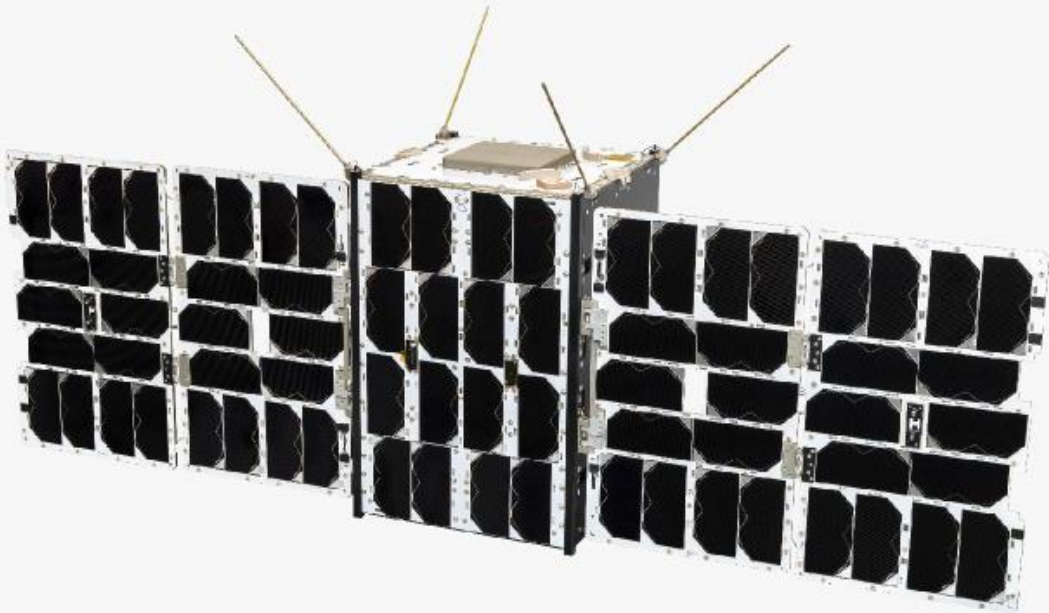


# Multi-Purpose 12U Satellite Bus

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# Multi-Purpose 12U Bus (M12P)

Kongsberg NanoAvionics M12P is a 12U CubeSat with double deployable solar panels for efficient solar energy harvesting and power generation. Its standard configurations are designed using our modular subsystems and a variety of common data interfaces to meet diverse payload performance needs.

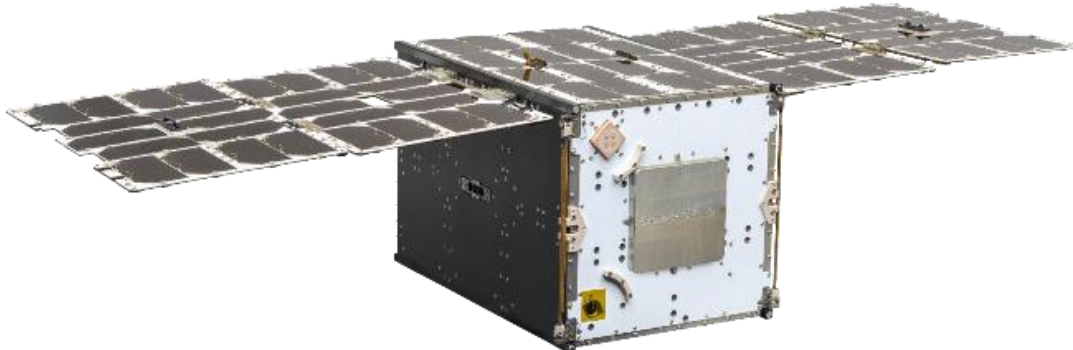


Figure 1. Multi-Purpose 12U Bus (M12P)

## Key Features

- Modular Subsystems: Facilitates customizable configurations.
- Deployable Solar Panels: Enhances solar energy harvesting.
- Standardized Interfaces: Ensures compatibility with a wide range of payloads.

## Performance Configurations

We offer three performance configurations for the M12P bus:

- Light.
- Mid.
- Max.

These options allow customers to choose the configuration that best matches their payload, mission objectives, and budget.

