attocube
WITTENSTEIN Group

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Products: ANC350, DAISY Software v1.2.xx

User Manual

attocube systems' Piezo Motion Controller ANC350

Safety Information

For the continuing safety of the operator of this equipment and the protection of the equipment itself, the operator should take notice of the **Warnings, Cautions,** and **Notes** throughout this handbook and - where applicable - on the device itself.

The following safety symbols may be used throughout this handbook:

Caution. Hot surface. May cause injury when touched.

Caution. An instruction which draws attention to the risks of damage to the device, process, or surrounding.

Warning. Risk of electric shock. High voltages present.

Warning. Laser radiation. Do not stare into the beam. Class 1M Laser product.

Caution. Electro-statically sensitive device. Equipment may get damaged if touched by personnel not grounded. Only touch with earthed wristband attached or otherwise connected to ground.

Note. Clarification of an instruction or additional information.

Functional (EMC) earth/ground terminal.

Important Warnings – Read this Section First!

The unit described in this manual must only be connected to a grounded and fused supply of 100, 115, or 230V, respectively.

Warning. The equipment, as described herein, is designed to be used by personnel properly trained in the use and handling of mains powered electrical equipment. Only personnel trained in servicing and maintenance of this equipment should remove its protective covers or attempt any repair or adjustments.
If malfunction is suspected, return the part to attocube systems immediately for repair or replacement. There are no user-serviceable parts inside the electronics. Take special care if connecting products from other manufacturers. Follow the General Accident Prevention Rules.

Note. Modified or opened electronics are no longer covered in terms of attocube's warranty.

Caution. **The piezo translators and controllers are high voltage devices which are capable of generating high output currents.** Do never touch any part of the piezo translator or the controller which might either be at high voltage or connected to the high voltage output of the controller by any means. Touching electrified parts of the system may cause serious or even lethal injuries. Working with high voltage devices requires adequately educated operating personnel.

Warning. **Do not operate the instrument outside its dedicated supply voltage or environmental range.** If this equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired. In particular, excessive moisture may impair safety.

Warning. **Never connect any cabling to the electronics when the outputs are enabled!**
The scan piezo elements at the heart of a positioner unit are high voltage components and can cause serious injuries.

Caution. Avoid short-cuts. Be careful not to create short-cuts between the contacts in the Sub-D-Mix connector or anywhere in the cabling.

Caution. For laboratory use only. This unit is intended for operation in conjunction with a normal, single phase supply, in the temperature range from 5°C to 40°C, 20% to 80% RH.

Firmware update. Before updating the firmware of the ANC350v4 please contact *attocube systems* technical support. Unauthorized updates could lead to permanent malfunction and will not be covered by attocube's warranty.

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Declarations of Conformity

For Customers in Europe:

This equipment has been tested and found to comply with the EC Directives 89/336/EEC 'EMC Directive' and 73/23/EEC 'Low Voltage Directive' as amended by 93/68/EEC.
Compliance was demonstrated by conformance to the following standard specifications:

Electromagnetic compatibility
- EN 61000-6-3:2007-09
- EN 61000-6-1:2007-09
- EN 61326:2006-10
- EN 55016-1-2:2007-08
- EN 55016-2-1:2006-05
- EN 55016-2-3:2007:08
- EN 55011:2007-11
- EN 61000-3-2:2005-09
- EN 61000-3-3:2002-05
- EN 61000-4-2:2001-12
- EN 61000-4-3:2008-06
- EN 61000-4-4:2005-07
- EN 61000-4-5:2007-06
- EN 61000-4-6:2008-04
- EN 61000-4-11:2005-02

Safety
- EN 61010-1: 2001

For Customers in the USA:

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his/her own expense. Changes or modifications not explicitly approved by attocube systems could void the user's authority to operate the equipment.

Waste Electrical and Electronic Equipment (WEEE) Directive

DE16963721

Compliance
As required by the Waste Electrical and Electronic Equipment (WEEE) Directive of the European Community and the corresponding national laws, attocube systems offers all end users within the European Union (EU) the possibility to return "end of life" units without incurring disposal charges.
This offer is valid for attocube systems electrical and electronic equipment:

- sold after August 13th 2005,
- marked correspondingly with the crossed out "wheelie bin" logo (see logo to the left),
- sold to a company or institute within the EU,
- currently owned by a company or institute within the EU,
- still complete, not disassembled, and not contaminated.

As the WEEE directive applies to self contained operational electrical and electronic products, this "end of life" take back service does not refer to other attocube products, such as

- pure OEM products, that means assemblies to be built into a unit by the user (e. g. OEM electronic drivers),
- components,
- mechanics and optics,
- left over parts of units disassembled by the user (PCB's, housings etc.).

If you wish to return an attocube unit for waste recovery, please contact attocube systems or your nearest dealer for further information.

Waste treatment on your own responsibility
If you do not return an "end of life" unit to attocube systems, you must hand it to a company specialized in waste recovery. Do not dispose of the unit in a litter bin or at a public waste disposal site.

Ecological background
It is well known that WEEE pollutes the environment by releasing toxic products during decomposition. The aim of the European RoHS directive is to reduce the content of toxic substances in electronic products in the future.
The intent of the WEEE directive is to enforce the recycling of WEEE. A controlled recycling of end of live products will thereby avoid negative impacts on the environment.

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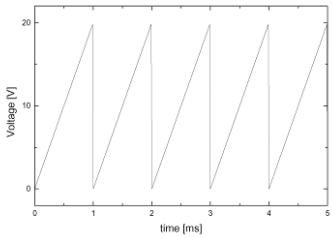
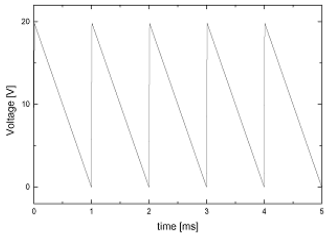
I. System Overview

The ANC350 electronics is a sophisticated open- and closed loop positioning and scanning controller, allowing the simultaneous operation of up to three piezo-driven positioners and/or scanners. The ANC350 can be controlled either directly from the front panel or, alternatively, with the help of the “DAISY” software provided by attocube.

In addition, a *.DLL-file is provided for the integration of ANC350 software control in your own programs. For synchrotron applications specs and EPIC drivers are also available.



With the ANC350 controller, you are able to drive attocube positioners either open-loop or closed-loop (only for encoded positioners). In both cases, two different driving modes are available, namely stepping mode and fine positioning mode.
Closed-loop positioning can be achieved in an either absolute or relative coordinate system. Both modes allow the most accurate operation and control since the position of the piezo stage is controlled and adjusted by the controller in real-time.



Stepping mode:
In this mode a saw-tooth-shaped driving signal as shown in the figure to the left is applied to the positioning stages. The amplitude and frequency of the signal can be adjusted to the positioner and the application.
The motion created by the depicted driving signal corresponds to several subsequent steps, where the step size is mainly dependant on the amplitude of the signal.

Fine positioning mode:
In this mode, a DC-Voltage signal is applied to the positioner which causes an elongation of its built-in piezo ceramic. The travel range of this mode is limited by the maximum extension of the piezo, typically on the order several micrometers.

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II. Setup Procedure

II.1. Mechanical Installation

Setting up
Please unpack the controller and the delivered positioning stages (if applicable) carefully and inspect them for any damage. Place all components on a flat and clean surface.

Caution. When setting up the ANC350v4 controller for first use, it should be positioned in such a way that the operation of the power supply plug and switch on the rear panel is not impeded. Ensure that proper airflow is maintained to the unit. Do not obscure the ventilation holes.

Warning. Operation outside the following environmental limits may adversely affect the safety of the operator:

- Indoor use only
- Maximum altitude 2000 m
- Temperature range 5°C to 40°C
- Maximum humidity less than 80% RH (non-condensing) at about 30°C

To ensure reliable operation, the unit should not be exposed to corrosive agents or excessive moisture, heat or dust. If the unit has been stored at a low temperature or in an environment of high humidity, it must be allowed to reach ambient conditions before being powered up.

Caution. In applications requiring the highest level of accuracy and repeatability, it is recommended that the controller unit is powered up approximately 30 minutes before usage in order to allow the internal temperature to stabilize.

Caution. Do not connect any cabling longer than 5 m. Longer cabling may increase the sensitivity of the device to external influences.

Caution. Only use control cables supplied by attocube systems. Other cabling may affect the sensitivity of the device to external influences or may cause errors.

II.2. Electrical Installation

Connect the controller to the voltage supply:

Warning. The unit must be connected to a grounded and fused supply of 100 V, 115 V, or 230 V.

Warning. Only use power supply cables supplied by attocube systems, other cables may not be rated to the same current. The unit is shipped with appropriate power cables for usage in the UK, Europe, and the USA. When shipped to other territories, the appropriate power plug has to be provided by the user.

Start the controller:

Note. When the unit's main power switch is turned on, the system will boot. This may take several seconds. Circles on the front panel indicate the booting process.

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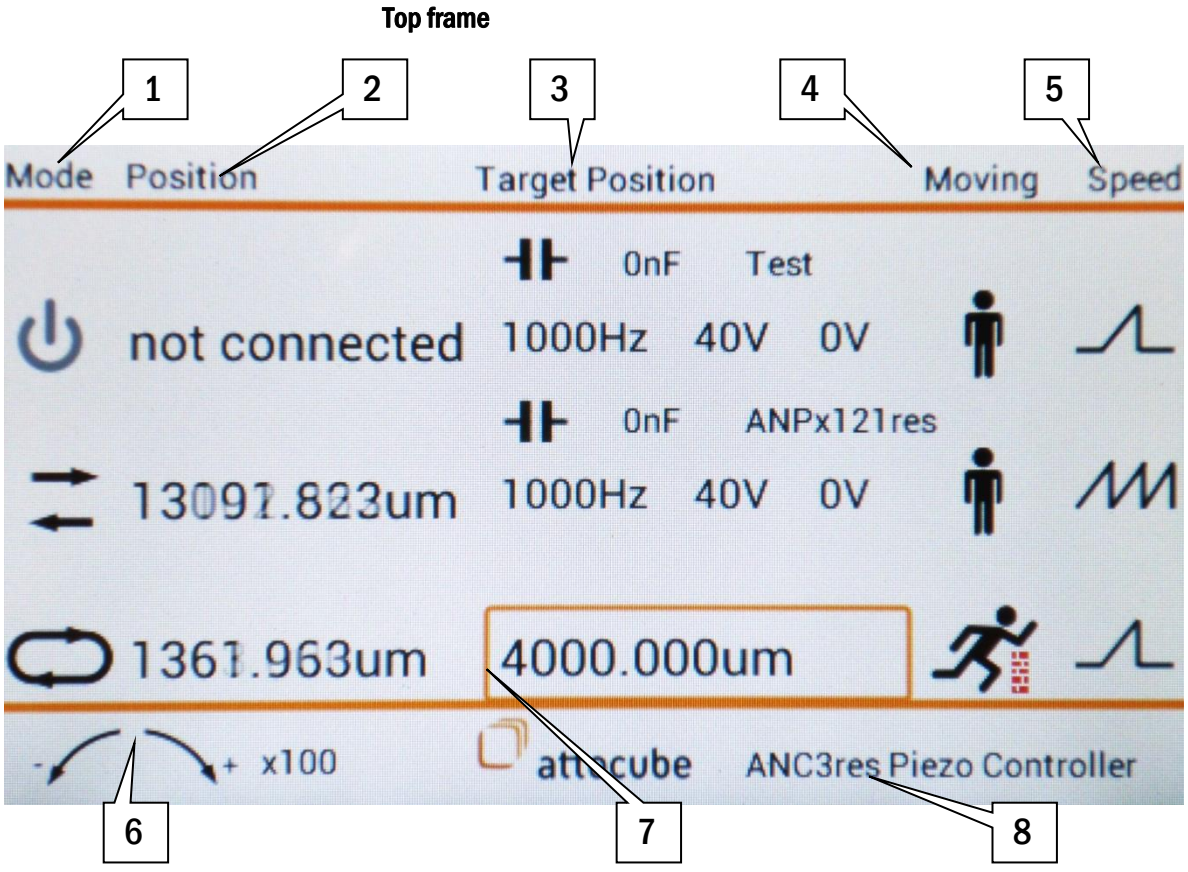
II.3. Front Panel Controls and Indicators

The front panel of the ANC350v4 consists of a single panel for the *control wheel*, a touchscreen and six stepping buttons [three axes, two directions]. On the following page, these segments are described in detail.

II.3.1. Touchscreen



The top row specifies the function below respectively labels the function inside the selection frame. The bottom row specifies the controller and the sensitivity of the control wheel

1. Mode [OFF | Open Loop | Closed Loop]
2. Position [actual position | not connected]
3. The changing field shows function of selected button on the touchscreen
    - Frequency: Stepping frequency [1..2000Hz]
    - Amplitude: Stepping amplitude [0..70V]
    - DC Level: constant DC voltage [0..70V]
    - Target Position [µm / m°]
    - Capacitance [---]: last measured capacitance [nF]
4. Moving [OFF | ON + direction]
5. Speed [Single Step | continuous]
6. The left/right arrows with "+" / "-" represent the moving directions of the control wheel. The number to the right indicates the sensitivity of the control wheel.

