

PICMAWalk Walking Drive

OEM Walking Drive for Durable Applications with up to 12 mm/s Velocity and 50 N Drive Force



N-331

- Robust walking drive for industrial use with PICMA® technology for extreme durability
- Fastest and strongest drive of its size class
- Variable runner lengths from 25 mm to 100 mm
- Precise, nanometer precision positioning of loads up to 5 kg
- Plug-and-play, thanks to PI proprietary controller technology
- Vacuum versions to 10⁻⁹ hPa available

Application fields

- Industrial precision positioning
- Semiconductor technology
- Semiconductor tests
- Wafer inspection
- Lithography
- Nanoimprinting
- Nanometrology

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.

Nanometer precision and high feed force with PiezoWalk® walking drives

In the PiezoWalk® walking drive, several piezo actuators do a walking motion that leads to a forward feed of a runner. Control of the actuators allows the smallest step and forward feed motion at a resolution of well under one nanometer.

Highly accurate position measuring with incremental linear encoder

Noncontact optical linear encoders measure the position directly at the platform with the greatest accuracy. Nonlinearity, mechanical play or elastic deformation have no influence on the measurement.

Motion	Unit	Tolerance	N-331.10	N-331.13	N-331.20	N-331.23	N-331.40	N-331.43
Active axes			X	X	X	X	X	X
Travel range in X	mm			25		50		100
Travel range in X, open loop	mm	±0.5 mm	30	30	55	55	105	105
Travel range in X (analog mode)	µm	Typ.	20	20	20	20	20	20
Operating frequency in full step mode	kHz		0.6	0.6	0.6	0.6	0.6	0.6
Velocity (100% duty cycle, full-step mode)	mm/s	Max.	12	12	12	12	12	12
Velocity (100% duty cycle, nanostepping mode)	mm/s	Max.	10	10	10	10	10	10

Positioning	Unit	Tolerance	N-331.10	N-331.13	N-331.20	N-331.23	N-331.40	N-331.43
Minimum incremental motion in X	µm	Typ.	0.01	0.01	0.01	0.01	0.01	0.01
Resolution in X, open loop	nm	Typ.	0.02	0.02	0.02	0.02	0.02	0.02
Integrated sensor				Incremental linear encoder		Incremental linear encoder		Incremental linear encoder
System resolution in X	nm			10		10		10

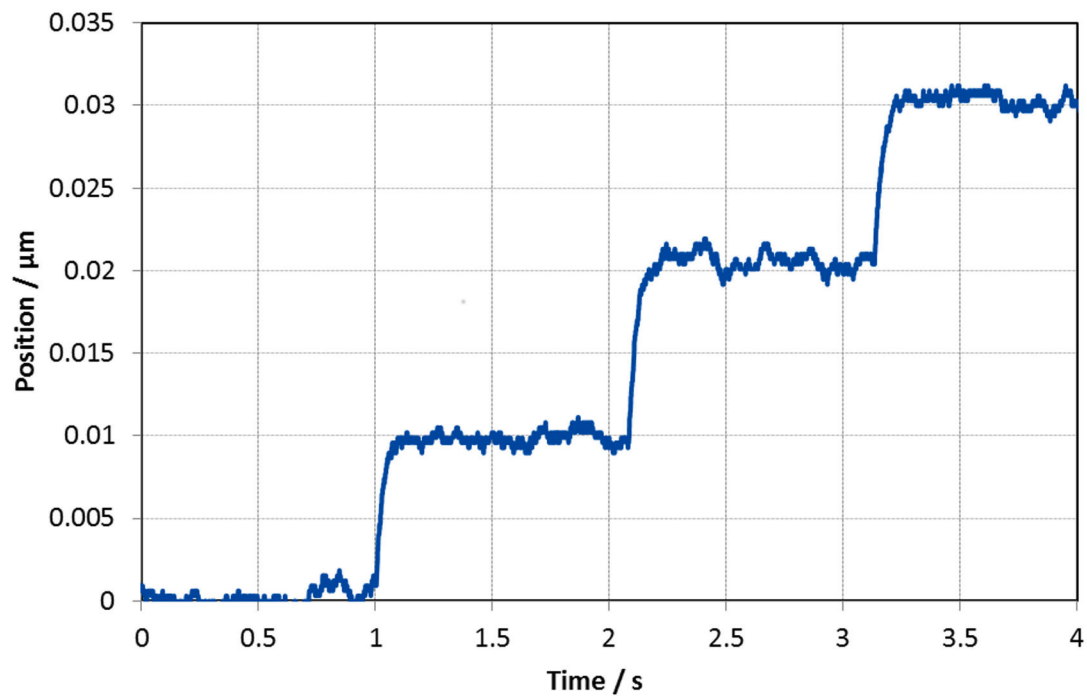
Drive Properties	Unit	Tolerance	N-331.10	N-331.13	N-331.20	N-331.23	N-331.40	N-331.43
Drive type			Piezo motor/Piezo walking drive/PICMA-Walk	Piezo motor/Piezo walking drive/PICMA-Walk	Piezo motor/Piezo walking drive/PICMA-Walk	Piezo motor/Piezo walking drive/PICMA-Walk	Piezo motor/Piezo walking drive/PICMA-Walk	Piezo motor/Piezo walking drive/PICMA-Walk
Operating voltage	V		-20 to 120	-20 to 120	-20 to 120	-20 to 120	-20 to 120	-20 to 120
Drive force in positive direction of motion in X	N	Min.	50	50	50	50	50	50
Drive force in negative direction of motion in X	N	Min.	50	50	50	50	50	50

