

# Trimble APX RTX

## Single board GNSS-inertial solution

The 4th generation Trimble® APX RTX™ is a GNSS-inertial OEM solution designed to reduce costs and improve mapping efficiency from Uncrewed Aerial Vehicles (UAVs). The APX RTX is comprised of a small OEM board containing a precision GNSS receiver enabled with the Trimble CenterPoint® RTX correction service, onboard inertial sensors, a dedicated interface for external Inertial Measurement Unit (IMU) models, plus post-mission GNSS-inertial software. The APX RTX eliminates the need to use a base station or survey extensive Ground Control Points (GCPs), and reduces the amount of sidelap required to be flown, thus increasing the area flown per mission.

### High accuracy, extremely small package

Measuring just 67 × 60 × 15 mm and weighing only 56 grams, the APX RTX provides unparalleled performance in an extremely small package. Also, with a dedicated remote IMU connector, the APX RTX offers a simple plug and play method of adding an external IMU for gimbal mount support or higher accuracy orientation where needed. The APX RTX includes a Centerpoint RTX Complete subscription which enables real-time and post-mission centimeter-level positioning without base stations and automatic processing via Applanix® POSPac™ UAV without any additional licenses. Available with four different performance options, the APX RTX produces the highest accuracy position and orientation accuracy tailored for direct georeferencing of virtually any UAV payloads.



### The benefits of direct georeferencing to UAV platforms:

- Turn your UAV into a professional mapping solution
- Ultra-fast image georeferencing for faster map production and delivery without the need for base stations
- Reduced number of ground control points, saving time and money
- Consistent, reliable, highly accurate results
- Increased collection area per flight for greater productivity
- Redundant navigation solution to autopilot for enhanced safety

### The Trimble APX RTX brings it all

- CenterPoint RTX Complete: high accuracy real-time and post-processing GNSS correction service for mapping without base stations
- Applanix SmartCal™: IMU software compensation technology
- Applanix IN-Fusion®+: real-time and post-processed aided-inertial sensor fusion software, featuring Trimble ProPoint® GNSS technology
- Trimble Maxwell™: survey grade GNSS technology
- Trimble Store: Your Hub for Hassle-Free Subscription Management
- Applanix POSPac UAV Complete: GNSS-inertial post-processing software (PP-RTX, Single Base and Applanix SmartBase™)

# Trimble APX RTX

## TECHNICAL SPECIFICATIONS

- Advanced Applanix IN-Fusion+ GNSS-Inertial integration software with Trimble ProPoint GNSS technology
- Solid-state MEMS inertial sensors with Applanix SmartCal compensation technology
- Advanced Trimble Maxwell Custom GNSS survey technology
- 336 Channels
  - GPS: L1 C/A, L1C, L2C, L2E, L5
  - GLONASS: L1 C/A, L1P, L2P, L2 C/A, L3 CDMA<sup>8</sup>
  - BeiDou: B1, B1C, B2, B2A, B2B
  - Galileo<sup>1</sup>: E1, E5A, E5B, E5AltBOC
  - QZSS: L1 C/A, L1S, L1C, L2C, L5
  - SBAS: L1 C/A, L5
  - NavIC: L5 C/A
  - MSS L-band: Trimble RTX<sup>®</sup>
- High precision multiple correlator for GNSS pseudorange measurements
- Trimble Everest<sup>™</sup> Plus multipath mitigation
- Unfiltered, unsmoothed pseudorange measurements data for low noise, low multipath error, low time domain correlation and high dynamic response
- Very low noise GNSS carrier phase measurements with <1 mm precision in a 1 Hz bandwidth
- Proven Trimble low elevation tracking technology
- 100 Hz position, roll, pitch and heading output
- Generic Gimbal support
- IMU data rate 200 Hz
- Navigation output format: ASCII (NMEA-0183), Binary (Trimble GSOF)
- Centerpoint RTX Complete<sup>4</sup> subscription, including real time CenterPoint RTX correction service and Applanix POSPac UAV Complete post-processing
- Dedicated onboard connector for remote IMU
- No export permit required

## LAN INPUT/OUTPUT

All Ethernet functions are supported through a dedicated IP address (Static or DNS) simultaneously.

TCP/IP and UDP ..... ASCII and Binary data streaming  
(Time tag, PPS sync, status, position, attitude, velocity, track and speed, dynamics, performance metrics, GNSS data)  
HTTP ..... Web based Control software (GUI)  
for easy system configuration and low rate display.  
Support for all common browsers (Google Chrome recommended)

## SERIAL INPUT/OUTPUT

RS232 level port TTL level (3.3 V) port  
Parameters ..... ASCII and Binary data streaming (Time tag, PPS sync, status, position, attitude, velocity, track and speed, dynamics, performance metrics, GNSS data), reference input (CMR, CMR+, sCMR<sub>x</sub>, RTCM), configuration messages, Gimbal Encoder and Autopilot input support.

