MT Manager User Manual

MT Manager 4.2.1

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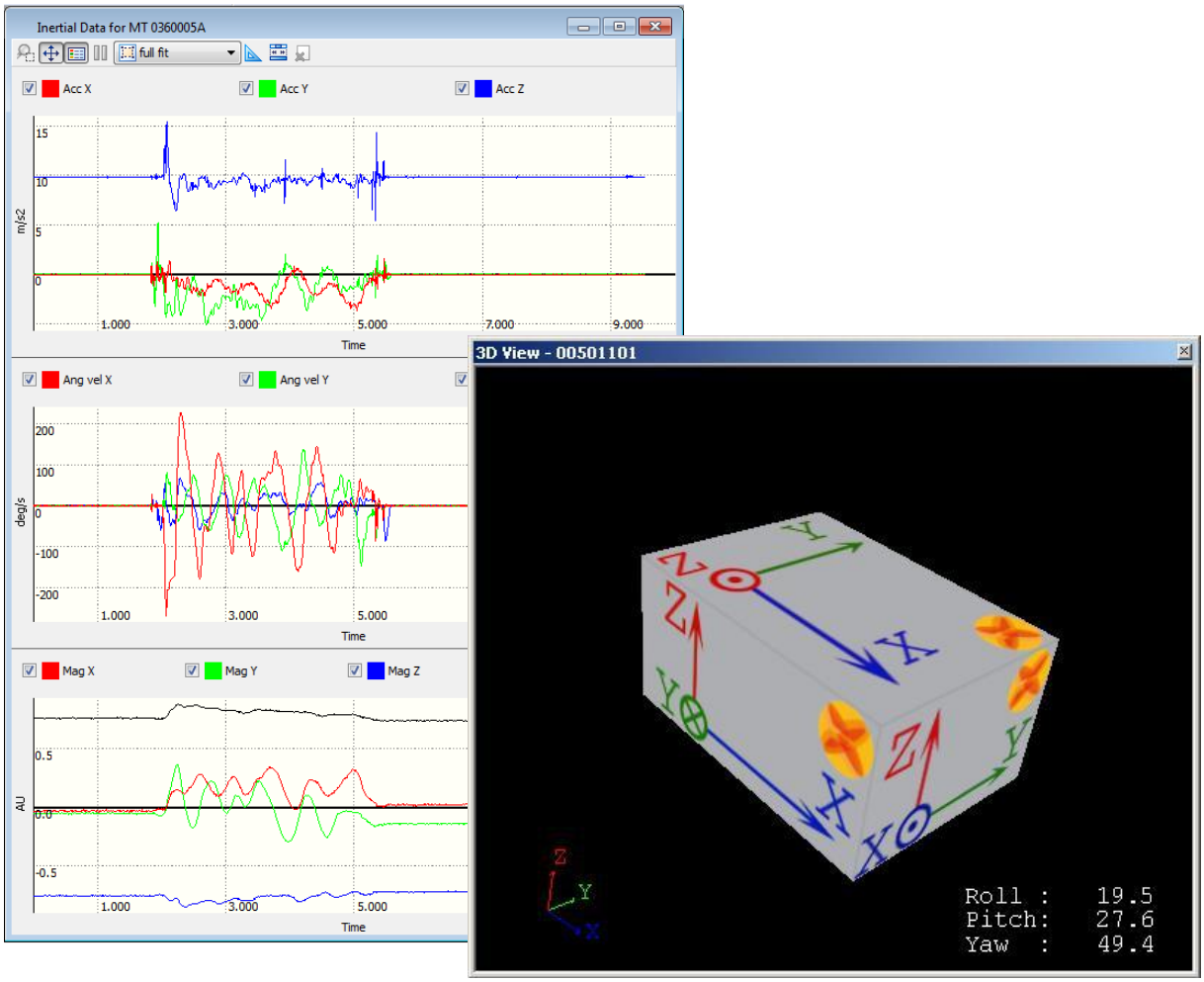

