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Miniature Linear Motion Series · PQ12



PQ12 Actual Size

Actuonix Motion Devices unique line of Miniature Linear Actuators enables a new generation of motion-enabled product designs, with capabilities that have never before been combined in a device of this size. These tiny linear actuators are a superior alternative to designing your own push/pull mechanisms. Their low cost and easy availability make them attractive to hobbyists and OEM designers alike.

The PQ12 actuators are complete, self contained linear motion devices with position feedback for sophisticated position control capabilities, or end of stroke limit switches for simple two position automation. Driving them couldn't be easier, simply apply a DC voltage to extend the actuator, and reverse the polarity to retract it. Several gear ratios and voltage options are available to give you varied speed/force configurations.

Benefits

- → **Compact miniature size**
- → **Precise position feedback**
- → **Limit switches**
- → **Simple control**
- → **Low voltage**
- → **Equal push/pull force**
- → **Easy mounting**

Applications

- → **Robotics**
- → **Consumer appliances**
- → **Toys**
- → **RC vehicles**
- → **Automotive**
- → **Industrial Automation**

PQ12 Specifications

Gearing Option	30:1	63:1	100:1
Peak Power Point	15N@15mm/s	30N @ 8mm/s	40N @ 6mm/s
Peak Efficiency Point	8N @ 20mm/s	12N@12mm/s	20N @ 8mm/s
Max Speed (no load)	28mm/s	15mm/s	10mm/s
Max Force (lifted)	18N	45N	50N
Max Side Load	5N	10N	10N
Back Drive Force	9N	25N	35N
Stroke	20 mm		
Input Voltage	6 or 12 VDC		
Stall Current	550mA @ 6V, 210mA @ 12V		
Mass	15g		
Operating Temperature	-10°C to +50°C		
Positional Repeatability	±0.1mm		
Mechanical Backlash	0.25 mm		
Audible Noise	55dB @ 45cm		
Ingress Protection	IP-54		
Feedback Potentiometer	5kΩ±50%		
Limit Switches	Max. Current Leakage: 8uA		
Maximum Duty Cycle	20%		



Basis of Operation

The PQ12 is designed to push or pull a load along its full stroke length. The speed of travel is determined by the load applied (see load curves). When power is removed the actuator will hold its position, unless the applied load exceeds the back drive force. Repeated stalling of the actuator against a fixed load will shorten the life of the actuator. Since application conditions (Environmental, loading, duty cycle, vibration, etc) vary so widely, we advise application specific testing to determine the expected life of the actuator.

