Septentrio
satellite navigation

PolaRx4/PolaRx4TR :
Multi-frequency GNSS Reference Station

The PolaRx4 GNSS reference receiver family consists of a series of fully featured high performance GNSS receivers providing network operators and scientific users with high-quality tracking and measurement of all available and upcoming GNSS signals. Innovative GNSS signal processing, extensive networking capabilities, a robust design and a highly-valued intuitive user interface make this family an excellent choice as a future-proof base station solution.

High-quality tracking of all visible signals

PolaRx4 is built around the proven GReCo3™ multi-constellation tracking processor, and provides 264 hardware channels that are assigned automatically and on-the-fly to all visible satellites. Using TRACK+, Septentrio's low-noise tracking algorithms, it provides access to all currently available satellite navigation signals, including GPS L1/L2/L2C/L5, GLONASS L1/L2 and GIOVE-A and GIOVE-B signals. Moreover, support for Galileo E1, E5a, E5b, E5 AltBOC and GLONASS CDMA L3 as well as experimental tracking of Beidou signals has been proven, guaranteeing support for all known planned GNSS signals.

Interference monitoring, multipath mitigation, and more

PolaRx4 features Septentrio GNSS+ technology, including

- **AIM+** Advanced Interference Monitoring and Mitigation. AIM+ successfully protects receivers against in-band continuous wave and pulsed interference signals. A built-in spectrum analyzer is available for interference signal identification.
- **APME+**, which extends Septentrio's patented A Posteriori Multipath Estimator to GLONASS, Galileo and Beidou signals. APME+ is unique in its ability to mitigate both code and carrier multipath in the short-delay range. Short delay multipath is the most prevalent and damaging form of multipath in practical circumstances. Moreover, APME+ is the only multipath mitigation technique which identifies the amount of multipath present, and which can simultaneously provide data unaltered as well as with multipath eliminated.
- **ATrack+** is Septentrio's patented Galileo AltBoc tracking.

Networking, remote operation, and data logging

Communication and (remote) management of PolaRx4 is made easy with a powerful built-in web interface, which features secured access to all receiver settings and status information, data storage, and fast and robust firmware upgrading. SBF and RINEX data logging is possible on a built-in 8GB memory, optionally extendable to 32 GB. Logged data can be accessed through the built-in ftp server or automatically pushed to a distant ftp server.

RxTools for flexible data manipulation

As with all Septentrio receivers, PolaRx4 comes with RxTools, a suite of applications that complements the web interface with advanced display and analysis tools.

PolaRx4TR : unique timing receiver

PolaRx4TR is a special variant of PolaRx4, which accepts an external 10 MHz reference and 1PPS input to perfectly synchronize the GNSS measurements with an external time and frequency standard, making PolaRx4TR perfectly suited for frequency and time transfer applications. Additionally, the PolaRx4 family features a GNSS-disciplined 10 MHz output.

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POLARX4/POLARX4TR PRO TECHNICAL SPECIFICATIONS

FEATURES

- Multi-frequency L1/L2/L3/L5/E5abAltBoc code/carrier tracking of GPS, GLONASS and GALILEO signals
- Codeless tracking of GPS P1 and P2
- Ready for Beidou and GLONASS modernization (firmware update)
- 264 hardware channels for simultaneous tracking of signals from GPS GLONASS, GALILEO and SBAS satellites in the supported bands
- Up to 50 Hz raw measurements
- A Posteriori Multipath Estimator (APME+)
- Advanced Interference mitigation (AIM+) :
  - Spectrum analyzer
  - Adaptive interference mitigation
- Correction formats
  RTCM v2.2, 2.3, 3.0 or 3.1
  CMR 2.0
- RAIM
- Raw data output (code, carrier, SBAS, navigation data)
- x PPS output (x = 1, 2, 5, 10)
- 10 MHz reference input/output (disciplined)
- 4 hi-speed serial ports
- 1 Ethernet port
- 1 full speed USB port
- Hardware ready for USB host (FW update)
- 8 GB standardon-board logging (up to 32GB optional)
- Highly compact and detailed Septentrio Binary Format (SBF) output
- NMEA v2.30 output format, up to 25 Hz
- IP65 waterproof enclosure with sturdy connectors
- 6 LEDs to indicate power, logging, tracking, PVT, network, differential corrections
- Start/Stop logging via button
- Advanced web interface providing all receiver controls, basis status monitoring, ftp server, ftp push
- Ntrip server (FW update)
- Convenient TCP/IP socket interface for easy integration with your software applications
- Support for standard MET/Tilt sensors (FW update)
- 1 PPS-in for time/frequency transfer (PolaRx4TR)
- Includes intuitive GUI (RxControl, webinterface and RxTools) and detailed operating and installation manual

Specifications subject to change without notice. Certain features and specifications may not apply to all models.