    Depending on the selected box the value can vary between "x0.1" and "x100". Pressing the control knob will change the value.

    x0.1 ➔ x1 ➔ x10 ➔ x100 ➔ x0.1➔...
7. The frame marks the parameter that is currently controlled by the control wheel. Touching a parameter value moves the frame there.
8. Controller specification [RES | NUM | FPS]

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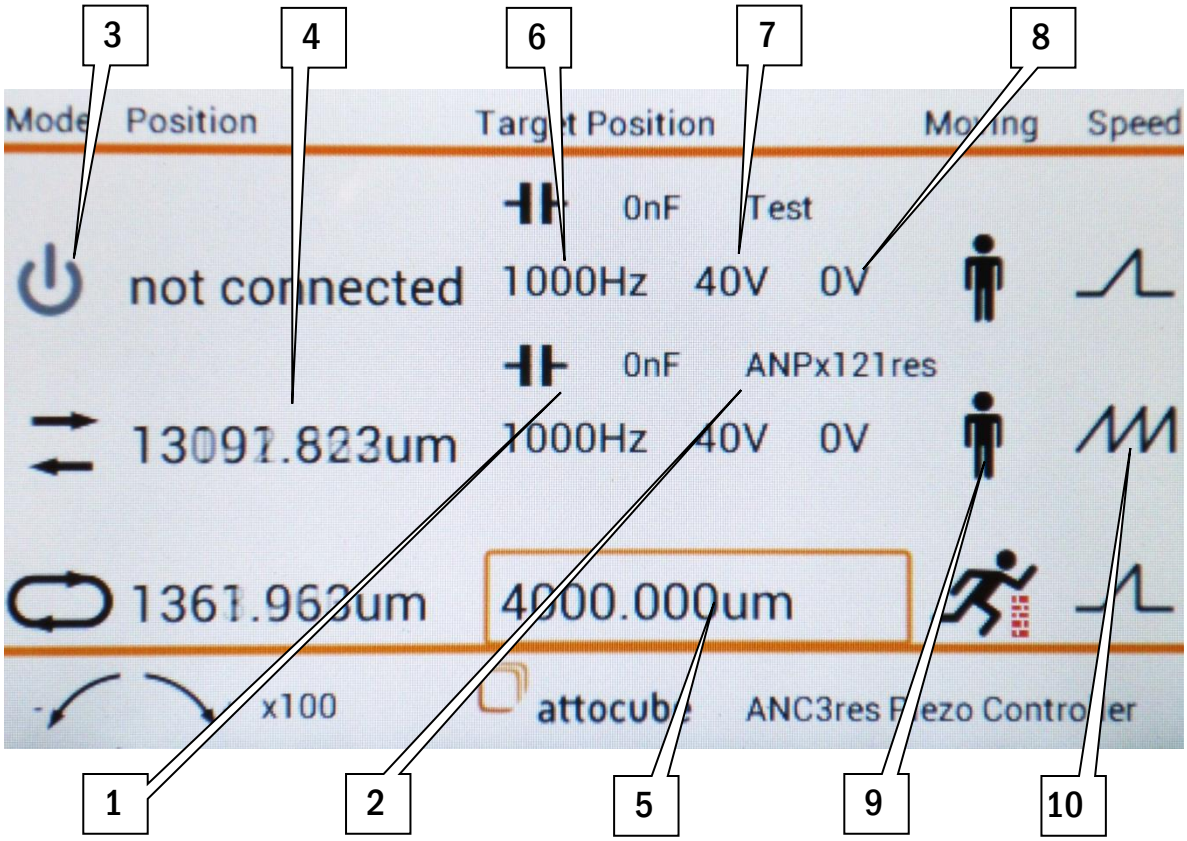
Center frame



The second part displays the functions of the three axes
The properties of every axis is shown in two lines

First line

1. Last **measured capacitance** 1311nF : by pressing and holding this button the capacitance of the connected positioner will be recorded

2. Selected **positioner type** ANPx101res : via daisy different positioner types with different characteristics can be chosen

Second line

3. **Mode**: [OFF | Open Loop | Closed Loop] displays the actual control mode of the selected axis. Touching the button will change mode.
   Note: By holding the button for about 2sec. the axis can be switched on and off.
   Note: Only axes with connected positioner can be switched on.

4. **Position** [Position | not connected] for connected positioners with readout the actual position in [µm] or [m°] is shown

5. **Target Position**: in Closed Loop mode the target position is shown. When this box is selected one can adjust the target by turning the control knob

6. **Frequency** (only open loop mode): depending on positioner type and usage of other axes one can adjust the frequency from 1Hz up to 5kHz (only on one axis at one time is a frequency above 2kHz allowed) (➔ control knob)

7. **Amplitude** (only open loop mode): depending on positioner type the stepping voltage can be adjusted up to 70V (➔ control knob)

8. **DC-voltage** (only open loop mode): depending on positioner type the constant voltage can be adjusted up to 70V (➔ control knob)

9. **Moving**: when pressing the stick figure in closed loop modus the positioner will move to the given target position.

The stick figure will change its look from standing: "not moving" to running left/right: moving inwards/outwards depending on command or direction of the target position. The brick wall indicates a mechanical stop or if movement is stopped for some other reason.

10. **Speed**: the saw tooth indicates if single step or continuous stepping is selected.

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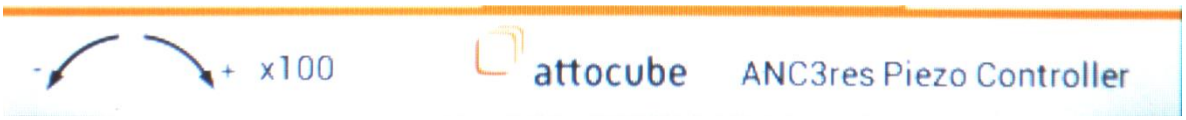
Bottom line



The left/right arrows with "+" / "-" represent the moving directions of the control wheel. The number to the right indicates the sensitivity of the control wheel.

Depending on the selected box the value can change in four steps between "x0.1" and "x100". Pressing the control knob will change the value.

x0.1 ➔ x1 ➔ x10 ➔ x100 ➔ x0.1➔...

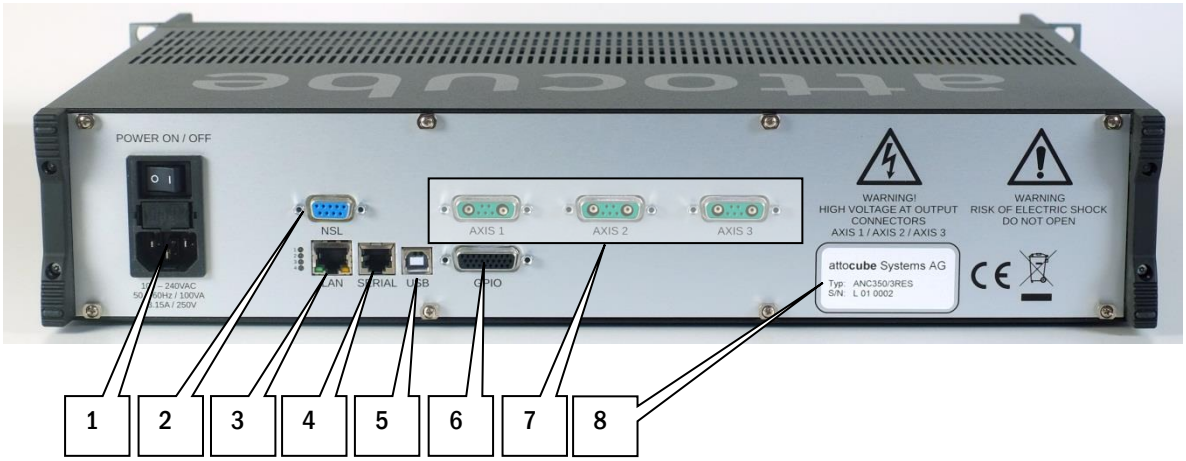
One can set single steps (if single step is set) with one click of the buttons next to the touchscreen.

If continuous motion is selected, the positioner will move in the dedicated direction as long as the button is pressed.

Assignment of the stepping buttons:

Axis 1 backward	Axis 1 forward
Axis 2 backward	Axis 2 forward
Axis 3 backward	Axis 3 forward

II.4. Rear Panel Connections



On the backpanel, there are:

1. main power switch
   main fuse
   main power connector (100 - 240 V, 50 Hz – 60 Hz, max. 100 VA)
2. NSL-port (only for connection to ASC400 and ASC500)
3. Ethernet port (optional)
4. RJ-12 port: diagnostic port for internal use only
5. USB port for connection to a computer
6. GPIO port for trigger (Sub-D, 26 Pin) and special applications
7. positioner connectors: Sub-D mix connectors (max. 70 V, 4.5 A), three axes

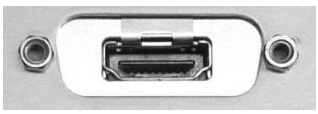
   Axes arrangement on rear panel:

Axis 1	Axis 2	Axis 3

8. serial and description of electronic

Connector for /NUM encoded system
Connector for stepping with /FPS

Connector for /RES encoded system



Connector for /FPS encoded system

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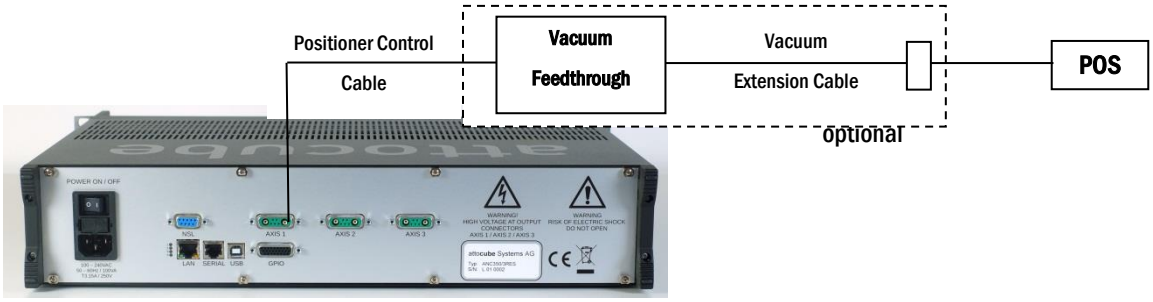
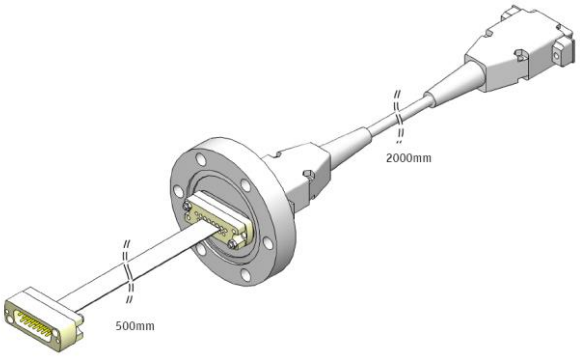
How to connect a positioner:



For more information on the specific types of positioners and connectors please see chapter III.2.

Optional vacuum feedthrough:
In addition to all attocube positioning systems, specific vacuum feedthroughs are available as an option. As an example, the image below depicts a feedthrough for a single /NUM-positioner. Vacuum feedthroughs for multiple axes are also availible. For more information please visit us at http://attocube.com/attomotion/accessories/vacuum-feedthroughs-vft/ or inquire at sales@attocube.com .
With every feedthrough, an alternative-adapter is delivered allowing the testing the whole system whithout dismantling the original feedthrough.



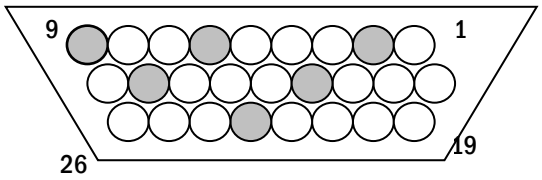
Vacuum feedthrough /NUM-positioner

alternative-adapter

III. Pin Assignment

III.1. TTL Trigger Connector

The ANC350 allows *outputting* LVTTL trigger signals depending on the actual position of a connected piezo positioning stage. For further details regarding this feature please refer to chapter V.2.1. In addition, modules and stages can be controlled by external trigger *inputs*, such as frequently used for the coarse approach of scanning probe microscopes. The pin assignment of the female 26-pin Sub-D connector at the rear side of the ANC350 for the trigger output and input signals is given in the table below:



Trigger assignment

Input				Output		
Function		Pin #		Function		Pin #
Quad	Trigger			Quad	Trigger	
A	Fwd	1	Axis 1	A	Range	5
B	Bkwd	11		B	-	15
ERR	-	20		ERR	-	24
A	Fwd	12	Axis 2	A	Range	16
B	Bkwd	21		B	-	25
ERR	-	3		ERR	-	7
A	Fwd	22	Axis 3	A	Range	26
B	Bkwd	4		B	-	8
ERR	-	14		ERR	-	18

Pin 19	GND	Pin 10	3.3V DC

Pins no 2, 6, 9, 13, 17, 23 are not used for trigger

The ANC350 uses LVTTL logic operating at a maximum Voltage of 3.3V. In the table below, all threshold values of the LVTTL logic are translated to the 5V-TTL logic.

	Input		Output	
Technology	Low (V_{IL})	High (V_{IH})	Low (V_{OL})	High (V_{OH})
LVTTL 3.3V	≤ 0.8	≥ 2.0	≤ 0.4	≥ 2.4
TTL 5V	≤ 0.8	≥ 2.0	≤ 0.4	≥ 2.4

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Warning. Do not under any circumstances attempt to connect the digital I/O to any external equipment that is not galvanically isolated from the mains. In addition to the damage that may occur to the controller there is the risk of serious injuries and fire hazard.

Error: high (V_{IH}) will mark an error while low (V_{IL}) means ok.

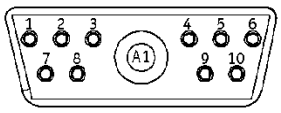
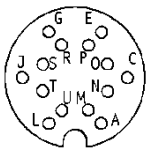
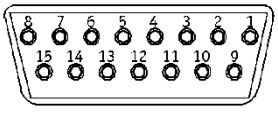
III.2. Positioner Control Cables

Positioner control cables are used to connect the ANC350 electronics to any of attocube's positioners and scanners. attocube provides these cables along with each delivered axis by default. Nevertheless, for self-construction or customization purposes, cabling specifications as well as pin assignment are listed below.

Caution. Avoid short-circuits. Be careful not to cause short-cuts between the contacts in the Sub-D-Mix connector or anywhere in the cabling.

