



**attocube**  
WITTENSTEIN Group



# User Manual

## AMC300



pioneers of precision

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Version: 1.3.22  
Modified: 12/2021  
Products: AMC300 | attoDISCOVERY Software | AMC Webserver Application

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# 1 Notes on This Manual

## 1.1 Purpose and Availability

This user manual applies to the AMC300, also referred to as "device" in this document.

The user manual explains the installation and operation of the device. It contains instructions for the appropriate use and the maintenance of the device.

- Read this manual before setting up and using the device.
- Always keep this manual easily accessible for all device users.

## 1.2 Symbols and Conventions

### 1.2.1 Warning Notes

**WARNING**

This is warning information about hazards that can cause death or severe injuries if the suitable precautions are not taken.

**CAUTION**

This is warning information about hazards that can cause injuries if the suitable precautions are not taken.

**NOTE**

This is warning information about hazards that can cause property damages if the suitable precautions are not taken.

### 1.2.2 Symbols

For the continuing safety of the operator of this equipment and the protection of the equipment itself, the operator must take notice of the warning symbols and notes throughout this manual and - where applicable - on the device itself.

The following safety symbols are used in this manual:



**Protective Earth**



**Risk of electric shock!** High voltages present. May cause injury or death when touched.



**General hazard!** May cause injury or death if the suitable precautions are not taken.



May cause damage to the device, the process, or the surroundings if the suitable precautions are not taken.

### 1.2.3 Information mark up

To improve traceability, the following design conventions are used in this document:

- Names of elements like folders, files, screens, options etc. are marked by "double quotes".
- Prerequisites for actions are displayed with a leading check: ✓.
- Instruction steps which are part of a sequence are displayed with leading ordinal number.
- Instruction steps which are variable or alternative are displayed with leading circle: o.
- Results of instruction parts are displayed with a leading arrow: →.
- References to parts of graphics are displayed in **bold** cardinal numbers.
- Software code or program text as well as file names are displayed in monospace font.
- Variables and wildcards are displayed in *italic font*.
- Keys and buttons are marked by [square brackets].
- References to internal document parts are displayed in orange font.

#### **TIP**

This note provides additional information to simplify your work.

## 2 Declarations

### 2.1 Declaration of Conformity

#### For Customers in Europe



This equipment has been tested and found to comply with the EC Directives 2014/30/EU "EMC Directive" and 2014/35/EU "Low Voltage Directive".

Compliance was demonstrated by conformance to the following specifications, which have been listed in the Official Journal of the European Communities:

- Safety EN61010-1:2010
- EMC EN61326-1: 2013

#### For North American Customers

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules and meets all requirements of the Canadian Interference-Causing Equipment Standard ICES-003 for digital apparatus. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- o Reorient or relocate the receiving antenna.
- o Increase the separation between the equipment and receiver.
- o Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- o Consult the dealer or an experienced radio technician for help.

Changes or modifications to the device that are not explicitly approved by attocube could void the user's authority to operate the equipment.



## 2.2 Waste Electrical and Electronic Equipment (WEEE) Directive

### Compliance



As required by the Waste Electrical and Electronic Equipment (WEEE) Directive of the European Community and the corresponding national laws, attocube 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's 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 (PCBs, housings etc.).

If you wish to return an attocube unit for waste recovery, please contact attocube 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 life products will thereby avoid negative impacts on the environment.

## 3 Safety Information

### 3.1 Important Warnings

**WARNING**

Risk of electric shock!

Inappropriate handling of the device may cause death, severe injury or material damage.

- Never remove the device's protective covers or attempt any repair or adjustment!
- Immediately shut off the device, disconnect the mains supply and contact attocube in case of any suspected malfunction!
- Never connect any cabling to the electronics when the outputs are enabled!
- Be careful not to create short-circuits on the connectors or anywhere in the cabling!

**CAUTION**

General hazard!

The device's operation under inappropriate conditions may lead to injury or material damage.

- Do not operate the device outside its dedicated supply voltage or environmental limits as specified in [4.4](#).
- Do not operate the device unless you are properly trained in the use and handling of mains powered electrical equipment.

**NOTE**

Servicing and maintenance is only allowed to persons with explicit authorization of attocube. There are no user serviceable parts on the device. Modified or open electronics are no longer covered by attocube's warranty.

- Do not open the device.
- For servicing and repair always contact attocube.

**NOTE**

Unauthorized updates can lead to a permanent malfunction and are not covered by attocube's warranty.

- Do not update the firmware of the device without authorization of attocube.

### 3.2 Labels on the Device

The following labels can be found on the device.

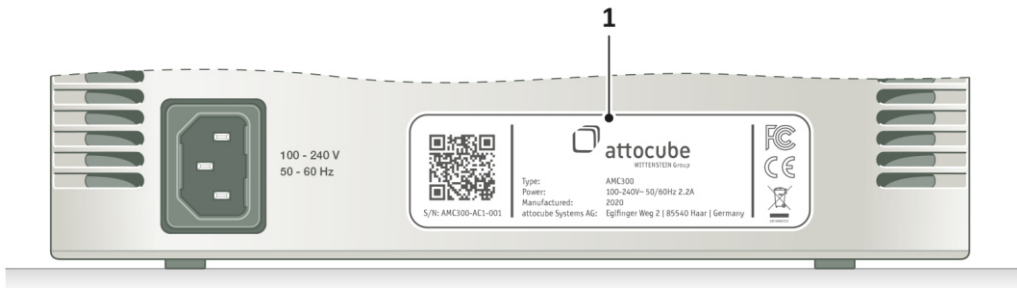


Figure 1 Labels on the device

No.	Label	Explanation	
1		AMC300 type label	
		QR-Code	Link to device support
		S/N	Serial number
		Type	Product name
		Power	Rated power
		Manufactured	Year of manufacture
		FCC	FCC conformity
		CE	CE conformity
		Crossed out wheelie bin	Disposal advice for EU

## 4 Device Description

### 4.1 Intended Use

The AMC300 is a controller for the simultaneous operation of up to three positioners out of attocube's ANP series positioners. Depending on the customer's choice, the set of positioners controlled can be an arbitrary combination of one to three dimensional, linear, rotary or goniometric positioners with open loop or closed loop feedback.

The typical field of application are user steered or automated processes in laboratory and industrial use.

### 4.2 Characteristics

The AMC300 is available as table top version, as rack version or as double rack version comprising two separate devices. The rack versions are apt for being installed in a regular 19" rack.

It provides four operation interfaces:

- the attoDISCOVERY software
- the AMC webserver application
- an integrated touch panel display
- a remote controller

An additional \*.DLL library, delivered with each device, allows the integration of the controller's functionalities into customized systems.

**TIP**

Consult the interface manual for the description of software commands and wrappers provided for system integration.

The basic version can be upgraded and extended by several optional device feature an upgrade packages (see section 11).

### 4.3 Scope of Delivery

The following components are part of the delivery:

- Positioning controller AMC300
- IEC power cord (suitable for use in UK, Europe or USA)

**NOTE**

The device is shipped with appropriate power cables for usage in the UK, Europe or the USA. When shipped to other territories, the appropriate power plug has to be provided by the user.

- USB-to-Ethernet adapter
- Ethernet cable
- USB flash drive with attoDISCOVERY software, dynamic link library and documentation
- Remote controller with Bluetooth USB receiver and USB cable

## 4.4 Operation Requirements



### CAUTION

#### Wrong operation

If the AMC300 is used in a manner not specified in this manual or by attocube, the protection provided by the device may be impaired!

- Only use the device in accordance with this manual.



### CAUTION

#### Inappropriate working conditions!

The device's operation under inappropriate conditions may lead to injury or material damage.

- Do not operate the device outdoor.
- Do not operate the device outside its dedicated voltage supply and environmental limits.



### CAUTION

#### Wrong cabling!

Inadequate equipment may cause electric shocks or fire.

- Only use power supply cables provided by attocube!

The following environmental limits have to be observed when operating the device.

Parameter	Value
Supply voltage	100 V to 240 V AC
Line frequency	50 Hz to 60 Hz
Operational area	Indoor use only
Maximum altitude	2000 m
Minimum temperature	5 °C
Maximum temperature	40 °C
Relative humidity at about 30 °C	< 80 % (non-condensing)
Overvoltage category	II
Pollution degree	2



### NOTE

The contact with chemicals, humidity or dirt may damage the device.

- Do not expose the device to corrosive agents, excessive moisture, heat, dust or other damaging environmental conditions.
- To clean the device only use clean and dry cloths.
- If the device has been stored at a low temperature or in an environment of high humidity it must be allowed to reach ambient conditions before being started.

## 4.5 Dimensions

Parameter	Table top version	Rack version	Double rack version
Dimensions	220 mm x 220 mm x 88 mm	483 mm (19 inch) x 260 mm x 88.1 mm	483 mm (19 inch) x 260 mm x 88.1 mm
Weight	2800 g	3050 g	5850 g

**TIP**

For further information on the device's technical data, consult the corresponding specification sheet.

## 4.6 PC Requirements

The following requirements have to be met by the connected PC.

Parameter	Value
Processor design	Any PC or mobile device with a working and up-to-date browser installed.
Interface	USB 2.0 or Ethernet RJ45

## 4.7 Hardware Interfaces

### 4.7.1 Operator Panel (Table Top Version)

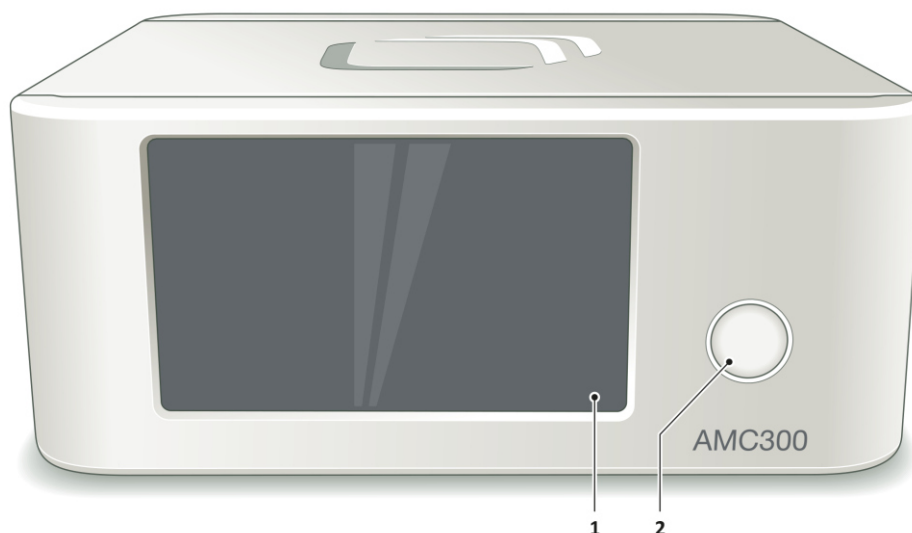


Figure 2 Operator panel, table top version

- |   |              |  |
|---|--------------|--|
| 1 | Touch panel  | Operate the device, see sections <a href="#">5.3</a> and <a href="#">8</a> |
| 2 | Power button | Switch the device on or off  |

## 4.7.2 Operator Panel (Rack Version)

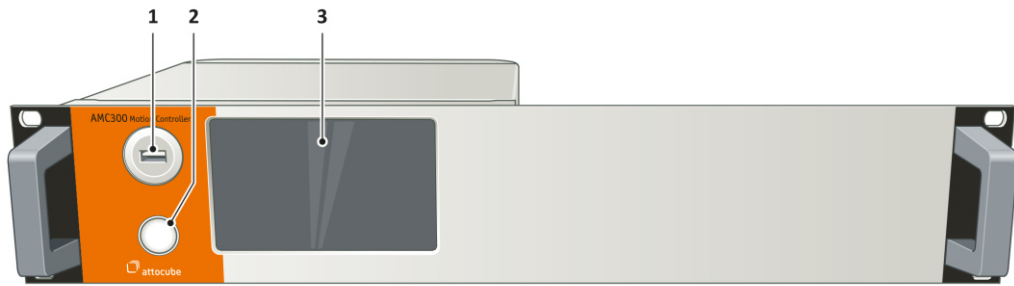


Figure 3 Operator panel, rack version

- |   |              |   |
|---|--------------|---|
| 1 | USB socket   | additional USB-A for multiple connection purposes |
| 2 | Power button | Switch the device on and off                      |
| 3 | Touch panel  | Operate the device, see sections 5.3 and 8        |

## 4.7.3 Operator Panel (Double Rack Version)

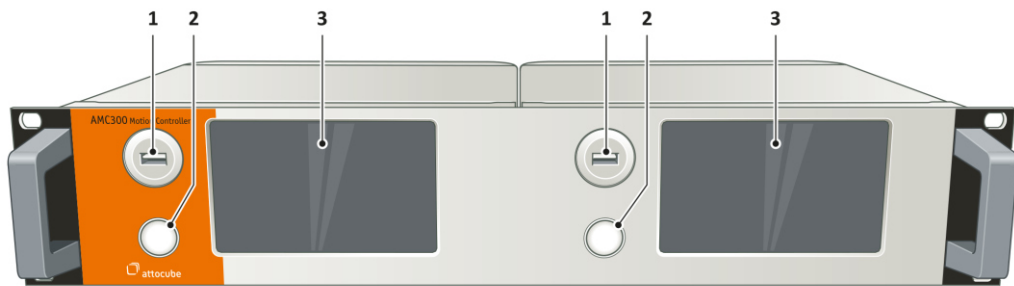


Figure 4 Operator panel, double rack version

- |   |              |   |
|---|--------------|---|
| 1 | USB socket   | additional USB-A for multiple connection purposes |
| 2 | Power button | Switch the device on and off                      |
| 3 | Touch panel  | Operate the device, see sections 5.3 and 8        |

### 4.7.4 Connector Panel

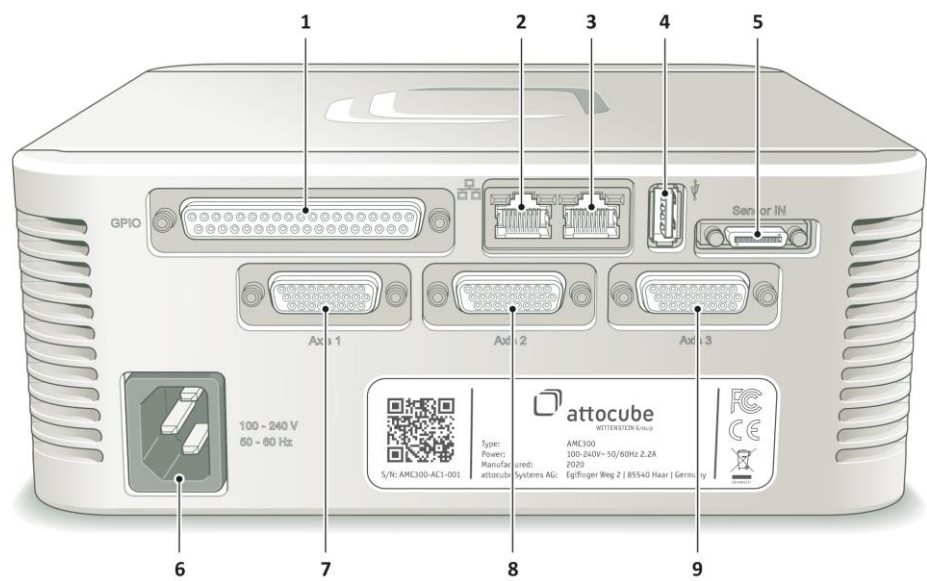


Figure 5 Connector panel

- |   |                          |   |
|---|--------------------------|---|
| 1 | GPIO socket              | Trigger signal connection (in and out)            |
| 2 | Ethernet uplink socket   | Network connection                                |
| 3 | Ethernet downlink socket | Daisy-chaining connection (/PRO upgrade required) |
| 4 | USB socket               | USB-A for multiple connection purposes            |
| 5 | Sensor IN socket         | Interferometer input connection                   |
| 6 | Power supply socket      | Power supply connection                           |
| 7 | Axis 1 socket            | Positioning signal connection                     |
| 8 | Axis 2 socket            | Positioning signal connection                     |
| 9 | Axis 3 socket            | Positioning signal connection                     |



## 4.7.5 Remote Controller

With the wireless remote controller, it is possible to control and drive positioners without PC.

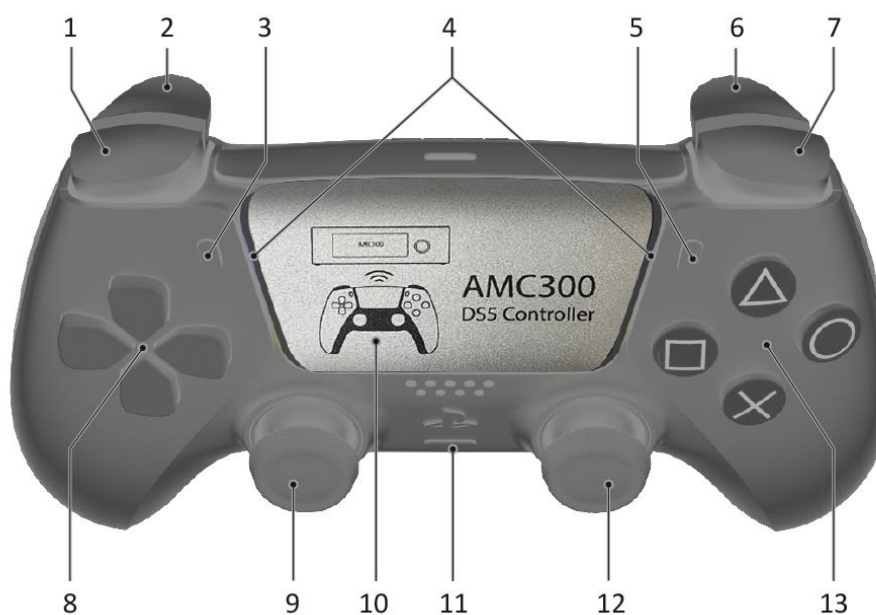


Figure 6 Controls of the remote controller

1	[L1] button	(configurable)
2	[L2] button	(configurable)
3	[SHARE] button	Pair the remote control with the device (simultaneously hold the [SHARE] and the PS button)
4	Light bars	Indicates the active profile
5	[OPTIONS] button	Switch profile
6	[R2] button	(configurable)
7	[R1] button	(configurable)
8	Directional buttons	(configurable)
9	Left stick	(configurable)
10	Display	Receive optic and haptic feedback on status of controlling functions
11	PS button	Switch the remote control on and off
12	Right stick	(configurable)
13	Symbol buttons	(configurable)

### TIP

Please refer to the manual of the remote controller for information on its structure and functioning.

## 4.7.6 Positioner Control Cable for Room Temperature Applications

The device is delivered with the following positioner control cable for room temperature applications.



### NOTE

When connecting customized cables certain cabling restrictions must be obeyed in order to guarantee an optimal positioning and detecting performance.

- Do not to connect cabling with a wire resistance  $> 5 \Omega$ .
- Use EMV housings as enclosure for the D-Sub connectors.
- Use extra shielded twisted pair wires for the piezo voltage supply.
- Do not connect any cable  $> 5 \text{ m}$ .

