M-110.xxx1 / M-111.xxx1 / M-112.xxx1 Microtranslation Stage

User Manual

Micropositioning stage with HD D-Sub 26 connector, in variants according to:

- Travel range: 5 mm / 15 mm / 25 mm
- Drive screw type: Threaded drive screw / ball screw
- Gear drive: stepper motor / DC motor

Contents

Safety

Highlighting Safety Instructions

CAUTION

Dangerous situation

If not avoided, the dangerous situation will result in minor injury.

➢ Measures for avoiding the risk.

NOTICE

Dangerous situation

If not avoided, the dangerous situation will result in damage to equipment.

➢ Measures for avoiding the risk.

INFORMATION

Information in easier handling, further sources of information etc.

Intended Use

The intended use is precision linear motion and positioning a payload in one direction (x axis). The product is equipped with a platform for mounting the payload.

The product is intended for indoor use and use in an environment that is free of dirt, oil, and lubricants. For vacuum-capable models (M-110.1VG1 / M-111.1VG1 / M-112.1VG1), a minimum atmosphere pressure of 10^{-6} mbar is allowed.

It is **not** intended for applications in areas where failure would result in considerable risks for human beings or the environment.

Use is considered as intended when

- accessories are used from the scope of delivery or additional components (e.g., controller, power adapters, mounting adapter, control software), which are recommended in this manual or on our website.
- the constraints and procedures described here are adhered to (intended use, maximum ratings, ambient conditions, load ranges, settings, process descriptions).

Basic Safety Instructions

Improper use of the product can cause personal injury and damage to property.

- Only use the product for its intended purpose, and only use it if it is in perfect condition.
- Before performing the actions described: Read the corresponding section of the instructions **completely**.
- Eliminate any faults and malfunctions that are likely to affect safety immediately.
- Make sure that all (i.e., also the following) users have access to the user instructions.

The operator is personally responsible for correct installation and operation of the product described.

INFORMATION

It is not necessary to open the housing either for operation or maintenance.

Loosening screws and opening the housing can adversely affect your safety and the functional capability of the positioner, and results in loss of warranty.

Additional Safety Notes for Vacuum-Capable Products

When handling the product, attention must be paid to appropriate cleanliness. At PI, all parts are cleaned before assembly. For assembly /measurement, powder-free gloves are worn. The product is wiped clean once again and then shrink-wrapped twice in vacuum-compatible film.

- Only touch the positioner when wearing powder-free gloves.
- If necessary, wipe the positioner clean after unpacking.

Maximum Ratings

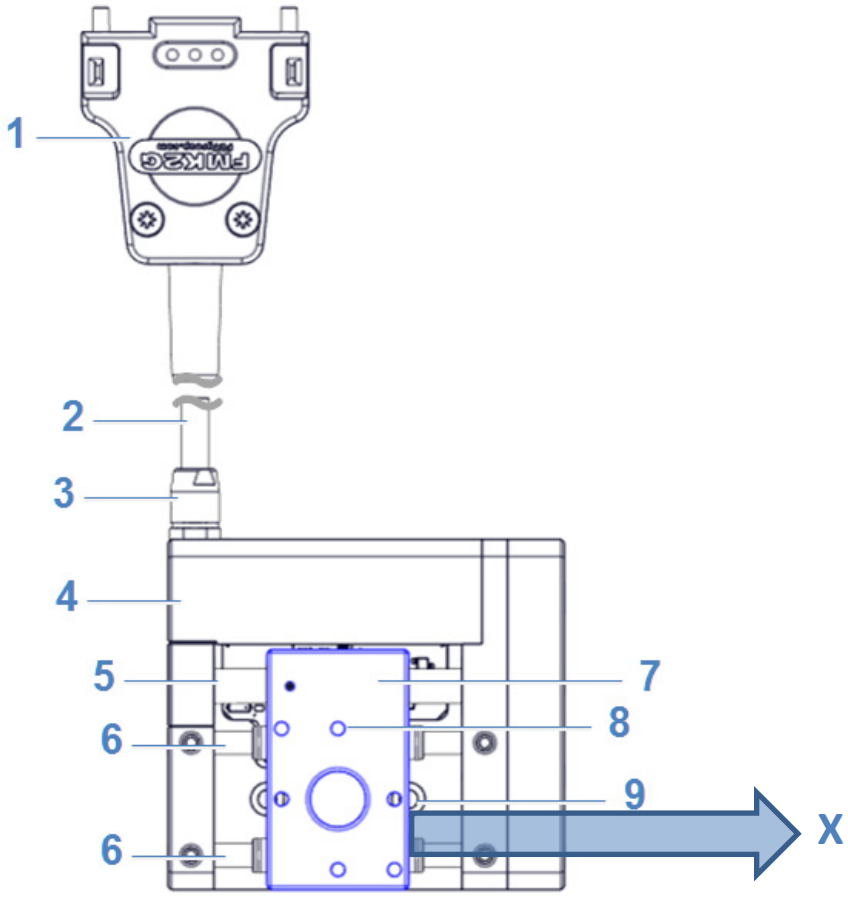
The following values may **not** be exceeded; the specified voltage values are **not** suitable for continuous operation. Compliance with optimum values is ensured by using the components and procedures described here. For a detailed model breakdown, see the appendix

Model*	**Maximum operating voltage**	**Operating frequency**	**Maximum power consumption**
	⚠	⚠	⚠
M-110.xDG1 M-110.xVG1	24 V	0 Hz	0.52 W
M-111.xDG1 M-111.xVG1 M-112.xDG1 M-112.xVG1			1.75 W
M-110.x2S1 M-111.x2S1 M-112.x2S1	48 V *	0 Hz	1.5 W

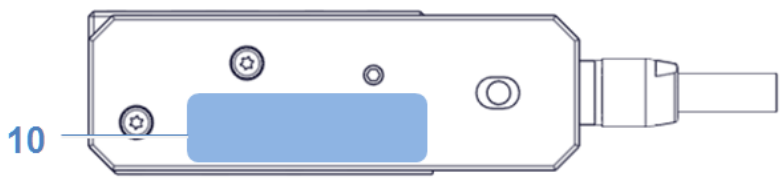
* Do not use for continuous operation!

Naming Product and System Components

Product Scheme



1 Connector for the controller (HD D-Sub 26, connector (m))
2 Cable (shorter illustration)
3 Cable exit
4 Housing
5 Drive screw
6 Guide
7 Platform
8 Mounting hole for payload (M3, 6 altogether)
9 Mounting hole for mounting the positioner from above (for DIN 7934 M3 screws, 2 altogether)
10 Product labeling area (laser engraving), incl. model designation and serial number
X Direction of motion on positive command in the control software



Further Information on the Product and the System Components

The products (and programs) from PI mentioned here are normally described in more detail separately (search for the product name on the website to get the user manual).

