10N Bipropellant Thruster

10N Bipropellant Thrusters

For precision attitude, trajectory and orbit control of large satellites and deep space missions.

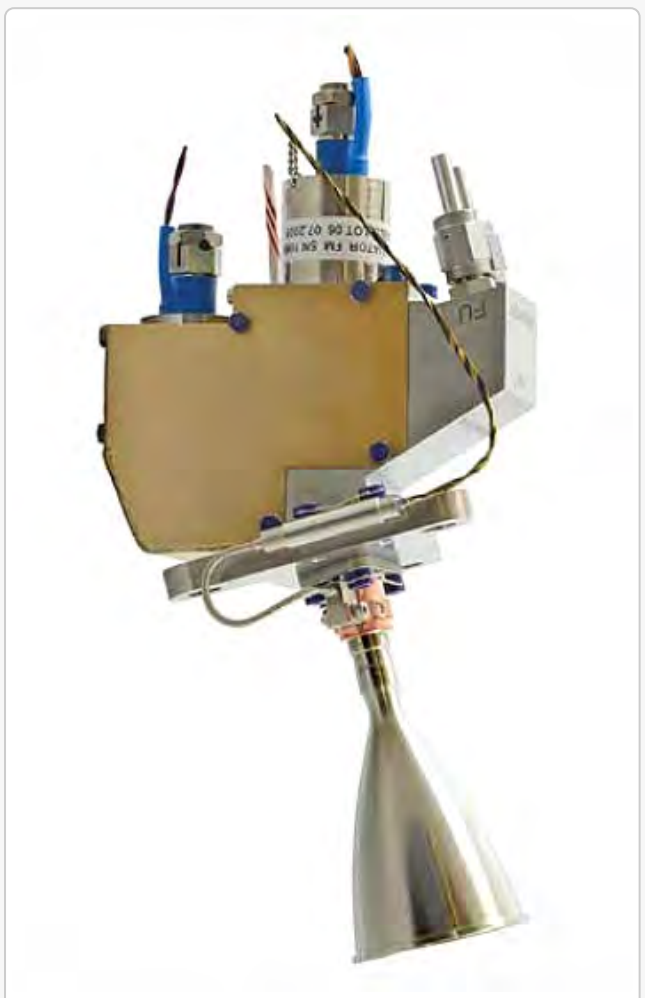
General Description

Amongst our range of bipropellant thrusters, the 10N 'work horse' thruster is specified for most applications. Over 1000 of these thrusters have performed flawlessly in space with hundreds more allocated to future missions.

The 10N bipropellant thruster uses the storable propellants N2O4, MON-1 or MON-3 as oxidiser, and MMH as fuel. The thruster is designed for both long term steady state and pulse mode operation and can function over a wide pressure range in either pressure regulated mode or blow down mode.

10N Bipropellant Thruster
Type S10-18
with Dual Seat Valve

Dimensions:
| Elevation | Plan | Cut-Out |



10N Bipropellant Thruster
Type S10-26
with Dual Seat ArianeGroup Valve

Dimensions:
| Elevation | Plan | Cut-Out |

10N Bipropellant Thruster
S10-13
with Single Seat US Valve

Dimensions:
| Elevation | Plan | Cut-Out |

Thermal Control

If required, the thruster can be fitted with heaters and thermistors for thermal control.

Control Valve Options.

While providing identical performance, the 10N bipropellant thruster is available with a choice of three types of propellant flow control valve:

Materials and Durability

The combustion chamber and nozzle is manufactured from a platinum alloy that requires no surface coating and allows operational temperatures up to 1,500 °C (2,700 °F), thus enabling maximum thruster performance. The uncoated surface is absolutely resistant against oxidation and is thus invulnerable to the application of test sensors as well as millions of pulse cycles.

Systems Flow Rate Calibration

The thruster is provided with trimming orifices upstream of the propellant control valves. This feature allows for individual adjustment of the propellant flow rate according to the systems design pressure.

- Thruster S10-13 with single seat, monostable, torque motor valve from a US supplier.
- Thruster S10-18 with dual seat valve, comprising an upstream latch valve and a downstream monostable valve from a US supplier.
- Thruster S10-26 with dual seat valve, comprising an upstream latch valve and a downstream monostable valve supplied by ArianeGroup, Germany.

When fitted with the ArianeGroup valve, the thruster becomes an all European product.

10N Bipropellant Thruster Characteristics

Characteristics	Metric Values	Imperial/US Values
Thrust, Nominal	10N	2.2 lbf
Thrust Range	6.0 to 12.5N	1.4 - 2.8 lbf
Specific Impulse at Nominal Point	292 s	
Flow Rate, Nominal	3.50 g/s	
Flow Rate, Range	2.30 to 4.20 g/s	
Mixture Ratio, Nominal	1.60 to 1.65	
Mixture Ratio, Range	1.20 to 2.10	
Chamber Pressure, Nominal	9 bar	130 psi
Inlet Pressure Range	10 to 23 bar	145 - 335 psi
Throat Diameter (inner)	2.85 mm	0.11 inch
Nozzle End Diameter (inner)	35 mm	1.38 inch
Nozzle Expansion Ratio (by area)	150	
Mass Thruster with Single Seat Valve	350 g	0.8 lb
Mass Thruster with Dual Seat Valve	650 g	1.5 lb

Chamber/Nozzle Material	Platinum / Rhodium alloy
Injector Type	Double Cone Vortex
Cooling Control	Film and Radiative
Propellants: - Fuel - Oxidiser	 MMH N2O4, MON-1, MON-3
Valve, Single Seat	Bipropellant torque motor valve
Valve, Dual Seat	Bipropellant torque or linear motor valve
Mounting Interface to Spacecraft	Valve flange with 3 feedthrough holes of 6.4 mm (¼") dia.
Tubing Interface	Per SAE AS4395E02, or welded
Valve Lead Wires	24 AWG per MIL-W-81381
Thruster Heater and Thermal Sensor	On request
Qualified longest single burn	8 Hours
Qualified Accumulated Burn Life	69 Hours

