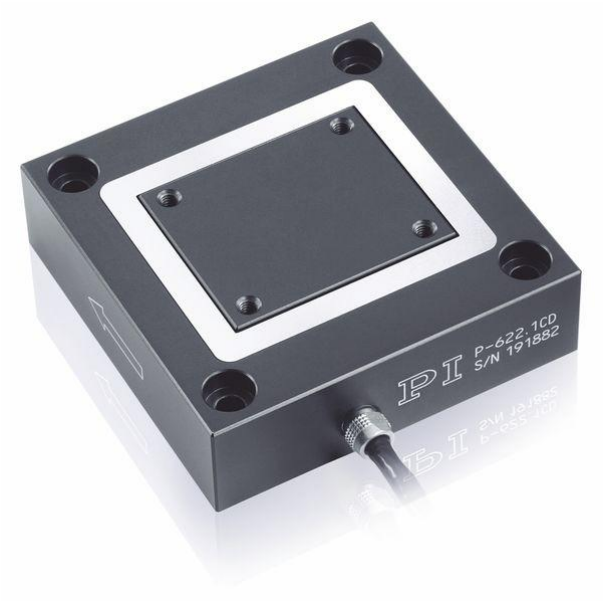
PIHera Piezo Linear Stage

VARIABLE TRAVEL RANGES AND AXIS CONFIGURATION



P-620.1 – P-629.1

- Travel ranges 50 to 1800 µm
- Resolution to 0.1 nm
- Linearity error 0.02 %
- Direct metrology with capacitive sensors
- X, XY, Z, XYZ versions

Reference- class linear positioner

Exceptionally reliable due to the combination of frictionless, maintenance-, and wear- free components. Vacuum-compatible versions to 10^{-9} hPa

Integrated lever / guiding module for flexible setup of various axis configurations

Frictionless flexure- guided design for precision guiding combined with lever amplification for long travel ranges. Drive by all- ceramic insulated PICMA® actuators with outstanding lifetime

Direct position metrology with capacitive sensors

Contactless measuring method (direct metrology). Frictionless subnanometer resolution. Excellent linearity. High bandwidth up to 10 kHz

Fields of application

Research and industry. Vacuum environment to 10^{-9} hPa

Specifications

	P-620.1CD P-620.1CL	P-621.1CD P-621.1CL	P-622.1CD P-622.1CL	P-625.1CD P-625.1CL	P-628.1CD P-628.1CL	P-629.1CD P-629.1CL	Unit	Tolerance
Active axes	X	X	X	X	X	X		
Motion and positioning								
Integrated sensor	Capacitive	Capacitive	Capacitive	Capacitive	Capacitive	Capacitive		
Open- loop travel, -20 to 120 V	60	120	300	600	950	1800	µm	min. (20 % / -0 %)
Closed- loop travel	50	100	250	500	800	1500	µm	
Closed- loop / open- loop resolution	0.2 / 0.1	0.4 / 0.2	0.7 / 0.4	1.4 / 0.5	1.8 / 0.5	3 / 2	nm	typ.
Closed- loop linearity error	0.02	0.02	0.02	0.03	0.03*	0.03**	%	typ.
Repeatability	±1	±1	±1	±5	±10	±14	nm	typ.
Pitch / yaw	±3	±3	±3	±6	±6	±30 / ±10	µrad	typ.
Mechanical properties								
Stiffness in motion direction	0.42	0.35	0.2	0.1	0.12	0.13	N/ µm	±20 %
Unloaded resonant frequency	1100	800	400	215	125	125	Hz	±20 %
Resonant frequency @ 20 g	550	520	340	180	115	120	Hz	±20 %

Resonant frequency @ 120 g	260	240	185	110	90	110	Hz	±20 %
Push / pull force capacity in motion direction	10	10	10	10	10	10	N	max.
Load capacity	10	10	10	10	10	10	N	max.
Lateral force	10	10	10	10	10	8	N	max.
Drive properties								
Piezo ceramic	PICMA® P-883	PICMA® P-885	PICMA® P-885	PICMA® P-885	PICMA® P-887	PICMA® P-888		
Electrical capacitance	0.35	1.5	3.1	6.2	19	52	µF	±20 %
Dynamic operating current coefficient	0.9	1.9	1.9	1.6	3	4.3	µA / (Hz × µm)	±20 %
Miscellaneous								
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 × 12 mm	40 mm × 40 mm × 15 mm	50 mm × 50 mm × 15 mm	60 mm × 60 mm × 15 mm	80 mm × 80 mm × 17 mm	100 mm × 100 mm × 22.5 mm		
Mass	0.11	0.16	0.2	0.24	0.38	0.72	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 special CL versions: LEMO							