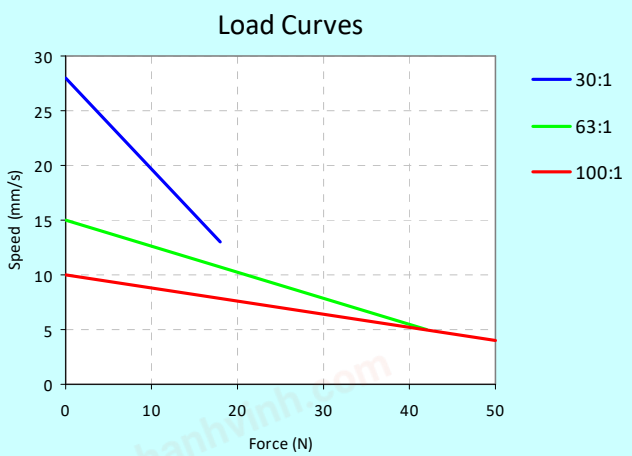
Ordering

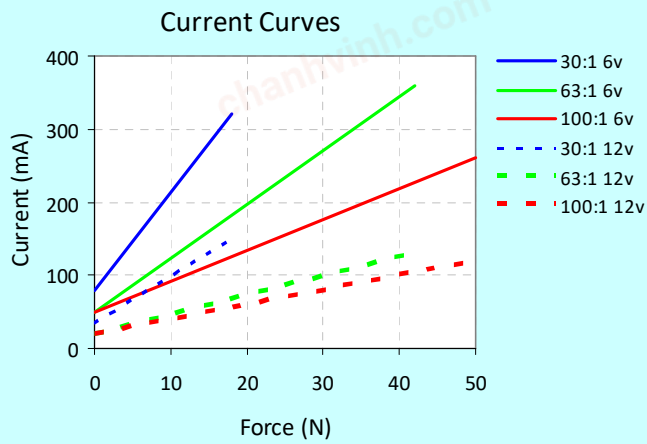
Small quantity orders can be placed directly online at www.Actuonix.com. Each actuator ships with two mounting brackets, M3 mounting hardware, and one FPC ribbon cable connector. To extend the length of the ribbon cable you can purchase one of our PQ12 cable adapters and extension cable, or solder wires directly to the ribbon cable. Contact sales@Actuonix.com for volume quotes and customization options for OEM's.

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PQ12 Specifications





Model Selection

The PQ12 has 3 configuration choices: Gear Ratio, Voltage and Controller. PQ12 options are identified according to the following scheme:

PQ12-GG-VV-C

feature	*options*
GG: Gear reduction ratio (refer to load curves above)	**30**, **63**, **100** (lower ratios are faster but push less force, and vice versa)
VV: Voltage	**6**, **12** (DC volts)
C: Controller	**P** Potentiometer Feedback **S** Limit Switches **R** RC Linear Servo (6V Only)

PQ12 Controller Options

Option S – End of Stroke Limit Switches

WIRING: (see next page for pin numbering)
1- Limit Switch Detection (Optional)
2- Actuator Motor Power
3- Actuator Motor Power
4- Not Connected
5- Not Connected

The –S actuators have limit switches that will turn off power to the motor when the actuator reaches within 1mm of the end of stroke. Internal diodes allow the actuator to reverse away from the limit switch. The limit switches cannot be moved. While voltage is applied to the motor power pins (2 & 3) the actuator extends. Reverse the polarity and the actuator retracts. This can be accomplished manually with a DPDT switch or relay, or using an H-Bridge circuit. The –S model cannot be used with the LAC control board. Pin #1 can be used to sense when the actuator has reached the end limits. See our FAQ page for a simple schematic to light an LED when the limits are reached.

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Option P – Potentiometer Position Feedback

WIRING: (see next page for pin numbering)
1 – Feedback Potentiometer negative reference rail
2 – Actuator Motor Power
3 – Actuator Motor Power
4 – Feedback Potentiometer positive reference rail
5 – Feedback Potentiometer wiper

