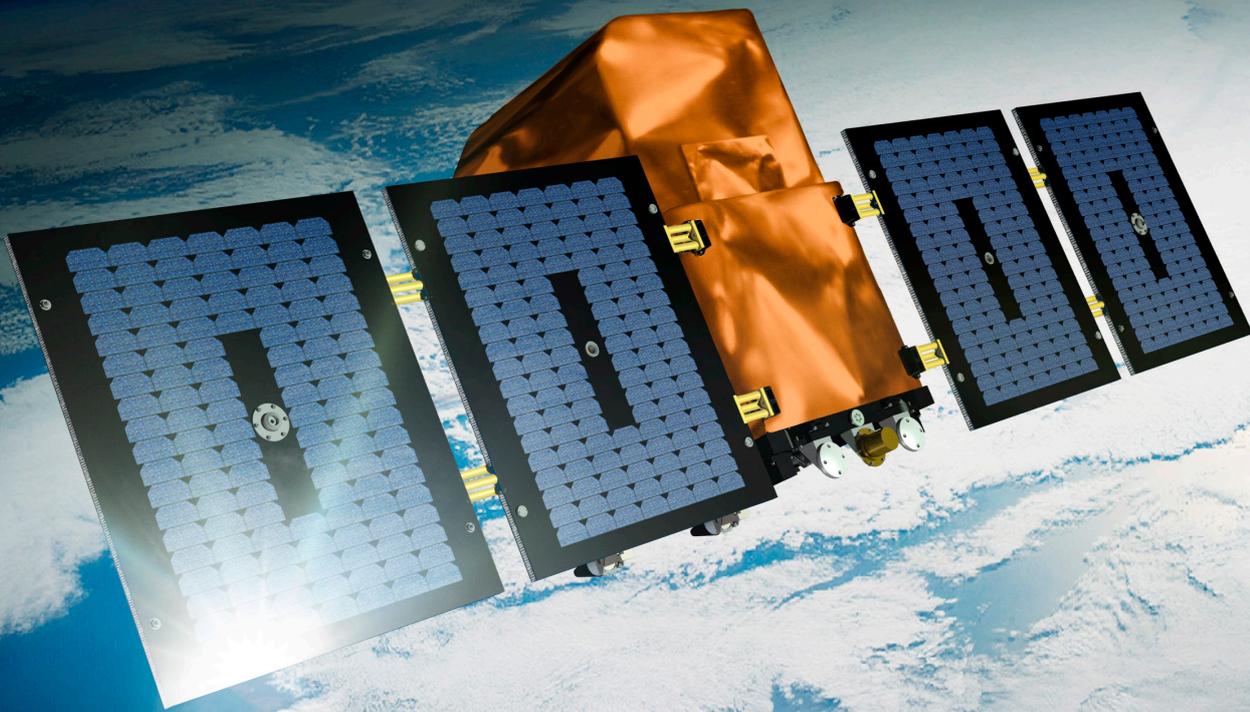


# The P200 platform



The P200 platform is an evolution of the PROBA platform which has acquired extensive flight heritage, accumulating more than 25 years in orbit without failure on any of the launched satellites. This P200 is capable of supporting payloads up to 70 kg and targets spacecraft mass less than 200 kg, making it compatible with typical shared launch opportunities and small satellites launchers.

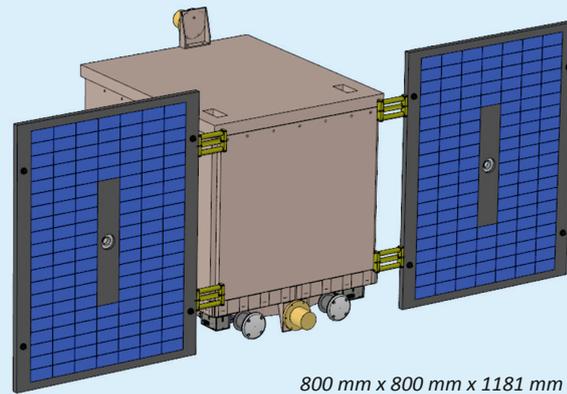
The P200 is a fully redundant design and features a very high level of autonomy, opening the door to low operating cost and very **high system availability** (> 99.9% demonstrated in-orbit). In addition, the P200 has market leading pointing, agility, and data throughput capabilities that can be used to enable **cost-effective missions** and enhance data return.

