PiezoMove Linear Actuator with Guides

With Optional Position Sensor

P-601

- Flexure guides for linear motion with minimum tip and tilt
- Travel ranges to 400 µm
- Resolution to 0.2 nm
- Available with integrated position sensors
- Outstanding lifetime due to PICMA® piezo actuators
- Ideal for OEM applications in optics, medical technology, biotechnology, and microfluidics
- Customized versions with longer travel range, shorter response time or nonmagnetic

Application fields

- Nanopositioning
- High-speed switching
- Patch clamp
- Microdispensing
- Adaptive systems technology / automation
- Photonics / integrated optics
- Biotechnology

Outstanding lifetime thanks 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.

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.

Motion	Unit	Tolerance	P-601.10	P-601.10L	P-601.1S	P-601.1SL	P-601.30	P-601.30L	P-601.3S	P-601.3SL
Active axes			Z	Z	Z	Z	Z	Z	Z	Z
Travel range in Z	µm		—	—	100	100	—	—	250	250
Travel range in Z, open loop, at -20 to 120 V	µm	+20 % / -0 %	100	100	100	100	250	250	250	250
Linearity error in Z	%	Typ.	—	—	0.1	0.1	—	—	0.3	0.3

Positioning	Unit	Tolerance	P-601.10	P-601.10L	P-601.1S	P-601.1SL	P-601.30	P-601.30L	P-601.3S	P-601.3SL
Unidirectional repeatability in Z	nm	Typ.	—	—	±8	±8	—	—	±10	±10
Resolution in Z, open loop	nm	Typ.	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3
Integrated sensor			—	—	SGS, indirect position measuring	SGS, indirect position measuring	—	—	SGS, indirect position measuring	SGS, indirect position measuring
System resolution in Z	nm		—	—	2	2	—	—	6	6

Drive properties	Unit	Tolerance	P-601.10	P-601.10L	P-601.1S	P-601.1SL	P-601.30	P-601.30L	P-601.3S	P-601.3SL
Drive type			PICMA®	PICMA®	PICMA®	PICMA®	PICMA®	PICMA®	PICMA®	PICMA®
Electrical capacitance in Z	µF	±20 %	1.5	1.5	1.5	1.5	3.1	3.1	3.1	3.1

Mechanical properties	Unit	Tolerance	P-601.10	P-601.10L	P-601.1S	P-601.1SL	P-601.30	P-601.30L	P-601.3S	P-601.3SL
Stiffness in Z	N/µm	±20 %	0.8	0.8	0.8	0.8	0.38	0.38	0.38	0.38
Resonant frequency in Z, unloaded	Hz	±20 %	750	750	750	750	440	440	440	440
Resonant frequency in Z, under load with 30 g	Hz	±20 %	620	620	620	620	350	350	350	350
Permissible push force in X	N	Max.	30	30	30	30	30	30	30	30
Permissible push force in Y	N	Max.	30	30	30	30	30	30	30	30
Permissible push force in Z	N	Max.	30	30	30	30	20	20	20	20
Permissible pull force in Z	N	Max.	10	10	10	10	10	10	10	10
Guide			Flexure guide with lever amplification	Flexure guide with lever amplification	Flexure guide with lever amplification	Flexure guide with lever amplification	Flexure guide with lever amplification	Flexure guide with lever amplification	Flexure guide with lever amplification	Flexure guide with lever amplification
Mass without cable	g	±5 %	50	50	50	50	80	80	80	80
Material			Stainless steel	Stainless steel	Stainless steel	Stainless steel	Stainless steel	Stainless steel	Stainless steel	Stainless steel

Miscellaneous	Unit		P-601.10	P-601.10L	P-601.1S	P-601.1SL	P-601.30	P-601.30L	P-601.3S	P-601.3SL
Operating temperature range	°C		-20 to 80	-20 to 80	-20 to 80	-20 to 80	-20 to 80	-20 to 80	-20 to 80	-20 to 80
Connector			Stranded wires, PTFE isolated, AWG 32, Ø 0.49 mm	LEMO FFS.00.250.CTCE24	Stranded wires, PTFE isolated, AWG 32, Ø 0.49 mm	LEMO FFS.00.250.CTCE24	Stranded wires, PTFE isolated, AWG 32, Ø 0.49 mm	LEMO FFS.00.250.CTCE24	Stranded wires, PTFE isolated, AWG 32, Ø 0.49 mm	LEMO FFS.00.250.CTCE24
Sensor connector			—	—	Stranded wires, PTFE isolated, AWG 36	LEMO FFA.0S.304.CLAC32	—	—	Stranded wires, PTFE isolated, AWG 36	LEMO FFA.0S.304.CLAC32
Cable length	m		0.3	1.5	0.3	1.5	0.3	1.5	0.3	1.5
Recommended controllers/drivers			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	E-610, E-625, E-831