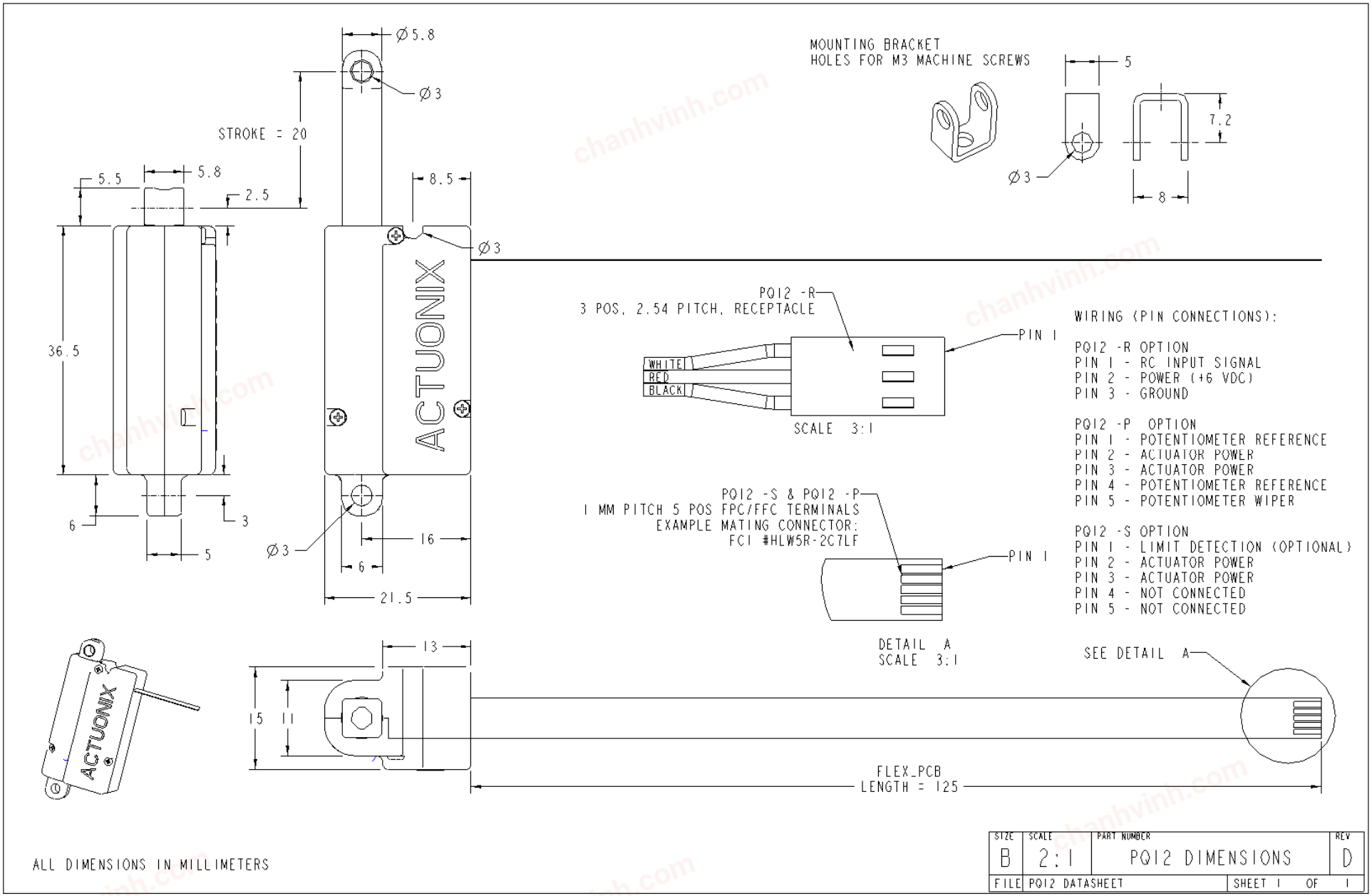
The –P actuators have no built in controller, but do provide analog position feedback. While voltage is applied to the motor power pins (2 & 3) the actuator extends. Reverse the polarity and the actuator retracts. Position of the actuator stroke can be monitored using the internal linear potentiometer. Provide any stable low and high reference voltage on pins 1 & 4, then read the position signal on pin 5. The voltage on pin 5 will vary linearly between the two reference voltages in proportion to the position of the actuator stroke. Connect to an LAC board for easy interface with any of the following control signals: Analog 0-5V or 4-20mA, or Digital 0-5V PWM, 1-2ms Standard RC, or USB.

Option R – RC Linear Servo

WIRING: (see last page for pin numbering)
1 - RC input signal (RC-servo compatible)
2 - Power (+6 VDC)
3 - Ground
Note: Reversing polarity on pins 2 and 3 may cause damage

-R actuators are ideally suited to use in robotics and radio control models. The –R actuators or 'linear servos' are a direct replacement for regular radio controlled hobby servos. The desired actuator position is input to the actuator on lead 1 as a positive 5 Volt pulse width signal. A 2.0 ms pulse commands the controller to fully retract the actuator, and a 1.0 ms pulse signals it to fully extend. If the motion of the actuator, or of other servos in your system, seems erratic, place a 1–4Ω resistor in series with the actuator's red V+ lead wire. The PQ12–R Linear Servos are designed to work with typical RC receivers and battery packs. Consequently, they also are compatible with Arduino control boards, VEX Microcontrollers and many other similar boards designed for robotics.

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Rev D. January 2019