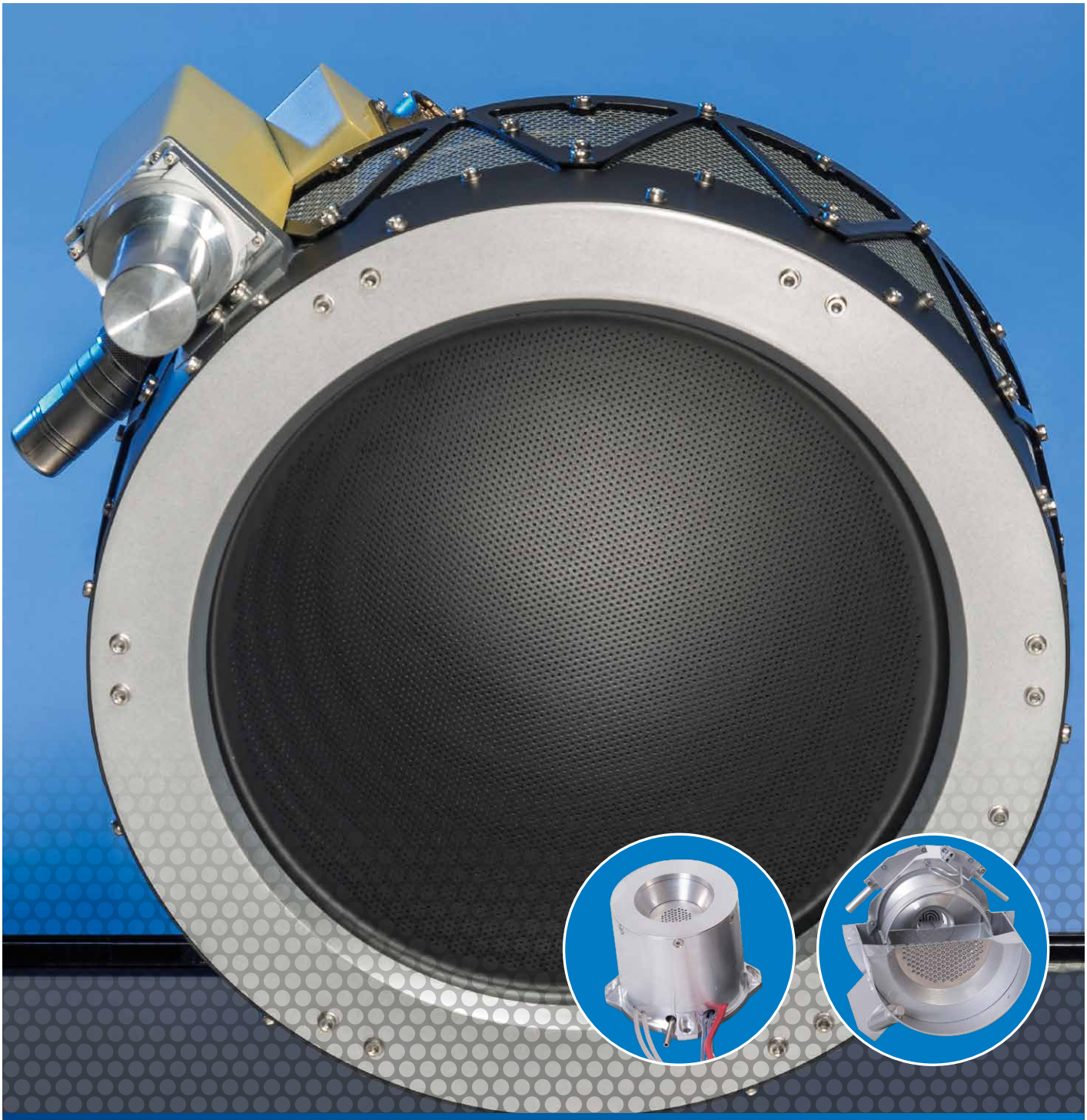
#space**enablers**

www.ariane.group

**ARIANEGROUP**
ORBITAL PROPULSION
ROBERT-KOCH-STRASSE 1
82024 TAUFKIRCHEN
GERMANY

SUSANA CORTÉS BORGMEYER
SUSANA.CORTES-BORGMEYER@ARIANE.GROUP
PHONE: +49 (0)89 6000 29244
WWW.SPACE-PROPULSION.COM

ARIANEGROUP



# ELECTRIC PROPULSION SYSTEMS AND COMPONENTS

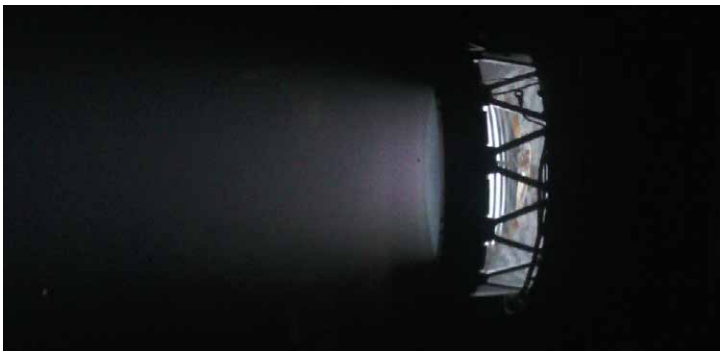
**RADIOFREQUENCY ION PROPULSION FOR ORBIT RAISING, STATION KEEPING AND DEEP SPACE MISSIONS.**

