every time that the instrument is switched on to identify the instrument. The entered text may also be read over the communications to identify the instrument (see USER?).

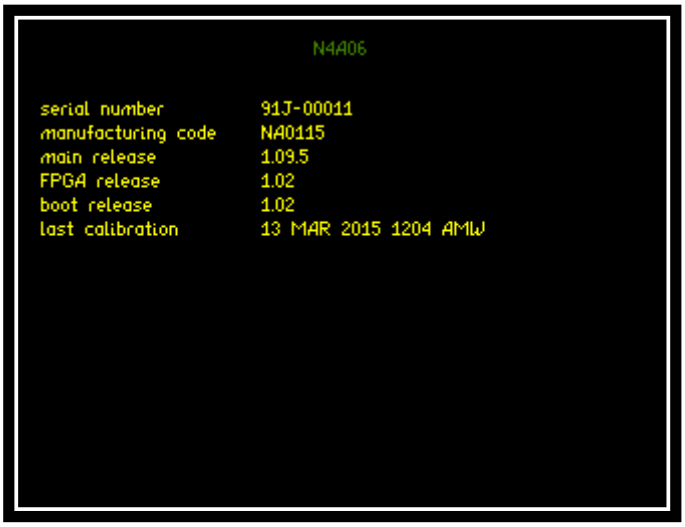
Typical arrangement of the user data might be:

line 1 company name
line 2 department or individual name
line 3 unique identifying number (eg. asset number)

Any user data may be entered as required, as the lines are treated purely as text and are not interpreted by the N4A at all.

System Information

Pressing the SYSTEM key displays information about the instrument, it cannot be changed by the user.



Serial Number:	Instruments unique serial number.
Manufacturing Code:	Code attributed to build date of the instrument.
Main release:	Current firmware release installed in the instrument.
FPGA Release:	Field Programmable Gate Array release version.
Boot Release:	Release version of instruments boot up firmware.
Last Calibration:	Instruments last calibration date.

6.11 Communications (COMMS)

There are 3 Interface options available for communications between the instrument and a PC. These options are LAN, RS232 and USB.

Notes:

When RS232 is selected ensure that the Baud rate is correctly set to 19200.

When LAN is selected ensure that a valid I.P. address is displayed on the comms screen.

6.12 Program store / recall (PROG)

1. Press “PROG” button to open up program store / recall mode.
2. Select the action to be taken – store / recall or delete.
3. Select the location that the associated action is to be recalled from, stored to or deleted from, there are 999 locations available.

NOTE:

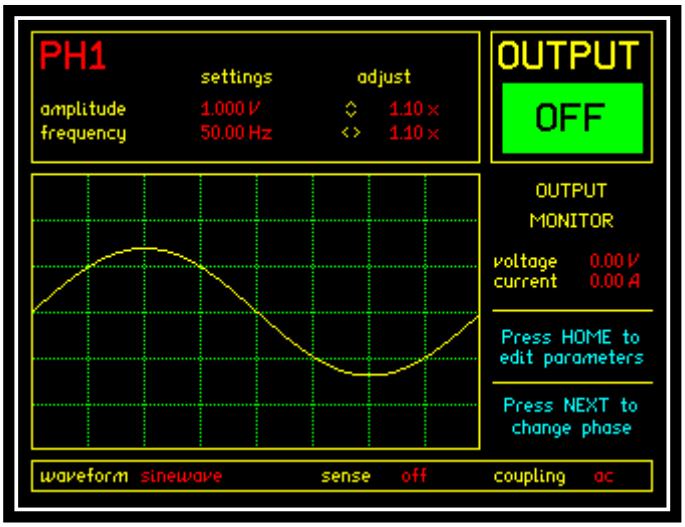
Location 0 = FACTORY DEFAULT and cannot be changed.
Location 1 = Programs stored within program location 1 are automatically recalled when the instrument is switched on.

4. Enter a name within this parameter to aid the user in relation to storing / recalling a program to / from memory for future reference. To enter a name, use the Alpha / Numerical keypad on the instruments front panel.

5. Upon implementing any of the above actions then remember to scroll down to “EXECUTE” and press “ENTER” to validate your selection / action.

7 Display Layout and Parameter adjustment.

The display default screen is as follows:



Direct Parameter Adjustment

The Amplitude and Frequency settings can be adjusted directly without having to enter the menus. The ADJUST settings can also be adjusted.