If instructions are missing or you require further information, contact service@pi.de or contact your PI subsidiary by telephone.

In addition to the information on the corresponding product page of our website, the following documents also apply:

MP119EK	Short instructions: Positioners with electric motors

Installation and Startup

Unpacking/Scope of Delivery

1. Unpack the positioner with care.
   For vacuum-capable positioners (M-110.1VG1 / M-111.1VG1 / M-112.1VG1):
   a. Remove the positioner in its inner and outer bag from the transport packaging carefully. Now unpack the positioner carefully and according to the regulations on the label of the packaging as follows:
   b. Compare the contents with the items listed in the contract and the packing list.
   c. Before opening the vacuum packaging, check the packaging and the product – if visible – for signs of damage. If there is any sign of damage or missing parts, contact PI or PI miCos immediately.
   d. Clean the outer bag with a lint-free cleanroom cloth that has been dampened with clean isopropyl alcohol (99.9% or better).
   e. Remove the outer bag before bringing the positioner into the cleanroom area.
   f. Only open the inner bag in a cleanroom environment. Wear cleanroom gloves. After removing the bag, the product may only be stored in a cleanbox, a cleanroom or in a sealed vacuum chamber.
   g. Touch the product only when wearing cleanroom gloves. If touched with bear hands, seat and grease residues come into contact with the product that cannot be completely removed by wipe-cleaning.
2. **Scope of delivery**: If parts in the following list are missing or damaged: Contact the customer service department (service@pi.de).
   – Positioner
   – Mounting screws (4x DIN 7984 M3x6)
   – Hex key AF 2 and AF 1.5
   – Short instructions (MP119EK)
3. Keep all packaging materials in case the product needs to be returned.

Mechanical Installation

NOTICE

Protruding screw heads!

Protruding screw heads can damage the positioner.

➢ Make sure that the screws are tightened and recessed completely, and do not interfere with motion of the platform.

Mounting the Positioner onto a Surface

NOTICE

Warping of the positioner reduces positioning accuracy

Mechanical tension can occur when for example,

- the positioner is mounted on uneven surfaces (flatness > 10 µm)
- the positioner and the surface heat up/cool down at different rates
- the gaps from the mounting holes in the positioner to the surface do not line up

➢ Avoid any mechanical tension.

NOTICE

Unwanted changes in position when mounted vertically or obliquely!

In order for the platform and the setup (payload) to remain at rest when it is switched off, its weight force component may not exceed the holding force of the drive (10 N) in the direction of motion.

➢ Lay out the inclination of the surface and the mass of the setup according.
➢ Before startup, check whether the platform moves when the drive is switched off.

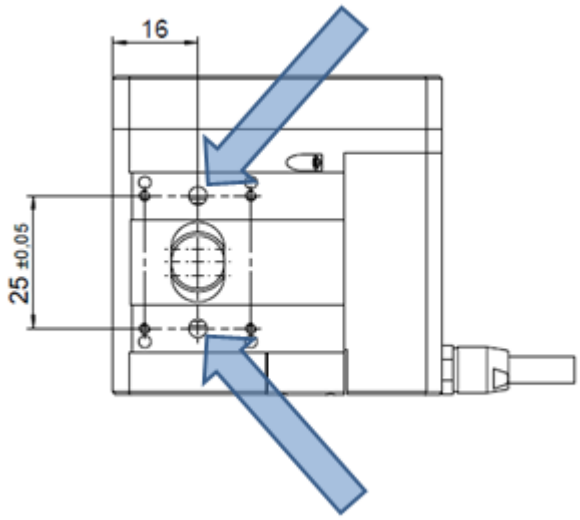
INFORMATION

When installing, pay attention to the desired travel range for your payload.

Mounting from above

Tools/accessories

- 2 mounting screws, DIN 7984 M3x6, in the scope of delivery
- Hex key AF 1.5, in the scope of delivery
- Hex key AF 2, in the scope of delivery
- Surface with holes and M3 thread according to the position of the mounting holes in the positioner (see fig.); min. depth of **3 mm**.

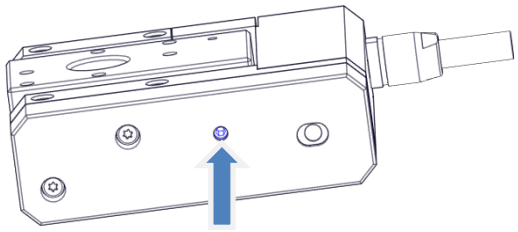


Position of the holes for mounting from above

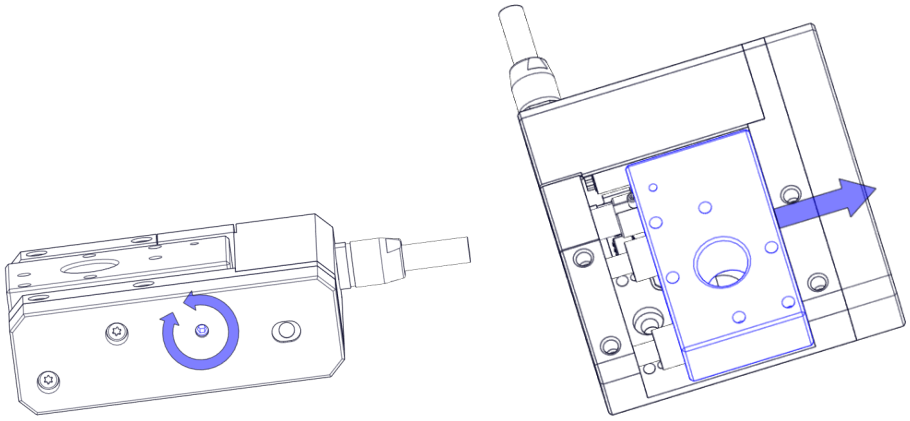
Procedure

1. Move the platform with the help of the controller or as follows, by hand so that one mounting hole can be used:

   a) Insert the AF 1.5 hex key into the drive screw inlet.

