User Manual

P602T0001, valid for P-602
KSch/CBo, 2019-11-21

P-602

PiezoMove High-Stiffness Linear Piezo Actuator

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Contents

About this Document

Symbols and Typographic Conventions

The following symbols and typographic conventions are used in this user manual:

CAUTION

Dangerous situation
Failure to comply could lead to minor injury or cause damage to equipment.

➢ Precautionary measures for avoiding.

NOTICE

Dangerous situation
Failure to comply could cause damage to equipment.

➢ Precautionary measures for avoiding.

INFORMATION

Additional information that can affect your application.

Symbol/Label	Meaning
1. 2.	Action consisting of several steps whose sequential order must be observed
➢	Action consisting of one or several steps whose sequential order is irrelevant
▪	List item
p. 5	Cross-reference to page 5
RS-232	Labeling of an operating element on the product (example: socket of the RS-232 interface)
	Warning sign affixed to the product that refers to detailed information in this user manual.

Other Applicable Documents

The devices that are mentioned in this user manual are described in their own manuals.

Product	Document
E-610 piezo amplifier / servo controller	PZ70 user manual
E-625 piezo servo controller	PZ167 user manual
E-831 OEM piezo driver	PZ151 / PZ191 / PZ235 user manual

Downloading Manuals

INFORMATION

If a manual is missing or problems occur with downloading:

➢ Contact our customer service department (p. 16).

Downloading manuals

1. Open the website **www.pi.ws**.
2. Search the website for the product number (e.g., P-602) or the product family (e.g., PiezoMove).
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.

Safety

Intended Use

The P-602 PiezoMove linear actuator provides motion on the X axis.

Depending on the version, the actuators provide different travel ranges and stiffness in motion direction, see “Technical Data” on p. 17. The P-602.xSx versions are equipped with SGS sensors.

The P-602 actuators are components which are intended to be integrated in other equipment: The operator is responsible for electrical safety according to EN 61010-1 and electromagnetic compatibility according to EN 61326-1 when integrating the P-602 in the overall system.

The actuators comply with the RoHS directive, i.e. the standards defined by EN 50581.

The P-602 actuators are intended to be used in interior spaces and in an environment which is free of dirt, oil and lubricants.

The P-602 can only be used as intended in conjunction with suitable electronics (p. 7) that are available from PI.

Safety Precautions

CAUTION

Dangerous voltage and residual charge on piezo actuators!

The P-602 contains piezo actuators. Mechanical shock, temperature changes and compressive stresses can induce charges in piezo actuators. Touching the contacts of the P-602 can lead to minor injuries from electric shock. In addition, the piezo actuators can be destroyed by an abrupt contraction.

- Only touch the P-602 when you have discharged it.
- Do **not** open the P-602.
- Only handle the actuator with the shorting clamp affixed on the stranded wires as shown in Figure 1 (p. 7).
- Do **not** disconnect the P-602 from the electronics during operation.

When the P-602 is not connected to a shorting clamp:

- Discharge the piezo actuators of the P-602 before installation:
  Connect the P-602 to the switched-off PI controller for 10 seconds.

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-602 in the case of malfunction or failure of the system. If touch voltages exist, touching the P-602 can result in minor injury from electric shock.

- Install the actuator before startup in a way that a risk of electric shock is prevented:
  - Connect the actuator to a protective earth conductor via an electrically conductive surface or
  - Connect the actuator to a protective earth conductor via its mounting interfaces or
  - Install the actuator such that it is electrically insulated according to protection class II.
- Do **not** remove the protective earth conductor during operation.
- Use electrically conductive materials (e.g., screws and flat washers) for mounting the protective earth conductor.
- Make sure that the contact resistance is <0.1 Ω at 25 A at all connection points relevant for mounting the protective earth conductor.
- If the protective earth conductor has to be temporarily removed (e.g., for modifications), reconnect the P-602 to the protective earth conductor before starting it up again.

