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Technical Support

For questions or concerns regarding the Model 830X Picomotor actuators, please contact Technical Customer Service at 1-866 NUFOCUS (683-6287), or outside the US and Canada, 408-919-1500, or through e-mail at TechSupport@NewFocus.com

Warranty

All products are guaranteed to be free from defects in material and workmanship for a period of one year from date of shipment. At its option, New Focus will either replace, repair, or credit the item.

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Picomotor™ Actuators

Model 830X

U.S. Patent #5,394,049 and #5,410,206

Getting Started

The Models 830X Picomotor™ actuators are ideal devices for motorizing fine-positioning stages and mounts in your optical or mechanical systems. Use them with New Focus opto-mechanical translation stages or your custom devices. They have <30-nm resolution with minimal backlash, and can exert a 5-lb (22-N) force. Moreover, they have exceptional long-term stability and the ability to hold their position with no power applied.



Model 8302 1" Picomotor Actuator

The Models 830X come with a single motor cable terminated with a RJ-22 connector. Because only the patented Picomotor drive waveform can be used to drive the Picomotor actuator, you must insert the RJ-22 connector into a New Focus driver (Model 8753 Intelligent Picomotor™ driver, Model 8751-C Intelligent closed-loop Picomotor™ driver, or Model 8703 TTL/Analog Picomotor driver module).† With these recommended drivers you should be able to move the actuator through a joystick (Model 8754), hand terminal (Model 8757), or computer (refer to the driver manuals for specific motion-control command sets).

We also offer the Model 832X European-style Picomotor actuators with 12x0.5-mm threading on the shank, the Model 8351 tiny version, the Model 8310 closed-loop Picomotor actuator as well as vacuum-compatible, non-magnetic and OEM versions. (Please contact us for more information on these products.)

† *Note: do not open the motor cover or cut the motor cable. High voltages (up to 120 V, 200 mA) are accessible with the cover removed or the cable cut.*

Mounting the Motor

The mounting shaft is 0.375"—typical in standard micrometers. We have provided a threaded nut so you can insert the motor into a bushing and tighten the nut to mount the motor. This is the preferred mounting method because it reduces the possibility of distortion on the motor's housing.

If instead you're going to mount the motor's shaft in a micrometer clamp, be careful not clamp too hard on the motor's housing. This can deform the motor's shank and may cause increased friction between the inner rotating screw and the fixed exterior housing. If the motor slows or fails completely, try loosening the clamp.

You can turn the motor manually using the knob at the end of the screw. Please be careful, however, not to touch the threads of the screw with your tools. Any damage to the screw threads will result in a significantly shorter motor lifetime.

Operating Tips

The Model 830X Picomotor™ actuator's inherent motor step size is <30 nm. To achieve consistent performance, you need only keep a few precautions in mind.

- **Do not remove the knob or the screw from the housing.** The knob is an integral piece of the Picomotor actuator, and its inertia plays an important part in the stick-slip motion of the Picomotor actuator.
- **If the motor stalls, carefully turn the actuator using the knob.** Stalling may occur as the Picomotor actuator ages. By turning the knob and working the screw across the "offending" thread region, the Picomotor actuator can "self heal."
- **If the motor hits a stop, turn off the driver as soon as possible.** Running the Picomotor actuator against a hard stop will decrease the lifetime but will not cause immediate irreparable damage.
- **Use a small amount of lubricant between the stainless-steel ball tip and the load surface to prevent wear and the generation of debris in the interface.** We recommend Krytox GPL 205 or the low-vapor pressure grease, LVP LCT-42.
- **Keep the interface between the stainless-steel ball tip and the load surface clean of debris.** Even small particles on the order of a micron can result in 0.1 to 10 micron differences between the encoder reading and the actual moved distance.
- **Use the Model 830X for pushing against smooth, hard, flat surfaces only, such as the sapphire pads used in New Focus mirror mounts and translation stages.** Pushing on aluminum or stainless-steel surfaces will wear out the ball tip. If the load surface is too soft, small amounts of material can build up in the interface between the ball tip and load surface resulting in surface roughness which can degrade repeatability.
- **Do not push against cone or v-shapes, especially in softer materials such as aluminum.** When the ball wears against a cone or v-shape in softer materials, particle generation can lead to increased friction and torsional loads. These torsional loads can easily exceed the torsional load limit of 2.5 oz-in (0.018 N•m) thus stalling the motor.
- **Avoid damage to the screw threads.** Do not touch the screw threads with any hard object—even lightly. To provide the fine resolution, the screw has very fine-pitch threads. If the threads are damaged, this damaged area will produce repeated excessive wear within the fixed motor housing and significantly reduce the lifetime of the motor.
- **Avoid clamping tightly on the motor's housing.** As stated in Mounting the Motor, this can cause increased friction between the rotating inner screw and the fixed exterior housing resulting in slowed motor motion or complete failure. This can also result in damaged screw threads.
- **Periodically examine the stainless-steel ball tip and the load surface for wear.**

Specifications

Model 8301 0.5" Picomotor Actuator

Linear Travel Range: 0.5" (12.7 mm)
Minimum Incremental Motion: <30 nm
Mounting: 0.375" (9.5 mm) Shank
Speed (@ 2 kHz pulse rate): 1.2 mm/min[1]
Operating Temperature: 10 – 40 °C
Connector Type: 4-Pin RJ-22

Maximum Load: 5 lbs (22 N)
Angular Resolution: <0.6 mrad
Torque: 2.5 oz-in (0.018 N ·m)
Lifetime: 2500 Standard Cycles[2]
Cable Length: 7 Feet

Model 8302 1" Picomotor Actuator

Linear Travel Range: 1" (25.4 mm)
Minimum Incremental Motion: <30 nm
Mounting: 0.375" (9.5 mm) Shank
Speed (@ 2 kHz pulse rate): 1.2 mm/min[1]
Operating Temperature: 10 – 40 °C
Connector Type: 4-Pin RJ-22

Maximum Load: 5 lbs (22 N)
Angular Resolution: <0.6 mrad
Torque: 2.5 oz-in (0.018 N ·m)
Lifetime: 2500 Standard Cycles[2]
Cable Length: 7 Feet

Model 8303 2" Picomotor Actuator

Linear Travel Range: 2" (50.8 mm)
Minimum Incremental Motion: <30 nm
Mounting: 0.375" (9.5 mm) Shank
Speed (@ 2 kHz pulse rate): 1.2 mm/min[1]
Operating Temperature: 10 – 40 °C
Connector Type: 4-Pin RJ-22

Maximum Load: 5 lbs (22 N)
Angular Resolution: <0.6 mrad
Torque: 2.5 oz-in (0.018 N ·m)
Lifetime: 2500 Standard Cycles[2]
Cable Length: 7 Feet

[1] *Achieved speed varies pulse rate.*

[2] *Standard cycle is a 3-mm round trip with a 5-lb load.*

A Word on Repeatability

Because the Picomotor actuators are stick-slip motors, their step-size varies under normal operation conditions. The actual achieved step size depends upon many variables including temperature, load, and lifetime. It is normal to have large changes in step size (thus speed) when traveling different directions.

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