



TR501 Dual-Mode Thruster

The TR501 DMT is the first truly dual-mode thruster to be flight qualified for both bipropellant and monopropellant modes. Patented by Northrop Grumman in 1995, its wide mixture ratio range makes it optimal for all systems including blow-down systems.

This DMT offers a combination of high Isp (specific impulse) for delta-V and high reliability for attitude control, while maintaining system simplicity and robustness. Over 55 TR501 DMT thrusters have been built to date, with more in production.

TR501 DMT is a 5-to-11 lbf regeneratively cooled, high-performance, N2H4/N2O4 Multipurpose Thruster for:

- Station keeping
- Thrust-vector control
- Attitude control
- Orbit insertion
- Change in orbit
- Propellant depletion

TR501 DMT KEY FEATURES

- Operates in fixed and blowdown (350-120 psia) propulsion systems.
- Thrust level can be set to accommodate various propulsion system inlet pressures.
- Operates in either N2H4 monopropellant mode or N2H4/N2O4 bipropellant mode.
 - Both fuel and oxidizer can be used to depletion.
- Envelope: 11.0 cm x 31.1 cm (4.32" x 12.25")
- Thruster weight: < 2.4 kg (< 5.2 lbm)
- Power:
 - 35 W max @28 Vdc for two dual seat, dual coil valves (17W max per valve).
 - Chamber Heaters: each 6.8W at 28 Vdc, 4 heaters total.
 - Valve Heaters: 9.8 W @28 Vdc per circuit, 4 heaters per circuit, 2 circuits total.
- Telemetry: Two RTDs (Resistance Temperature Detector) to measure chamber temperature and two valve temperature sensors.

R501 DMT PERFORMANCE

- Performance in bipropellant mode:
 - 315 seconds at MR of 1.0, thrust level of 11.5 lbf.
 - 305 seconds at MR of 1.3, thrust level of 7.6 lbf.
 - 292 seconds at MR of 1.4, thrust level of 4.8 lbf.
- Total Throughput:
 - 858 lbs Qual Thruster 1
 - 878 on Qual Thruster 2
- Longest Single Firing:
 - 15,640 in blowdown mode.
 - 6000 seconds fixed thrust.
- Propellant Temperatures: 50 – 148°F
- Flight programs: GeoLITE, JWST, Restricted.

