

PZ258E
P-763 Nanopositioner
User Manual

Version: 1.1.0

Date: 17.06.2020



This document describes the following product:

- **P-763.22C**
 Compact XY nanopositioner with clear aperture, $200\ \mu\text{m} \times 200\ \mu\text{m}$, direct position measuring, capacitive sensors



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Original instructions
First printing: 17.06.2020
Document number: PZ258E, CBo, Version 1.1.0

Subject to change without notice. This manual is superseded by any new release. The latest release is available for download (p. 3) on our website.

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Symbol/ Label	Meaning
1. 2.	Action consisting of several steps with strict sequential order
➤	Action consisting of one or more steps without relevant sequential order.
▪	Bullet
p. 5	Cross-reference to page 5
RS-232	Label on the product indicating an operating element (example: RS-232 interface socket)
	Warning signs attached to the product that refer to detailed information in this manual.

1.3 Figures

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.

1.4 Other Applicable Documents

The devices and software tools from PI mentioned in this documentation are described in separate manuals.

The latest versions of the user manuals are available for download (p. 3) on our website.

Product	Document
E-727.xF Digital Multi-Channel Piezo Controller with EtherCAT	E727T0005 User Manual
E-727.x • E-727.xAP Digital Multi-Channel Piezo Controller	E727T0005 User Manual
PIMikroMove	SM148E Software Manual
P-5xx / P-6xx / P-7xx Piezo Positioning Systems	PZ240 Short Instructions

1.5 Downloading Manuals

INFORMATION

If a manual is missing or problems occur with downloading:

- Contact our customer service department (p. 31).

Downloading manuals

1. Open the website **www.pi.ws**.
2. Search the website for the product number (e.g., P-763) or the product family (e.g., Nanopositioner).
3. Click the corresponding product to open the product detail page.
4. Click **Downloads**.

The manuals are shown under **Documentation**.

5. Click the desired manual and fill out the inquiry form.

The download link will then be sent to the email address entered.

2 Safety

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2.1 Intended Use

The P-763 is a laboratory device as defined by DIN EN 61010-1. It is intended for indoor use and use in an environment that is free of dirt, oil, and lubricants.

According to its design, the P-763 is intended for fine positioning as well as moving small objects quickly and precisely. The specifications for the P-763 apply to horizontal mounting. Movement is horizontal in two axes.

The P-763 can only be used as intended in conjunction with suitable electronics (p. 11) available from PI. The electronics are not included in the P-763's scope of delivery.

The electronics must provide the required operating voltages. To ensure proper performance of the servo control system, the electronics must also be able to read out and process the signals from the position sensors.

2.2 General Safety Instructions

The P-763 is built according to state-of-the-art technology and recognized safety standards. Improper use can result in personal injury and/or damage to the P-763.

- Use the P-763 for its intended purpose only, and only when it is in perfect technical condition.
- Read the user manual.
- Eliminate any malfunctions that may affect safety immediately.

The operator is responsible for the correct installation and operation of the P-763.

The P-763 is driven by piezo actuators. Temperature changes and compressive stress can induce charges in piezo actuators. Piezo actuators can remain charged for several hours after disconnecting from the electronics. Touching or short-circuiting the contacts in the P-763's connectors could lead to minor injuries from electric shock. The piezo actuators can be destroyed by an abrupt contraction.

- Do **not** open the P-763.
- Discharge the P-763's piezo actuators before installing:
Connect the P-763 to the switched-off electronics from PI equipped with an internal discharge resistor.
- Do **not** pull the connectors out of the electronics during operation.
- Do **not** touch the contacts in the connectors.
- Use screws to secure the P-763's connectors against being pulled out of the electronics.

Mechanical forces can damage or misalign the P-763.

- Avoid impacts that affect the P-763.
- Do **not** drop the P-763.
- Do **not** exceed the maximum permissible stress and load capacities according to the specifications (p. 33).
- Do **not** touch any sensitive parts (e.g., platform) when handling the P-763.

The P-763 is maintenance-free and achieves its positioning accuracy as a result of the optimal alignment of mechanical components and piezo actuators. Loosened screws cause a loss in positioning accuracy.

- Loosen screws only when instructed in this manual.
- Do **not** open the P-763.

2.3 Organizational Measures

User manual

- Always keep this user manual together with the P-763.
The latest versions of the user manuals are available for download (p. 3) on our website.
- Add all information from the manufacturer to the user manual, for example supplements or technical notes.
- If you give the P-763 to a third party, include this user manual as well as other relevant information provided by the manufacturer.
- Do the work only if the user manual is complete. Missing information due to an incomplete user manual can result in minor injury and damage to equipment.
- Install and operate the P-763 only after you have read and understood this user manual.

