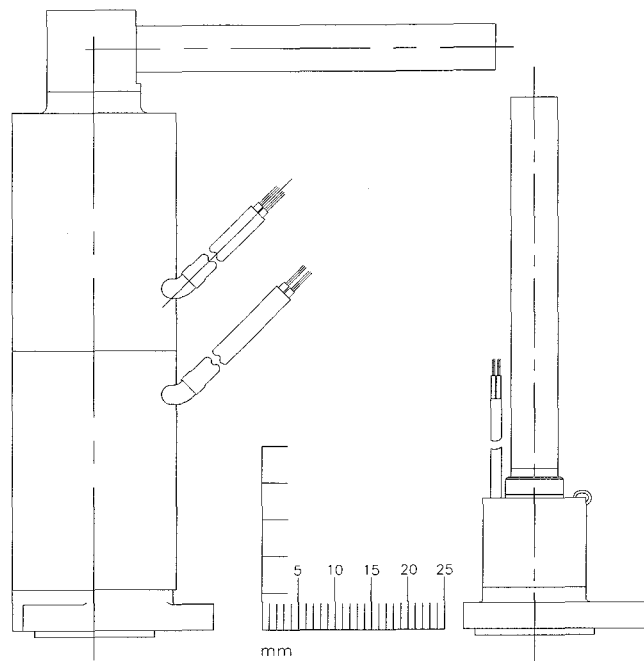


Minimum Impulse Thruster Valve Design and Development

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The design and development of a minimum impulse thruster valve was conducted under contract by NASA's Jet Propulsion Laboratory for deep space propulsion systems. The effort was focused on applying known solenoid design techniques scaled to provide a 1-millisecond response capability for monopropellant, hydrazine **ACS thruster** applications. The valve has an extended operating temperature range of 20°F to 350+°F with a total mass of less than 25 grams and nominal power draw of 7 watts.

The design solution resulted in providing a solenoid valve that is one-tenth the scale of the standard product line. The valve has the capability of providing a mass flow rate of 0.0009 pounds per second hydrazine. The design life of 1,000,000 cycles was demonstrated both dry and wet. Not all design factors scaled as expected and proved to be the focus of the final development effort. These included the surface interactions, hydrodynamics and driver electronics. The resulting solution applied matured design approaches to minimize the program risk with innovative methods to address the impacts of scale.



Standard Thruster Valve Compared to MIT Valve