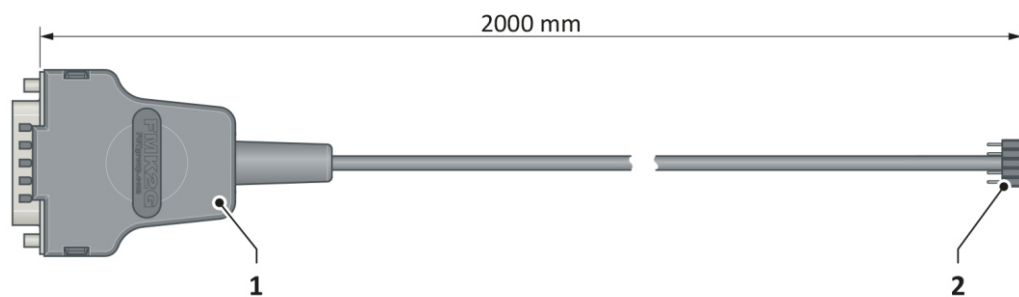
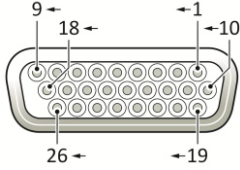



Figure 7 Positioner control cable AMC300/RES, for room temperature applications

- |   |                        |   |
|---|------------------------|---|
| 1 | 26 pin D-Sub connector | Positioning signal connection (device side)     |
| 2 | 5 pin socket           | Positioning signal connection (positioner side) |

The pins of the device's positioner control cables are assigned as follows:

Controller side (26 pin D-Sub)	Signal Name	Wire Color	Positioner side
			
1	Piezo+/OP2	Brown	1
4	Piezo-/ON12	White	2
13	GND	Green	5
20	V0/U2+	Yellow	3
21	GSENSE/U1-	Gray (blue)	5
22	TAP/U1+	Blue	4
19	VOREF/U2-	Purple	3
21	GSENSE/U1-	Gray (purple)	5
11	(Inner) shield		
17, 18	Jumper		
1, 2	Jumper		
4, 5	Jumper		
16	General shield		

### 4.7.7 Positioner Control Cable for Vacuum Applications

For vacuum applications, the following positioner control cable can be ordered separately.



#### NOTE

When connecting customized cables certain cabling restrictions must be obeyed in order to guarantee an optimal positioning and detecting performance.

- Do not to connect cabling with a wire resistance  $> 5 \Omega$ .
- Use EMV housings as enclosure for the D-Sub connectors.
- Use extra shielded twisted pair wires for the piezo voltage supply.
- Do not connect any cable  $> 5 \text{ m}$ .

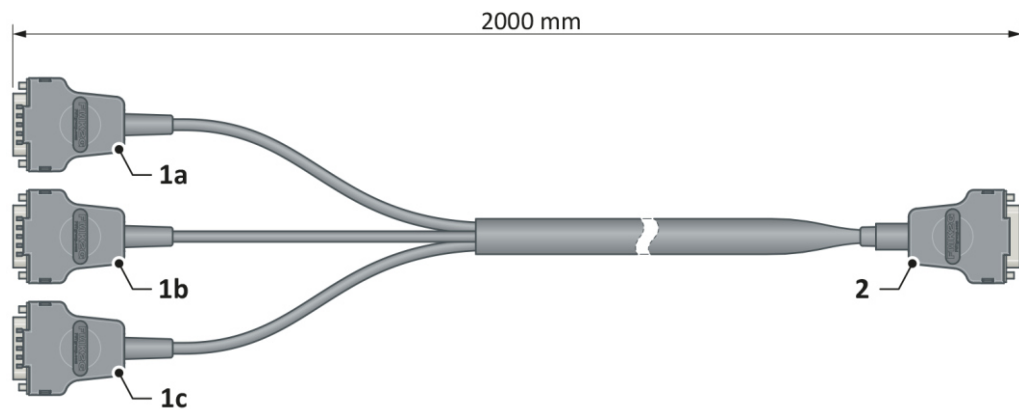
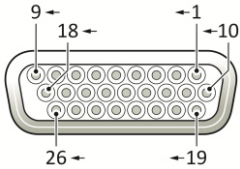
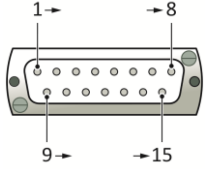


Figure 8 Positioner control cable AMC300/RES, for vacuum applications

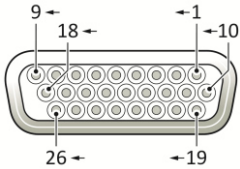
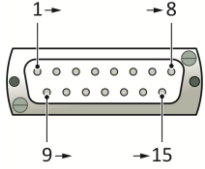
- |   |                        |   |
|---|------------------------|---|
| 1 | 26 pin D-Sub connector | Positioning signal connection (device side)             |
| 2 | 15 pin D-Sub connector | Positioning signal connection (vacuum feedthrough side) |

The pins of the device's positioner control cables are assigned as follows.

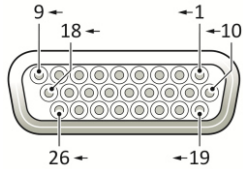
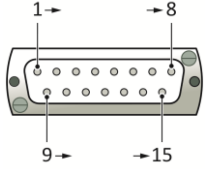
## Pin Assignment for Axis 1

Controller side, axis 1 (26 pin D-Sub)	Signal Name	Wire Color	Feedthrough side
			
1	Piezo+/OP2	Brown	8
4	Piezo-/ON12	White	15
13	GND	Green	4
20	V0/U2+	Yellow	5
21	GSENSE/U1-	Gray (blue)	4
22	TAP/U1+	Blue	12
19	VOREF/U2-	Purple	5
21	GSENSE/U1-	Gray (purple)	4
11	(Inner) shield	Silver	
17, 18	Jumper		
1, 2	Jumper		
4, 5	Jumper		
16	General shield	Silver	

## Pin Assignment for Axis 2


Controller side, axis 2 (26 pin D-Sub)	Signal Name	Wire Color	Feedthrough side
			
1	Piezo+/OP2	Brown	7
4	Piezo-/ON12	White	14
13	GND	Green	10
20	V0/U2+	Yellow	11
21	GSENSE/U1-	Gray (blue)	10
22	TAP/U1+	Blue	3
19	VOREF/U2-	Purple	11
21	GSENSE/U1-	Gray (purple)	10
11	(Inner) shield	Silver	
17, 18	Jumper		
1, 2	Jumper		
4, 5	Jumper		
16	General shield	Silver	

### Pin Assignment for Axis 3

Controller side, axis 3 (26 pin D-Sub)	Signal Name	Wire Color	Feedthrough side
			
1	Piezo+/OP2	Brown	6
4	Piezo-/ON12	White	13
13	GND	Green	1
20	V0/U2+	Yellow	2
21	GSENSE/U1-	Gray (blue)	1
22	TAP/U1+	Blue	9
19	VOREF/U2-	Purple	2
21	GSENSE/U1-	Gray (purple)	1
11	(Inner) shield	Silver	
17, 18	Jumper		
1, 2	Jumper		
4, 5	Jumper		
16	General shield	Silver	

### 4.7.8 Extension Cable for Vacuum Applications

For vacuum applications, the following attocube vacuum extension cable for the control of positioners with resistive position readout (AVC/RES) can be ordered separately.



**NOTE**

When connecting customized cables certain cabling restrictions must be obeyed in order to guarantee an optimal positioning and detecting performance.

- Do not to connect cabling with a wire resistance > 5 Ω.
- Use EMV housings as enclosure for the D-Sub connectors.
- Use extra shielded twisted pair wires for the piezo voltage supply.
- Do not connect any cable > 5 m.

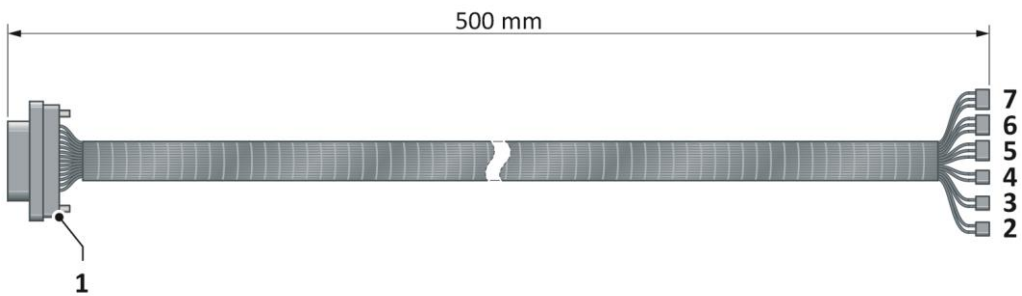
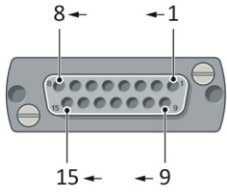



Figure 9
attocube vacuum extension cable AVC/RES, for positioners with resistive readout

1	15 pin D-Sub connector	Positioning control and sensor connection (feedthrough side)
2	2 pin connector	Positioning control connection (positioner side)
3	2 pin connector	Positioning control connection (positioner side)
4	2 pin connector	Positioning control connection (positioner side)
5	3 pin connector	Positioning sensor connection (positioner side)
6	3 pin connector	Positioning sensor connection (positioner side)
7	3 pin connector	Positioning sensor connection (positioner side)

The pins of the positioner control cables are assigned as follows:



Feedthrough side (15 pin D-Sub)	Signal Name	Wire Color	Positioner side
			
1	Piezo +1	Copper	2/1
9	Piezo -1	Copper	2/2
2	Piezo +2	Copper	3/1
10	Piezo -2	Copper	3/2
3	Piezo +3	Copper	4/1
11	Piezo -3	Copper	4/2
4	RES 1+	Copper	5/1
12	RES 1S	Copper	5/2
5	RES 1-	Copper	5/3
13	RES 2+	Copper	6/1
6	RES 2S	Copper	6/2
14	RES 2-	Copper	6/3
7	RES 3+	Copper	7/1
15	RES 3S	Copper	7/2
8	RES 3-	Copper	7/3

## 5 Graphical User Interfaces

### 5.1 attoDISCOVERY Software

The attoDISCOVERY software is a PC-based application for controlling and analyzing positioner movements.

**Access** If the software is installed it can be called up via the respective desktop icon or start menu entry.

#### 5.1.1 "Find Devices" Screen

**Access** The "Find Devices" screen is the start screen of the actual attoDISCOVERY software. From the "Operation" screen it can be accessed by clicking [Back] (Figure 12/1).

#### Overview

The "Find Devices" screen is the actual start screen of the attoDISCOVERY software. It displays the AMC300 and AMC100 devices connected to the respective network subnet. Each controller is displayed in a separate tile.

**TIP**

When the software is started for the first time, a folder named attocube containing a file named staticDevices.json is created in your user's folder at the PC. In this file you can specify IP addresses of controllers that will automatically be connected, even if they are not directly connected to the PC's network subnet.

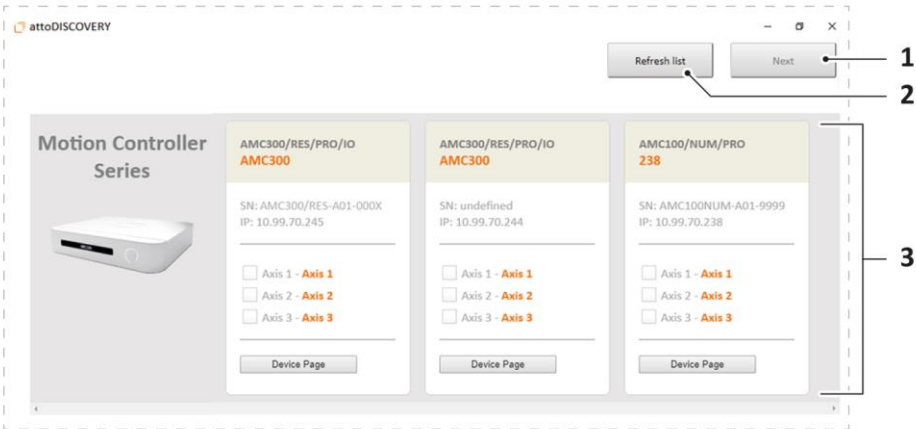


Figure 10 "Find Devices" screen

- |   |                 |  |
|---|-----------------|--|
| 1 | [Next]          | Open the "Operation" screen (see section 5.1.2)      |
| 2 | [Refresh list]  | Refresh the list of available controllers            |
| 3 | Controller tile | Read out and adapt controller properties (see below) |

**TIP**

[Next] is not available unless you have selected at least one axis.

## Controller Tile

The controller tile

- displays several controller and connection properties.
- allows you to label the controller and the axes, see section 8.2.
- allows you to select the axes to be displayed and controlled on the "Operation" screen, see section 5.1.2.

### Controls

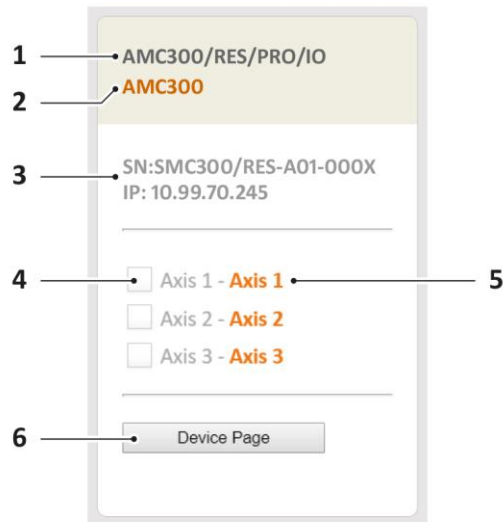


Figure 11 Controller tile

1	Controller type field	Read out the controller type and activated features
2	Controller name field	Read out and adapt the controller name, see section 8.2.1
3	Controller SN and IP field	Read out the controller's serial number and IP address
4	Axis selection checkbox	Select axis to be displayed and controlled on the "Operation" screen
5	Axis name field	Read out and adapt the axis name, see section 8.2.2
6	[Device Page]	Open the webserver application's "Configuration" screen for configuring the device settings, see section 5.2.2

### TIP

To select and use axes of various devices, the /PRO upgrade must be activated on all of the controllers.

## 5.1.2 "Operation" Screen

The "Operation" screen is the screen where the actual positioning process takes place.

**Access** The "Operation" screen can be accessed via the "Find Devices" screen's [Next] button.

### Overview

The "Operation" screen displays the formerly selected axes ([Figure 11/4](#)), each in a separate tile.

#### TIP

The headers of the active axes are displayed orange. The headers of the inactive axes are displayed gray.

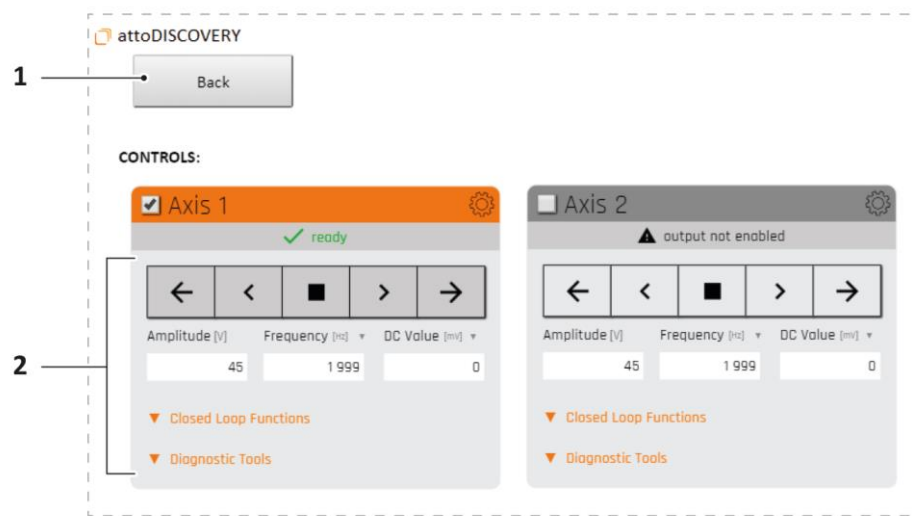


Figure 12 "Operation" screen

- 1 [Back]
- 2 Axis tile

Open the "Find Devices" screen, see section [5.1.1](#)  
Control axis, see section [8](#)

### Axis Tile, Operation View

The operation view of the axis tile is the default view on the axis parameters. It allows you to

- read out the axis' name and status.
- open the axis configuration.
- perform the actual positioning, see sections [8.5](#) and [8.6](#).
- measure the connected positioner's performance, see section [11.4](#).



#### NOTE

Position values for ANP series positioners are specified in micrometers or millidegrees, respectively.

## Controls

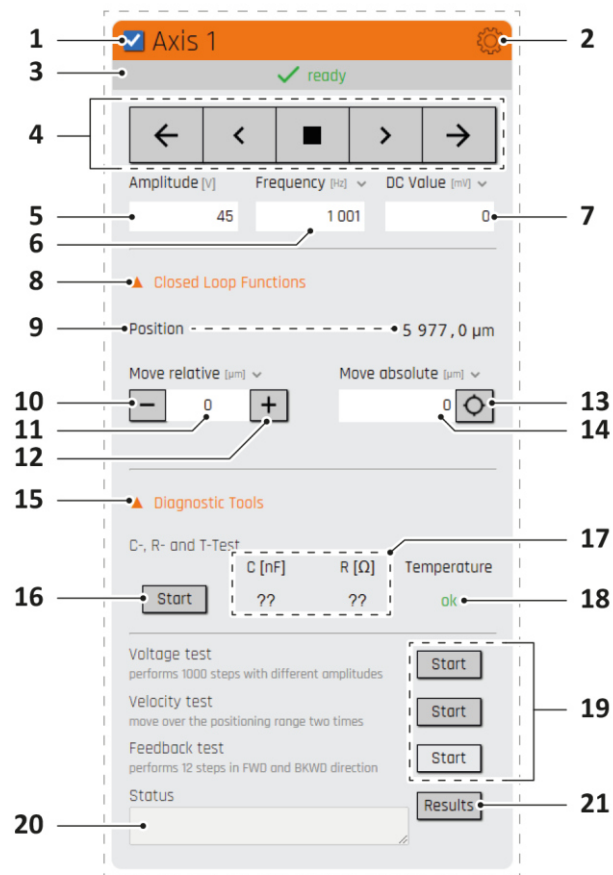











Figure 13 Axis tile, operation view (fully expanded)






- |    |                             |  |
|----|-----------------------------|--|
| 1  | Axis activation checkbox    | Activate or deactivate the axis, see section 8.3   |
| 2  | Configuration link          | Open the axis' configuration view  |
| 3  | Axis status bar             | Read out the axis' current status, see table below   |
| 4  | Open loop movement controls | Control open loop positioning movements, see table below and section 8.5.2                 |
| 5  | "Amplitude" field           | Set the amplitude applied for a motion step, see section 8.5.1                             |
| 6  | "Frequency" field           | Set the frequency of motion steps, see section 8.5.1                                       |
| 7  | "DC Value" field            | Set the DC value for manual position adjustment (/PRO upgrade required), see section 8.5.1 |
| 8  | [Closed Loop Functions]     | Expand closed loop functions, see section 8.6  |
| 9  | Position display            | Read out current position  |
| 10 | [-]                         | Move defined distance in negative direction, see section 8.6.2                             |
| 11 | Distance field              | Set motion distance, see section 8.6.2   |
| 12 | [+]                         | Move defined distance in positive direction, see section 8.6.2                             |
| 13 | "Move to target" button     | Start movement to the defined target position, see section 8.6.3                           |
| 14 | Target field                | Set motion target position, see section 8.6.3  |
| 15 | [Diagnostic Tools]          | Expand diagnostic tools, see section 11.4  |
| 16 | [Start]                     | Start positioner property measurement, see section 11.4                                    |
| 17 | Positioner property display | Read out positioner performance measurement results, see table below                       |
| 18 | Temperature display         | Read out the temperature status of the AMC, see table below                                |

19	[Start]	Start positioner performance tests, see table below
20	Status display	Read out current performance test status
21	[Results]	Download results of performance tests to be evaluated by attocube support team

**Axis status** The axis status bar indicates the current status of the axis. The following states are possible:

Status message	Description
 positioner not connected	No positioner connected
 output not enabled	Positioner connected, axis not activated
 ready	Positioner connected, axis activated, waiting for order
 moving	Positioner moving
 in target range	Positioner is within target and keeps regulating on the target position)
 forward limit reached	Positioner reached insurmountable obstacle in positive direction
 backward limit reached	Positioner reached insurmountable obstacle in negative direction
 grounded	Positioner is in target range and grounded
 compensating	Rotation Compensation feature is compensating X/Y runout

**Positioning controls** The following control elements (Figure 13/4) are available for open loop movement control.

Control element	Function
	Move continuously in negative direction
	Move stepwise in negative direction
	Stop any movement (including closed loop positioning movements)
	Move stepwise in positive direction
	Move continuously in positive direction

**TIP**

The number of steps implemented with each stepwise move can be adapted when /PRO upgrade is activated.

