

# MTx

## 3DOF Orientation Tracker

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.

### 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
- all solid state miniature MEMS inertial sensors inside
- compact design
- high update rate
- accepts synchronization pulses
- individually calibrated for temperature, 3D misalignment and sensor cross-sensitivity

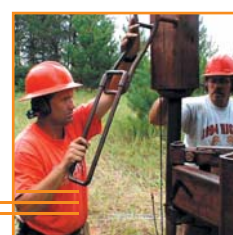
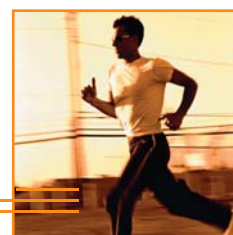
### Fields of use

- biomechanics
- exercise and sports
- virtual reality
- animation

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 systems real-time algorithm fuses the sensor information to calculate accurate 3D orientation, with a highly dynamic response and stable over time.

With the MTx Development Kit, the MTx can easily be integrated in any system or (OEM) application.

The MTx is available in a stand-alone, as well as an Xbus version. On the Xbus, Xsens' digital data bus, multiple MTx's can easily be used simultaneously, enabling ambulatory and cost-effective measurement of human body motion.



## 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

|                                          | rate of turn  | acceleration                | magnetic field  | temperature     |
|------------------------------------------|---------------|-----------------------------|-----------------|-----------------|
| Dimensions                               | 3 axes        | 3 axes                      | 3 axes          | -               |
| Full Scale (standard)                    | ± 1200 deg/s  | ± 17 m/s <sup>2</sup>       | ± 750 mGauss    | -55...+125 °C   |
| Linearity                                | 0.1% of FS    | 0.2% of FS                  | 0.2% of FS      | <1% of FS       |
| Bias stability <sup>4</sup> (1σ)         | 5 deg/s       | 0.02 m/s <sup>2</sup>       | 0.5 mGauss      | 0.5 °C accuracy |
| Scale Factor stability <sup>4</sup> (1σ) | -             | 0.05%                       | 0.5%            | -               |
| Noise density                            | 0.1 deg/s/√Hz | 0.001 m/s <sup>2</sup> /√Hz | 0.5 mGauss (1σ) | -               |
| Alignment error                          | 0.1 deg       | 0.1 deg                     | 0.1 deg         | -               |
| Bandwidth (standard)                     | 40 Hz         | 30 Hz                       | 10 Hz           | -               |

## Interfacing

Max update rate: 512 Hz (calibrated sensor data)  
120 Hz (orientation data)  
Operating voltage: 4.5 - 15 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: 0 - 55 deg Celsius



## Options and product code

|                                                            |      |                              |       |                          |       |
|------------------------------------------------------------|------|------------------------------|-------|--------------------------|-------|
| Interface:                                                 |      | Full Scale Acceleration:     |       | Full Scale Rate of Turn: |       |
| RS-232<br>(RS-232, sync in)                                | : 28 | 1.7 g (17 m/s <sup>2</sup> ) | : A33 | 150 deg/s                | : G15 |
| RS-485<br>(RS-485)                                         | : 48 | 5 g (50 m/s <sup>2</sup> )   | : A53 | 300 deg/s                | : G35 |
| Xbus<br>(two connectors, only to be used with Xbus Master) | : 49 | 10 g (100 m/s <sup>2</sup> ) | : A13 | 1200 deg/s               | : G25 |

Product code: MTx- ##A##G##  
Standard version: MTx- 28A33G25  
Standard Xbus version: MTx- 49A33G25

Other options on request.  
Surcharges may apply.

1 1σ standard deviation of zero-mean angular random walk  
2 in homogenous magnetic environment  
3 may depend on type of motion  
4 deviation over operating temperature range (1σ) specifications subject to change without notice