Personnel qualification

The P-763 may only be installed, started, operated, maintained, and cleaned by authorized and appropriately qualified personnel.

3 Product Description

In this Chapter

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3.1 Product View

The figure serves as an example and can differ from your positioner model.

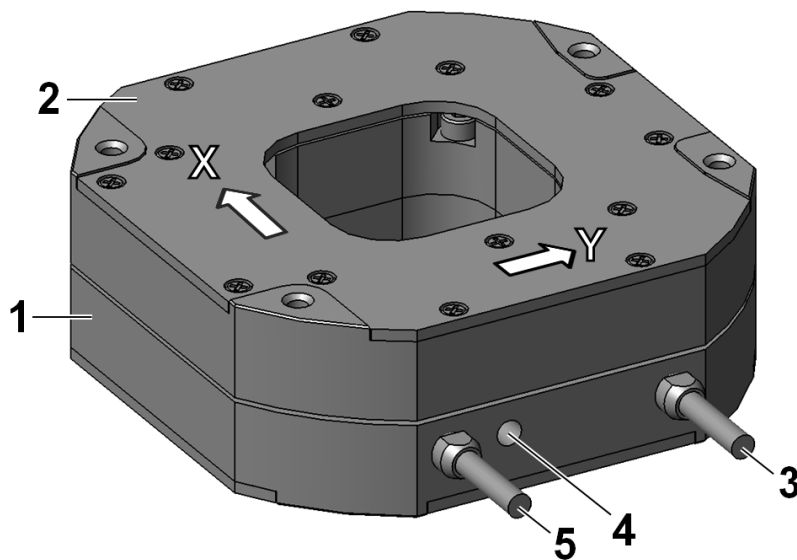


Figure 1: Exemplary product view of the P-763

- 1 Base body
- 2 Platform
- 3 Cable exit (X axis)
- 4 Protective earth connector
- 5 Cable exit (Y axis)
- X Positive direction of motion of the X axis
- Y Positive direction of motion of the Y axis

3.2 Product Labeling




Labeling	Description
P-763.22C	Product number
123456789	Serial number (example), individual for each P-763 Meaning of each position (from the left): 1 = internal information 2 and 3 = year of manufacture 4 to 9 = consecutive number
PI	Manufacturer's logo
	Warning sign "Pay attention to the manual!"
	Old equipment disposal (p. 39)
Country of origin: Germany	Country of origin
WWW.PI.WS	Manufacturer's address (website)
CE	CE conformity mark
	Symbol for the protective earth conductor, marks the protective earth connection of the P-763 (p. 16)
X	Cable exit of the X axis
Y	Cable exit of the Y axis
Arrow and letter X	Positive direction of motion of the X axis
Arrow and letter Y	Positive direction of motion of the Y axis



Figure 2: "Residual Voltage" warning sign on the connector of the P-763
 "Residual Voltage" warning sign: Indicates risk of electric shock (p. 5)

3.3 Scope of Delivery

Product number	Description
P-763.22C	Compact XY nanopositioner with clear aperture, 200 µm × 200 µm, direct position measuring, capacitive sensors
000036450	M4 screw set for protective earth, consisting of: <ul style="list-style-type: none"> One flat-head screw with cross recess, M4x8, ISO 7045 Two lock washers Two flat washers
PZ240	Short instructions for P-5xx / P-6xx / P-7xx piezo positioning systems

3.4 Suitable Electronics

Product number	Description
E-727.3CD*	Digital multi-channel piezo controller, 3 axes, -30 to 130 V, capacitive sensors, D-sub 25W3 socket
E-727.3CDA*	Digital multi-channel piezo controller, 3 axes, -30 to 130 V, capacitive sensors, D-sub 25W3 socket, analog inputs
E-727.3CDP*	Digital multi-channel piezo controller, 3 axes, -30 to 130 V, capacitive sensors, D-sub 25W3 socket, 1.5 A peak output current
E-727.3CDAP*	Digital multi-channel piezo controller, 3 axes, -30 to 130 V, capacitive sensors, D-sub 25W3 socket, 1.5 A peak output current, analog inputs

* P-895.2DDC adapter cable required

- To order, contact our customer service department (p. 31).

3.5 Required Accessories

Product number	Description
P-895.2DDC	Adapter cable 2× D-sub 7W2 (f) to D-sub 25W3 (m) for piezo actuator nanopositioning systems with capacitive sensors, 2 channels, length: 0.3 m

- To order, contact our customer service department (p. 31).