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Revisions

Revision	Date	By	Changes
A	1 Apr 2008	MMI	Initial release
..	…	…	…
H	26 Sep 2012	MHA	Added MTi 10-series and MTi 100-series, MT Manager 4.0
I	18 Dec 2012	MHA	MT Manager 4.1
J	07 May 2013	MHA	MT Manager 4.1.5 - KMZ Exporter - Message terminals
K	28 October 2013	MHA	MT Manager 4.2 - NMEA (string mode) - Added StartSampling Synchronization
L	17 January 2014	MHA	MT Manager 4.2.1 - Added NMEA – Enable NMEA protocol

Table of Contents

1 Terms, abbreviations and references

Term	Description
Quaternion	A non-commutative extension of complex numbers. A unit length quaternion is a convenient parameterization of rotations.
Euler Angles	Representation of the spatial orientation of any frame of the space as a composition of rotations from a reference frame.

Abbreviation	Description
DOF	Degrees Of Freedom
DSP	Digital Signal Processor
GPS	Global Positioning System
IMU	Inertial Measurement Unit
KML	Keyhole Markup Language
KMZ	Zipped Keyhole Markup Language
LLA	Latitude Longitude Altitude
MFM	Magnetic Field Mapping
MT	Motion Tracker
MTB	MT Binary Communication Protocol
MTM	MT Manager
OpenGL	Open Graphics Library
SDK	Software Development Kit
SVInfo	Space Vehicle Information
UTC	Coordinated Universal Time
WGS84	The latest revision of the World Geodetic System. It defines a reference frame for the earth, for use in geodesy and navigation.
Xbus	Xsens Communication Protocol
XDA	Xsens Device API, the communication API between the MTi and the user application. See also [MTi_10s_100s]
XFF	Xsens Firmware File format
XKF-3	Xsens Kalman Filter 3 DOF
XKF-3i	Xsens Kalman Filter 3 DOF (MTi 10-series)
XKF-6	Xsens Kalman Filter 6 DOF
XEE	Xsens Estimation Engine (MTi 100-series)
XML	eXtended Markup Language

Reference id	Document description
[LLCP]	“MT Low-Level Communication Protocol Documentation.pdf”, document ID MT0101P
[MFM]	“Magnetic Field Mapper Documentation.pdf”, document ID MT0202P
[MTi_MTx]	“MTi and MTx User Manual and Technical Documentation.pdf”, document ID MT0100P
[MTi-G]	“MTi-G User Manual and Technical Documentation.pdf”, document ID MT0137P
[XBM]	“User Manual Xbus Master B.pdf”, document ID XM0100P “XM-B Technical Documentation.pdf”, document ID XM0101P
[FWU]	“Firmware Updater User Manual.pdf”, document ID FU0100P
[MTi_10s_100s]	“MTi User Manual.pdf”, document ID MT0605P
[MTw_SDK]	“MTw SDK User Manual.pdf”, document ID MV0319P

2 Introduction

This user manual describes the product features and operating instructions for Xsens' MT Manager 4.2.

Note: this User Manual mostly describes the use of MTi 10-series and MTi 100-series. This means that although there is compatibility with legacy Motion Trackers, this manual may not explore all functionalities of these legacy Motion Trackers.

MT Manager is compatible with all Xsens Motion Trackers as of the MTx (for a complete list of supported MTs, refer to section 4.3) and the Xbus Master. Note that listed features and sections in this document may not apply to all Xsens devices. For device specific details please refer to the documentation listed in section 1.

The MT Manager uses the XsensDeviceApi32.DLL with the dynamic library interface. This is the same API that is provided for software development in the MT SDK.