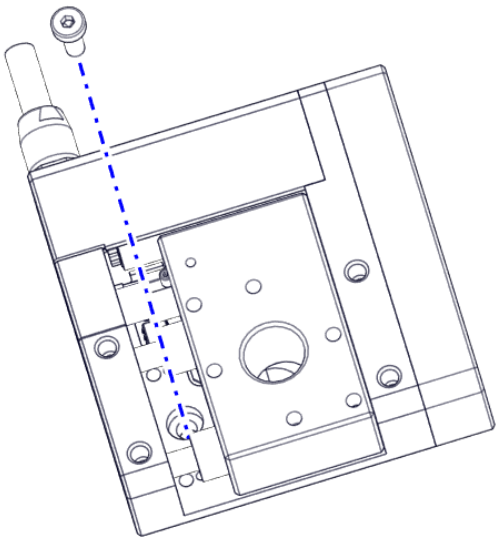


   b) Turn the hex key until the mounting hole is exposed completely.

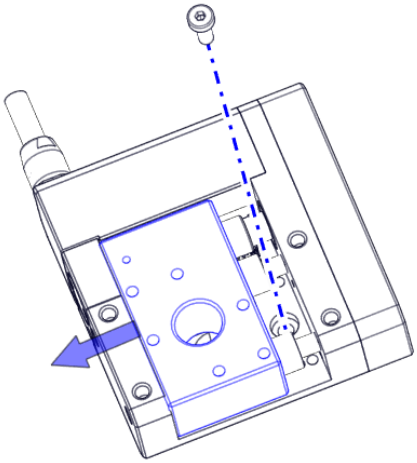


2. Place the positioner onto the surface so that its mounting holes are in line.

3. Tighten the mounting screws but do not overtighten.
   The head of the screw may not protrude. Otherwise, the platform could be damaged during motion.



4. Proceed with the second mounting screw according to the above-mentioned steps.



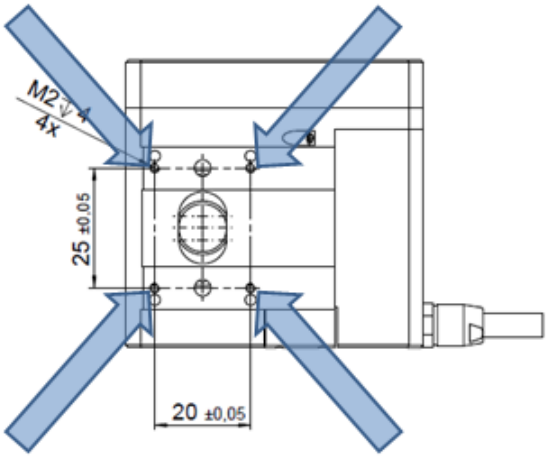
5. Move the platform so that the first mounting screw that was inserted is exposed.
6. Tighten the mounting screws but do not overtighten (**max. torque is 1.5 Nm**).
7. Repeat steps 5 and 6 accordingly for the remaining screws.
8. Check that the positioner is affixed firmly to the surface.

Mounting from below

The platform may **not** be moved when mounting from below.

Tools/accessories

- M2 mounting screw. When selecting the screw length, take the length of the screw, the depth of the hole in the surface and the depth of 4 mm of the inner thread in the base body into consideration.
- Screwdriver respectively hex key according to the screw type selected (hex key AF 1.5 in the scope of delivery)
- Surface with holes corresponding to the geometry shown below.



1. Place the positioner onto the surface so that its mounting holes are in line.
2. Tighten the 4 mounting screws completely.
3. Check that the positioner is firmly attached to the surface.

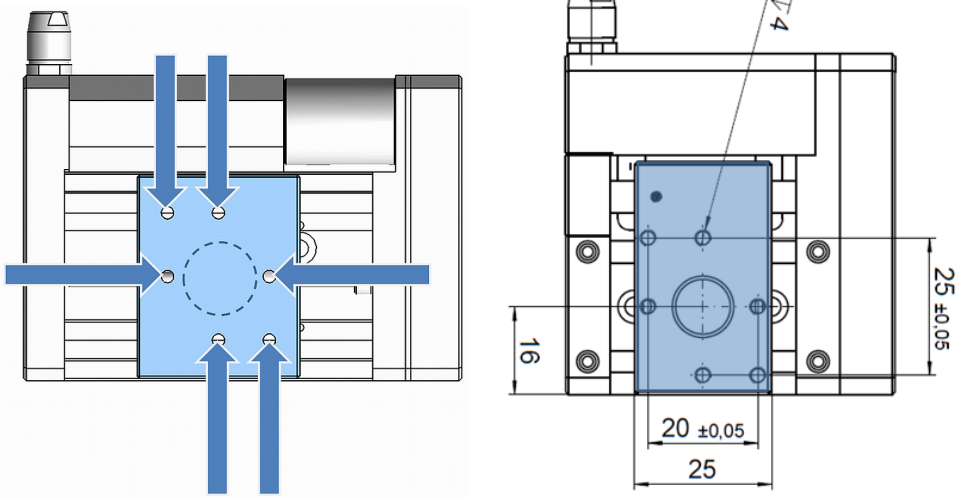
Mounting the Payload on the Platform

NOTICE

Excessively long screws!

The positioner can be damaged by screws that are inserted too deeply.

- ➢ Note the depth of the mounting holes in the platform.
- ➢ Only use screws with the correct length for the respective mounting holes.



Requirements

- The distance between the center of gravity of the payload and the center of the platform is as small as possible in all directions.
- At least two points are provided for mounting the payload on the platform (ideally: three attachment points).
- The position of the mounting holes in the payload and platform match.
- Take the inner thread's depth in the platform of 4 mm when choosing the length of the screw.

Tools and accessories

- Mounting screws: At least 2 M3 screws of suitable length
- Suitable screwdriver

Procedure

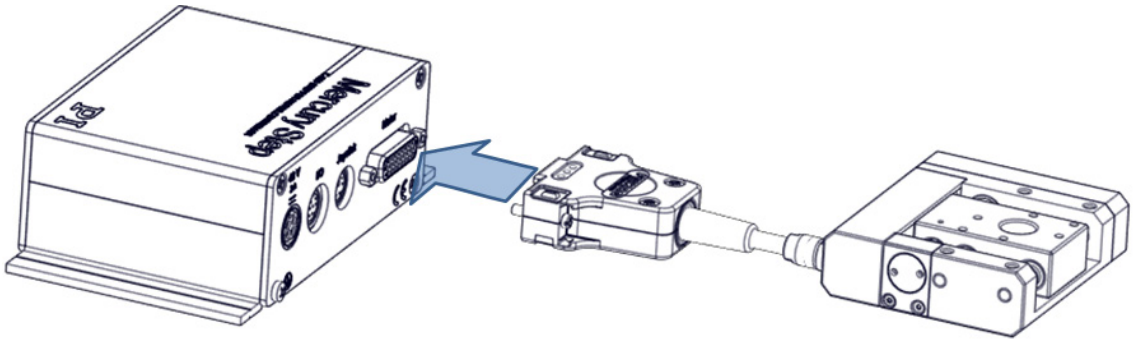
1. Bring the corresponding mounting holes in line for the payload and the platform.
2. Use the mounting screws to affix the payload (tightening torque: Max. 1.5 Nm).
3. Check that the payload is attached firmly to the platform of the positioner.