3.6 Technical Features

3.6.1 PICMA® Piezo Actuators

P-763 positioners are driven by PICMA® piezo actuators. PICMA® actuators have all-ceramic insulation and their performance and lifetime are therefore far superior to conventional actuators. The ceramic insulation layer protects the monolithic piezoceramic block against humidity and failure due to increased leakage current. In this way, an especially high reliability is achieved even under extreme ambient conditions. In contrast to motorized drives, there are no rotating parts or friction. The piezo actuators are therefore free of backlash, maintenance, and wear.

3.6.2 Flexure Guides

P-763 positioners have flexure guides for friction-free motion and high guiding accuracy.

A flexure guide is an element that is free of static and sliding friction. It is based on the elastic deformation (bending) of a solid (e.g., steel) and does not have any rolling or sliding parts. Flexure elements have a high stiffness and load capacity. Flexure guides are maintenance and wear free. They are 100 % vacuum compatible, function in a wide temperature range and do not require any lubricants.

3.6.3 Capacitive Sensors

Capacitive sensors measure the position directly on the platform (direct metrology) and work without contact. Neither friction nor hysteresis interferes with the motion, which allows excellent linearity values to be achieved together with the high position resolution. In conjunction with suitable electronics, capacitive sensors achieve the best resolution, stability, and bandwidth.

3.6.4 ID Chip

An ID chip is located in the D-sub connector of the P-763. When the P-763 is calibrated at the factory with digital electronics, the calibration data is saved on the ID chip together with specific product information. During switch-on, the digital electronics read the data from the ID chip of the P-763 connected. A P-763 with an ID chip containing calibration data can therefore be connected to any suitable digital electronics without renewed calibration.

For more information on the ID chip, see the manual of the controller used.

4 Unpacking

NOTICE

**Mechanical overload due to incorrect handling!**

An impermissible mechanical load on the platform of the P-763 can cause damage to the piezo actuators, sensors, and flexures of the P-763 as well as loss of accuracy.

- Do **not** touch any sensitive parts (e.g., platform) when handling the P-763.

1. Unpack the P-763 with care.
2. Compare the contents with the scope of delivery according to the contract and the delivery note.
3. Inspect the contents for signs of damage. If any parts are damaged or missing, contact our customer service department (p. 31) immediately.
4. Keep all packaging materials in case the product needs to be returned.

5 Installation

In this Chapter

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Fixing the Load	19

5.1 General Notes on Installation

CAUTION



Dangerous voltage and residual charge in piezo actuators!

The P-763 is driven by piezo actuators. Temperature changes and compressive stress can induce charges in piezo actuators. Piezo actuators can remain charged for several hours after disconnecting from the electronics. Touching or short-circuiting the contacts in the P-763's connectors could lead to minor injuries from electric shock. The piezo actuators can be destroyed by an abrupt contraction.

- Do **not** open the P-763.
- Discharge the P-763's piezo actuators before installing:
Connect the P-763 to the switched-off electronics from PI equipped with an internal discharge resistor.
- Do **not** pull the connectors out of the electronics during operation.



Touching the contacts in the connectors can lead to an electric shock (max. 130 V DC) and minor injuries.

- Do **not** touch the contacts in the connectors.
- Use screws to secure the P-763's connectors against being pulled out of the electronics.

NOTICE



Mechanical overload due to incorrect handling!

An impermissible mechanical load on the platform of the P-763 can cause damage to the piezo actuators, sensors, and flexures of the P-763 as well as loss of accuracy.

- Do **not** touch any sensitive parts (e.g., platform) when handling the P-763.

NOTICE**Damage due to unsuitable cables!**

Unsuitable cables can damage the P-763 and the electronics.

- Use cables provided by PI only to connect the P-763 to the electronics.

NOTICE**Damage due to improper mounting!**

Improper mounting of the P-763 or incorrectly mounted parts can damage the P-763.

- Only use the holes or threads intended for the purpose of fixing the P-763 and loads.
- Install the P-763 so that the platform and all parts attached to it can move freely within the entire travel range.

NOTICE**Damage due to incorrectly tightened screws!**

Incorrectly tightened screws can cause damage.

- Pay attention to the torque range (p. 36) specified for the screws used during installation.

INFORMATION

Extension cables can reduce the positioning accuracy of the P-763 or affect sensor processing by the electronics.

- Do **not** use extension cables. If you need longer cables, contact our customer service department (p. 31).