The MT Manager software for Windows XP/Vista/W7 is easy-to-use software with familiar Windows user interface, which allows you to:

- view 3D orientation in real-time
- view inertial and magnetic sensor data in real time
- view latitude, longitude, altitude plots in real time (depends on Motion Tracker used)
- monitor and compose message to and from the device via a message terminal
- export log files to other formats like ASCII and KML/KMZ
- change and view various device settings and properties
- run a self-test to check the mechanical functions of the inertial sensors and magnetometer

The MT Manager is therefore an easy way to get to know and to demonstrate the capabilities of the Motion Tracker.

3 Quick start

This section is intended to help you install and use the MT Manager quickly. For detailed instructions, please go to sections 4 and 5.

3.1 Installing the MT Manager

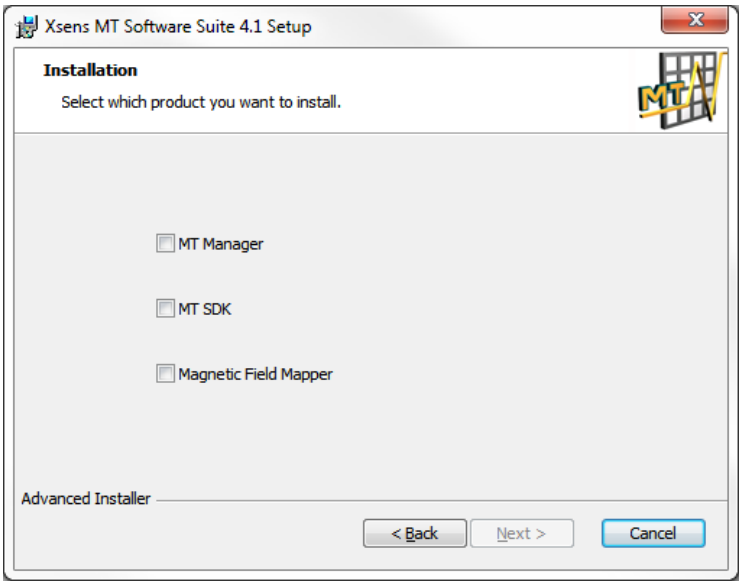
First you need to install the MT Manager on your computer running Windows XP, Windows Vista or Windows 7. This is easily done by using the MT Software Suite application that guides you through the installation.
NOTE: the most recent version of the software, source code and documentation can always be downloaded on the support section of www.xsens.com.

For users of previous Xsens' MT software:
Be sure to uninstall the previous version of the USB converter drivers:
Open the Windows Control Panel and go to Add or Remove Programs.
Scroll down until you find an entry 'Windows Driver Package - Xsens USB-serial Converter Driver Package'. Please uninstall all entries of these drivers.

For Windows XP users:
After inserting the Xsens USB Flash drive in the computer, the installation will start automatically. If not, go to your USB flash drive and install the MT Software Suite from there.
For Windows Vista/W7 users:
After inserting the Xsens USB Flash drive in the computer, choose to "Open folder to view files" in the Autoplay dialog. Then right-click on the installer and choose to "Run as administrator". This installation procedure also tells the procedure to install the entire MT Software Suite.

The installation procedure consists of a set of several installers and starts with displaying this screen:

It is possible to choose the components that you need to install. Only the MT Manager needs a serial key to install:



When you cancel the installation of a particular component, the installer will continue with the next component. Make sure to accept the End-User License agreement and Software License Agreements