**Motion parameters** The following motion parameters can be adjusted.

Parameter	Value range	Related motion aspect
Amplitude	0 – 60 V	Step size
Frequency	3 – 5000 Hz	Step repetition rate at continuous movement
DC Value	0 – 60 V	Manual fine adjustment of position

**TIP**

The power limit is dynamic, depending on the measured capacitance of the positioner. The smaller the capacitance, the higher frequencies are possible for all axes.

**Measurements** The following positioner properties can be measured.

Property	Description
Capacitance (C)	Electrical capacitance of the positioner, including cabling, the results are displayed directly
Resistance (R)	Electrical resistance of the positioner, including cabling, the results are displayed directly
Temperature	Device temperature (ok, medium, high, critical)



**NOTE**

The measurement of the electrical capacitance (C) and electrical resistance (R) will be started automatically every time an axis is activated - if not changed under "Auto measure C and R" (Figure 14/17). Also be aware of the fact that the positioner will be moved slightly (a few  $\mu\text{m}$ ) within those measurements. The procedure will take a few seconds.



**NOTE**

The device temperature is an indicator for the overall functioning of the positioning system. Connection or positioner errors are most likely if the device temperature is critical.

If the device shows a critical temperature it will deactivate all axes outputs for security reasons in case of any further heating.

**Performance** The following positioner performance aspects can be tested. attocube support team evaluates the results with special tools.

Performance aspect	Test procedure
Voltage	Performs 1000 steps with different amplitudes in both directions.
Velocity	Moves over the positioning range twice in both directions.
Feedback	Performs 12 steps in both directions



**NOTE**

By clicking [Results], the performance test results will be encoded and directly sent to attocube.

## Axis Tile, Configuration View

The options and functions available in the axis tile's configuration view depend on the device configuration and the positioners you employ. It allows you to

- specify the positioner type.
- adapt various positioner performance options.
- read out certain axis properties.

### TIP

Changes applied in the axis tile's configuration view are applied automatically, i. e. without having to be confirmed by pressing a respective button.

**Access** The axis tile's configuration view can be accessed via the operation view's configuration link (Figure 13/2).

### Controls

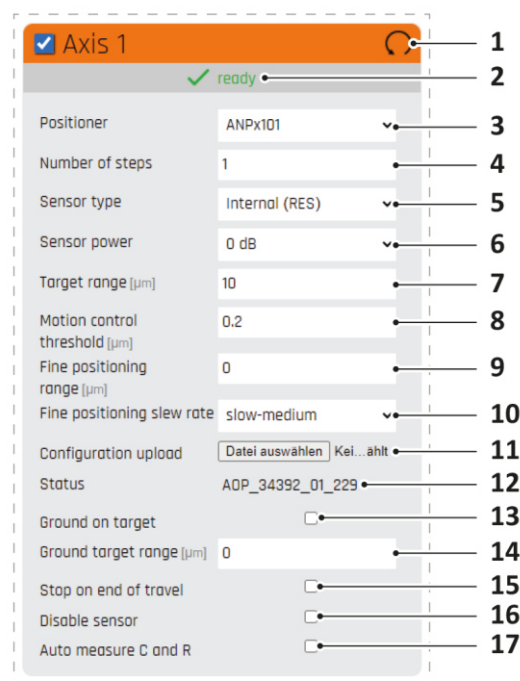


Figure 14 Axis tile, configuration view

- |    |                                |   |
|----|--------------------------------|---|
| 1  | Return button                  | Open the axis' operation view   |
| 2  | Axis status bar                | Read out the axis' current status   |
| 3  | "Positioner" field             | Select the positioner type (default: ANPx101)   |
| 4  | "Number of steps" field        | Set the number of steps carried out with each stepwise move (/PRO upgrade required)               |
| 5  | "Sensor type" field            | Select the used sensor (AMC/IDS – Closed loop feature required, default: Internal (RES) )         |
| 6  | "Sensor power" field           | Select the feedback power value for the position sensor (/RES positioner required, default: 0 dB) |
| 7  | "Target range" field           | Set the range regarded as "in target" for closed loop positioning, see section 8.4.2              |
| 8  | "Motion control threshold"     | Set position deviation that triggers automatic compensation (AMC/IDS closed loop only)            |
| 9  | "Fine positioning range" field | Set the range where the fine positioning slew rate is used in closed loop operation               |
| 10 | "Fine positioning slew rate"   | Select the fine positioning speed. Slower speed results in a more accurate position               |



11	"Configuration upload" button	Upload a standardized positioner configuration – the "LUT-file" (/RES positioner required)
12	"Status"	Read out positioner serial number (as specified in positioner configuration, see "Configuration upload")
13	"Ground on target" checkbox	Activate or deactivate the positioner's being grounded on target (/RES positioner required, default: deactivated)
14	"Ground target range" field	Set the range regarded as "in target" for the positioner's being grounded on target (/RES positioner required)
15	"Stop on end of travel" checkbox	Activate or deactivate the positioner's being stopped when faced with physical obstacles (/PRO upgrade required)
16	"Disable sensor" checkbox	Activate or deactivate position feedback (/RES positioner required, default: deactivated)
17	"Auto measure C and R"	Activate or deactivate automatic measurement of the positioner's capacitance when axis is activated (default: activated)

**Sensor Power** Within the drop-down menu for the sensor power (Figure 14/6) you can choose between four different values:

- 0 dB (per default)
- -10 dB
- -15 dB
- -20 dB

With the adjustment of the sensor power one can affect the heat input of the system. However, with lowering the sensor power also the signal-to-noise-ratio might get worse, what could cause a lowering of the stability of the position controlling. The stability of the system as well as the heat input strongly depends on the whole setup, the environment and other parameters of each application. Especially for applications in the mK-range it is suggested to adjust and test different sensor powers for the individual setup to find the optimum in low heat input, good signal-to-noise-ratio and high positioning stability.

**Fine positioning slew rate** Within the drop-down menu for the fine positioning slew rate (Figure 14/10) you can choose between four different pre-sets:

- slow
- slow-medium
- medium-fast
- fast

With the slew rate one can affect the fine positioning behavior of the positioners to avoid unwanted stepping and blindly following noise after reaching the desired target position. After the position is within the definable fine positioning range (Figure 14/9) around the target position, the speed of the positioner is adjusted. When set to "slow", the speed is decreased to a minimum, while the default behavior is "fast". Resultantly, "slow" does not follow high frequency disturbances on the position. Therefore, "slow" represents a very fine positioning, whereby "fast" represents a coarse positioning. This option does not affect the speed of the positioning when targeting a position outside of the "fine positioning range".



## 5.2 Webserver Application

The webserver application is a browser-based application for controlling and analyzing positioner movements as well as for the controller device's configuration and maintenance.

- Access**
If PC and device are connected to the same LAN and subnet, the webserver application can be started by typing one of the following information into a browser's address line:
- the device's IP address
  - the device's serial number (without slashes) followed by `.local`

**TIP**
For each device a separate browser window must be used.

### 5.2.1 "Navigation" Screen

The "Navigation" screen is the screen where the actual positioning process takes place.

- Access**
The "Navigation" screen can be accessed via the [Navigation] button in the application's header.

#### Overview

The "Navigation" screen displays all of the controller's three axes, each in a separate tile.

**TIP**
The headers of the active axes are displayed orange. The headers of the inactive axes are displayed gray.

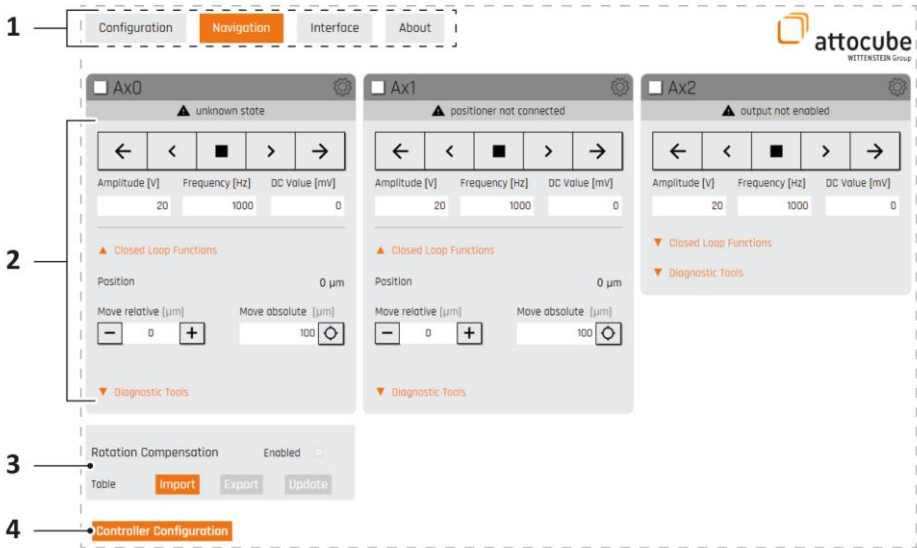


Figure 15 "Navigation" screen

- |   |                                 |   |
|---|---------------------------------|---|
| 1 | Header                          | Navigate between screens  |
| 2 | Axis tile                       | Control axis, see section 8   |
| 3 | "Rotation Compensation" section | Activate and configure rotation compensation (Rotation compensation upgrade required) |
| 4 | [Controller Configuration]      | Configure the remote controller   |

## Axis Tile, Operation View

The operation view of the axis tile is the default view on the axis parameters. It allows you to

- read out the axis' name and status.
- open the axis configuration.
- perform the actual positioning, see sections 8.5 and 8.6.
- measure the connected positioner's performance, see section 11.4.



### NOTE

Position values for AN\* positioners are specified in micrometers or millidegrees, respectively.

### Controls

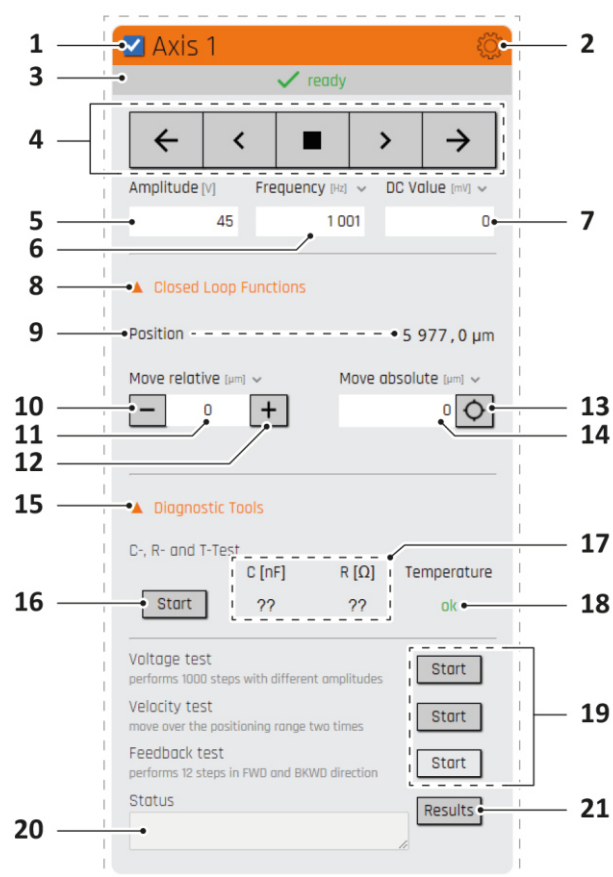


Figure 16 Axis tile, operation view (fully expanded)

- |   |                             |  |
|---|-----------------------------|--|
| 1 | Axis activation checkbox    | Activate or deactivate the axis, see section 8.3   |
| 2 | Configuration link          | Open the axis' configuration view  |
| 3 | Axis status bar             | Read out the axis' current status, see table in section 5.1.2                              |
| 4 | Open loop movement controls | Control open loop positioning movements, see table in section 5.1.2 and section 8.5.2      |
| 5 | "Amplitude" field           | Set the amplitude applied for a motion step, see section 8.5.1                             |
| 6 | "Frequency" field           | Set the frequency of motion steps, see section 8.5.1                                       |
| 7 | "DC Value" field            | Set the DC value for manual position adjustment (/PRO upgrade required), see section 8.5.1 |
| 8 | [Closed Loop Functions]     | Expand closed loop functions, see section 8.6  |
| 9 | Position display            | Read out current position  |

10	[-]	Move defined distance in negative direction, see section <a href="#">8.6.2</a>
11	Distance field	Set motion distance, see section <a href="#">8.6.2</a>
12	[+]	Move defined distance in positive direction, see section <a href="#">8.6.2</a>
13	"Move to target" button	Start movement to the defined target position, see section <a href="#">8.6.3</a>
14	Target field	Set motion target position, see section <a href="#">8.6.3</a>
15	[Diagnostic Tools]	Expand diagnostic tools, see section <a href="#">11.4</a>
16	[Start]	Start positioner property measurement, see section <a href="#">11.4</a>
17	Positioner property display	Read out positioner performance measurement results
18	Temperature display	Read out the temperature status of the AMC
19	[Start]	Start positioner performance tests
20	Status display	Read out current performance test status
21	[Results]	Download results of performance tests to be evaluated by attocube's support team

**TIP**

Some further explanation of the axis tile's operation view controls is given in section [5.1.2](#).

## Axis Tile, Configuration View

The options and functions available in the axis tile's configuration view depend on the device configuration and the positioners you employ. It allows you to

- specify the positioner type.
- adapt various positioner performance options.
- read out certain axis properties.

**TIP**

Changes applied in the axis tile's configuration view are applied automatically, i. e. without having to be confirmed by pressing a respective button.

**Access** The axis tile's configuration view can be accessed via the operation view's configuration link ([Figure 16/2](#)).

## Controls

Figure 17 Axis tile, configuration view

- |    |                                  |  |
|----|----------------------------------|--|
| 1  | Return button                    | Open the axis' operation view  |
| 2  | Axis status bar                  | Read out the axis' current status  |
| 3  | "Positioner" field               | Select the positioner type (default: ANPx101)  |
| 4  | "Number of steps" field          | Set the number of steps carried out with each stepwise move (/PRO upgrade required)                                      |
| 5  | "Sensor type" field              | Select the used sensor (AMC/IDS – Closed loop feature required, default: Internal (RES) )                                |
| 6  | "Sensor power" field             | Select the feedback power value for the position sensor (/RES positioner required, default: 0 dB)                        |
| 7  | "Target range" field             | Set the range regarded as "in target" for closed loop positioning, see section 8.4.2                                     |
| 8  | "Motion control threshold"       | Set position deviation that triggers automatic compensation (AMC/IDS closed loop only)                                   |
| 9  | "Fine positioning range" field   | Set the range where the fine positioning slew rate is used in closed loop operation                                      |
| 10 | "Fine positioning slew rate"     | Select the fine positioning speed. Slower speed results in a more accurate position                                      |
| 11 | "Configuration upload" button    | Upload a standardized positioner configuration – the "LUT-file" (/RES positioner required)                               |
| 12 | "Status"                         | Read out positioner serial number (as specified in positioner configuration, see "Configuration upload")                 |
| 13 | "Ground on target" checkbox      | Activate or deactivate the positioner's being grounded on target (/RES positioner required, default: deactivated)        |
| 14 | "Ground target range" field      | Set the range regarded as "in target" for the positioner's being grounded on target (/RES positioner required)           |
| 15 | "Stop on end of travel" checkbox | Activate or deactivate the positioner's being stopped when faced with physical obstacles (/PRO upgrade required)         |
| 16 | "Disable sensor" checkbox        | Activate or deactivate position feedback (/RES positioner required, default: deactivated)                                |
| 17 | "Auto measure C and R"           | Activate or deactivate automatic measurement of the positioner's capacitance when axis is activated (default: activated) |



## 5.2.2 "Configuration" Screen

On the "Configuration" screen you can

- adapt certain controller and connection properties.
- update the device's firmware.
- upgrade its feature package.

**Access** The "Configuration" screen can be accessed via the [Configuration] button in the application's header and via the [Device Page] button on the attoDISCOVERY's controller tiles ([Figure 11/6](#)).

### Overview

The screenshot shows the 'Configuration' screen of the attocube application. The top navigation bar includes 'Configuration', 'Navigation', 'Interface', and 'About'. The main content area is titled 'Axis Setup / RES Sensors' and contains five numbered sections:

- Networking**: Includes fields for IP mode (Static configuration), IP address (10.99.1.40), Subnet mask (255.255.255.0), Default gateway (10.99.1.1), and an 'Advanced' section with 'Device reachable at' (localhost.local).
- Device Name**: Includes fields for Device name (Default device), Axis 1 name (Axis 1), Axis 2 name (Axis 2), and Axis 3 name (Axis 3).
- Secure Access over HTTPS**: Includes fields for Private key and Certificate, with an 'Apply' button.
- Firmware Update**: Includes a 'Firmware image' field with a 'Choose a file or drop it here...' button and a 'Datei auswählen' button.
- Feature Upgrade**: Includes a 'License file' field with a 'Choose a file or drop it here...' button and a 'Datei auswählen' button.

Figure 18 "Configuration" screen

- |   |                                    |                                |
|---|------------------------------------|--------------------------------|
| 1 | "Networking" section               | Adapt the network settings     |
| 2 | "Device Name" section              | Rename the device and the axes |
| 3 | "Secure Access over HTTPS" section | Enable secure HTTPS access     |
| 4 | "Firmware Update" section          | Update the device's firmware   |
| 5 | "Feature Upgrade" section          | Activate features and upgrades |

## „Axis Setup/RES Sensors“ Section

In the „Axis Setup/RES Sensors“ section you can adapt the measurement mode of the AMC300. The AMC300 supports two measurement modes for the lock-in measurement of the RES position, those are “Individual per axis” and “Shared”(line).

Controls

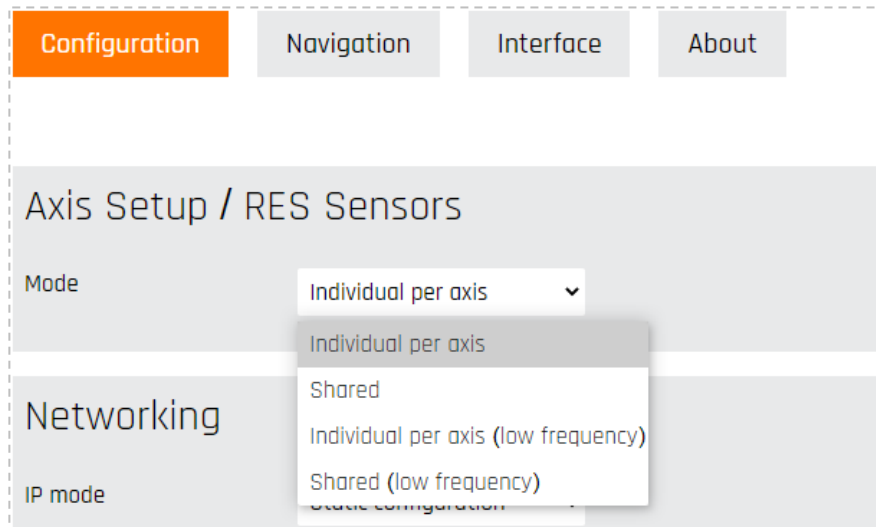


Figure 19 "Axis Setup / RES Sensors" section, static configuration

Individual per axis: each axis' position is measured on a different frequency; this mode reduces noise coupling between axes, while requiring more cabling.