5.2 Connecting the P-763 to the Protective Earth Conductor


INFORMATION

In the case of P-763 positioners with D-sub connectors, ground loops can occur when the positioner is grounded via its protective earth connector as well as via the connecting cable's shielding for the electronics.

- If a ground loop occurs, contact our customer service department (p. 31).

INFORMATION

- Pay attention to the applicable standards for connecting the protective earth conductor.

The P-763 has an M4 hole for attaching the protective earth conductor. This hole is marked with the symbol for the protective earth conductor . Refer to "Dimensions" (p. 35) for the exact position of the hole.

Requirements

- ✓ You have read and understood the general notes on installation (p. 15).
- ✓ The P-763 is **not** connected to the electronics.

Tools and accessories

- Suitable protective earth conductor: Cable cross section $\geq 0.75 \text{ mm}^2$
- M4 protective earth screw set (p. 11) supplied for connecting the protective earth conductor
- Suitable screwdriver

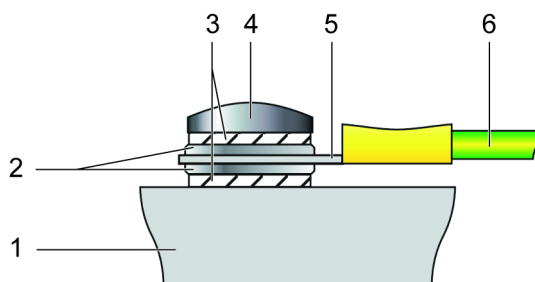


Figure 3: Connecting the protective earth conductor (profile view)

- | | |
|---|----------------------------|
| 1 | Base body of the P-763 |
| 2 | Flat washer |
| 3 | Lock washer |
| 4 | Screw |
| 5 | Cable lug |
| 6 | Protective earth conductor |

Connecting the P-763 to the protective earth conductor

1. If necessary, attach a suitable cable lug to the protective earth conductor.
2. Use the M4 screw (together with the flat and lock washers) to attach the cable lug of the protective earth conductor to the threaded hole in the P-763 as shown in the profile view.
3. Tighten the M4 screw with a torque of 1.2 Nm to 1.5 Nm.
4. Make sure that the contact resistance at all connection points relevant for connecting the protective earth conductor is $< 0.1 \Omega$ at 25 A.

5.3 Mounting the P-763

NOTICE

**Warping of the P-763 when mounted on uneven surfaces!**

The P-763 could warp if mounted on an uneven surface. Warping reduces the accuracy.

- Mount the P-763 onto an even surface. The recommended flatness of the surface is $\leq 20 \mu\text{m}$.
- For applications with large temperature changes:
Mount the P-763 only onto surfaces that have the same or similar thermal expansion properties as the P-763.

NOTICE

**Tensile stress when mounted vertically!**

When the P-763 is mounted vertically, certain alignments can cause tensile stress that reduces the preload and destroys the piezo actuator.

- If you want to mount the P-763 vertically, contact our customer service department (p. 31).

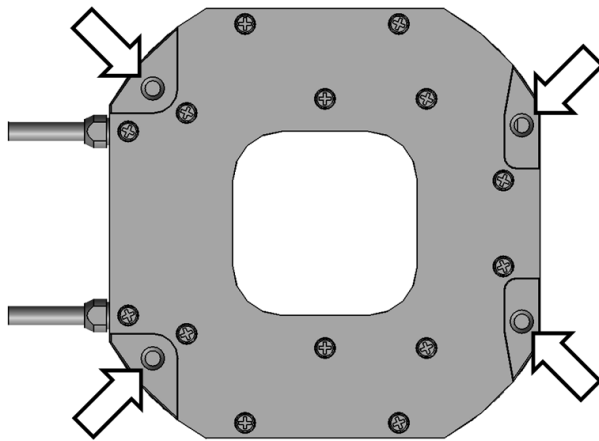


Figure 4: P-763: Holes at the bottom for mounting the positioner onto an underlying surface

Requirements

- ✓ You have read and understood the general notes on installation (p. 15).
- ✓ The P-763 is **not** connected to the electronics.
- ✓ You have accounted for the space required to route cables according to regulations and without bending them.

