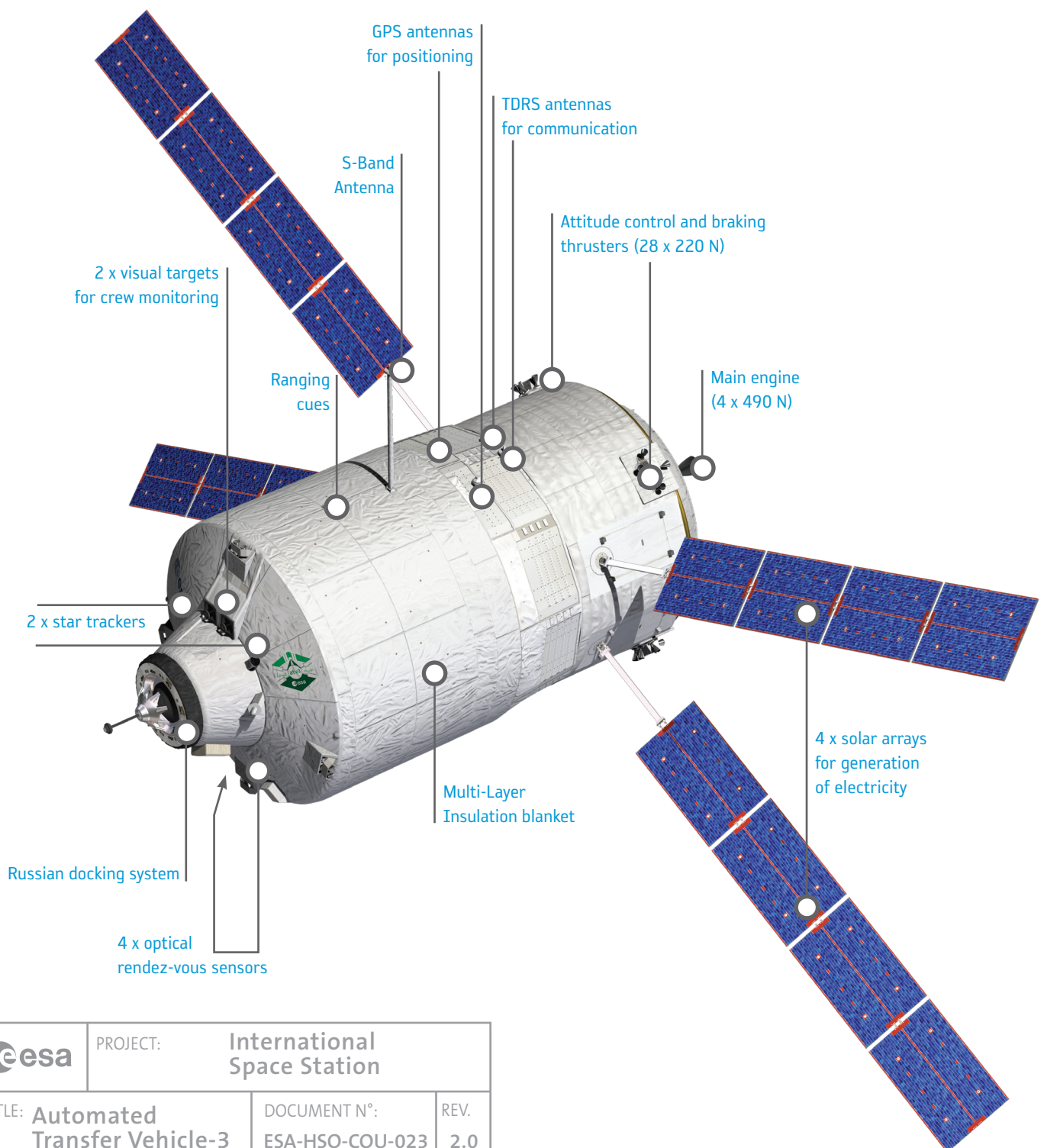


→ **ATV-3 EDOARDO AMALDI**

European servicing and logistics vehicle

The Automated Transfer Vehicle (ATV) is an unmanned automatic vehicle which is put in orbit by the European Ariane 5 launcher. It provides the International Space Station with: pressurized cargo, water, air, nitrogen, oxygen and attitude control propellant. It also removes waste from the station and re-boosts it to a higher altitude to compensate for the atmospheric drag.