III.2.1. Cable Layout for /NUM

Connectors and Cabling: (figures illustrates front view of connectors)

<table>
<tr><td colspan="2">ANC350 | D-SUB Mix | Control Cable | Application dependent connector | POS</td></tr>
<tr><td> 
</td><td>D-SUB MIX connector, male, 11-pin
Connector: FM11W1P-K120
High power contact (A1)</td></tr>
<tr><td> 
</td><td>Circular plug-in connector, female
Type Binder 678, 14-pin
→ Used for room temperature applications</td></tr>
<tr><td> 
</td><td>Standard D-SUB connector, female, 15-pin
→ Used for vacuum applications</td></tr>
<tr><td> </td><td>Control Cable Type
e.g. LiY-LiY(CB)-Y,
12-pin, 6x2x0.14,
twisted in pairs,
one pair extra shielded (driving signal)</td></tr>
</table>

Pin Assignment:

Control Cable, 12-pin., shielded (/NUM)				
SUB-D MIX, 11W1P	Sensor I/O (1 Vss)	Piezo voltage	RT	HV/UHV
			Circ. plug-in connector 14-pin	SUB-D 15-pin
1	U0+		N	1
2	Pos-Con		G	5
3		- OUT	U	10
4		+ OUT	T	11
5	U1+		L	3
6	U2+		R	13
7	U0-		O	15
8	UB=5V		S	12
9	U1-		J	4
10	U2-		P	14
A1	GND		E	6
			A,C,M not connected	2,7,8,9 not connected

Caution.

- The pin-numbers of the feed through will be different from the numbers of the vacuum cable [Sub-D 15-pin]. 1⇔8; 2⇔7;3⇔6;4⇔5; 9⇔15; 10⇔14; 11⇔13
- Make sure not to connect cabling with a wire resistance >5Ω.
- Use EMV-housings as enclosure for the SUB-D connectors
- Use the extra shielded twisted pair wires for the piezo voltage supply to avoid interference with the sensor signal.

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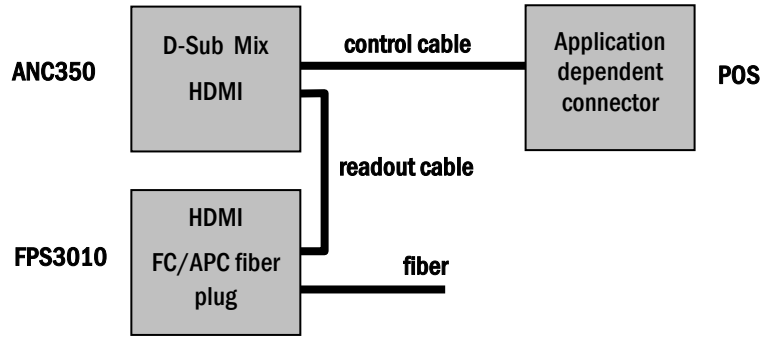
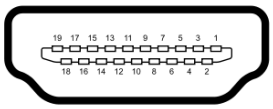
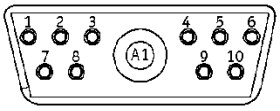
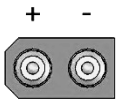
III.2.2. Cable Layout for /FPS

Connectors and Cabling:



	Standard HDMI A connector, female, 19-pin
	D-SUB MIX connector, male, 11-pin Connector: FM11W1P-K120 High power contact (A1)
	2 pin connector, male for ambient conditions: the red dot marks "+"

Pin assignment:

	Y - Control Cable, 14-pin., shielded (/NUQ)				
	SUB-D MIX, 11W1P			HV/ UHV	LT
		Sensor I/O	Piezo voltage	Positioner pin plug	
	3		- OUT	not beveled 2-pin	black 2-pin
	4		+ OUT	beveled 2-pin	red 2-pin

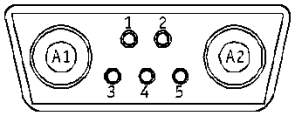
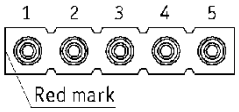
Caution.

- Make sure not to connect cabling with a wire resistance >5Ω.
- Use EMV-housings as enclosure for the SUB-D connectors
- Use the extra shielded twisted pair wires for the piezo voltage supply to avoid interference with the sensor signal.

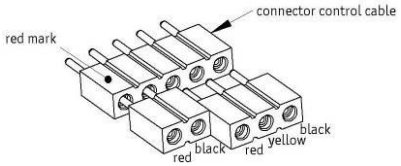
III.2.3. Cable Layout for /RES

Connectors and Cabling: (figures illustrates front view of connectors)

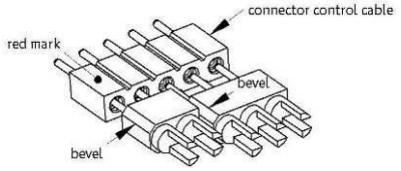
ANC350	D-SUB Mix	Control Cable	Application dependent connector	**POS**

	D-SUB MIX connector, male, with 2x coaxial contacts Connector: FM-7W2P-K120 Coaxial contacts (A1, A2)
	Socket board connector, 5 pin, female, raster 2.0mm
	Control Cable Type e.g. LiY-LiY(CB)-Y, 6-pin, 3x2x0.14/12, twisted in pairs, one pair extra shielded (driving signal)

Connecting scheme for non-vacuum positioners



Connecting scheme for vacuum positioners



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Pin Assignment:

SUB-D MIX, 7W2	Sensor I/O	Piezo voltage	Socket board con. 5-pin	HV/ UHV	LT
				Positioner pin plug	
1	**S -**		5	not beveled 3-pin	black 3-pin
2	Sensor GND		5		
3	**S 0**		4	middle	yellow
4	RES-CON				
5	**S +**		3	beveled 3-pin	red 3-pin
I-A1		**-OUT**	2	not beveled 2-pin	black 2-pin
S-A1					
I-A2		**+OUT**	1	beveled 2-pin	red 2-pin
S-A2					
Jumper 4 to 2					
R=1MΩ between 1 and 3					

Caution.

- Make sure not to connect cabling with a wire resistance >5Ω.
- Use EMV-housings as enclosure for the SUB-D connectors
- Use the extra shielded twisted pair wires for the piezo voltage supply to avoid interference with the sensor signal.

IV. Software

IV.1. Hardware Requirements

A standard x86- or x64-PC with a USB2.0 port is required to operate the software for the ANC350 Motion Controller.

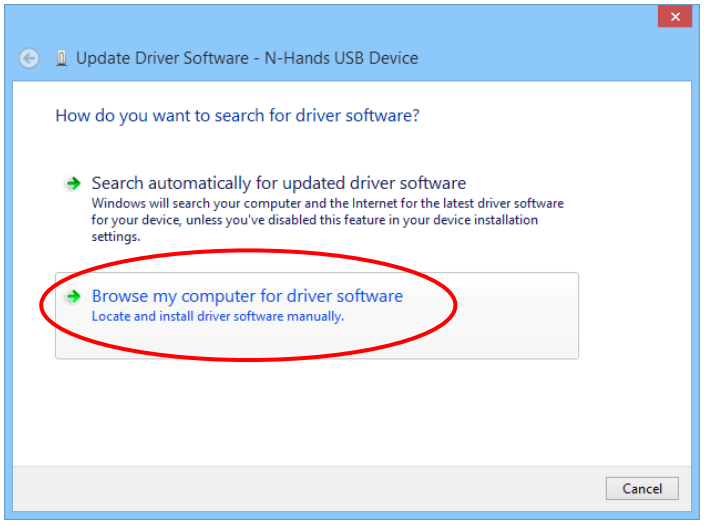
IV.2. Operating System

The current version of the ANC350 software is compatible with Microsoft Windows XP ®™*), Microsoft Windows Vista ®™*), Microsoft Windows 7 ®™*) and Microsoft Windows 8 ®™*), Microsoft Windows 8.1 ®™*), and Microsoft Windows 10 ®™*). Corresponding drivers are included on the installation CD.

Note. In order to computer control the ANC350 Motion Controller, both hardware driver and DAISY software need to be installed. Driver and software are installed separately, see sections V.3 and V.4.

Note. Windows 7 and newer may ask for missing MSVCP100.DLL. The missing software is included in Microsoft Visual C++ ® Redistributable Package (x64) / (x86) which can be downloaded from Microsoft ®.

IV.3. Hardware Driver Installation



For the installation of the USB-drivers administrator rights will be needed.

Connect the USB cable to both computer and ANC350 Motion Controller. Once connected, the new hardware wizards (shown to the left) will pop up. Do not let the wizard search for drivers automatically; instead choose: 'browse my computer for driver software' as indicated in the screenshot to the left.

*)Windows, MS, Windows Logo, Microsoft, Windows XP are registered trademarks or trademarks of Microsoft Corporation in the US and or in other countries.

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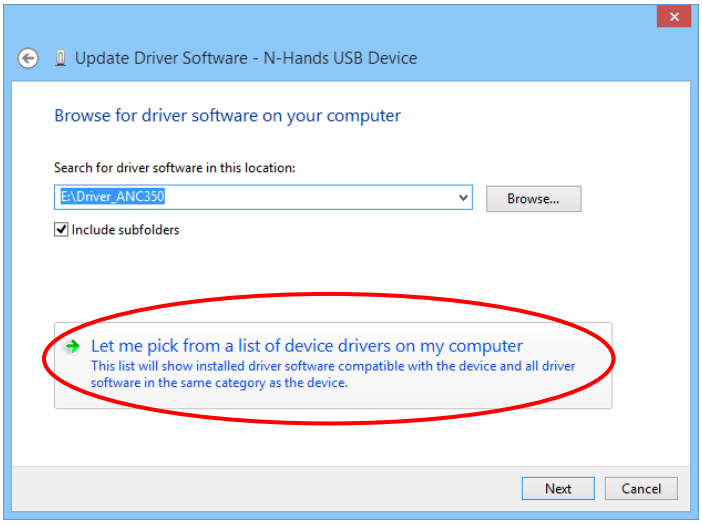
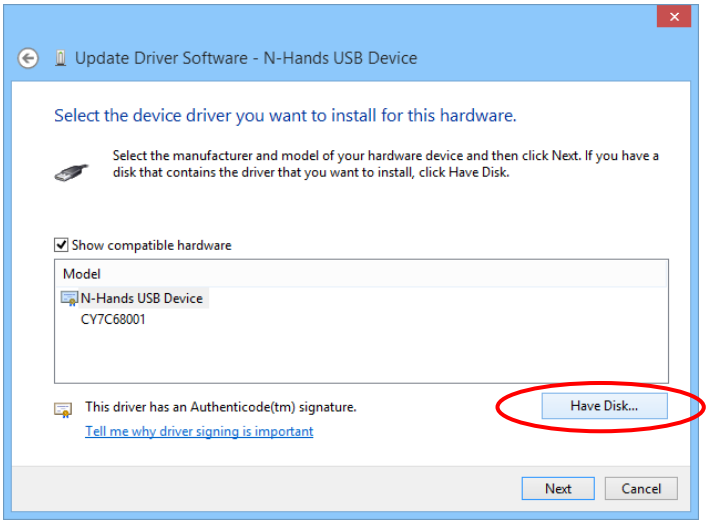


In the next window, choose the directory where the wizard should search for the driver.

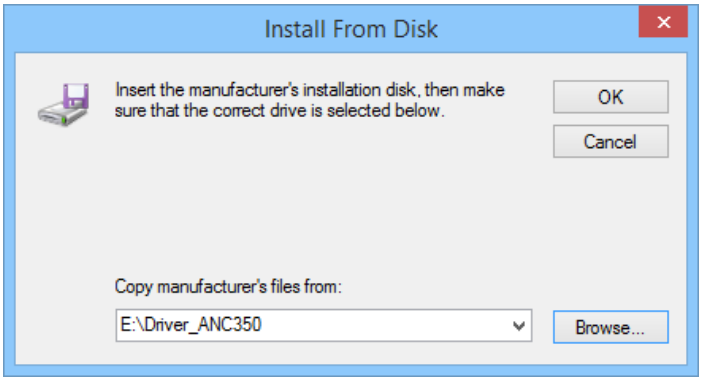
Check: "Let me pick from a list of device drivers on my computer".

Click "Next".



In the subsequent window, choose "Have Disk" and choose either the CD-Rom path if the driver is installed from CD or the path where you copied the folder ANC350 Driver to.

Click "Have Disk".

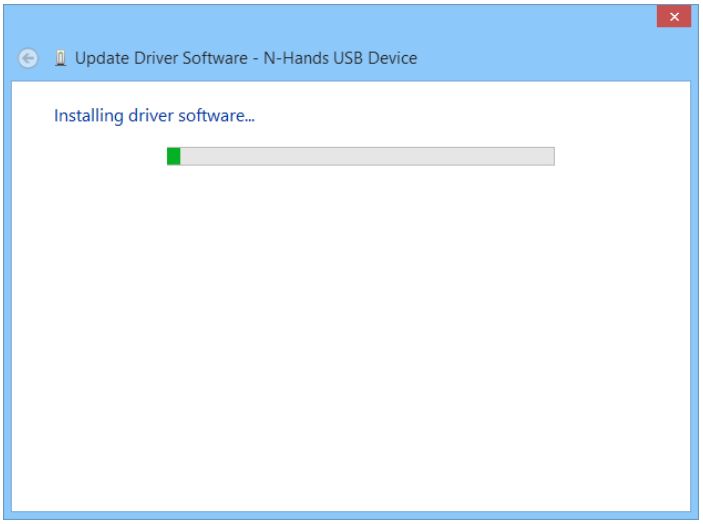


If installing from CD, choose the following path:

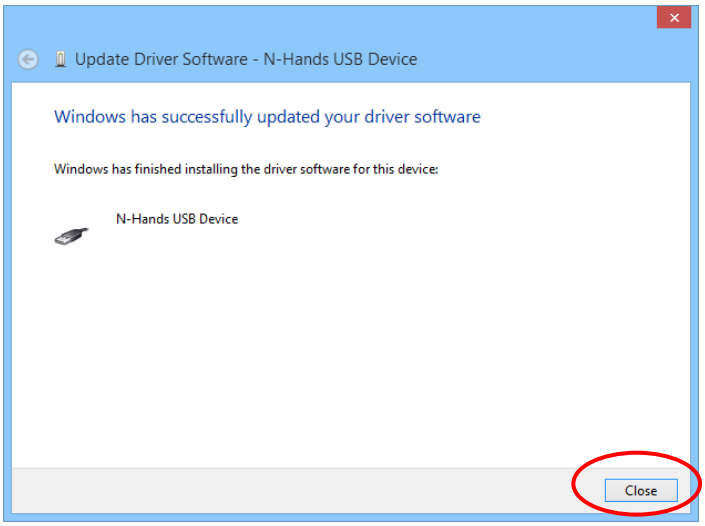
\Software\ANC350_Software_v*.*.**\
ANC350_USB_Driver\

Otherwise choose the path of the copied drivers

Click "OK".



