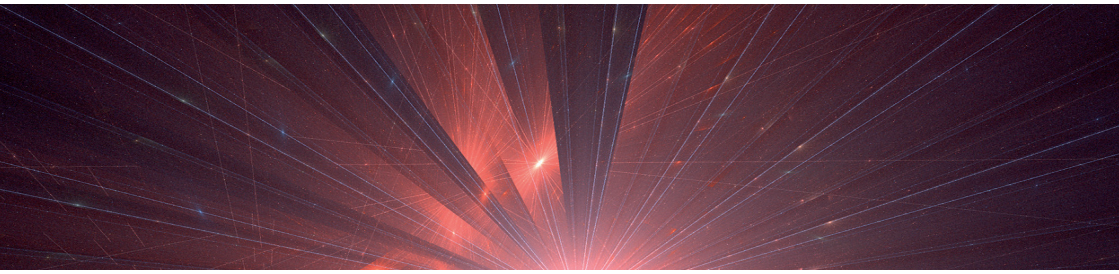
NC SOFTWARE v 5



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NanoControl Software v 5 Online Manual version 8.04

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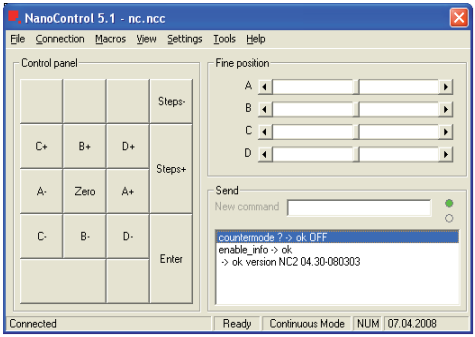
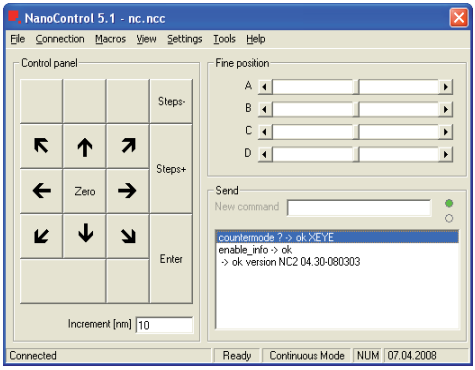
Produced by Gavin Frayne

Contents

User interface

Main window





The software will detect whether your hardware is fitted with a positional encoder and automatically show the correct main window. The interface shown above on the right is for positional encoder systems.

New command	*Enter*	An input box to type in commands to be sent to the NanoControl. For valid commands and syntax refer to the command reference on page 9.
Control panel	*Numeric keypad*	Buttons to move channels A to D in a positive or negative direction and to control the number of coarse steps or fine steps made each time a command is sent.
Fine position		Sliders to control the fine position for channels A to D.

Menu

File		
New NanoControl config	*Ctrl+N*	Creates and loads a new configuration file with default settings.
Open NanoControl config		Opens a previously saved configuration file.
Save NanoControl config as	*Ctrl+S*	Saves the currently active configuration file.
Auto-load last config		Automatically loads the last used configuration file when the software is started.
Auto-save current config		Automatically saves any changes you make to the currently active configuration file.

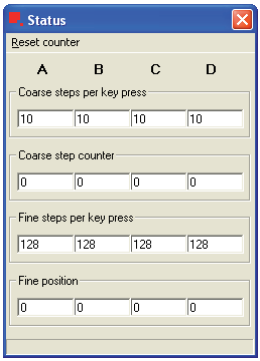
Exit	*Ctrl+X*	Closes the NanoControl software and terminates the currently active connection.
Connection		
Connect	*Ctrl+C*	Opens a serial connection between the software and the NanoControl on the selected port.
Disconnect	*Ctrl+D*	Disconnects the currently active connection.
Auto-connect		Automatically connects to the NanoControl when the software is started.
Abort waiting	*Ctrl+Z*	Aborts the current command, file or macro that is being executed.
Macros		
Record	*Ctrl+R*	Opens a window which records all the commands that you send to the NanoControl.
Send file (once)	*Ctrl+O*	Opens a macro file and executes commands in succession. The entire file is executed only once.
Send file (loop)	*Ctrl+L*	Opens a macro file and executes commands in a loop until you abort the process.
Step mode	*Ctrl+F3*	Toggles step mode on or off.
View		
Show status window	*Ctrl+F1*	Shows or hides the status window.
Show encoder info window	*Ctrl+F2*	Shows or hides the encoder info window. Only available for substages with positional encoder systems.
Settings		
COM port		Specifies the COM port to be used for communication with the NanoControl.
Shortcut keys	*Ctrl+S*	Opens the shortcut keys window.
Tools		
Backup tool	*Ctrl+B*	Opens the NanoControl profile backup and restore tool.
Firmware tool	*Ctrl+F*	Opens the NanoControl firmware update tool.
LCD magnifier	*Ctrl+M*	Opens the NanoControl LCD tool.

