

# N-310 NEXACT® OEM Miniature Linear Motor/Actuator

## Compact, High-Speed PiezoWalk® Drive



N-310 Actuator with E-861 Servo-Controller (integrated drive electronics)

- 10 to 125 mm Standard Travel Range, Flexible Choice of the Runner Length
- Compact and Cost-Effective Design
- 0.03 nm Resolution\*\*
- To 10 N Push/Pull Force
- Low Operating Voltage
- Self Locking at Rest, No Heat Generation, Nanometer Stability
- Non-Magnetic and Vacuum-Compatible Working Principle

N-310 NEXACT® PiezoWalk® linear drives feature travel ranges of up to 125 mm and push/pull force capacities to 10 N in a compact package of only 25 x 25 x 12 mm. With their high resolution, NEXACT® drives, are ideal for high-precision positioning over long travel ranges. The N-310 can be operated in open-loop and closed-loop mode (with the addition of an external

position sensor). A variety of NEXACT® controllers facilitates the integration into micro- or nanopositioning applications.

### Working Principle for Application Flexibility

NEXACT® PiezoWalk® technology overcomes the limitations of conventional nanopositioning drives and combines virtually unlimited travel ranges with high stiffness in a very small package. Furthermore, NEXACT® actuators provide piezo-class resolution (far below one nanometer) and millisecond responsiveness. The special drive design reduces the operating voltage to 45 V and below.

In operation, piezoceramic bending elements act on the runner, which is connected to the moving part of the application. The length of the runner determines the travel range.

Force capacity, resolution and velocity are determined by the piezo geometry and drive electronics and are scalable. To move the runner over longer distances the stepping mode is used, whereas for distances smaller than one step, the linear (analog) mode enables high-dynamics positioning with resolutions far below one nanometer.

### Wear- and Maintenance-Free

In contrast to ordinary DC or stepper motor drives, the PiezoWalk® drives effect linear motion directly, without the need to transform rotation with mechanical elements such as gears, leadscrews and nuts. Therefore, mechanical limitations such as backlash and wear are eliminated and the drive is maintenance-free.

### Self-Locking PiezoWalk® Piezo Stepping Drive

NEXLINE® and NEXACT® exhibit high stiffness and are self-locking even when powered down due to the clamping action of the piezo actuators in the mechanics. This entails nanometer position stability at rest, with no heat generation or servo-dither.

### Controller and Drive Electronics Optimized for the Application

NEXACT® actuators require special drive electronics to control the complex stepping sequences. The E-860 series NEXACT® controllers are available in different open-and closed-loop versions. For example, the E-861 includes a complete NEXACT® servo-controller with low-noise, 24-bit drivers and a powerful DSP. It also comes with ample software for easy integration and highly effective computer control. For applications which do