Product Description

Model Overview

21 standard versions of the P-602 actuators are available. They differ with regard to the following features:

- Travel range
- Position sensor
- LEMO connector

Model	Travel range	Sensor	LEMO connector
P-602.100	120 µm	-	No
P-602.1S0	120 µm	SGS	No
P-602.1SL	120 µm	SGS	Yes
P-602.300	300 µm	-	No
P-602.3S0	300 µm	SGS	No
P-602.3SL	300 µm	SGS	Yes
P-602.500	600 µm	-	No
P-602.5S0	600 µm	SGS	No
P-602.5SL	600 µm	SGS	Yes
P-602.108	100 µm	-	No
P-602.1S8	100 µm	SGS	No
P-602.1L8	100 µm	SGS	Yes
P-602.308	300 µm	-	No
P-602.3S8	300 µm	SGS	No
P-602.3L8	300 µm	SGS	Yes
P-602.508	500 µm	-	No
P-602.5S8	500 µm	SGS	No
P-602.5L8	500 µm	SGS	Yes
P-602.800	1000 µm	-	No
P-602.8S0	1000 µm	SGS	No
P-602.8SL	1000 µm	SGS	Yes

Product View

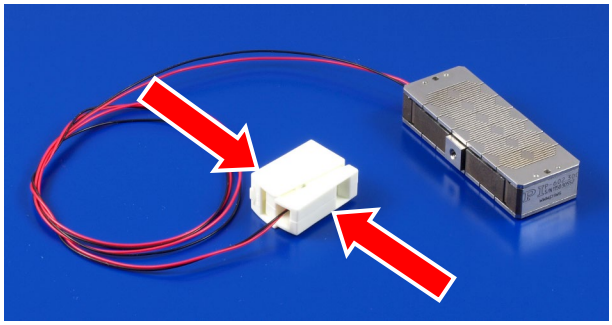


Figure 1: P-602.300 actuator with shorting clamp on the stranded wires, red arrows indicate how to release the stranded wires

Figure 2: P-602.8SL actuator with LEMO connectors

Scope of Delivery

Product number	Description
P-602	Piezo actuator according to order (p. 6)
PZ302EK	Short instructions for PiezoMove® linear actuators

Suitable Electronics

Product number	Description
E-610	Piezo amplifier / servo controller
E-625	Piezo servo controller
E-831	OEM piezo driver

➢ To order, contact our customer service department (p. 16).

Unpacking

NOTICE

Damage due to improper handling!
Mechanical shock or pull forces on the stranded wires can damage the actuator.

- ➢ Avoid shocks and drops.
- ➢ Avoid pull forces on the stranded wires.

1. Unpack the actuator 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. 16) immediately.
4. Keep all packaging materials in case the product needs to be returned.

Installation

General Notes on Installation

CAUTION

Dangerous voltage and residual charge on piezo actuators!
The P-602 contains piezo actuators. Mechanical shock, temperature changes and compressive stresses can induce charges in piezo actuators. Touching the contacts of the P-602 can lead to minor injuries from electric shock. In addition, the piezo actuators can be destroyed by an abrupt contraction.

- ➢ Only touch the P-602 when you have discharged it.
- ➢ Do **not** open the P-602.
- ➢ Only handle the actuator with the shorting clamp affixed on the stranded wires as shown in Figure 1 (p. 7).
- ➢ Do **not** disconnect the P-602 from the electronics during operation.

When the P-602 is not connected to a shorting clamp:

- ➢ Discharge the piezo actuators of the P-602 before installation:
  Connect the P-602 to the switched-off PI controller for 10 seconds.

NOTICE

Heating up of the P-602 during operation!
The heat produced during dynamic operation of the P-602 can affect your application.

- ➢ Install the P-602 so that your application is not affected by the dissipating heat.

NOTICE

Destruction of the piezo actuator due to rapid discharging!
If the P-602 is not connected to the electronics, the stranded wires must be short-circuited in order to prevent the piezo actuator from charging during temperature changes and compressive stresses. Unsuitable short-circuiting leads to an abrupt contraction of the piezo actuator due to excessively fast discharging. Abrupt contraction can destroy the piezo actuator.

- Remove the shorting clamp supplied (p. 7) from the stranded wires only if this is required for installation or operation.
- If the shorting clamp has been removed:
  - Ensure adequate protection against touching live parts.
  - Short-circuit the stranded wires of the P-602 using a **10 kΩ discharge resistor** or discharge the piezo actuator (p. 15) in a suitable manner before reconnecting the shorting clamp.
- If the piezo actuator is discharged: Keep the stranded wires of the P-602 short-circuited using the supplied shorting clamp.

