PIHera Vertical Precision Positioner

Variable Travel Ranges and Axis Configuration

P-620.Z - P-622.Z

- Travel ranges 50 µm to 250 µm (350 µm open loop)
- Resolution to 0.1 nm
- Linearity error only 0.02 %
- Direct position measuring with capacitive sensors
- X, XY, Z, XYZ versions

Application fields

- Interferometry
- Microscopy
- Nanopositioning
- Biotechnology
- Test applications
- 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.Z0L	P-620.ZCD	P-620.ZCL	P-621.Z0L	P-621.ZCD	P-621.ZCL	P-622.Z0L	P-622.ZCD
Active axes			Z	Z	Z	Z	Z	Z	Z	Z
Travel range in Z	µm			50	50		100	100		250
Travel range in Z, open loop	µm	±20%	65	65	65	140	140	140	350	350
Linearity error in Z	%	Typ.		0.02	0.02		0.02	0.02		0.02
Yaw (Rotational crosstalk in θX with motion in Z)	µrad	Typ.	±80	±80	±80	±100	±100	±100	±200	±200
Pitch (Rotational crosstalk in θY with motion in Z)	µrad	Typ.	±80	±80	±80	±100	±100	±100	±200	±200

Positioning	Unit	Tolerance	P-620.Z0L	P-620.ZCD	P-620.ZCL	P-621.Z0L	P-621.ZCD	P-621.ZCL	P-622.Z0L	P-622.ZCD
Bidirectional repeatability in Z	nm	Typ.		1	1		1	1		1
Resolution in Z, open loop	nm	Typ.	0.1	0.1	0.1	0.2	0.2	0.2	0.5	0.5
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 Z	nm			0.2	0.2		0.3	0.3		1

Drive Properties	Unit	Tolerance	P-620.Z0L	P-620.ZCD	P-620.ZCL	P-621.Z0L	P-621.ZCD	P-621.ZCL	P-622.Z0L	P-622.ZCD
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		5	5	5	18	18	18	17	17
Electrical capacitance in Z	µF	±20%	0.7	0.7	0.7	3	3	3	6.2	6.2
Short-term maximum operating frequency	Hz		333	333	333	263	263	263	120	120

Mechanical Properties	Unit	Tolerance	P-620.Z0L	P-620.ZCD	P-620.ZCL	P-621.Z0L	P-621.ZCD	P-621.ZCL	P-622.Z0L	P-622.ZCD
Stiffness in Z	N/µm	±20%	0.5	0.5	0.5	0.6	0.6	0.6	0.24	0.24
Resonant frequency in Z, unloaded	Hz	±20%	1000	1000	1000	790	790	790	360	360
Resonant frequency in Z, under load with 30 g	Hz	±20%	690	690	690	500	500	500	270	270
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 Z	N	Max.	5	5	5	8	8	8	8	8
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		120	120	120	170	170	170	240	240
Material			Aluminum	Aluminum	Aluminum	Aluminum	Aluminum	Aluminum	Aluminum	Aluminum

Miscellaneous	Unit		P-620.Z0L	P-620.ZCD	P-620.ZCL	P-621.Z0L	P-621.ZCD	P-621.ZCL	P-622.Z0L	P-622.ZCD
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 FFS.00.250.CTCE24	D-sub 7W2 (m)	LEMO FFS.00.250.CTCE24	LEMO FFS.00.250.CTCE24	D-sub 7W2 (m)	LEMO FFS.00.250.CTCE24	LEMO FFS.00.250.CTCE24	D-sub 7W2 (m)
Sensor connector				D-sub 7W2 (m)	LEMO for capacitive sensors		D-sub 7W2 (m)	LEMO for capacitive sensors		D-sub 7W2 (m)
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-610	E-503, E-505, E-610, E-621, E-625, E-709.1C1L, E-754	E-503, E-505, E-610, E-621, E-625, E-709.1C1L, E-754	E-503, E-505, E-610	E-503, E-505, E-610, E-621, E-625, E-709.1C1L, E-754	E-503, E-505, E-610, E-621, E-625, E-709.1C1L, E-754	E-503, E-505, E-610	E-503, E-505, E-610, E-621, E-625, E-709.1C1L, E-754

Motion	Unit	Toleran-ce	P-622.ZCL
Active axes			Z
Travel range in Z	µm		250
Travel range in Z, open loop	µm	±20%	350
Linearity error in Z	%	Typ.	0.02
Yaw (Rotational crosstalk in θX with motion in Z)	µrad	Typ.	±200
Pitch (Rotational crosstalk in θY with motion in Z)	µrad	Typ.	±200

Positioning	Unit	Toleran-ce	P-622.ZCL
Bidirectional repeatability in Z	nm	Typ.	1
Resolution in Z, open loop	nm	Typ.	0.5
Integrated sensor			Capacitive, direct position measuring
System resolution in Z	nm		1