## Advantages

- Speed: Rapid payload integration and deployment.
- Efficiency: Optimized for cost-effectiveness without compromising quality.
- Scalability: Streamlined processes for scalable constellation manufacturing.

## Applications

- Remote Sensing.
- Communications.
- Defense.
- Fundamental Research.
- Custom Solutions.

For missions requiring capabilities beyond our standard platforms, we provide tailored satellite buses to meet specific mission needs.

## Comprehensive Support

Kongsberg NanoAvionics offers end-to-end customer support, from initial mission planning to in-orbit operations, ensuring a smooth and successful mission lifecycle.

## Proven Performance

With industry-leading performance and a proven track record, the standard M12P bus is an ideal choice for customers aiming to enhance their time to space and operational efficiency in space.

# M12P Bus Performance Configurations

Parameters	M12P Light Specs	M12P Mid Specs	M12P Max Specs
Available Payload Power (Sun Tracking)	33 W	29.5 W	25.5 W
Bus Power (Sun Tracking)	51 W	51 W	51 W
Available Payload Mass	18 kg / 17 kg With Propulsion	17.5 kg / 16.5 kg With Propulsion	17.5 kg / 16.5 kg With Propulsion
Available Payload Volume	8 U	8 U	8 U
Max Allowable Spacecraft Mass	32 kg	32 kg	32 kg
Data Rates and Frequencies	UHF 401-402 MHz Uplink/Downlink up to 1.6 kbps S-Band Uplink 2025-2110 MHz Up to 1 Mbps Downlink 2200-2290 MHz Up to 3 Mbps	UHF 401-402 MHz Uplink/Downlink up to 1.6 kbps S-Band Uplink 2025-2110 MHz Up to 1 Mbps Downlink 2200-2290 MHz Up to 3 Mbps X-Band Downlink 8025-8400 MHz Up to 80 Mbps	UHF 401-402 MHz Uplink/Downlink up to 1.6 kbps S-Band Uplink 2025-2110 MHz Up to 1 Mbps Downlink 2200-2290 MHz Up to 3 Mbps X-Band Downlink 8025-8400 MHz Up to 80 Mbps
Absolute Knowledge Error	4.31° (1σ)	4.31° (1σ)	0.04° (1σ)*
Absolute Performance Error	4.40° (1σ)	4.40° (1σ)	0.08° (1σ)*
Slew Rate	X - 2 deg/s Y - 1.6 deg/s Z - 2.5 deg/s	X - 2 deg/s Y - 1.6 deg/s Z - 2.5 deg/s	X - 2 deg/s Y - 1.6 deg/s Z - 2.5 deg/s
GPS Accuracy	Orbital position knowledge: ~100m (10m in ECEF); Velocity 0.2m/s (ECEF); Time 50ns (1σ)	Orbital position knowledge: ~100m (10m in ECEF); Velocity 0.2m/s (ECEF); Time 50ns (1σ)	Orbital position knowledge: ~100m (10m in ECEF); Velocity 0.2m/s (ECEF); Time 50ns (1σ)
Design Lifetime	Up to 5 years	Up to 5 years	Up to 5 years
Launch Vehicles** (Nominal orbit - up to 600 km SSO)	SpaceX Falcon 9 Ariane Space Vega-C Rocket Lab Electron PSLV	SpaceX Falcon 9 Ariane Space Vega-C Rocket Lab Electron PSLV	SpaceX Falcon 9 Ariane Space Vega-C Rocket Lab Electron PSLV
Battery Capacity	161 Wh	161 Wh	161 Wh
Payload Voltage Channels	3.3 - 12.0 V, 12.0 - 28.0 V, Vbat (6.0 - 8.4 V)	3.3 - 12.0 V, 12.0 - 28.0 V, Vbat (6.0 - 8.4 V)	3.3 - 12.0 V, 12.0 - 28.0 V, Vbat (6.0 - 8.4 V)
Data Interfaces	1 x 100BASE-TX Ethernet 1x CAN 1. x RS-422 (on request RS-485) 3 x SPI 2. x USART/UART 2 x I2C	3 x IEEE 802.3 1000BASE-T 1 x CAN 3 x RS422/UART 1. x SPI 2. x I2C Up to 20 x LVDS, GTP, GPIO	3 x IEEE 802.3 1000BASE-T 1 x CAN 3 x RS422/UART 1. x SPI 2. x I2C Up to 20 x LVDS, GTP, GPIO
Data Storage	4 GB NAND	32 GB NAND	32 GB NAND
Encryption	AES-256-GCM/CBC (On-board)	AES-256-GCM/CBC (On-board)	AES-256-GCM/CBC (On-board)
Optional Propulsion	Field Emission Electric Propulsion	Field Emission Electric Propulsion	Field Emission Electric Propulsion
Propulsion Thrust	0.1 - 0.3 mN	0.1 - 0.3 mN	0.1 - 0.3 mN