Motion	Unit	Tolerance	P-601.40	P-601.40L	P-601.4S	P-601.4SL
Active axes			Z	Z	Z	Z
Travel range in Z	µm		—	—	400	400
Travel range in Z, open loop, at -20 to 120 V	µm	+20 % / -0 %	400	400	400	400
Linearity error in Z	%	Typ.	—	—	0.3	0.3

Positioning	Unit	Tolerance	P-601.40	P-601.40L	P-601.4S	P-601.4SL
Unidirectional repeatability in Z	nm	Typ.	—	—	±30	±30
Resolution in Z, open loop	nm	Typ.	0.4	0.4	0.4	0.4
Integrated sensor			—	—	SGS, indirect position measuring	SGS, indirect position measuring
System resolution in Z	nm		—	—	12	12

Drive properties	Unit	Tolerance	P-601.40	P-601.40L	P-601.4S	P-601.4SL
Drive type			PICMA®	PICMA®	PICMA®	PICMA®
Electrical capacitance in Z	µF	±20 %	4.6	4.6	4.6	4.6

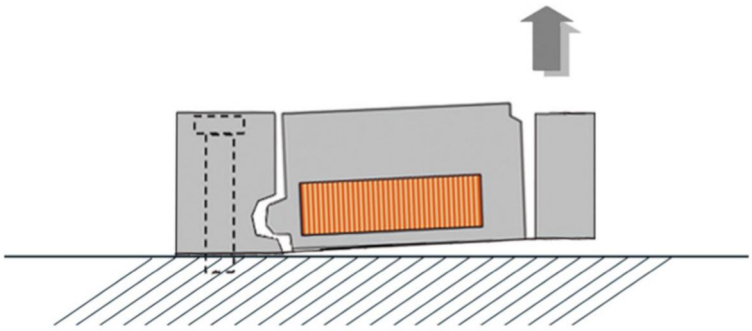
Mechanical properties	Unit	Tolerance	P-601.40	P-601.40L	P-601.4S	P-601.4SL
Stiffness in Z	N/µm	±20 %	0.28	0.28	0.28	0.28
Resonant frequency in Z, unloaded	Hz	±20 %	350	350	350	350
Resonant frequency in Z, under load with 30 g	Hz	±20 %	290	290	290	290
Permissible push force in X	N	Max.	30	30	30	30
Permissible push force in Y	N	Max.	30	30	30	30
Permissible push force in Z	N	Max.	15	15	15	15
Permissible pull force in Z	N	Max.	10	10	10	10
Guide			Flexure guide with lever amplification	Flexure guide with lever amplification	Flexure guide with lever amplification	Flexure guide with lever amplification
Mass without cable	g	±5 %	110	110	110	110
Material			Stainless steel	Stainless steel	Stainless steel	Stainless steel

Miscellaneous	Unit		P-601.40	P-601.40L	P-601.4S	P-601.4SL
Operating temperature range	°C		-20 to 80	-20 to 80	-20 to 80	-20 to 80
Connector			Stranded wires, PTFE isolated, AWG 32, Ø 0.49 mm	LEMO FFS.00.250.CTCE24	Stranded wires, PTFE isolated, AWG 32, Ø 0.49 mm	LEMO FFS.00.250.CTCE24
Sensor connector			—	—	Stranded wires, PTFE isolated, AWG 36	LEMO FFA.0S.304.CLAC32
Cable length	m		0.3	1.5	0.3	1.5
Recommended controllers/ drivers			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.