Press the HOME / ESC menu control key.

The amplitude setting will now be highlighted by the cursor.

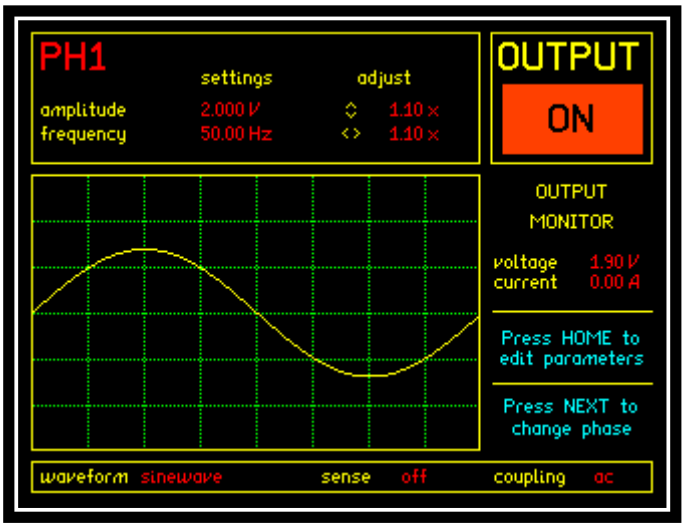
Use the Up and Down arrow keys to select the required parameter to be adjusted.

Use the numeric keypad to enter the new value and press the ENTER / NEXT key.

Repeat this process to adjust other parameters if required.

Press the HOME / ESCAPE key to exit the adjustment screen.

When the output of the generator is switched on the display changes to the following screen to warn the user that potentially lethal voltages are present on the terminals of the instrument:



The default summary display is divided into a number of sections.

- The top half of the screen displays the generator settings for the indicated phase. These settings can be altered by the user. The top right hand corner of the display indicates if the generator output is on or off.
  The main part of the display shows the current waveform loaded into the generator. Note: The waveform display is not an accurate representation of what is seen at the output, it is simply a quick reference. To the right of the waveform the voltage and current monitor values are displayed. User instructions are also displayed in blue text.

- Along the very bottom of the display can be found the waveform, sense and coupling settings.

8 Specifications

Nominal Output Power	
N4A03 (1-phase)	3000VA
N4A06 (1-phase)	6000VA
N4A18 (3-phase)	18000VA
N4A30 (3-phase)	30000VA
N4A67 (3-phase)	67500VA

Output

Output Voltage (AC)	
N4A03 (1-phase)	0-300Vrms
N4A06 (1-phase)	0-300Vrms
N4A18 (3-phase)	0-300Vrms
N4A30 (3-phase)	0-300Vrms
N4A67 (3-phase)	0-300Vrms

Output Voltage (DC)	
N4A03 (1-phase)	0-425V DC
N4A06 (1-phase)	0-425V DC
N4A18 (3-phase)	0-425V DC
N4A30 (3-phase)	0-425V DC
N4A67 (3-phase)	0-425V DC

Maximum Continuous Output Power (AC)	
N4A03 (1-phase)	3000VA
N4A06 (1-phase)	6000VA
N4A18 (3-phase)	18000VA
N4A30 (3-phase)	30000VA
N4A67 (3-phase)	67500VA

Maximum Inrush (3 Second) Output Power	
N4A03 (1-phase)	6000VA
N4A06 (1-phase)	12000VA
N4A18 (3-phase)	36000VA
N4A30 (3-phase)	60000VA
N4A67 (3-phase)	90000VA

Maximum Output Current (Continuous)	
N4A03 (1-phase)	10Arms
N4A06 (1-phase)	20Arms
N4A18 (3-phase)	20Arms (Per Phase)
N4A30 (3-phase)	32Arms (Per Phase)
N4A67 (3-phase)	75Arms (Per Phase)

Maximum Output Current (Inrush)	
N4A03 (1-phase)	20Arms
N4A06 (1-phase)	40Arms
N4A18 (3-phase)	40Arms (Per Phase)
N4A30 (3-phase)	64Arms (Per Phase)
N4A67 (3-phase)	100Arms (Per Phase)

