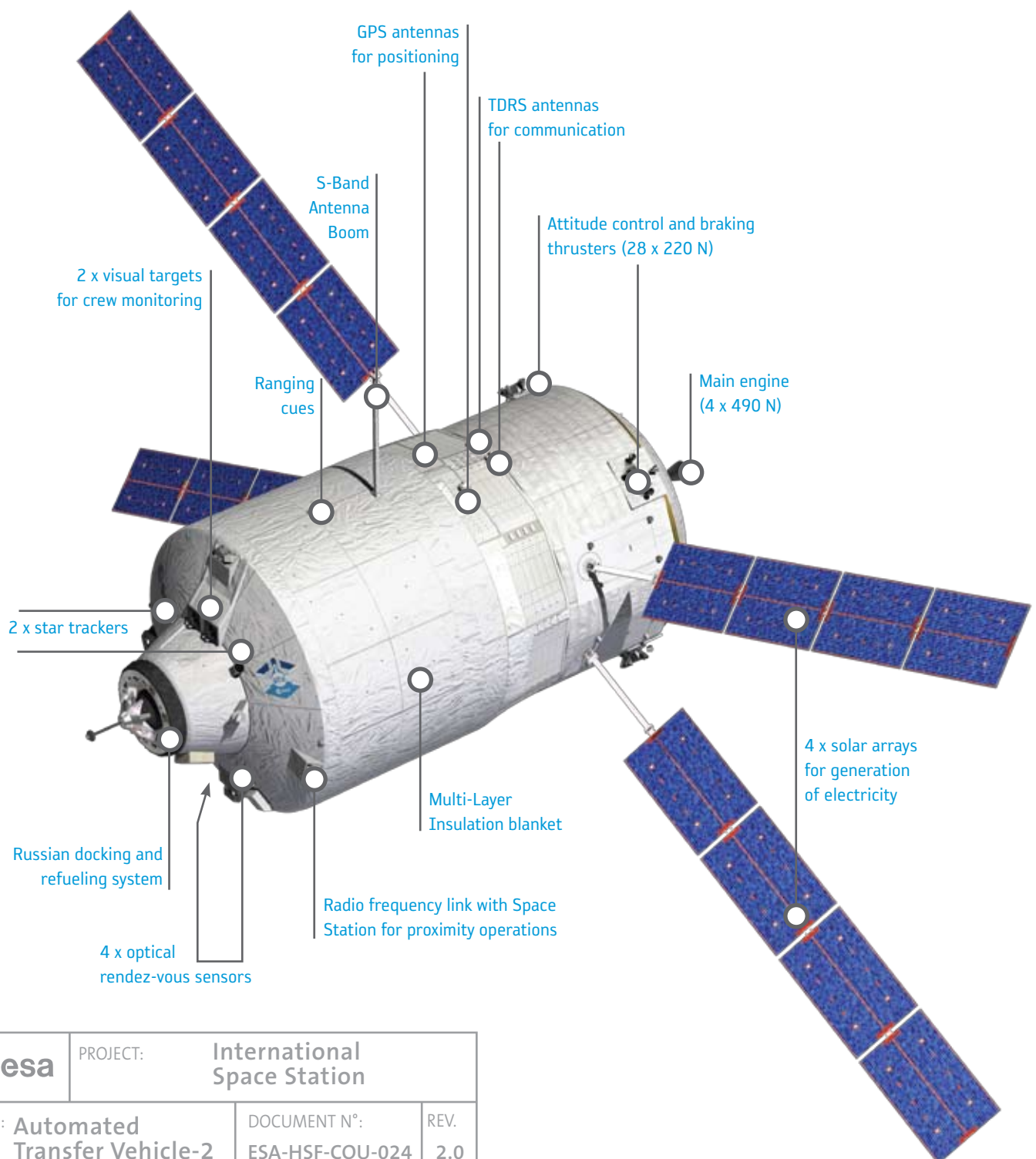


→ ATV-2 JOHANNES KEPLER

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.