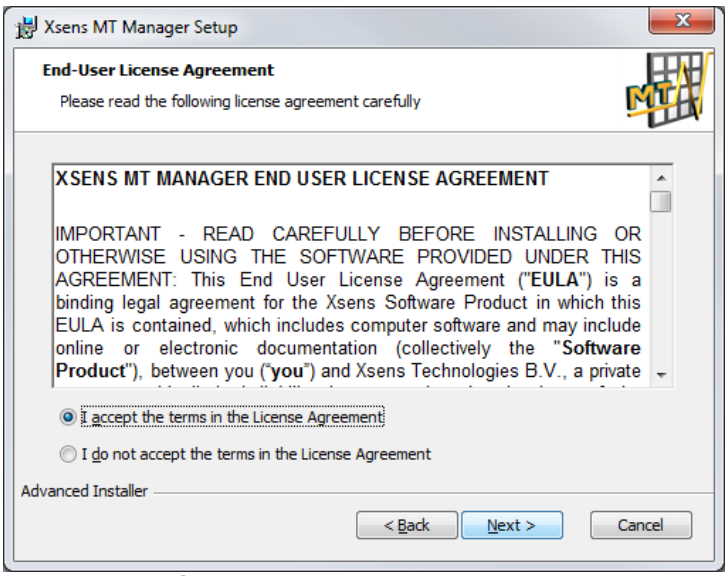


Figure 1: Xsens MT Manager EULA

3.2 Connecting your device to MT Manager

Connect a device to your PC using the supplied USB cable. With the USB cable, the MTi is automatically found.

3.2.1 Automatic COM port selection

Upon execution of the MT Manager it automatically scans the available COM-ports and/or MTi USB devices on the PC for connected devices.

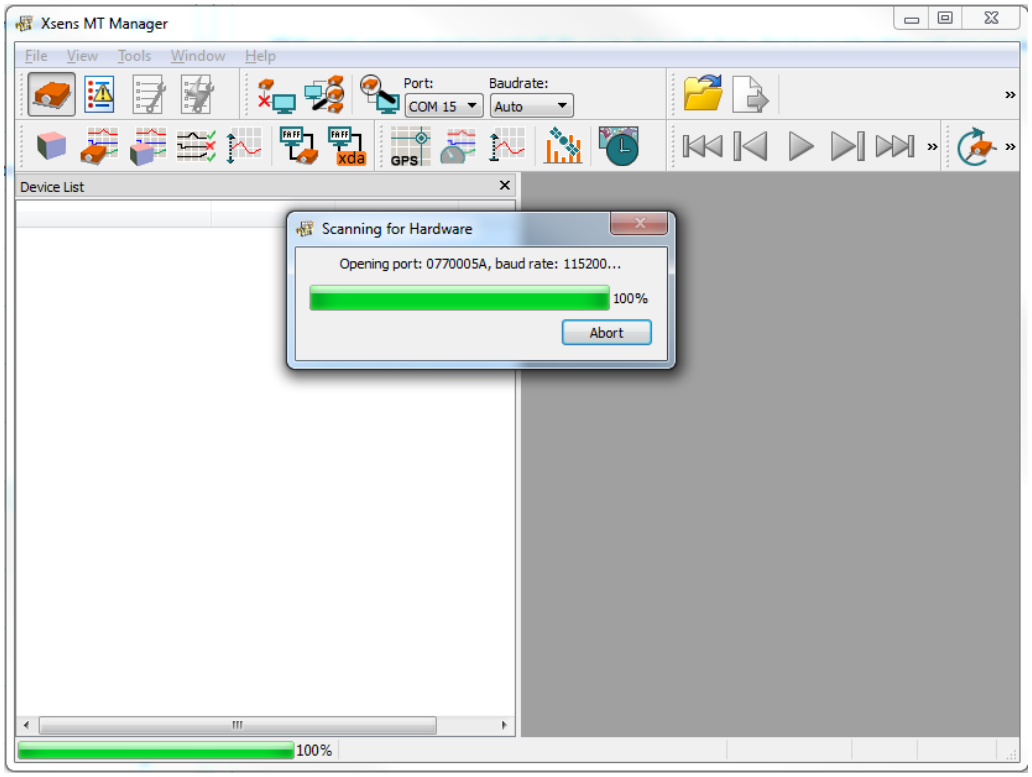


Figure 2: MT Manager scanning for attached devices

If you are using an RS-485 sensor, be sure to enable the RS-485 compatibility mode in the General pane via "Tools" → "Options…", refer to section 4.6. Without RS-485 compatibility enabled, the RS485 MTi may not be found.