Shared (line/MIC-Mode): each axis is measured on the same frequency, within this mode the number of required cables can be reduced; more coupling noise is expected on the position readout.

Both measurement modes are also available in a 'low frequency' version. It might be necessary to use the low frequency version, if the cables from the AMC300 to the positioners exceed the standard length. Please contact the attocube's support team, if you need further instructions on that topic.



### NOTE

Not only the required wires for the position readout but also the wires to connect the piezo ( $U_{\text{Step}+}$  and  $U_{\text{Step}-}$  per direction of movement) to the electronics can be reduced. Depending on the configuration of your controller, the common potential  $U_{\text{Step}-}$  will exhibit a constant negative voltage when the axis is switched on, while for a deactivated axis the potential will be GND. Therefore, please make sure to not interconnect the  $U_{\text{Step}-}$  on the motion controller side to prevent a short circuit. This cabling will require the axis which shares  $U_{\text{Step}-}$  to be powered on in order to drive the other axes.

### TIP

For more information see the `setMode` function of the RES interface in the Interface Manual or attocubes Technical note TN04 "Numbers of Wires".

## "Networking" Section

In the "Networking" section you can adapt the network settings used by the device for connection to a LAN.

Controls

The screenshot shows the 'Networking' configuration interface. It includes fields for 'IP mode' (set to 'Static configuration'), 'IP address' (10.99.1.40), 'Subnet mask' (255.255.255.0), and 'Default gateway' (10.99.1.1). An 'Advanced' section is expanded, showing 'DNS resolver 1' (10.10.10.10), 'DNS resolver 2' (10.10.10.11), 'Proxy server setting' (http://proxy.local:8080), and 'Device reachable at' (localhost.local). A 'Test internet connection' button is also present. Numbered callouts point to: 1. IP mode dropdown, 2. IP address field, 3. Subnet mask field, 4. Default gateway field, 5. DNS resolver 1 field, 6. DNS resolver 2 field, 7. Test internet connection button, and 8. Device reachable at field.

Figure 20 "Networking" section, static configuration

- |   |                               |   |
|---|-------------------------------|---|
| 1 | "IP mode" field               | Select the IP mode (default: DHCP)        |
| 2 | "IP address" field            | Enter device's IP address                 |
| 3 | "Subnet mask" field           | Enter IP subnet mask                      |
| 4 | "Default gateway" field       | Enter default gateway address             |
| 5 | "DNS resolver" fields         | Enter DNS resolver address (optional)     |
| 6 | "Proxy server setting" field  | Enter the proxy server address (optional) |
| 7 | [Test internet connection]    | Check the connection to the internet      |
| 8 | "Device reachable at" display | Read out device's DNS name                |

## "Device Name" Section

The "Device Name" section allows you to label the device and its axes.

Controls

The screenshot shows the 'Device Name' configuration interface. It includes fields for 'Device name' (Default device), 'Axis 1 name' (Axis 1), 'Axis 2 name' (Axis 2), and 'Axis 3 name' (Axis 3). Numbered callouts point to: 1. Device name field, and 2. Axis 1, 2, and 3 name fields.

Figure 21 "Device Name" section

- |   |                     |                                       |
|---|---------------------|---------------------------------------|
| 1 | "Device name" field | Enter the device's name               |
| 2 | "Axis name" fields  | Enter the axis' name (default: Ax...) |

TIP

Note that all axes of a device must have different names.



### 5.2.3 "Interface" Screen

On the "Interface" screen, the settings for incoming and outgoing trigger communication can be configured each in a separate tile. The tiles are divided in three sections corresponding to the axes.

For the parameters and value ranges that are related to a certain protocol, consult section [12.2](#).

#### TIP

For trigger communication the /IO feature upgrade is required.

**Access** The "Interface" screen can be accessed via the [Interface] button in the application's header.

### Overview

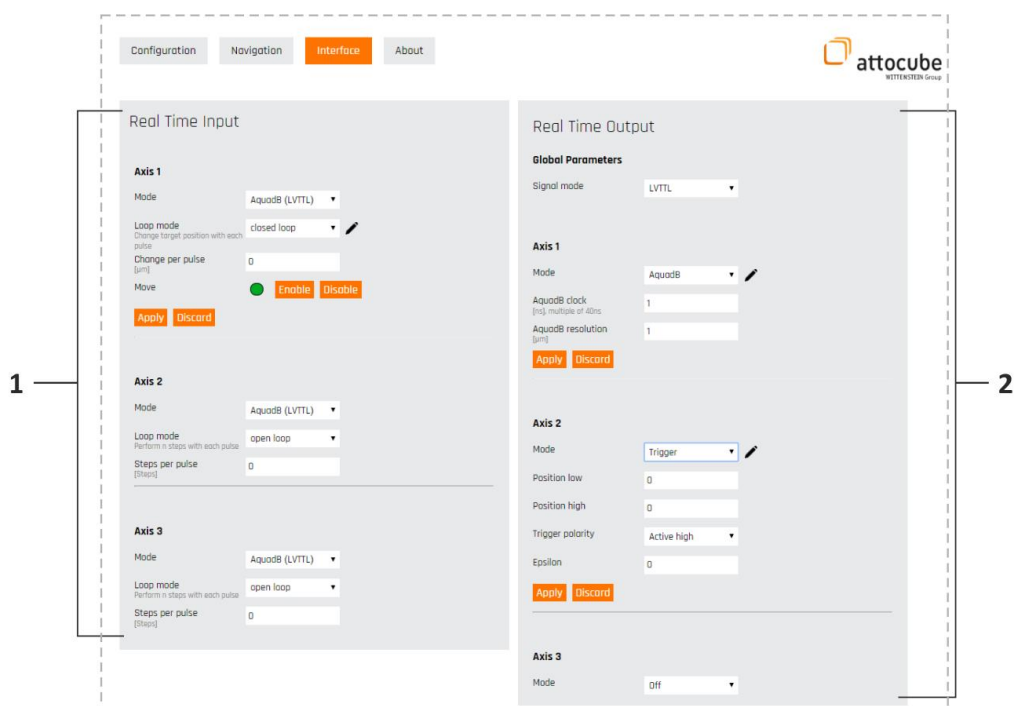


Figure 22 "Interface" screen

- |   |                         |                            |
|---|-------------------------|----------------------------|
| 1 | "Real Time Input" tile  | Configure real time input  |
| 2 | "Real Time Output" tile | Configure real time output |

"Real Time Input" Tile

On the "Real Time Input" tile you set the communication mode and the parameters for the interpretation of incoming position commands.

**TIP**  
To allow you a comfortable adjustment of the parameters, the real time input is not applied until it is activated explicitly.

Controls

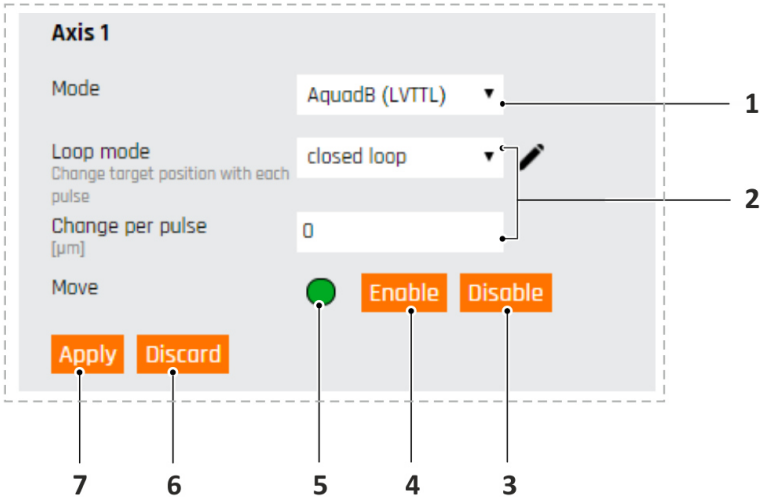


Figure 23 "Real Time Input" tile, "Axis" section

1	"Mode" field	Select input mode
2	Parameter fields	Adapt input parameters (vary according to input mode)
3	[Disable]	Deactivate real-time input
4	[Enable]	Activate real-time input
5	Activation indicator	Read out the activation status of trigger input communication (green: trigger input is enabled)
6	[Discard]	Discard all changes
7	[Apply]	Save all changes

The number and the designation of the parameter fields depends on the selected input mode.

## "Real Time Output" Tile, "Global parameters" Section

In the "Global parameters" section you specify the signal mode for the trigger output communication.

Controls



Figure 24 "Real Time Output" tile, "Global parameters" section

- |   |                     |                    |
|---|---------------------|--------------------|
| 1 | "Signal Mode" field | Select signal mode |
|---|---------------------|--------------------|

## "Real Time Output" Tile, "Axis" Section

In the "Axis" section you adapt the signal type for trigger output communication, and its parameters.

Controls

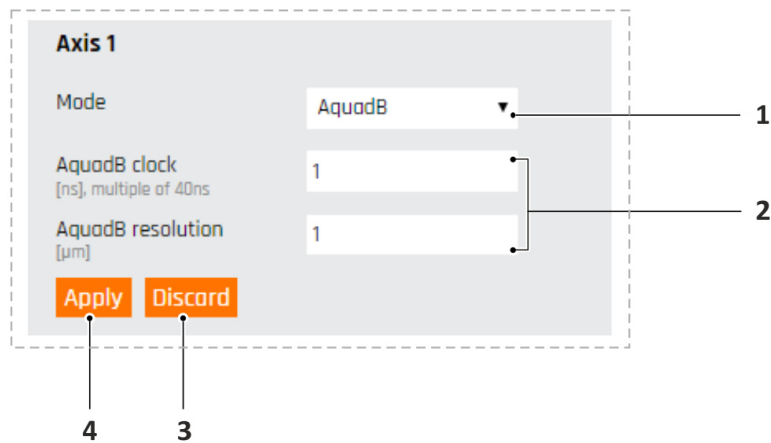


Figure 25 "Real Time Output" tile, "Axis" section

- |   |                  |  |
|---|------------------|--|
| 1 | "Mode" field     | Select output mode   |
| 2 | Parameter fields | Adapt output parameters<br>(vary according to output mode) |
| 3 | [Discard]        | Discard all changes  |
| 4 | [Apply]          | Save all changes   |

The number and the designation of the parameter fields depends on the selected output mode.

## 5.2.4 "About" Screen

The "About" screen enables you to reset or reboot the device and provides you with comprehensive information on

- the device itself, the software used, and the features and upgrades activated.
- the manufacturer.
- sources of integrated software parts.
- activated licenses.

### TIP

As the information of the "About" screen may be relevant for servicing, updating, upgrading and maintaining the device or its parts, prepare to retrieve the information and provide it to attocube in case of questions and servicing requests.

**Access** The "About" screen can be accessed via the [About] button in the application's header.

### Controls

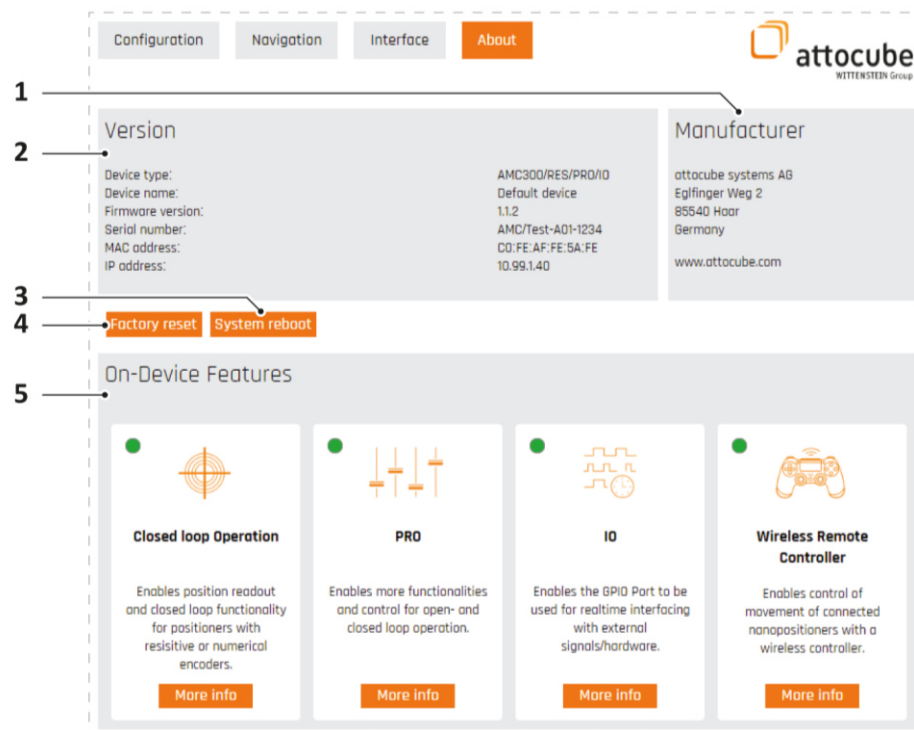


Figure 26 "About" screen, detail

- |   |                              |                                       |
|---|------------------------------|---------------------------------------|
| 1 | "Manufacturer" section       | Read out manufacturer information     |
| 2 | "Version" section            | Read out device information           |
| 3 | [System reboot]              | Reboot device                         |
| 4 | [Factory reset]              | Restore factory settings (see 11.2.2) |
| 5 | "On-Device Features" section | Read out active features and upgrades |

## 5.2.5 "Controller Configuration" Screen

On the "Controller Configuration" screen the remote controller can be configured.

### TIP

The configurations can be stored to two separate profiles, named "yellow" and "red". A profile can be configured regardless of whether it is currently active or not.

**Access** The "Controller Configuration" screen can be accessed via the [Controller Configuration] button on the "Navigation" screen.

### Controls

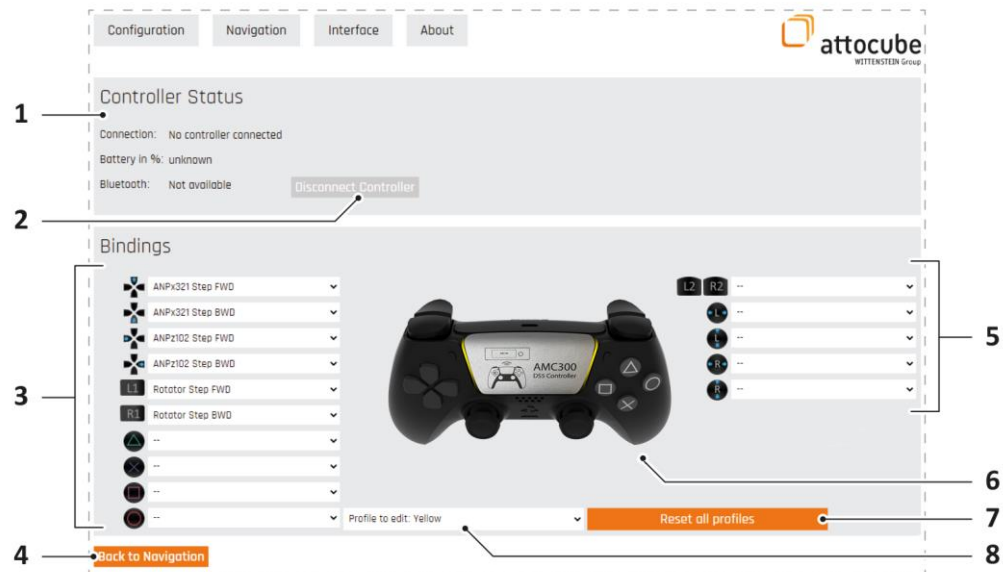


Figure 27 "Controller Configuration" screen

- |   |   |  |
|---|---|--|
| 1 | Remote controller status section                      | Read out remote controller status  |
| 2 | [Disconnect Controller]                               | Unpair / remove remote controller from device  |
| 3 | Button function fields (stepwise movement)            | Select stepwise movement function for the respective remote controller button          |
| 4 | [Back to Navigation]                                  | Open "Navigation" screen   |
| 5 | Button function fields (continuous movement)          | Select continuous movement function for the respective remote controller button        |
| 6 | Remote controller with profile indicator (light bars) | Read out the profile currently selected for controlling via the color-coded light bars |
| 7 | [Reset all profiles]                                  | Reset all configurations in all profiles to delivery status                            |
| 8 | [Profile to edit] field                               | Select profile to be configured  |

## 5.3 Touch Panel Application

The device's touch panel (Figure 2/1) serves as the interface of the device-internal touch panel application for controlling the device. The remote control can also be configured with the touch panel application.



**NOTE**  
 The touch panel can be damaged if it is touched with anything but the fingers or a suitable pen.

**TIP**  
 A non-responding display can be refreshed by swiping down with the finger on the display. A switched-off display can be switched on again by tapping anywhere on the display.

### 5.3.1 Page Composition

The touch panel application's pages have some common elements to be described below.

#### Overview

The screen of the touch panel is divided into the following sections.

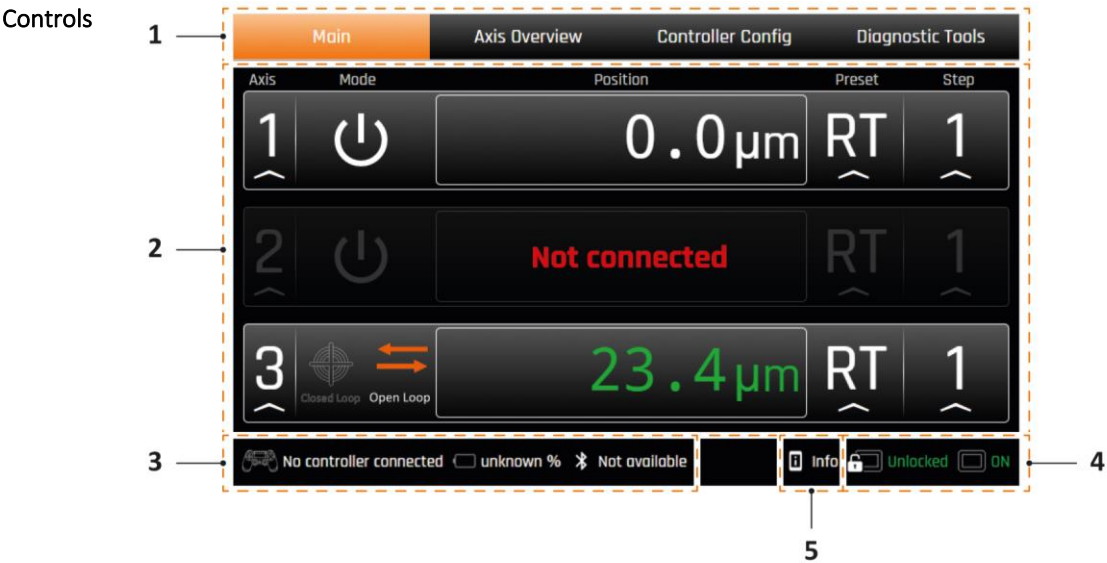


Figure 28 Touch panel screen sections

1	Header	Switch between pages
2	Control section	Control device and read out information
3	Remote controller status bar	Read out remote controller status (see below)
4	Locking bar	Lock and unlock the touch panel (see below)
5	[Info]	Open the "Version" overlay (see below)

## Remote Controller Status Bar

The remote controller status bar provides information about the connection and the charging status of the remote controller.

