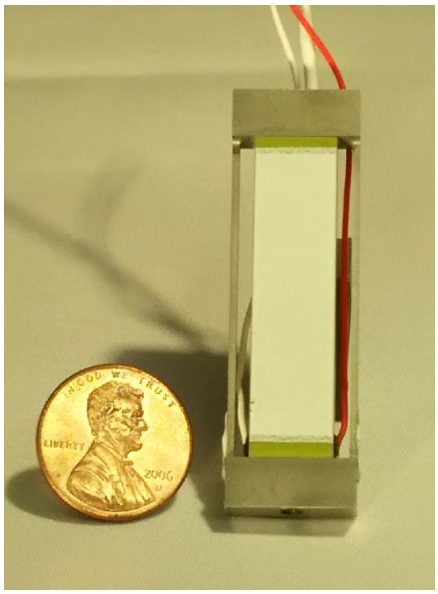
Mechano Transformer Corporation

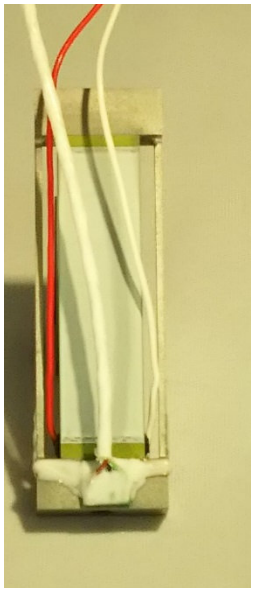
www.mechano-transformer.com
contact: info@mechano-transformer.com

Preload piezoelectric actuator with strain gauge

MTPTK Series: MTPTK05S50F2000SG

Specifications for actuator





- **Open-loop stroke: 50 μm @ 150V (fixed-free)**

*Tolerance value: 40～60 μm

- **Operating voltage:-20 V ～+150 V**
- **Stiffness in motion direction: 40 N/μm**
- **Resonance frequency(fixed-free):**
  2.1 kHz@130g of load

*Tolerance value: 1.6～2.5 kHz (@130g of load)

*Blocked-Free

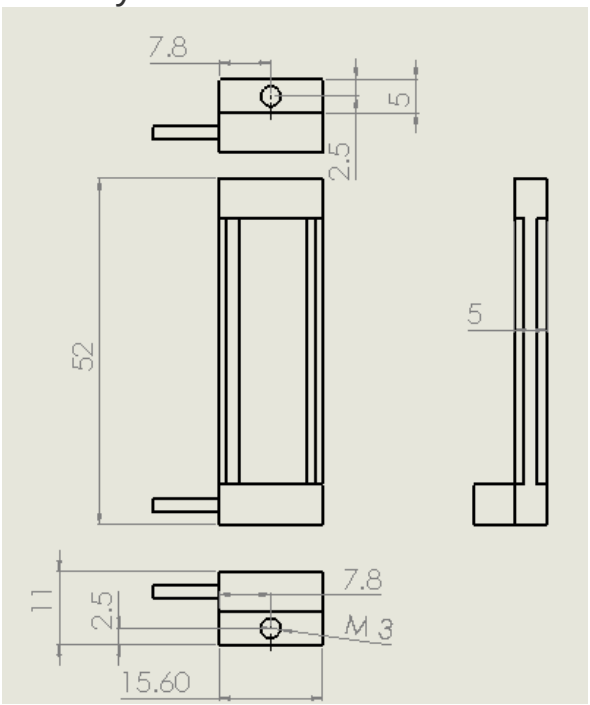
- **Blocked force: 2.0 kN** (*Tolerance value: 1.6～2.4kN)
- **Capacitance: 11.0 μF**
- **Electrical connection: Red=+HV, White=GND**
- **Dimension: 5x16x52 mm**
- **Mechanical interface: 2-M3.0 Tapped hole at both sides**
- **Environment: 0 to 85℃ with humidity less than 40%**
- **Mass: 28 g**