A progress bar will show the status of the installation.



Finish the installation by pressing the 'close' button.

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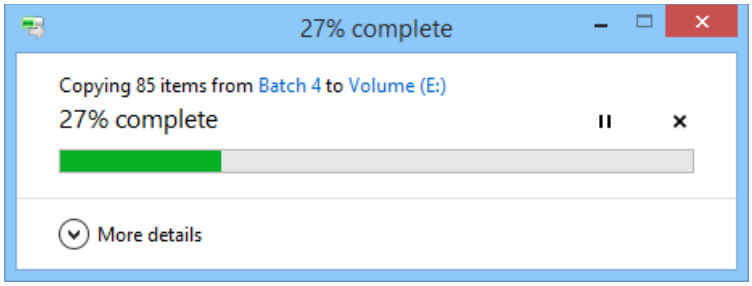
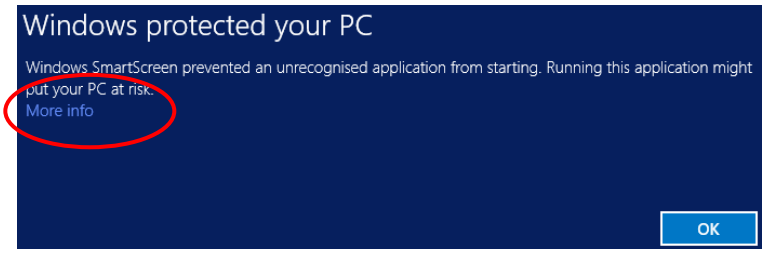
IV.4. DAISY Software Installation

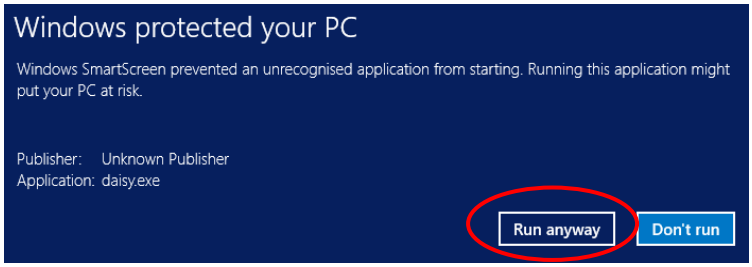


For the installation of the DAISY software, please copy the folder *\Software\ANC350_Software_*v*.*.**\ANC350_GUI* on the enclosed CD and all of its contents to a new folder on your hard drive. In order to launch the software, simply execute the file *daisy.exe* within the new folder (an installation of the software is not required). If desired, a shortcut to the program can be created on the desktop.



When initially executing the file "daisy.exe", a warning message may appear. Choose "Do not block again" to go ahead.

For Microsoft Windows 8 ®™*) and newer one needs to select "more info" option.



Continue with "Run anyway"

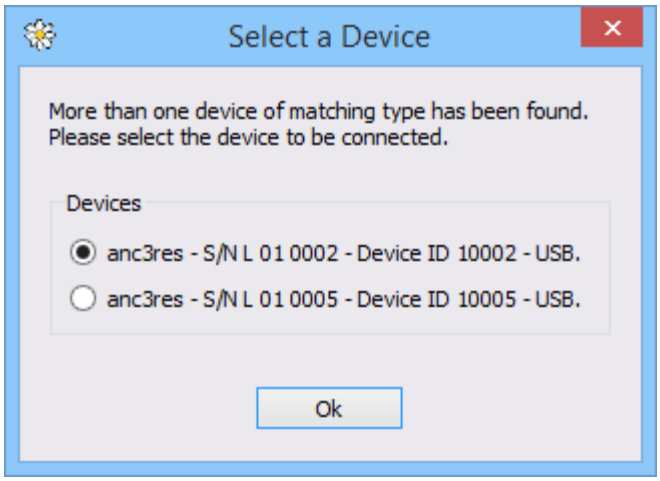
Depending on the operating system the warnings may vary

V. Starting the System

The ANC350 positioning system can be fully controlled with the DAISY software. In the following, a detailed description on how to operate this software is given.

The ANC350 can be connected to the host PC via USB or Ethernet (optional feature). By starting up the system, the software will search for connected ANC350s. Any motion controller connected via USB will be linked first. Note: Only **one** ANC350 can be connected at any one time with the DAISY.

If two or more ANC350 are connected to the PC a popup will request to choose ANC350.



The chosen ID and hard-coded serial are shown.

Daisy can only be connected to one ANC350 at one time.
To control more than one ANC350 several instances of Daisy must be started.

Already connected ANC350 will not be shown in the popup window.

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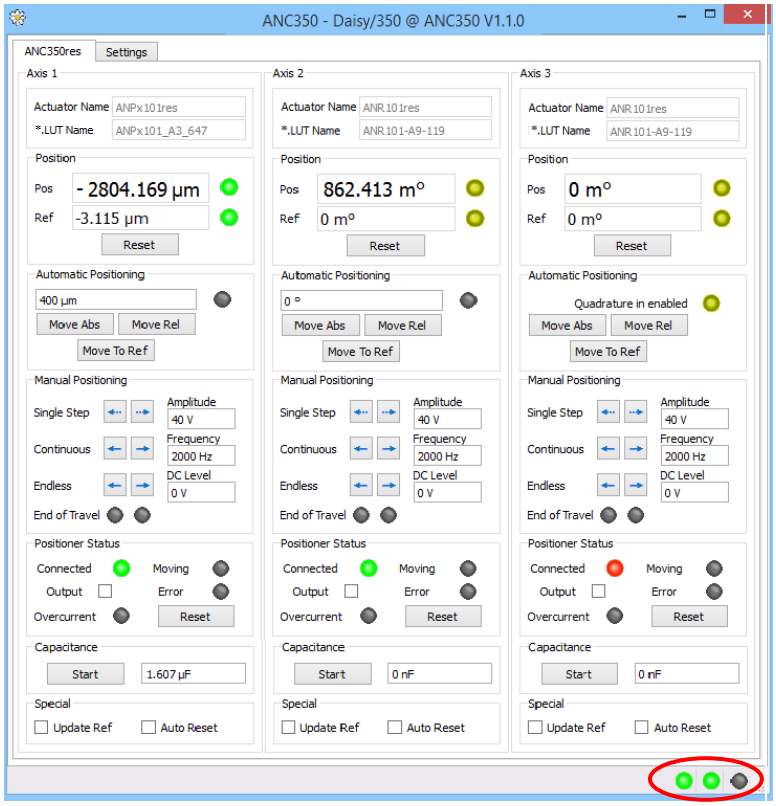
V.1. Starting the GUI (DAISY)

The main GUI [*Daisy.exe*] can be found in the software folder on the CD
..\Software\ANC350_Software_v***\ANC350_GUI
After starting Daisy the standard ANC350 user interface window for three axes will be loaded.



First of all, check if the (left) status LED in the lower right is illuminated, verifying a proper connection between ANC350 and the host PC. There are three LEDs in this software window, with the following functionalities:

left LED:	"*Connection to Server*"	→ ***green*** if connection to the ANC350 is established, otherwise *red*.
middle LED:	"Receiving Data"	→ ***grey*** when using an ANC350
right LED:	"Data Overflow"	→ always ***grey*** when using an ANC350

If the left LED is illuminated ***red***, check all connections and driver installation.

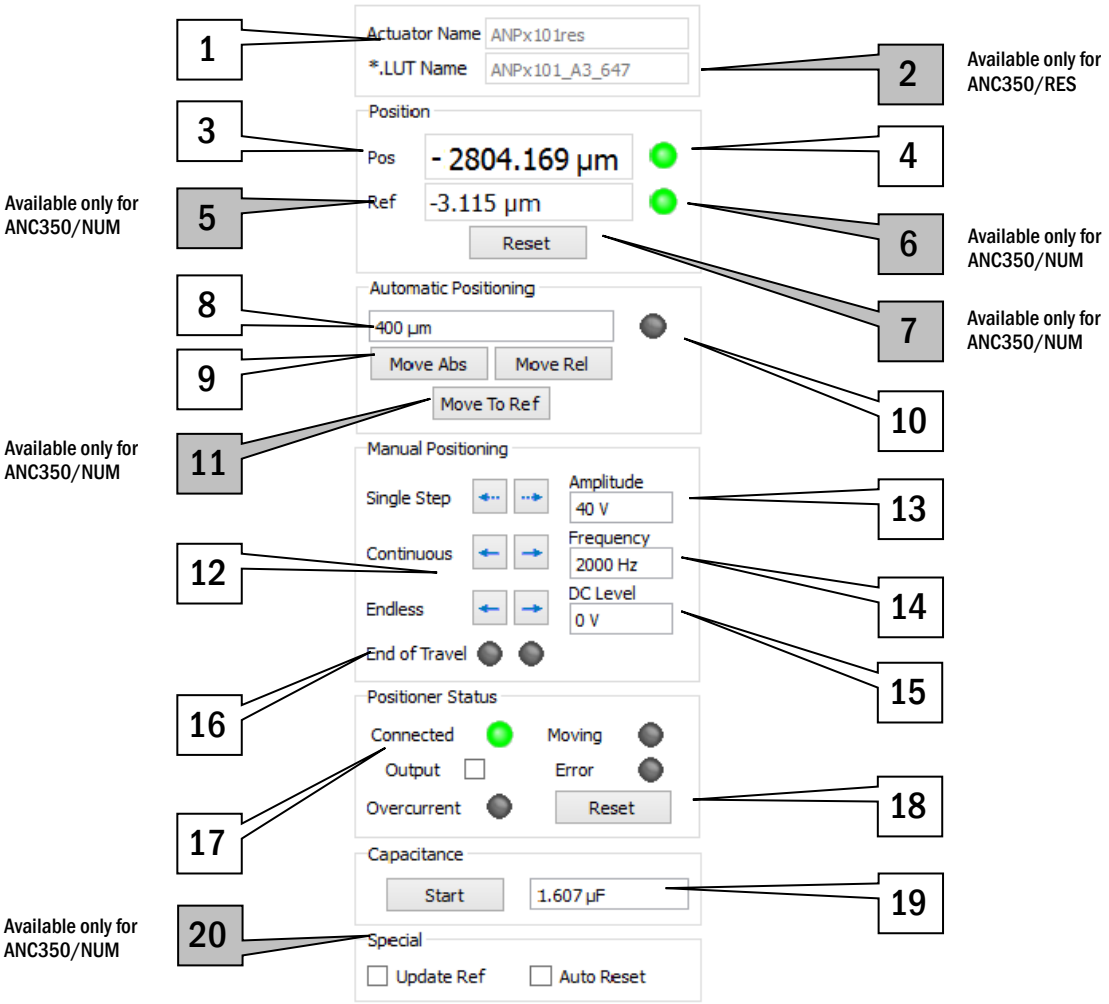
Note: Generally, an ANC350 GUI profile (*.ngp-file) consists of individual panels (*.ngc-files). In simple words, these panels designate input arrays for axis controls, ethernet settings and feature settings. In addition, these panels include all parameters necessary for the positioning or scanning process.

If other configurations are needed one can place another configuration tab (*.ngp-file or *.ngc-file) by drag-and-drop in the centre of the Daisy window.

The main window of the attocube profile “ANC350***.ngp”, for example, combines the axis control panel for 3 individual axes and the settings panel. To switch between the individual panels, simply choose the corresponding flag on top of the window. It is also possible to place several control windows next to each other by detaching them from the DAISY environment by double clicking on control window.

V.2. Software – Axis Control

The following figure shows the features available for each axis:



The software allows entering values for some parameters such as position, amplitude and frequency of a positioning stage into specific input fields.

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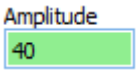
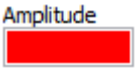
Note: All values typed into respective input fields need to lie within a certain range allowed by the software. Typed values need to be confirmed by hitting the "Enter"-button. Unless a value is confirmed, the ANC350 uses the last confirmed value.

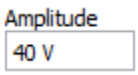
With respect to input confirmation, three different display modes may appear:



A ***green box*** indicates an allowed value which needs to be confirmed.



A ***red box*** indicates a value outside the allowed range or an uncompleted value.



A ***white box*** indicates an allowed and subsequently confirmed value.

In the following, the different features available for each axis will be explained in detail:

Actuator Name [01] Different positioner types can be selected in the "*settings*"-tab and saved to the system for optimal positioning results.

***.LUT Name** [02] Serial number of the selected look-up table file

Only ANC350RES

Position [03-04] This indicator displays the current position of the positioner connected to the respective axis. If a rotary positioner (ANR) is used, an additional counter indicates the number of revolutions.

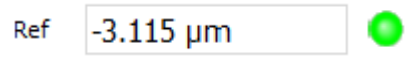
Linear positioner:

Rotary positioner:

The LED indicates whether the positioner is within a specified distance to the specified target.
*(see also "target range" in chapter **V.2.1**)*

Reference [05-06]

Only ANC350NUM



This display refers to the /NUM system only. In contrast to the /RES system, which is reading out an absolute position, the /NUM system uses an incremental encoding method.
Each /NUM positioner has its individual reference position, given by a physical marker on an optical grating mounted in the inside of the positioning stage. Due to the physical nature of this marker, the reference position does exist even after closing the DAISY software or shutting down the ANC350.
The value indicated in the 'Reference'-field corresponds to the distance between the position of the reference mark and the current zero-position.
If the computer read-out is restarted, the positioner needs to be moved across the mark once in order to initialize its reference position.
Only after this process, the read-out provided by the software is accurate, indicated by a green LED "VALID". If no referencing has been performed, the LED is lit red.