Versions without sensor are available under the P-62x.10L ordering number; operating temperature range -20 to 150 °C. Sensor / voltage connection LEMO.
Vacuum versions to 10^{-9} hPa are available as P-62x.1UD.
The resolution of PI piezo nanopositioners is not limited by friction or stiction. Value given as noise with E-710 digital controller.
* With digital controller. With analog controllers 0.05 %
** With digital controller. With analog controllers 0.08 %

Order Information

Versions with Sub- D connector

P-620.1CD
Precise PIHera Linear Nanopositioning System, 50 µm, Direct Metrology, Capacitive Sensor, Sub- D Connector(s)
P-621.1CD
Precise PIHera Linear Nanopositioning System, 100 µm, Direct Metrology, Capacitive Sensor, Sub- D Connector(s)
P-622.1CD
Precise PIHera Linear Nanopositioning System, 250 µm, Direct Metrology, Capacitive Sensor, Sub- D Connector(s)
P-625.1CD
Precise PIHera Linear Nanopositioning System, 500 µm, Direct Metrology, Capacitive Sensor, Sub- D Connector(s)
P-628.1CD
Precise PIHera Linear Nanopositioning System, 800 µm, Direct Metrology, Capacitive Sensor, Sub- D Connector(s)
P-629.1CD
PIHera Linear Piezo Nanopositioning Stage, 1500 µm, Capacitive Sensor, Sub- D Connector(s)

Versions with LEMO connector

P-620.1CL
Precise PIHera Linear Nanopositioning System, 50 µm, Direct Metrology, Capacitive Sensor, LEMO Connector(s)
P-621.1CL
Precise PIHera Linear Nanopositioning System, 100 µm, Direct Metrology, Capacitive Sensor, LEMO Connector(s)
P-622.1CL
Precise PIHera Linear Nanopositioning System, 250 µm, Direct Metrology, Capacitive Sensor, LEMO Connector(s)
P-625.1CL
Precise PIHera Linear Nanopositioning System, 500 µm, Direct Metrology, Capacitive Sensor, LEMO Connector(s)
P-628.1CL
Precise PIHera Linear Nanopositioning System, 800 µm, Direct Metrology, Capacitive Sensor, LEMO Connector(s)
P-629.1CL
PIHera Linear Piezo Nanopositioning Stage, 1500 µm, Capacitive Sensor, LEMO Connector(s)

PIHera linear positioner without position sensor

P-620.10L
Precise PIHera Linear Nanopositioning System, 60 µm, Open- Loop, LEMO Connector(s)
P-621.10L
Precise PIHera Linear Nanopositioning System, 120 µm, Open- Loop, LEMO Connector(s)
P-622.10L
Precise PIHera Linear Nanopositioning System, 300 µm, Open- Loop, LEMO Connector(s)
P-625.10L
Precise PIHera Linear Nanopositioning System, 600 µm, Open- Loop, LEMO Connector(s)
P-628.10L
Precise PIHera Linear Nanopositioning System, 950 µm, Open- Loop, LEMO Connector(s)
P-629.10L
Precise PIHera Linear Nanopositioning System, 1800 µm, Open- Loop, LEMO Connector(s)

PIHera linear positioner, vacuum compatible to 10^{-9} hPa

P-620.1UD
Precise PIHera Linear Nanopositioning System, 50 µm, Direct Metrology, Capacitive Sensor, Sub- D Connector(s), Vacuum- Compatible to 10^{-9} hPa
P-621.1UD
Precise PIHera Linear Nanopositioning System, 100 µm, Direct Metrology, Capacitive Sensor, Sub- D Connector(s), Vacuum- Compatible to 10^{-9} hPa
P-622.1UD
Precise PIHera Linear Nanopositioning System, 250 µm, Direct Metrology, Capacitive Sensor, Sub- D Connector(s), Vacuum- Compatible to 10^{-9} hPa
P-625.1UD
Precise PIHera Linear Nanopositioning System, 500 µm, Direct Metrology, Capacitive Sensor, Sub- D Connector(s), Vacuum- Compatible to 10^{-9} hPa
P-628.1UD
Precise PIHera Linear Nanopositioning System, 800 µm, Direct Metrology, Capacitive Sensor, Sub- D Connector(s), Vacuum- Compatible to 10^{-9} hPa
P-629.1UD
PIHera Linear Piezo Nanopositioning Stage, 1500 µm, Capacitive Sensor, Sub- D Connector(s), Vacuum- Compatible to 10^{-9} hPa