Electrical Installation

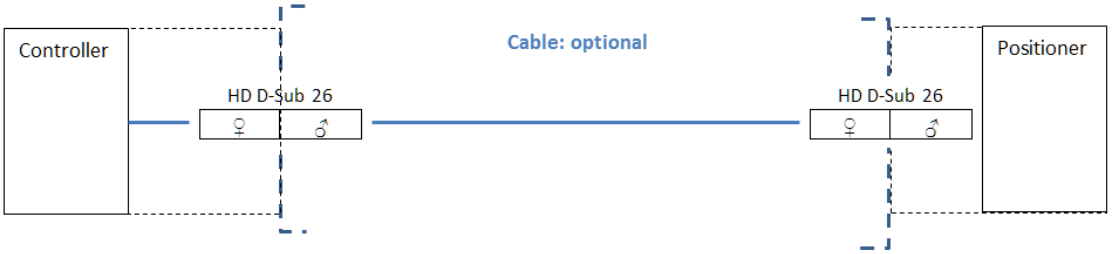
INFORMATION

- Positioners with stepper motor have the letter sequence **2S** in the model designation and must be connected to a controller from the **C-663.12** series.
- Positioners with DC gear motor have the letter sequence **DG** in the model designation and must be connected to ta controller from the **C-863.11, C-863.12 or C-884** series. You will need the C-815.LDM1 adapter cable for the **C-863.11 or C-884**. This must be ordered separately.
- The C-815.LDM1 adapter cable must **not** be used for the above-mentioned positioners with stepper motor.
- The connecting cable may only be extended once and only with the extension cable (3 m, order no. C-815.AK446) or with a further cable specifically recommended.
- Only use the controllers and cables recommended by PI!

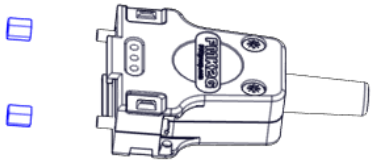
Connecting a Suitable Controller



C-663.12 stepper motor controller / C-863.12 DC motor controller



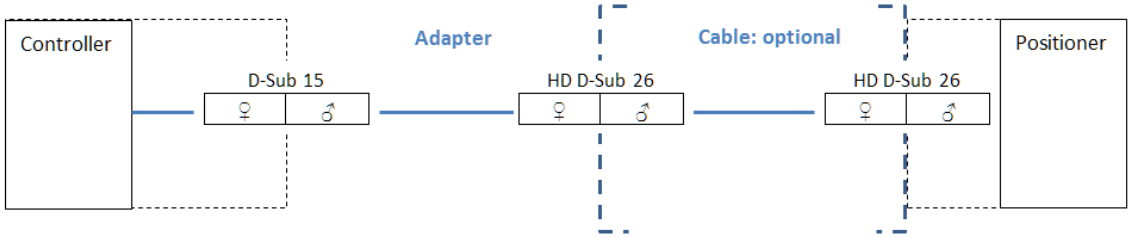
1. Optionally, if the attached cable is not long enough: Connect the positioner's plug connector to the socket of a suiting extension cable. The UNC nuts must be removed from the plug (turn the knurled screws counterclockwise) before connecting directly to the controller.



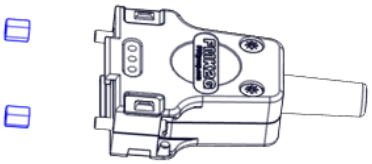
2. Connect the positioner's plug or the extension cable, respectively, to the "Motor" socket of the controller.
3. Tighten the screws on all connectors used.

4. Connect the controller to the corresponding power adapter.
5. Use the power cord to connect the power adapter to the mains supply.

C-863.11 / C-884 DC motor controller



1. Connect the plug of the adapter cable (C-815.LDM1) to the "Motor" socket of the controller. The UNC nuts must be removed from the plug (turn the knurled screws counterclockwise) before connecting directly to the controller.



2. Optionally, if the attached cable is not long enough: Connect the socket of the suiting adapter cable to the plug of the extension cable.
3. Connect the positioner's plug to the socket on the extension cable or respectively the adapter cable.
4. Tighten the screws on all connectors used.
5. Connect the controller to the corresponding power adapter.
6. Use the power cord to connect the power adapter to the mains supply.

Integration into the Control Software and Initial Test

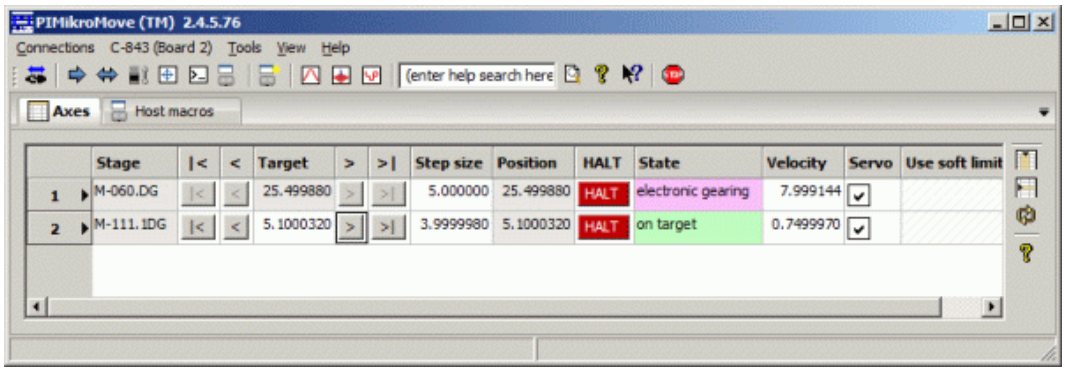
Requirements

- The controller has been connected according to the corresponding user manual and ready for operation (connected to the power adapter/mains supply **and** positioner; see above).
- The ***PIMikroMove®*** control software has been installed and started according to the corresponding user manual.
- The positioner is **already referenced** according to the user manual for the controller.

Procedure

INFORMATION

Images are schematic; value setting exemplary.