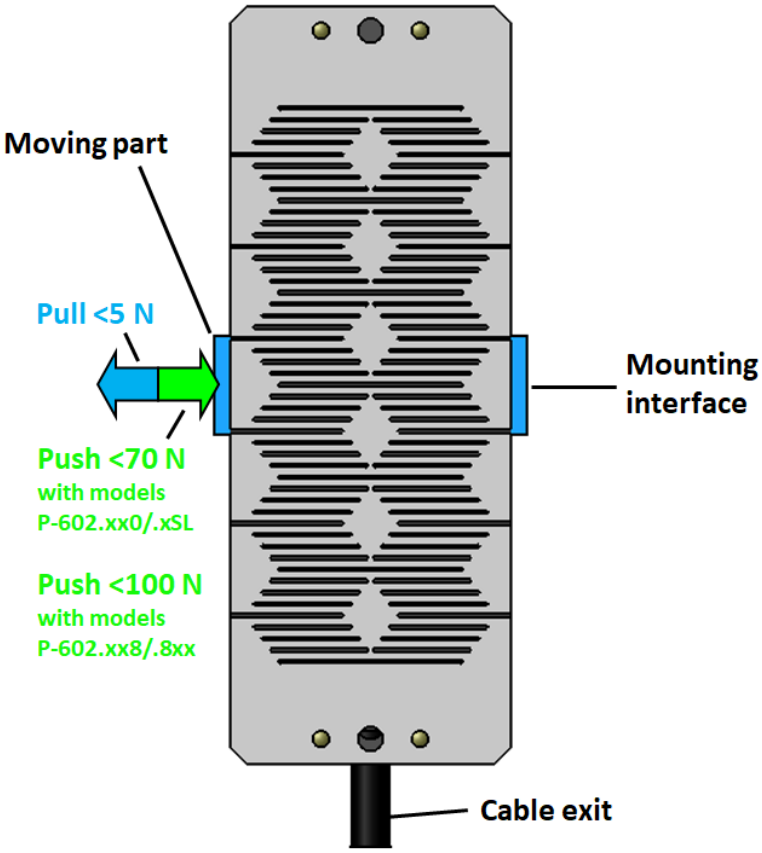


Figure 3: Maximum permissible push and pull forces in motion direction for the P-602

NOTICE

Destruction of the piezo actuator due to excessive forces and loads!
Excessive push /pull forces on the moving part in the direction of motion, as well as excessive loads, can destroy the P-602.

- **Do not exceed the maximum push force** on the moving part (see Figure 3, p. 9):
  - Models P-602.xx0/.xSL: Do not exceed a push force of **70 N**.
  - Models P-602.xx8/.8xx: Do not exceed a push force of **100 N**.
- **Do not exceed a pull force of 5 N** on the moving part (see Figure 3, p. 9).
- In dynamic operation, take special care not to exceed the maximum push/pull forces.

Preventing the Risk of Electric Shock

The P-602 actuator does not feature a separate protective earth connection, but must be installed in a way that a risk of electric shock is prevented.

You have the following options:

- Connect the actuator to a protective earth conductor via an electrically conductive surface
  or
- Connect the actuator to a protective earth conductor via its mounting interfaces
  or
- Install the actuator such that it is electrically insulated according to protection class II.

When you choose the first or the second option:

1. Make sure that the contact resistance is <0.1 Ω at 25 A at all connection points relevant for mounting the protective earth conductor.
2. Pay attention to the applicable standards for connecting the protective earth conductor.

Preparing a P-602 with Stranded Wires for Connection to a Controller

When you prepare a P-602 actuator with stranded wires for connection to a controller, pay attention to the assignment of the stranded wires as specified in “Color coding of stranded wires” (p. 22).

