xsens

Orientation. Position. Xsens.

MTi 100-series

The 4th generation MTi sets the new industry standard for reliable MEMS based INSs AHRSs, VRUs and IMUs. The breakthrough sensor fusion algorithm that overcomes limitations in Kalman Filtering, the Xsens Estimation Engine (XEE), lets the MTi 100-series pioneer as an alternative for optical gyroscopes. The MTi 10-series and MTi 100-series are fully interchangeable with respect to physical and electrical interface, wich allows you to choose the specific MTi that best fits the application.

MTi 100-series

- Breakthrough tracking performance
- Coning and sculling algorithms @ 2kHz
- Motion processing core for multiple sensor inputs and data sources
- High-performance XEE, beyond traditional Kalman Filtering
- Tuned for performance under vibrations and magnetic distortions
- Comprehensive SDK and straightforward system integration

	Roll/Pitch Typ	Roll/Pitch Max	Roll/Pitch Typ	Roll/Pitch Max	Yaw (Typ)	Sensor fusion core	Position & Velocity
MTi 10-series	Static		Dynamic				
MTi-10 IMU	-	-	-	-	-	-	-
MTi-20 VRU	0.2 °	0.4 °	0.5 °	2.0 °	Unreferenced	XKF	-
MTi-30 AHRS	0.2 °	0.4 °	0.5 °	2.0 °	1.0 °	XKF	-
MTi 100-series							
MTi-100 IMU	-	-	-	-	-	-	-
MTi-200 VRU	0.2 °	0.25 °	0.3 °	1.0 °	Unreferenced	XEE	-
MTi-300 AHRS	0.2 °	0.25 °	0.3 °	1.0 °	1.0 °	XEE	-
MTi-G-700 GPS/INS	0.2 °	0.25 °	0.3 °	1.0 °	1.0 °	XEE	1m (1σ STD)

Breakthrough performance from market leader

- Next level MEMS AHRSs with vibration rejecting gyroscopes
- Cutting-edge sensor fusion technology
- Market leader serving a large and high-profile customer base

Complete product, with highest accuracy

- Low latency (<2ms) for real-time applications
- Compensation against long-lasting transient accelerations
- Able to cope with GPS outages and magnetic distortions
- Leading innovator introducing a new class of AHRS's

Maximum flexibility and versatility

- Available as OEM board and IP67 encased MTi
- 24-pins connector for OEM
- Extensive suite of output formats, available directly from the MTi
- Choice of several interfaces, onboard USB and GPIO's
- Xsens' industry standard open Xbus protocol or NMEA

System specifications MTi 100-series

Input voltage	4.5-34V or 3V3;	**Clock drift**	10 ppm (1 ppm w. GPS) or ext. ref.
Typical power consumption	675-950 mW	**Output frequency**	Up to 2 kHz
Start-up time	2.5 sec.	**Latency**	<2 ms
IP-rating	IP 67 (encased)	**Interfaces**	RS232/422/485/UART/USB (on board)
Temperature (in use)	-40 to 85 ºC	**GPIO's and options**	SyncIn, SyncOut, 2x GPIO, Clock sync
Vibration and shock	MIL STD 202 / 2000g	**Interface protocol**	XBus or NMEA
Casing material	Anodized aluminum 6060	**Mounting**	Free; orientation alignment available
Sampling frequency	10 kHz/channel (60 kS/s)	**Built-in self test (BIT)**	gyroscopes, accelerometers, magnetometer

Orientation and position accuracy MTi 100-series

		200-VRU		300-AHRS		700-GPS/INS	
		Typ	Max	Typ	Max	Typ	Max
Orientation							
Roll/pitch	Static	0.2 °	0.25 °	0.2 °	0.25 °	0.2 °	0.25 °
	Dynamic	0.3 °	1.0 °	0.3 °	1.0 °	0.3 °	1.0 °
Yaw	In homogenous magnetic field	Unreferenced		1.0 °	-	1.0 °	-
Position and velocity							
Horizontal position	1σ STD (SBAS)	-			-		1.0 m
Vertical position	1σ STD (SBAS, baro)	-			-		2.0 m
Velocity	1σ RMS	-			-		0.1 m/s

* Additional orientation and position test specifications can be found in the MTi Technical Datasheet (MT0503P)
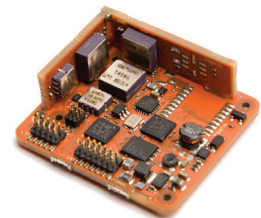
Mechanical specifications

MTi-G encased:
57x42x23.5 mm, 55g
9-pins push-pull connector

MTi encased:
57x42x23.5 mm, 52g
9-pins push-pull connector

OEM:
37x33x12 mm, 11g
24-pins header

Sensor specifications MTi 100-series

	Gyroscopes		Accelerometers	
	Typ	Max	Typ	Max
Standard full range‡	450°/s	-	50 m/s^2	-
Bias repeatability (1 yr)	0.2°/s	0.5°/s	0.03m/s^2	0.05m/s^2
In-run bias stability	10°/h	-	40 µg	-
Bandwidth (-3 dB)	415 Hz	N/A	375 Hz	N/A
Noise density	0.01°/s/√Hz	0.015°/s/√Hz	80 µg/√Hz	150 µg/√Hz
g-sensitivity (calibrated)	0.003°/s/g	0.015°/s/g	N/A	N/A
Non-orthogonality	0.05 deg	-	0.05 deg	-
Non-linearity	0.01% FS	-	0.03% FS	0.5% FS

