

# PIHera XY Piezo Stage

High-precision XY Nanopositioners with Variable Travel Ranges



## P-620.2 – P-629.2

- Travel ranges 50 to 1800  $\mu\text{m}$
- Resolution to 0.1 nm
- Positioning accuracy 0.02 %
- Direct metrology with capacitive sensors
- X, XY, Z, XYZ versions

### Fields of application

- Interferometry
- Microscopy
- Nanopositioning
- Biotechnology
- Test procedures and quality assurance
- Photonics
- Fiber positioning
- Semiconductor technology

### Outstanding lifetime thanks to PICMA<sup>®</sup> piezo actuators

The patented PICMA<sup>®</sup> piezo actuators are all-ceramic insulated. This protects them against humidity and failure resulting from an increase in leakage current. PICMA<sup>®</sup> actuators offer an up to ten times longer lifetime than conventional polymer-insulated actuators. 100 billion cycles without a single failure are proven.

### Subnanometer resolution with capacitive sensors

Capacitive sensors measure with subnanometer resolution without contacting. They guarantee excellent linearity of motion, long-term stability, and a bandwidth in the kHz range.

### High guiding accuracy due to zero-play flexure guides

Flexure guides are free of maintenance, friction, and wear, and do not require lubrication. Their stiffness allows high load capacity and they are insensitive to shock and vibration. They are 100 % vacuum compatible and work in a wide temperature range.

### Maximum accuracy due to direct position measuring

Motion is measured directly at the motion platform without any influence from the drive or guide elements. This allows optimum repeatability, outstanding stability, and stiff, fast-responding control.

### Suitable for sophisticated vacuum applications

All components used in the piezo systems are excellently suited for use in vacuum. No lubricant or grease is necessary for operating. Polymer-free piezo systems allow particularly low outgas rates.

## Specifications

	P-620.2CD P-620.2CL	P-621.2CD P-621.2CL	P-622.2CD P-622.2CL	P-625.2CD P-625.2CL	P-628.2CD P-628.2CL	P-629.2CD P-629.2CL	Unit	Tolerance
Active axes	X, Y	X, Y	X, Y	X, Y	X, Y	X, Y		
<b>Motion and positioning</b>								
Integrated sensor	Capacitive	Capacitive	Capacitive	Capacitive	Capacitive	Capacitive		
Travel range in X, Y at -20 to 120 V, open loop	60	120	300	600	950	1800	µm	+20 % / - 0 %
Travel range in X, Y, closed loop	50	100	250	500	800	1500	µm	
Resolution in X, Y, open loop	0.1	0.2	0.4	0.5	0.5	2	nm	typ.
Resolution in X, Y, closed loop	0.2	0.4	0.7	1.4	3.5	3.5	nm	typ.
Linearity error in X, Y	0.02	0.02	0.02	0.03	0.03*	0.03**	%	typ.
Repeatability X, Y	±2	±2	±2	±5	±10	±14	nm	typ.
Pitch / yaw	±3	±3	±3	±3 / ±5	±20 / ±5	±30 / ±5	µrad	typ.
<b>Mechanical properties</b>								
Stiffness X, Y	0.22	0.25	0.2	0.1	0.05	0.1	N/µm	±20 %
Resonant frequency in X, no load	575	420	225	135	75	60	Hz	±20 %
Resonant frequency in Y, no load	800	535	300	195	105	100	Hz	±20 %
Resonant frequency in X, under load, 50 g	270	285	180	120	60	55	Hz	±20 %
Resonant frequency in Y, under load, 50 g	395	365	215	150	85	85	Hz	±20 %
Resonant frequency in X, under load 100 g	285	220	160	105	55	50	Hz	±20 %
Resonant frequency in Y, under load, 100 g	300	285	175	125	75	80	Hz	±20 %
Push/pull force capacity in motion direction	10 / 5	10 / 8	10 / 8	10 / 8	10 / 8	10 / 8	N	max.
Load capacity	10	10	10	10	10	10	N	max.

