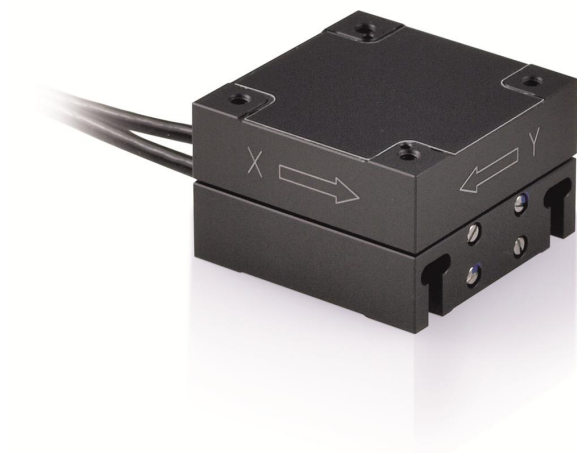


PIHera XY Piezo Stage

High-precision XY Nanopositioners with Variable Travel Ranges



P-620.2 - P-629.2

- Travel ranges 50 to 1800 μm
- Resolution to 0.1 nm
- Positioning accuracy 0.02 %
- Direct position measuring with capacitive sensors
- X, XY, Z, XYZ versions

Application fields

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

Outstanding lifetime due to PICMA® piezo actuators

The PICMA® piezo actuators are all-ceramic insulated. This protects them against humidity and failure resulting from an increase in leakage current. PICMA® 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 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 optimal repeatability, outstanding stability, and stiff, fast-responding control.

Motion	Unit	Tolerance	P-620.20L	P-620.2CD	P-620.2CL	P-621.20L	P-621.2CD	P-621.2CL	P-622.20L	P-622.2CD
Active axes			X, Y	X, Y	X, Y	X, Y	X, Y	X, Y	X, Y	X, Y
Travel range in X	μm			50	50		100	100		250
Travel range in Y	μm			50	50		100	100		250
Travel range in X, open loop	μm	±20%	60	60	60	120	120	120	300	300
Travel range in Y, open loop	μm	±20%	60	60	60	120	120	120	300	300
Linearity error in X	%	Typ.		0.02	0.02		0.02	0.02		0.02
Linearity error in Y	%	Typ.		0.02	0.02		0.02	0.02		0.02
Pitch (Rotational crosstalk in θX with motion in Y)	μrad	Typ.	±3	±3	±3	±3	±3	±3	±3	±3
Pitch (Rotational crosstalk in θY with motion in X)	μrad	Typ.	±3	±3	±3	±3	±3	±3	±3	±3
Yaw (Rotational crosstalk in θZ with motion in X)	μrad	Typ.	±3	±3	±3	±3	±3	±3	±3	±3
Yaw (Rotational crosstalk in θZ with motion in Y)	μrad	Typ.	±3	±3	±3	±3	±3	±3	±3	±3

Positioning	Unit	Tolerance	P-620.20L	P-620.2CD	P-620.2CL	P-621.20L	P-621.2CD	P-621.2CL	P-622.20L	P-622.2CD
Bidirectional repeatability in X	nm	Typ.		2	2		2	2		2
Bidirectional repeatability in Y	nm	Typ.		2	2		2	2		2
Resolution in X, open loop	nm	Typ.	0.1	0.1	0.1	0.2	0.2	0.2	0.4	0.4
Resolution in Y, open loop	nm	Typ.	0.1	0.1	0.1	0.2	0.2	0.2	0.4	0.4
Integrated sensor				Capacitive, direct position measuring	Capacitive, direct position measuring		Capacitive, direct position measuring	Capacitive, direct position measuring		Capacitive, direct position measuring
System resolution in X	nm			0.2	0.2		0.4	0.4		0.7
System resolution in Y	nm			0.2	0.2		0.4	0.4		0.7

