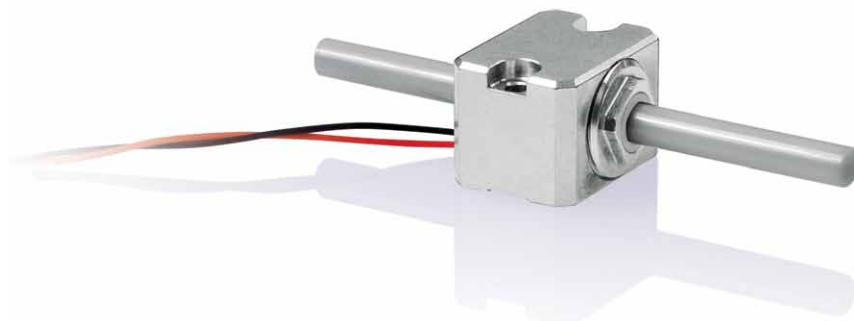
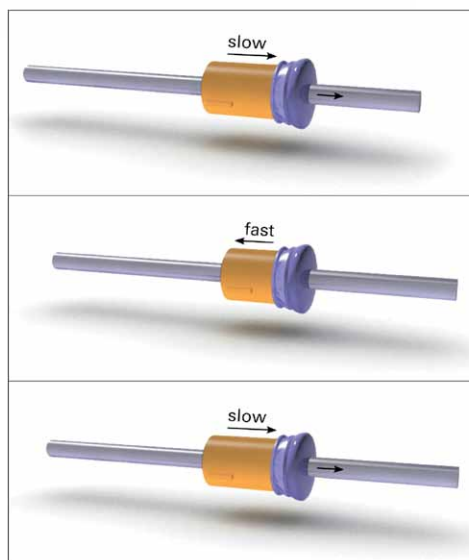


PIShift Stick-Slip Piezo Inertia Drives

LOW-COST LINEAR MOTORS



- Compact, multi-purpose linear drive
- Flexible travel ranges
- Easy mechanical integration
- Self-locking at rest
- Holding force to 10 N
- Velocity over 5 mm/s
- Simple, low-cost control



The PIShift drive principle is based on a single piezo actuator that is controlled with a modified sawtooth voltage provided by a special drive electronics. The actuator expands slowly taking along the runner. When the piezo element contracts quickly, the runner cannot follow due to its inertia and remains at its position

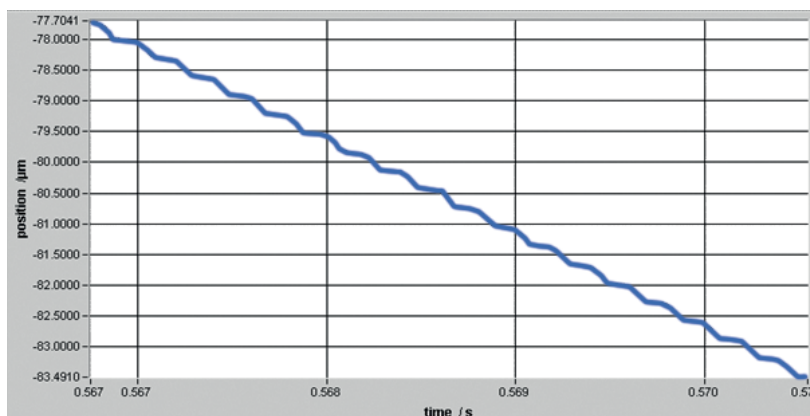
PIShift are space-saving and low-cost piezo-based inertia drives with relatively high holding forces of up to 10 N and a travel range that is only limited by the length of the moving rod. They make use of the stick-slip effect – a cyclical alternation of static and sliding friction between a moving runner and the drive element. The driving force behind this principle is a small piezo actuator operating at a frequency of more than 20 kHz and achieving velocities of more than 5 mm/s.

Silent and energy-saving

The drive works silently at this frequency. At a standstill, the drive produces its maximum clamping force, with zero holding current and no heat generation.

Easy integration

For easy integration, the static housing can either be bolted to a level surface or mounted via a threaded flange. The load is coupled to the moving runner. Compact drive electronics are available in single or multi-channel versions and can be controlled via analog or digital interfaces. The piezo drive element in the actuator requires less than 50 V operating voltage.