Mounting the P-602 and Mounting a Load

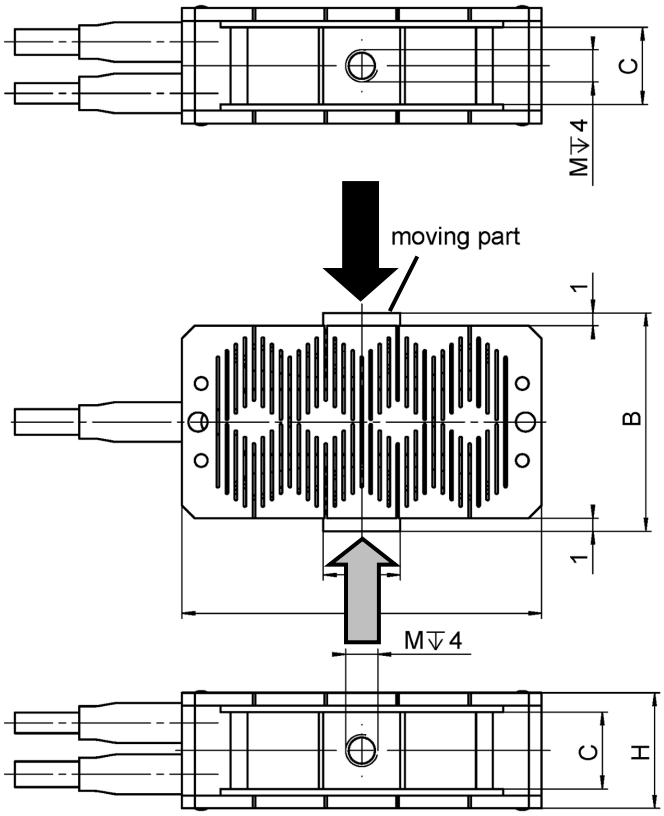


Figure 4: The gray arrow indicates where to mount the P-602 on a surface, the black arrow indicates where to mount a load. Refer to p. 20 for assignment of letters to dimensions.

Requirements

✓ You have read and understood the following sections:
- Safety Precautions (p. 5)
- General Notes on Installation (p. 8)

Tools and accessories

- 1 screw of suitable length for mounting the actuator on a surface:
  - P-602.8xx: M4 screw
  - All other models: M2.5 screw
- 1 screw of suitable length for mounting a load to the actuator:
  - P-602.8xx: M4 screw
  - All other models: M2.5 screw
- Suitable tools

Mounting the P-602 and mounting a load

1. Only affix the P-602 on a surface using the mounting hole intended for this purpose (see Figure 4, p. 11).
   Maximum torque: 0.5 Nm
2. Only affix a load onto the P-602 using the mounting hole intended for this purpose (see Figure 4, p. 11).
   Maximum torque: 0.5 Nm
3. With P-602.xx0 models:
   When the actuator is installed, release the stranded wires from the shorting clamp by pressing it together in the direction shown by the red arrows (see Figure 1, p. 7).

INFORMATION

If the shorting clamp needs to be used again, make sure that the stranded wires are stripped before inserting them.

Startup and Operation

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-602 in the case of malfunction or failure of the system. If touch voltages exist, touching the P-602 can result in minor injury from electric shock.

- Install the actuator before startup in a way that a risk of electric shock is prevented:
  - Connect the actuator to a protective earth conductor via an electrically conductive surface or
  - Connect the actuator to a protective earth conductor via its mounting interfaces or
  - Install the actuator such that it is electrically insulated according to protection class II.
- Do **not** remove the protective earth conductor during operation.
- Use electrically conductive materials (e.g., screws and flat washers) for mounting the protective earth conductor.
- Make sure that the contact resistance is <0.1 Ω at 25 A at all connection points relevant for mounting the protective earth conductor.
- If the protective earth conductor has to be temporarily removed (e.g., for modifications), reconnect the P-602 to the protective earth conductor before starting it up again.

CAUTION

Dangerous voltage and residual charge on piezo actuators!
The P-602 contains piezo actuators. Mechanical shock, temperature changes and compressive stresses can induce charges in piezo actuators. Touching the contacts of the P-602 can lead to minor injuries from electric shock. In addition, the piezo actuators can be destroyed by an abrupt contraction.

- Only touch the P-602 when you have discharged it.
- Do **not** open the P-602.
- Only handle the actuator with the shorting clamp affixed on the stranded wires as shown in Figure 1 (p. 7).
- Do **not** disconnect the P-602 from the electronics during operation.

When the P-602 is not connected to a shorting clamp:

- Discharge the piezo actuators of the P-602 before installation:
  Connect the P-602 to the switched-off PI controller for 10 seconds.

NOTICE

Destruction of the piezo actuator due to excessive forces and loads!
Excessive push /pull forces on the moving part in the direction of motion, as well as excessive loads, can destroy the P-602.

- **Do not exceed the maximum push force** on the moving part (see Figure 3, p. 9):
  - Models P-602.xx0/.xSL: Do not exceed a push force of **70 N**.
  - Models P-602.xx8/.8xx: Do not exceed a push force of **100 N**.
- **Do not exceed a pull force of 5 N** on the moving part (see Figure 3, p. 9).
- In dynamic operation, take special care not to exceed the maximum push/pull forces.