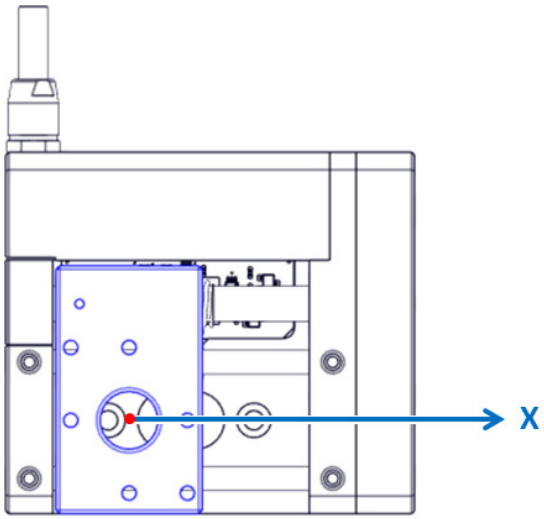
1. Click the button in the ***PIMikroMove®*** (***Axes*** tab) main window to move the platform to the left (**|<**) or right (**>|**) end of the travel range.

2. Check:
   - Does the platform move to the end of the travel range?
   - Does the drive stop at end of travel range?
   - Does the ***Target*** value change accordingly in the main window of the control software (see above)?

   If this is not the case:

   Check the electrical installation (see the section "Electrical Installation“, p.12) and the settings in the control software (see user manual for the Controller) If the error persists, contact the customer service department (service@pi.de)

Coordinate System / Direction of Motion



The position of the platform at the left end of the travel range corresponds to the zero point.

Maintenance, Cleaning, Troubleshooting, and Disposal

Maintenance

Maintenance run

If the platform only moves in a limited travel range, we recommend running once over the entire range with the following intervals (maintenance run). This allows the lubricant to be distributed evenly over the relevant machine elements.

Type of operation	Interval
Laboratory use	After 50 operating hours or at least after one 1 year
Continuous industrial operation	After every 5000 motion cycles

Relubricating

Type of operation	Interval
Laboratory use	Normally not necessary
Continuous industrial operation	According to separately agreed maintenance schedule

➢ If you have any questions on relubricating, contact our customer service department (service@pi.de).

Cleaning

Tools

- Soft cloth
- Mild cleaning agent or disinfectant

Procedure

INFORMATION

Do not allow the cleaning agent or disinfectant to get onto the drive screw or guides. This could impair lubrication.

1. Remove the motor cable from the controller.
2. Dampen the cloth with the cleaning agent or disinfectant.
3. Wipe over the dirty surface gently.
4. After cleaning, reconnect the motor cable to the controller and tighten the screws to secure the plug.

Troubleshooting

Problem	Possible causes	Solution
The platform can be moved slightly; there is an audible clicking noise	This behavior is design-related and results from the (desired) preload of the drive screw.	- (There is **no** malfunction. The performance capability is not impaired.)
Increased wear Reduced accuracy	Warped base body	➢ Determine and eliminate the cause of mechanical stress in the housing ➢ Pay attention to the recommended surface flatness that the positioner is mounted on: <10 µm.
Impairment of the function after system modification	▪ Controller was replaced ▪ Positioner was replaced by another model from the product series	➢ If necessary, reconfigure the assignments from the controller and positioner in the control software.
The stage no longer moves	The platform has got stuck at the end of the travel range (hard stop).	➢ Move the platform by hand (see below).

If the problem that occurred with your system is not listed in the table above or cannot be solved as described, contact our customer service department (service@pi.de).

Moving the Platform by Hand

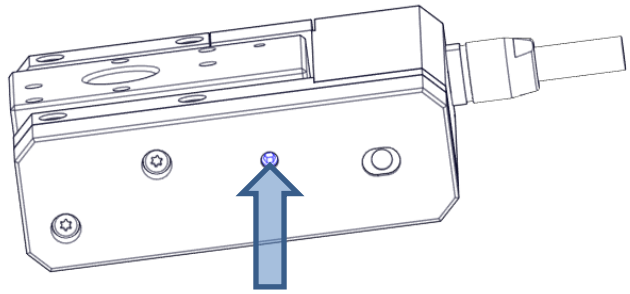
Tools

- Hex key AF 2

Procedure

You can move the platform by hand by turning the drive screw.

1. Insert a hex key into the drive screw inlet (see fig.).

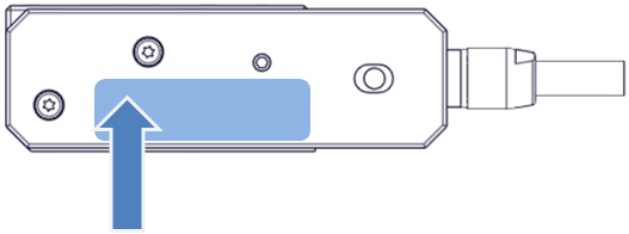


2. Turn the hex key (anti)clockwise.
   - Clockwise: Platform moves away from the cable exit.
   - Anticlockwise: Platform moves towards the cable exit.

Repair and Warranty

In the case of malfunction or failure:

- Do **not** try to repair the positioner yourself.
- Contact our customer service department (service@pi.de).
  You will find the positioner's exact model designation and serial number in the laser engraving (see fig.).



- For return shipment: If possible, return the entire contents of the scope of delivery and in the original packaging.

Disposal

In accordance with EU law, electrical and electronic equipment may not be disposed of in EU member states via the municipal residual waste.

Dispose of your old equipment according to international, national, and local rules and regulations.

In order to fulfil the responsibility as the product manufacturer, PI undertakes environmentally correct disposal of all old PI equipment made available on the market after 13 August 2005 without charge.

Any old PI equipment can be sent free of charge to the following address:

Physik Instrumente (PI) GmbH & Co. KG
Auf der Roemerstrasse 1

76228 Karlsruhe, Germany

Appendix

Model Range, Characteristics (Differences)

All models with HD D-Sub 26 connector (plug)

Model	Travel range			Drive screw		Motor (w. gearhead)		Vacuum
	5 mm	15 mm	25 mm	Thread	Recircu-lating ball bearing	DC motor	Stepper motor	(min. 1E-6 hPa)
M-110.1DG1	+			+		+		
M-110.1VG1	+			+				+
M-110.12S1	+			+			+	
M-110.2DG1	+				+	+		
M-110.22S1	+				+		+	
M-111.1DG1		+		+		+		
M-111.1VG1		+		+		+		+
M-111.12S1		+		+			+	
M-111.2DG1		+			+	+		
M-111.22S1		+			+		+	
M-112.1DG1			+	+		+		
M-112.1VG1			+	+		+		+
M-112.12S1			+	+			+	
M-112.2DG1			+		+	+		
M-112.22S1			+		+		+	

See the data table (below) for other model-specific characteristics.

