NaviLEO™ and NaviLEO-POD
Spaceborne GNSS Receiver
<10 cm real-time satellite positioning

SpacePNT+

NaviLEO-POD is SpacePNT's highest performance GNSS receiver solution delivering outstanding sub-decimeter-level positioning and timing accuracy autonomously and in real-time in Low Earth Orbits, thanks to its embedded accurate forces model orbital propagator and optional Precise Orbit Determination (POD) algorithm

Fugro SPACESTAR™
REAL TIME - ACCURATE POSITIONING
SYSTEM ENABLED

NaviLEO Status: in production

Highly reliable architecture

- Implements a tightly coupled orbital forces model for improved performance and availability, allowing to propagate the navigation solution even when few or no observables are available
- Supports multiple GNSS and multiple frequencies, including multiple sources for precise orbits and clocks
- Supports cold/warm redundancy with 2 units
- Based on the use of high performance rad-tolerant COTS EEE components and a radiation tolerant HW/SW/FW architecture including latch-up protections and ECC

Upgradable and scalable

- Full in-flight FW/SW upgradability (including FPGA)
- One unique platform solution for launchers, LEO, GTO, GEO, HEO, and even Moon missions
- Optional external LNA allows the use of passive antenna(s) and provides additional filtering
- Highly customizable with many options (POD, internal or external clocks, passive/active antenna(s), internal/external LNA, etc.)

Applications

- Remote sensing; Earth observation; Optical constellations
- In-orbit servicing; space debris removal
- LEO-PNT (GNSS backup or provision of alternate PNT services)
- Launchers and upper stages and more

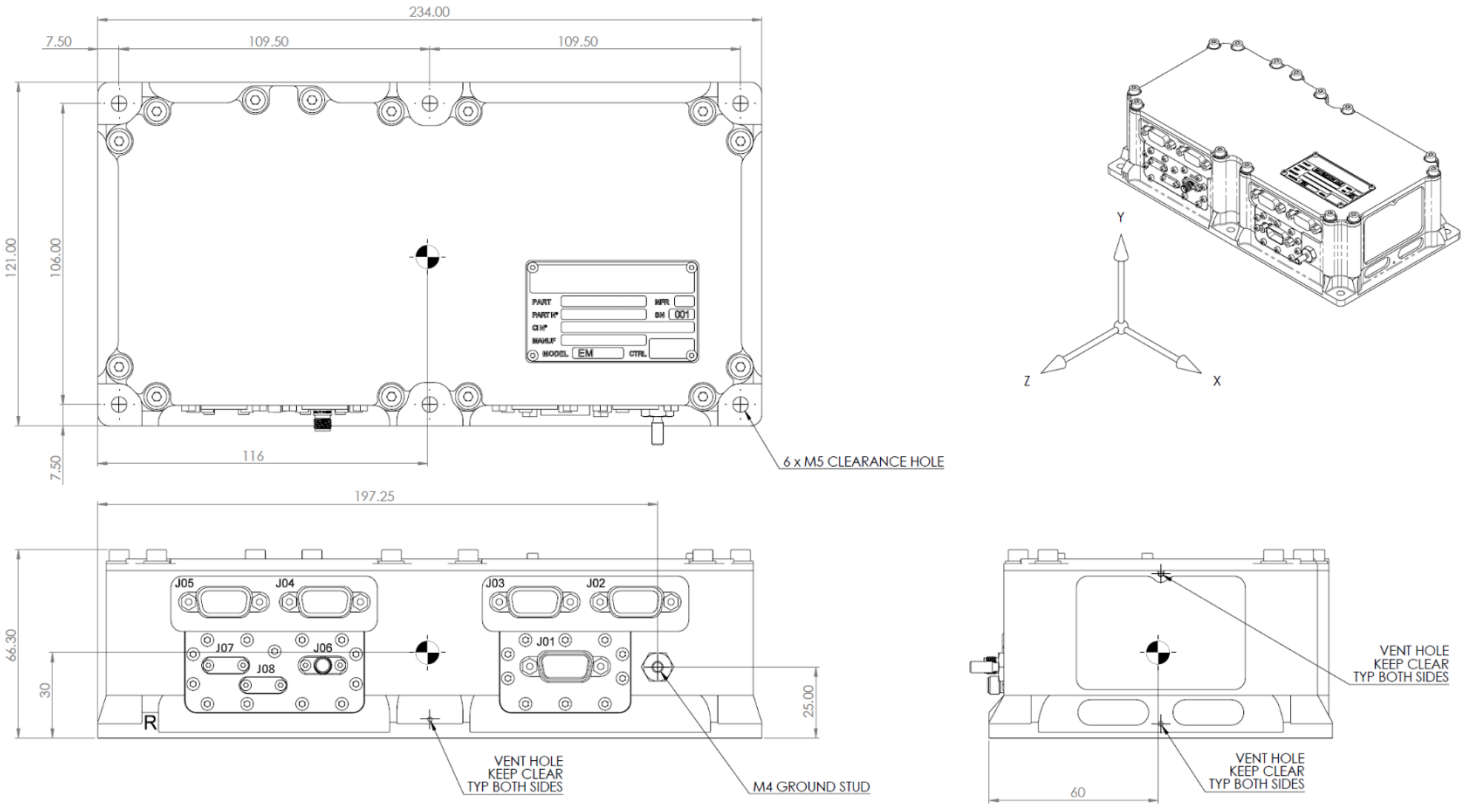
Key performance characteristics	
Real-time pos. accuracy[1]	< 1 m (3D rms) < 10 cm (3D rms) with POD option
Warm / cold TTFF[1]	<60s / < 300s
Lifetime	Total dose TID compatible with typical 10 years LEO Upgradable on option for longer mission lifetime
Reliability	< 650 FIT (20% margin included, may depend on configuration)
Qualification levels	See next page
Technical	
Signals and frequencies POD correction channels	GPS L1C/A L5I/Q Galileo E1B E1C E5a-I/Q Galileo E6 or L-band Inmarsat
Number of channels	32 or 48 on option
Number of antenna inputs	1 or 2 on option (internal LNA supports both active/passive ant.)
PPS signal	6x RS-422 pairs (on 2 connectors) GPS/Galileo synchronized
TM/TC	2x (N+R), UART (RS-422) CAN on option PUS-CCSDS compliant
Update rate	1 Hz
Physical	
Power and voltage (depending on configuration)	8 W typ. at 5V regulated (4.8-5.2V) 10 W typ. at 28V (isolated input option)
Mass	<1500 g (without antenna)
Size	234 x 121 x 66.3 mm^2
Mechanical interface	Flat baseplate
External LNA box option	
Mass	< 350 g
Size	107 x 26.5 x 57 mm^3
Power	< 0.5 W Supplied from GNSS receiver

