



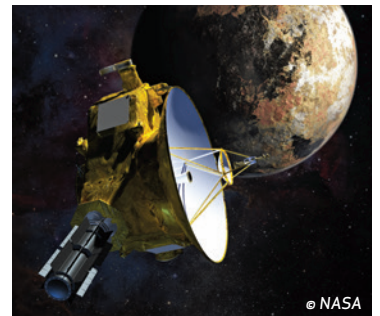
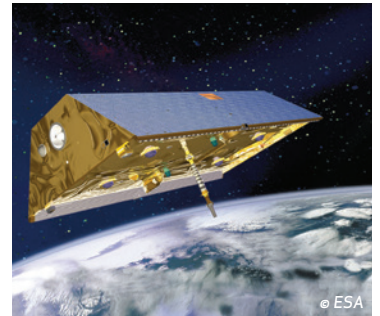
## COLD GAS THRUSTERS



Moog cold gas thruster valves are direct-acting, solenoid actuated devices with a nylon poppet which is integrated in the armature/poppet assembly. In the de-energized closed position, the armature/poppet assembly is held against the seat by a conical helical spring. The valve is opened when the electromagnetic force of the coil overcomes the spring pre-load and the armature/poppet assembly lifts from the seat allowing gas to

flow. De-energizing the coil causes the magnetic field to decay and the spring preload forces returns the armature assembly to its seat providing leak tight gas shut off.

Moog produces cold gas thrusters in a variety of thrust ranges to meet mission requirements. Typical thrusts range from 10mN to 4N. Moog cold gas thrusters have flown on SAFER, SIRTf, CHAMP, GRACE, Pluto Fast Flyby, and DOD classified missions.



# COLD GAS THRUSTERS

## PERFORMANCE CHARACTERISTICS

Parameter



Parameter	GN <sub>2</sub>	GN <sub>2</sub>	GN <sub>2</sub>	GN <sub>2</sub>	GN <sub>2</sub> , GAr, Xe
Propellant	GN <sub>2</sub>	GN <sub>2</sub>	GN <sub>2</sub>	GN <sub>2</sub>	GN <sub>2</sub> , GAr, Xe
Material	Stainless Steel, Fluorosilicone	Stainless Steel, Nylon	Stainless Steel, AFE411	Stainless Steel, Nylon	Stainless Steel, Vespel
Nominal Thrust	10 mN (0.0022 lbf), 16 mN (0.0036 lbf), 40 mN (0.0090 lbf) @ 1.5 bar (21.75 psia) GN <sub>2</sub>	120 mN (0.027 lbf) @ 6.9 bar (100 psia) GN <sub>2</sub>	120 mN (0.027 lbf) @ 6.9 bar (100 psia) GN <sub>2</sub>	3.6 N (0.8 lbf) @ 15.7 bar (230 psia) GN <sub>2</sub>	1.3 N @ 90 bar (1300 psia) Xe inlet, 0.9N @ 90 bar (1300 psia) GN <sub>2</sub> and GAr inlet
Specific Impulse (Nom)	> 60 sec	> 57 sec	65 sec	57 sec	21 sec Xe 70 sec GN <sub>2</sub> 54 sec GAr
MEOP	10.0 bar (145 psia)	20.7 bar (300 psia)	27.6 bar (400 psia)	15.7 bar (230 psia)	186 bar (2700 psia)
Proof	20.0 bar (290 psia)	41.4 bar (600 psia)	70.0 bar (1015 psia)	76.9 bar (1115 psia)	279 bar (4050 psia)
Burst	40.0 bar (580 psia)	82.7 bar (1200 psia)	111.4 bar (1615 psia)	155 bar (2250 psia)	465 bar (6750 psia)
Leakage - Internal	< 0.1 scch GN <sub>2</sub> @ 2.5 bar (36 psid)	< 0.1 sccm GN <sub>2</sub> @ 13.8 bar (200 psid)	< 2.8x10 <sup>-4</sup> scc/s GHe	< 2.0 sccm GN <sub>2</sub> @ 4.1 bar (60 psig)	< 1.0 x 10 <sup>-4</sup> sccs GHe @ MEOP
Leakage – External	< 1.0x10 <sup>-5</sup> su/s GHe	< 1.0x10 <sup>-6</sup> scc/s GHe @ 27.6 bar (400 psid)	< 1.0x10 <sup>-6</sup> scc/s GHe	< 1.0 sccm GN <sub>2</sub> @ 4.1 bar (60 psig)	<1.0 x 10 <sup>-6</sup> sccs GHe @ MEOP
Operating Voltage	22-32 Vdc, 28 Vdc Nominal, 10 Vdc Holding	27-29 Vdc, 28 Vdc Nominal	22-34 Vdc, 28 Vdc Nominal	27-29 Vdc, 28 Vdc Nominal	28 Vdc nominal, 10 Vdc hold
Power	10 W open, 1 W holding	< 35 W @ 28 Vdc, 20°C	< 10.5 W @ 28 Vdc, 20°C 1.5 W @ 10 Vdc (holding)	30 W @ 28 Vdc, 20°C	10.5 W nominal @ 28 Vdc @ 21°C, 1.3W @ 10 Vdc holding voltage
Coil Resistance	86 Ohms at 20°C (68°F)	26.8 Ohms at 20°C (68°F)	75 Ohms at 20°C (68°F)	28 Ohms at 20°C (68°F)	74.5 Ohms nominal at 21°C (68°F)
Response – Opening	< 2.5 msec	< 3.5 msec @ 28 Vdc, 13.8 bar (200 psia)	< 5 msec	< 4 msec	< 10 msec
Response – Closing	< 2.5 msec	< 3.5 msec @ 28 Vdc, 13.8 bar (200 psia)	< 3 msec	< 4 msec	< 10 msec
Life (Cycles)	500,000 – 2,000,000	20,000	1,000,000	> 10,000	> 100,000
Operating Temperature	-50°C to +60°C (-58°F to +140°F)	-40°C to +60°C (-40°F to +140°F)	-25°C to +75°C (-13°F to +167°F)	-40°C to +60°C (-40°F to +140°F)	-70°C to +60°C (-94°F to +140°F)
Inlet Filtration	none	10 micron Absolute	40 micron Absolute	10 micron Absolute	25 micron Absolute
Dimensions	Ø14 mm x 57 mm long (Ø0.55" x 2.25")	Ø14 mm x 20.3 mm long (Ø0.55" x 0.8")	Ø19.1 mm x 41 mm long (Ø0.75" x 1.6")	Ø6.6 mm x 25.4 mm long (Ø0.26" x 1.0")	Ø23.8 x 53.1 mm long (Ø0.94" x 2.1")
Mass	40 grams (0.09 lbm)	16 grams (0.035 lbm)	70 grams (0.15 lbm)	23 grams (0.05 lbm)	115 grams max (0.25 lbm)
Heritage	CHAMP and GRACE	SIRTF	SIRTF, Classified Mission	SAFER, SCIT, Pluto Fast Flyby	GEO applications
Model No.	058E143 058E145 058E146	058E142A	058E151	058-118	58E163A

**MOOG**  
SPACE AND DEFENSE GROUP

For More Information:  
Chet Crone +1.818.576.6823  
ccrone@moog.com



linkedin.com/  
company/moog-sdg



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MoogSDG.USA



twitter.com/  
MoogSDG

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