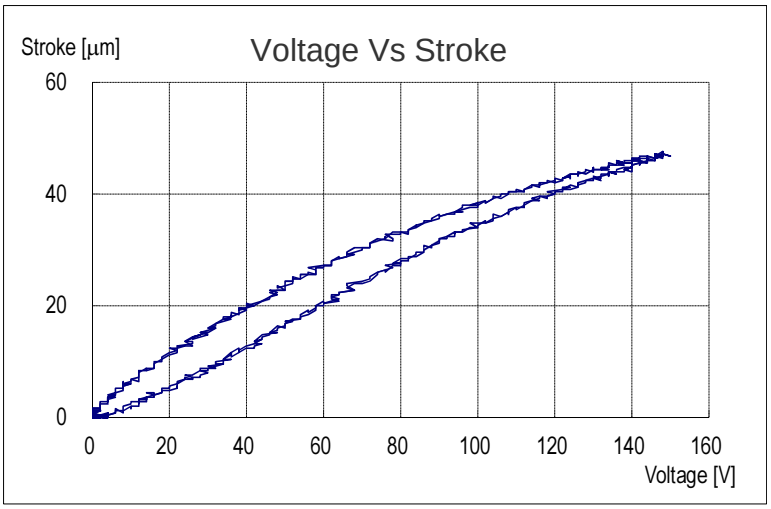
*All dimensions and specifications stated are nominal.

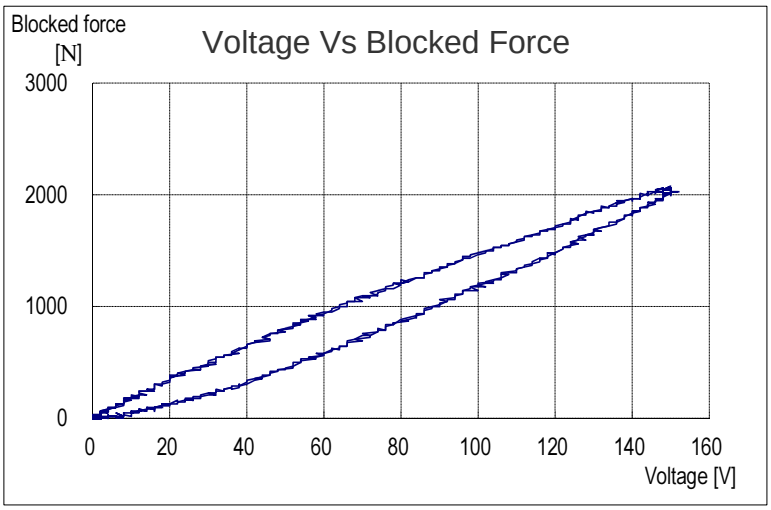
Option:

・Mechanical interface can be tailor with an addition option fees.

Geometry







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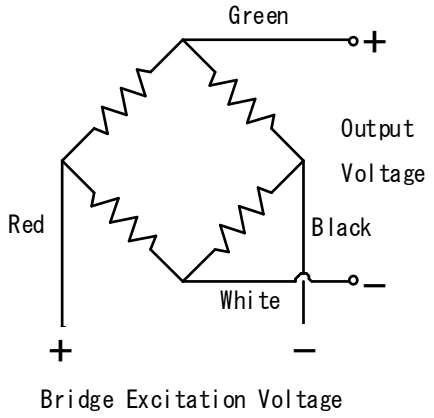
Preload piezoelectric actuator with strain gauge

MTPTK Series: MTPTK05S50F2000SG

Specifications for strain gauge:

