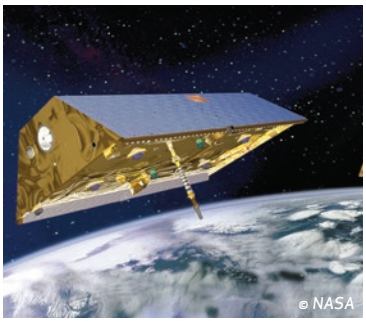
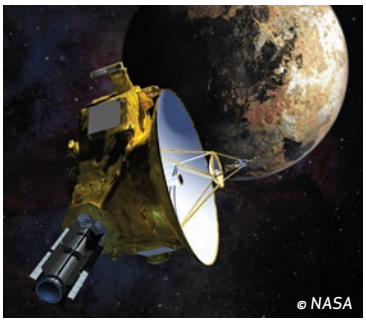
COLD GAS THRUSTER TRIAD

Model 50-820's design evolved from years of Moog miniature solenoid valve experience. Moog supported high profile Missile Defense Agency programs by designing very small, light weight and fast acting pilot actuated thruster valves. Moog transferred technology from these programs to develop a family of commercial cold gas thruster valves. The cold gas triad thruster was also flight qualified for the launch and hypersonic vehicle markets as the vehicle's attitude and roll control system. The cold gas thruster is a perfect solution for packaging three thrusters into a triad configuration or two thrusters into a "bow-tie" configuration.





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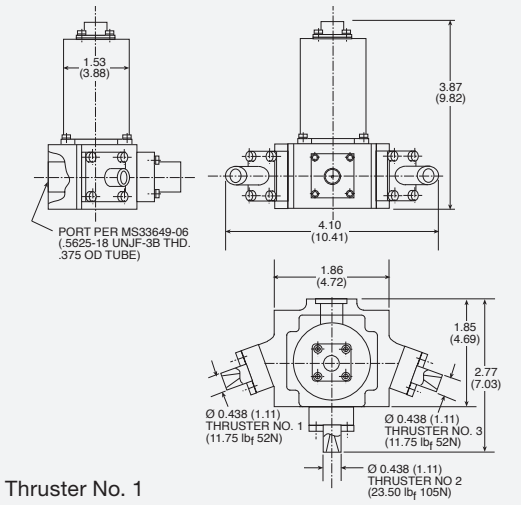
COLD GAS THRUSTER TRIAD

TYPICAL PERFORMANCE SPECIFICATIONS

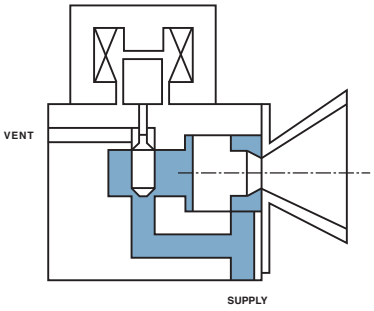
Parameter		Performance
Pressures	Operating	200 to 2500 psig (13.7 to 172.4 bar)
	Proof	3750 psig (258.6 bar)
	Burst	6,250 psig (431 bar)
Atmospheric Thrust	Thruster 1&3: 11.75lbf (52N) at 2,000psi Thruster 2: 23.5lbf (105N) at 2,000psi	
Operating Voltage Range	24 to 34 vdc	
Response Time	Open	< 10 msec
	Close	< 10 msec
Power Consumption	6 to12 watts	
Leakage	Internal	≤ 10 scc/min GN_2 per seat
	External	< 30 scc/min GN_2 entire module
Cycle Life	> 6,000	
Weight	0.95 lb (0.43 kg)	
Thermal Capacity (Operating)	0°F to +120°F (-17°C to +48°C)	
Wetted Materials	Aluminum, Stainless Steel and Vespel®	

Most of the listed performance parameters reflect the program requirements and not the design limitations of the valve. In general most valves will perform better than listed in the following areas: system pressure, flow rate, pressure drop, internal leakage and response time.

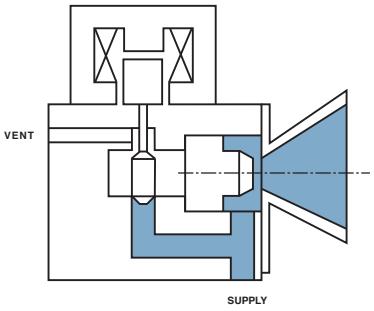
PRODUCT DIMENSIONS



LOCKUP POSITION



FLOWING POSITION



Note: 1/3 section shown for simplification.

OPERATIONAL DESCRIPTION

Model 50-820 packages three individual pilot valve actuated, normally closed, cold gas thrusters into a single housing. At 2,000 psi inlet pressure, the two outboard thrusters produce 11.75 lbf thrust each and the center thruster produces 23.5 lbf. Each thruster has the capability of being fired independently, simultaneously or in combinations with the other two thrusters to achieve the desired thrust vectoring.

The main seat is closed when the pilot valve is not energized. In this mode a solenoid spring and supply pressure position the pilot poppet against the vent seat. This allows supply pressure to build in a cavity behind the main stage poppet forcing it closed.

When the pilot valve is energized, the pilot poppet moves to the supply pressure seat, uncovering the vent seat and allowing pressure behind the main poppet to vent. At this point the supply pressure acting on the front of the main poppet overcomes the decaying force behind the main poppet causing it to open.

De-energizing the pilot valve allows the solenoid spring and supply pressure to move the pilot poppet back to the vent seat allowing pressure to re-build behind the main poppet overcoming the forces on the front of poppet, closing the main seat.

Model 50-820's thrust levels can be varied by changing its orifice diameters or inlet pressure.

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