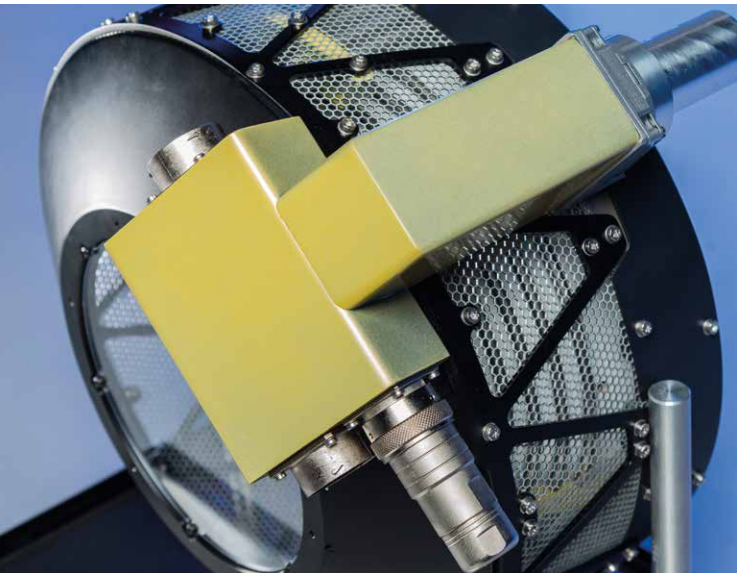
# ELECTRIC PROPULSION SYSTEMS AND COMPONENTS

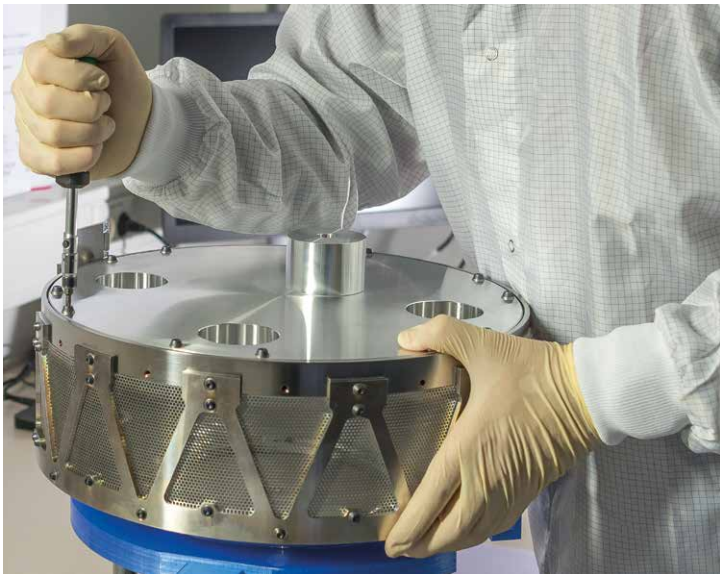
## RADIOFREQUENCY ION PROPULSION FOR ORBIT RAISING, STATION KEEPING AND DEEP SPACE MISSIONS.

### Overview

Our electric space propulsion expertise is based on the space proven Radiofrequency Ion Technology (RIT). Within this field, we produce complete propulsion systems, modules, thrusters and related components.







### Working Principle and Advantages of RIT Technology

In a Radiofrequency Ion Thruster, the atoms in the propellant – the inert gas xenon – are ionised by means of a high-frequency electromagnetic field, forming a plasma. In a plasma, both positively charged xenon ions and electrons can exist separately. The positively charged xenon ions are then accelerated utilizing electrical fields and so ejected to provide thrust. In order to prevent an imbalance in the satellite's net charge due to the stream of positively charged ions being expelled, a neutralizer is used to release electrons so as to keep the system in balance.

- High performance at low complexity
- Highest specific impulse offers substantial mass saving
- Narrow beam divergence
- Robust design concept with a large domain of operational stability
- Large throttle range and adaptable to available electric power
- Highest growth potential with increasing electric power

# RIT µX

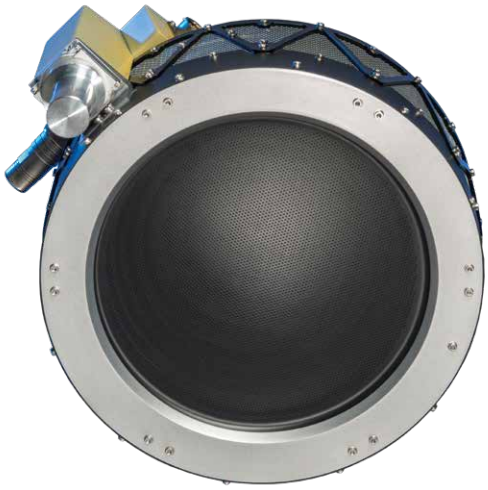
## A VERSATILE MINIATURIZED ELECTRIC PROPULSION THRUSTER OPTIMIZED FOR HIGH PRECISION ORBITAL MANEUVERS

RIT µX is the smallest Radiofrequency Ion Thruster of the electric propulsion thruster portfolio of ArianeGroup. An electric propulsion system based on RIT µX answers to advanced and challenging mission requirements thanks to special characteristics demonstrated during extensive tests: Complex thrust profiles, high dynamics and high resolution, thrust linearity, very low noise and very long thruster lifetime.

