

# PolaRx5TR

Multi-frequency GNSS Time and Frequency Transfer Receiver



Scientific



Timing

**Dedicated to time and frequency transfer applications, the PolaRx5TR is optimised for quality of code and carrier phase measurements. The PolaRx5TR is fully compliant with recommendation CCTF 5 (2015) of the Consultative Committee for Time and Frequency.**

## KEY FEATURES

- ▶ **Ultra-precise time synchronisation for time transfer applications**
- ▶ **PPS IN internal delay auto-calibration**
- ▶ **CGGTTS V2E compliant**
- ▶ **Tracks all visible signals (GPS, GLONASS, GALILEO, BEIDOU, NAVIC)**
- ▶ **OSNMA Support**
- ▶ **High-precision, low-noise measurements**
- ▶ **Unique interference monitoring and mitigation**
- ▶ **Powerful Web UI and logging tools**

## BENEFITS

### Timing

As well as the standard inputs for time and frequency, the PolaRx5TR incorporates a calibration circuit to measure and compensate for the delay between the PPS input and the internal time reference. This ensures the measurement latching is always accurately synchronised with the PPS input. Additionally, PPS out signal allows for long-term monitoring of internal delay stability.

CGGTTS data for the GPS, GLONASS, Galileo and BeiDou constellations is generated with RxTools both on the receiver board and on PC and can be automatically transferred over FTP. The CGGTTS files are fully compliant with V2E, in accordance with recommendation CCTF 4 (2015).

### GNSS technology

PolaRx5TR is built around the GReCo4™ multi-constellation tracking processor, and provides 544 hardware channels which are assigned automatically and on-the-fly to all visible satellites. Advanced interference analysis and mitigation using adaptive filtering facilitates operation in difficult radio environments, including near chirp jammers.

### Networking, remote operation and data logging

Communication and (remote) management of PolaRx5TR is made easy with a powerful built-in Web UI accessible over WiFi, network or USB connection. The Web UI features secured access to all receiver settings and status information, data storage, and fast and robust firmware upgrading. SBF, RINEX and BINEX data logging is possible on both a built-in 16 GB memory and on an externally connected device.

# PolaRx5TR

## FEATURES

### GNSS technology

544 Hardware channels for simultaneous tracking of all visible satellite signals

P-code tracking on L1 and L2 to avoid CA-P biases

Independent tracking of L2C (GPS)

Up to 100 Hz Raw data output (code, carrier, navigation data) (optional feature)

### Septentrio's patented GNSS+ technologies

▶ **AIM+** unique anti-interference system monitors, flags and mitigates narrow and wideband interference, jamming and spoofing

▶ **APME+** a posteriori multipath estimator for code and phase multipath mitigation. All multipath mitigation and smoothing algorithms can be enabled/disabled.

▶ **LOCK+** superior tracking robustness under heavy mechanical shocks or vibrations

OSNMA Support

Spectrum analyser

PPS in delay calibration circuit can be enabled/disabled

### Supported data formats

▶ CGGTTS V2E both on board and on PC

▶ Septentrio Binary Format (SBF), fully documented with sample parsing tools

▶ RINEX (obs, nav, meteo) v2.x, 3.05, 4.00

▶ BINEX

▶ NMEA v2.30 and v4.10 output

▶ RTCM output (all MSM messages supported)<sup>1</sup>

▶ 16 GB Standard on-board logging

▶ Up to 48 logging jobs (8 independent sessions x 6 data formats)

### Connectivity

10 MHz reference input

1 PPS-IN with monitoring functionality

x PPS output (max 100 Hz)

10 MHz reference output

4 Hi-speed serial ports

1 Ethernet port (100 MBps)

Integrated WiFi (802.11 b/g/n)

Power over ethernet

1 Full-speed USB port

1 USB host for external disk

HTTP/HTTPS

Advanced Web UI providing all receiver controls, and status monitoring. Alternatively, a light Web UI for low bandwidth connections

FTP server, FTP push, SFTP, SYNC+, CloudIT

NTRIP (v1 and v2) client, server and caster

Point-to-Point communication protocol

## PERFORMANCE

### Measurement precision<sup>2</sup>

Code-carrier bias 0 by design

Inter-frequency code bias <10 ns

Inter-system code bias in common carrier <2 ns

Code measurements <0.5 ns

Phase measurements < 5 ps

PPS in delay calibration precision 20 ps

### Time accuracy

1 PPS out 5 ns

1 PPS out rise time <2 ns

Events 20 ns

### Update rate

Measurements 100 Hz

### Tracking performance (C/N0 threshold)<sup>3,4</sup>

Tracking 20 dB-Hz

Acquisition 33 dB-Hz

## HARDWARE PARAMETERS

### Time reference input

Signal type: 1 PPS

Input impedance: 10k Ω

(compatible with 50 Ω 1PPS sources)

Level: -0.5 to 5.5 V

### Frequency reference input

Signal type: 10 MHz

Input impedance: 50 Ω

Amplitude -8 dBm to +4 dBm

(0.5 V pp to 2 V pp)

### Time reference output

Signal type 5 V-level PPS (up to 100 Hz)

Time system GNSS/UTC/receiver internal time

Output impedance 50 Ω

### Frequency reference output

Signal type 1.1 V pp 10 MHz sine wave

Time system GNSS/REF IN/receiver internal time

Output impedance 50 Ω

## PHYSICAL AND ENVIRONMENTAL

**Size** 235 x 140 x 37 mm  
9.25 x 5.51 x 1.45 in

**Weight** 940 g / 2.07 lb

**Input voltage** 9 – 30 VDC

### Antenna LNA power output

Output voltage +5 VDC

Maximum current 200 mA

**Power consumption** 3 – 5 W

**Operating temperature** -40° C to +65° C  
-40° F to 149° F

**Storage temperature** -40° C to 85° C  
-40° F to 185° F

**Humidity** 5 % to 95 % (non-condensing)

### Connectors

Antenna TNC female

REF IN BNC female

REF OUT BNC female

PPS IN BNC female

PPS OUT BNC female

Power ODU 3 pins female

COM1 ODU 7 pins female

COM2 ODU 7 pins female

COM3/4/USB ODU 7 pins female

USB Host ODU 5 pins female

IN ODU 7 pins female

OUT ODU 5 pins female

Ethernet ODU 4 pins female

WiFi antenna SMA female

### Certification

IP65, RoHS, WEEE, CE

FCC Class B Part 15, UKCA



<sup>1</sup> Optional feature

<sup>2</sup> 1 Hz measurement rate

<sup>3</sup> Max speed 600 m/s

<sup>4</sup> Depends on user settings on tracking loop parameters

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