The MTs are displayed in the Device List with the respective unique MT device ID number.

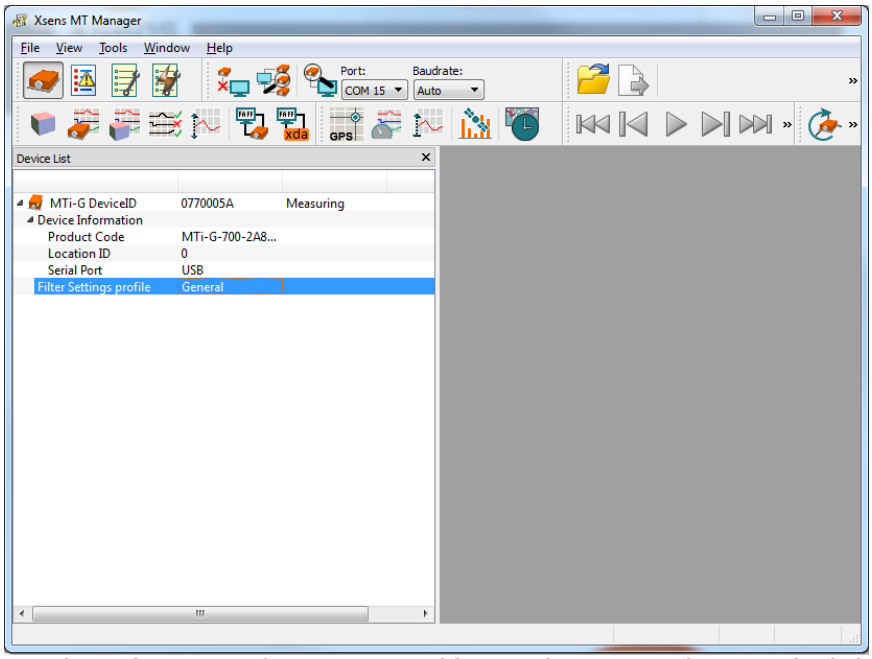


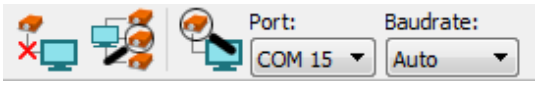
Figure 3: The main screen of MT Manager with an MTi-G-700 GPS/INS attached via USB

If an Xbus Master is attached to one of the COM-ports, the MT Manager detects this and will query the Xbus Master for attached sensors. MTs found in this manner are treated the same as MTs found on separate COM-ports.
After physically connecting one or more devices, press the rescan button:

to let MT Manager search for connected devices on any available COM port and update the device list.
When you want to disconnect all devices, press the disconnect button:

3.2.2 Manual COM port selection

If you want to select the COM port manually, then in the Connectivity toolbar:



you can choose a COM port and the baud rate if you are using a serial connection or a USB converter, see below. Note that the direct USB connection does not have a COM-port. Instead, the USB has a unique USB name that you can find in the MT Settings dialog window, see section 5.2.2.5.

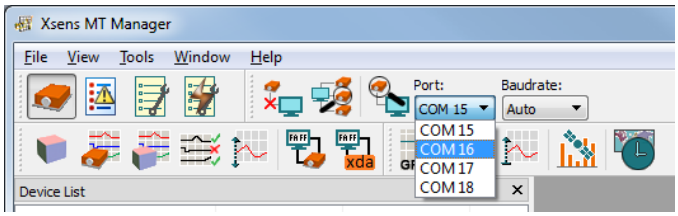


Figure 4: Manually selecting the COM port that MT Manager uses during its scanning procedure