PERFORMANCE

Measurement precision[1,3,5]	
C/A pseudoranges	5 cm (GPS)[6]
	0.16 m (GPS)[7,8]
	7 cm (GLONASS)[6]
	0.25 m (GLONASS)[7,9]
E1 pseudoranges	8 cm (GALILEO)[7,8]
L5/E5ab	6 cm (GALILEO)[7,8]
E5 AltBOC	1.5 cm (GALILEO)[7,8]
GPS P2 pseudoranges[7]	0.1 m
GLONASS P pseudoranges[7]	0.1 m
L1 carrier phase	1 mm
L2 carrier phase	1 mm
L5/E5 carrier phase	1.3 mm
L1/L2/L5 doppler	0.1 Hz
Maximum Update rate	50 Hz
Time accuracy[3]	
1PPS	10 nsec
Time to first fix	
Cold start[10]	< 45 sec
Warm start[11]	< 20 sec
Re-acquisition	avg 1.2 sec
Tracking performance (C/N_0 threshold)[12,13,15]	
Tracking	26 dB-Hz
Acquisition	33 dB-Hz
Acceleration[16]	10 g
Jerk[17]	4g/sec

1 1 Hz measurement rate
2 Performance depends on environmental conditions
3 1σ level
5 C/N0 = 45 dB-Hz
6 Smoothed
7 Non-smoothed
8 Multipath mitigation disabled
9 Multipath mitigation enabled
10 No information available (no almanacs, no approximate position)
11 Ephemeris and approximate position known
12 95%
13 Max speed 600 m/sec
14 Fixed ambiguities
15 Depends on user settings of tracking loop parameters
16 During acquisition
17 During tracking

PHYSICAL AND ENVIRONMENTAL

Size	235 x 140 x 37 mm
Weight	980 g
Input voltage	9-30 VDC
Antenna LNA Power Output	+ 5VDC
Output voltage	200 mA
Maximum current	
Power consumption	6 W typical
Operating temperature	-40 to +60°C
Storage temperature	-40 to +85 °C
Humidity	5% to 95% (non condensing)
Connectors	
Antenna	TNC female
Ref in/out	BNC female
1PPS out/in*	BNC female
Power	ODU 3 pins female
COM1	ODU 7 pins female
COM2	ODU 7 pins female
USB host	ODU 5 pins female
COM3/4/USB	ODU 7 pins female
IN	ODU 7 pins female
OUT	ODU 5 pins female
Ethernet	ODU 4 pins female
Power Button	
Logging Button	

* 1PPS in on PolaRx4TR PRO only

OTHER SEPTENTRIO PRODUCTS

AsteRx2e/2eL - Compact dual-frequency GPS/GLONASS receiver platform, offering top-quality GPS code and carrier phase data and dual-frequency positioning (including DGPS, RTK and PPP (AsteRx2eL)) at up to 25 Hz.

AsteRx3 - A Multi-frequency GPS/GLONASS/GALILEO receiver for demanding industrial applications, featuring precise RTK with extended baselines, advanced multipath and interference mitigation and exceptional tracking stability under high vibration conditions.

AsteRx2eH - A unique single-board dual-frequency multi-antenna GPS/GLONASS receiver in a waterproof aluminum housing, that can be connected to 2 antennas for various machine control, heading and other multi-antenna applications.

AsteRxi - IMU assisted Compact Dual-frequency GNSS receiver platform, offering a 50Hz RTK position based on integrated IMU and GNSS measurements. In addition attitude information such as heading, pitch and roll are provided even in shadowed environments where conventional GNSS receivers fail.

PolaRxS - a multi-frequency multi-constellation receiver dedicated to ionospheric monitoring and space weather applications

PolaNt* - A set of lightweight sturdy precise positioning and survey single, dual- or multi-frequency GPS, GPS/GLONASS and GPS/GLONASS Galileo/L-band antennas for use with the PolaRx and AsteRx receiver family.

Chokering MC - A multi-frequency GPS/GLONASS/Galileo L1/L2/E5abAltBOC chokering antenna for use with the PolaRx receiver family

RxTools - A suite of software applications for easy control of PolaRx and AsteRx receivers, and for easy manipulation, analysis and reporting of the data generated with these receivers

RxMobile - A unique intuitive, portable GUI field controller for the Septentrio receivers. RxMobile allows controlling the receiver, monitoring the navigation solution and accessing its functions in the field in the same intuitive way as with RxControl.

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