Tools and accessories

- You have provided a suitable surface (for the required position and depth of the holes for accommodating the screws, refer to "Dimensions" (p. 35)):
 - Four through-holes for M3 screws are provided.
 - The surface flatness is $\leq 20 \mu\text{m}$.
 - For applications with large temperature changes: The surface should have the same thermal expansion properties as the P-763 (e.g., underlying surface made of aluminum).
- Four M3 screws of suitable length (p. 35)
- Suitable screwdriver

Mounting the P-763 onto an underlying surface

1. Align the P-763 on the underlying surface so that the corresponding mounting holes in the base body and the underlying surface are in line.
2. Mount the P-763 from below onto the underlying surface:
 - a) Insert the screws through the holes in the underlying surface into the base body of the P-763 from below.
 - b) Tighten the screws with the individual torque (p. 36) specified for the screws.
3. Check that the P-763 is fixed firmly.

5.4 Fixing the Load

NOTICE**Mechanical overload of the platform!**

High torques during fastening of the load as well as high loads can overload the platform of the P-763. Mechanical overload can cause damage to the piezo actuators, sensors, and flexures of the P-763 and lead to loss of accuracy.

- Avoid torques $> 100 \text{ Ncm}$ on the platform.
- Do **not** exceed the maximum permissible loads according to the specifications (p. 33).
- Hold the load and adhere to the specified torque range (p. 36) when tightening (or loosening) the screws.

NOTICE**Warping of the P-763 when fixing loads with an uneven contact surface!**

Fixing loads with an uneven contact surface could warp the P-763. Warping reduces the accuracy.

- Only fix loads on the P-763 whose contact surface with the platform of the P-763 has a flatness of at least 20 µm.
- For applications with large temperature changes:
Only fix loads to the P-763 that have the same or similar thermal expansion properties as the P-763.

NOTICE**Center of load at unsuitable position!**

If the center of load is located too far away from the center of the platform (e.g., tall loads and unwanted lever effect), the P-763 can be damaged by high strain on the flexure guides, high torques, and oscillation, especially when operated dynamically.

- If the center of the load to be affixed is too far above or to the side of the platform, adjust the controller settings before startup or contact our customer service department (p. 31).

NOTICE**Excessively long screws!**

The P-763 could be damaged by screws inserted too deeply.

- Pay attention to the depth of the mounting holes in the platform (p. 35).
- Use screws of the correct length for the respective mounting holes only.

INFORMATION

Positive direction of axis motion is specified in the product view (p. 9).

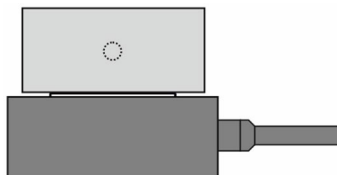
Center of load at the optimal position:

Figure 5: Example of an optimally placed load

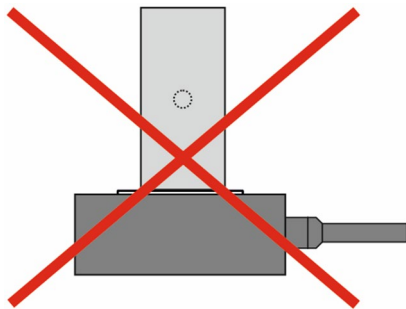
Center of load at an unsuitable position:

Figure 6: Tall load and center of load too far above the platform

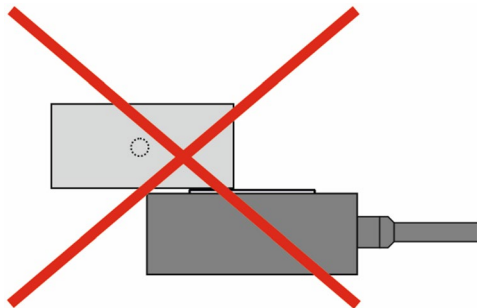


Figure 7: Unwanted lever effect and center of load on the side of the platform

Requirements

- ✓ You have read and understood the general notes on installation (p. 15).
- ✓ The P-763 is **not** connected to the electronics.

Tools and accessories

- Screws of suitable size and length (p. 35)
- Suitable screwdriver

Fixing the Load

1. Align the load on the P-763 so that the mounting holes in the load and the holes in the platform are in line.
2. Hold the load so that it cannot move while tightening the screws.
3. Fix the load by tightening the screws in the mounting holes (p. 35) provided. Do not exceed the maximum torque while tightening the screws:
 - Maximum torque on the platform: 100 Ncm
 - Torque range (p. 36) for the screws
4. Check that the load is sitting firmly on the platform.

6 Startup and Operation

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6.1 General Notes on Startup and Operation

CAUTION



Risk of electric shock if the protective earth conductor is not connected!

If a protective earth conductor is not or not properly connected, dangerous touch voltages can occur on the P-763 in the case of malfunction or failure of the system. If there are touch voltages, touching the P-763 can result in minor injuries from electric shock.