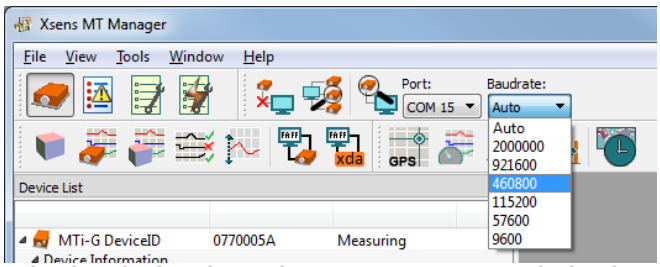


Figure 5: Manually selecting the baud rate that MT Manager uses during its scanning procedure

For the COM ports you can choose between all active COM ports. It is recommended to use the “Auto” baud rate to have the baud rate determined automatically. Then, finally, press the “Scan Port” button[1]:

To learn how to retrieve the USB name, please refer to section 5.2.2.5.

Now you are ready to go using your Motion Tracker and/or Xbus Master with the MT Manager.

[1] If you are using an RS-485 sensor, be sure to enable the “RS-485 compatibility mode” (refer to section 3.2.1).

4 Overview MT Manager

This section describes the options available to the user in the MT Manager.
In section 5 operating the MT Manager is described.

4.1 Purpose

The purpose of the MT Manager is to provide easy access to the capabilities of any of the currently supported devices (refer to section 4.3).
The MT Manager can be used to interface with the MT and to visualize and log data. It offers export options for ASCII text files. The ASCII export format can be customised to your needs.

4.2 MT Manager features

The MT Manager software for Windows XP/Vista/W7 is easy-to-use software with a familiar Windows user interface, which allows you to:

- view 3D orientation in real-time
- view inertial and magnetic sensor data in real time
- view latitude, longitude, altitude plots in real time (depends on Motion Tracker used)
- view and compose messages to and from the device via a real time message terminal
- reprocess binary data log files
- export log files to ASCII
- change and view various device settings and properties
- run a self test to check the mechanical functions of the inertial sensors and magnetometer

The MT Manager is therefore an easy way to get to know and to demonstrate the capabilities of your Xsens Motion Tracker and/or Xbus Master.

4.3 Supported devices

Currently the following devices are being supported by the MT Manager:

- MTi 10-series 4th generation
- MTi 100-series, including MTi-G-700 GPS/INS 4th generation
- MTw Wireless Motion Tracker (see [MTw_SDK])
- MTi and MTx 3rd generation (legacy mode)
- MTi-G 3rd generation (legacy mode)
- Xbus Master

For detailed information about these MTs and Xbus Master, please refer to the corresponding User Manuals and Technical Documentation: [MTi_MTx], [MTi-G], [XBM] and [MTi_10s_100s].
Future Xsens Motion Trackers will be supported as of their release.

4.4 Input Options

The MT Manager can handle real-time input and input from recorded binary files (see also sections 5.5.1 and 5.5.2).

Real-time: Serial data using COM port (via USB virtual COM-port or RS232[2]) or directly via USB.

Files: `.MTB` (MT Binary Communication Protocol)[3] log files. Contain recorded output log-files from a Motion Tracker.

[2] COM1 and COM2 only
[3] The `.MTB` extension is associated with MT Manager.

In both cases the input (file) format is the same.

The `.MTB` log files generated with the MT Manager will contain the following MT Data messages:

- Configuration data
- For Sensor Component Readout (SCR) log files; Extended MT Specification data
- If enabled, UTC date and time at regular intervals (as configured)
- If enabled, GPS satellite SVInfo at regular intervals (as configured)
- MT Data at output frequency (as configured)

The MT Manager software handles the request of these additional data packets from the MT (not only requesting MT Data) to enable full analysis of log-files in the MT Manager software later.

NOTE: An MTB file can contain any MT Data packets that are requested from the MT. Only if an MTB file contains Sensor Component Readout or sensors data ($\Delta q/\Delta v$ or inertial data) and/or GPS data messages, the data can be re-processed using different filter profiles. In all other cases the .MTB file is considered a log-file, which can be played back again for viewing.
In the case that only sensors data and/or GPS data is requested from the MT, the MT Manager will run the sensor fusion filter in xsensdeviceapi32.DLL on the host PC (and not on the DSP on the MT) to estimate orientation, position, velocity.