### Ordering Information

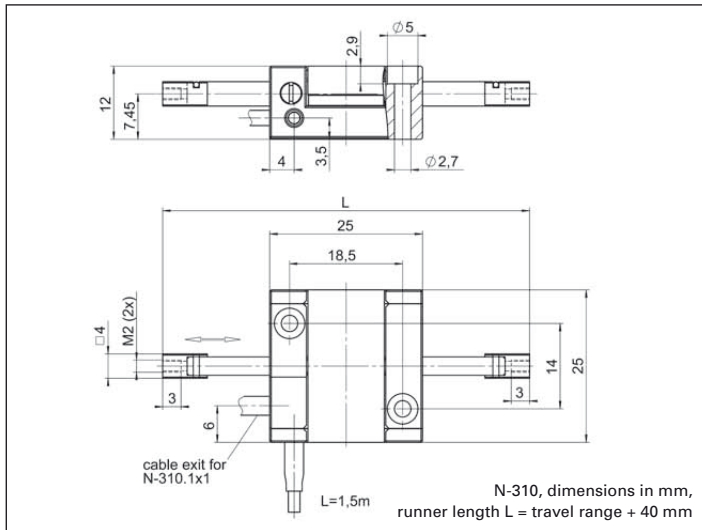
- N-310.10**  
NEXACT® OEM Linear Drive, 10 mm, 10 N
  - N-310.101**  
NEXACT® OEM Linear Drive, 10 mm, 10 N, Shifted Cable Exit
  - N-310.11**  
NEXACT® PiezoWalk® OEM Linear Drive, 20 mm, 10 N
  - N-310.111**  
NEXACT® PiezoWalk® OEM Linear Drive, 20 mm, 10 N, Shifted Cable Exit
  - N-310.12**  
NEXACT® OEM Linear Drive, 30 mm, 10 N
  - N-310.121**  
NEXACT® OEM Linear Drive, 30 mm, 10 N, Shifted Cable Exit
  - N-310.13**  
NEXACT® OEM Linear Drive, 50 mm, 10 N
  - N-310.131**  
NEXACT® OEM Linear Drive, 50 mm, 10 N, Shifted Cable Exit
  - N-310.14**  
NEXACT® OEM Linear Drive, 75 mm, 10 N
  - N-310.141**  
NEXACT® OEM Linear Drive, 75 mm, 10 N, Shifted Cable Exit
  - N-310.15**  
NEXACT® OEM Linear Drive, 100 mm, 10 N
  - N-310.151**  
NEXACT® OEM Linear Drive, 100 mm, 10 N, Shifted Cable Exit
  - N-310.16**  
NEXACT® OEM Linear Drive, 125 mm, 10 N
  - N-310.161**  
NEXACT® OEM Linear Drive, 125 mm, 10 N, Shifted Cable Exit
- Ask about custom designs!**

not require the highest resolution, the E-862 lower-priced drive electronics can be ordered.

The products described in this document are in part protected by the following patents: German Patent No. P4408618.0

### Application Examples

- Semiconductor technology
- Wafer inspection
- Nano lithography
- Surface Measurement Technique
- Profilometry
- Microscopy
- Motion in strong magnetic fields



Translation stage with N-310 NEXACT® drive.  
The positioner offers 20 mm travel range with  
an encoder resolution of 25 nm

## Linear Actuators & Motors

### PiezoWalk® Motors / Actuators

PILine® Ultrasonic Motors

DC-Servo & Stepper Actuators

Piezo Actuators & Components

Guided / Preloaded Actuators

Unpackaged Stack Actuators

Patches/Benders/Tubes/Shear...

## Nanopositioning / Piezoelectrics

### Nanometrology

### Micropositioning

### Index

## Technical Data

Model	N-310	Tolerance
Active axes	X	
<b>Motion and positioning</b>		
Travel range	N-310-10: 10 mm N-310-11: 20 mm N-310-12: 30 mm N-310-13: 50 mm N-310-14: 75 mm N-310-15: 100 mm N-310-16: 125 mm	
Step size (in step mode)	5 nm to 5 $\mu$ m	
Travel range in analog operation	7 $\mu$ m	max.
Open-loop resolution	0.03 nm**	typ.
Step frequency	1.5 kHz*	max.
Max. speed	10 mm/s*	max.
<b>Mechanical properties</b>		
Push/Pull force (active)	10 N	max.
<b>Drive properties</b>		
Drive type	NEXACT® linear drive	
Operating voltage	-10 V to +45 V	
<b>Miscellaneous</b>		
Operating temperature range	0 to 50 °C	
Body material	Stainless steel, non-magnetic	
Mass	50 g (20 mm travel range)	$\pm$ 5%
Cable length	1.5 m	$\pm$ 10 mm
Connector	HD Sub-D connector 15 pin, single channel	
Recommended controller/driver	E-862, E-861 (see p. 1-20)	

\*Depending on the control electronics.

\*\*Depending on the drive electronics. 1 nm with E-861.