

MS976 Antenna



GNSS Smart Antenna

The MS976 is a fully integrated GNSS positioning receiver plus antenna intended for rugged chassis or on-machine cab mounting. The rugged design of the MS976 allows for direct mounting to the machine without the need for external shock isolation. The MS976 is specially designed and tuned to operate through the shock and vibration forces experienced on the cabs or frames of heavy equipment.

The MS976 implements the latest Trimble Maxwell™ 7 Custom GPS chip and ProPoint Real-Time Kinematic (RTK) engine. This allows for more signal tracking and faster system initialization times when satellite lock is lost and improved operation near tree canopies or other obstructions.

The MS976 simultaneously tracks GPS, GLONASS, Galileo, BeiDou, and SBAS systems including; WAAS, EGNOS, MSAS, QZSS.

Key features and benefits

- Trimble® ProPoint RTK Engine for faster initialization times when satellite lock is lost and enhanced performance near obstructions
- Simultaneously tracks GPS, GLONASS, Galileo and BeiDou
- Support for SBAS systems (including WAAS, EGNOS, MSAS, QZSS)
- Support for Trimble xFill
- Single, rugged chassis or cab mountable unit - GPS antenna and receiver
- 3 LED indicators that provide instant operational feedback
- Single cable connector (high cycle count connector)
- USB¹ support enabling improved firmware update speeds and WebUI browser access
- Single serial PPS output
- GSOF (General Serial Output Format) support



Tracking capability and performance

- Trimble 360 Satellite Tracking Technology
- Advanced receiver autonomous integrity monitoring (RAIM) algorithm to detect and reject problem satellite measurements to improve position quality
- GPS: L1C/A, L2C, L2E, and L5
- GLONASS: L1C/A, L1P, L2P, L2C/A, and L3
- Galileo: E1, E5A, E5B & E5AltBOC, and E6
- BeiDou: B1, B1C, B2, B2A, B2B, and B3
- QZSS: L1C/A, L2C, L5, L6
- IRNSS: L5
- SBAS (WASS, EGNOS, MSAS): L1C/A and L5
- Trimble xFill

Measurements

- Advanced Trimble® Maxwell™ 7 Custom GPS chip with Trimble® ProPoint RTK Engine technology
- Proven Trimble low elevation tracking technology
- Advanced Iridium filtering that allows use up to 2 m away from Iridium transceiver
- Japanese LTE filtering that allows use up to 100 m from Japanese LTE cell tower
- Constellation agnostic, flexible signal tracking and improved positioning in challenging environments with Trimble ProPoint GNSS technology
- Reduced downtime due to loss of radio signal or cellular connectivity with Trimble xFill technology

I/O

- 2 CAN
- 2 RS232
- 1 ID/USB Enable
- 1 Boot Monitor
- 1 USB (service mode only)

Code differential positioning²

| | |
|---------------------|-----------------------------------------|
| Horizontal accuracy | 0.25 m + 1 ppm RMS (0.8 ft + 1 ppm RMS) |
| Vertical accuracy | 0.50 m + 1 ppm RMS (1.6 ft + 1 ppm RMS) |



Real time kinematic (RTK) positioning²

| | |
|----------------------------|------------------------------------------------------------------------------------|
| Horizontal accuracy | 8 mm + 0.5 ppm RMS (0.032 ft +0.5 ppm) |
| Vertical accuracy | 15 mm + 0.5 ppm RMS (0.05 ft +0.5 ppm) |
| Initialization time | Typically ³ < 10 seconds + 0.5 times baseline length in km, up to 30 km |
| Initialization reliability | Typically ⁴ > 99.9% |

Network RTK positioning²

| | |
|---------------------|------------------------------------------------------------------------------------|
| Horizontal accuracy | 8 mm + 1 ppm RMS (0.032 ft +0.5 ppm) |
| Vertical accuracy | 15 mm + 1 ppm RMS (0.05 ft +0.5 ppm) |
| Initialization time | Typically ³ < 10 seconds + 0.5 times baseline length in km, up to 30 km |

xFill RTK positioning²

| | |
|---------------------|-----------------------------------------------------------|
| Horizontal accuracy | RTK ⁶ + 10 mm/minute RMS (0.033 ft/minute RMS) |
| Vertical accuracy | RTK ⁶ + 20 mm/minute RMS (0.066 ft/minute RMS) |