Drive Properties	Unit	Tolerance	P-620.20L	P-620.2CD	P-620.2CL	P-621.20L	P-621.2CD	P-621.2CL	P-622.20L	P-622.2CD
Drive type			Piezo actuator/PICMA®	Piezo actuator/PICMA®	Piezo actuator/PICMA®	Piezo actuator/PICMA®	Piezo actuator/PICMA®	Piezo actuator/PICMA®	Piezo actuator/PICMA®	Piezo actuator/PICMA®
Maximum power consumption	W		2	2	2	6	6	6	7	7
Electrical capacitance in X	μF	±20%	0.35	0.35	0.35	1.5	1.5	1.5	3.1	3.1
Electrical capacitance in Y	μF	±20%	0.35	0.35	0.35	1.5	1.5	1.5	3.1	3.1
Short-term maximum operating frequency	Hz		267	267	267	178	178	178	100	100

Mechanical Properties	Unit	Tolerance	P-620.20L	P-620.2CD	P-620.2CL	P-621.20L	P-621.2CD	P-621.2CL	P-622.20L	P-622.2CD
Stiffness in X	N/μm	±20%	0.22	0.22	0.22	0.25	0.25	0.25	0.2	0.2
Stiffness in Y	N/μm	±20%	0.22	0.22	0.22	0.25	0.25	0.25	0.2	0.2
Resonant frequency in X, unloaded	Hz	±20%	575	575	575	420	420	420	225	225
Resonant frequency in X, under load with 50 g	Hz	±20%	285	285	285	285	285	285	180	180
Resonant frequency in X, under load with 100 g	Hz	±20%	270	270	270	220	220	220	160	160
Resonant frequency in Y, unloaded	Hz	±20%	800	800	800	535	535	535	300	300
Resonant frequency in Y, under load with 50 g	Hz	±20%	395	395	395	365	365	365	215	215
Resonant frequency in Y, under load with 100 g	Hz	±20%	300	300	300	285	285	285	175	175
Permissible push force in X	N	Max.	10	10	10	10	10	10	10	10
Permissible push force in Y	N	Max.	10	10	10	10	10	10	10	10
Permissible push force in Z	N	Max.	10	10	10	10	10	10	10	10
Permissible pull force in X	N	Max.	5	5	5	8	8	8	8	8
Permissible pull force in Y	N	Max.	5	5	5	8	8	8	8	8
Permissible pull force in Z	N	Max.	10	10	10	10	10	10	10	10
Guide			Flexure guide/Flexure guide with lever amplification	Flexure guide/Flexure guide with lever amplification	Flexure guide/Flexure guide with lever amplification	Flexure guide/Flexure guide with lever amplification	Flexure guide/Flexure guide with lever amplification	Flexure guide/Flexure guide with lever amplification	Flexure guide/Flexure guide with lever amplification	Flexure guide/Flexure guide with lever amplification
Overall mass	g		195	195	195	295	295	295	348	348
Material			Aluminum	Aluminum	Aluminum	Aluminum	Aluminum	Aluminum	Aluminum	Aluminum

Miscellaneous	Unit		P-620.20L	P-620.2CD	P-620.2CL	P-621.20L	P-621.2CD	P-621.2CL	P-622.20L	P-622.2CD
Operating temperature range	°C		-20 to 150	-20 to 80	-20 to 80	-20 to 150	-20 to 80	-20 to 80	-20 to 150	-20 to 80
Connector			LEMO LV-PZT	2 × D-sub 7W2 (m)	LEMO LV-PZT	LEMO LV-PZT	2 × D-sub 7W2 (m)	LEMO LV-PZT	LEMO LV-PZT	2 × D-sub 7W2 (m)
Sensor connector					LEMO for capacitive sensors			LEMO for capacitive sensors		
Cable length	m		1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Recommended controllers / drivers			E-503, E-505, E-663	E-503, E-505, E-621, E-712, E-727	E-503, E-505, E-621, E-712, E-727	E-503, E-505, E-663	E-503, E-505, E-621, E-712, E-727	E-503, E-505, E-621, E-712, E-727	E-503, E-505, E-663	E-503, E-505, E-621, E-712, E-727

