

# MTx

3DOF ORIENTATION TRACKER



**xsens**

The MTx is a small and accurate 3DOF Orientation Tracker. It provides drift-free 3D orientation as well as kinematic data: 3D acceleration, 3D rate of turn (rate gyro) and 3D earth-magnetic field. The MTx is an excellent measurement unit for orientation measurement of human body segments and other applications requiring very low profile and light-weight sensor units.

## PRODUCT OVERVIEW

### Features

- Accurate full 360 degrees 3D orientation output
- Highly dynamic response combined with long-term stability (no drift)
- 3D acceleration, 3D rate of turn and 3D earth-magnetic field data
- Compact design
- High update rate
- Accepts synchronization pulses
- All solid state miniature MEMS inertial sensors inside
- Individually calibrated for temperature, 3D misalignment and sensor cross-sensitivity

### Fields of use

- Biomechanics
- Rehabilitation
- Sports science
- Virtual reality
- Ergonomics
- Animations

The MTx uses 3 rate gyros to track rapidly changing orientations in 3D and it measures the directions of gravity and magnetic north to provide a stable reference. The system's real-time algorithm fuses the sensor information to calculate accurate 3D orientation, with a highly dynamic response which remains stable over prolonged periods. With the MTx Software Development Kit, the MTx can be easily integrated in any system or (OEM) application.

A standalone MTx is available, as well as an Xbus version. With the Xbus Master, Xsens' digital data bus, multiple MTx's can easily be used simultaneously, enabling ambulatory and cost-effective measurements of human body motion.



## MTx TECHNICAL SPECIFICATIONS

### Output

3D orientation (Quaternions/Matrix/Euler angles)  
 3D acceleration  
 3D rate-of-turn  
 3D earth-magnetic field (normalized)  
 Temperature

### Orientation performance

Dynamic Range all angles in 3D  
 Angular Resolution<sup>1</sup> 0.05 deg  
 Static Accuracy (Roll/Pitch) <0.5 deg  
 Static Accuracy<sup>2</sup> (Heading) <1 deg  
 Dynamic Accuracy<sup>3</sup> 2 deg RMS

### Sensor performance

Dimensions  
 Full Scale (standard)  
 Linearity  
 Bias stability<sup>4</sup>  
 Scale Factor stability<sup>4</sup>  
 Noise  
 Alignment error  
 Bandwidth  
 Max update rate

### Rate of turn

3 axes  
 $\pm 1200$  deg/s  
 0.1% of FS  
 1 deg/s  
 -  
 0.05 deg/s/  $\sqrt{\text{Hz}}$   
 0.1 deg  
 40 Hz  
 512 Hz

### Acceleration

3 axes  
 $\pm 50$  m/s<sup>2</sup>  
 0.2% of FS  
 0.02 m/s<sup>2</sup>  
 0.03%  
 0.002 m/s<sup>2</sup>/ $\sqrt{\text{Hz}}$   
 0.1 deg  
 30 Hz  
 512 Hz

### Magnetic field

3 axes  
 $\pm 750$  mGauss  
 0.2% of FS  
 0.1 mGauss  
 0.5%  
 0.5 mGauss  
 0.1 deg  
 10 Hz  
 512 Hz

### Interfacing

Max. update rate 512 Hz (calibrated sensor data)  
 120 Hz (orientation data)  
 Operating voltage<sup>5</sup> 4.5 - 30 V  
 Power consumption 360 mW (orientation output)  
 Digital interface (standard) RS-232 and USB (external converter) or 'Xbus'

### Housing

Dimensions 38x53x21 mm (WxLxH)  
 Weight 30 g  
 Ambient temperature operating range<sup>6</sup> -20... +55 °C  
 Specified performance operating range<sup>4</sup> 0.. +55 °C

### Options and product code

Interface:

RS-232 (RS-232, sync in)

RS-485 (RS-485)

Xbus

(two connectors, only to be used with Xbus Master)

28

48

49

Full Scale Acceleration:

5g (50 m/s<sup>2</sup>)  
 18g (180 m/s<sup>2</sup>)

A53

A83

Full Scale Rate of Turn:

300 deg/s  
 1200 deg/s

G35

G25

Other options on request.  
 Surcharges may apply.

Product code:

Standard version:

Standard Xbus version:

MTx-## A## G##

MTx-28 A53 G25

MTx-49 A53 G25

<sup>1</sup> 1 $\sigma$  standard deviation of zero-mean angular random walk

<sup>2</sup> in homogenous magnetic environment

<sup>3</sup> may depend on type of motion

<sup>4</sup> deviation over operating temperature range (1 $\sigma$ ) specifications subject to change without notice

<sup>5</sup> only valid for MTx's with device ID's > 2000, other units operate on 4.5 - 15 V max

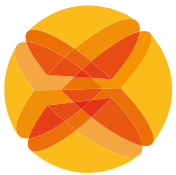
<sup>6</sup> non-condensing environment



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## ABOUT XSSENS TECHNOLOGIES

Xsens has strong expertise in biomechanics and inertial sensor technology. Thousands of Xsens inertial motion sensors have already been deployed in challenging human and machine motion applications such as motion capture, training & simulation, biomechanics, marine technology and automotive. Xsens' customers include Daimler, PGA, Össur, Roessingh Research and Development, TNO, INAIL, Electronic Arts, Sony Computer Entertainment, and others. The combination of expertise in human motion analysis and innovative inertial motion sensors makes Xsens a leader in inertial human motion capture solutions.



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