Reset [08]

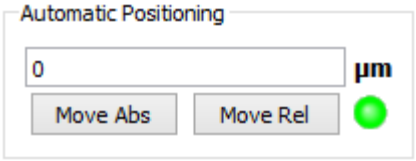
Only ANC350NUM

Pressing this button resets the current position to "0". The reference value is updated automatically. This feature is only valid for the /NUM system.

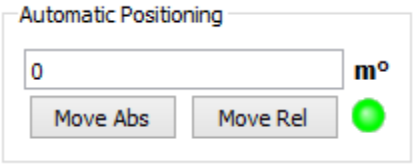
Automatic Positioning [08-10]

The following controls determine the closed loop functionalities of the ANC350.

Linear positioning stage:

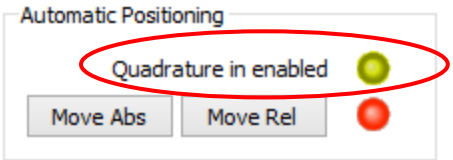


Rotary positioning stage:



Target: In this (input) box, the desired target position needs to be entered. This position may either be an *absolute distance* or a *relative distance* which the positioner is supposed to travel. No movement of the positioner is caused unless the "move" button is pressed.

In the case of activated quadrature input trigger the input box will be replaced by the indicator *"Quadrature enabled".* The target position can only be entered by the trigger inputs.



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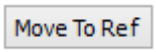
Move Abs: : If an absolute positioning is selected by pressing the "Absolute"-button, the positioner travels from its current position to the target position entered in the "Position" field.

Move Rel: If relative positioning is selected, the positioner travels a distance according to the entered value. In this case, the entered value is *added* to the current position.

Output LED: The led indicates green/red if the output of the corresponding axis is enabled.

Move to Ref [11]

Only ANC350NUM



By pressing this button, the positioner travels to the *absolute reference position,* presuming a referencing motion has already been executed (*green "Valid"-LED is illuminated*).

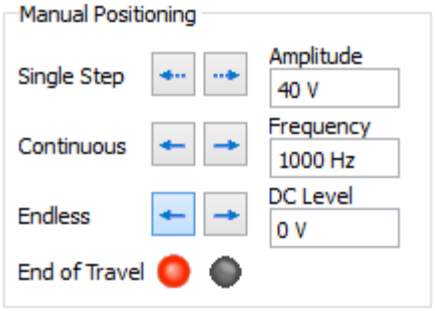
In case of the /RES system, there is no reference position. Therefore, the "Reference" button is available only when using a /NUM positioner.

Note. During controlled positioning, no other functionality of the software is available. However, the controlled positioning can be stopped at any time by re-pressing either the "Absolute" or "Relative"-button.

Note. Whenever the axis is operating, i.e. the positioning stage moving in closed loop mode, the move button will be coloured light blue until the positioner is stopped.

Manual Positioning **[12-16]**

By operating the controls within the "Manual Positioning" window, a positioner connected to the ANC350 can be driven manually via the software interface.



Single Step [12]**:** The positioner travels one step [alternatively the number of steps entered in *Step Count* box] in the selected direction with each actuation.

Continuous [12]**:** The positioner travels in the selected direction as long as the button remains actuated or a stop is detected [if hump detection is enabled]. The step repetition frequency is given by the field "Frequency".

Endless [12]**:** This button stays activated when pressed, causing the positioner to move until the button is unlatched (pressed again) or a stop is detected [if hump detection is enabled].

Amplitude [13]**:** Value for the drive voltage of the piezo drive. By changing this value, the step size of the positioner can be varied. The allowed voltage values range from 0V to 70V. The maximal voltage depends on the particular positioner type.

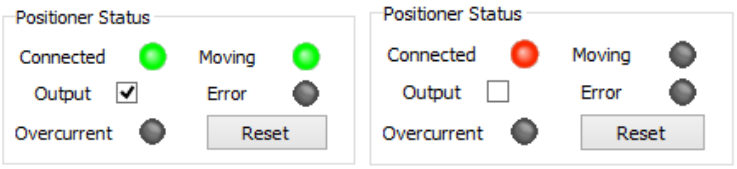
Frequency [14]**:** Here, the desired frequency of the voltage signal applied to the piezo translation stage can be entered. The frequency is proportional to the travel speed of the positioner and vice versa. The allowed frequency values range from 1Hz to 5kHz for one axis and 1Hz to 2kHz for all axes.

DC Level [15]**:** The "DC Level" (offset) box is both indicator and input for the applied DC-voltage to the piezo.

End of travel LED [16]**:** These LEDs are illuminated *red* if the positioner reaches a mechanical end stop or if its movement is stopped by any other influence. Otherwise the LED is gray.

Note: In general, piezo elements change their properties due to different environmental conditions such as heavy loads or low temperatures, etc.

Positioner Status **[17-18]**



This area provides information on the sensor status.

Connected: Indicates if a positioner is connected to the respective axis. A properly connected positioner will cause the LED to be illuminated green, otherwise it will be red.

Moving: Indicates if the positioner is moving regardless of the moving mode [absolute, relative, open loop].

Output: By checking the "Output Enable" box, the respective axis output is enabled. Deactivating this box sets the axis to GND.

After a restart of the electronic the axes are set to ground by default.

Error: Indicates a malfunction of the sensor. If a fully operational positioner is connected to the ANC350, this LED is in switched-off state (*grey*). If this LED indicates an error (*red*), please check the connection between positioner, ANC350, and the computer. If the error signal persists, the

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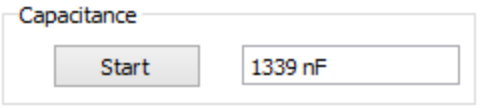
sensor may be contaminated or even damaged. In this case, please contact our attocube support team.

The **Overcurrent** LED indicates a voltage error e.g. a short circuit.

Reset will reset the alarm.

Capacitance Measurement **[19]**



Pressing the **Start** button measures the actual capacitance of a connected positioner shown in the separate box on the right.

Reference Specials **[20]**

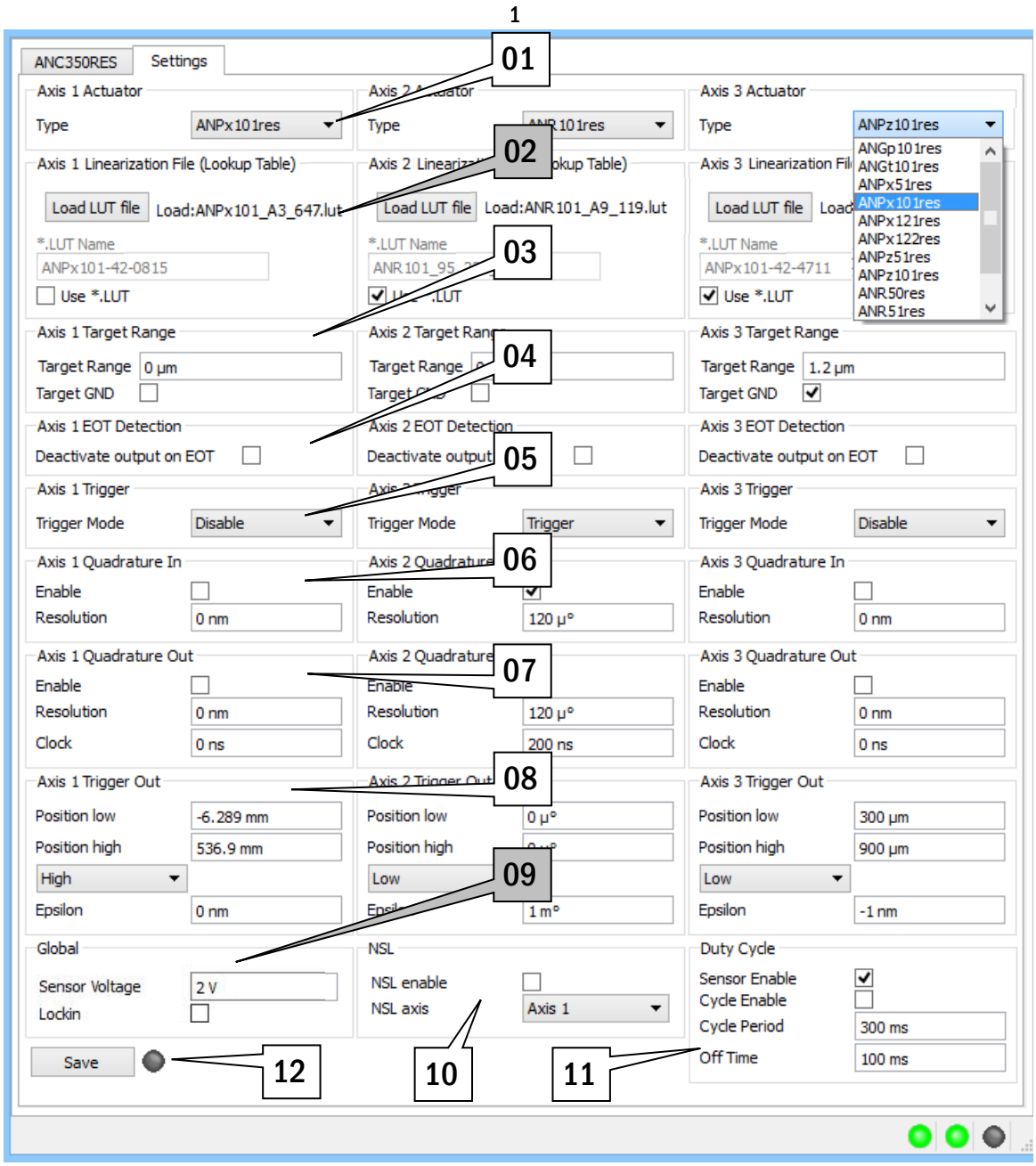
When **Update Ref** is enabled, every time the reference marking is hit, the reference position will be updated. When disabled, the reference marking will be considered only the first time, later hits will be ignored. Only applicable for ANC350NUM.
When **Auto Reset** is enabled, every time the reference marking is hit, the position will be set to zero. When disabled, the reference marking will be ignored. Only applicable for ANC350NUM.

V.2.1. Settings

This module provides setting options for a more comfortable positioning with higher precision.

The settings module creates furthermore the possibility to generate position-dependent output/trigger signals which can be accessed on the 26-pin sub-D trigger connector of the ANC350 [*see chapter III.1*].

All Trigger signals are LVTTL compatible, i.e. the high-signal value is 3.3V and the low-signal value 0V [*see chapter III.1*].



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Note: **Before operating any axis** the "Actuator Type" of the respective positioner needs to be loaded into the software . The specific command to perform this action is located in the "Manual Positioning" array and will be described in detail later. This procedure will import positioner-characteristic parameters into the GUI and guarantees an accurate positioning.

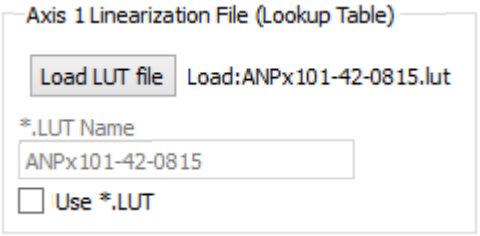
Actuator Type [01]

The actuator type drop down menue provides general parameters for the positioner like essential values for end of travel detection or value conversion for readout.

For RES positioners an additional *.lut-file is required for a more accurate readout.

Linearization-File [Look Up Table] [02]

Only ANC350RES



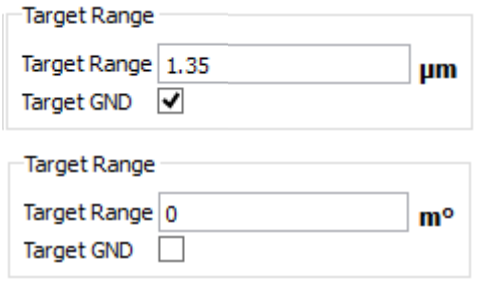
Load LUT file (Look Up Table): Pressing the button "*Load LUT File"* opens up the browser window and allows loading a calibration/parameter file (*.lut-files). For each attocube positioner with resistive readout, an individual parameter file exists (e.g. "ANPx101-42-0815.lut").

Next to the Load-button the name of the loaded file is shown.

By loading a parameter file, all linearization parameters of a positioner will be imported into the GUI. For convenience, the serial of the currently loaded positioner parameter file is displayed in the "*.***LUT Name**" box. For stand-alone usage of the ANC350, these parameter files can also be uploaded to the controller .

By pressing "***Use *.LUT***" the specific linearization parameters of the loaded file will be used.

Target Range [03]



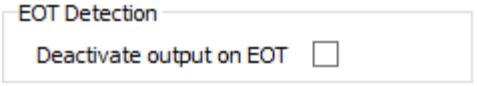
Target Range defines the range around the target position in which the flag target status becomes active.

Indicator LED retrieves the target status. Indicates whether the actual position is within the target range.

The target status will be shown in the main module next to the actual position.

Target GND: The positioner will be grounded, if the target position is reached. There will be no correction of the actual position by applying a constant voltage to the positioner.

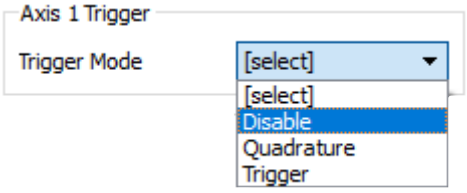
EOT Detection [04]



EOT (end of travel) detection indicates hitting a mechanical end stop or if the movement of the positioner is stopped by any other influence.

Bkwd LED / Fwd LED: These LEDs are illuminated *green* if the positioner reaches a mechanical end stop or if its movement is stopped by any other influence. Otherwise the LED is gray.
Deactivate output on EOT: Once a stop is detected, the system either stops the positioning operation or continues running depending on whether the "deactivate output on EOT" is activated or not.

Trigger enable [05]



The trigger drop down menu lets you choose the options for the input and output trigger.