Motion	Unit	Tolerance	P-622.2CL	P-625.20L	P-625.2CD	P-625.2CL	P-628.20L	P-628.2CD	P-628.2CL	P-629.2CD
Active axes			X, Y	X, Y	X, Y	X, Y	X, Y	X, Y	X, Y	X, Y
Travel range in X	μm		250		500	500		800	800	1500
Travel range in Y	μm		250		500	500		800	800	1500
Travel range in X, open loop	μm	±20%	300	600	600	600	1000	1000	1000	1800
Travel range in Y, open loop	μm	±20%	300	600	600	600	1000	1000	1000	1800
Linearity error in X	%	Typ.	0.02		0.03	0.03		0.03	0.03	0.03
Linearity error in Y	%	Typ.	0.02		0.03	0.03		0.03	0.03	0.03
Pitch (Rotational crosstalk in θX with motion in Y)	μrad	Typ.	±3	±3	±3	±3	±20	±20	±20	±30
Pitch (Rotational crosstalk in θY with motion in X)	μrad	Typ.	±3	±3	±3	±3	±20	±20	±20	±30
Yaw (Rotational crosstalk in θZ with motion in X)	μrad	Typ.	±3	±5	±5	±5	±5	±5	±5	±5
Yaw (Rotational crosstalk in θZ with motion in Y)	μrad	Typ.	±3	±5	±5	±5	±5	±5	±5	±5

Positioning	Unit	Tolerance	P-622.2CL	P-625.20L	P-625.2CD	P-625.2CL	P-628.20L	P-628.2CD	P-628.2CL	P-629.2CD
Bidirectional repeatability in X	nm	Typ.	2		5	5		10	10	14
Bidirectional repeatability in Y	nm	Typ.	2		5	5		10	10	14
Resolution in X, open loop	nm	Typ.	0.4	0.5	0.5	0.5	0.5	0.5	0.5	2
Resolution in Y, open loop	nm	Typ.	0.4	0.5	0.5	0.5	0.5	0.5	0.5	2
Integrated sensor			Capacitive, direct position measuring		Capacitive, direct position measuring	Capacitive, direct position measuring		Capacitive, direct position measuring	Capacitive, direct position measuring	Capacitive, direct position measuring
System resolution in X	nm		0.7		1.4	1.4		3.5	3.5	3.5
System resolution in Y	nm		0.7		1.4	1.4		3.5	3.5	3.5

Drive Properties	Unit	Tolerance	P-622.2CL	P-625.20L	P-625.2CD	P-625.2CL	P-628.20L	P-628.2CD	P-628.2CL	P-629.2CD
Drive type			Piezo actuator/PICMA®	Piezo actuator/PICMA®	Piezo actuator/PICMA®	Piezo actuator/PICMA®	Piezo actuator/PICMA®	Piezo actuator/PICMA®	Piezo actuator/PICMA®	Piezo actuator/PICMA®
Maximum power consumption	W		7	9	9	9	15	15	15	38
Electrical capacitance in X	µF	±20%	3.1	6.2	6.2	6.2	19	19	19	52
Electrical capacitance in Y	µF	±20%	3.1	6.2	6.2	6.2	19	19	19	52
Short-term maximum operating frequency	Hz		100	65	65	65	35	35	35	33