### Controls

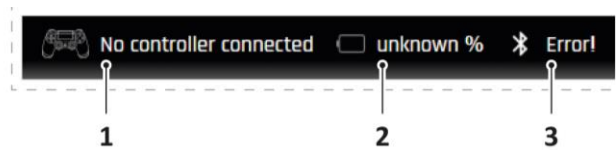


Figure 29 Remote controller status bar

- |   |                           |  |
|---|---------------------------|--|
| 1 | Connection status display | Read out connection status, see table below  |
| 2 | Battery status display    | Read out battery charge level (if connected) |
| 3 | Bluetooth status display  | Read out Bluetooth status, see table below   |

### Connection status

Status	Description
Controller connected and enabled	Remote controller is connected via USB or Bluetooth and recognized by the software
Controller not connected	Remote controller not recognized by the software of the AMC300

### Bluetooth status

Status	Description
Not available	No Bluetooth adapter connected to the device
Waiting for pairing	Connected, ready for pairing
Pairing...	Pairing in progress
Not connected	Device is paired with a remote controller, but Bluetooth connection is interrupted (e.g. remote controller out of reach)
Connecting...	Connecting in progress
Connected	The remote controller is connected to the device via Bluetooth

### Locking Bar

Via the locking bar you can deactivate or lock the display, to prevent any values from being changed unintentionally.

Controls

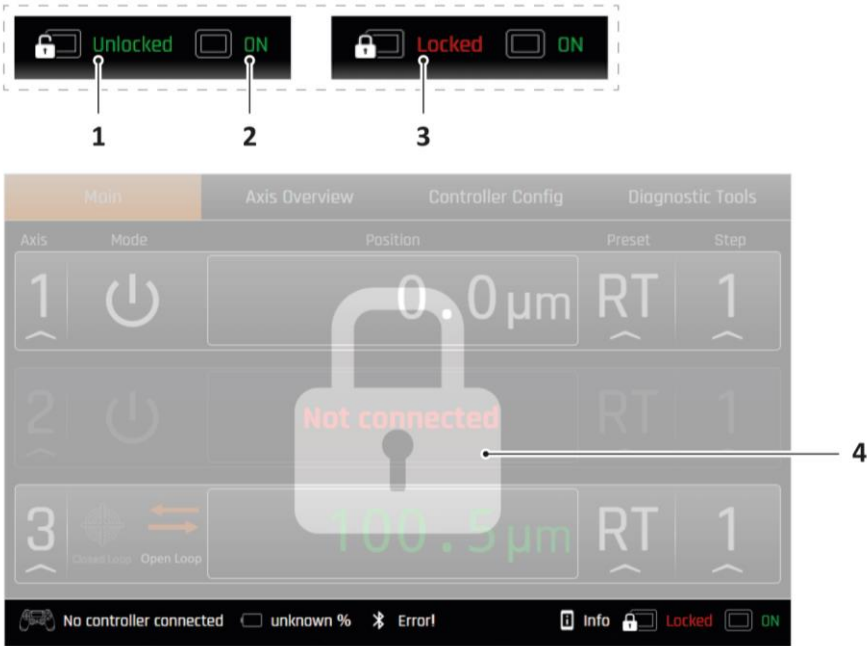


Figure 30 Locking bar

- |   |                                   |                    |
|---|-----------------------------------|--------------------|
| 1 | Display locking control, unlocked | Lock touch panel   |
| 2 | Display activation control        | Switch off display |
| 3 | Display locking control, locked   | Unlock touch panel |
| 4 | Control section, locked           |                    |



## "Version" Overlay

The "Version" overlay provides you with comprehensive information about the device and its current firmware version. It also enables you to reboot the device or to reset it without the need for a PC being connected. The network settings can also be adjusted here.

**Access** The "Version" overlay can be accessed from every page by tapping [Info] (Figure 28/5).

**Controls**

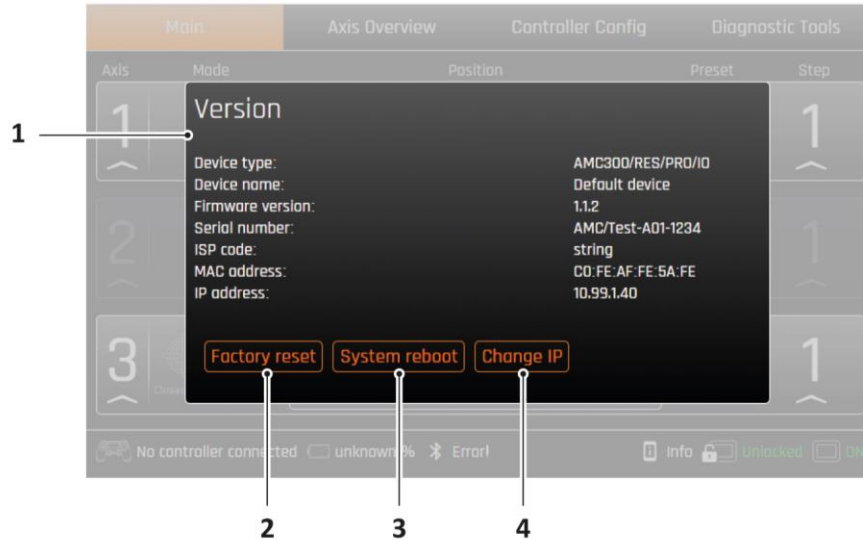


Figure 31 "Version" overlay

- |   |                   |                                       |
|---|-------------------|---------------------------------------|
| 1 | "Version" section | Read out device information           |
| 2 | [Factory reset]   | Restore factory settings (see 11.3.3) |
| 3 | [System reboot]   | Reboot device                         |
| 4 | [Change IP]       | Open the "Networking" overlay         |

### Numerical Input Overlay

The numerical input overlay always appears when a field for numerical input is touched.

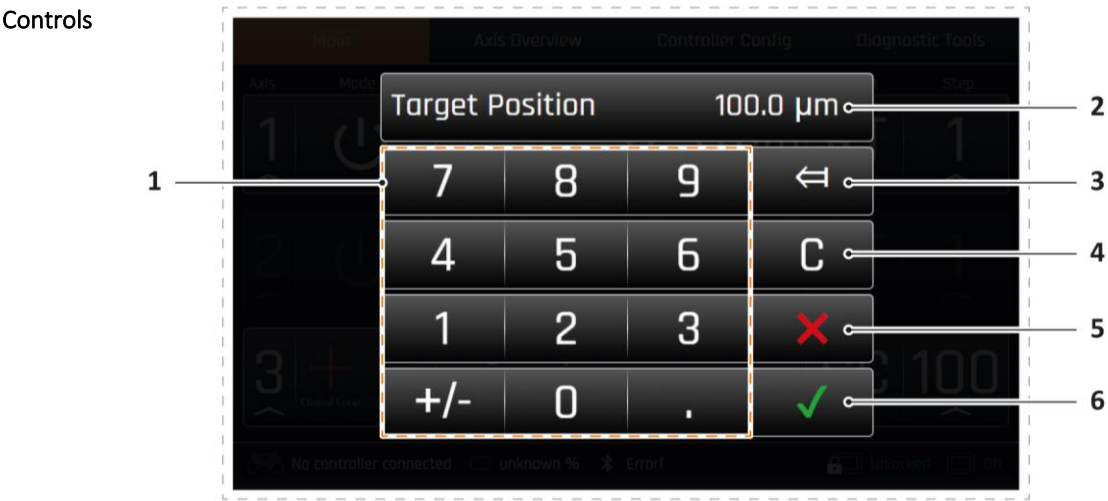


Figure 32 Numerical input field, example: target position setting

1	Numeric keys	Type in numerical values
2	Parameter display	Read out parameter to be adapted and its current value
3	[←]	Delete last digit
4	[C]	Delete entire input
5	[x]	Discard input and close overlay
6	[✓]	Confirm input and close overlay

### 5.3.2 "Main" Page

The "Main" page is the page where the actual positioning process takes place. It displays the parameter values of each axis in a row and allows you to adapt these values.

**Access** The "Main" page can be accessed via the [Main] button in the application's header.

## Overview

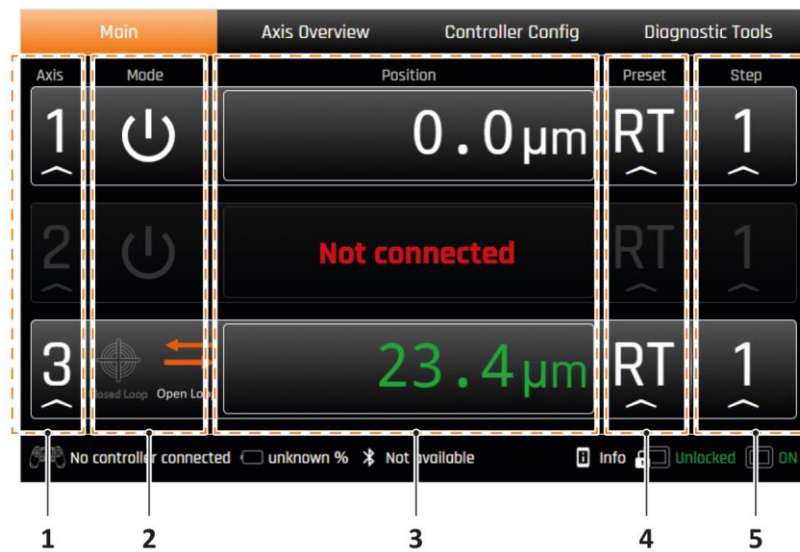


Figure 33 "Main" page





- |   |                   |   |
|---|-------------------|---|
| 1 | "Axis" column     | Read out axis' number and open the axis' settings                                     |
| 2 | "Mode" column     | Read out and adapt axis' controlling status, see below                                |
| 3 | "Position" column | Read out and adapt axis position (adapting only in closed loop mode), see section 8.6 |
| 4 | "Preset" column   | Read out and adapt preset axis parameter profile, see sections 8.4.2 and 8.5.1        |
| 5 | "Step" column     | Set the number of steps carried out with each stepwise move, see sections 8.4.2       |

An axis with connected positioner can be activated by pressing the "Mode" symbol in the corresponding row for more than 1 second.

## Connection and Control Mode Indicators

On the "Mode" and the "Position" column of an axis you can read out the connection and control status of the axis.

The available options are displayed in the following table.

Controls	Description
 <b>Not connected</b>	No positioner is connected.
 <b>0.0 μm</b>	A positioner is connected, but controlling is not activated for this axis.
 <b>Target in μm: 100.0</b> <b>Current: 23.4 μm</b>	A positioner is connected and controlling is activated. The control mode is closed loop positioning.
 <b>23.4 μm</b>	A positioner is connected and controlling is activated. The control mode is open loop positioning.

### TIP

The color of the current position provides additional information to simplify your work.

## "Position" Column, Closed Loop Control

In the closed loop control mode the "Position" column allows not only to read out the current position, but also to adapt it.

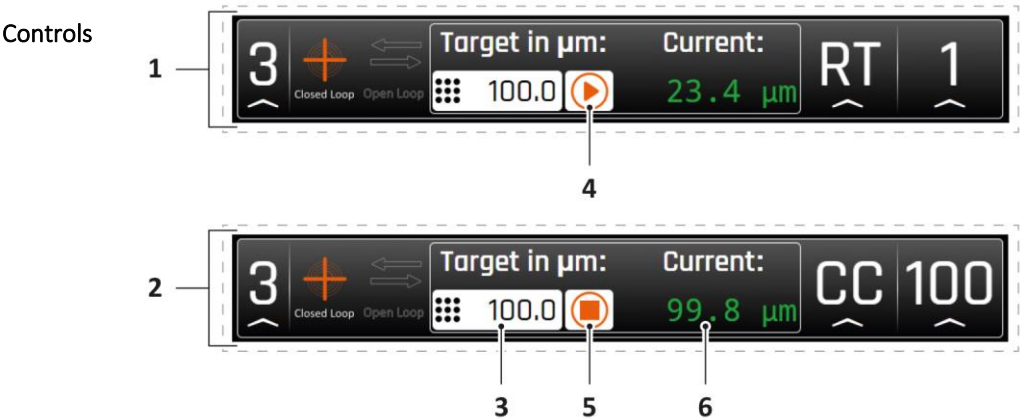


Figure 34 Axis row, positioning controls in closed loop mode

- |   |                              |   |
|---|------------------------------|---|
| 1 | Row of an axis not in motion |   |
| 2 | Row of an axis in motion     |   |
| 3 | Target field                 | Open numerical input overlay to enter target position |
| 4 | "Start moving" button        | Start moving to target position                       |
| 5 | "Stop moving" button         | Stop at current position                              |
| 6 | "Current position" display   | Current axis position                                 |

## "Preset" Column

By tapping on the "Preset" column of an axis you can select one of three preset combination of values for amplitude, frequency and target range. The values of the selected set are applied to the axis.

The preset designations correspond to typical use cases and are as follows:

- LT – low temperature use
- RT – room temperature use
- CC – custom configuration

**TIP**

The preset values can be adapted individually on the "Axis Settings" page, see [5.3.4](#).

### 5.3.3 "Axis Overview" Page

The "Axis Overview" page provides an additional way to access the settings of an axis.

**Access** The "Axis Overview" page can be accessed via the [Axis Overview] button in the application's header.

**Controls**



Figure 35 "Axis Overview" page

The settings page of an axis can be opened by tapping on the respective axis' button.

### 5.3.4 "Axis Settings" Page

The "Axis Settings" page provides different controls to adjust motion parameters or general axis parameters. The motion parameters are arranged as profiles, i.e. sets of settings which can be adapted to the axis as a whole.

**TIP**

The axis profile can be changed in the respective axis row on the "Main" page (Figure 33/4).

**Access** The "Axis Settings" page can be accessed by tapping on the respective axis' number on the "Main" page (Figure 33/1), or by tapping on the axis' button on the "Axis Overview" page (Figure 35).

## Controls

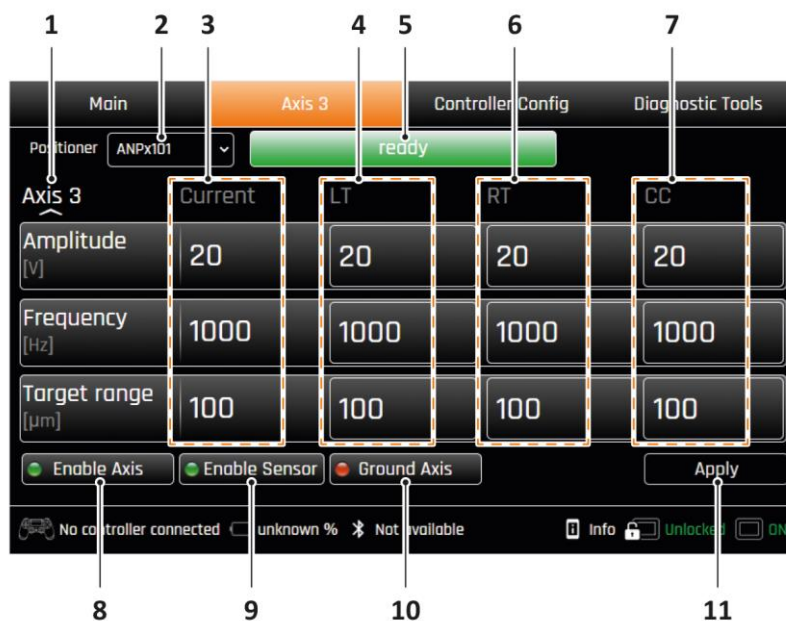


Figure 36 "Axis Settings" page

1	Axis number field	Switch axis
2	"Positioner" field	Select type of connected positioner
3	"Current" column	Read out values currently applied to the selected axis
4	"LT" profile column	Open the numerical input overlay to adapt the preset's respective value
5	Positioner status	Read out the current axis status
6	"RT" profile column	Open the numerical input overlay to adapt the preset's respective value
7	"CC" profile column	Open the numerical input overlay to adapt the preset's respective value
8	[Enable Axis]	Activate or deactivate selected axis
9	[Enable Sensor]	Activate or deactivate position feedback (/RES positioner required)
10	[Ground Axis]	Ground positioner
11	[Apply]	Save all changes

### 5.3.5 "Controller Config" Page

On the "Controller Config" page the remote controller can be configured.

**TIP**

The configurations can be stored to two separate profiles, named "yellow" and "red". A profile can be configured regardless of whether it is currently active or not.

**Access** The "Controller Config" page can be accessed via the [Controller Config] button in the application's header.

**Controls**

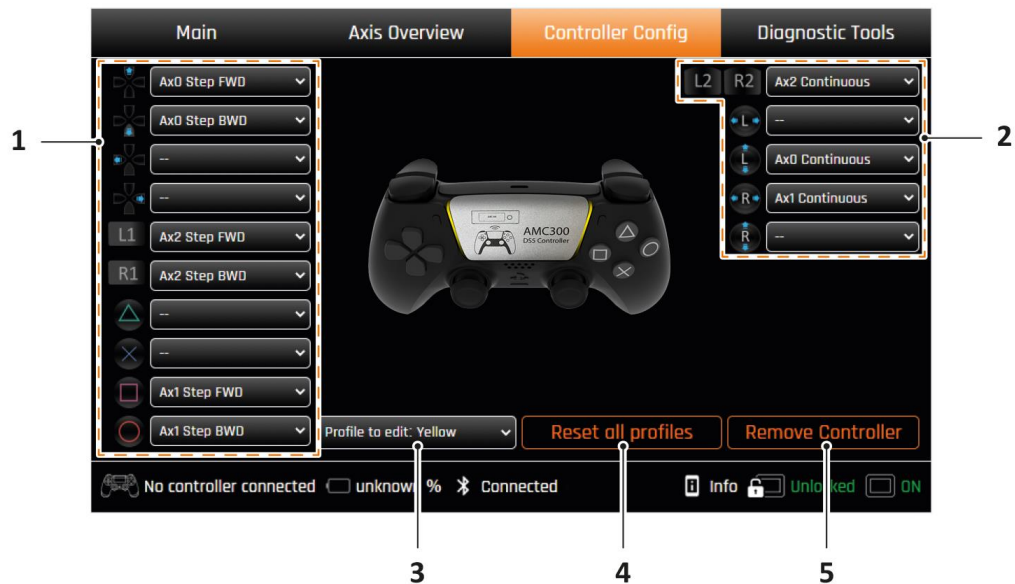


Figure 37 "Controller Config" page

- |   |  |   |
|---|--|---|
| 1 | Button function fields (stepwise movement)   | Select stepwise movement function for the respective remote controller button   |
| 2 | Button function fields (continuous movement) | Select continuous movement function for the respective remote controller button |
| 3 | [Profile to edit] field                      | Select profile to be configured   |
| 4 | [Reset all profiles]                         | Reset all configurations in all profiles to delivery status                     |
| 5 | [Remove Controller]                          | Unpair / remove remote controller from device                                   |

### 5.3.6 "Diagnostic Tools" Page

On the "Diagnostic Tools" page you can measure the performance of the connected positioners.