- Payload: 70 kg / 120 W (standard configuration)
- High system availability
- Delivery in 30 months
- Built in accordance to ESA standards
- Compatible with small satellite launch opportunities

## P200 platform standard configuration

The standard configuration has 2 deployable solar panels but mission specific solutions are available as well.

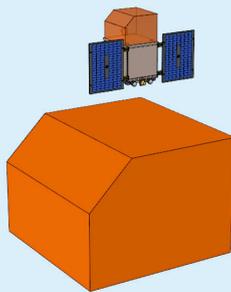
Total mass of the platform is less than 130 kg which, in combination with a 70 kg payload, is compatible with typical shared launch opportunities and small satellites launchers.



800 mm x 800 mm x 1181 mm

## Available payload volume

The layout of the P200 platform allows to accommodate several payload configurations; the complete payload panel at the top of the platform is dedicated to the accommodation of the payload. The payload panel directly accommodates all the payload electronics. Harness is routed through cut-outs in the top panel, along the platform frame towards the bottom board for connection to the platform.



Available payload volume in case of Vega dual launch

Generally, the P200 platform is designed as to keep the interfaces between the platform and payload as simple as possible while imposing also limited constraints on the payload. This makes the platform flexible to various type of payload, making P200 a multi-mission platform capable product.

The available payload volume (in case of Vega dual launch) is shown in the figure right and corresponds to 650x670x490 mm<sup>3</sup>. Depending on launcher, larger payload volumes could be supported.

## Satellite Control Centre

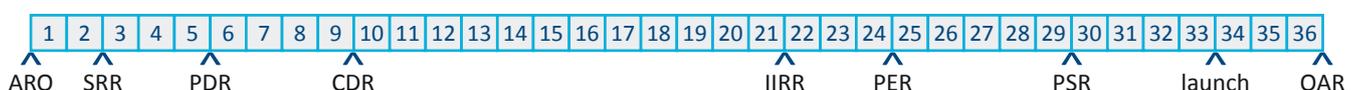
The P200 can be delivered with a satellite control centre (SCC). The SCC is a **turn-key system** which is fully validated in AIV; when entering the operations phase, only the user changes, not the system. It offers as well a **fully transparent automation system**, which can easily be tailored by the end user.

The SCC has showed flawless and fully automated operations since many years, demonstrating its relevance in term of simplicity, autonomy and response to the mission needs starting from AIV up to routine operations.

The SCC is CCSDS compliant allowing seamless integration with majority of existing infrastructure.

## P200 platform – baseline delivery schedule

29 months from ARO to observatory Pre-Shipment Review, up to 36 months for Observatory Acceptance Review.



