MS996 Antenna

GNSS Smart Antenna

The MS996 is a fully integrated GNSS positioning receiver plus antenna intended for rugged on-machine blade and cab mounting. The rugged design of the MS996 allows for direct mounting to the machine without the need for external shock isolation. The MS996 is specially designed and tuned to operate through the shock and vibration forces experienced on the cabs or frames of heavy equipment.

The MS996 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 MS996 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 cab, chassis, or blade mountable unit - GPS antenna, receiver and isolation system
- 3 LED indicators that provide instant operational feedback
- Single cable connector (high cycle count connector)
- USB[1] 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 positioning[2]

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) positioning[2]

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 positioning[2]

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 positioning[2]

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	0.1448 m
From top of lower housing	0.0613 m

Physical specifications

Size	Height: 147 mm
	Width: 231.9 mm
	Depth: 251.1 mm
Weight	3.8 kg with mounting bracket
Mounting	4 x M10x1.5 fasteners, 140 mm x 140 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)

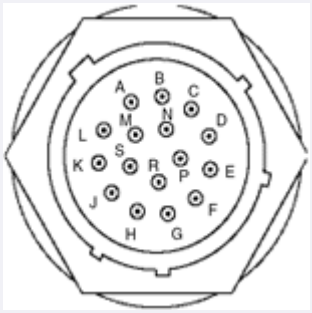
Environmental specifications

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	20.4 gRMS (Machine blade 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 theM996 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.

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.