* Typical values @ 25 °C

‡ Other ranges available upon request

	Magnetometer		Barometer	
	Typ	Max	Typ	Max
Standard full range	-	+/- 80 µT	-	300-1100 hPa
Noise density	200 µG/√Hz	-	0.01 hPa/√Hz	-
Non-linearity	0.1% FS	-	-	-

* Typical values @ 25 °C

| GPS receiver (MTi-G-700 GPS/INS only)			
Receiver type	50 ch, L1, C/A code	DGPS	SBAS
Update rate	4Hz	GPS L1 C/A horizontal accuracy [CEP]	2.0 m (2.5m w/o SBAS)
Start-up time cold start	27s	GPS L1 C/A vertical accuracy [CEP]	5.0 m
Tracking sensitivity	-161 dbM	Velocity accuracy	0.1 m/s @ 30 m/s

* Typical values @ 25 °C

Integration with the MTi is very straightforward with the Xsens MT Software Suite. The MT Software Suite is an easy-to-use API which can be interfaced with via a COM, C and C++ interface with support for Windows and Linux. In addition, there is complete access to the low level source code for full flexibility on any platform. The components of the MT Software Suite are:

Xsens Device API	API to communicate with the MTi. Interfaces for common programming languages as well as source code for lower communication levels.
Example code	To make starting with the MTi even easier, example code is provided for various platforms, amongst others Matlab and Linux.
MT Manager	An intuitive GUI for Windows, including configuration and recording tools, graphs and a serial port viewer to help understand the XBus protocol.
Magnetic Field Mapper	An algorithm and tool to calibrate the MTi for hard- and soft iron effects. The calibration can be done during normal operation; there are no restrictions on the trajectories or rotations.
Documentation	Full (HTML-)documentation on the MTi, API, SDK and application notes.

Xsens MT Software Suite
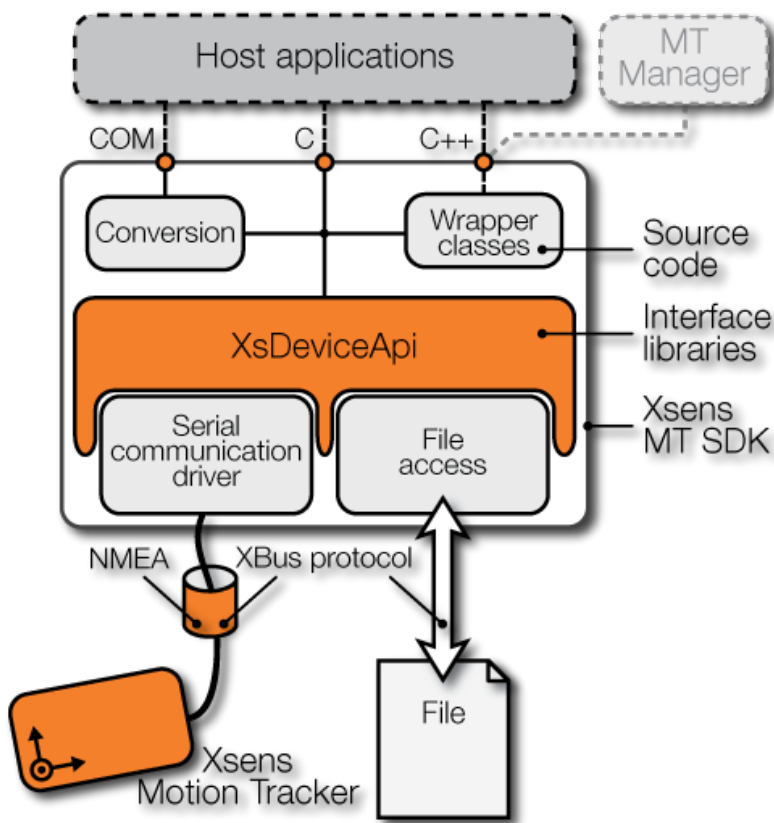
Development kit

The best way to start with the MTi is with the complete MTi Development Kit. This kit will make development very easy. The MTi Development Kit contains the following:

• The MTi of your choice
• Cable set for USB and serial communication, as well as GPIO's.
• MT Software Suite (on USB flash drive)
• Robust suitcase
• Test and calibration certificates

ABOUT XSENS

Xsens is the leading innovator in 3D motion tracking technology and products.

Its sensor fusion technologies enable a seamless interaction between the physical and the digital world in applications such as industrial control and stabilization, health, sports and 3D character animation.

Clients and partners include Electronic Arts, NBC Universal, Daimler, Autodesk, ABB, Siemens and various other leading institutes and companies throughout the world. Xsens is fully owned by Fairchild Semiconductor, an industry icon delivering power solutions for the mobile, industrial, cloud, automotive, lighting, and computing industries. Xsens has offices in Enschede, the Netherlands and Los Angeles, California.