Output Frequency	
N4A03 (1-phase)	DC - 1kHz
N4A06 (1-phase)	DC - 1kHz
N4A18 (3-phase)	DC - 1kHz
N4A30 (3-phase)	DC - 1kHz
N4A67 (3-phase)	DC - 1kHz

Min Slew Rate	
N4A03 (1-phase)	3V/us
N4A06 (1-phase)	3V/us
N4A18 (3-phase)	3V/us
N4A30 (3-phase)	3V/us
N4A67 (3-phase)	3V/us

Output Voltage Stability	
N4A03 (1-phase)	Better than 0.1%
N4A06 (1-phase)	Better than 0.1%
N4A18 (3-phase)	Better than 0.1%
N4A30 (3-phase)	Better than 0.1%
N4A67 (3-phase)	Better than 0.1%

Output Voltage Accuracy	
N4A03 (1-phase)	Better than 0.5%
N4A06 (1-phase)	Better than 0.5%
N4A18 (3-phase)	Better than 0.5%
N4A30 (3-phase)	Better than 0.5%
N4A67 (3-phase)	Better than 0.5%

THD	
N4A03 (1-phase)	Better than 0.3%*
N4A06 (1-phase)	Better than 0.3%*
N4A18 (3-phase)	Better than 0.3%*
N4A30 (3-phase)	Better than 0.3%*
N4A67 (3-phase)	Better than 0.3%*

Output Noise	
N4A03 (1-phase)	<500mVrms
N4A06 (1-phase)	<500mVrms
N4A18 (3-phase)	<500mVrms
N4A30 (3-phase)	<500mVrms
N4A67 (3-phase)	<500mVrms

Recovery Time of Output Waveform	
N4A03 (1-phase)	Better than 50us
N4A06 (1-phase)	Better than 50us
N4A18 (3-phase)	Better than 50us
N4A30 (3-phase)	Better than 50us
N4A67 (3-phase)	Better than 50us

Max Compensated drop on wires (w.r.t voltage setting)	
N4A03 (1-phase)	5%
N4A06 (1-phase)	5%
N4A18 (3-phase)	5%
N4A30 (3-phase)	5%
N4A67 (3-phase)	5%

Recovery Time of Drop on Wires	
N4A03 (1-phase)	Less than 200ms
N4A06 (1-phase)	Less than 200ms
N4A18 (3-phase)	Less than 200ms
N4A30 (3-phase)	Less than 200ms
N4A67 (3-phase)	Less than 200ms

Maximum Crest Factor Output (Current)	
N4A03 (1-phase)	[Inrush Imax*1.41]/RMS Load Current
N4A06 (1-phase)	[Inrush Imax*1.41]/RMS Load Current
N4A18 (3-phase)	[Inrush Imax*1.41]/RMS Load Current
N4A30 (3-phase)	[Inrush Imax*1.41]/RMS Load Current
N4A67 (3-phase)	[Inrush Imax*1.41]/RMS Load Current

General

Dimensions	
N4A03 (1-phase)	281mm x 471mm x 513mm
N4A06 (1-phase)	281mm x 471mm x 513mm
N4A18 (3-phase)	1785mm x 930mm x 755mm
N4A30 (3-phase)	1785mm x 930mm x 755mm
N4A67 (3-phase)	1800mm x 1200mm x 800mm

Weight	
N4A03 (1-phase)	30kg
N4A06 (1-phase)	45kg
N4A18 (3-phase)	740kg
N4A30 (3-phase)	740kg
N4A67 (3-phase)	1300kg

Input Voltage	
N4A03 (1-phase)	230V AC +/- 10% 3PH
N4A06 (1-phase)	400V AC +/- 10% 3PH
N4A18 (3-phase)	400V AC +/- 10% 3PH
N4A30 (3-phase)	400V AC +/- 10% 3PH
N4A67 (3-phase)	400V AC +/- 10% 3PH

Input Frequency	
N4A03 (1-phase)	45-65Hz
N4A06 (1-phase)	45-65Hz
N4A18 (3-phase)	45-65Hz
N4A30 (3-phase)	45-65Hz
N4A67 (3-phase)	45-65Hz

Operating Temperature	
N4A03 (1-phase)	0-35degC
N4A06 (1-phase)	0-35degC
N4A18 (3-phase)	0-35degC
N4A30 (3-phase)	0-35degC
N4A67 (3-phase)	0-35degC