Help		
Online manual	*Shift+F1*	Displays this manual.
About		Displays version and copyright information.

Status bar

Connected/Disconnected	Indicates whether connection to NanoControl has been established.
Ready/Wait/Pause	Indicates whether the NanoControl is ready to receive a new command.
Continuous Mode/Step Mode	Indicates whether step mode is activated.
NUM	Indicates whether NUM lock, and thus fine mode, is currently activated.
Date	Shows the date when the program was started.

Status window

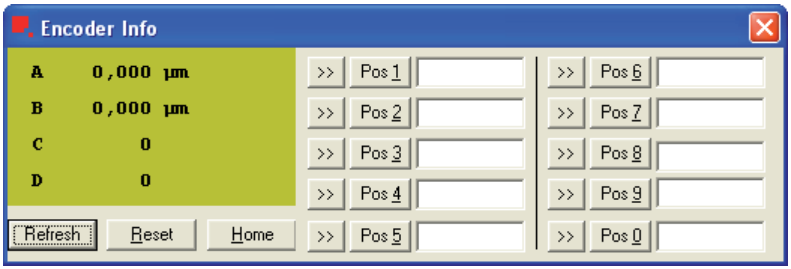


Reset counter	*Alt+R*	Resets the coarse step counter.
Coarse steps per key press		Indicates the number of coarse steps that are executed for each channel each time a key or button is pressed.
Coarse step counter		Shows the total number of coarse steps that have been executed for each channel.

Fine steps per key press	Indicates the number of fine steps that are executed for each channel each time a key or button is pressed.
Fine position	Shows the current fine position for each channel.

Encoder info window

Only available for substages with positional encoder systems.



LCD		Shows the encoder values for each channel. Double-click on a specific channel to enter a desired value.
Refresh	*Enter*	Returns the values of all the encoders.
Reset	*Alt+R*	Sets all the encoders to zero.
Home	*Alt+H*	Moves all channels to position 0,0 µm.
>>		Saves the current co-ordinates for all channels to the buttons Pos 1 to Pos 5.
Pos 1 to Pos 0	*1 .. 0*	Moves to the saved co-ordinate.
Right-click on Pos 1 to Pos 0		Shows a context menu allowing you to edit, delete and go to saved co-ordinates.
Hover over Pos 1 to Pos 0		Shows the co-ordinate saved in the button.

Operation

Changing connection settings

Available COM ports on your PC are automatically detected by the software. Use the settings menu to select an available port.

Different ways of executing commands

- Left-click on a button in the **Control Panel** or press the corresponding button on the *numeric keypad*.
- Move the **fine position sliders** with the mouse.
- Run a macro using **Send file (once)** or **Send file (loop)**[1].
- Press a *shortcut key* that has been assigned to a valid command[1].
- Manually type a valid command into the **New Command** input box and press *Enter* [1].
- When working with a substage with a positional encoder system, the keys *1 to 5* will move to the co-ordinate positions stored in the buttons **Pos 1 to Pos 5**.

[1] For valid commands and syntax refer to the command reference.

Using the control panel

By clicking on the control panel buttons with the mouse you can execute a defined number of steps for a specific channel. If NUM lock is on coarse steps will be executed. If NUM lock is off fine steps will steps will be executed. The number of steps that one click will make is listed in the status window for each channel. This number can be changed by clicking **Steps+** to increase the number of steps or **Steps–** to decrease them. If the number steps per keypress is greater than 128 coarse steps will be executed, otherwise fine steps will be executed. Pressing **Zero** resets the fine position for all channels to zero. **Enter** moves the cursor to the **New Command** field.

Using the fine position sliders

The fine position sliders are used to control the fine position for each channel with the mouse. Click on the slider of the desired channel and drag it to the desired position. The new fine position will be shown in the status window. The sliders also move to the corresponding fine position when fine steps are executed using the control panel, macros, etc.

Working with macros

Creating a macro

To begin recording a macro, open the record window via the file menu. As you execute the desired commands they will appear in the record window. This list can then be saved

and executed as an automated process at a later stage. You can also use a text editor to write your own macros. For valid commands and syntax refer to the command reference on page 9.

Running a macro

To run a macro simply choose **Send file (once)** or **Send file (loop)** from the file menu and then select the desired file.

Using step mode

Step mode is toggled on and off via the file menu. When is it active and a macro is executed, the step mode menu will appear allowing you to step through each command in the macro one at a time. If **Esc** is pressed while a macro is being executed the step mode menu will also appear.