NOTICE

Destruction of the piezo actuator by electric flashovers!
The use of the P-602 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 such as 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-602 in environments that can increase the electric conductivity.
- Only operate the P-602 within the permissible ambient conditions and classifications (p. 19).

NOTICE

Destruction of the piezo actuator by continuously high voltage!
The constant application of high voltage to piezo actuators can lead to leakage currents and flashovers that destroy the ceramic.

If the P-602 is not used, but the controller is to remain switched on to ensure temperature stability:

➢ Set the piezo voltage to 0 V on the controller.

NOTICE

Uncontrolled oscillation!
Oscillations can cause irreparable damage to the P-602. Oscillations are indicated by a humming and can result from the following causes:

➢ The load and/or dynamics of operation differ too much from the calibration settings.
➢ The P-602 is operated near to its resonant frequency.
➢ If you notice oscillations, stop the P-602 immediately.

Starting and Operating the P-602

INFORMATION

Respect Serial Number IDs
Always connect the actuator to the controller channel with which it has been calibrated. Each PI controller channel is given a label with the ID or S/N of the piezo with which it was calibrated.

Requirements

✓ You have read and understood the following sections:
  – Safety Precautions (p. 5)
  – General Notes on Startup and Operation (p. 12)

Starting and operating the P-602

➢ Follow the instructions in the manual of the piezo controller used for startup and operation of the P-602.

Discharging the P-602

The P-602 must be discharged in the following cases:

- When the P-602 is not in use but the electronics remains switched on to ensure temperature stability
- When the stranded wires of the P-602 are to be short-circuited without a discharge resistor, e.g., with the shorting clamp (p. 7) supplied
- If the connecting cable of the P-602 is accidentally pulled out of the electronics during operation

Requirements

✓ You have read and understood the following sections:
  - Safety Precautions (p. 5)
  - General Notes on Startup and Operation (p. 12)

Tools and accessories

If the P-602 is not connected to the electronics:

- Only for P-602 **without** connector:
  - 10 kΩ discharge resistor (not included in scope of delivery), the touchable parts must be adequately insulated for the actuator's operating voltage range (p. 18)
- Only for P-602 **with** connector:
  - Electronics from PI or suitable shorting plug

Discharging a P-602 connected to the electronics

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

Discharging a P-602 not connected to the electronics

If the P-602 does not have a connector:

1. Ensure adequate protection against touching live parts.
2. Short-circuit the stranded wires of the P-602 for at least a few seconds using a **10 kΩ discharge resistor**.

If the P-602 has a connector:

➢ Connect the voltage connector of the P-602 to the switched off PI electronics, which has an internal discharge resistor, for at least a few seconds.

➢ Alternative: Connect a suitable shorting plug with integrated discharge resistor to the voltage connector of the P-602 for at least a few seconds.

Maintenance

NOTICE

Misalignment from loosening screws!
The P-602 is maintenance-free and precision aligned.

- ➢ Do **not** loosen any screws on the P-602.

Cleaning the P-602

NOTICE

Damage from ultrasonic cleaning!
Ultrasonic cleaning can damage the P-602.

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

Requirements

- ✓ You have discharged (p. 15) the P-602.
- ✓ You have disconnected the P-602 from the electronics.

Cleaning the P-602

- ➢ When necessary, clean the surfaces of the P-602 with a cloth that is dampened with a mild cleanser (e.g., ethanol or isopropyl alcohol)

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. 4) on our website.