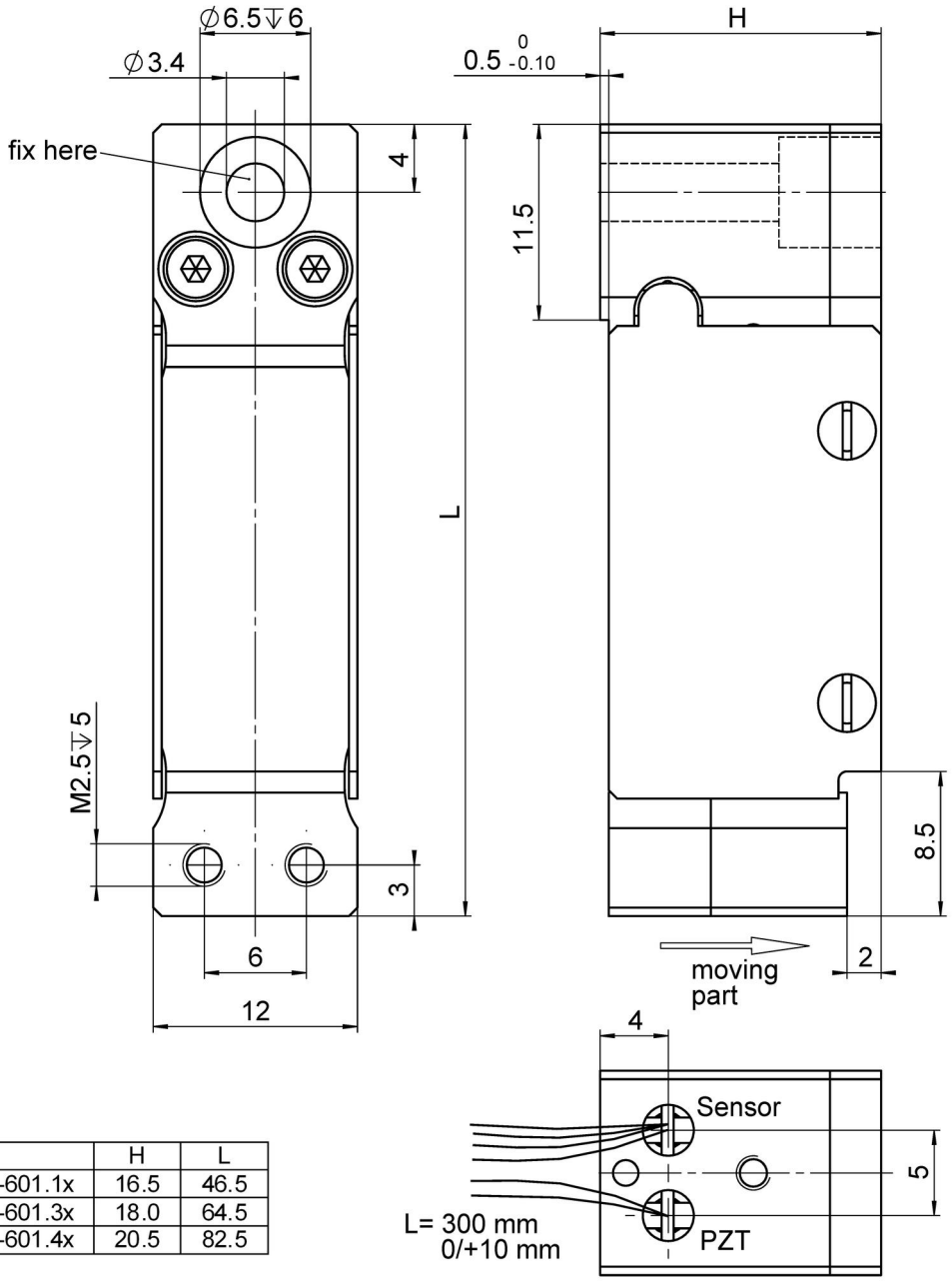
At PI, technical data is specified at 22 ±3 °C. Unless otherwise stated, the values are for unloaded conditions. Some properties are interdependent. The designation "typ." indicates a statistical average for a property; it does not indicate a guaranteed value for every product supplied. During the final inspection of a product, only selected properties are analyzed, not all. Please note that some product characteristics may deteriorate with increasing operating time.

Drawings / Images



Direction of motion of the P-601. The flexure guides prevent tilt at the output.

Drawings / Images



	H	L
P-601.1x	16.5	46.5
P-601.3x	18.0	64.5
P-601.4x	20.5	82.5

P-601, dimensions in mm

Order Information

P-601.10
PiezoMove linear actuator with guides; PICMA® piezo actuator drive; 100 µm travel range (open loop); connecting wires; 0.3 m cable length

P-601.10L
PiezoMove linear actuator with guides; PICMA® piezo actuator drive; 100 µm travel range (open loop); LEMO connector; 1.5 m cable length

P-601.1S
PiezoMove linear actuator with guides; PICMA® piezo actuator drive; 100 µm travel range; SGS, indirect position measuring; connecting wires; 0.3 m cable length

P-601.1SL
PiezoMove linear actuator with guides; PICMA® piezo actuator drive; 100 µm travel range; SGS, indirect position measuring; LEMO connectors; 1.5 m cable length

P-601.30
PiezoMove linear actuator with guides; PICMA® piezo actuator drive; 250 µm travel range (open loop); connecting wires; 0.3 m cable length

P-601.30L
PiezoMove linear actuator with guides; PICMA® piezo actuator drive; 250 µm travel range (open loop); LEMO connector; 1.5 m cable length

P-601.3S
PiezoMove linear actuator with guides; PICMA® piezo actuator drive; 250 µm travel range; SGS, indirect position measuring; connecting wires; 0.3 m cable length

P-601.3SL
PiezoMove linear actuator with guides; PICMA® piezo actuator drive; 250 µm travel range; SGS, indirect position measuring; LEMO connectors; 1.5 m cable length

P-601.40
PiezoMove linear actuator with guides; PICMA® piezo actuator drive; 400 µm travel range (open loop); connecting wires; 0.3 m cable length

P-601.40L
PiezoMove linear actuator with guides; PICMA® piezo actuator drive; 400 µm travel range (open loop); LEMO connector; 1.5 m cable length

P-601.4S
PiezoMove linear actuator with guides; PICMA® piezo actuator drive; 400 µm travel range; SGS, indirect position measuring; connecting wires; 0.3 m cable length

P-601.4SL
PiezoMove linear actuator with guides; PICMA® piezo actuator drive; 400 µm travel range; SGS, indirect position measuring; LEMO connectors; 1.5 m cable length