**Access** The "Diagnostic Tools" page can be accessed via the [Diagnostic Tools] button in the application's header.

**Controls**

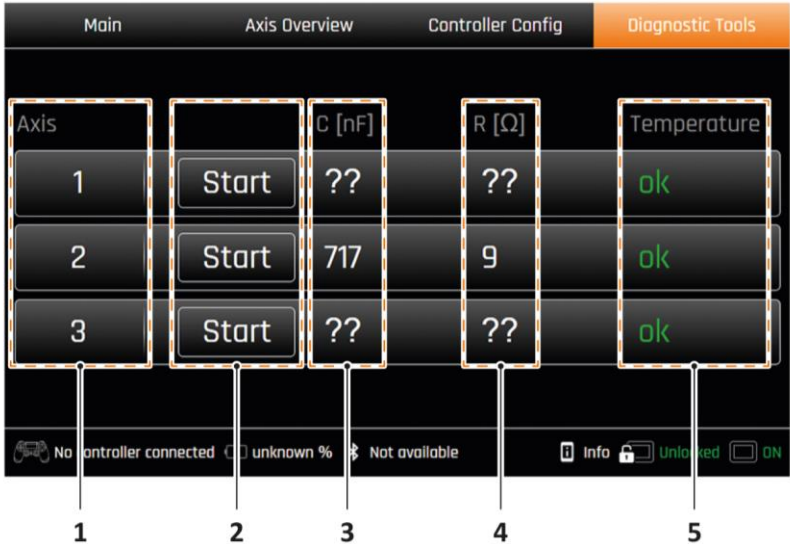


Figure 38 "Diagnostic Tools" page

1	"Axis" column	Read out number of the axis to be tested
2	[Start]	Start measuring capacitance, resistance and power for the respective axis
3	"C" column	Read out last measured capacitance value of the respective axis
4	"R" column	Read out last measured resistance value of the respective axis
5	"Temperature" column	Read out device temperature



## 6 Device Setup

### 6.1 Unpacking and Positioning

1. Carefully unpack the device and its accessories.
2. Inspect the device and the accessories for any damage. Contact attocube in case of any detected damage.
3. Place all components on a flat and clean surface.

**NOTE**

Inadequate positioning may lead to malfunctions or damage the device.

- Position the device in such a way that it can easily be disconnected from the mains supply.
- Do not obscure the ventilation slots. Make sure that proper airflow is maintained to the unit.
- Observe the operation requirements specified in section 4.4.

### 6.2 Mounting the Rack and Double Rack Device

**NOTE**

If handled by only one person, the device might fall and be damaged.

- Always work in pairs when installing the device.

1. Grab the device at its handles and attach it to the rack, matching its screw holes (Figure 39/1) to the threaded holes in the rack.

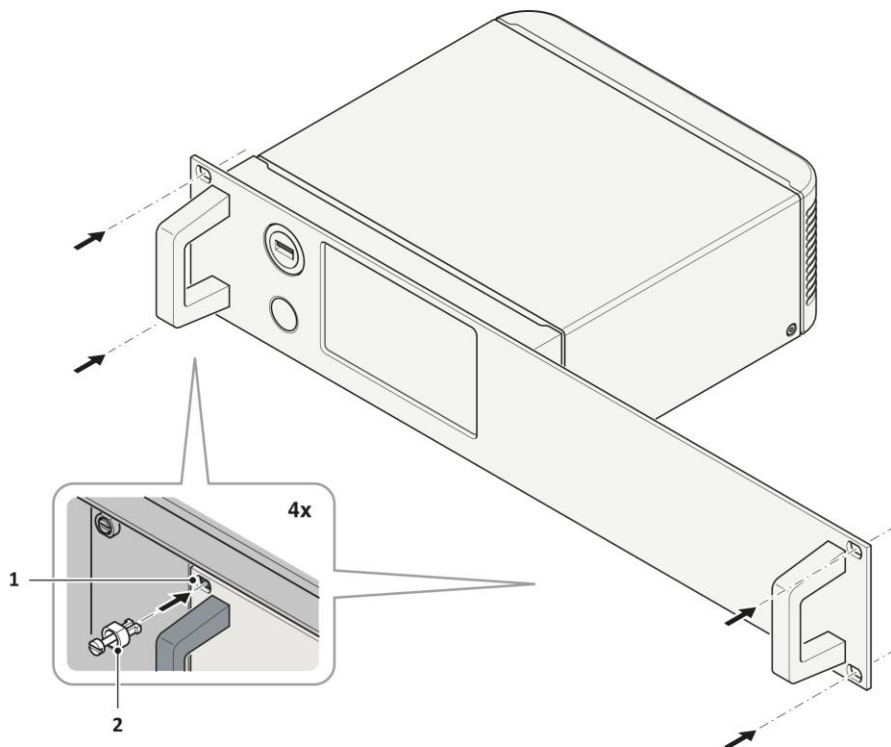


Figure 39 Mounting the rack device

2. Screw in the device's fixing screws ([Figure 39/2](#)) at their designated positions ([Figure 39/1](#)).

## 6.3 Connecting to Voltage Supply



### CAUTION

#### Wrong cabling!

Inadequate equipment may cause electric shocks or fire.

- Always use power supply cables provided by attocube!

1. Connect the power cable to the mains supply socket.
2. Connect the power cable to the device's power supply socket.

### TIP

The sockets for outgoing voltage ([Figure 5/7-9](#)) are insulated and do not conduct power unless there are positioners connected.

## 6.4 Connecting to PC via USB

- ✓ The PC fulfills the requirements specified in [section 4.6](#).
  - ✓ You are logged in to the PC with administrator rights.
1. Plug in the USB connector of the USB-to-Ethernet adapter (part of the delivery) into the USB port of your PC.
    - The driver is installed automatically.
  2. Plug in the connector of the Ethernet cable into the corresponding socket at the adapter.
  3. Plug in the opposite connector of the Ethernet cable into the device's Ethernet uplink socket ([Figure 5/2](#)).

You can connect several AMC300 devices to the PC via USB. Therefore, an Ethernet switch must be interposed between the USB-to-Ethernet adapter and the devices. An Ethernet switch is not part of the delivery.

## 6.5 Connecting to Network

### 6.5.1 Establishing the Cable Connection

- ✓ The PC fulfills the requirements specified in [section 4.6](#).
1. Plug the connector of the Ethernet cable into the Ethernet socket of your PC or of the respective LAN router.
  2. Plug the opposite connector of the Ethernet cable into the device's Ethernet uplink socket ([Figure 5/2](#)).

You can connect several AMC300 devices to the network via separate Ethernet cables or by interposing an Ethernet switch between PC / router and the devices. An Ethernet switch is not part of the delivery.

Alternatively, you can daisy-chain the network devices, connecting them via their Ethernet uplink and downlink (Figure 5/3) sockets.

**TIP**

The use of the device's Ethernet downlink socket requires the /PRO upgrade.

## 6.5.2 Configuring the Network Settings

If you are not using the device as DHCP server, its IP address and the network configuration must be adapted, to operate the device within a LAN.

**NOTE**

Assigning an unavailable IP address or one which has already been assigned to another device, will cause networking problems.

- Make sure the chosen IP address is available for your network and is not already in use.

**WebApp**

- ✓ The PC fulfills the requirements specified in section 4.6.
  - ✓ PC and device are connected to the same LAN.
  - ✓ The "Configuration" screen is opened, see section 5.2.2.
1. Navigate to the "Networking" section and select Static configuration or DHCP from the "IP Mode" field (Figure 20/1).
    - Additional controls become available.
  2. Adapt the values in the fields of the "Networking" section to your network specification.
  3. Click on [Apply].

**Touch panel**

- ✓ The "Version" overlay is opened, see section 5.3.1.
1. Tap on [Change IP] (Figure 31/5).
    - The "Networking" overlay opens.
  2. Tap into the field, the value of which you want to adapt.
  3. Adapt the value to your network specification and confirm the upcoming prompt.
    - A pen symbol behind the "Networking" overlay's respective field indicates that the value has been adapted.
  4. If required, adapt further networking settings accordingly.
  5. Tap on [Apply].

## 6.6 Connecting Remote Controller

The remote controller can be connected to the device via USB or wirelessly via Bluetooth.

### 6.6.1 Establishing a Cable Connection

1. Plug the USB-micro-B connector of the USB cable (part of the delivery) into the remote controller's USB socket.
2. Plug the USB-A connector of the cable into the device's USB socket (Figure 5/4).

### 6.6.2 Establishing a Wireless Connection

- o Plug the Bluetooth receiver (part of the delivery) into the device's USB socket (Figure 5/4).

### 6.6.3 Pairing Remote Controller and Device

**TIP**

Pairing is not required when the remote controller is connected via cable.

- ✓ A wireless connection between the device and the remote controller has been established.
  - ✓ The device is switched on.
  - ✓ The remote controller is switched off.
  - ✓ The Bluetooth receiver connected to the device's USB socket lights blue.
1. Simultaneously hold the remote controller's [SHARE] (Figure 6/3) and PS button (Figure 6/11) until the light bar on the controller's back (Figure 6/4) starts blinking rapidly.
    - The Bluetooth status display (Figure 29/3) on the touch panel shows the status **Pairing**.
  2. Verify that the Bluetooth status display shows the message **Connected**.

**TIP**

The pairing has to be done only once. The device will remember the paired controller until a firmware reset is done.

Note that only one controller can be paired with the device at a time. If you want to pair another controller with the device, you will have to discard the current pairing connection, see section 6.6.4.

## 6.6.4 Discarding the Pairing Connection

As only one remote controller can be paired with the device at a time, the pairing connection of a connected remote controller must be discarded before another controller can be paired with the device.

- 
- |               |   |
|---------------|---|
| <b>WebApp</b> | <ul style="list-style-type: none"> <li>✓ The "Controller Configuration" screen is opened.</li> <li>○ Click on [Disconnect Controller] (Figure 27/2).               <ul style="list-style-type: none"> <li>→ The current pairing connection is discarded.</li> </ul> </li> </ul> |
|---------------|---|
- 
- |                    |  |
|--------------------|--|
| <b>Touch panel</b> | <ul style="list-style-type: none"> <li>✓ The "Controller Config" page is opened.</li> <li>○ Tap on [Remove Controller] (Figure 37/8).               <ul style="list-style-type: none"> <li>→ The current pairing connection is discarded.</li> </ul> </li> </ul> |
|--------------------|--|

## 6.6.5 Switching off the Remote Controller

The remote controller can be switched off by pressing the PS button for 10 seconds.

## 6.7 Configuring Remote Controller

The keys of the remote controller can be assigned functions according to your individual controlling preferences.

### TIP

The profile activated for controlling is independent from the profile that is selected for configuration. You might, e.g. configure profile red while profile yellow is active for controlling.

- 
- |               |  |
|---------------|--|
| <b>WebApp</b> | <ul style="list-style-type: none"> <li>✓ The remote controller is connected and paired with the device, see section 6.6.</li> <li>✓ The "Navigation" screen is opened, see section 5.2.1.</li> <li>1. Click on [Controller Configuration].               <ul style="list-style-type: none"> <li>→ The "Controller Configuration" screen opens.</li> </ul> </li> <li>2. Tap on [Profile to edit].</li> <li>3. From the drop-down menu, select the profile to be configured.</li> <li>4. Click on the field corresponding to the button you want to assign a function to.</li> <li>5. From the drop-down menu, select the desired function.               <ul style="list-style-type: none"> <li>→ The configuration takes effect immediately. For testing, the configured profile must be also active for controlling.</li> </ul> </li> </ul> |
|---------------|--|

- Touch panel**
- ✓ The remote controller is connected and paired with the device, see section 6.6.
  - ✓ The "Controller Config" page is opened, see section 5.3.5.
1. Tap on [Profile to edit].
  2. From the drop-down menu, select the profile to be configured.
  3. Tap on the field corresponding to the button you want to assign a function to.
  4. From the drop-down menu, select the desired function.
    - The configuration takes effect immediately. For testing, the configured profile must be also active for controlling.

## 6.8 Connecting Positioner



### CAUTION

#### Wrong connection!

Inadequate connections may cause injury and are likely to damage the device or interfere with an appropriate functioning.

- When connecting the device to customer hardware, carefully take note of the warnings and specifications given in section 13!

1. Plug in the positioner control cable into the positioner's connector or the vacuum feedthrough's socket, accordingly.

### TIP

Use the test adapter to directly connect a positioner control cable to a positioner for vacuum use.

2. Plug in the D-Sub connector of the positioner control cable into one of the corresponding sockets at the device (Figure 5/7, 8, 9).

## 6.9 Disconnecting Positioner



### CAUTION

#### Risk of electric shock

Contact with live connectors can cause injuries or material damage.

- Always deactivate an axis before disconnecting the corresponding positioner!

A positioner can be disconnected at any time in the process, e.g. for changing positioners to be controlled by the device.

- ✓ The respective axis is deactivated, see section 8.3.
- To disconnect a positioner, unplug the positioner control cable from the device or from the positioner's socket.

## 6.10 Installing the attoDISCOVERY Software

- ✓ You are logged in to the PC with administrator rights.
- 1. Connect the USB flash drive contained in the scope of delivery to your PC.
- 2. Open a file explorer window and navigate to the USB flash drive's folder.
- 3. Double-click on the installation file fitting your operating system ( .exe for Windows, .deb for Linux).
- 4. Follow the instructions of the installation wizard.

**TIP**

When the software is started for the first time, a folder named `attocube` containing a file named `staticDevices.json` is created in your user's folder at the PC. In this file you can specify IP addresses of controllers that will automatically be connected, even if they are not directly connected to the PC's network subnet.

## 7 Device Start-Up

### 7.1 Switching On the Device

- Press the device's power button (Figure 2/2 or Figure 3/2, respectively).
- Start up your PC.

### 7.2 Switching On the Remote Controller

- Press the remote controller's PS button (Figure 6/2) shortly, until the light bar on the controller's back (Figure 6/4) turns on.

**NOTE**

If the remote controller is not charged it might turn off immediately after connecting.

- Regularly check the remote controller's charging status at the touch panel's remote controller status bar.
- Make sure the remote controller is always sufficiently charged.
- For charging, connect the remote controller to any USB power supply via USB cable.

**TIP**

If connected to the device via USB cable for charging, the remote controller can simultaneously be used for controlling.



## 8 Operation

In the course of this section, instructions on the fulfillment of some typical application tasks are given.

**TIP**

For a concise description of all of the device's controlling functions, see section 0.

### 8.1 Restoring Former Axis Selection

When starting the software, attoDISCOVERY automatically checks the connected networks for devices (identified by serial number) that were also connected when the software ran the last time. If so, the "Restore Selection" dialog opens.

The "Restore Selection" dialog allows you to comfortably restore the last axis selection, i.e. the axes to be controlled.

**TIP**

Make use of the "Restore selection" option if you repeatedly use the axes in the same setting, e.g. a constant experimental arrangement.

attoDISCOVERY ✓ The "Restore Selection" dialog is opened after software start.

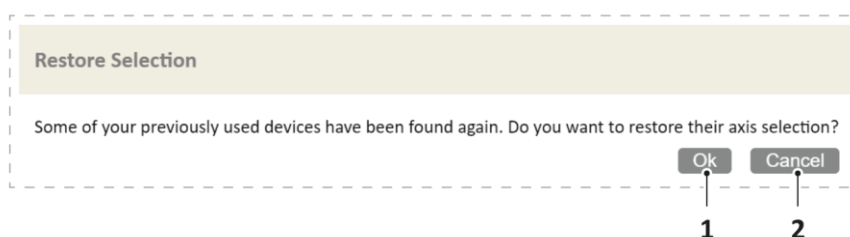


Figure 40 "Restore Selection" dialog

- To restore the last axis selection, click [Ok] (Figure 40/1).
- To discard the last axis selection, click [Cancel] (Figure 40/2).

## 8.2 Labeling Entities

The options to label devices and axes provide a way to increase transparency, especially when working with the same experimental arrangements over larger periods of time or with varying personnel.

### 8.2.1 Labeling Device

- attoDISCOVERY** ✓ The "Find Devices" screen is opened, see section 5.1.1.
1. At the respective controller tile, click on the controller name field (Figure 11/2).
  2. Type in the device name of your choice.
  3. Click on [Apply].  
→ The settings are saved.

- WebApp** ✓ The "Configuration" screen is opened, see section 5.2.2.
1. In the "Device Name" section, click on the "Device Name" field (Figure 21/1).
  2. Type in the device name of your choice.
  3. Click anywhere else on the "Configuration" screen or press [Enter].  
→ The settings are saved.

### 8.2.2 Labeling Axes

#### TIP

Make use of the axis labeling option to secure transparency of the axis' assignments (e.g. to the positioning dimension) over time and personnel changes.



#### NOTE

The axis connected to a device must have different names.

- attoDISCOVERY** ✓ The "Find Devices" screen is opened, see section 5.1.1.
1. At the respective controller tile, click on the name field of the axis to be labeled (Figure 11/5).
  2. Type in the axis name of your choice.
  3. Click on [Apply].  
→ The settings are saved.

- WebApp** ✓ The "Configuration" screen is opened, see section 5.2.2.
1. In the "Device Name" section, click on the name field of the axis to be labeled (Figure 21/2).
  2. Type in the axis name of your choice.
  3. Click anywhere else on the "Configuration" screen or press [Enter].  
→ The settings are saved.

## 8.3 Activating and Deactivating Axis

Before you can control and configure an axis you have to activate it. An axis must always be deactivated before the corresponding positioner is disconnected or the device is switched off.



### NOTE

Under rare circumstances, it is possible that older positioners of attocube's industrial line are not detected properly by the device, regardless of their physical connection status.

- Contact the attocube support, if a connected positioner is not detected by the device.

- |                      |   |
|----------------------|---|
| <b>attoDISCOVERY</b> | <ul style="list-style-type: none"> <li>✓ The "Operation" screen is opened, see section <a href="#">5.1.2</a>.</li> <li>○ To activate an axis, check the axis activation checkbox (<a href="#">Figure 13/1</a>) of the corresponding axis tile.               <ul style="list-style-type: none"> <li>→ The axis is activated.</li> </ul> </li> <li>○ To deactivate an axis, uncheck the axis activation checkbox (<a href="#">Figure 13/1</a>) of the corresponding axis tile.               <ul style="list-style-type: none"> <li>→ The axis is deactivated.</li> </ul> </li> </ul>              |
| <b>WebApp</b>        | <ul style="list-style-type: none"> <li>✓ The "Navigation" screen is opened, see section <a href="#">5.2.1</a>.</li> <li>○ To activate an axis, check the axis activation checkbox (<a href="#">Figure 16/1</a>) of the corresponding axis tile.               <ul style="list-style-type: none"> <li>→ The axis is activated.</li> </ul> </li> <li>○ To deactivate an axis, uncheck the axis activation checkbox (<a href="#">Figure 16/1</a>) of the corresponding axis tile.               <ul style="list-style-type: none"> <li>→ The axis is deactivated.</li> </ul> </li> </ul>             |
| <b>Touch panel</b>   | <ul style="list-style-type: none"> <li>✓ The "Main" page is opened, see section <a href="#">5.3.2</a>.</li> <li>○ To activate an axis, press the "Mode" field of the corresponding axis' row for more than 1 second (<a href="#">Figure 33/2</a>).               <ul style="list-style-type: none"> <li>→ The axis is activated.</li> </ul> </li> <li>○ To deactivate an axis, press the "Mode" field of the corresponding axis' row for more than 1 second (<a href="#">Figure 33/2</a>).               <ul style="list-style-type: none"> <li>→ The axis is deactivated.</li> </ul> </li> </ul> |



## 8.4 Configuring Axis

### 8.4.1 Specifying Positioner Type

In order to "tell" the device e.g. whether movements are linear or rotational etc. you always have to specify the positioner type after connecting a positioner.

**TIP**

Per default an ANPx101 positioner is selected.