Technical Data

Specifications

	P-602.100 / P-602.1S0 / P-602.1SL	P-602.300 / P-602.3S0 / P-602.3SL	P-602.500 / P-602.5S0 / P-602.5SL	P-602.108 / P-602.1S8 / P-602.1L8	P-602.308 / P-602.3S8 / P-602.3L8	P-602.508 / P-602.5S8 / P-602.5L8	P-602.800 / P-602.8S0 / P-602.8SL	Unit
Active axes	X	X	X	X	X	X	X	
Motion and positioning								
Integrated sensor	– / SGS / SGS	– / SGS / SGS	– / SGS / SGS	– / SGS / SGS	– / SGS / SGS	– / SGS / SGS	– / SGS / SGS	
Travel range at -20 to 120 V, open loop	120	300	600	100	300	500	1000	µm
Travel range, closed loop	– / 100 / 100	– / 300 / 300	– / 500 / 500	– / 100 / 100	– / 300 / 300	– / 500 / 500	– / 1000 / 1000	µm
Resolution, open loop	0.2	0.3	0.4	0.2	0.3	0.4	0.5	nm
Resolution, closed loop	– / 2 / 2	– / 3 / 3	– / 3 / 3	– / 2 / 2	– / 3 / 3	– / 3 / 3	– / 7 / 7	nm
Linearity error, closed loop	– / 0.5 / 0.5	– / 0.5 / 0.5	– / 0.5 / 0.5	– / 0.5 / 0.5	– / 0.5 / 0.5	– / 0.5 / 0.5	– / 1.5 / 1.5	%
Repeatability	– / 10 / 10	– / 20 / 20	– / 35 / 35	– / 10 / 10	– / 20 / 20	– / 35 / 35	– / 60 / 60	nm
Mechanical properties								
Stiffness in motion direction	0.75	0.25	0.2	2.3	0.75	0.65	0.4	N/µm
Resonant frequency, no load	1000	450	230	1100	480	240	150	Hz
Push force capacity in motion direction	70	70	70	100	100	100	100	N
Pull force capacity in motion direction	5	5	5	5	5	5	5	N
Drive properties								
Piezo ceramic	PICMA® P-885	PICMA® P-885	PICMA® P-885	PICMA® P-888	PICMA® P-888	PICMA® P-888	PICMA® P-888	
Electrical capacitance	1.5	3.1	6.2	6	13	26	39	µF
Miscellaneous								
Operating temperature range	-20 to 80	-20 to 80	-20 to 80	-20 to 80	-20 to 80	-20 to 80	-20 to 80	°C
Material	Stainless steel	Stainless steel	Stainless steel	Stainless steel	Stainless steel	Stainless steel	Stainless steel	
Dimensions	28 mm × 17 mm × 9 mm	46 mm × 19 mm × 9 mm	85 mm × 26 mm × 9 mm	28 mm × 22 mm× 14 mm	46 mm × 24 mm × 14 mm	85 mm × 31 mm × 14 mm	126 mm × 34 mm × 14 mm	
Mass	0.02	0.04	0.105	0.05	0.088	0.215	0.355	kg
Cable length	0.5 / 0.5 / 2	0.5 / 0.5 / 2	0.5 / 0.5 / 2	0.5 / 0.5 / 2	0.5 / 0.5 / 2	0.5 / 0.5 / 2	0.5 / 0.5 / 2	m
Power / sensor connector	Bare stranded wires / bare stranded wires / LEMO	Bare stranded wires / bare stranded wires / LEMO	Bare stranded wires / bare stranded wires / LEMO	Bare stranded wires / bare stranded wires / LEMO	Bare stranded wires / bare stranded wires / LEMO	Bare stranded wires / bare stranded wires / LEMO	Bare stranded wires / bare stranded wires / LEMO	
Recommended electronics	E-610, E-625, E-831	E-610, E-625, E-831	E-610, E-625, E-831	E-610, E-625, E-831	E-610, E-625, E-831	E-610, E-625, E-831	E-610, E-625, E-831	

The resolution of the system is only limited by the noise of the amplifier and measuring technology because PI piezo actuators are free of friction.

All specifications based on room temperature (22 °C ±3 °C).

Ask about customized versions.

Maximum Ratings

The models of the P-602 are designed for the following maximum ratings:

Model	Maximum operating voltage ⚠	Maximum operating frequency (no load) [1] ⚠	Maximum power consumption [2] ⚠
P-602.100 P-602.1S0 P-602.1SL	-20 to 120 V	330 Hz	4.3 W
P-602.300 P-602.3S0 P-602.3SL	-20 to 120 V	150 Hz	8.6 W
P-602.500 P-602.5S0 P-602.5SL	-20 to 120 V	75 Hz	17.2 W
P-602.108 P-602.1S8 P-602.1L8	-20 to 120 V	365 Hz	5.7 W
P-602.308 P-602.3S8 P-602.3L8	-20 to 120 V	160 Hz	11.4 W
P-602.508 P-602.5S8 P-602.5L8	-20 to 120 V	80 Hz	22.8 W
P-602.800 P-602.8S0 P-602.8SL	-20 to 120 V	50 Hz	34.2 W