- Connect the P-763 to a protective earth conductor (p. 16) before startup.
- Do **not** remove the protective earth conductor during operation.
- If the protective earth conductor has to be removed temporarily (e.g., in the case of modifications), reconnect the P-763 to the protective earth conductor before restarting.

NOTICE



Destruction of the piezo actuator due to electric flashovers!

Using the P-763 in environments that increase the electrical conductivity can lead to the destruction of the piezo actuator by electric flashovers. Electric flashovers can be caused by moisture, high humidity, liquids, and conductive materials (e.g., metal dust). In addition, electric flashovers can also occur in certain air pressure ranges due to the increased conductivity of the air.

- Avoid operating the P-763 in environments that can increase the electric conductivity.
- Operate the P-763 only within the permissible ambient conditions and classifications (p. 34).

NOTICE



Decreased lifetime due to permanently high voltage!

Applying a continuous high static voltage to piezo actuators reduces the lifetime of the piezo ceramic.

- When the P-763 is not used but the electronics remain switched on to ensure temperature stability, discharge the P-763 (p. 25).

NOTICE**Operating voltage too high or incorrectly connected!**

Operating voltages that are too high or incorrectly connected can cause damage to the P-763.

- Operate the P-763 only with controllers/drivers and original accessories from PI.
- Do **not** exceed the operating voltage range (p. 34) for which the P-763 is specified.
- Operate the P-763 only when the operating voltage is properly connected; see "Pin Assignment" (p. 36).

NOTICE**Uncontrolled oscillation!**

Oscillation can cause irreparable damage to the P-763. Oscillation is indicated by a humming noise and can be caused by the following:

- A change in the load and/or dynamics requires the servo control parameters to be adjusted.
- The P-763 is operated near to its resonant frequency.

If you notice oscillation:

- In closed-loop operation, switch off the servo mode immediately.
- In open-loop operation, stop the P-763 immediately.

INFORMATION

Positive direction of axis motion is specified in the product view (p. 9).

INFORMATION

Sound and vibration (e.g., footfall, knocks) can be transmitted to the P-763 and can affect its performance with regard to position stability.

- Avoid sound and vibration while the P-763 is being operated.

6.2 Operating the P-763

- Follow the instructions in the manual for the electronics (p. 11) used for startup and operation of the P-763.

6.3 Discharging the P-763

The P-763 must be discharged in the following cases:

- Before Installation
- When the P-763 is not in use but the electronics remain switched on to ensure temperature stability
- Before demounting (e.g., before cleaning and transporting the P-763 and for modifications)

The P-763 is discharged via the discharge resistor inside the electronics from PI.

Discharging a positioner connected to the electronics

In closed-loop operation:

1. Switch off the servo mode on the controller.
2. Set the piezo voltage to 0 V on the controller.

In open-loop operation:

- Set the piezo voltage to 0 V on the electronics.

Discharging a positioner not connected to the electronics

- Connect the positioner to the switched-off electronics from PI.

7 Maintenance

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7.1 General Notes on Maintenance

NOTICE



Misalignment due to loosening screws!

The P-763 is maintenance-free and achieves its positioning accuracy as a result of the optimal alignment of mechanical components and piezo actuators. Loosened screws cause a loss in positioning accuracy.

- Loosen screws only when instructed in this manual.
- Do **not** open the P-763.

7.2 Cleaning the P-763

NOTICE



Damage from ultrasonic cleaning!

Ultrasonic cleaning can damage the P-763.

- Do **not** do any ultrasonic cleaning.

Requirements

- ✓ You have discharged the piezo actuators of the P-763 (p. 25).
- ✓ You have disconnected the P-763 from the electronics.

Cleaning the P-763

- Clean the surfaces of the P-763 with a cloth dampened with a mild cleanser or disinfectant (e.g., isopropyl alcohol).

8 Troubleshooting

Problem	Possible causes	Solution
No or limited motion	Cable not connected correctly	➤ Check the cable connections.
	Excessive load	➤ Do not exceed the maximum permissible stress and load capacities according to the specifications (p. 33).
	Zero shift of the sensor for the following reasons: <ul style="list-style-type: none"> ▪ Load in direction of motion ▪ Ambient/operating temperature of the positioner is far above or below the calibration temperature (21 °C to 24 °C) 	➤ Adjust the zero-point of the sensor (see controller manual).
Reduced positioning accuracy	The base body or the platform is warped	<ul style="list-style-type: none"> ➤ Mount the P-763 onto surfaces with the following characteristics only: <ul style="list-style-type: none"> – Flatness of at least 20 µm – The thermal expansion properties are similar to those of the P-763 (e.g., surfaces made of aluminum). ➤ Mount loads onto the P-763 with the following characteristics only: <ul style="list-style-type: none"> – The contact surface of the load has a flatness of at least 20 µm. – The thermal expansion properties are similar to those of the P-763 (e.g., loads made of aluminum).