## Core Spacecraft Mission Heritage

**Proba 1** – customer European Space Agency

**Earth observation, Panchromatic 4m GSD, hyperspectral 17 m GSD (17 bands out of 63)**

Launch: Oct 2001 – PSLV into 650 x 560 km near polar orbit

**Proba 2** – customer European Space Agency

**Space weather / sun observation mission, EUV instruments**

Launch: Nov 2009 – Rockot into 700 km down-dusk orbit

**Proba V** – customer European Space Agency

**Global vegetation mapping, 100 – 300 m GSD, daily coverage global land surface**

Launch: May 2013 – VEGA into 820 km near polar orbit

## Bus Design Features – P200

<i>Structure</i>	<ul style="list-style-type: none"><li>Aluminium Honeycomb Structure mounted on Al milled bottom board</li></ul>
<i>Command and Data Handling</i>	<ul style="list-style-type: none"><li>Based on Rad-hard LEON-3 SPARC processor, cold-redundant</li><li>Interfaces RS422 serial, CAN, SpaceWire</li><li>Payload Data Handling unit 125 Gbit (1Tbit option) with Spacewire I/F to P/L@ 200 Mbps</li></ul>
<i>Flight software</i>	<ul style="list-style-type: none"><li>Flight proven and based on RTEMS Operating System</li><li>Designed for max on-board autonomy, including system mode management, payload ops and FDIR</li></ul>
<i>Electrical Power</i>	<ul style="list-style-type: none"><li>Four deployable panels using GaAs Triple-Junction cells</li><li>Li-Ion battery 18,4Ah</li><li>Unregulated 28V bus with S3R solar array regulation</li></ul>
<i>Guidance, Navigation and Control</i>	<ul style="list-style-type: none"><li>3-axis stabilized design – redundant (4 reaction wheels, redundant star tracker)</li></ul>
<i>Communication</i>	<ul style="list-style-type: none"><li>S-band transceiver for Command and Telemetry: 64 kbps U/L – 2000 kbps D/L, BPSK</li><li>X-band payload telemetry: 100 Mbps</li></ul>
<i>Propulsion</i>	<ul style="list-style-type: none"><li>Monopropellant HPGP system - 4+4 1N thrusters configuration in blow down 4:1</li><li>Tank capacity for up to delta v 120 m/s</li></ul>
<i>Thermal</i>	<ul style="list-style-type: none"><li>Passive thermal control for the spacecraft in general</li><li>Active thermal control (heaters) for battery and propulsion system</li></ul>
<i>Mechanism</i>	<ul style="list-style-type: none"><li>Heritage solar array deployment mechanism</li></ul>

## Bus Capabilities – P200

### Mission Parameters

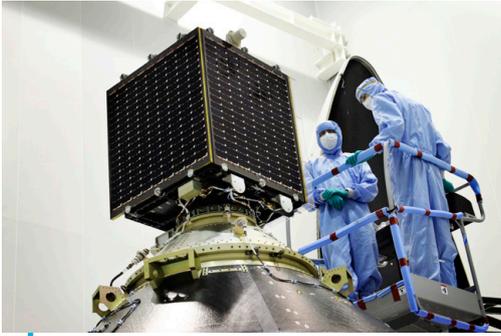
	<b>P200 platform</b>
<i>Mission Design lifetime</i>	5 years at Ps = 0,800
<i>Orbit</i>	All LEO orbits from 450 to 900 km, 0° to SSO
<i>Launch vehicle</i>	Falcon -9, VEGA, Soyuz, PSLV, Ariane-5, DNEPR, Rockot, Athena, Cyclone-4
<i>Bus dimensions</i>	Cubic, 800 mm x 800 mm x 1181 mm
<i>Payload mass capacity</i>	70 kg
<i>Orbit average P/L power / Peak P/L power</i>	70 W EOL / 95 W EOL
<i>External payload volume</i>	650 mm x 770 mm x 490 – 1872 mm, depending on launcher
<i>Internal payload volume</i>	180 mm x 290 mm x 180 mm

### Pointing

<i>Pointing modes</i>	3-axis stabilized system supporting whole range of pointing modes: Sun, Nadir, Inertial, Target, Push-broom, TDI, ...
<i>Pointing control accuracy</i>	6 arcsec (1 sigma)
<i>Pointing knowledge</i>	2 arcsec (1 sigma)
<i>Pointing stability</i>	1,5 arcsec/sec
<i>Slew rate</i>	60 deg/min

### Propulsion

<i>Propellant capacity</i>	15 kg propellant - up to 120 m/s delta v
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## QinetiQ Space Facilities

QinetiQ Space has its own existing facilities for assembly, integration and functional testing of spacecraft.

QinetiQ Space possesses **2 cleanrooms** with following characteristics:

- Cleanliness: class 10.000 (ISO 7) (constant monitoring of partical fallout, temperature and humidity) with an area of 90 m<sup>2</sup> (CR1) and 50m<sup>2</sup> (CR2).
- For integration of optical components, a flow bench class 100 (ISO 5) is available.

For environmental testing on spacecraft level, QinetiQ Space collaborates with specialized testhouses across Europe (eg. Intespace (F)).

## QinetiQ Space

QinetiQ Space is a seasoned mission prime and systems integrator delivering end-to-end mission solutions built around the **PROBA** small satellite platform. QinetiQ Space demonstrated expertise in the **small satellite industry** with nearly **four decades of experience** in space programs has resulted in a market leading product line designed to meet the growing demand for **cost-effective small spacecraft** with reliable and fast delivery.

All our small satellite are packed with performance, enabling the same functions delivered by larger satellites to be performed more effectively with a smaller, cost-effective platform.

### QinetiQ Space nv

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