Ambient Conditions and Classifications

Area of application	For indoor use only
Maximum altitude	2000 m
Relative humidity	Max. 80 % for temperatures up to 31 °C Decreasing linearly to 50 % at 40 °C
Storage temperature	-20 °C to 65 °C
Transport temperature	-20 °C to 65 °C
Supply fluctuations	Max. ±10 % of the nominal voltage
Degree of pollution	2
Degree of protection according to IEC 60529	IP40

Data

Measured values valid for 20 ±3 °C.
If there is an updated datasheet, it will be made available on our website.

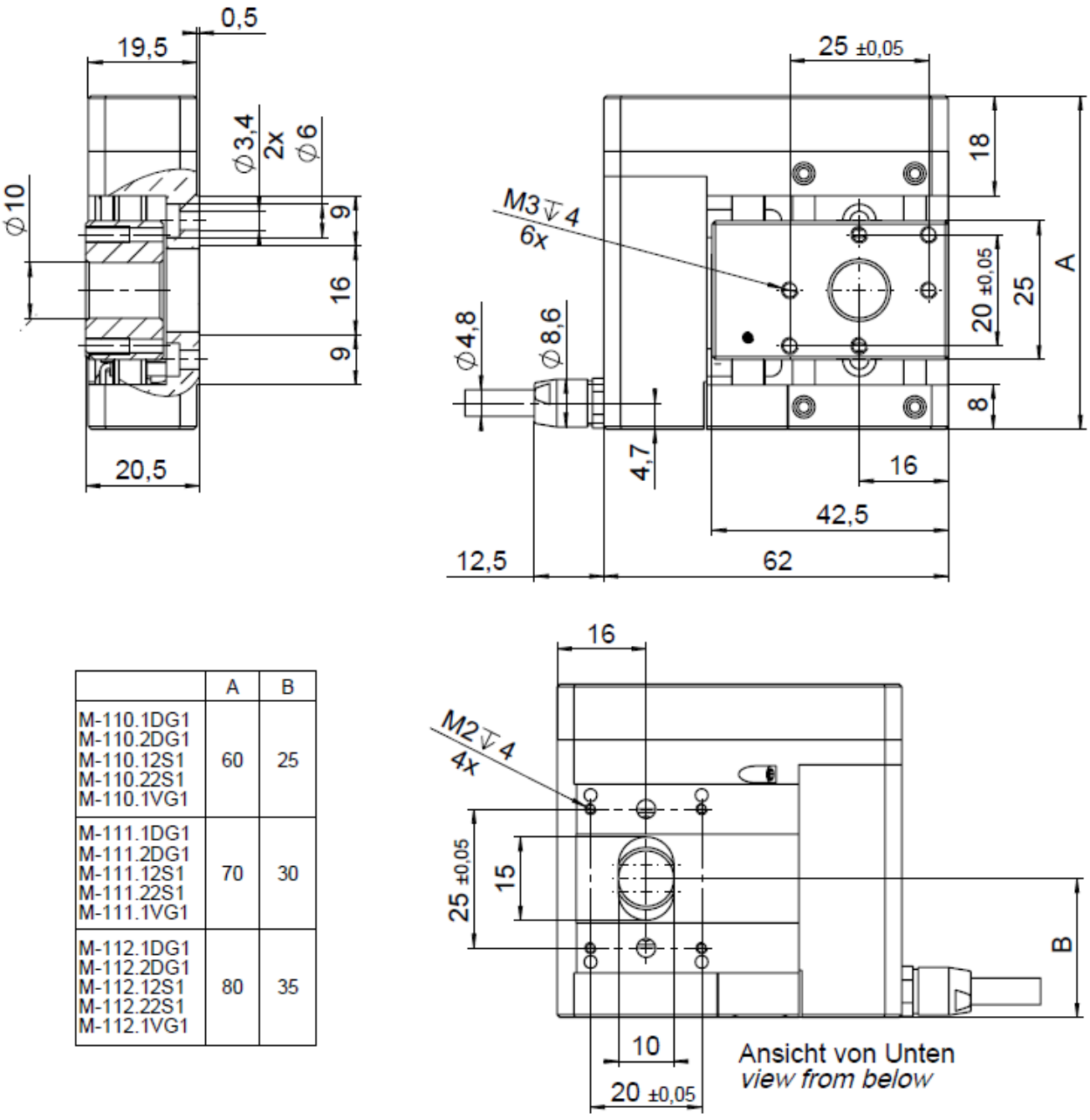
	M-110.1DG1 / M-111.1DG1 / M-112.1DG1	M-110.1VG1 / M-111.1VG1 / M-112.1VG1	M-110.12S1 / M-111.12S1 / M-112.12S1	M-110.2DG1 / M-111.2DG1 / M-112.2DG1	M-110.22S1 / M-111.22S1 / M-112.22S1	Unit	Tole–rance
Motion and positioning							
Travel range	5 / 15 / 25	5 / 15 / 25	5 / 15 / 25	5 / 15 / 25	5 / 15 / 25	mm	
Integrated sensor	Rotation encoder	Rotation encoder		Rotation encoder			
Design resolution*	0.0069	0.0048	0.00029	0.0086	0.00036	µm	
Minimum incremental motion*	0.05	0.05	0.02	0.2	0.2	µm	typ.
Backlash	3	3	3	3	3	µm	typ.
Unidirectional repeatability	0.25	0.25	0.25	0.15	0.15	µm	typ.
Velocity	1 / 1.5 / 1.5	0.65/ 0.65 / 0.65	1 / 1 / 1	1.5 / 2 / 2	1 / 1 / 1	mm/s	max.
Mechanical properties							
Drive screw	Drive screw	Drive screw	Drive screw	Ball screw	Ball screw		
Drive screw pitch	0.4	0.4	0.4	0.5	0.5	mm	
Gear ratio	256:9	29791 : 729	256:9	256:9	256:9		
Motor resolution			24		24	Full steps/ rev.	
Load capacity	30 / 30 / 20	30 / 30 / 20	30 / 30 / 20	30 / 30 / 20	30 / 30 / 20	N	max.
Push/pull force	10	10	10	10	10	N	max.
Holding force	10	10	10	10	10	N	max.
Permissible lateral force	15 / 10 / 10	15 / 10 / 10	15 / 10 / 10	15 / 10 / 10	15 / 10 / 10	N	max.
Drive properties							
Motor type	DC gearhead motor	DC gearhead motor	2-phase stepper motor	DC gearhead motor	2-phase stepper motor		
Operating voltage	0 to ±12	0 to ±12		0 to ±12			
Motor power	0.52 / 1.75 / 1.75	0.52 / 1.75 / 1.75	1.5	0.52 / 1.75 / 1.75	1.5	W	
Reference and limit switches	Hall effect	Hall effect	Hall effect	Hall effect	Hall effect		