Mechanical Properties	Unit	Tolerance	N-331.10	N-331.13	N-331.20	N-331.23	N-331.40	N-331.43
Holding force in X, passive	N	Min.	60	60	60	60	60	60
Moved mass in X, unloaded	g		110	110	140	140	190	190
Overall mass	g		580	580	610	610	660	660
Material			Aluminum, stainless steel	Aluminum, stainless steel	Aluminum, stainless steel	Aluminum, stainless steel	Aluminum, stainless steel	Aluminum, stainless steel
Endurance at 1013 hPa, 2 kg payload, 70% duty cycle	km		>30	>30	>30	>30	>30	>30

Miscellaneous	Unit		N-331.10	N-331.13	N-331.20	N-331.23	N-331.40	N-331.43
Operating temperature range	°C		0 to 50	0 to 50	0 to 50	0 to 50	0 to 50	0 to 50
Connector			D-sub 37-pin (m)	D-sub 37-pin (m)	D-sub 37-pin (m)	D-sub 37-pin (m)	D-sub 37-pin (m)	D-sub 37-pin (m)
Cable length	m		2	2	2	2	2	2
Recommended controllers / drivers			E-712.1AN • E-712.2AN • E-712.3AN	E-712.1AN • E-712.2AN • E-712.3AN	E-712.1AN • E-712.2AN • E-712.3AN	E-712.1AN • E-712.2AN • E-712.3AN	E-712.1AN • E-712.2AN • E-712.3AN	E-712.1AN • E-712.2AN • E-712.3AN