Problem	Possible causes	Solution
The positioner starts oscillating or positions inaccurately	Servo control parameters incorrectly set because for example, the load was changed	<ol style="list-style-type: none"> 1. Switch off the servo mode of the corresponding motion axes immediately. 2. Check the settings of the servo control parameters on the controller. 3. Adjust the servo control parameters on the controller according to the load change.
	Open-loop operation near the resonant frequency	➤ In open-loop operation, operate the positioner only with a frequency that is below the resonant frequency.

If the problem with your system is not listed in the table above or cannot be solved as described, contact our customer service department (p. 31).

9 Customer Service

For inquiries and orders, contact your PI sales engineer or send us an email (service@pi.de).

- If you have any questions concerning your system, provide the following information:
 - Product and serial numbers of all products in the system
 - Firmware version of the controller (if applicable)
 - Version of the driver or the software (if applicable)
 - Operating system on the PC (if applicable)
- If possible: Take photographs or make videos of your system that can be sent to our customer service department if requested.

The latest versions of the user manuals are available for download (p. 3) on our website.

10 Technical Data

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10.1 Specifications

10.1.1 Data Table

	P-763.22C	Unit	Tolerance
Active axes	X, Y		
Motion and positioning			
Integrated sensor	Capacitive		
Travel range in X, Y, closed loop	200	μm	
Resolution in X, Y, open loop	1	nm	Typ.
Resolution in X, Y, closed loop	2	nm	
Linearity error in X, Y	0.02	%	Typ.
Repeatability X, Y	±5	nm	Typ.
Mechanical properties			
Resonant frequency in X, under load, 260 g	180	Hz	±20 %
Load capacity	10	N	Max.
Drive properties			
Piezo ceramic	PICMA® P-887		
Electrical capacitance in X, Y	12.8	μF	±20 %
Miscellaneous			
Operating temperature range	-20 to 80	°C	
Material	Aluminum, steel		
Dimensions	70 mm × 70 mm × 25 mm		
Clear aperture	30 mm × 30 mm		
Cable length	1.5	m	±10 mm
Sensor/voltage connector	2 × D-sub 7W2 (m)		
Recommended electronics	E-727 (with P-895.2DDC adapter cable)		

10.1.2 Maximum Ratings

P-763 positioners are designed for the following operating data in continuous operation:

Maximum operating voltage 	Maximum operating frequency (without load) ¹ 	Maximum power consumption ² 
-20 to +120 V	100 Hz (in X) 83 Hz (in Y)	37.6 W (18.8 W per axis)

¹ To ensure stable operation, the maximum operating frequency has been defined as around one third of the mechanical resonant frequency.

² The heat that is generated by the piezo actuator during dynamic operation limits the value for maximum power consumption.

Details can be found at the following website:

<https://www.physikinstrumente.com/en/technology/piezo-technology/properties-piezo-actuators/electrical-operation/>

10.2 Ambient Conditions and Classifications

Pay attention to the following ambient conditions and classifications for the P-763:

Area of application	For indoor use only
Maximum altitude	2000 m
Air pressure	1100 hPa to 0.1 hPa
Relative humidity	Highest relative humidity 80 % for temperatures up to 31 °C Decreasing linearly to 50 % relative humidity at 40 °C
Operating temperature	-20 °C to 80 °C
Storage temperature	-20 °C to 80 °C
Transport temperature	-25 °C to 85 °C
Overvoltage category	II
Protection class	I
Degree of pollution	1
Degree of protection according to IEC 60529	IP20

10.3 Dimensions

Dimensions in mm.