#### attoDISCOVERY

- ✓ The "Operation" screen is opened, see section 5.1.2.
- ✓ The axis tile's configuration view is opened.
- 1. Click on the "Positioner" field (Figure 14/3).
- 2. From the drop-down menu, select the desired positioner type.

#### WebApp

- ✓ The "Navigation" screen is opened, see section 5.2.1.
- ✓ The axis tile's configuration view is opened.
- 1. Click on the "Positioner" field (Figure 17/3).
- 2. From the drop-down menu, select the desired positioner type.

#### Touch panel

- ✓ The "Axis Settings" page of the respective axis is opened, see section 5.3.4.
- 1. Tap on the "Positioner" field (Figure 36/2).
- 2. From the drop-down menu, select the desired positioner type.

### 8.4.2 Adjusting Axis Parameters

The device allows you to adjust various parameters of your positioning tasks, always depending on the active control mode and the activated features.

Examples for adjustable actuator parameters are:

- the number of steps that are implemented with each stepwise move (/PRO upgrade required)
- the range in which a positioner is regarded as "in target"
- whether the positioner stops the attempt to move when it is confronted with physical obstacles
- whether the positioner is grounded when it is in the defined target range

Adjustable sensor parameters are:

- the sensor activity itself
- the sensor's feedback power

- 
- attoDISCOVERY**
- ✓ The "Operation" screen is opened, see section 5.1.2.
  - ✓ The axis tile's configuration view is opened.
1. Click on the field, the value of which you want to adapt.
  2. Select or type in the desired value.
  3. Click anywhere else on the axis tile.
    - The settings are saved.
- 
- WebApp**
- ✓ The "Navigation" screen is opened, see section 5.2.1.
  - ✓ The axis tile's configuration view is opened.
1. Click on the field, the value of which you want to adapt.
  2. Select or type in the desired value.
  3. Click anywhere else on the axis tile.
    - The settings are saved.
- 
- Touch panel**
- ✓ The "Main" page is opened, see section 5.3.2.
  - ✓ The respective axis is activated.
1. To change the steps applied with a stepwise move, tap various times on the "Step" field of the axis' row (Figure 33/5).
- TIP**  
The possible values for "Step" are 1, 10 and 100.
2. To change further parameters, tap on the "Axis" field in the axis' row (Figure 33/1).
    - The "Axis Settings" page opens.
  3. To activate or deactivate the sensor, tap on [Enable Sensor] (Figure 36/9).
    - The button's indicator changes its color (green: activated, red: deactivated).
  4. To ground the axis on target, tap on [Ground Axis] (Figure 36/10).
    - The button's indicator changes its color (green: activated, red: deactivated).
  3. To adapt the target range, tap on the "Target range" field of desired profile's column (Figure 36/4, 6, 7).
    - The numerical input overlay opens.
  4. Type in the desired target range value and confirm (Figure 32/6).
  5. Tap on [Apply] (Figure 36/11).
    - The settings are saved.
  6. To change the active preset, tap on [Main] in the application's header (Figure 28/1).
    - The "Main" page opens.
  7. Tap various times on the "Preset" field of the axis' row (Figure 33/4), until the desired preset value appears.

**TIP**

The possible values for "Preset" are LT, RT and CC.

### 8.4.3 Loading Standard Axis Parameters

- 
- attoDISCOVERY**
- ✓ The "Operation" screen is opened, see section [5.1.2](#).
  - ✓ The axis tile's configuration view is opened.
  - 1. Click on the "Configuration Upload" button ([Figure 14/8](#)).
    - A file explorer opens.
  - 2. Navigate to the desired configuration file's folder.
  - 3. Click on the file and confirm.
    - The axis configuration is uploaded and applied.

- 
- WebApp**
- ✓ The "Navigation" screen is opened, see section [5.2.1](#).
  - ✓ The axis tile's configuration view is opened.
  - 1. Click on the "Configuration Upload" button ([Figure 17/8](#)).
    - A file explorer opens.
  - 2. Navigate to the desired configuration file's folder.
  - 3. Click on the file and confirm.
    - The axis configuration is uploaded and applied.

## 8.5 Open loop Positioning

The open loop positioning mode operates without position feedback from the positioner.

The position on the axis can be varied without any absolute position information. Motion aspects like speed and step size depend on the physical motion parameters you set for the movement.

### TIP

For additional information on the motion-related significance of amplitude and frequency, consult the positioner's manual.

### 8.5.1 Adjusting Motion Parameters

- |                      |  |
|----------------------|--|
| <b>attoDISCOVERY</b> | <ul style="list-style-type: none"> <li>✓ The "Operation" screen is opened, see section 5.1.2.</li> <li>✓ The respective axis is activated (required only for DC value adjustment), see section 8.3.</li> <li>✓ The axis tile's operation view is opened.</li> </ul> <ol style="list-style-type: none"> <li>1. To adapt the step size, type in the desired value into the amplitude setting field (Figure 13/5).</li> <li>2. To adapt the step repetition rate, type in the desired value into the frequency setting field (Figure 13/6).</li> <li>3. To set the DC value for manual position adjustment, type in the desired value into the DC value setting field (Figure 13/7).</li> <li>4. Click anywhere else on the axis tile.<br/>→ The settings are saved.</li> </ol> |
| <b>WebApp</b>        | <ul style="list-style-type: none"> <li>✓ The "Navigation" screen is opened, see section 5.2.1.</li> <li>✓ The respective axis is activated (required only for DC value adjustment), see section 8.3.</li> <li>✓ The axis tile's operation view is opened.</li> </ul> <ol style="list-style-type: none"> <li>1. To adapt the step size, type in the desired value into the amplitude setting field (Figure 16/5).</li> <li>2. To adapt the step repetition rate, type in the desired value into the frequency setting field (Figure 16/6).</li> <li>3. To manually adjust the position, type in the desired value into the DC value setting field (Figure 16/7).</li> <li>4. Click anywhere else on the axis tile.<br/>→ The settings are saved.</li> </ol>                   |
| <b>Touch panel</b>   | <ul style="list-style-type: none"> <li>✓ The "Axis Settings" page of the respective axis is opened, see section 5.3.4.</li> </ul> <ol style="list-style-type: none"> <li>1. To adapt the step size, tap on the "Amplitude" field of the desired profile's column (Figure 36/4, 6, 7).<br/>→ The numerical input overlay opens.</li> <li>2. Type in the desired amplitude value and confirm (Figure 32/6).</li> <li>3. To adapt the step repetition rate, tap on the "Frequency" field of the desired profile's column (Figure 36/4, 6, 7).<br/>→ The numerical input overlay opens.</li> </ol>   |

4. Type in the desired frequency value and confirm (Figure 32/6).
5. Tap on [Apply] (Figure 36/11).
  - The settings are saved.
6. To change the active preset, tap on [Main] in the application's header (Figure 28/1).
  - The "Main" page opens.
7. Tap various times on the "Preset" field of the axis' row (Figure 33/4), until the desired preset value appears.

**TIP**

The possible values for "Preset" are LT, RT and CC.

## 8.5.2 Controlling Movements

**attoDISCOVERY**

- ✓ The "Operation" screen is opened, see section 5.1.2.
- ✓ The respective axis is activated, see section 8.3.
- ✓ The axis tile's operation view is opened.
- Click on the open loop positioning controls (Figure 13/4) to initiate or stop a movement.

**WebApp**

- ✓ The "Navigation" screen is opened, see section 5.2.1.
- ✓ The respective axis is activated, see section 8.3.
- ✓ The axis tile's operation view is opened.
- Click on the open loop positioning controls (Figure 16/4) to initiate or stop a movement.

**Remote controller**

- ✓ The remote controller is connected and paired with the device, see section 6.6.
- ✓ Movement commands for the respective axis have been assigned to remote controller keys, see section 6.7.
- Press the remote controller keys assigned to the axis to initiate or stop a movement.



## 8.6 Closed Loop Positioning

The closed loop positioning mode operates with active position feedback from the positioner.



### NOTE

Closed loop positioning is only available for positioners with /RES encoding. Refer to the specification sheets of the positioner for information on the motion specifications in closed loop mode.

### 8.6.1 Activating Closed Loop Positioning

To perform positioning, the corresponding controls must be activated first.

#### attoDISCOVERY

- ✓ The "Operation" screen is opened, see section 5.1.2.
- ✓ The respective axis is activated, see section 8.3.
- ✓ The axis tile's operation view is opened.
- Click on [Closed Loop Functions] (Figure 13/8).
  - The closed loop positioning controls are expanded.

#### WebApp

- ✓ The "Navigation" screen is opened, see section 5.2.1.
- ✓ The respective axis is activated, see section 8.3.
- ✓ The axis tile's operation view is opened.
- Click on [Closed Loop Functions] (Figure 16/8).
  - The closed loop positioning controls are expanded.

#### Touch panel

- ✓ The "Main" page is opened, see section 5.3.2.
- ✓ The respective axis is activated, see section 8.3.
- Tap on [Closed Loop] in the axis row's "Mode" column (Figure 33/2).
  - The "Closed Loop" icon lights up.

### 8.6.2 Moving Defined Distances

#### attoDISCOVERY

- ✓ The "Operation" screen is opened, see section 5.1.2.
- ✓ The respective axis is activated, see section 8.3.
- ✓ The axis tile's operation view is opened.
- ✓ Closed loop positioning is activated, see section 8.6.1.
- 1. Into the distance field (Figure 13/11), type in the desired absolute movement distance (in  $\mu\text{m}$ ).
  - To move the defined distance in positive direction, click on [+] (Figure 13/12).
  - To move the defined distance in negative direction, click on [-] (Figure 13/10).



- 
- WebApp**
- ✓ The "Navigation" screen is opened, see section 5.2.1.
  - ✓ The respective axis is activated, see section 8.3.
  - ✓ The axis tile's operation view is opened.
  - ✓ Closed loop positioning is activated, see section 8.6.1.
1. Into the distance field (Figure 16/11), type in the desired absolute movement distance (in  $\mu\text{m}$ ).
    - To move the defined distance in positive direction, click on [+] (Figure 16/12).
    - To move the defined distance in negative direction, click on [-] (Figure 16/10).

### 8.6.3 Moving to Defined Target

- 
- attoDISCOVERY**
- ✓ The "Operation" screen is opened, see section 5.1.2.
  - ✓ The respective axis is activated, see section 8.3.
  - ✓ The axis tile's operation view is opened.
  - ✓ Closed loop positioning is activated, see section 8.6.1.
1. Into the target field (Figure 13/14), type in the desired target position (in  $\mu\text{m}$ ).
  2. Click on the "Move to target" button (Figure 13/13).
    - The positioner is moved to the defined target position.

- 
- WebApp**
- ✓ The "Navigation" screen is opened, see section 5.2.1.
  - ✓ The respective axis is activated, see section 8.3.
  - ✓ The axis tile's operation view is opened.
  - ✓ Closed loop positioning is activated, see section 8.6.1.
1. Into the target field (Figure 16/14), type in the desired target position (in  $\mu\text{m}$ ).
  2. Click on the "Move to target" button (Figure 16/13).
    - The positioner is moved to the defined target position.

- 
- Touch panel**
- ✓ The "Main" page is opened, see section 5.3.2.
  - ✓ The respective axis is activated, see section 8.3.
  - ✓ Closed loop positioning is activated, see section 8.6.1.
1. Tap on the axis' target field (Figure 34/3).
    - The numerical input overlay opens.
  2. Type in the desired target position (in  $\mu\text{m}$ ) and confirm (Figure 32/6).
    - The settings are saved.
  3. Tap on the "Start moving" button (Figure 34/4).
    - The positioner is moved to the defined target position.
  4. If required, tap on the "Stop moving" button (Figure 34/5), to interrupt the movement.
    - The positioner's movement is stopped.

## 9 Device Shut-Off

### 9.1 Switching Off the Remote Controller

- Press and hold the remote controller's PS button (Figure 6/2), until the light bar on the controller's back (Figure 6/4) turns off.

### 9.2 Switching Off the Device

**TIP**

To allow an independent functioning of the device (e.g. for automated experimental arrangements), the device works properly even when the software is closed.

**CAUTION**

Risk of electric shock

Contact with power guiding connectors can cause injuries or material damage.

- Always deactivate all axes before shutting off the device.
- ✓ All axes are deactivated, see section 8.3.
1. Close the PC-based device control software applications.
  2. Press the device's power button (Figure 2/2 or Figure 3/2, respectively).
    - The device is switched off.

## 10 Update, Upgrade and Maintenance

All update, upgrade and maintenance procedures are carried out in the webserver application.



### NOTE

There are no user serviceable parts inside the controller!



### NOTE

Please refer to the manual of the remote controller for information on its maintenance requirements.

### 10.1 Adding Private Key and Certificate

The device is provided with a proper certificate for secure access over HTTPS. However, you can also add your own private key and a certificate to be used for HTTPS communication.



### NOTE

It is recommended to upload your private key over a SSL connection secured by the attocube certificate. This pre-installed certificate is self-signed and will cause a warning message issued by the browser. Confirm this warning.



### NOTE

The private key and the certificate must be uploaded in the PEM format. Otherwise they might not be applied and your device might not be accessible via HTTPS.

- Before uploading, double check if key and certificate are in the correct format.

✓ The webserver application's "Configuration" screen is opened.

1. Navigate to the "Secure Access over HTTPS" section.
2. Copy the private key (in PEM format) to the clipboard.

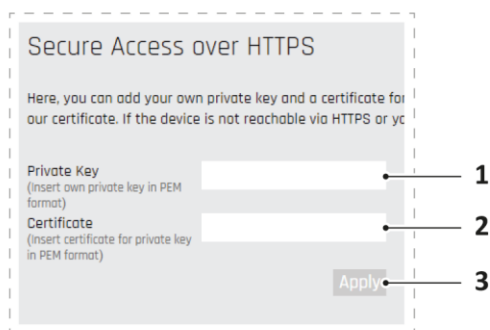


Figure 41 "Configuration" screen, "Secure Access over HTTPS" section

3. Click on the "Private Key" field (Figure 41/1) and paste the clipboard contents.
4. Copy the certificate (in PEM format) to the clipboard.
5. Click on the "Certificate" field (Figure 41/2) and paste the clipboard contents.
6. Click on [Apply] (Figure 41/3).
  - The key and the certificate are uploaded and applied.
7. To test the key, try to establish a HTTPS connection.

## 10.2 Updating Firmware

attocube provides occasional updates in the form of image files. The files are delivered in a zip folder. attocube informs you when an update for your device is available.



### NOTE

Unauthorized updates can lead to a permanent malfunction and are not covered by attocube's warranty.

- Contact attocube for technical support, before updating the device firmware.

- ✓ The update file has been downloaded, unpacked from the zip folder and stored to your PC.
- ✓ The webserver application's "Configuration" screen is opened.

1. Navigate to the "Firmware Update" section.

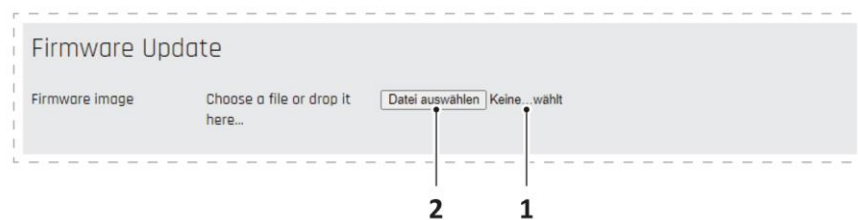


Figure 42 "Configuration" screen, "Firmware Update" section

2. Click on the browse button (Figure 42/2).
  - A file explorer window is opened.
3. Navigate to the update file's folder.
4. Select the file ending on ".image" and click [Open].
  - The file is uploaded and its name is displayed in the file name field (Figure 42/1).
  - After the successful upload additional controls are displayed.



### NOTE

It is essential to the update process that the device is constantly connected to the PC during the reboot!

- Do not disconnect the device until the connection to the webserver application is established again.

5. Click on [Install & Reboot].
  - The update is installed and the device is rebooted.

## 10.3 Upgrading Device

To increase your performance using the AMC300, attocube provides you with additional features and upgrades. License files are delivered for this purpose.

### TIP

Contact attocube for available upgrades.

- ✓ The license file has been downloaded and stored to your PC.
- ✓ The webserver application's "Configuration" screen is opened.

1. Navigate to the "Feature Upgrade" section.

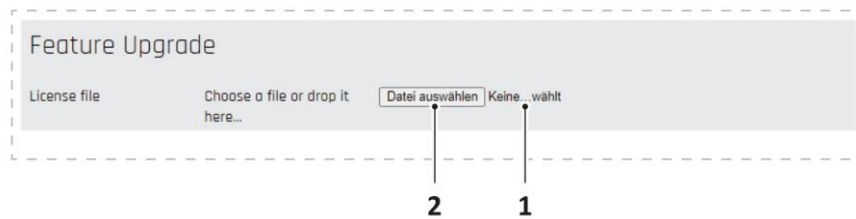


Figure 43 "Configuration" screen, "Feature Upgrade" section

2. Click on the browse button (Figure 43/2).
  - A file explorer window is opened.
3. Navigate to the license file's folder.
4. Select the file ending on ".gpg" and click [Open].
  - The file is uploaded and its name is displayed in the file name field (Figure 43/1).
  - After the successful upload additional controls are displayed.



### NOTE

It is essential to the upgrade process that the device is constantly connected to the PC during the reboot!

- Do not disconnect the device until the connection to the webserver application is established again.

5. Click on [Install & Reboot].
  - The upgrade is installed and the device is rebooted.

# 11 Troubleshooting



## NOTE

Unauthorized error handling may result in permanent malfunction and is not covered by attocube's warranty.

- Do not take any action not proposed for troubleshooting in this document.
- If problems occur that are not mentioned in this section, contact attocube for help.
- If the problems cannot be solved by the proposed action, contact attocube for help.

## 11.1 Checking for Physical Network Connection

If no network connection between the device and the PC is established, check for the presence of a physical network connection.

1. Make sure at least one minute has passed since the device's start up, so it had enough time to boot. If still no connection is established, continue with step 2.

## TIP

You can tell if the device boots from a short noise produced by its fan, approximately ten seconds after start up.

2. If no /PRO features are active, make sure that the device's Ethernet uplink socket (Figure 5/2) is used for connection.
3. Check if the indicator light next to the device's Ethernet socket is blinking.
  - The device is connected to the PC via USB-to-Ethernet adapter and the indicator light is not blinking: Continue with step 4.
  - Else: Continue with step 5.
4. Disconnect the USB-to-Ethernet adapter from your PC and connect it again. If still no connection is established, continue with step 5.
5. Reboot the device by switching it off and on again at the power button (Figure 2/2 or Figure 3/2).
6. Check if a network connection is established after the reboot.
  - A connection is established: If required, solve further problems according to section 11.2.
  - No connection is established: Continue with section 11.3.

## 11.2 Physical Network Connection Present

Follow the instructions in this section to solve problems when the device is connected to the network.

### 11.2.1 Accessing Webserver Application

If you cannot access to the device using the webserver application with the right IP address, take the following steps until the problem is solved:

1. Try opening the webserver application with the latest version of Google Chrome or Mozilla Firefox. If the problem is not solved, continue with step 2.
2. Erase the cookies and history of your web browser.
3. Try opening the webserver application. If the problem is not solved, continue with step 4.
4. Type in the device's serial number (without slashes) followed by `.local` into the browser's address line. Press [Enter]. If the problem is not solved, continue with step 5.
5. Retrieve and, if required, adapt the network settings to make sure the device can be reached via network. See section 11.3.

### 11.2.2 Resetting Device to Factory Defaults

You can reset the device to the factory defaults using the touch panel application or the webserver application.