\* The AKE and APE values are reached if the satellite angular velocity does not exceed 0.6 deg/s. The ADCS performance is impacted if this angular velocity is exceeded.  
\*\*Not including satellite deployment systems or orbital transfer vehicle

# M12P Architecture Diagram

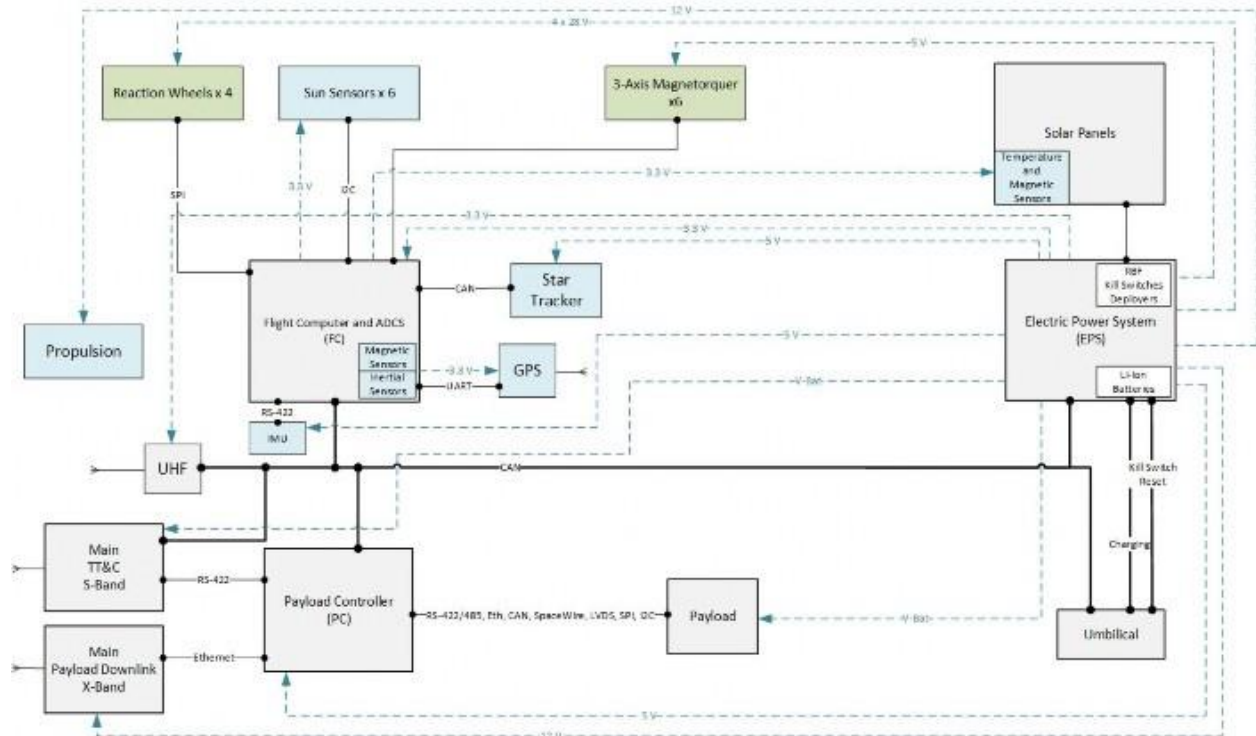


Figure 2. M12P Architecture Diagram (the diagram varies according to the satellite configuration)

# M12P Delivery Timing

Delivery of an integrated bus in as quickly as 7 months after receipt of order depending on level of deviation from standard product configuration.

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