	M-110.1DG1 / M-111.1DG1 / M-112.1DG1	M-110.1VG1 / M-111.1VG1 / M-112.1VG1	M-110.12S1 / M-111.12S1 / M-112.12S1	M-110.2DG1 / M-111.2DG1 / M-112.2DG1	M-110.22S1 / M-111.22S1 / M-112.22S1	Unit	Tole–rance
Miscellaneous							
Operating temperature range	-20 … 65	-20 … 65	-20 … 65	-20 … 65	-20 … 65	°C	
Vacuum compliance	-	1 E-6	-	-	-	hPa	
Outbaking temperature	-	80	-	-	-	°C	max.
Material	Anodized aluminum	Anodized aluminum	Anodized aluminum	Anodized aluminum	Anodized aluminum		
Mass	0.3 / 0.4 / 0.5	0.3 / 0.4 / 0.5	0.3 / 0.4 / 0.5	0.3 / 0.4 / 0.5	0.3 / 0.4 / 0.5	kg	
Cable length	0.5	0.5	0.5	0.5	0.5	m	
Connector	HD D-Sub 26	HD D-Sub 26	HD D-Sub 26	HD D-Sub 26	HD D-Sub 26		
Recommended controllers	C-863.12 C-863.11 C-863.20C885 C-884.xDC	C-863.12	C-663.11 C-663.12	C-863.12 C-863.11 C-863.20C885 C-884.xDC	C-663.11 C-663.12		

* With recommended controller.

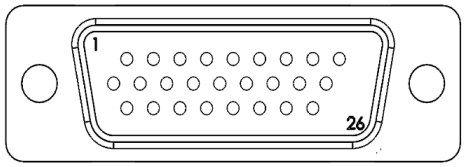
Dimensions

Values in mm.



	A	B
M-110.1DG1 M-110.2DG1 M-110.12S1 M-110.22S1 M-110.1VG1	60	25
M-111.1DG1 M-111.2DG1 M-111.12S1 M-111.22S1 M-111.1VG1	70	30
M-112.1DG1 M-112.2DG1 M-112.12S1 M-112.22S1 M-112.1VG1	80	35

HD D-Sub 26 Pin Assignment



Pin	Signal			Direction
	M-110.x2S1 / M-111.x2S1 / M-112.x2S1	**M-110.xDG1 / M-111.xDG1 / M-112.xDG1**	**M-110.xVG1 / M-111.xVG1 / M-112.xVG1**	
1	Motor A+	Motor +	Motor -	Input
2	-	-	-	-
3	Motor A-	Motor -	Motor +	Input
4	-	-	-	-
5	Motor B+	-	-	(Input)
6	-	-	-	-
7	Motor B-	-	-	(Input)
8	-	-	-	-
9	-	-	-	-
10	REF	REF	REF	Output
11	Limit E1 (neg.)	Limit E1 (neg.)	Limit E1 (neg.)	Output
12	Limit E2 (pos.)	Limit E2 (pos.)	Limit E2 (pos.)	Output
13	-	-	-	-
14	-	-	-	-
15	-	-	-	-
16	-	-	-	-
17	-	-	-	-
18	-	-	-	-
19	-	Encoder A+	Encoder B+	Output
20	-	Encoder A-	Encoder B-	Output
21	-	Encoder B+	Encoder A+	Output
22	-	Encoder B-	Encoder A-	Output
23	-	-	-	-
24	-	-	-	-
25	Limit/Encoder GND	Limit/Encoder GND	Limit/Encoder GND	-
26	Limit/Encoder Power (5 V DC)	Limit/Encoder Power (5 V DC)	Limit/Encoder Power (5 V DC)	Input

Options and Additional Accessories

Mounting Adapter (Order Separately)

M-110.01	for honeycomb stages (metric and imperial standard)
M-110.02	for XZ positioning systems, **M-110** stage typeas Z axis
M-110.03	for XZ positioning systems, **M-111** stage typeas Z axis
M-110.04	for XZ positioning systems, **M-112** stage type as Z axis

Extension Cable for Connecting to the C-863.12 or C-663.12 Controller

C-815.AK446	3 m length

Adapter Cable for Connecting to the C-863.11 or C-884 Controller

C-815.LDM1	3 m length
C-815.LDM1-0100	1 m length
C-815.LDM1-0800	8 m length
C-815.LDM1-1000	10 m length

Vacuum Feedthrough (for M-110.1VG1 / M-111.1VG1 / M-112.1VG1)

C-815.VF26	With connectors HD D-Sub 26 (male / female)

Multi-Axis Systems

2 positioners from the M-110, M-111, and M-112 series can be

- combined to an **XY** positioning system without further accessories
- combined to an **XZ** positioning system with a mounting adapter

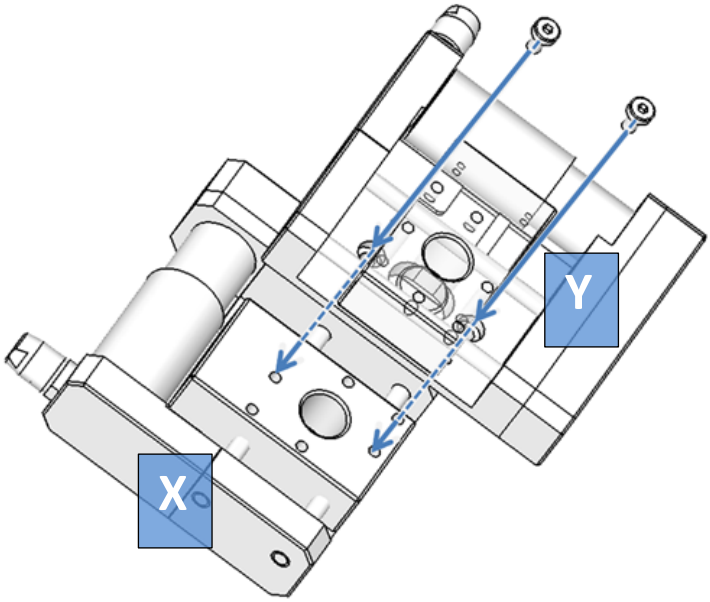
  M-110.01 / M-110.02 / M-110.03 (for M-110 / M-111 / M-112 as Z axis)