[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/

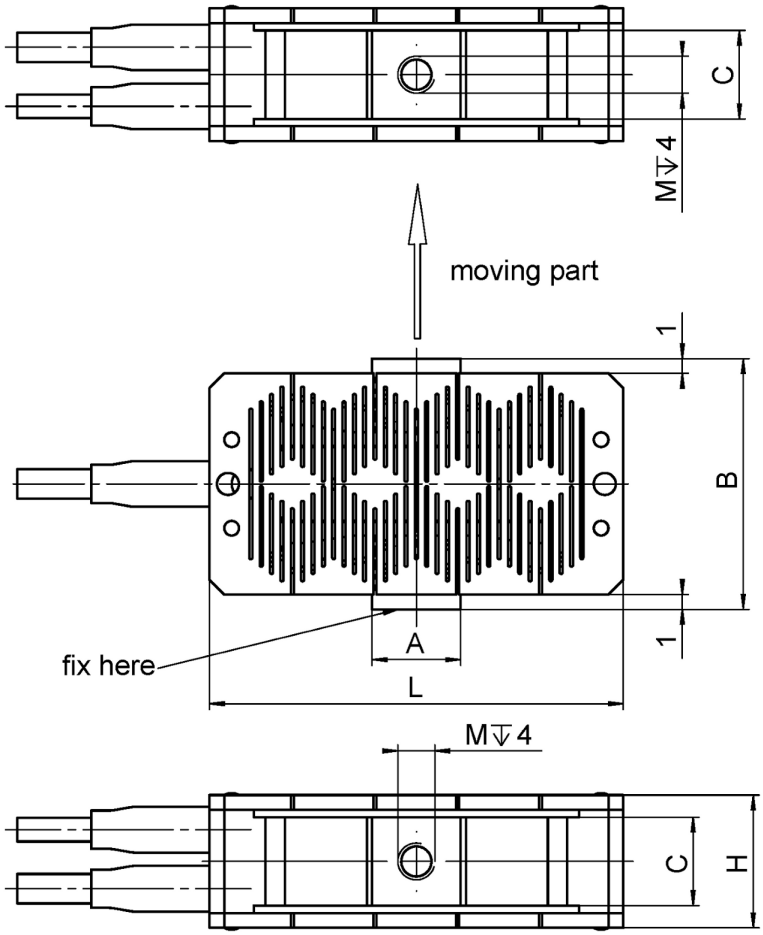
Ambient Conditions and Classifications

The following ambient conditions and classifications must be observed for the models of the P-602:

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
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

Dimensions

Dimensions in mm. Note that a comma is used in the drawings instead of a decimal point.



	L	B	H	M	A	C
P-602.1xx	28	17	9	M2,5	6	6
P-602.3xx	46	19	9	M2,5	6	6
P-602.5xx	85	26	9	M2,5	6	6
P-602.8xx	126	34	14	M4	10	11
P-602.1x8	28	22	14	M2,5	6	11
P-602.3x8	46	24	14	M2,5	6	11
P-602.5x8	85	31	14	M2,5	6	11

Figure 5: Dimensions of the P-602.xxx

Pin Assignment

Sensor connector

P-602.xxL/.xLx only

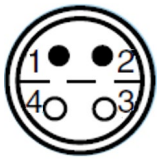


Figure 6: Sensor connector, LEMO FFA.0S.304.CLAC32, front view

Pin	Function
1	Reference
2	Sensor -
3	Sensor +
4	GND

PZT connector

P-602.xxL/.xLx only

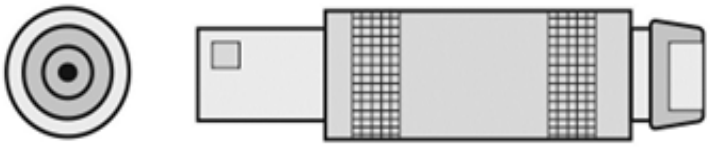


Figure 7: PZT connector, LEMO FFS.00.250.CTCE24, front view

Pin	Function
Inner contact	PZT + (-20 to 120 V)
Connector shell	PZT - (GND)

Color coding of stranded wires

Only for models that are equipped with stranded wires

Color	Function	Remarks
Black	PZT - (GND)	
Red	PZT + (-20 to 120 V)	
Yellow	Reference	Only if the model features a sensor
Green	Sensor -	Only if the model features a sensor
White	Sensor +	Only if the model features a sensor
Brown	GND	Only if the model features a sensor

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