A full cycle produces a feed of typically 300 nanometers. The mechanical components are designed so that there is minimum backstep during the fast contraction

PIShift Driver for Stick-Slip Inertial Motors

VERSATILE AND COST-EFFECTIVE



E-870

- For PIShift and PiezoMike piezo inertia drives
- Ideal for OEM applications
- One to four actuators, serial control (through demultiplexing)
- With digital USB interface

Drive electronics for one to four axes

OEM module with solder pins or on carrier board with connectors and terminal strips for the operation of open-loop PIShift piezo inertia drives

Operating modes

Full-step mode, max. piezo voltage 0 to 100 V (configurable). Various command modes. Configuration of the operating parameters can be programmed via USB or via hardware settings. Serial control of up to 4 actuators by one unit

Interfaces

USB for control, configuration and for firmware updates. Interfaces for TTL and analog control. Optional SPI interface

Fields of application

Lab automation, medical technology, handling

Related products

N-412 • N-422 PIShift linear actuator



E-870.10: Single-channel driver for piezo inertia drives (to be plugged in or soldered)

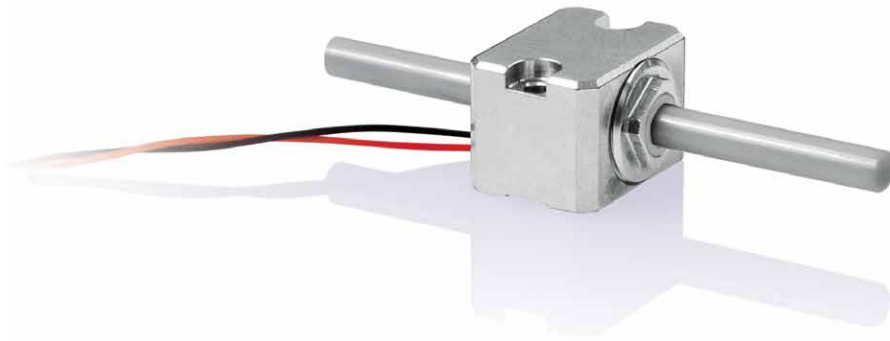


The E-870.41 allows the serial control of up to four PIShift or PiezoMike actuators through demultiplexing

| Perliminary Data | E-870.10 | E-870.11 | E-870.41 |
|--------------------------------|--|--|--|
| Function | Drive electronics for PIShift linear drives, OEM circuit board with solder pins | Drive electronics for PIShift linear drives, OEM circuit board with connectors | Drive electronics for PIShift linear drives, OEM circuit board with connectors |
| Channels | 1 | 1 | 4 (serial control through demultiplexing) |
| Amplifier | | | |
| Channels | 1 | 1 | 1 (4-fold demultiplexing) |
| Output voltage | 0 to 100 V | 0 to 100 V | 0 to 100 V |
| Peak output power | 30 W | 30 W | 30 W |
| Output current/channel (<5 ms) | ±650 mA | ±650 mA | ±650 mA |
| Interface and operation | | | |
| Communication interfaces | USB 2.0, analog Interface, ±10 V, 10 bit ADC, TTL inputs | USB 2.0, analog Interface, ±10 V, 10 bit ADC, TTL inputs | USB 2.0, analog Interface, ±10 V, 10 bit ADC, TTL inputs |
| Actuator connection | Solder pins | DIN 4-pin | DIN 4-pin |
| Analog and digital inputs | Solder pins | Terminal strip | Terminal strip |
| Digital output | Overtemperature protection indicated at 75°C, operating status and error output | | |
| Command set | PI GCS 2 | PI GCS 2 | PI GCS 2 |
| User software | Configuration and operation tool | Configuration and operation tool | Configuration and operation tool |
| Software drivers | LabVIEW driver, shared libraries for Windows | LabVIEW driver, shared libraries for Windows | LabVIEW driver, shared libraries for Windows |
| Supported functionality | Alternative command modes: pulse-controlled, pulse slope-controlled, quadrature decoder control, analog velocity control | | |
| Display | – | LED display for operation, error status and overtemperature protection | LED display for operation, error status and overtemperature protection |
| Manual control | – | Integrated pushbutton control forwards/backwards, joystick via USB | Integrated pushbutton control forwards/backwards, joystick via USB |
| Miscellaneous | | | |
| Operating temperature range | 0 to 50°C | 0 to 50°C | 0 to 50°C |
| Overtemp protection | Deactivation at 85°C | Deactivation at 85°C | Deactivation at 85°C |
| Dimensions | 76 mm × 61 mm × 20 mm | 92.5 mm × 104 mm × 36 mm | 92.5 mm × 105 mm × 36 mm |
| Mass | 100 g | 172 g | 185 g |
| Operating voltage | 12 to 24 V (power supply not included in the scope of delivery) | 12 to 24 V (power supply not included in the scope of delivery) | 12 to 24 V (power supply not included in the scope of delivery) |
| Max. power consumption | 35 W | 35 W | 35 W |