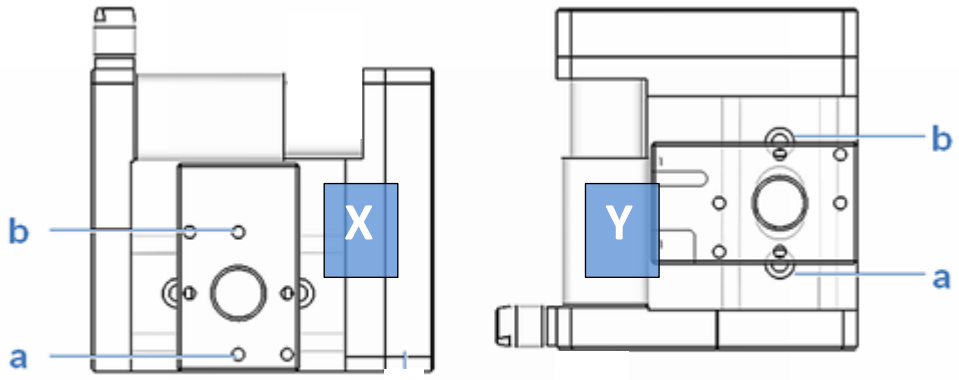
  The DIN 7984 M3x6 and ISO 4762 M3x6 screws as well as matching hex key AF 2 respectively SW 1.5 are included in the scope of delivery of the positioner and the adapter.

Procedure

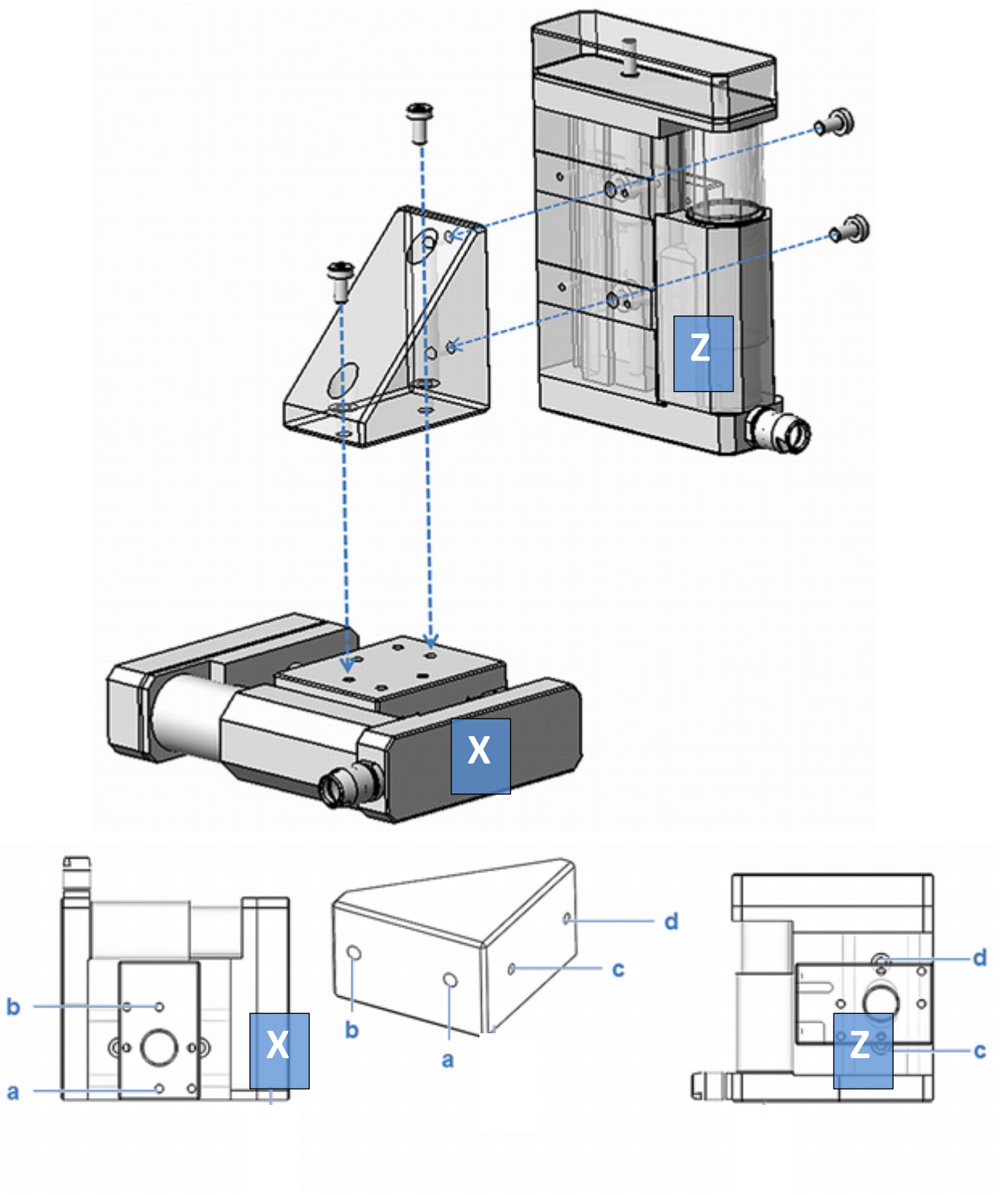
Align the mounting holes with the same letter and mount the positioner with mounting screws (see fig. below). Pay attention to the max. tightening torque of 1.5 Nm.

X/Y Combination Mounting Diagram





X/Z Combination Mounting Diagram (with Mounting Adapter)



Legal Information

CE Compliance

An EU Declaration of Conformity has been issued for the M-100, M-111, and M-112 models in accordance with the following European directives:

- EMC Directive
- RoHS Directive

The standards applied for certifying the conformity are listed below.

- EMC: EN 61326-1
- Safety: EN 61010-1
- RoHS: EN 50581

Figures, Commitment, Actuality

Subject to change and errors excepted.

For better understandability, the colors, proportions and degree of detail in illustrations can deviate from the actual circumstances.

Photographic illustrations may also differ and must not be seen as guaranteed properties.

The conditions in text and the images correspond to the status at the time of publication. The current documentation is available on our website for download. In the case of new documentation, pay attention to possible interim changes to the product.

Copyright

Information on any brand names used can be found under:
https://www.physikinstrumente.de/de/ueber-pi/impressum/#c2147

Contact Person, Feedback

If you have any questions, suggestions or criticism:

Please contact the engineer responsible for your company or use the following contact options:

Post	Physik Instrumente (PI) GmbH & Co. KG Auf der Roemerstrasse 1 76228 Karlsruhe Germany
Phone	+49 721 4846-0
Fax	+49 721 4846-1019
Email	info@pi.ws
Web	www.pi.ws