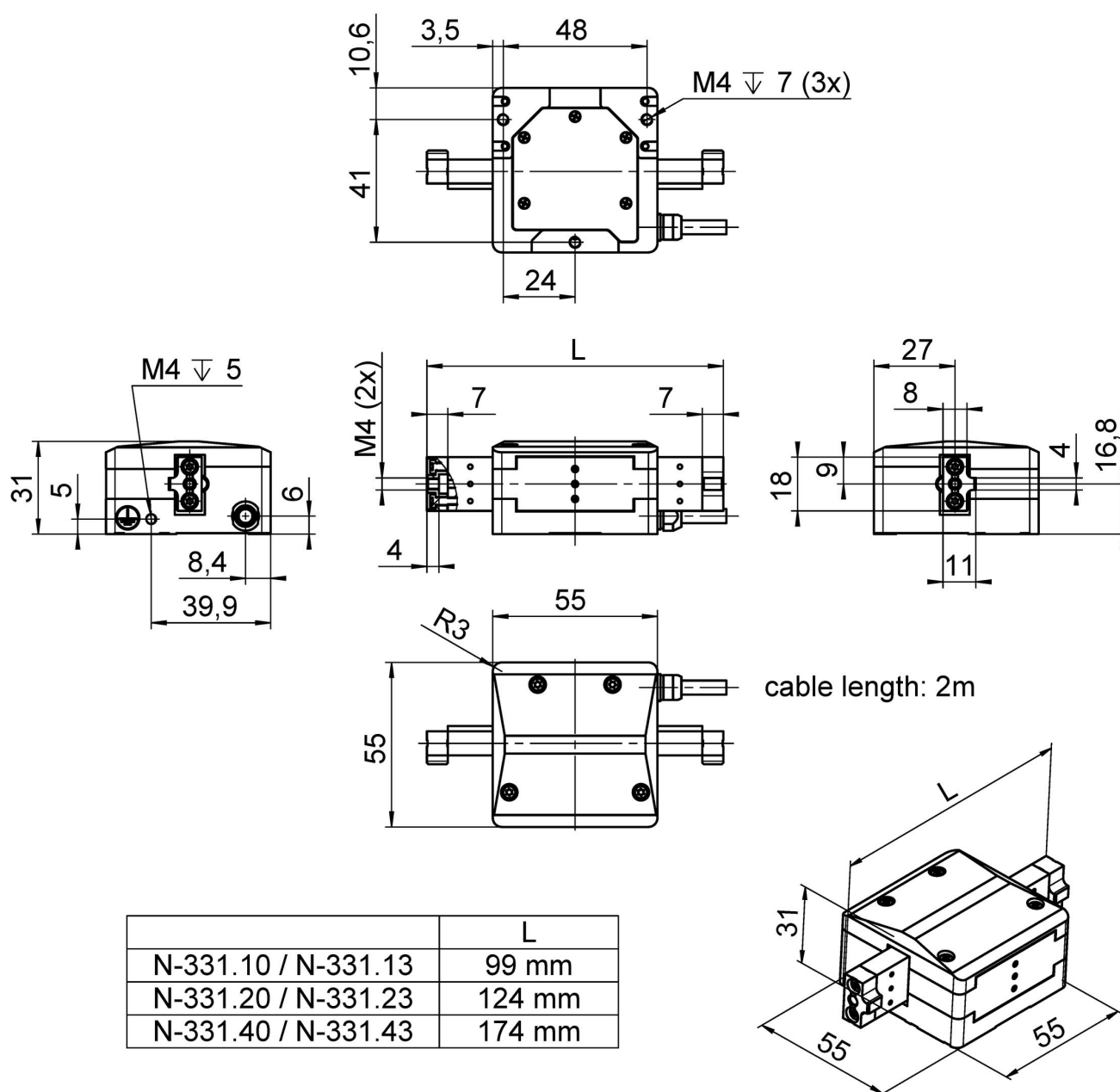
Travel range in X, open loop: From one mechanical hard stop of the runner to the other mechanical hard stop, only in open-loop operation
Velocity (100 % duty cycle, full-step mode): depends on the controller, the load, and the servo parameters: in this case an E-712.1AN controller is used. For longer positioning processes, operate the linear actuator with this controller at a velocity below 3 mm/s.
Operating frequency in full-step mode: when operated with a digital controller with 25 W peak power output
All specifications based on room temperature (22 °C ±3 °C).

Drawings / Images



The N-331 drive reliably performs repeatable 10-nm steps. Measured by an interferometer.

Drawings / Images



N-331.xx, dimensions in mm. Note that a comma is used in the drawings instead of a decimal point.

Order Information

N-331.10

PICMAWalk walking drive; 30 mm travel range (open loop); 50 N drive force; 12 mm/s maximum velocity; 2 m cable length

N-331.13

PICMAWalk walking drive; 25 mm travel range; 50 N drive force; 12 mm/s maximum velocity; incremental linear encoder; 2 m cable length

N-331.20

PICMAWalk walking drive; 55 mm travel range (open loop); 50 N drive force; 12 mm/s maximum velocity; 2 m cable length

N-331.23

PICMAWalk walking drive; 50 mm travel range; 50 N drive force; 12 mm/s maximum velocity; incremental linear encoder; 2 m cable length

N-331.40

PICMAWalk walking drive; 105 mm travel range (open loop); 50 N drive force; 12 mm/s maximum velocity; 2 m cable length

N-331.43

PICMAWalk walking drive; 100 mm travel range; 50 N drive force; 12 mm/s maximum velocity; incremental linear encoder; 2 m cable length