Qualified Cycle Life	1,000,000 cycles

HERITAGE - 10N Bipropellant Thruster

Spacecraft	Launch
SYMPHONIE	1974
SYMPHONIE	1975
TV-SAT 1	1987
TDF-1	1988
DFS COPERNICUS	1989
GALILEO	1989
TELE-X	1989
TV-SAT 2	1989
DFS COPERNICUS	1990
EUTELSAT2-F1	1990
INMARSAT2	1990
TDF-2	1990
EUTELSAT2-F2	1991
EUTELSAT2-F3	1991
TELECOM2	1991
DFS COPERNICUS	1992
EUTELSAT2-F4	1992
HISPASAT 1A	1992
HISPASAT 1B	1993
EUTELSAT2-F5	1994
LOCSTAR/ORION-1	1994
TURKSAT 1A	1994
TURKSAT 1AR	1994
TURKSAT 1B	1994
HOT BIRD 1	1995
AMOS	1996
ARABSAT 2A	1996
ARABSAT 2B	1996
CLUSTER I	1996
HOT BIRD 2	1996
HOT BIRD 3	1997
NAHUEL 1A	1997
SIRIUS 2 FM1	1997
THAICOM 3	1997
AFRISTAR	1998
AMC-5, GE-5	1998
EUTELSAT W2	1998

Spacecraft	Launch
HELLAS SAT 2	2003
MARS EXPRESS	2003
Amazonas	2004
EUTELSAT W3A	2004
Intelsat 10-02	2004
ROSETTA	2004
Anik F1R	2005
Apstar 6	2005
GEi1	2005
GEi2	2005
Inmarsat4 FM1	2005
Inmarsat4 FM2	2005
Meteosat SG FM2	2005
Syracrus 3A	2005
Venus Express	2005
Arabsat 4A = Badr-1	2006
Arabsat 4B = Badr-4	2006
HB7A, APA2	2006
Hot Bird 8	2006
Koreasat 5	2006
Syrakus 3B FM2	2006
THAICOM 5	2006
Anik F3	2007
Chinasat 6B	2007
Galaxy 17	2007
Rascom RC1	2007
Skynet 5A	2007
Skynet 5B	2007
Star One C1	2007
AMOS III	2008
Astra 1M	2008
Chinasat 9	2008
CIEL2	2008
Arabsat 4AR = Badr-6	2008
Hot Bird 9	2008
Inmarsat4 FM3	2008
Nimiq-4	2008

Spacecraft	Launch
Astra 2F	2012
W5A	2012
W6A	2012
YAHSAT 1B	2012
Astra 2E	2013
SES-6	2013
W3D	2013
Alphasat	2013
GAIA	2013
Meteosat SG FM4	2013
AMOS 4	2013
BepiColombo	2013
Astra 2G	2014
Astra 5B	2014
Ekspress AM4	2014
ARSAT	2014
AthenaFidus	2014
Eutelsat 3B	2014
MEASAT 3B	2014
Arabsat 6B	2015
ARSAT 2	2015
Eutelsat 9B	2015
LISA Pathfinder	2015
MSG FM4	2015
Exspress AM7	2015
Sicral 2	2015
DirecTV 15	2015
SmallGEO	2015
TELSTAR	2015
AMU - 1	2015
Eutelsat 8WB	2015
AMOS 6	LV failure
SkyBrasil	2015
AMOS 6 R	2016
Bepi Colombo	2018
EDRS - C	2016
SES - 10	2017

HOT BIRD 4	1998	Turksat 3A	2008
HOT BIRD 5	1998	Skynet 5C	2008
SINGASAT	1998	Star One C2	2008
SINOSAT	1998	Afristar 2	2009
ARABSAT 3A	1999	Hot Bird 10	2009
EUTELSAT W3	1999	SICRAL2 (1B)	2009
ORION 2	1999	W2A	2009
ASIASTAR	2000	Comsat-Bw 1	2009
ASTRA 2B	2000	Amazonas-2	2009
CLUSTER II	2000	Palapa D	2009
CLUSTER II	2000	Thor-6	2009
EUTELSAT W4	2000	W7	2009
HISPASAT 1C	2000	Arabsat 5A	2010
NILESAT 2	2000	Arabsat 5B	2010
ARTEMIS	2001	Astra 3B	2010
Atlantic Bird 2	2001	COMS	2010
EURASIASAT	2001	Comsat-Bw 2	2010
Eurobird	2001	RASCOM QAF 1R	2010
SICRAL	2001	KA-SAT	2010
ASTRA 1K	2002	Nilesat 201	2010
Atlantic Bird 1	2002	W3B, PDS31	2010
EUTELSAT W5	2002	Atlantic Bird 7	2011
Hispasat 1D	2002	LISA-Pathfinder	2011
HOT BIRD 6	2002	Arabsat 5C	2011
HOT BIRD 7	2002	Astra 1N	2011
MSG FM1	2002	W3C	2011
STENTOR	2002	YAHSAT 1A	2011
Atlantic Bird 3	2002	SK5D	2012
AMC-9, GE-12	2003	Meteosat SG FM3	2012
AMOS II	2003	Apstar 7	2012
SGDC	2017		
Koreasat 7	2017		
Exomars Orbiter	2016		
Echostar 105	2017		
Eutelsat 172B	2017		
SES - 12	2018		
Solar Orbiter	2018		
MTG	2019		

Bipropellant Thrusters
(PDF Brochure)

Bipropellant Thruster Brochure (pdf)

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