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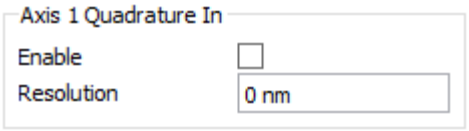
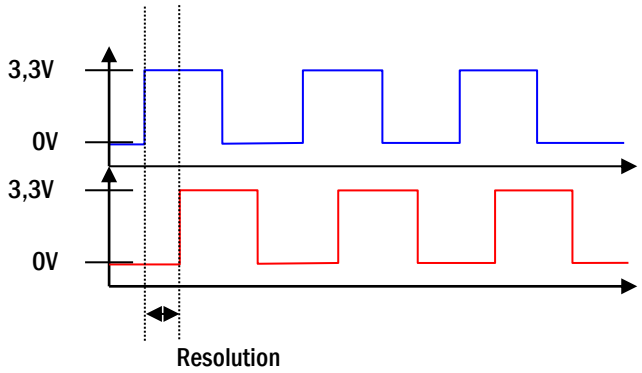
Quadrature In [06]



The Quadrature input trigger updates the target position for closed loop positioning. To actually control the positioner, the move button must be activated.

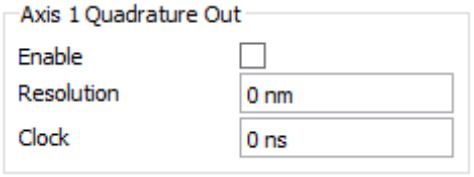
When the **Enable** box is checked, the input trigger will change to a quadrature signal with the resolution entered in the **Resolution** field.

The target field on the main tab will be hidden if quadrature in is enabled.



Resolution: distance between the two levels in the quadrature signal. [¼ of one cycle]

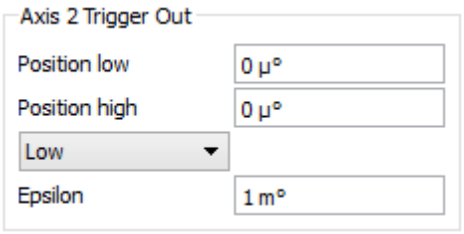
Quadrature Out [07]



The quadrature output provides real time information on the actual position of the target, allowing to calculate the contouring error (difference between target position and actual position) or simply verifying physical motion of the positioning unit.

Enble: The **check box** will **enable** the quadrature output trigger separately. The read-out resolution can be set to a different value than the input trigger.

Trigger Out [08]

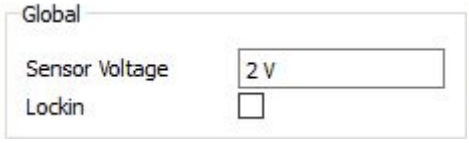


The trigger outputs react within the defined limits with the selected polarity.
Position low: Position value at which a trigger signal is initiated.
Position high: Position value at which the trigger signal is aborted.
The **polarity** indicates whether the signal is high or low in between the two trigger positions "low" and "high".
Epsilon: Threshold at which the trigger signal is initiated and aborted, respectively, relative to its actual boundaries.

Recommended values are:
ANR rotary positioners: Epsilon = 5mdeg
ANP linear positioners: Epsilon = 1µm

Note. The trigger low position needs to be smaller than its corresponding high value.

Global [09]
Additional feature, available only for ANC350/RES



This control sets the voltage applied to the resistive readout system. The voltage can be set from 0.00V to 2.048V. Typically, a very small voltage (marginal heat generation) is used for low temperature applications, whereas higher voltages are used at elevated temperature (increased resolution).

Note. Adjusting the reference voltage of the resistive readout system provides the user the opportunity to optimize the system according to the specific application.

Higher voltages enhance the sensitivity of positioning and provide a better signal to noise ratio. Low voltages, however, minimize the heat dissipation, making the system advantageous for low temperature applications where little heat input is required.

If the voltage is set to 0.00 the actual position of all resistive axes will be set to –INF.

The **Lockin** check box will enable a Lock-In with the above mentioned voltage to reduce the heat production inside the resistive element.

NSL [10]

The NSL box enables/disables the direct connection to ASC500.

[only for direct connection between ANC350 and ASC500]

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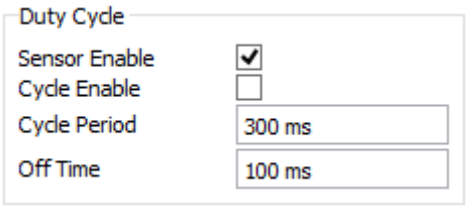
Duty Cycle [11]
Additional feature, available only for ANC350/NUM



For ANC350 piezo motion controller with duty-cycling option there is the possibility to minimize the heat dissipation for /NUM-Positioners.

Sensor Enable allows to enable/disable the voltage feed for the sensor completely.

Cycle Enable enables/disables the duty cycle feature.

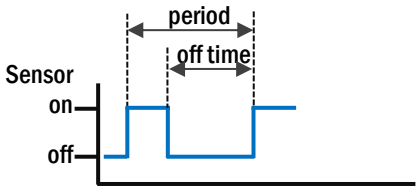
This is achieved by cycling the sensor of the /NUM-Positioner which means it is constantly switched on and off. The ratio between the time the sensor is activated ("On-time") and the time the sensor is off and blind ("Off-time") give the reduction of the heat dissipation. This ration could be chosen in respect to two conditions: The minimum On-time is 10ms otherwise the sensor will not be activated completely.

The maximum Off-time must be set in a way that the maximum travel of the positioner, while the sensor is off and blind, is smaller than a quarter of the period of the sensors grating (20µm for all linear /NUM-Positioners).

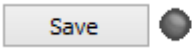
The table below shows some typical duty-cycling values in respect to the conditions descript above. The values set in the ANC350 are "Period" and "Off time".

ANC350 duty cycling values							
	On time	ms	**10**				
	ratio		50,00%	20,00%	10,00%	4,00%	2,00%
	max.	µm/s	**250**	**63**	**28**	**10**	**5**
ANC350 values	**Period**	ms	20	50	100	250	500
	Off time	ms	10	40	90	240	490

The duty-cycling option could be enabled or disabled for all /NUM-axis of the ANC350 controller.



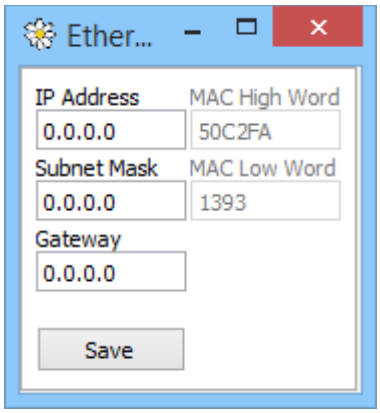
Save [12]



Press this button to save all axis parameters and global settings to your ANC350. This avoids reentering the parameters for subsequent usage and allows stand-alone operation of the ANC350.

The LED next to the "Save"-Button is illuminated as long as the saving process is ongoing. Please do not switch off the controller or software while the LED is illuminated.

V.3. Configuring ethernet settings



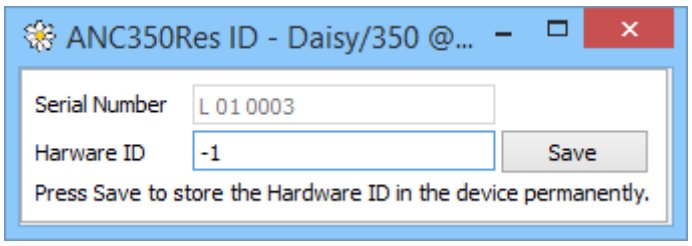
The Ethernet settings can only be set in the Daisy-GUI.

For this purpose one can place the *ethernet.ngc* on *Daisy* via drag and drop.

Specific Ethernet settings for communication with ANC350 via network can be set for different requirements.

For further information please contact your system/network administrator.

V.4. Changing ANC ID



By using „*id.ngc*" one can set an ID number to identify the ANC in the system.

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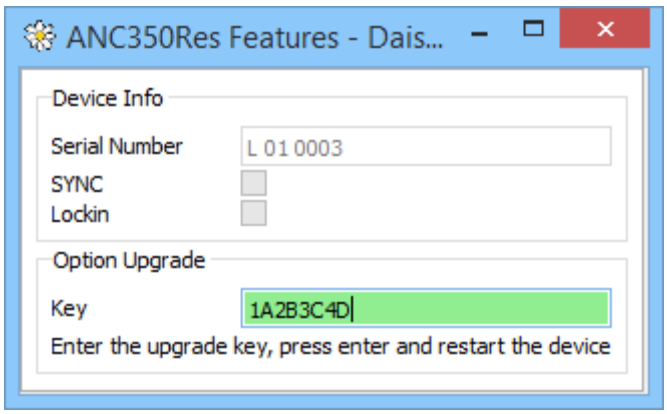
V.5. Upgrading



To obtain more functions on the ANC350 such as Ethernet the ANC350-software can be upgraded.

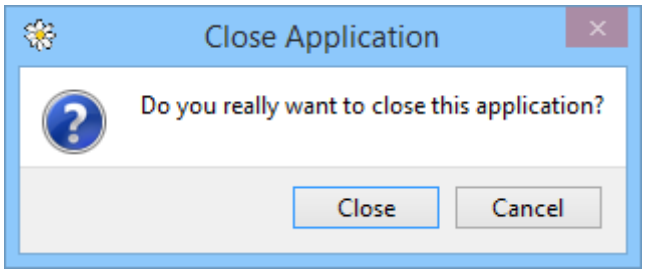
These features can be unlocked by a code provided by attocube.

The required "*feature.ngc*" can be found in the same folder as Daisy.exe.

Available upgrade options are shown below the serial number. If the corresponding box is not checked, the function is not available for this controller.

For further information please contact your sales representative or send an email to sales@attocube.com

V.6. Closing the GUI and switching off the ANC350



To avoid malfunctions, always shut down the software connection between ANC350 and PC and exit the DAISY software before switching off the ANC350 or when the ANC350 is not in use.

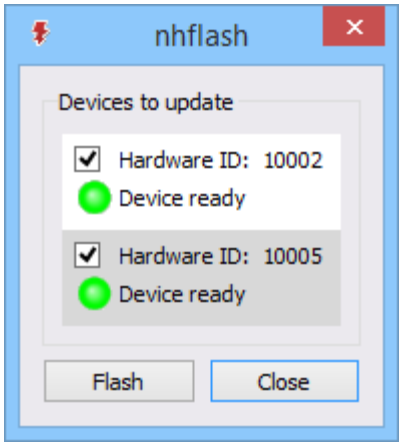
VI. Firmware Update Procedure

Requirements

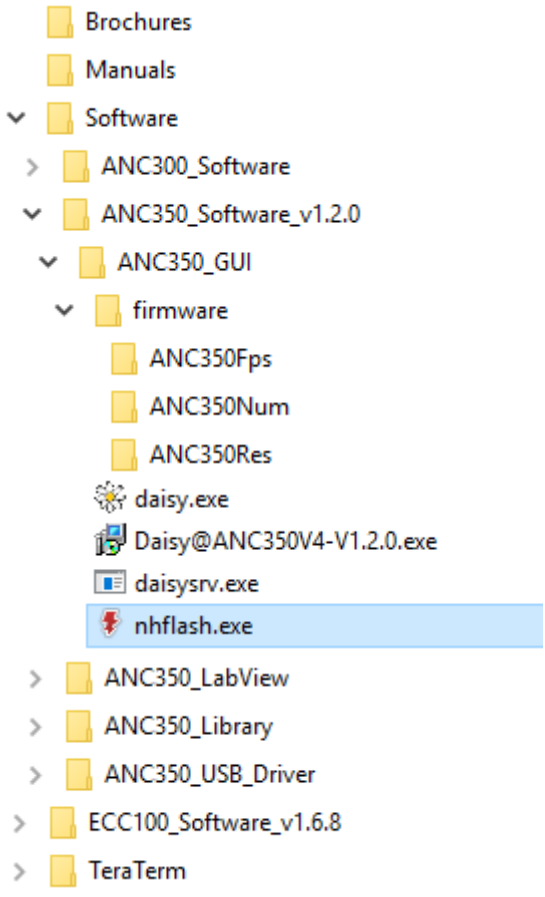
The controller is connected to the computer. The software and the drivers are already copied onto your computer and the hardware driver is correctly installed as described in chapter IV.3 .

First execute the separate program “nhflash.exe” (to be found in same folder as Daisy.exe).
The updater will automatically check for all connected ANC350 and obtain their IDs.

While updating make sure not to disconnect the power cable or disrupt the USB or Ethernet connection in any way.



The firmware folder must be stored in the same folder as nhflash.exe:



All connected ANC350 will be shown and can be updated at one time.

Choose the specific ANC350(s) you want to update and press the “Flash”-button.

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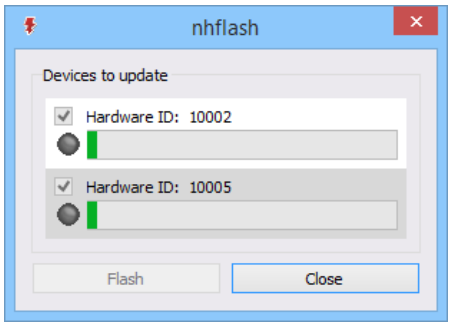
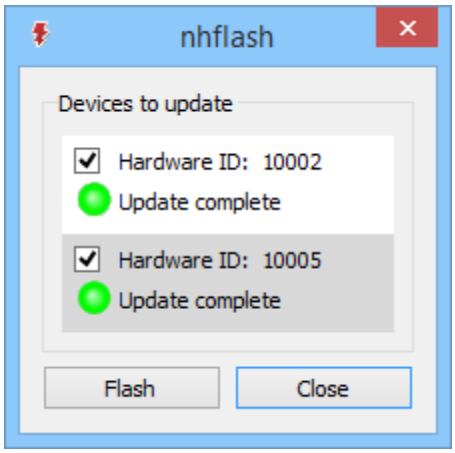
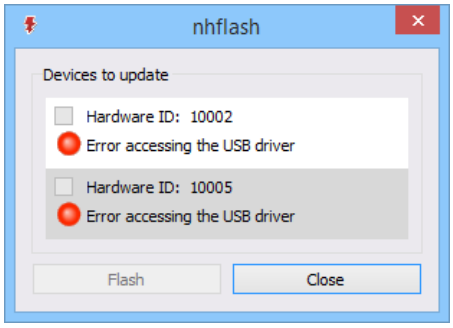


The update process shows a progress bar.