Using shortcut keys

Click on **Shortcut keys** in the file menu to open the window where you can assign commands to the function keys F1 to F12. Simply type in the command and the required parameters and close the window when finished. For valid commands and syntax refer to the command reference on page 9.

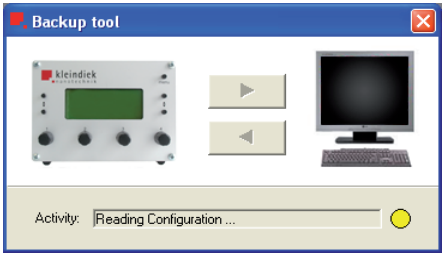
Using the new command input box

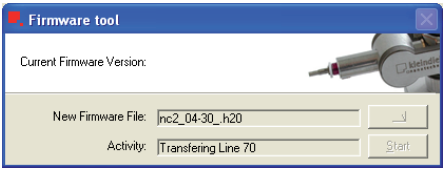
You can move the cursor to the **New Command** input box at any time by pressing the **Enter** button on the control panel or *Enter* on the keyboard. Type in the command and the required parameters and press *Enter* to send it. For valid commands and syntax refer to the command reference on page 9.

Using the backup tool

The NanoControl configuration settings can be saved into a text file or loaded from a text file at any time. This may be needed when performing a firmware update so that your settings are not lost, or to keep a safe record of various user profiles for applications that need to repeated under the same conditions in the future.

- Start the **Backup tool** from the tools menu.
- Use the upper arrow to save the current NanoControl configuration to your hard disk.
- Use the lower arrow to load a NanoControl configuration from your hard disk. This will replace any existing settings.
- Close the tool by pressing the *Esc* key or closing the window.





Upgrading the firmware

When performing a firmware update all configuration settings will be lost. You can use the backup tool to save your NanoControl settings before updating your firmware.

- Visit our website www.nanotechnik.com/firmware for the latest firmware version and save it to your hard disk.
- Start the **Firmware tool** from the tools menu.
- Use the folder button to select the firmware file on your hard disk.
- Press **Start** to update the NanoControl.
- Close the tool by pressing the *Esc* key or closing the window.

Command reference

Syntax

- Parameters must be separated by blank spaces (ASCII character 32).
- Every command must be terminated by carriage return (ASCII character 13).
- Lines in macros can be commented out using '#'.

Output

The NanoControl sends a carriage return terminated line after execution of a command:

<status char><tab><message string><CR>

<status char> = 'o' for okay and <status char> = 'e' for error.

<message string> is either empty, returns a value described below or returns an error description.

Abort

coarse commands can be aborted during execution by sending any new command, including a single carriage return <CR>.

Examples

Command	Output	Description
coarse A +100	o<tab><CR>	Executes 100 positive coarse steps in channel A.
coarse A ?	o<tab>100<CR>	Returns value of coarse step counter for channel A.
fine C -10	o<tab><CR>	Sets the fine position of channel C to -10.
fine ?	o<tab>0 0 -10 0<CR>	Returns fine position A to D separated by blanks.

Examples (positional encoder systems)

Command	Output	Description
moveabs 0 0	o<tab>0 0<CR>	Moves substage to origin.
moveabs 100000 100000	o<tab>100000 100000<CR>	Moves substage 100 µm in each axis in a positive direction relative to the origin.
moveabs -100 -100	o<tab>-100 -100<CR>	Moves substage 100 nm in each axis in a negative direction relative to the origin.

Command	Parameters	Description
Movement		
coarse	<A..D> <-65536..65535>	Executes <-65536..65535> coarse steps in channel <A..D> at the current speed.
coarse	<A..D> <-65536..65535> <1..6>	Executes <-65536..65535> coarse steps in channel <A..D> at speed <1..6>.
coarse	<A..D> ?	Returns value of coarse step counter in <message string>.
coarse	?	Returns values of coarse step counters for channels A to D in <message string> separated by blanks.
coarsereset	<A..D>	Resets coarse step counter in channel <A..D> (no parameter resets all counters).
fine	<A..D> <-2048..2047>	Sets fine position to <-2048..2047> in channel <A..D>.
fine	?	Returns fine positions for all channels in <message string> separated by blanks.
fine	<A..D> ?	Returns fine position for channel <A..D> in <message string>.
speed	<1..6>	Changes to speed <1..6>.
speed	?	Returns the current speed in <message string>.
speed	<1..6> <f01..c64> <f01..c64> <f01..c64> <f01..c64>	Sets the number of fine or coarse steps to be executed for speed <1..6> in channels A to D.
penetration	<fwd> <bck> <dir>	Settings for intracellular penetration mode. An experimental command for the MM3A-LS.
go	<steps A> <steps B> <steps C> <steps D> <ms>	Steps in the range <-100..+100> for each channel are executed simultaneously every few milliseconds <ms> at the current speed. Loop will continue until any other command or <stop> is sent. Will use fine with coarse if it is enabled and current speed is 3.
Counter (only for substages with positional encoder systems)		
countermode	<OFF, XEYE, XEYEZE, X2EY2E>	Sets the counter mode.
countermode	?	Returns the current counter mode.