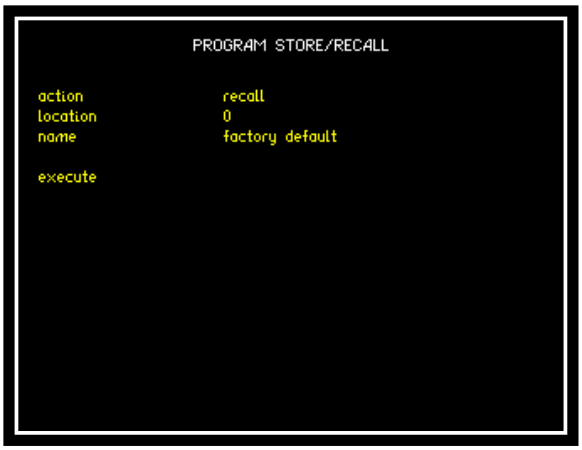
Input Current	
N4A03 (1-phase)	24Arms
N4A06 (1-phase)	16Arms Phase / 27A Neutral
N4A18 (3-phase)	60A continuous 120A inrush / Phase
N4A30 (3-phase)	80A continuous 160A inrush / Phase
N4A67 (3-phase)	160A continuous 220A inrush / Phase

Efficiency	
N4A03 (1-phase)	Better than 80%
N4A06 (1-phase)	Better than 80%
N4A18 (3-phase)	Better than 80%
N4A30 (3-phase)	Better than 80%
N4A67 (3-phase)	Better than 80%

*At Nominal Voltage with Linear Load

9 Resetting the N4A to factory default mode.

This will clear any user defined programs that might be stored in the N4A and recalled when the instrument is switched on.



To access Program Store / Recall mode:

Press “PROG” button

Press ▼ Key until

Red Box surrounds the number adjacent to “Location”

Enter “0”

Press ▼ Key until

Red Box surrounds “Execute”

Press “ENTER” - This will now reset the instrument to factory default mode.

The default settings are:

Amplitude:	1V
Frequency:	50Hz
Output:	Off
Sense:	Off

Firmware Programming.

N4L CommView2 software is used to program the N4A with updated firmware. LAN, Serial and USB interfaces can be used.

10 Repair / Recalibration & Servicing

Servicing

This instrument requires servicing after the following periods:

20,000 hours – Ventilator replacement
40,000 hours – DC bus capacitor replacement

Repair / Recalibration

In the event of any problem with the instrument, during or outside of the guarantee period, contact your local representative

Newtons4th Ltd offer a full repair and re-calibration service

It is recommended that the instrument be re-calibrated annually. This can be performed by the user if they have access to a N4L Precision Power Analyzer.

Contact details:

Newtons4th Ltd
1 Bede Island Road
Leicester
Leicestershire
LE2 7EA
United Kingdom

Tel: (0116) 230 1066 International: +44 116 230 1066
Fax: (0116) 230 1061 International: +44 116 230 1061

E-mail address: sales@newtons4th.com
office@newtons4th.com

Web site: www.newtons4th.com

We have a policy of continuous product improvement and are always keen to hear comments, whether favourable or unfavourable from users of our products. Please telephone, fax, write or e-mail with your comments.

Appendix A – Accessories

Supplied Standard Accessories

Single Phase Units:

one N4A unit
one 6” BNC to BNC cable
one null modem cable
one USB cable
one communications manual

3-Phase Units:

one N4A unit
one null modem cable
one USB cable
one communications manual

Documentation:

Calibration Certificate
Combined User Manual & Communications manual

Appendix B – CommView2 PC Software

CommView2 is a self contained software program for a PC, which facilitates communication over RS232, USB or LAN.

CommView2 allows strings to be sent and received between a PC and the N4A. The strings can be viewed in a window and optionally stored in a file. Data received from the N4A may be displayed in normal scientific notation with an identifying label.

Strings to be sent to the N4A can be stored in a “script file” and executed automatically. The script file is created with any text editor and includes three types of lines (interpreted by the first character on each line):

lines beginning with " are sent to the N4A
lines beginning with # are commands for CommView2
any other line is a comment.