After a successful update process it may be necessary to reboot the controller.



The reboot is only advisable after a successful update.

If any error occurs one has to repeat the complete update process.

Otherwise severe damages may occur to the controller.

VII. DLL and LabView calls

To control the ANC350 without the DAISY software, a *.DLL library [*anc350v4.dll*] including a detailed documentation is available. The library can be found on the installation CD.

The documentation can be found on the CD in the following folder:
[*Software* *ANC350_Software* *ANC350_Library* *Documentation* \]

The header-file can be found here:
Software *ANC350_Software* *ANC350_Library* *Documentation* *inc*

Windows ® (64 Bit) may require Microsoft ® Visual C++ Redistributable Package (x64) .

General information and settings

Discover

ANC350v4_Discover.vi

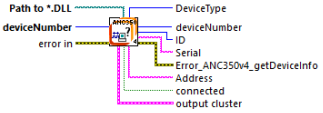
The function searches for connected ANC350 devices on USB and LAN and initializes internal data structures per device.
Devices that are in use by another application or PC are not found.
The function must be called before connecting to a device and must not be called as long as any devices are connected.
The number of devices found is returned. In subsequent functions, devices are identified by a sequence number that must be less than the number returned.

Input
- ifaces — Interfaces where devices are to be searched
  - 0 = none
  - 1 = USB
  - 2 = Ethernet
  - 3 = all

Output
- devCount — number of devices found
- error — error message

getDeviceInfo

ANC350v4_getDeviceInfo.vi



Returns available information about a device.
The function can not be called before ANC_discover but the devices don't have to be connected .
All Pointers to output parameters may be zero to ignore the respective value.

Input
- deviceNumber — deviceNumber
- error — error message

Output
- deviceNumber — deviceNumber
- deviceType — type of the ANC350
  - ANC350RES
  - ANC350NUM
  - ANC350FPS
  - type unknown
- ID — number of the configured axis (0..2)
- serial number — The device's serial number
- address — The device's interface address if applicable. Returns the IP address in dotted-decimal notation or the string "USB", respectively.
- connected — Indicates if the device is already connected
- error — error message

registerExternalIP

ANC350v4_registerExternalIp.vi

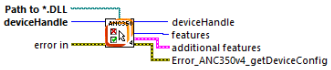
The function will return ANC_Ok if the name resolution succeeds (ANC_NoDevice otherwise); it doesn't test if the device is reachable.
Registered and reachable devices will be found by @ref ANC_discover

Input
- hostname — Hostname or IP Address in dotted decimal notation of the device to register.

Output
- error — error message

getDeviceConfig

ANC350v4_getDeviceConfig.vi



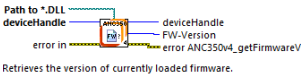
Reads static device configuration data.

Input
- device number — Sequence number of the device. Must be smaller than the devCount from the last ANC_discover call.
- error — error message

Output
- device number — Sequence number of the device.
- features — Bitfield of enabled features
  - 0x01 "Sync": Ethernet enabled
  - 0x02 "Lockin": Low power loss measurement only for RES
  - 0x03 "DutyCycle": Low power loss measurement only for NUM
  - 0x04 "APP": Control interface for tablets
- additional features — cluster of all available features and status
- error — error message

getFirmwareVersion

ANC350v4_GetFirmwareVersion.vi



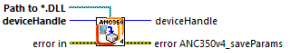
Retrieves the version of currently loaded firmware.

Input
- deviceHandle — device handle
- error — error message

Output
- deviceHandle — device handle
- version — version number
- error — error message

saveParams

ANC350v4_SaveParams.vi



Saves parameters to persistent flash memory in the device.
They will be present as defaults after the next power-on.
The following parameters are affected: Amplitude, frequency, actuator selections as well as Trigger and quadrature settings.

Input
- deviceHandle — device handle
- error — error message

Output
- deviceHandle — device handle
- error — error message

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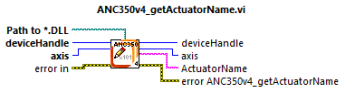
getActuatorName



Get the name of the currently selected actuator

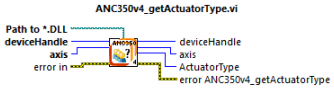
Input

deviceHandle	device handle
axisNo	number of the axis to be configured (0..2)
error	error message

Output

deviceHandle	device handle
axis	number of the configured axis (0..2)
name	Name of the actuator as NULL-terminated c-string. The string buffer should be at least 20 bytes long.
error	error message

getActuatorType



Get the type of the currently selected actuator

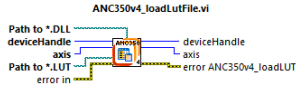
Input

deviceHandle	device handle
axisNo	number of the axis to be configured (0..2)
error	error message

Output

deviceHandle	device handle
axis	number of the configured axis (0..2)
type	Type of the actuator
error	error message

loadLUT



Loads a sensor lookup table from a file into the device.
The function is only available for ANC350Res devices.

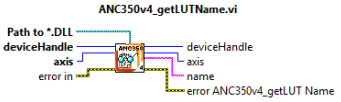
Input

deviceHandle*	device handle
axis*	number of the axis to be configured (0..2)
Path to *.LUT*	direct path to the corresponding *.LUT-file
error	error message

Output

deviceHandle	device handle
axis	number of the configured axis (0..2)
error	error message

getLUTName



Get the name of the currently selected sensor lookup table.
The function is only available in RES devices.

Input

deviceHandle	device handle
axis	number of the axis to be configured (0..2)
error	error message

Output

deviceHandle	device handle
axis	number of the configured axis (0..2)
name	Name of the LUT as NULL-terminated c-string. The string buffer should be at least 20 bytes long.
error	error message

errorHandler

Error handler translates the generated error code to a LabView conform message.

Input

error number	error number generated by the library call

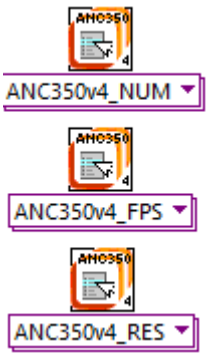
0	Success, no error
(-1)	Unspecified error.
1	Receive timed out.
2	No connection was established.
3	Error accessing the USB driver.
7	Can't connect, device already in use.
8	Unknown error.
9	Invalid device number used in call.
10	Invalid axis number in function call.
11	Parameter in call is out of range.

show popup	if the value is true a popup will be generated to inform the user

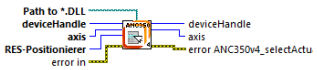
Output

error	error message

Select actuator



ANC350v4sub_selectActuator_RES.vi



Selects the actuator to be used for the axis from actuator presets.

Input

deviceHandle	device handle
axisNo	number of the axis to be configured (0..2)
actuator	Actuator selection [0..255]

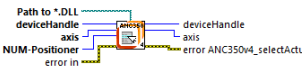
ANPx51	[00]
ANPz51	[01]
ANPz51ext	[02]
ANPx101	[03]
ANPz101	[04]
ANPz102	[05]
ANPz101ext	[06]
ANPz111(ext)	[07]
ANPx111(ext)	[08]
ANPx121	[09]
ANPx311	[10]
ANPx321	[11]
ANPx341	[12]
ANGt101	[13]
ANGp101	[14]
ANR(v)101	[15]
ANR(v)5*	[16]
ANR(v)200/240	[17]
ANR(v)220	[18]

error	error message

Output

deviceHandle	device handle
axis	number of the configured axis (0..2)
error	error message

ANC350v4sub_selectActuator_NUM.vi



Selects the actuator to be used for the axis from actuator presets.

Input

deviceHandle	device handle
axisNo	number of the axis to be configured (0..2)
actuator	Actuator selection [0..255]

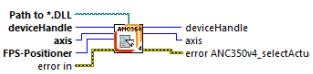
ANGp101num	[00]
ANGt101num	[01]
ANPx51num	[02]
ANPx101num	[03]
ANPx112num	[04]
ANPx121num	[05]
ANPx122num	[06]
ANPx320num	[07]
ANP340num	[08]
ANPz101num	[09]
ANPz111num	[10]
ANR101num	[11]
ECS3030	[12]
ECS3050	[13]
ECS3080	[14]

error	error message

Output

deviceHandle	device handle
axis	number of the configured axis (0..2)
error	error message

ANC350v4sub_selectActuator_FPS.vi



Selects the actuator to be used for the axis from actuator presets.

Input

deviceHandle	device handle
axisNo	number of the axis to be configured (0..2)
actuator	Actuator selection [0..255]

ANP+*	[00]
ANP-*	[01]
ANPextended+*	[02]
ANPextended-*	[03]
ANS+*	[04]
ANS-*	[05]

error	error message

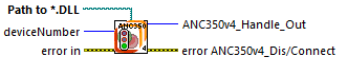
Output

deviceHandle	device handle
axis	number of the configured axis (0..2)
error	error message

Starting and ending communication

Connect / Disconnect

ANC350v4sub_Connect.vi



Initializes and connects the selected device.
This has to be done before any access to control variables or measured data.

DeviceNumber input between 0..n the ANC350v4 will be connected, otherwise the ANC350v4 indicated by the handle will be disconnected.

Input
- device number — Sequence number of the device. Must be smaller than the devCount from the last ANC_discover call
- error — error message

Output
- deviceHandle — device handle
- error — error message

ANC350v4sub_Disconnect.vi

Closes the connection to the device. The device handle becomes invalid.

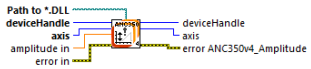
Input
- deviceHandle — device handle
- error — error message

Output
- error — error message

Motion settings

Amplitude

ANC350v4sub_setAmplitude.vi

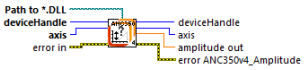


Controls the amplitude of the actuator signal

Input
- deviceHandle* — device handle
- axis* — number of the axis to be configured (0..2)
- amplitude — amplitude in V
- set* — true: send the supplied values to the controller; false: ignore input; only retrieve the results
- error — error message

Output
- deviceHandle — device handle
- axis — number of the configured axis (0..2)
- amplitude — retrieves the set amplitude in V
- error — error message

ANC350v4sub_getAmplitude.vi



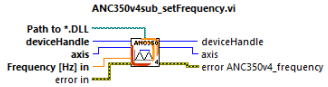
Controls the amplitude of the actuator signal

Input
- deviceHandle* — device handle
- axis* — number of the axis to be configured (0..2)
- amplitude — amplitude in V
- set* — true: send the supplied values to the controller; false: ignore input; only retrieve the results
- error — error message

Output
- deviceHandle — device handle
- axis — number of the configured axis (0..2)
- amplitude — retrieves the set amplitude in V
- error — error message

Frequency

ANC350v4sub_setFrequency.vi

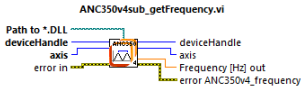


Sets / obtains the frequency parameter for an axis

Input
- handle — Handle of the device to access
- axisNo — Axis number (0 ... 2)
- frequency — Frequency in Hz, internal resolution is 1 Hz
- set/get — set / obtain value
- error — error message

Output
- handle — Handle of the device to access
- axisNo — Axis number (0 ... 2)
- frequency — Frequency in Hz, internal resolution is 1 Hz
- error — error message

ANC350v4sub_getFrequency.vi



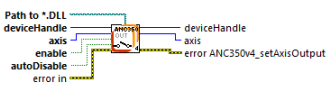
Sets / obtains the frequency parameter for an axis

Input
- handle — Handle of the device to access
- axisNo — Axis number (0 ... 2)
- frequency — Frequency in Hz, internal resolution is 1 Hz
- set/get — set / obtain value
- error — error message

Output
- handle — Handle of the device to access
- axisNo — Axis number (0 ... 2)
- frequency — Frequency in Hz, internal resolution is 1 Hz
- error — error message

setAxisOutput

ANC350v4_SetAxisOutput.vi



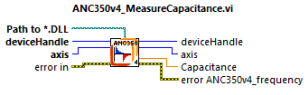
Enables or disables the voltage output of an axis.

Input
- deviceHandle — device handle
- axisNo — number of the axis to be configured (0..2)
- enable — Enable (1) or disable (0) axis output
- autoDisable — the voltage output is to be deactivated automatically when end of travel is detected.
- error — error message

Output
- deviceHandle — device handle
- axis — number of the configured axis (0..2)
- error — error message

measureCapacitance

ANC350v4_MeasureCapacitance.vi



Performs a measurement of the capacitance of the piezo motor and returns the result. If no motor is connected, the result will be 0. The function doesn't return before the measurement is complete; this will take a few seconds of time.

Input
- handle — Handle of the device to access
- axisNo — Axis number (0 ... 2)
- error — error message

Output
- handle — Handle of the device to access
- axisNo — Axis number (0 ... 2)
- Capacitance — measured capacitance
- error — error message

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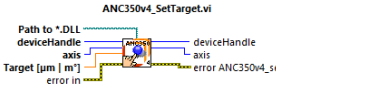
Moving

SetTarget



Sets the target position for automatic motion,
see ANC_startAutoMove. For linear type actuators
the position unit is m, for goniometers and rotators it is degree.

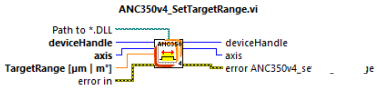
Input

deviceHandle	device handle
axisNo	number of the axis to be configured (0..2)
target	Target position [µm] or [m°]. Internal resulution is 1 nm or 1 µ°.
error	error message

Output

deviceHandle	device handle
axis	number of the configured axis (0..2)
error	error message

SetTargetRange



Defines the range around the target position
where the target is considered to be reached.

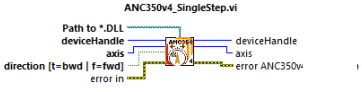
Input

deviceHandle	device handle
axisNo	number of the axis to be configured (0..2)
Range	Target range [µm] or [m°]. Internal resulution is 1 nm or 1 µ°.
error	error message

Output

deviceHandle	device handle
axis	number of the configured axis (0..2)
error	error message

SingleStep



Triggers a single step in desired direction.