	P-620.2CD P-620.2CL	P-621.2CD P-621.2CL	P-622.2CD P-622.2CL	P-625.2CD P-625.2CL	P-628.2CD P-628.2CL	P-629.2CD P-629.2CL	Unit	Tolerance
Lateral force	10	10	10	10	10	10	N	max.
<b>Drive properties</b>								
Piezo ceramic	PICMA® P-883	PICMA® P-885	PICMA® P-885	PICMA® P-885	PICMA® P-887	PICMA® P-888		
Electrical capacitance in X, Y	0.35	1.5	3.1	6.2	19	52	µF	±20 %
<b>Miscellaneous</b>								
Operating temperature range	-20 to 80	-20 to 80	-20 to 80	-20 to 80	-20 to 80	-20 to 80	°C	
Material	Aluminum	Aluminum	Aluminum	Aluminum	Aluminum	Aluminum		
Dimensions	30 mm × 30 mm × 21.5 mm	40 mm × 40 mm × 25 mm	50 mm × 50 mm × 25 mm	60 mm × 60 mm × 25 mm	80 mm × 80 mm × 25 mm	100 mm × 100 mm × 40 mm		
Mass	0.195	0.295	0.348	0.43	0.7	1.37	kg	±5 %
Cable length	1.5	1.5	1.5	1.5	1.5	1.5	m	±10 mm
Sensor/voltage connection	CD versions: Sub-D 7W2 (m) CL versions: LEMO	CD versions: Sub-D 7W2 (m) CL versions: LEMO	CD versions: Sub-D 7W2 (m) CL versions: LEMO	CD versions: Sub-D 7W2 (m) CL versions: LEMO	CD versions: Sub-D 7W2 (m) CL versions: LEMO	CD versions: Sub-D 7W2 (m) CL versions: LEMO		
Recommended electronics	E-503, E-505, E-663, E-712, E-727	E-503, E-505, E-663, E-712, E-727	E-503, E-505, E-663, E-712, E-727	E-503, E-505, E-663, E-712, E-727	E-503, E-505, E-663, E-712, E-727	E-503, E-505, E-663, E-712, E-727		

\* With digital controller. With analog controllers 0.05 %.

\*\* With digital controller. With analog controllers 0.08 %.

Lower axis: X; upper axis: Y.