# RIT 10 EVO

## THE OPTIMUM THRUSTER FOR NORTH SOUTH STATION KEEPING FOR GEO SATELLITES SYSTEMS AND SMALLER LEO SATELLITES

RIT 10 EVO is the Radiofrequency Ion Thruster with medium thrust level based on the RIT 10 which has flown successfully and flawlessly over 10 years.



# RIT 2X SERIES

## THE BEST MASS SAVING SOLUTION FOR AN ALL-ELECTRIC SATELLITE

The RIT 2X series consists of the largest Radiofrequency Ion Thrusters of the electric propulsion portfolio of ArianeGroup. An electric propulsion system based on a RIT 2X thruster has various advantages like the highest possible thrust efficiency which results in excellent specific impulse over wide thrust ranges and very efficient use of electrical energy.

# RIT THRUSTER FAMILY PERFORMANCE DATA

| | RIT µX | RIT 10 EVO | RIT 2X |
|---|---|---|---|
| **THRUST & POWER** | | | |
| Nominal Thrust | 50 - 500 µN | 5 mN \| 15 mN \| 25 mN | 70–88 mN \| 151–171 mN \| 198–215 mN |
| nom. Power | < 50 W | 145 W \| 435 W \| 760 W | 2000–2500 W \| 4000–4500 W \| 4800–5300 W |
| **FUNCTIONAL PERFORMANCE** | | | |
| extended / on request | 10-100 µN, 300 - 3000 µN | | |
| Isp | 300 - 3000s | > 1900s \| > 3000s \| > 3200s | 3400–3500s \| 3300–3500s \| 2450–2750s |
| max. demonstrated | > 3500s | > 3400s | |
| Divergance angle* | < 17° | < 15° | < 25° |
| **LIFETIME** | | | |
| Total Impulse | > 10kNs up to 200kNs | > 1.1 MNs | > 10 MNs |
| Max Operational cycles | > 10000 | > 10000 | > 10000 |
| Total Lifetime | > 20000 h | > 20000 h | > 20000 h |
| **TECHNOLOGY** | | | |
| Ionisation | RF-Principle | RF-Principle | RF-Principle |
| Acceleration | Electrostatic | Electrostatic | Electrostatic |
| Gridsystem | 2 Grids | 2 Grids | 2 Grids |
| Propellant | Xenon | Xenon | Xenon |
| **DESIGN** | | | |
| mass | 440 g | 1.8 kg | < 10 kg |
| Dimensions | | | |
| Diameter | 78 mm | 186 mm | < 330 mm |
| Height | 76 mm | 134 mm | < 220 mm |
| **ENVIRONMENT** | | | |
| Random | 20-60Hz: +9db/oct<br>60-400Hz: 0.5g^2/Hz<br>400-2000Hz: -6dB/oct<br>Overall: 18.4gRMS | 20-50Hz: +6dB/oct<br>50-1200Hz: 0.32g^2/Hz<br>1200-2000Hz: -6dB/oct<br>Overall: 22.9gRMS | 20Hz: 0.004g^2/Hz<br>100-250Hz: 0.1g^2/Hz<br>400-800Hz: 0.4g^2/Hz<br>2000Hz: 0.006g^2/Hz<br>Overall: 8.1gRMS |
| Sine | 5-20Hz: 11mm (0-peak)<br>20-100Hz: 20g | Z-Axis:<br>5-18Hz: 11mm<br>18-35Hz: 15g<br>35-60Hz: 12g<br>60-100Hz: 6g<br>X-Y-Axis:<br>5-16.5Hz: 11mm<br>16.5-35Hz: 12g<br>35-60Hz: 8g<br>60-100Hz: 4g | 5-20Hz: +- 10mm<br>20-100Hz: 35g |
| Shock | 500Hz: 100g<br>1000Hz: 1500g<br>10000Hz: 1500g | 100Hz: 10g<br>3000Hz: 2000g<br>10000Hz: 2000g | 100Hz: 10g<br>4500Hz: 10000g<br>10000Hz: 10000g |
| Operating Temperature | -40°C to +160°C | -75°C to + 140°C | -50°C to +190°C |
| Non-Operating Temperature range | -60°C to +160°C | -85°C to +140°C | -60°C to +190°C |

* Half angle 95%

# ELECTRIC PROPULSION SYSTEM COMPETENCE

## RADIOFREQUENCY ION PROPULSION FLOW SCHEMATIC