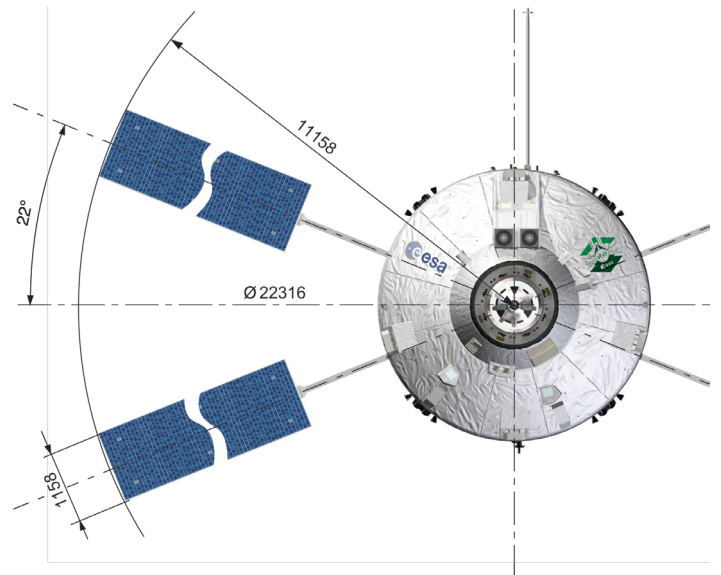
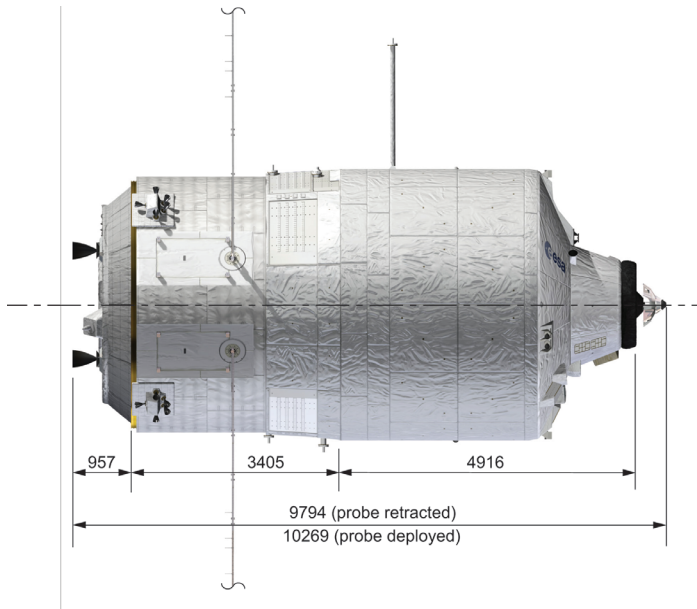
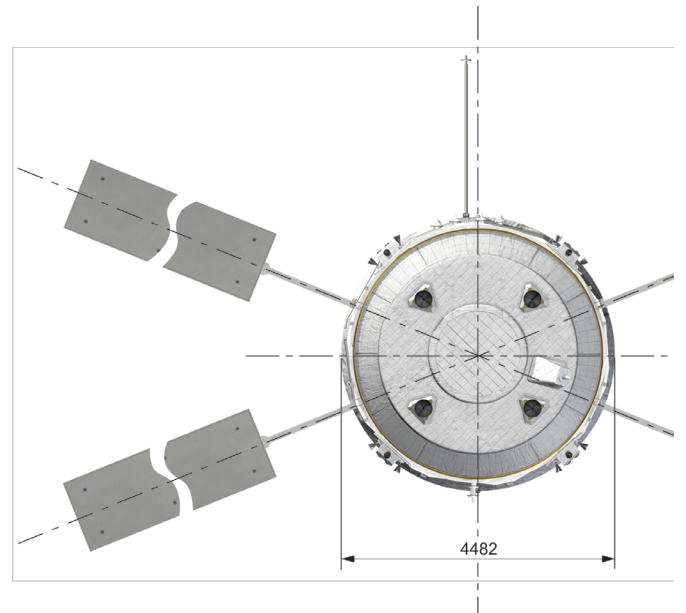
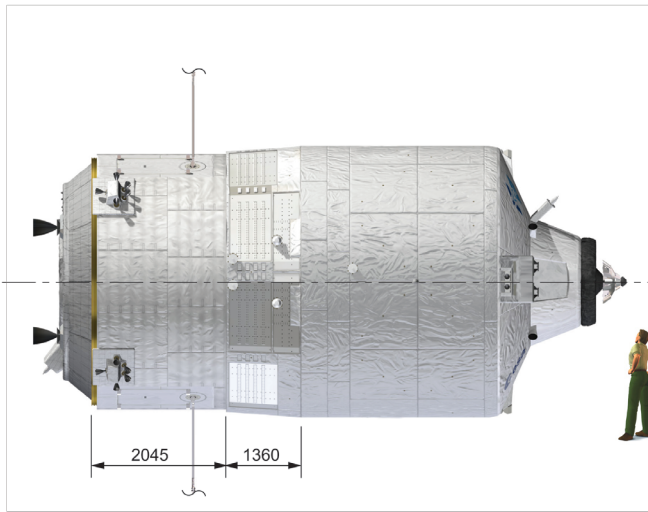
PROJECT:

**International
Space Station**

TITLE: **Automated
Transfer Vehicle-3**

DOCUMENT N°:
ESA-HSO-COU-023

REV.
2.0



The Integrated Cargo Carrier (ICC) getting ready for its flight to Bremen, Germany



ATV-3's Equipped Avionics Bay (EAB) was delivered from Toulouse, France, to Bremen, Germany, via a 'Beluga' Airbus



Specifications

DIMENSIONS

Length: 9,794 mm (probe retracted)
Largest diameter: 4,480 mm
Solar arrays span: 22,281 mm

MASS BUDGET

Vehicle dry mass: 9,778 kg
Vehicle consumables: 2,261 kg
Total vehicle mass: 12,039 kg
Total cargo upload capacity: 7,384 kg
Mass at launch (max): 20,100 kg
Waste download capacity: 6,495 kg (420 km altitude, 51.6° inclination)

PROPULSION

Main propulsion system: 4 x 490 N thrusters (Pressurized liquid bi-propellant system)
Attitude control system: 28 x 220 N thrusters (Pressurized liquid bi-propellant system)
Propellant: Monomethyl hydrazine fuel and Nitrogen tetroxide oxidizer
Pressurization: Helium pressurant at 31 MPa

AVIONICS

- 2 Failures tolerant architecture
- Equipment Interconnection via multiple redundant MIL-STD-1553B buses
- 2 Fault tolerant Computer via voting mechanisms
- Flight Application Software: 450000 lines of code

COMMUNICATIONS INFRASTRUCTURE

To ground: S-band via TDRS satellite
ATV to ISS: S-band antenna via Proximity link
Navigation: Relative GPS, Optical rendez-vous sensors

THERMAL/ENVIRONMENTAL CONTROL

Thermal Control: Multi Layer Insulation material, active thermal control using Variable & Constant Conductive Heat Pipes and paints
ECLSS: Fire detection, air circulation, air temperature monitoring

ELECTRICAL POWER

Ascent to ISS and de-orbit: 4 Solar panel wings of 4 panels each and 40 Ah rechargeable batteries
Number of arrays: 4
Number of panels/array: 4
Generated power: 3,800 W after 6 months in orbit
Required power: < 400 W Dormant mode
supplied by ISS: < 900 W Active mode