Controllers / Drivers / Amplifiers

E-610 Piezo Amplifier / Controller
E-625 Piezo Servo- Controller & Driver
E-665 Piezo Amplifier / Servo Controller
E-753 Digital Piezo Controller
E-500 • E-501 Modular Piezo Controller

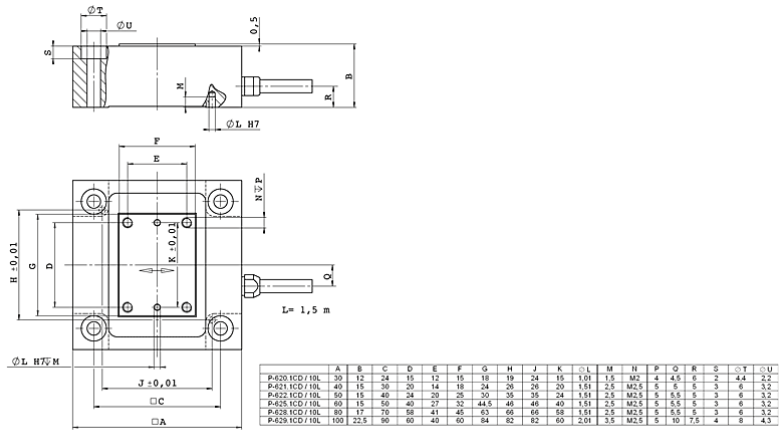
Accessories

P-895.1DLC Adapter Cable, Sub- D 7W2 (f) to LEMO Connectors (m)
P-895.1LDC Adapter Cable, Sub- D 7W2 (f) to LEMO Connectors (m)

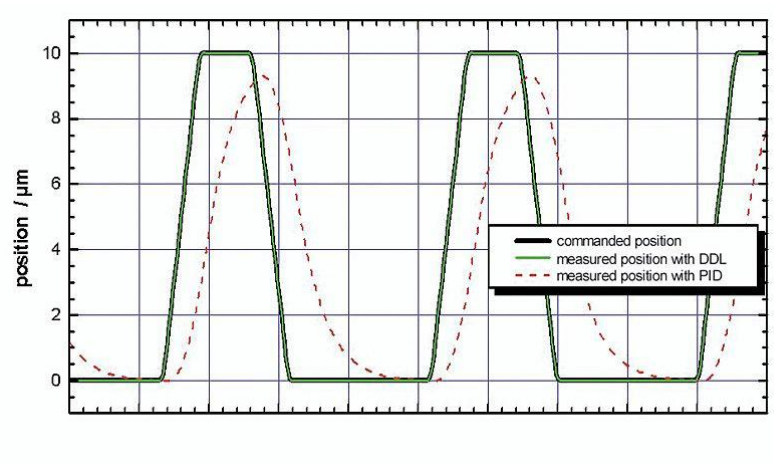
Related Products

P-620.2 – P-629.2 PIHera XY Piezo Stage
P-620.Z – P-622.Z PIHera Precision Z- Stage
P-611.1 Linear Piezo Positioning System
P-753 LISA Linear Actuator & Stage

Drawings / Images



	A	B	C	D	E	F	G	H	J	K	○L	M	N	P	Q	R	S	○T	○U
P-620.1CD / 10L	30	12	24	15	12	15	18	19	24	15	1,01	1,5	M2	4	4,5	6	2	4,4	2,2
P-621.1CD / 10L	40	15	30	20	14	18	24	26	26	20	1,51	2,5	M2,5	5	5	5	3	6	3,2
P-622.1CD / 10L	50	15	40	24	20	25	30	35	35	24	1,51	2,5	M2,5	5	5,5	5	3	6	3,2
P-625.1CD / 10L	60	15	50	40	27	32	44,5	46	46	40	1,51	2,5	M2,5	5	5,5	5	3	6	3,2
P-628.1CD / 10L	80	17	70	58	41	45	63	66	66	58	1,51	2,5	M2,5	5	5,5	5	3	6	3,2
P-629.1CD / 10L	100	22,5	90	60	40	60	84	82	82	60	2,01	3,5	M2,5	5	10	7,5	4	8	4,3



Rapid scanning motion of a P-621.1CD (commanded rise time 5 ms) with the E-710 controller and Digital Dynamic Linearization (DDL) option. DDL virtually eliminates the tracking error (<20 nm) during the scan. The improvement over a classical PI controller is up to 3 orders of magnitude, and increases with the scanning frequency