The # commands that are recognised:

#beep	*sound the beeper on the PC*
#label,i,string	*apply a label to data value[i]*
#pause,t	*wait for time t*
#reply,t	*wait time t for a reply*

For an example script file, look at example.scr on the CommView2 release disc.

Other functions in CommView2:

save results	*results menu*
set COM port parameters	*configure menu*
firmware upgrade	*instrument menu*
read/store user programs	*instrument menu*

Appendix C – N4ASoft PC Software

The N4A source can be controlled remotely from a PC using N4ASoft software. LAN, RS232 and USB interfaces can be used.

Features include:

The output can be switched on and off including an immediate SHUTDOWN SOURCE option.

Waveform type, amplitude and frequency can be selected.

Schedule mode allowing:

Setting of start time, stop time, amplitude, frequency and output setting after test completion.
Multiple tests can be scheduled and re-scheduled at any time.
Count down until start of the next scheduled test.
Test settings displayed along with test time remaining.
The next test can be started immediately.
Present test can be stopped at any time.

Appendix D - N4A Communications Commands

Amplifier output voltage

Set channel 1 voltage: Amplitude,chx,value

Notes:

Chx is the output channel: 1a,1b,2a,2b,3a,3b
Value is the required voltage and can be between 0-300.

Example: Amplitude,ch1,240

Note: “a” outputs are the standard outputs. “b” outputs only need to be set when setting the harmonic outputs.

Amplifier frequency

Set frequency to xxHz: Frequency,value

Notes:

Value is the required frequency value
example 50Hz: Frequency,50

Amplifier output control

Output ON: output,on
Output OFF: output,off

Communications mode

USB Comms interface**:** comms,USB
RS232 comms interface: comms,RS232
LAN comms interface: comms,LAN

Amplifier wiring (sense) configuration

Sense Off:	amplifier,sense,nosens
Sense On – 2 Wire:	amplifier,sense,wire2
Sense On – 4 Wire:	amplifier,sense,wire4

Amplifier coupling Configuration

Coupling AC Only:	amplifier, couple, ac
Coupling AC+DC:	amplifier, couple,acdc

Amplifier phase wiring

1-phase wiring:	wiring,1phase
3-phase wiring:	wiring,3phase

Amplifier phase offset

Set phase 2 offset:	offset,ph2,value
Set phase 3 offset:	offset,ph3,value

Notes:

Value is the offset value and can be between 0 – 180

Amplifier sequence mode

Single sequence:	sequence,single
Repeat sequence:	sequence,repeat
Clear Sequence:	sequence,clear

Entering Sequence settings

First entry: sequence,value1,value2,value3,value4

Notes:

Value1 = entry number, can be between 0-50.
Value2 = Voltage
Value3 = Frequency
Value4 = Number of half cycles

Appendix E – Available character set

The following characters can be selected in text entry mode. The table is to be read across then down (eg, starting at space and repeatedly pressing NEXT gives ! “ # $ % & ‘ ( ) * etc.)

	!	“	#	$	%	&	‘
(	)	*	+	,	-	.	/
0	1	2	3	4	5	6	7
8	9	:	;	<	=	>	?
@	A	B	C	D	E	F	G
H	I	J	K	L	M	N	O
P	Q	R	S	T	U	V	W
X	Y	Z	[	\	]	^	_
‘	a	b	c	d	e	f	g
h	i	j	k	l	m	n	o
p	q	r	s	t	u	v	w
x	y	z	{	|	}		

Appendix F – Contact details

Please direct all queries or comments regarding the N4Axx instrument or manual to:

Newtons4th Ltd.
1 Bede Island Road
Leicester.
Leicestershire.
LE2 7EA.
United Kingdom

Tel: (0116) 230 1066 international +44 116 230 1066
Fax: (0116) 230 1061 international +44 116 230 1061

E-mail address: sales@newtons4th.com
office@newtons4th.com

Web site: www.newtons4th.com

At Newtons4th Ltd. we have a policy of continuous product improvement and are always keen to hear comments, whether favourable or unfavourable, from users of our products.

An example comment form can be found at the end of this manual – if you have any comments or observations on the product please fill a copy of this form with as much detail as possible then fax or post it to us.

Alternatively send an e-mail with your comments.

AC Power Source comments		
serial number:		date:
your contact details:		
comments:		
detailed description of application or circumstances:		
Please post or fax to Newtons4th Ltd.		