Mechanical Properties	Unit	Tolerance	P-622.2CL	P-625.20L	P-625.2CD	P-625.2CL	P-628.20L	P-628.2CD	P-628.2CL	P-629.2CD
Stiffness in X	N/µm	±20%	0.2	0.1	0.1	0.1	0.05	0.05	0.05	0.1
Stiffness in Y	N/µm	±20%	0.2	0.1	0.1	0.1	0.05	0.05	0.05	0.1
Resonant frequency in X, unloaded	Hz	±20%	225	135	135	135	75	75	75	60
Resonant frequency in X, under load with 50 g	Hz	±20%	180	120	120	120	60	60	60	55
Resonant frequency in X, under load with 100 g	Hz	±20%	160	105	105	105	55	55	55	50
Resonant frequency in Y, unloaded	Hz	±20%	300	195	195	195	105	105	105	100
Resonant frequency in Y, under load with 50 g	Hz	±20%	215	150	150	150	85	85	85	85
Resonant frequency in Y, under load with 100 g	Hz	±20%	175	125	125	125	75	75	75	80
Permissible push force in X	N	Max.	10	10	10	10	10	10	10	10
Permissible push force in Y	N	Max.	10	10	10	10	10	10	10	10
Permissible push force in Z	N	Max.	10	10	10	10	10	10	10	10
Permissible pull force in X	N	Max.	8	8	8	8	8	8	8	8
Permissible pull force in Y	N	Max.	8	8	8	8	8	8	8	8
Permissible pull force in Z	N	Max.	10	10	10	10	10	10	10	10
Guide			Flexure guide/Flexure guide with lever amplification	Flexure guide/Flexure guide with lever amplification	Flexure guide/Flexure guide with lever amplification	Flexure guide/Flexure guide with lever amplification	Flexure guide/Flexure guide with lever amplification	Flexure guide/Flexure guide with lever amplification	Flexure guide/Flexure guide with lever amplification	Flexure guide/Flexure guide with lever amplification
Overall mass	g		348	430	430	430	700	700	700	1370
Material			Aluminum	Aluminum	Aluminum	Aluminum	Aluminum	Aluminum	Aluminum	Aluminum

Miscellaneous	Unit		P-622.2CL	P-625.20L	P-625.2CD	P-625.2CL	P-628.20L	P-628.2CD	P-628.2CL	P-629.2CD
Operating temperature range	°C		-20 to 80	-20 to 150	-20 to 80	-20 to 80	-20 to 150	-20 to 80	-20 to 80	-20 to 80
Connector			LEMO LV-PZT	LEMO LV-PZT	2 × D-sub 7W2 (m)	LEMO LV-PZT	LEMO LV-PZT	2 × D-sub 7W2 (m)	LEMO LV-PZT	2 × D-sub 7W2 (m)
Sensor connector			LEMO for capacitive sensors			LEMO for capacitive sensors			LEMO for capacitive sensors	
Cable length	m		1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Recommended controllers / drivers			E-503, E-505, E-621, E-712, E-727	E-503, E-505, E-663	E-503, E-505, E-621, E-712, E-727	E-503, E-505, E-621, E-712, E-727	E-503, E-505, E-663	E-503, E-505, E-621, E-712, E-727	E-503, E-505, E-621, E-712, E-727	E-503, E-505, E-621, E-712, E-727

Motion	Unit	Tolerance	P-629.2CL
Active axes			X, Y
Travel range in X	μm		1500
Travel range in Y	μm		1500
Travel range in X, open loop	μm	±20%	1800
Travel range in Y, open loop	μm	±20%	1800
Linearity error in X	%	Typ.	0.03
Linearity error in Y	%	Typ.	0.03
Pitch (Rotational crosstalk in θX with motion in Y)	μrad	Typ.	±30
Pitch (Rotational crosstalk in θY with motion in X)	μrad	Typ.	±30
Yaw (Rotational crosstalk in θZ with motion in X)	μrad	Typ.	±5
Yaw (Rotational crosstalk in θZ with motion in Y)	μrad	Typ.	±5

Positioning	Unit	Tolerance	P-629.2CL
Bidirectional repeatability in X	nm	Typ.	14
Bidirectional repeatability in Y	nm	Typ.	14
Resolution in X, open loop	nm	Typ.	2
Resolution in Y, open loop	nm	Typ.	2
Integrated sensor			Capacitive, direct position measuring
System resolution in X	nm		3.5
System resolution in Y	nm		3.5

Drive Properties	Unit	Tolerance	P-629.2CL
Drive type			Piezo actuator/PICMA®
Maximum power consumption	W		38
Electrical capacitance in X	μF	±20%	52
Electrical capacitance in Y	μF	±20%	52
Short-term maximum operating frequency	Hz		33