Linear Actuator with PIShift Stick-Slip Piezomotor

COST-EFFECTIVE AND EASY TO INTEGRATE



N-412 • N-422

- Simple integration: Two mounting versions
- Quiet: Drive frequency >20 kHz
- Velocity over 5 mm/s
- Sub-micron resolution
- Holding force to 10 N

Piezomotor-based direct drive

OEM actuator without position sensor. Continuous motion with step frequencies in the ultrasound range. Easy integration, the housing can either be bolted to a level surface (N-412) or mounted via a threaded flange (N-422)

PIShift inertia drive

Self-locking, no heat generation at rest. Noiseless drive with operating frequencies beyond 20 kHz. Resolution in step mode approx. 300 nm, open-loop

Fields of application

Research and industry. Alignment of optical elements, micromanipulation, biotechnology, cell manipulation, medical technology

Recommended controller / amplifier

E-870 PIShift drive electronics



PIShift drives mounted in a cardanic N-412.50 for mounting via the threaded flange mirror for aligning the tilting angles

Related products

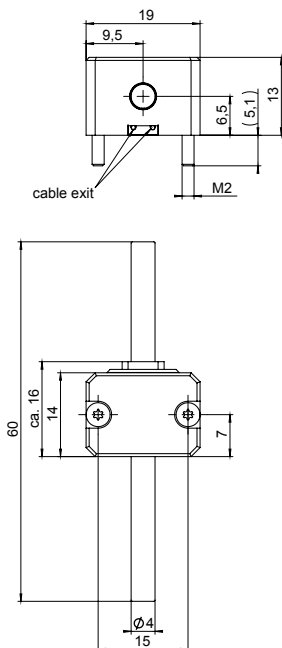
N-310 NEXACT® OEM miniature linear motor/actuator
N-381 NEXACT® linear actuator, manipulator, piezo stepper
U-264 RodDrive piezomotor direct drive
M-272 ceramic linear drive for automation

| Perliminary Data | N-412.50 | N-422.50 | Unit | Tolerance |
|---------------------------------|---|---|-----------------|-------------|
| Active axes | X | X | | |
| Motion and positioning | | | | |
| Travel range | 30 | 40 | mm | |
| Step frequency* | >20 | >20 | kHz | max. |
| Max. velocity* | 5 | 5 | mm/s | min. |
| Mechanical properties | | | | |
| Stiffness in motion direction | >4 | >4 | N/ μ m | $\pm 20\%$ |
| Push / pull force (active) | 5 | 7 | N | max. |
| Max. holding force (passive) | 10 | 10 | N | min. |
| Drive properties | | | | |
| Drive type | PIShift inertia drive | PIShift inertia drive | | |
| Operating voltage | 48 | 48 | V _{pp} | max. |
| Power consumption | 15 W (actuator) 30 W (drive input) | 15 W (actuator) 30 W (drive input) | W | nominal |
| Miscellaneous | | | | |
| Operating temperature range | 0 to 50 | 0 to 50 | $^{\circ}$ C | |
| Material** | Stainless steel | Stainless steel | | |
| Dimensions | \varnothing 18 mm, length 26 mm + rod | 21,5 mm \times 18 mm \times 13 mm + rod | | |
| Mass | 25 | 25 | g | $\pm 5\%$ |
| Cable length | 1,5 | 1,5 | m | ± 10 mm |
| Connector | DIN 4-pin | DIN 4-pin | | |
| Recommended controller / driver | E-870 PIShift drive electronics | E-870 PIShift drive electronics | | |

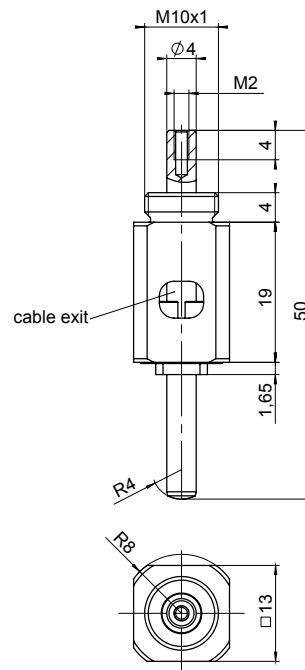
Ask about custom designs!

* Depending on drive electronics.

** Ceramic rod.



N-422.50, dimensions in mm. Version for mounting on an even surface vertical to the direction of motion



N-412.50, dimensions in mm. Version for mounting on the front via the M10 threaded flange