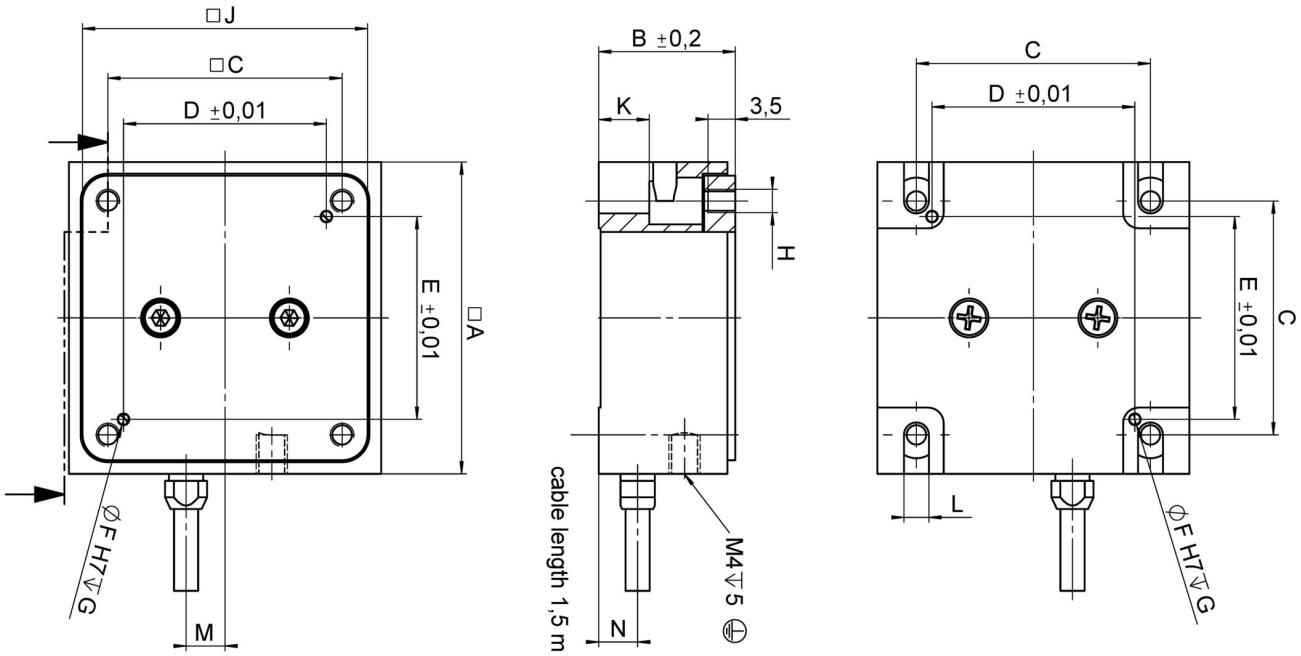
Drive Properties	Unit	Toleran-ce	P-622.ZCL
Drive type			Piezo actuator/PICMA®
Maximum power con-sumption	W		17
Electrical capacitance in Z	µF	±20%	6.2
Short-term maximum operating frequency	Hz		120

Mechanical Properties	Unit	Toleran-ce	P-622.ZCL
Stiffness in Z	N/µm	±20%	0.24
Resonant frequency in Z, unloaded	Hz	±20%	360
Resonant frequency in Z, under load with 30 g	Hz	±20%	270
Permissible push force in Y	N	Max.	10
Permissible push force in Z	N	Max.	10
Permissible pull force in Z	N	Max.	8
Guide			Flexure guide/Flexure guide with lever amplification
Overall mass	g		240
Material			Aluminum

Miscellaneous	Unit		P-622.ZCL
Operating temperature range	°C		-20 to 80
Connector			LEMO FFS.00.250.CTCE24
Sensor connector			LEMO for capacitive sensors
Cable length	m		1.5
Recommended controllers / drivers			E-503, E-505, E-610, E-621, E-625, E-709.1C1L, E-754

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



	A	B	C	D	E	∅F	G	H	J	K	L	M	N
P-620.ZCD / Z0L	30	15	24	19	24	1,01	2	M2	28	5	2,2	4,5	6
P-621.ZCD / Z0L	40	17,5	30	26	26	1,51	2,5	M3	36,5	6,5	3,2	5	5
P-622.ZCD / Z0L	50	17,5	40	35	35	1,51	2,5	M3	46,5	6,5	3,2	5	5

P-62x.ZCD / .ZCL / .Z0L, dimensions in mm. Note that a comma is used in the drawings instead of a decimal point.

Order Information

P-620.Z0L
Precise PIHera vertical nanopositioning stage, 65 µm, without sensor, LEMO connectors

P-620.ZCD
Precise PIHera vertical nanopositioning stage, 50 µm, direct position measuring, capacitive sensor, D-sub connector

P-620.ZCL
Precise PIHera vertical nanopositioning stage, 50 µm, direct position measuring, capacitive sensor, LEMO connectors

P-621.Z0L
Precise PIHera vertical nanopositioning stage, 140 µm, without sensor, LEMO connectors

P-621.ZCD
Precise PIHera vertical nanopositioning stage, 100 µm, direct position measuring, capacitive sensor, D-sub connector

P-621.ZCL
Precise PIHera vertical nanopositioning stage, 100 µm, direct position measuring, capacitive sensor, LEMO connectors

Order Information

P-622.Z0L
Precise PIHera vertical nanopositioning stage, 350 µm, without sensor, LEMO connectors

P-622.ZCD
Precise PIHera vertical nanopositioning stage, 250 µm, direct position measuring, capacitive sensor, D-sub connector

P-622.ZCL
Precise PIHera vertical nanopositioning stage, 250 µm, direct position measuring, capacitive sensor, LEMO connectors