Command	Parameters	Description
counterread		Returns the values of the counters in <message string> separated by blanks. Counter values are in nanometers.
moveabs	<A..D> <position>	Moves axis <A..D> to absolute position <position> and executes counterread.
moveabs	<position x> < position y> < position z>	Moves multiple axes to specified absolute co-ordinate position and executes counterread.
counterreset		Resets all counters to zero.
amplwizard		Starts the automatic amplitude detection routine.
relax	<A..D>	Relaxes channel <A..D>. No parameter relaxes all.
backlash	<-100..+100>	When a moveabs command is sent, an offset of <-100..+100> µm is used to ensure that the co-ordinate is always approached from the same direction. Value must be set via PC and is not permanently saved in NanoControl settings. Backlash 0 to deactivate.
Configuration		
devicemode	<NM, MM3A, LT>	Sets device mode.
devicemode	?	Returns the current device mode.
frequency	<500..10000> <500..10000> <500..10000> <500..10000>	Sets the frequency for channels A to D.
minamppos	<1..80> <1..80> <1..80> <1..80>	Sets the positive min. amplitude for channels A to D.
minampneg	<1..80> <1..80> <1..80> <1..80>	Sets the negative min. amplitude for channels A to D.
stepsize	<0..80> <0..80> <0..80> <0..80>	Sets the step size for channels A to D.
reversalcorrection	<0..80> <0..80> <0..80> <0..80>	Sets reversal correction for channels A to D.
finewithcoarse	<0,1> <0,1> <0,1> <0,1>	Enables/disables fine-with-coarse functionality for channels A to D.
bridgemode	<A..D,0> <A..D,0> <A..D,0> <A..D,0>	Toggles bridge functionality for channels A to D.
Orientation		
knobinversion	<0,1> <0,1> <0,1> <0,1>	Enables/disables knob inversion for knobs 1 to 4.
knobmapping	<A..D> <A..D> <A..D> <A..D>	Maps knobs 1 to 4 to channel <A..D> .

Command	Parameters	Description
joypadinversion	<0,1> <0,1> <0,1> <0,1>	Enables/disables joypad axis inversion for joypad axes 1 to 4.
joypadmapping	<A..D> <A..D> <A..D> <A..D>	Maps joypad axes 1 to 4 to channel <A..D> .
cubeinversion	<0,1> <0,1> <0,1>	Enables/disables dial inversion for cube dials 1 to 3.
cubemapping	<A..D> <A..D> <A..D>	Maps cube dials 1 to 3 to channels <A..D> .
Profile		
?		Screen prints the current NanoControl configuration.
saveprofile	<1..6>	Stores the current configuration into the specified profile. No parameter stores settings to the current profile.
saveprofile	*	Stores the current configuration to all profiles.
loadprofile	<1..6>	Loads the configuration settings from specified profile. No parameter reloads the current profile.
Initprofile		Sets the current profile to the default configuration.
Miscellaneous		
version		Returns the firmware version number and build date.
pause	<seconds>	Allows you to create timed breaks in the execution of a macro. Only works with NanoControl software.

Additional command reference NanoControl Software v 5.1

Command	Parameters	Description
Chip Positioning		
`movecp`	`<chip_position_x  chip_position_y>`	Moves the chip to the chip position (values in units of nm)
`pos_x TAB pos_y`	`<chip_position_x> tab <chip_position_y>`	Moves the chip to the chip position (values in units of nm)
`matrix`		
`logmatrix`		
`logmatrixpos`		
`inline`	`full_path_to_script`	
`inline`	`relative path to script from exe`	
SIOS Interferometer Measurement		
`readsios`	`<position_number1…4>`	
`siosstep`		
Recording		
`logencoder`		Records the current position into a log file

`logfms`	`<Boardnumber>`
	`<SetChannel>`
	`<Average>`
	`<Scale>`
		Records the Output of the ME1208 (requires additional DLL)

AutoIt		
`autoit_connect`	`<server_name> <server_port>`	Connects to the Daemon
`autoit_send`	`<AutoIt_Command> <Arg1,Arg2,… >`	Send AutoIt Commands to the daemon See AutoIt Command Reference for details (all arguments have to be used, optional arguments are NOT supported)
	`{date}`	placeholder that will be replaced by the current date
	`{time}`	placeholder that will be replaced by the current time
	`{i+}`	increment counter
	`{i=0}`	set counter to zero
	`{i}`	placeholder that will be replaced by the current value