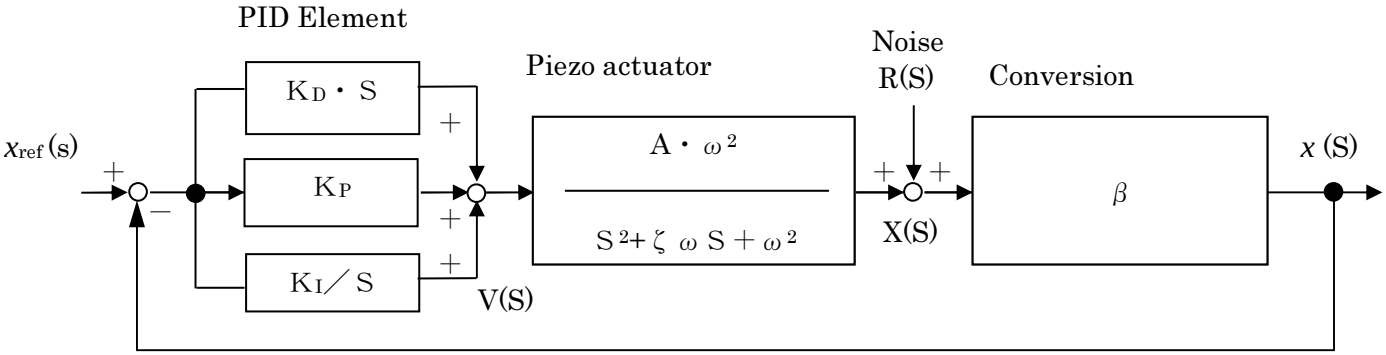
- **Bridge Arm Resistance: 120ohm**
- **Bridge Excitation Voltage (V_{BE}): 2V?(Max)**
- **Lead Wire:**
  in 4 different colored wires(shown in figure)
  with shield mesh
  length 50cm

Electrical connection of Strain gauge:

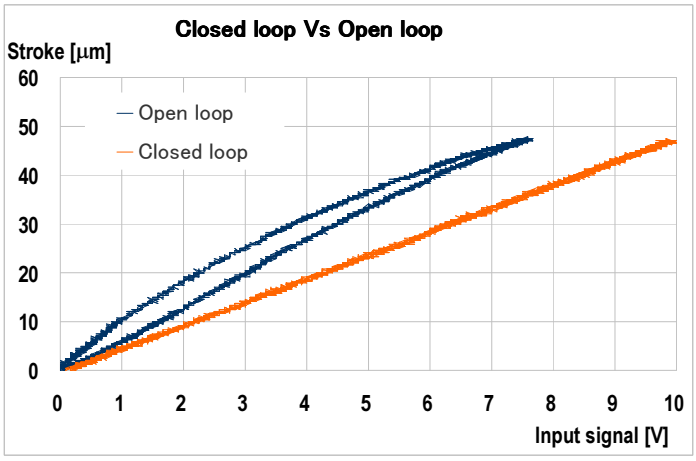


Closed loop control

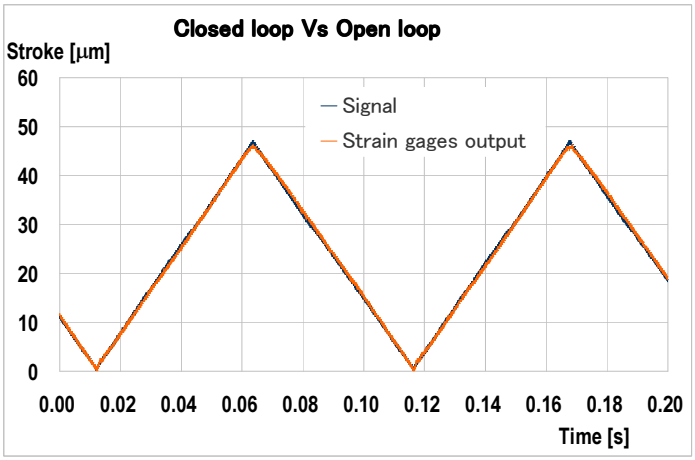
The piezo actuator (piezoelectric stack actuator) is known to have hysteresis, which effect the positioning accuracy. However, with a closed loop control, the linearity of the positioning accuracy can be guaranteed to a certain level depends on the positioning sensor used. Here is an example result of using the strain gages as a positioning sensor to form a closed loop to do a precise positioning with the piezo actuator. The structure of the closed loop system is illustrated below. The PID control method is utilized in the closed loop system.



Structure of the closed loop system utilizing the PID control



Input signal Vs output stroke (displacement)



The tracking performance with strain gages (10Hz)