#### Touch panel

- ✓ The "Version" overlay is opened.
- 1. Tap on [Factory reset] (Figure 31/2).
  - The reset takes effect after the device's next boot.
- 2. Tap on [System reboot] (Figure 31/3).
  - The reboot is carried out and the factory default settings are restored.

#### WebApp

- ✓ The "About" screen is opened.



#### NOTE

Following the instructions of this section will delete your customized network configuration.

- For resetting the device without losing the network settings, use the touch panel application or see section 11.3.3.

1. Click on [Factory Reset] (Figure 26/4).
  - A dialog window is opened.
2. Click on [OK] to confirm the reset.
  - The reset takes effect after the device's next boot.
3. Click on [System Reboot] (Figure 26/3).
  - A dialog window is opened.
4. Click on [OK] to confirm the reboot.
  - The reboot is carried out and the factory default settings are restored.



## 11.3 Physical Network Connection Not Present

If no network connection to the device is available, a USB flash drive can be used to perform some basic problem solving tasks.



### NOTE

The USB flash drive must be FAT32-formatted.

### 11.3.1 Reading out Network Settings

- ✓ The FAT32-formatted USB flash drive is connected to your PC.
  - ✓ The device is shut off.
1. On your PC, open a file explorer and navigate to the USB flash drive's root folder.
  2. Create a new empty folder named `attoDeviceIP`.
  3. Disconnect the flash drive from your PC and connect it to the device's USB socket (Figure 5/4 or Figure 3/1).
  4. Switch on the device by pressing its power button (Figure 2/2 or Figure 3/2).  
→ A `.json` file containing the network information stored on the device is created.
  5. When the booting is finished, disconnect the flash drive from the device and connect it to the PC.
  6. Open a file explorer, navigate to the flash drive's folder and open the folder `attoDeviceIP`.
  7. Open the file `attoIPconfig.json` with a plain text editor application.
  8. Read out the network information from the file.

### 11.3.2 Adjusting Network Settings

This section instructs you how to adjust the network settings with no physical network connection present.

### TIP

The method described here can be used as fallback. A more straightforward way to adjust the network settings directly at the device is provided by the touch panel application (see section 6.5.2).

- ✓ The device's network settings have been read out, see section 11.3.2.
  - ✓ The USB flash drive containing the device's network information is connected to your PC.
  - ✓ The device is shut off.
1. Open a file explorer, navigate to the flash drive's folder and open the folder `attoDeviceIP`.
  2. Open the file `attoIPconfig.json` with a plain text editor application.



### NOTE

The structure of the information contained in the file is essential to the further process.

- Make sure only to adapt variable values.
- Do not modify variable names or the syntax of the information.



3. Modify the network information contained in the file according to the desired settings. Save and close the file.
4. Disconnect the flash drive from your PC and connect it to the device's USB socket (Figure 5/4 or Figure 3/1).
5. Switch on the device by pressing its power button (Figure 2/2 or Figure 3/2).
  - The network settings are changed according to your adaptations.

### 11.3.3 Resetting Device to Factory Defaults

This section provides information on how to reset the device to the factory defaults using the webserver application.

**TIP**

A more straightforward way to reset the device to the factory defaults (without the risk of losing the network settings) is provided by the touch panel application (see section 11.2.2).

The first subsection instructs you on taking precautions to preserve the network settings when a reset is performed. If preserving the device's network settings is not required you can skip the first subsection.

#### Taking Precautions to Save Network Settings

- ✓ The FAT32-formatted USB flash drive is connected to your PC.
1. On your PC, open a file explorer and navigate to the USB flash drive's root folder.
  2. Create a new empty folder named `attoDeviceIP`.
  3. Continue with the next subsection.
    - The device's network information will be read out before the reset and be written to the device when it is rebooted.

#### Resetting Device

- ✓ The FAT32-formatted USB flash drive is connected to your PC.
  - ✓ The device is shut off.
1. On your PC, open a file explorer and navigate to the USB flash drive's root folder.
  2. Create a new empty folder named `attoreset`.
  3. Disconnect the flash drive from your PC and connect it to the device's USB socket (Figure 5/4 or Figure 3/1).
  4. Switch on the device by pressing its power button (Figure 2/2 or Figure 3/2).
    - The device is reset to the factory defaults.

## 11.4 Measuring the Positioner Performance

In case a positioner or positioner cable damage is suspected, some significant aspects of the positioner's performance can be measured.

### attoDISCOVERY

- ✓ The "Operation" screen is opened, see section 5.1.2.
  - ✓ The respective axis is activated, see section 8.3.
  - ✓ The axis tile's operation view is opened.
  - ✓ Closed loop positioning is activated, see section 8.6.1.
1. Click on [Diagnostic tools] (Figure 13/15).  
→ The diagnostic tools controls are expanded.
  2. Click on [Start] (Figure 13/16).  
→ The measurement is carried out.
  3. Read out the measured values from the "Positioner property display" section (Figure 13/17).

### WebApp

- ✓ The "Navigation" screen is opened, see section 5.2.1.
  - ✓ The respective axis is activated, see section 8.3.
  - ✓ The axis tile's operation view is opened.
  - ✓ Closed loop positioning is activated, see section 8.6.1.
1. Click on [Diagnostic tools] (Figure 16/15).  
→ The diagnostic tools controls are expanded.
  2. Click on [Start] (Figure 16/16).  
→ The measurement is carried out.
  3. Read out the measured values from the "Positioner property display" section (Figure 16/17).

### Touch panel

- ✓ The "Diagnostic Tools" page is opened, see section 5.3.6.
  - ✓ The respective axis is activated, see section 8.3.
1. In the row of the axis the positioner of which is to be measured, tap on [Start] (Figure 38/2).  
→ The measurement is carried out.
  2. Read out the measured values from the measurement categories' respective columns.

## 12 Optional On-Device Features and Upgrades

attocube offers various upgrades to facilitate and improve your work with the device.

### TIP

Contact attocube for available features and upgrades.

### 12.1 Dual- and Tri-Channel Upgrades

The device's basic 'single-channel' version can be upgraded with the 'dual-channel' upgrade. This upgrade allows you to simultaneously drive two positioners.

The upgraded 'dual-channel' version or an original 'dual-channel' device can be further upgraded to the 'tri-channel' version to simultaneously drive three positioners.

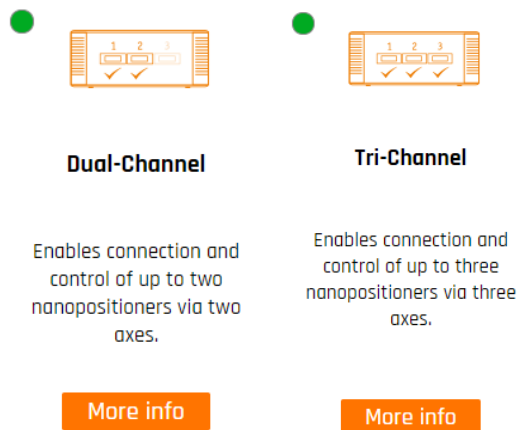


Figure 44 Dual-Channel and Tri-Channel upgrade icons (shown within the "About" screen)

### 12.2 /IO Feature Package

The /IO feature upgrade allows you to

- trigger positioning movements by input signals.
- send the axis' positioning information to an external interpreter.

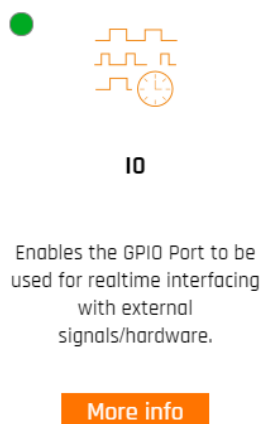


Figure 45 /IO feature icon (shown within the "About" screen)

## 12.2.1 Pin Assignments

The GPIO socket at the device's connector panel ([Figure 5/1](#)) can be used for the communication of trigger signals.

Each position signal consists of two parts transmitted via different pins. The semantics of a signal depend on the used communication protocol. A third pin communicates error signals.

The pins of the 37 pin D-Sub socket are assigned as follows.

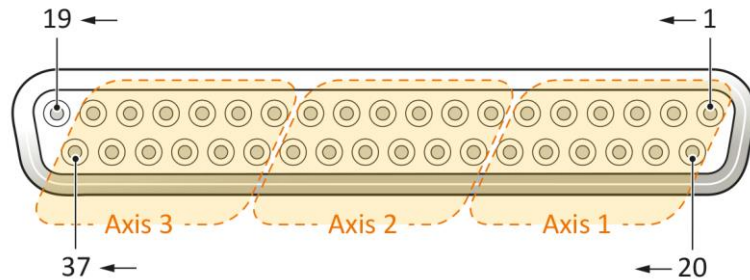


Figure 46 GPIO socket, pin assignment

	Pin	Protocol function		
		AquadB	Trigger	Stepper
Axis 1				
Input	1	A+	UP+	Step-Pulse+
	20	A-	UP-	Step-Pulse-
	2	B+	DOWN+	Direction+
	21	B-	DOWN-	Direction-
	3	Error+	Error+	Error+
	22	GND	GND	GND
Output	4	A+	n/a	n/a
	23	A-	n/a	
	5	B+	Trigger +	
	24	B-	Trigger -	
	6	Error+	n/a	
	25	GND	GND	
Axis 2				
Input	7	A+	UP+	Step-Pulse+
	26	A-	UP-	Step-Pulse-
	8	B+	DOWN+	Direction+
	27	B-	DOWN-	Direction-
	9	Error+	Error+	Error+
	28	GND	GND	GND
Output	10	A+	n/a	n/a
	29	A-	n/a	
	11	B+	Trigger +	
	30	B-	Trigger -	

	Pin	Protocol function		
		AquadB	Trigger	Stepper
	12	Error+	n/a	
	31	GND	GND	
Axis 3				
Input	13	A+	UP+	Step-Pulse+
	32	A-	UP-	Step-Pulse-
	14	B+	DOWN+	Direction+
	33	B-	DOWN-	Direction-
	15	Error+	Error+	Error+
	34	GND	GND	GND
Output	16	A+	n/a	n/a
	35	A-	n/a	
	17	B+	Trigger +	
	36	B-	Trigger -	
	18	Error+	n/a	
	37	GND	GND	

## 12.2.2 Output Modes and Parameters

For outgoing communication, the following communication protocols are supported:

- AquadB
- Trigger

### TIP

The output mode and parameters can be adjusted on the webserver application's "Interface" screen, see section 5.2.3.

### AquadB

According to the logic of AquadB, the signals on lines A and B designate the increment of the position change. The direction of the position change is defined by whether signal A (positive) or B (negative) is leading the signal. AquadB is available in LVTTTL and LVDS mode.

Parameter	Value range	Related communication aspect
Clock	40 – 1,280 ns (in steps of 40 ns)	Minimal signal emitting period
Resolution	0.001 – 64.93 nm	Position change resolution

### Trigger

The trigger output indicates that the positioner is within a certain position range, i.e. on the inside or on the outside of a specified area.

Parameter	Value range	Related communication aspect
Position low	0.000 – n nm (depending on positioner travel range)	Lower limit of the respective area
Position high	0.000 – n nm (depending on positioner travel range)	Upper limit of the respective area
Trigger polarity	Active high / Active low	Signal emission when inside or when outside the area
Epsilon	0.000 – n nm (depending on positioner travel range)	Tolerance range around upper and lower area limits (hysteresis to avoid signal glitches)

## 12.2.3 Input Modes and Parameters

For incoming communication, the following communication protocols are supported:

- AquadB
- Stepper
- Trigger

### TIP

The input mode and parameters can be adjusted on the webserver application's "Interface" screen, see section 5.2.3.

### AquadB

According to the logic of AquadB, the signals on lines A and B designate the increment of the position change. The direction of the position change is defined by whether signal A (positive) or B (negative) is leading the signal. AquadB is available in LVTTTL and LVDS mode. It can only be applied in the closed loop mode.

Parameter	Value range	Related communication aspect
Loop mode	"open loop" / "closed loop"	Motion valued in metric distance or motion steps
Change/steps per pulse	0 – n nm/ 0 – n steps	Position change resolution

### Stepper

According to the logic of Stepper, the signal on line A designates the increment of the position change, while the signal on line B designates the direction of the position change. Stepper is available in LVTTTL and LVDS mode and can be applied in open loop and closed loop mode.

Parameter	Value range	Related communication aspect
Loop mode	"open loop" / "closed loop"	Motion valued in metric distance or motion steps
Change/steps per pulse	0 – n nm/ 0 – n steps	Position change resolution

### Trigger

According to the logic of Trigger, the signal on line A designates the increment of the position change in positive direction, while the signal on line B designates the increment in negative direction. Trigger is available in LVTTTL and LVDS mode and can be applied in open loop and closed loop mode.

Parameter	Value range	Related communication aspect
Loop mode	"open loop" / "closed loop"	Motion valued in metric distance or motion steps
Change/steps per pulse	0 – n nm/ 0 – n steps	Position change resolution



## 12.3 /PRO Feature Package

The /PRO feature upgrade activates the following enhanced features:

- controlling multiple devices with one single attoDISCOVERY application
- daisy-chaining via the device's Ethernet up- and downlink sockets
- setting the number of steps that are implemented with each stepwise move
- setting the DC level for manual position adjustment
- activating end-of-travel detection
- stopping movement on end-of-travel



### PRO

Enables more functionalities and control for open- and closed loop operation.

[More info](#)

Figure 47 /PRO feature icon (shown within the "About" screen)

## 12.4 Microscopy Upgrade

The Microscopy Upgrade is activated if the AMC300 is used within an attocube microscope system. The Microscopy Upgrade allows you that

- the GPIO port can be configured to trigger single steps with attocube's SPM-controller ASC500 (see section 12.4.1).
- for the read out of the RES-position, all three axis use the same ground and supply line (see section 12.4.2).



### Microscopy Upgrade

Enables the GPIO Port to be used with the ASC500 and to use shared GND and Supply Lines for RES-Positioners.

[More info](#)

Figure 48 Microscopy Upgrade icon (shown within "About" screen)

## 12.4.1 Use GPIOs with ASC500

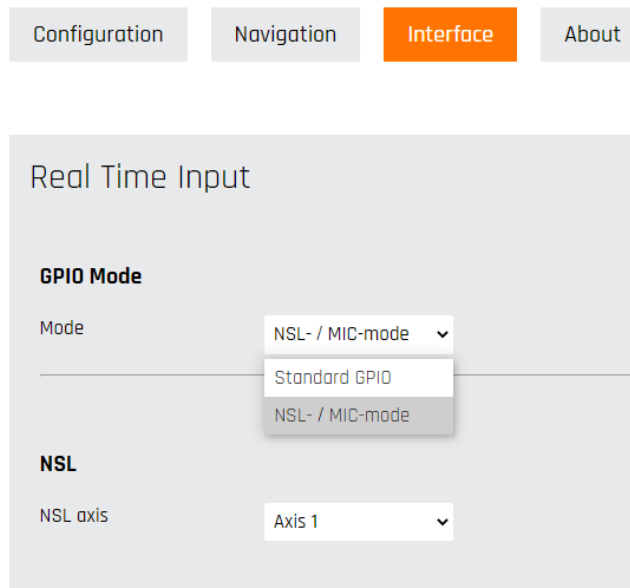


Figure 49 NSL-/Mic-mode option for the GPIO mode within the "Interface" screen

To control the AMC300 with the ASC500, a so-called NSL-cable included in the AMC300 (with activated Microscopy Upgrade) delivery is needed. Connect the NSL-plug of the cable to the ASC500 and the other connector with the GPIO port of the AMC300. Please refer to the ASC500 manual to find the correct settings for its NSL ports.

With the Microscopy Upgrade, you can find an additional GPIO Mode in the "Interface" screen of the AMC300 Web-Application, which is called "NSL- / MIC-mode". By choosing that option, the 'Real Time Input'-area changes its appearance as shown in the figure above. If a trigger signal is sent from the ASC500 to the AMC300, a single step is triggered on a certain axis. By changing the "NSL axis", you can define on which axis the single steps are performed.



### NOTE

When the "Microscopy Upgrade" is activated, the settings are automatically switched to "NSL-/MIC-mode".

## 12.4.2 Shared Lines for RES-position read-out

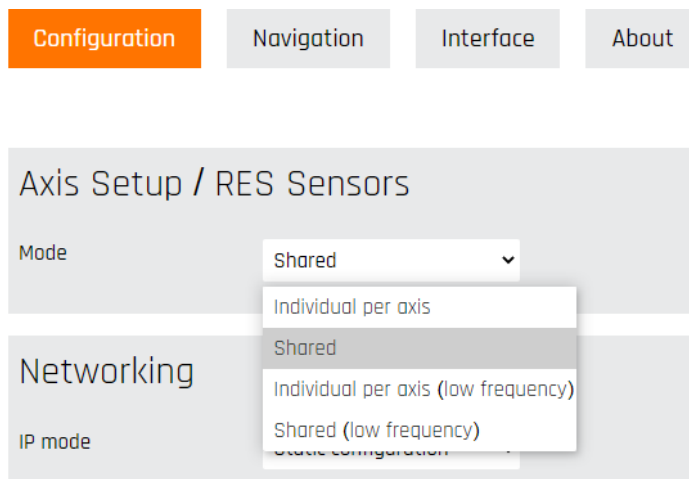


Figure 50 Shared mode option for axis setup/ RES sensors within the "Configuration" screen

In order to reduce the number of cables, which have to be connected to the positioners in the insert, the ground and supply wires for the RES elements are used by all three axis, if the **"shared (line)"**-option is active.

This mode is also available in a 'low frequency' version. It might be necessary to use the low frequency version, if the cables from the AMC300 to the positioners exceed the standard length.

For more information see the setMode function of the RES interface in the Interface Manual or contact the attocube's support team, if you need further instructions on that topic.

### TIP

With reducing the number of cables, the heat load can be lowered – what is crucial for all low temperature experiments. Find out more about this topic within attocube's technical note TN04.



### NOTE

When the "Microscopy Upgrade" is activated, the settings are automatically switched to "shared".

## 12.4.3 Hardware connection for usage within microscopy systems

The AMC300 needs to be connected to attocube's SPM controller ASC500 and (via the ACC100 or ACC50) to the microscopy insert. For the latter connection, one or two dedicated AMC300 – ACC100/ACC50 break-out panels (BOP) can be used (see Figure 51). Each BOP has three D-Sub HD 26-Pin connectors and one 12-Pin Fischer connector. The three D-Sub connectors are meant to be for the connection with the three D-Sub HD 26-Pin connectors on the back of the AMC300 (see Figure 5/7-9). The dedicated "AMC300 RES-cable for MIC" fits perfectly. The 12-Pin Fischer connector is for the connection with the MIC-Insert.



*Figure 51 AMC300 - ASC500 break-out panel*

The AMC300's GPIO port (see Figure 5/1) will be used to connect the device to the ASC500. The dedicated NSL-cable ASC500-AMC300 must be used here.

If the setup requires more than three positioner axis, a double-rack version of the AMC300 will be used. A second BOP including the appropriate cables is then needed. Moreover, an Ethernet cable and USB-stick is required for Daisy-chaining.

## 13 System Integration

The device can be integrated with external systems or devices by

- combining it with third party hardware
- establishing incoming and outgoing trigger connections (/IO upgrade required), see section [12.2](#)
- controlling it with individual software interfaces (see interface manual).



### CAUTION

General hazard!

Inadequate hardware connections may cause injury and are likely to damage the device or interfere with an appropriate functioning.

- o Always contact attocube for technical support, before combining the device with third party hardware.
- o Do carefully observe the information in this section when combining the device with third party hardware.



### NOTE

attocube is not liable for any damages resulting from an unauthorized combination of the device with third party hardware. Unauthorized combination with third party hardware is not covered by attocube's warranty.



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