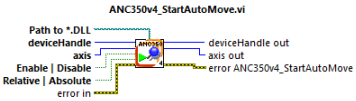
Input

deviceHandle	device handle
axisNo	number of the axis to be configured (0..2)
direction	If the step direction is forward (F) or backward (T)
error	error message

Output

deviceHandle	device handle
axis	number of the configured axis (0..2)
error	error message

StartAutoMove



Switches automatic moving (i.e. following the target position) on or off .

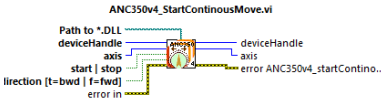
Input

deviceHandle	device handle
axisNo	number of the axis to be configured (0..2)
enable	Enables (T) or disables (F) automatic motion
resolution	If the target position is to be interpreted absolute (F) or relative to the current position (T)
error	error message

Output

deviceHandle	device handle
axis	number of the configured axis (0..2)
error	error message

StartContinousMove



tarts or stops continous motion in forward direction. Other kinds of motions are
topped.

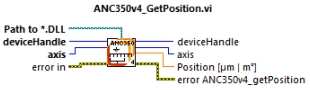
nput

deviceHandle	device handle
axisNo	number of the axis to be configured (0..2)
start	Starts (T) or stops (F) the motion
direction	If the step direction is forward (F) or backward (T)
error	error message

)utput

deviceHandle	device handle
axis	number of the configured axis (0..2)
error	error message

getPosition



Retrieves the current actuator position. For linear type actuators the
position unit is m; for goniometers and rotators it is degree.

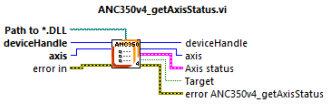
Input

deviceHandle	device handle
axisNo	number of the axis to be configured (0..2)
error	error message

Output

deviceHandle	device handle
axis	number of the configured axis (0..2)
position	Current position [µm] or [m°]
error	error message

getAxisStatus



Reads status information about an axis of the device.
All pointers to output values may be NULL to ignore the information.

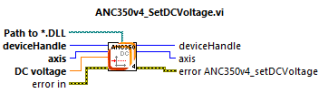
Input

deviceHandle	device handle
axisNo	number of the axis to be configured (0..2)
error	error message

Output

deviceHandle	device handle
axis	number of the configured axis (0..2)
axisStatus	Cluster of status flags
connected	If the axis is connected to a sensor.
enabled	If the axis voltage output is enabled.
moving	If the axis is moving.
target	If the target is reached in automatic positioning
eotFwd	If end of travel detected in forward direction.
eotBwd	If end of travel detected in backward direction.
error	If the axis' sensor is in error state.
error	error message

SetDCVoltage



Sets the DC level on the voltage output when no sawtooth based motion is
active.

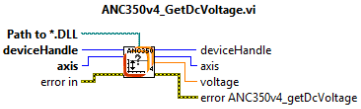
Input

deviceHandle	device handle
axisNo	number of the axis to be configured (0..2)
voltage	DC output voltage [V], internal resolution is 1 mV
error	error message

Output

deviceHandle	device handle
axis	number of the configured axis (0..2)
error	error message

GetDCVoltage



Read back DC Output Voltage.

Reads back the current DC level. It may be the level that has
been set by ANC_setDcVoltage or the value currently adjusted
by the feedback controller.
Currently the function is only available for RES devices

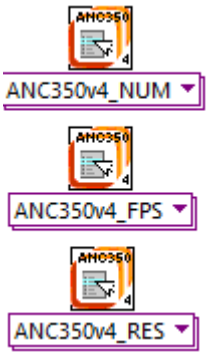
Input

deviceHandle	device handle
axis	number of the axis to be configured (0..2)
error	error message

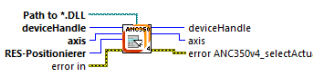
Output

deviceHandle	device handle
axis	number of the configured axis (0..2)
voltage	retrieves the DC output voltage in V
error	error message

Starting and ending communication



ANC350v4sub_selectActuator_RES.vi



Selects the actuator to be used for the axis from actuator presets.

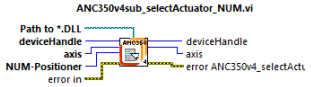
Input

deviceHandle	device handle
axisNo	number of the axis to be configured (0..2)
actuator	Actuator selection [0..255]
	ANPx51 [00]
	ANPz51 [01]
	ANPz51ext [02]
	ANPx101 [03]
	ANPz101 [04]
	ANPz102 [05]
	ANPz101ext [06]
	ANPz111(ext) [07]
	ANPx111(ext) [08]
	ANPx121 [09]
	ANPx311 [10]
	ANPx321 [11]
	ANPx341 [12]
	ANGt101 [13]
	ANGp101 [14]
	ANR(v)101 [15]
	ANR(v)5* [16]
	ANR(v)200/240 [17]
	ANR(v)220 [18]
error	error message

Output

deviceHandle	device handle
axis	number of the configured axis (0..2)
error	error message

ANC350v4sub_selectActuator_NUM.vi



Selects the actuator to be used for the axis from actuator presets.

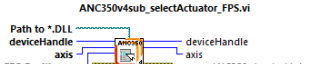
Input

deviceHandle	device handle
axisNo	number of the axis to be configured (0..2)
actuator	Actuator selection [0..255]
	ANGp101num [00]
	ANGt101num [01]
	ANPx51num [02]
	ANPx101num [03]
	ANPx112num [04]
	ANPx121num [05]
	ANPx122num [06]
	ANPx320num [07]
	ANP340num [08]
	ANPz101num [09]
	ANPz111num [10]
	ANR101num [11]
	ECS3030 [12]
	ECS3050 [13]
	ECS3080 [14]
error	error message

Output

deviceHandle	device handle
axis	number of the configured axis (0..2)
error	error message

ANC350v4sub_selectActuator_FPS.vi



Selects the actuator to be used for the axis from actuator presets.

Input

deviceHandle	device handle
axisNo	number of the axis to be configured (0..2)
actuator	Actuator selection [0..255]
	ANP+* [00]
	ANP-* [01]
	ANPextended+* [02]
	ANPextended-* [03]
	ANS+* [04]
	ANS-* [05]
error	error message

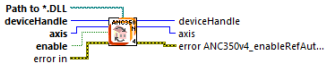
Output

deviceHandle	device handle
axis	number of the configured axis (0..2)
error	error message

Sensor sensitive commands

enableRefAutoUpdate

ANC350v4_enableRefAutoUpdate.vi



Enables or disables the reference auto update for an axis. When enabled, every time the reference marking is hit, the reference position will be updated. When disabled, the reference marking will be considered only the first time, later hits will be ignored. Only applicable for ANC350NUM.

Input

deviceHandle	device handle
axisNo	number of the axis to be configured (0..2)
enable	Enable (1) or disable (0) the feature
error	error message

Output

deviceHandle	device handle
axis	number of the configured axis (0..2)
error	error message

[Only NUM]

enableRefAutoReset

ANC350v4_EnableRefAutoReset.vi

Enables or disables the position auto reset for an axis. When enabled, every time the reference marking is hit, the position will be set to zero. When disabled, the reference marking will be ignored. Only applicable for ANC350NUM.

Input

deviceHandle	device handle
axisNo	number of the axis to be configured (0..2)
enable	Enable (1) or disable (0) the feature
error	error message

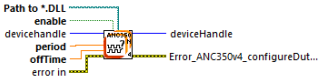
Output

deviceHandle	device handle
axis	number of the configured axis (0..2)
error	error message

[Only NUM]

configureDutyCycle

ANC350v4_ConfigureDutyCycle.vi



Enables and configures the sensor's duty cycle for all axes.
Requires the duty cycle feature to be installed.

Only applicable for ANC350NUM.

Input

deviceHandle	device handle
enable	Enable or disable the duty cycle
period	Duty cycle period [s]
offTime	Duty cycle off time [s]
error	error message

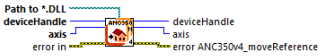
Output

deviceHandle	device handle
error	error message

[Only NUM]

moveReference

ANC350v4_MoveReference.vi



Starts an approach to the reference position.
A running motion command is aborted; automatic moving is switched on.
Requires a valid reference position.

Only applicable for ANC350NUM.

Input

deviceHandle	device handle
axisNo	number of the axis to be configured (0..2)
error	error message

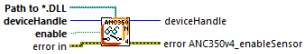
Output

deviceHandle	device handle
axis	number of the configured axis (0..2)
error	error message

[Only NUM]

enableSensor

ANC350v4_enableSensor.vi



Switches the sensor power for all axes on or off.
Only applicable for ANC350NUM.

Input

deviceHandle	device handle
enable	Enable (1) or disable (0) the feature
error	error message

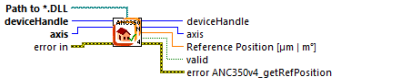
Output

deviceHandle	device handle
error	error message

[Only NUM]

getRefPosition

ANC350v4_GetRefPosition.vi



Retrieves the current reference position. For linear type actuators the position unit is m; for goniometers and rotators it is degree. Only applicable for ANC350NUM.

Input

deviceHandle	device handle
axisNo	number of the axis to be configured (0..2)
error	error message

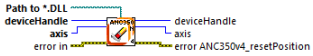
Output

deviceHandle	device handle
axis	number of the configured axis (0..2)
position	Current reference position [µm] or [m°]
valid	Indicates if the reference position is valid
error	error message

[Only NUM]

ResetPosition

ANC350v4_ResetPosition.vi



Sets the current (relative) position of an axis to Zero.

Only applicable for ANC350NUM.

Input

deviceHandle	device handle
axisNo	number of the axis to be configured (0..2)
error	error message

Output

deviceHandle	device handle
axis	number of the configured axis (0..2)
error	error message

[Only NUM/FPS]

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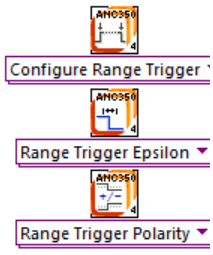
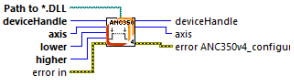
Trigger

Range Trigger



ANC350v4sub_configureRangeTrigger.vi



Configure lower position for range Trigger

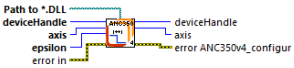
Input

deviceHandle	device handle
axis	number of the axis to be configured (0..2)
lower	lower position for range trigger
higher	higher position for range trigger
error	error message

Output

deviceHandle	device handle
axis	number of the configured axis (0..2)
error	error message

ANC350v4sub_configureRangeTriggerEpsilon.vi



Configure hysteresis for range Trigger.

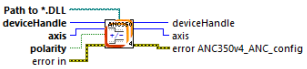
Input

deviceHandle	device handle
axis	number of the axis to be configured (0..2)
epsilon	hysteresis in nm / mdeg
error	error message

Output

deviceHandle	device handle
axis	number of the configured axis (0..2)
error	error message

ANC350v4sub_configureRangeTriggerPolarity.vi



Configure Polarity of Range Trigger

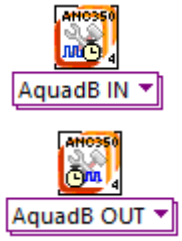
Input

deviceHandle	device handle
axis	number of the axis to be configured (0..2)
polarity	Polarity of trigger signal when position is between lower and upper Low (FALSE) and High(TRUE)
error	error message

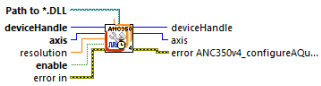
Output

deviceHandle	device handle
axis	number of the configured axis (0..2)
error	error message

AquadB Trigger



ANC350v4sub_configureAQuadBIn.vi



Enables and configures the A-Quad-B (quadrature) input for the target position.

Input

deviceHandle	device handle
axisNo	number of the axis to be configured (0..2)
enable	Enable (1) or disable (0) A-Quad-B input
resolution	A-Quad-B step width in nm.
error	error message

Output

deviceHandle	device handle
axis	number of the configured axis (0..2)
error	error message

ANC350v4sub_configureAQuadBOut.vi

Outputs

1 deviceHandle
2 axis
3 error ANC350v4_configureAQu...

Enables and configures the A-Quad-B output of the current position.

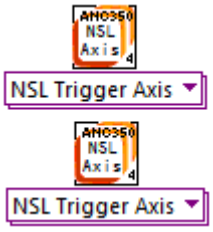
Input

deviceHandle	device handle
axisNo	number of the axis to be configured (0..2)
enable	Enable (1) or disable (0) A-Quad-B output
resolution	A-Quad-B step width in nm.
clock	Clock of the A-Quad-B output [ns]. Allowed range is 40ns ... 1.3ms; internal resulution is 20ns.
error	error message

Output

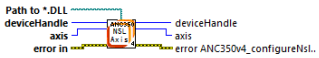
deviceHandle	device handle
axis	number of the configured axis (0..2)
error	error message

NSL-Trigger



r

ANC350v4sub_configureNSLTriggerAxis.vi



Selects Axis for NSL Trigger.

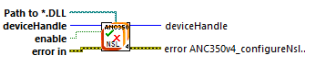
Input

deviceHandle	device handle
axis	number of the axis to be configured (0..2)
error	error message

Output

deviceHandle	device handle
axis	number of the configured axis (0..2)
error	error message

ANC350v4sub_configureNSLTriggerONOFF.vi



Enables NSL Input as Trigger Source.

Input

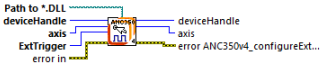
deviceHandle	device handle
enable	disable (DISABLE), enable (TRUE)
error	error message

Output

deviceHandle	device handle
error	error message

configureExtTrigger

ANC350v4_ConfigureExtTrigger.vi



Enables the input trigger for steps.

Input

deviceHandle	device handle
axis	number of the axis to be configured (0..2)
enable triggering	Disable (0), Quadratur (1), Trigger(2) for external
error	error message

Output

deviceHandle	device handle
axis	number of the configured axis (0..2)
error	error message

VIII. Quickstart

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