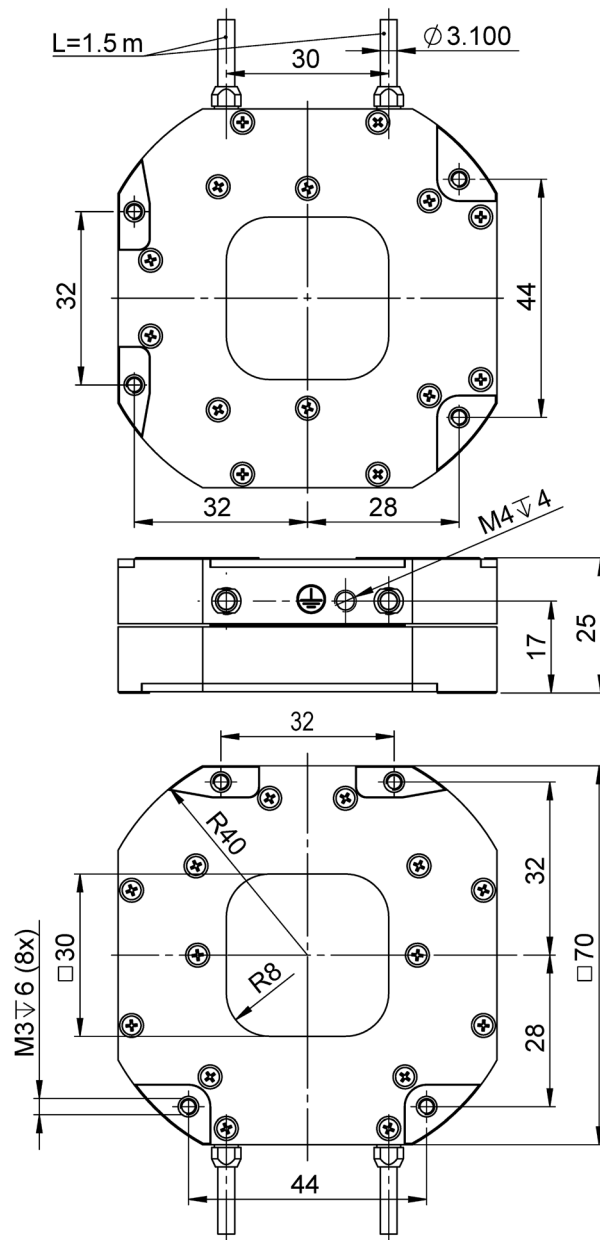


Figure 8: P-763.22C

10.4 Torque for Stainless Steel Screws (A2-70)

Screw size	Minimum torque	Maximum torque
M6	4 Nm	6 Nm
M5	2.5 Nm	3.5 Nm
M4	1.5 Nm	2.5 Nm
M3	0.8 Nm	1.1 Nm
M2.5	0.3 Nm	0.4 Nm
M2	0.15 Nm	0.2 Nm
M1.6	0.06 Nm	0.12 Nm

- Pay attention to the screw-in depth required for the respective material according to the VDI directive 2230.

10.5 Pin Assignment

D-sub 7W2 connector (m)

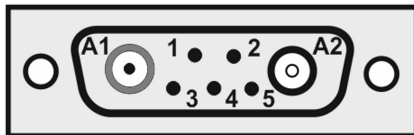


Figure 9: D-sub 7W2 connector (m): Front with connections

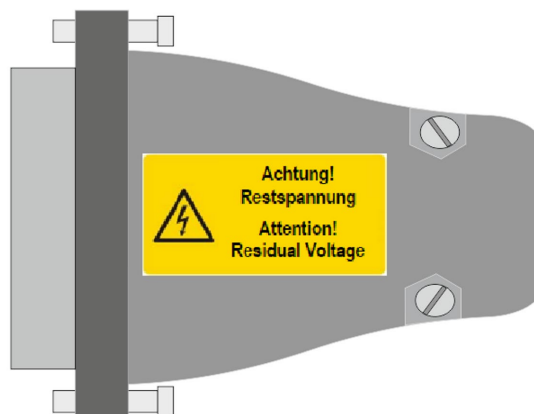


Figure 10: D-sub connector: Example top view

Pin	Signal	Function
A1	PZT	Piezo voltage
A2	Probe	Probe sensor signal (immovable part of the capacitive sensor)
1	Data ID chip	Data line for ID chip
2	GND Target and ID chip	Target and ID chip ground
3	GND PZT	Piezo voltage ground
4	---	(not connected)
5	Target	Target sensor signal (movable part of the capacitive sensor)
Housing	---	Shield

11 Old Equipment 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 its responsibility as the product manufacturer, Physik Instrumente (PI) GmbH & Co. KG 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 Roemerstr. 1

D-76228 Karlsruhe, Germany



12 EU Declaration of Conformity

For the P-763, an EU Declaration of Conformity has been issued in accordance with the following European directives:

Low Voltage Directive

EMC Directive

RoHS Directive

The applied standards certifying the conformity are listed below.

Safety (Low Voltage Directive): EN 61010-1

EMC: EN 61326-1

RoHS: EN 50581 or EN IEC 63000

