ThermOmegaTech®

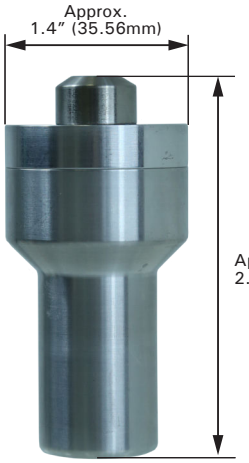
Aerospace & Defense Division

HIGH OUTPUT PARAFFIN ACTUATORS (HOPA)

PHASE CHANGE THERMAL ACTUATORS

ThermOmegaTech's High Output Paraffin Actuator (HOPA) converts a temperature change into a mechanical force to push/pull, extend/retract, release, or move a load. These actuators utilize paraffin wax that transitions between solid and liquid states in response to temperature changes, producing a significant amount of force due to the non-compressible nature of the wax.

Our HOPAs are developed to withstand the harsh environment of space, including vacuum conditions, extreme temperatures, and radiation exposure. Their simplistic design has no complex mechanical parts or external power source needed to operate. They are easily customizable to meet a variety of customer size and application requirements.



Approx.
Weight = .28lb (127g)

*Weights and dimensions will alter based on customer requirements

APPLICATIONS

Our High Output Paraffin Actuators are a reliable solution for a wide range of applications. They operate in pressure or vacuum, liquid, or gas. They can be used on spacecraft, satellites, and deep sea vehicles for multiple actuation or one-time release operation and are ideal for delicate payloads.

DESIGN FEATURES

- Self-actuating; No external power source
- Nonexplosive
- Long, powerful, gentle stroke
- Negligible outgassing
- High output force
- Quiet operation
- Low SWaP
- Unaffected by shock or vibration
- Fewer components = fewer failure points
- Customizable dimensions and materials

OPERATION

The paraffin wax is sealed inside the actuator cup. As the actuator is heated to the actuation temperature for the wax, it begins to melt and expand, creating pressure. This pressure is translated through the lip seal to the piston, causing it to extend, generating a linear motion.

As the wax cools and solidifies, it contracts, allowing the piston to be pushed back into the actuator if a return force is acting on the piston.

An external heat source (such as an electric resistor) can be used to heat the actuator on demand.

SPECIFICATIONS

Start to stroke temperatures:	15°F to 300°F (-9.4°C to 148.8°C)
Typical temperature change for maximum stroke:	10°F to 20°F (5.5°C to 11.1°C)
Stroke/Output Force:	At .550" of stroke = 900 lbf
Materials:	Brass, 300 series SS, Duplex 2205 and 2507 SS, and Aluminum 7075. *Other material is available upon request.*
Chemical treatment options:	Passivation, Electropolishing, NACE Annealing, Chemfilm and Anodizing