[1] *for a typical LEO orbit (800 km altitude)*

Navi LEO™ and NaviLEO-POD
Spaceborne GNSS Receiver
<10 cm real-time satellite positioning

SpacePNT+

NaviLEO(-POD) external dimensions [mm]



Qualification levels		
First eigenmode frequency		>1000 Hz
Sine vibration (1 sweep per axis at 2 oct/min)	5-20 Hz 20-100 Hz	10 mm 20 g
Random vibration (60 s/axis, GRMS = 20 g)	20 Hz 20-100 Hz 100-300 Hz 300-2000 Hz 2000 Hz	0.052 g^2/Hz +6 dB/oct. 0.32 g^2/Hz -6 dB/oct 0.052 g^2/Hz
Shock (3 axes)	10 Hz 1200 Hz 10000 Hz	20 g SRS 1000 g SRS 1000 g SRS
Thermal vacuum (10^{-5} mbar, 2 hours dwell at min/max temperatures)	Non-operat. (1 cycle) Operational (7 cycles)	-40°C to 70°C -25°C to 55°C
EMC (Based on MIL-STD-461G)		CE102 (10 k-10 MHz) CE106 (1 M-18 GHz) RE102 (10 k-18 GHz) RS103 (30 M-18 GHz)

Electrical interfaces		
J01	D-sub 9 m	power supply input
J02	D-sub 9 f	TM/TC nominal
J03	D-sub 9 f	TM/TC redundant
J04	D-sub 9 f	PPS nominal
J05	D-sub 9 f	PPS redundant
J06	SMA	antenna input
J07	SMA	2nd antenna input (option)
J08	SMA	10 MHz input (option)

Non-contractual document, subject to change