Mechanical Properties	Unit	Tolerance	P-629.2CL
Stiffness in X	N/μm	±20%	0.1
Stiffness in Y	N/μm	±20%	0.1
Resonant frequency in X, unloaded	Hz	±20%	60
Resonant frequency in X, under load with 50 g	Hz	±20%	55
Resonant frequency in X, under load with 100 g	Hz	±20%	50
Resonant frequency in Y, unloaded	Hz	±20%	100
Resonant frequency in Y, under load with 50 g	Hz	±20%	85
Resonant frequency in Y, under load with 100 g	Hz	±20%	80
Permissible push force in X	N	Max.	10
Permissible push force in Y	N	Max.	10
Permissible push force in Z	N	Max.	10
Permissible pull force in X	N	Max.	8
Permissible pull force in Y	N	Max.	8
Permissible pull force in Z	N	Max.	10
Guide			Flexure guide/Flexure guide with lever amplification
Overall mass	g		1370
Material			Aluminum

Miscellaneous	Unit		P-629.2CL
Operating temperature range	°C		-20 to 80
Connector			LEMO LVPZT
Sensor connector			LEMO for capacitive sensors
Cable length	m		1.5
Recommended controllers / drivers			E-503, E-505, E-621, E-712, E-727

P-628.2CD / P-628.2CL: Linearity error in X, Y (typ.) 0.03 % with digital controller. With analog controllers 0.05 %.

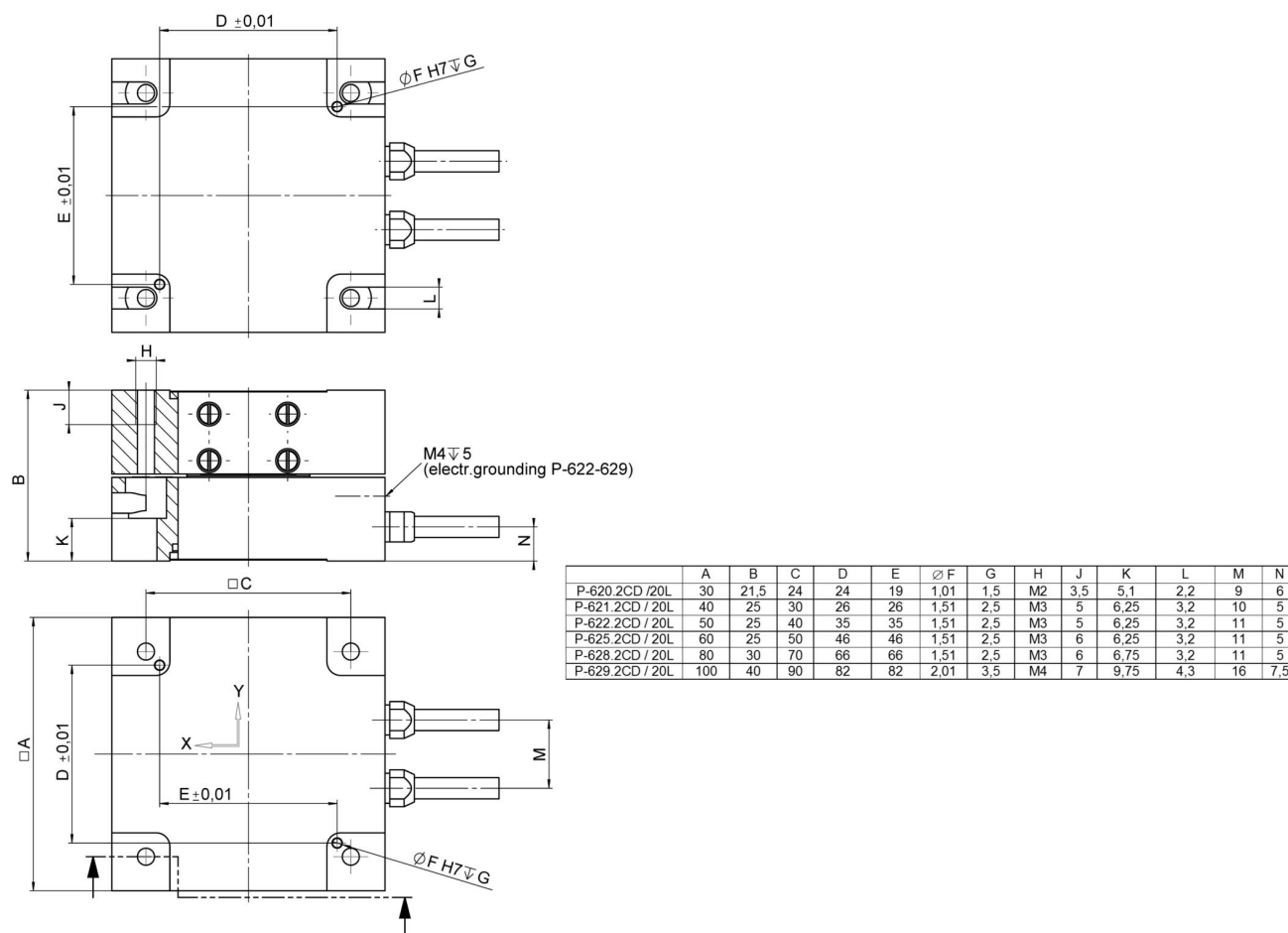
P-629.2CD / P-629.2CL: Linearity error in X, Y (typ.) 0.03 % with digital controller. With analog controllers 0.08 %.