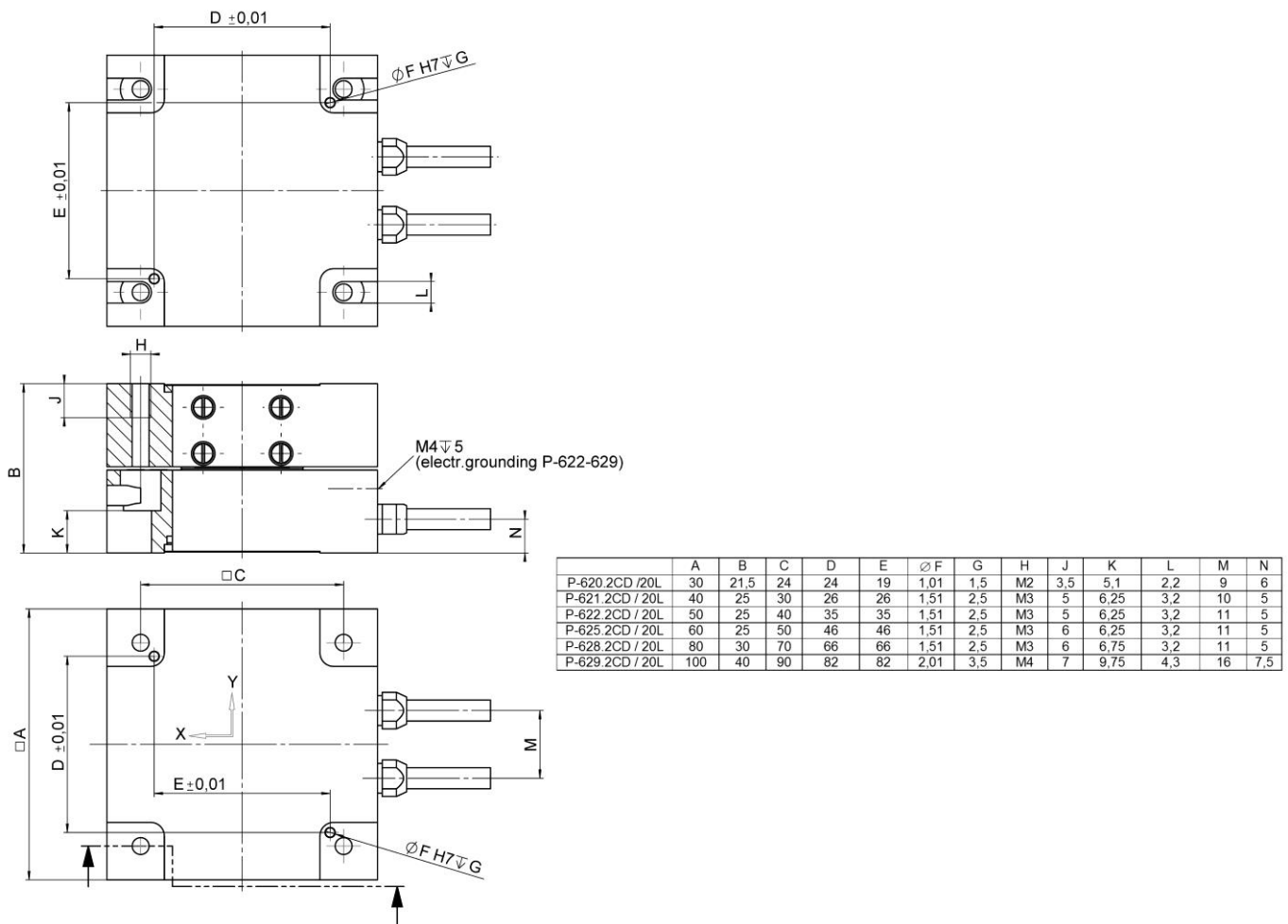
The resolution of the system is limited only by the noise of the amplifier and the measuring technology because PI piezo nanopositioning systems are free of friction.

Versions without sensor are available under the P-62x.20L order numbers; operating temperature range -20 to 150 °C; LEMO voltage connection.

Vacuum versions to  $10^{-9}$  hPa are available under the P-62x.2UD order numbers.

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

## Drawings / Images



P-62x.2CD/.2CL/.20L, dimensions in mm

## Ordering Information

### Versions with Sub-D connector (m)

#### P-620.2CD

Precise PIHera XY nanopositioning system, 50 µm × 50 µm, direct position measuring, capacitive sensors, Sub-D connector

#### P-621.2CD

Precise PIHera XY nanopositioning system, 100 µm × 100 µm, direct position measuring, capacitive sensors, Sub-D connector

#### P-622.2CD

Precise PIHera XY nanopositioning system, 250 µm × 250 µm, direct position measuring, capacitive sensors, Sub-D connector

#### P-625.2CD

Precise PIHera XY nanopositioning system, 500 µm × 500 µm, direct position measuring, capacitive sensors, Sub-D connector

#### P-628.2CD

Precise PIHera XY nanopositioning system, 800 µm × 800 µm, direct position measuring, capacitive sensors, Sub-D connector

#### P-629.2CD

Precise PIHera XY nanopositioning system, 1500 µm × 1500 µm, direct position measuring, capacitive sensors, Sub-D connector

## Versions with LEMO connector

### P-620.2CL

Precise PIHera XY nan positioning system, 50  $\mu\text{m}$   $\times$  50  $\mu\text{m}$ , direct position measuring, capacitive sensors, LEMO connector(s)