MAIN CONSTRUCTION MATERIAL

Pressure shell: Al - 2219
Micrometeoroid and Debris Protection System: Al-6061-T6
Primary bumper: Nextel/Kevlar blankets
Secondary bumper: Al-6061-T6
Internal structure (racks): Goldised Kapton Multi-layer Insulation blanket & aluminised beta cloth
Thermal insulation: Silicon Solar Cells on 4 Carbon Fibre Reinforced Plastic Sandwich panels
Solar arrays:

MAIN CONTRACTOR

Astrium-Space Transportation, leading a consortium of many sub-contractors



PROJECT: **International Space Station**

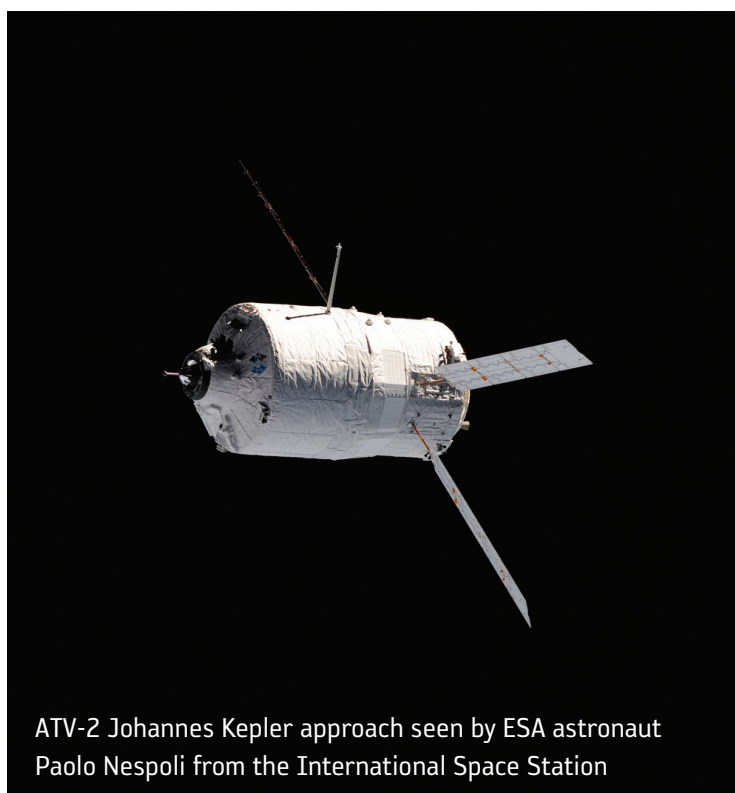
TITLE: **Automated Transfer Vehicle-3**

DOCUMENT N°: **ESA-HSO-COU-023**

REV. **2.0**



ATV-3 containers being offloaded in Kourou harbour from the French cargo ship MN Toucan on 25 August 2011



ATV-2 Johannes Kepler approach seen by ESA astronaut Paolo Nespoli from the International Space Station

Utilisation Relevant Data

LAUNCH CONFIGURATION

Payload: 8 racks with 1.25 m³ each
envelope: 1.005 m³ in front of 2 racks
Cargo mass: Dry cargo: 2400 kg
 Water: 285 kg
 Gas (Nitrogen, Oxygen, air, max. 2 gases/flight): 102 kg
 ISS Refueling propellant: 860 kg (306 kg of fuel, 554 kg of oxidizer)
 ISS re-boost and attitude control propellant: 2950 kg
 Total cargo upload capacity: 6960 kg
Launch vehicle: Ariane 5 (300 x 300 km, 51.6° transfer orbit) ATV-3 will be launched with its solar panels folded to the body of the spacecraft. Electrical power will be supplied by rechargeable batteries.

Launch site: Kourou, French Guiana
Launch date: 29 February 2012

ON ORBIT CONFIGURATION

Deployed solar arrays, with a total span of 22.3 m, that provide electrical power to rechargeable batteries for eclipse periods. Automated flight towards the International Space Station.

FLIGHT HARDWARE

Propulsion and re-boost system
 Avionics equipment
 Guidance navigation and control system
 Communications system
 Power generation and storage system
 Thermal control system
 Russian docking and refueling system