## OTHER INPUT/OUTPUT

PPS (pulse-per-second) Time Sync Pulse output  
Event Input (2) ..... Two time mark of external events  
TTL 3.3 V pulses, max rate 50 Hz  
Digital I/O (3) ..... LED drivers with dedicated functionality for systems integrators  
USB 2.0 ..... Device/Host mode

## LOGGING

Internal Logging ..... 9 GByte Flash memory External LogginExternal Logging  
USB 2.0 Host port  
Parameters ..... Time tag, status, position, attitude, velocity, track and speed, dynamics, performance metrics, raw IMU data (200 Hz), raw GNSS data (5 Hz)

- 1 Developed under a License of the European Union and the European Space Agency
- 2 Typical performance. Actual results are dependent upon satellite configuration, atmospheric conditions, environmental effects, GNSS antenna
- 3 Typical survey mission profile, max RMS error. Heading error will increase for low speed rotor applications and when hovering.
- 4 Trimble CenterPoint RTX Complete, 1 year subscription including real time CenterPoint RTX high accuracy correction service and POSPac Complete (PP-RTX, Single Base and Applanix SmartBase processing)
- 5 Performance is subject to POSPac UAV processing mode
- 6 The accuracy is subject to regional coverage, data set duration and GNSS antenna
- 7 Sold separately
- 8 There is no official GLONASS L3CDMA or Galileo E6 ICD. The current tracking capability is based on publicly available information. Full receiver compatibility cannot be guaranteed.

Specifications subject to change without notice.

PERFORMANCE SPECIFICATIONS <sup>2</sup> (RMS ERROR) UNMANNED AIRBORNE VEHICLE APPLICATIONS					
		Position (m)	Velocity (m/s)	Roll & Pitch (deg)	True Heading <sup>3</sup> (deg)
APX-15 <sup>4</sup>	Trimble RTX <sup>6</sup>	0.03H 0.06V	0.020	0.030	0.180
	Applanix POSPac UAV Complete <sup>5</sup>	0.02H 0.03V-0.05V	0.015	0.025	0.080
APX-20 <sup>4</sup>	Trimble RTX <sup>6</sup>	0.03H 0.06V	0.015	0.015	0.080
	Applanix POSPac UAV Complete <sup>5</sup>	0.02H 0.03V-0.05V	0.010	0.010	0.030
APX-30 <sup>4</sup>	Trimble RTX <sup>6</sup>	0.03H 0.06V	0.015	0.010	0.050
	Applanix POSPac UAV Complete <sup>5</sup>	0.02H 0.03V-0.05V	0.010	0.008	0.025
APX-50 <sup>4</sup>	Trimble RTX <sup>6</sup>	0.03H 0.06V	0.010	0.006	0.020
	Applanix POSPac UAV Complete <sup>5</sup>	0.02H 0.03V-0.05V	0.005	0.005	0.010

INERTIAL MEASUREMENT UNIT (IMU)						
MODEL	IMU TYPE	RANGE	OPERATIONAL TEMPERATURE	POWER	SIZE (L x W x H) mm	WEIGHT (KG)
APX-15	Onboard IMU-103	+/-15g +/- 300 dps	-40 °C to +75 °C	n/a	n/a	n/a
APX-20	Onboard IMU-104	+/-15g +/- 300 dps	-40 °C to +75 °C	n/a	n/a	n/a
APX-30	Remote IMU-93	+/-10g +/- 490 dps	-40 °C to +85 °C	4.75-28VDC 3W max	50 x 50 x 50	0.18
APX-50	Remote IMU-95	+/-10g +/- 490 dps	-40 °C to +85 °C	4.75-28VDC 3W max	50 x 50 x 50	0.18

## PHYSICAL CHARACTERISTICS

Size ..... 67 mm x 60 mm x 15 mm (L x W x H) (nominal)  
Weight ..... 56 grams  
Power ..... Wide range input 9-30 V DC, typical power consumption of 3.5W at room temperature  
Connectors ..... I/O: 44 Pin Header Samtec TMM-122-03-S-S-MW (mating part FCI 90311-044LF)  
Antenna Port ..... MMCX receptacle  
Output Voltage ..... 3.3 V DC to 5 V DC Maximum Current: 400 mA  
Minimum Input Signal Strength ..... 32 dB (>35 dB Recommended)

## ENVIRONMENTAL CHARACTERISTICS

Temperature ..... -40 °C to +75 °C (Operational)  
-55 °C to +85 °C (Storage)  
Mechanical Shock ..... +/- 75g Survival  
Operating Humidity ..... 5% to 95% R.H. non-condensing at +60 °C  
Maximum Operating Limits ..... 515 m/sec 18,000 m

## ADDITIONAL ACCESSORIES<sup>6</sup>

Evaluation Kit (Includes development board, power supply and short antenna cable)  
Compact GNSS UAV Antenna - Multi-frequency, Multi-constellation, L-Band

## APPLANIX POSPac UAV SOFTWARE (INCLUDED)

- Post-processed GNSS-Inertial SW
- 200 Hz Navigation solution (Position, Velocity, Orientation, Rates, Accelerations)
- Applanix IN-Fusion+ GNSS-Integration technology
- Full support for UAV dynamic models
- Applanix POSPac UAV Complete: PP-RTX, Single Base and Applanix SmartBase post-processing
- Forward and reverse processing with optimal Smoother
- Processing enabled automatically as part of Centerpoint RTX Complete subscription, no additional licensing required

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