X: lower axis; Y: upper axis.

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.

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

Drawings / Images



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

Order Information

P-620.20L

PIHera precision XY nanopositioner, 60 $\mu\text{m} \times 60 \mu\text{m}$, without sensors, LEMO connectors

P-620.2CD

PIHera precision XY nanopositioner, 50 $\mu\text{m} \times 50 \mu\text{m}$, direct position measuring, capacitive sensors, D-sub connectors

P-620.2CL

PIHera precision XY nanopositioner, 50 $\mu\text{m} \times 50 \mu\text{m}$, direct position measuring, capacitive sensors, LEMO connectors

P-621.20L

PIHera precision XY nanopositioner, 120 $\mu\text{m} \times 120 \mu\text{m}$, without sensors, LEMO connectors

Order Information

P-621.2CD

PIHera precision XY nanopositioner, 100 μm $\times$ 100 μm , direct position measuring, capacitive sensors, D-sub connectors

P-621.2CL

PIHera precision XY nanopositioner, 100 μm $\times$ 100 μm , direct position measuring, capacitive sensors, LEMO connectors

P-622.20L

PIHera precision XY nanopositioner, 300 μm $\times$ 300 μm , without sensors, LEMO connectors

P-622.2CD

PIHera precision XY nanopositioner, 250 μm $\times$ 250 μm , direct position measuring, capacitive sensors, D-sub connectors

P-622.2CL

PIHera precision XY nanopositioner, 250 μm $\times$ 250 μm , direct position measuring, capacitive sensors, LEMO connectors

P-625.20L

PIHera precision XY nanopositioner, 600 μm $\times$ 600 μm , without sensors, LEMO connectors

P-625.2CD

PIHera precision XY nanopositioner, 500 μm $\times$ 500 μm , direct position measuring, capacitive sensors, D-sub connectors

P-625.2CL

PIHera precision XY nanopositioner, 500 μm $\times$ 500 μm , direct position measuring, capacitive sensors, LEMO connectors

P-628.20L

PIHera precision XY nanopositioner, 1000 μm $\times$ 1000 μm , without sensors, LEMO connectors

P-628.2CD

PIHera precision XY nanopositioner, 800 μm $\times$ 800 μm , direct position measuring, capacitive sensors, D-sub connectors

P-628.2CL

PIHera precision XY nanopositioner, 800 μm $\times$ 800 μm , direct position measuring, capacitive sensors, LEMO connectors

P-629.2CD

PIHera precision XY nanopositioner, 1500 μm $\times$ 1500 μm , direct position measuring, capacitive sensors, D-sub connectors

P-629.2CL

PIHera precision XY nanopositioner, 1500 μm $\times$ 1500 μm , direct position measuring, capacitive sensors, LEMO connectors