

400N Hydrazine Thruster

400N Monopropellant Hydrazine Thruster

For launch vehicle and upper stage ARCS and the controlled re-entry of spacecraft.



General Description

The 400N monopropellant thruster uses the storable propellant hydrazine N2H4 and is designed for both long term steady state and pulse mode operation.

This thruster is primarily used for the attitude and roll control of the Ariane 5 launch vehicle during its ascent. After Ariane 5 upper stage separation, the thruster is used for ACS manoeuvres preparatory to the separation of one, or more, spacecraft into their initial orbit.

The thruster is also used for re-entry attitude control applications as successfully demonstrated during the Atmospheric Re-entry Demonstrator (ARD) mission.

The thruster operates over a wide pressure range and is thus ideal for blow down propulsion systems.

The combustion chamber and nozzle are manufactured from Haynes 25 alloy. The structure is also designed to serve as a heat barrier for protecting both the propellant valve and spacecraft structure.

An optional internally redundant catalyst bed heater and thermal insulation guarantees optimum start up conditions. In addition, the thruster is qualified for multiple cold starts.

400N HydrazineThruster Heritage and Future Missions

Since 1996 the 400N Hydrazine thruster has been used on all Ariane 5 G, GS and ES versions for the roll and attitude control manoeuvres.

To March 2015, the thruster has flown on 30 Ariane 5 flights with more than 170 units.

As a further application of the technology gained with this thruster, a derivative has been developed, qualified and flown successfully on the ESA Atmospheric Re-Entry Demonstrator (ARD).

The application envelope of this thruster was further extended in 2005, when it was used within the roll controll systems of the IXV (re-entry technology) and EXM2016 Descent Module. The thruster is also being qualified for satellite de-orbiting manoeuvres where long steady state firings are demanded.

400N Bipropellant Thruster Characteristics	
Characteristics	Values

Thrust range vac	120 to 420N
Isp range vac	212 to 220 sec
Nominal mass flow range	58 to 190 g/s
Supply pressure range	5.5 to 26 bar
Minimum impulse bit range	< 9 Ns
Shortest 'on' time	16 ms
Nozzle area ratio	30
Overall length	325 mm
Nozzle end diameter	67 mm
Mass:	P1 - design 2.7 kg P2 - design 3.8 kg
Environmental loads	16.2 grms
Propellant	Monopropellant grade hydrazine (N2H4)

Qualification	Values
Total Impulse	< 188 kNs
Total number of pulses	> 3900 cycles
Total hydrazine throughput	~ 300 kg
Total operating time	> 850 s
Longest steady state burn	450 s
Number of cold starts < 25° C	19

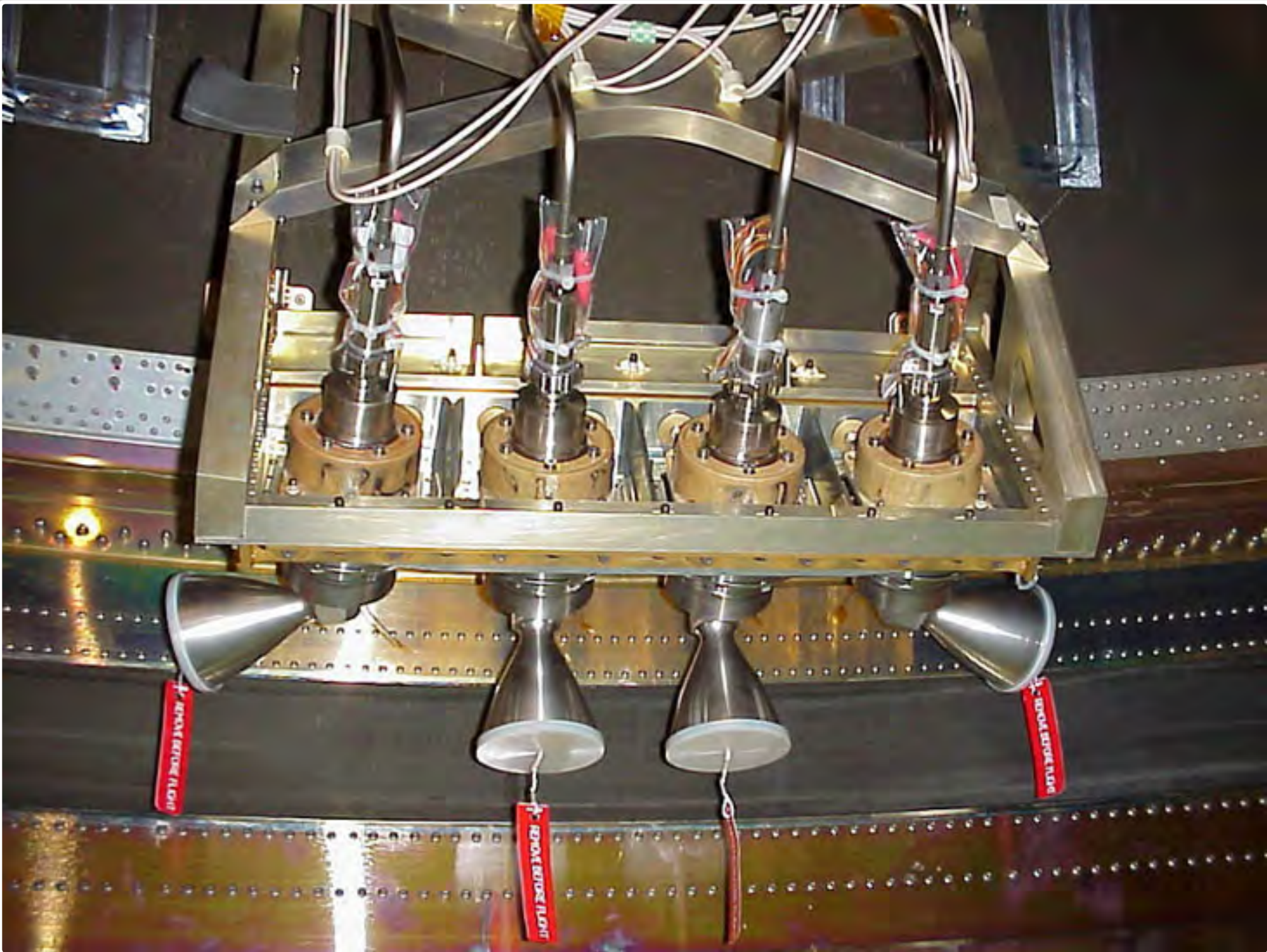
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400N Hydrazine Thruster Cluster Integrated to the Ariane 5 Vehicle Equipment Bay



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