### P-621.2CL

Precise PIHera XY nan positioning system, 100  $\mu\text{m}$   $\times$  100  $\mu\text{m}$ , direct position measuring, capacitive sensors, LEMO connector(s)

### P-622.2CL

Precise PIHera XY nan positioning system, 250  $\mu\text{m}$   $\times$  250  $\mu\text{m}$ , direct position measuring, capacitive sensors, LEMO connector(s)

### P-625.2CL

Precise PIHera XY nan positioning system, 500  $\mu\text{m}$   $\times$  500  $\mu\text{m}$ , direct position measuring, capacitive sensors, LEMO connector(s)

### P-628.2CL

Precise PIHera XY nan positioning system, 800  $\mu\text{m}$   $\times$  800  $\mu\text{m}$ , direct position measuring, capacitive sensors, LEMO connector(s)

### P-629.2CL

Precise PIHera XY nan positioning system, 1500  $\mu\text{m}$   $\times$  1500  $\mu\text{m}$ , direct position measuring, capacitive sensors, LEMO connector(s)

## Linear positioners without position sensor

### P-620.20L

Precise PIHera XY nan positioning system, 60  $\mu\text{m}$   $\times$  60  $\mu\text{m}$ , without sensors, LEMO connector(s)

### P-621.20L

Precise PIHera XY nan positioning system, 120  $\mu\text{m}$   $\times$  120  $\mu\text{m}$ , without sensors, LEMO connector(s)

### P-622.20L

Precise PIHera XY nan positioning system, 300  $\mu\text{m}$   $\times$  300  $\mu\text{m}$ , without sensors, LEMO connector(s)

### P-625.20L

Precise PIHera XY nan positioning system, 600  $\mu\text{m}$   $\times$  600  $\mu\text{m}$ , without sensors, LEMO connector(s)

### P-628.20L

Precise PIHera XY nan positioning system, 1000  $\mu\text{m}$   $\times$  1000  $\mu\text{m}$ , without sensors, LEMO connector(s)

### P-629.20L

Precise PIHera XY nan positioning system, 1800  $\mu\text{m}$   $\times$  1800  $\mu\text{m}$ , without sensors, LEMO connector(s)

## Linear positioners, vacuum compatible to $10^{-9}$ hPa

### P-620.2UD

Precise PIHera XY nan positioning system, 50  $\mu\text{m}$   $\times$  50  $\mu\text{m}$ , direct position measuring, capacitive sensors, Sub-D connector, vacuum compatible to  $10^{-9}$  hPa

### P-621.2UD

Precise PIHera XY nan positioning system, 100  $\mu\text{m}$   $\times$  100  $\mu\text{m}$ , direct position measuring, capacitive sensors, Sub-D connector, vacuum compatible to  $10^{-9}$  hPa

### P-622.2UD

Precise PIHera XY nan positioning system, 250  $\mu\text{m}$   $\times$  250  $\mu\text{m}$ , direct position measuring, capacitive sensors, Sub-D connector, vacuum compatible to  $10^{-9}$  hPa

### P-625.2UD

Precise PIHera XY nan positioning system, 500  $\mu\text{m}$   $\times$  500  $\mu\text{m}$ , direct position measuring, capacitive sensors, Sub-D connector, vacuum compatible to  $10^{-9}$  hPa

**P-628.2UD**

Precise PIHera XY nanopositioning system, 800  $\mu\text{m}$   $\times$  800  $\mu\text{m}$ , direct position measuring, capacitive sensors, Sub-D connector, vacuum compatible to  $10^{-9}$  hPa

**P-629.2UD**

Precise PIHera XY nanopositioning system, 1500  $\mu\text{m}$   $\times$  1500  $\mu\text{m}$ , direct position measuring, capacitive sensors, Sub-D connector, vacuum compatible to  $10^{-9}$  hPa