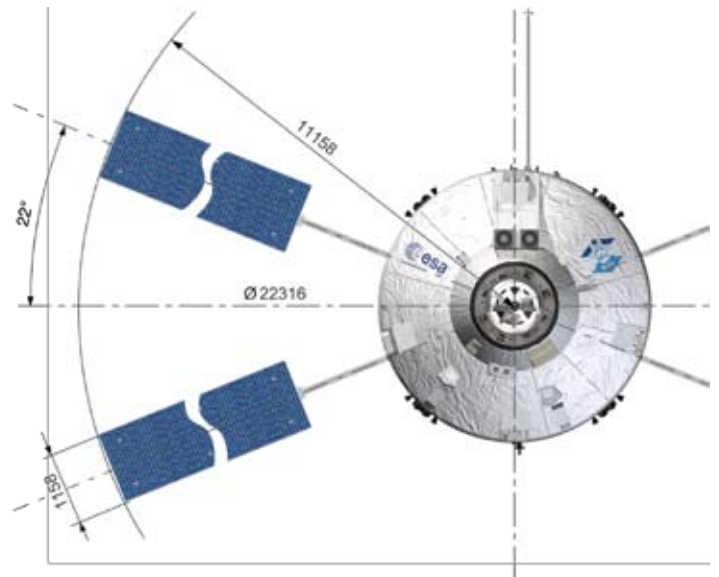
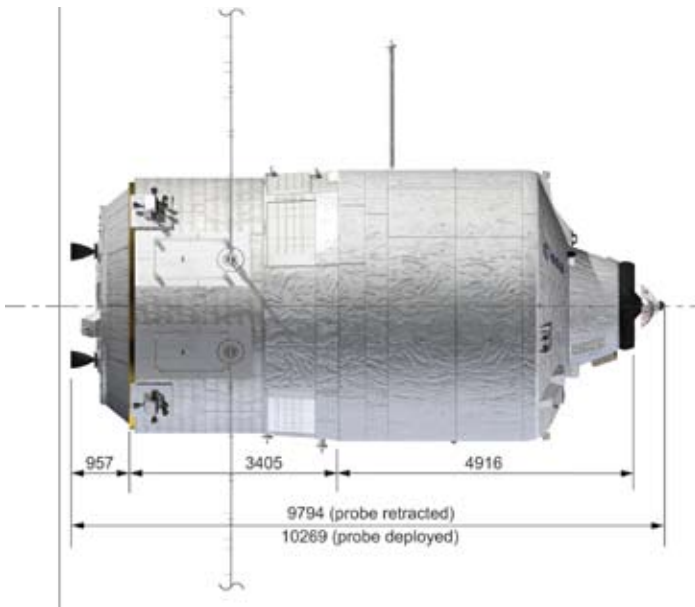
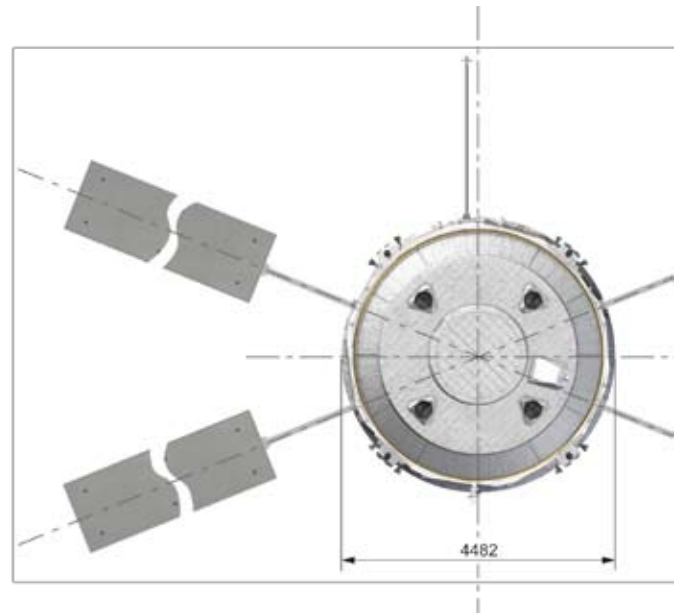
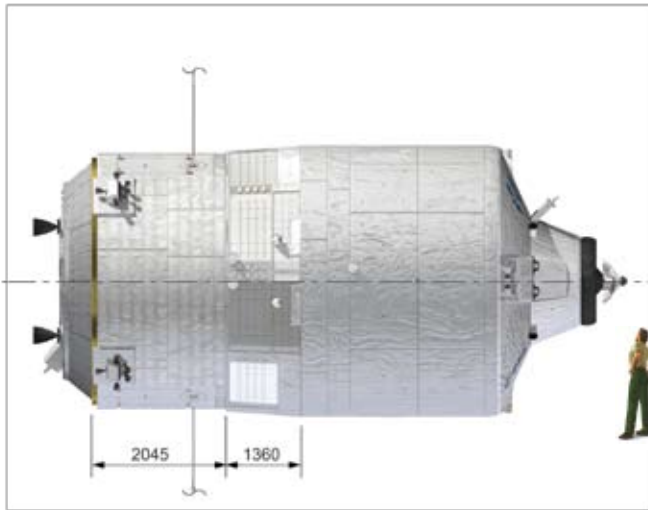
PROJECT:

International
Space Station

TITLE: **Automated
Transfer Vehicle-2**

DOCUMENT N°:
ESA-HSF-COU-024

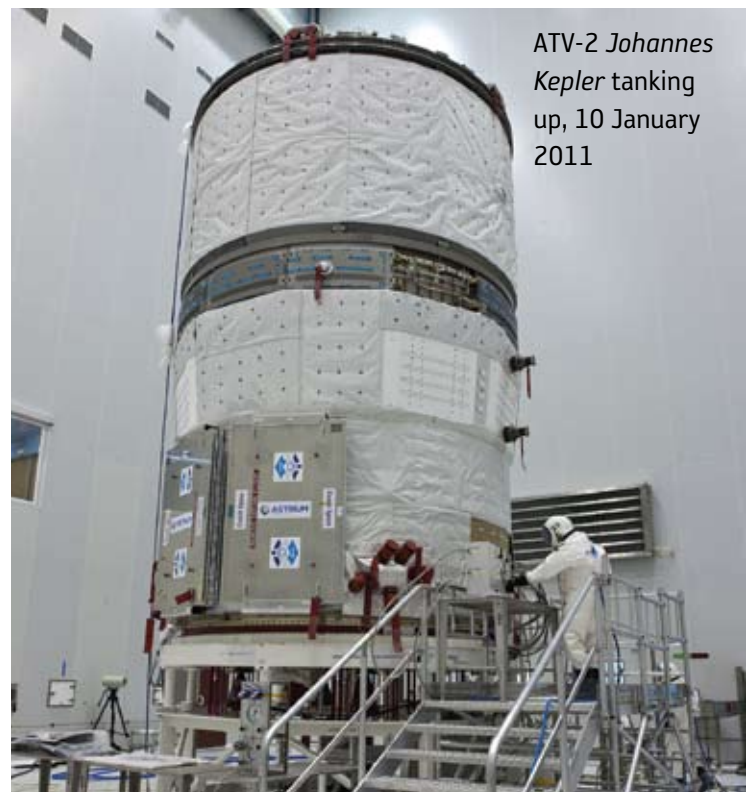
REV.
2.0



ATV-2 Johannes Kepler ready for mating




ATV-2 Johannes Kepler tanking up, 10 January 2011



Specifications

DIMENSIONS	
Length:	9,794 mm (probe retracted)
Largest diameter:	4,480 mm
Solar arrays span:	22,281 mm
MASS BUDGET	
Vehicle dry mass:	10,470 kg
Vehicle consumables:	2,613 kg
Total vehicle mass:	13,083 kg
Total cargo upload capacity:	7,500 kg
Mass at launch (max):	20,750 kg
Waste download capacity:	6,300 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
COMMUNICATIONS INFRASTRUCTURE	
To ground:	S-band via TDRS satellite
ATV to ISS:	S-band antenna via Proximity link
Navigation:	GPS
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:	
Primary bumper:	Al-6061-T6
Secondary bumper:	Nextel/Kevlar blankets
Internal structure (racks):	Al-6061-T6
Thermal insulation:	Goldised Kapton Multi-layer Insulation blanket & aluminised beta cloth
Solar arrays:	Silicium Solar Cells on 4 Carbon Fibre Reinforced Plastic Sandwich panels
MAIN CONTRACTOR	
EADS-Space Transportation, Leading a consortium of many sub-contractors	

	PROJECT: International Space Station	SCALE: 1:75	
		DIMENSIONS: mm	
TITLE: Automated Transfer Vehicle-2		DOCUMENT N°: ESA-HSF-COU-024	REV. 2.0



Liftoff of the Ariane 5 ES-ATV launcher from the Ariane Launch Complex no.3 (ELA-3), on 9 March 2008. On board is ATV-1 *Jules Verne*.



ATV-1 *Jules Verne* following undocking from the International Space Station

Utilisation Relevant Data

LAUNCH CONFIGURATION

Payload: 8 racks with 2 x 0.314 m³ and 2 x 0.414 m³

envelope: each 1.146 m³ in front of 4 of these 8 racks

Cargo mass: Dry cargo: 1,500 - 5,500 kg
Water: 0 - 840 kg
Gas (Nitrogen, Oxygen, air, 2 gases/flight): 0 - 100 kg
ISS Refueling propellant: 0 - 860 kg (306 kg of fuel, 554 kg of oxidizer)
ISS re-boost and attitude control propellant: 0 - 4,700kg
Total cargo upload capacity: 7,667 kg

Launch vehicle: Ariane 5 (300 x 300 km, 51.6° transfer orbit) ATV-2 will be launched with its solar panels folded to the body of the spacecraft. Electrical power will be supplied by non rechargeable batteries.

Launch site: Kourou, French Guiana
Launch date: 15 February 2011

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