L1 Antenna reference point

| | |
|------------------------------|----------|
| From bottom of mounting pads | 0.1238 m |
| From top of lower housing | N/A |



Physical specifications

| | |
|----------------------------|-------------------------------------------------------------------------------------------------------------------------------|
| Size | Height: 118.9 mm |
| | Width: 190 mm |
| | Depth: 194.6 mm |
| Weight | 1.83 kg (4.03 lb) |
| Mounting | 1 x 5/8-11, 4 x M10x1.5 fasteners, 91.92 mm x 91.92 mm square pattern. Optional bracket with quick release adjustment ratchet |
| Network connector | 16 pin Amphenol bayonet, sealed |
| Indicators (3 yellow LEDs) | Upper: DC Power |
| | Middle: GPS correction signal status (via radio link, cable or MSS-Band) |
| | Lower: GNSS signal status (no signal, searching, or tracking) |

Environmental specifications


| | |
|-------------------|-------------------------------------------------------------------------------------------|
| Temperature | Operating: -40°C to +70°C (-40°F to +158°F) |
| | Storage: -50°C to +85°C (-67°F to +185°F) |
| Humidity | SAE J1445 (Mar 2017) Section 4.2 - 8 hour humidity cycle |
| Sealing | IP67, sealed to +/- 5 PSI |
| Shock - survival | 75 Gs, 6 milliseconds duration, 3 shocks in each of the three mutually perpendicular axes |
| Shock - operating | 40 Gs, 10 milliseconds duration |
| Vibration | 15.3 gRMS (Chassis mount qualified) |

Electrical specifications

| | |
|----------------------------|-------------------------------|
| Electrical input voltage | 9 to 32 VDC |
| Electrical input power | 18W maximum |
| Control interface | J1939 CAN network (two buses) |
| Load dump protected | Yes |
| Reverse voltage protection | Yes |

Primary I/O connector style

| Type | Description | Connector |
|------------------|-------------|----------------------|
| 16 Pin Connector | A | RS232 GND |
| | B | PWR - |
| | C | CAN2 LO |
| | D | CAN2 GND |
| | E | Chassis |
| | F | RS232-1 TXD / USB D+ |
| | G | PWR + |
| | H | Boot monitor |
| | J | RS232-1 RXD / USB D- |
| | K | CAN1 GND |
| | L | CAN1 LO |
| | M | ID / USB Enable |
| | N | CAN2 HI |
| | P | CAN1 HI |
| | R | RS232-2 RXD |
| S | RS232-2 TXD | |



Regulatory

Radio and electromagnetic CE, RED, FCC, RCM, ICES-003

Environmental

WEEE, REACH, ROHS, China RoHS and Prop 65

Compliant with EMC Directive 2014/30/EU and RED 2014/53/EU

¹ USB is enabled using theM976 service cable

² Accuracy and reliability may be subject to anomalies such as multi-path, obstructions, interference, satellite geometry and atmospheric conditions

³ Accuracy and reliability may be subject to anomalies such as multi-path, obstructions, satellite geometry and atmospheric conditions.

⁴ May be affected by atmospheric conditions, signal multipath, and satellite geometry. Initialization reliability is continuously monitored to ensure highest quality.

⁶ RTK refers to the last reported precision before the correction source is lost and xFill started.

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FCC Compliance Statement

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Canada Statement

This device complies with ISED's licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Le présent appareil est conforme aux CNR d'ISED applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) le dispositif ne doit pas produire de brouillage préjudiciable, et (2) ce dispositif doit accepter tout brouillage reçu, y compris un brouillage susceptible de provoquer un fonctionnement indésirable.