4.5 Output Files

The MT Manager can export data logged in .MTB files to several formats (see also section 5.5.3).

ASCII text data

- Calibrated sensor data (3D acceleration, rate of turn, magnetic field, $\Delta q/\Delta v$, free acceleration, etc.)
- Orientation data
- Position
- Velocity

The output orientation can be presented in different conventions:

- Unit normalised Quaternions (also known as Euler parameters)
- Euler angles: roll, pitch, yaw (XYZ Earth fixed type, also known as Cardan)
- Rotation Matrix (Direction Cosine Matrix)

Data and (UTC) time can also be included in the exported files. See 0 for more information on the columns of the exported ASCII file.

KMZ/KML geographic data

- Timestamp
- Position
- Velocity
- Orientation
- GPS Mode
- UTC time

KMZ/KML files are excellent to study trajectories in e.g. Google Earth.

4.6 Menu bar

In the MT Manager menu bar you will find the following entries:

In the table below each (sub-) entry is explained.

Entry (level 1)	Entry (level 2)	Entry (level 3)	Description
File	Open File		Open a previously recorded (shortcut: CTRL-O): • MT Manager log file (`.mtb`) • Xsens log file (`.bin` and `.xm`) • Xbus Master log file (`.xm`) • Binary log file (`.bin`)
	Close		Closes the currently opened file
	Export		Export an opened log file to (shortcut: CTRL-E): • ASCII formatted file For more details, refer to section 5.5.3.
	List of last opened files		A list of last opened files
	Exit		Closes MT Manager
View	Displays	Device List	Toggle to open/close Device list. Refer to section 4.7.1.1 for details
		Messages	Toggle to open/close the Messages window
		MT Settings	Toggle to open/close the MT Settings dialog
		Output configuration	Toggle to open/close the output configuration dialog
		3D Orientation	Toggle to open/close the 3D display of orientation
		Inertial Data	Toggle to open/close the inertial data graph
		Orientation data	Toggle to open/close the orientation graph
		Status Data	Toggle to open/close the status graph
		Pressure	Toggle to open/close the pressure graph
		Device Data View	Toggle to open/close the Device Data terminal
		XDA Data View	Toggle to open/close the XDA Data terminal
		Position	Toggle to open/close the position graph
		Velocity	Toggle to open/close the velocity graph
		Altitude	Toggle to open/close the altitude graph
		Space Vehicle Information	Toggle to open/close the SV information graph
	Toolbars	Main views	Toggle to switch on/off the Main view toolbar. Refer to section 4.7.1 for details.
		Connectivity	Toggle to switch on/off the Connectivity toolbar.
		Wireless Devices	Toggle to switch on/off the Wireless Devices toolbar. For MTw and Awinda only
		Orientation resets	Toggle on/off the Orientation resets toolbar. Refer to section 4.7.5.
		File control	Toggle to switch on/off the File control toolbar
		Data Views	Toggle to switch on/off the Data views toolbar Refer to section 4.7.14.7.1 for details.
		GPS Views	Toggle to switch on/off the GPS toolbar.

			Refer to section 4.7.1 for details.
		Record and Playback	Toggle to switch on/off the Record/Playback toolbar. Refer to section 4.7.4 for details.
	Status bar		Toggle to switch on/off the status bar at the bottom of the MT Manager window. This status bar shows playback information, “extended” tool tips etc.
Tools	Preferences	MT Manager	Here you can change the following general settings: Graphs: - Euler Angles or Quaternions - Toggle display graphs as strobes - File Plotting mode: Real time or All data Miscellaneous: - Toggle show docked MTw’s and log and visualize docked MTw’s - Enable RS485 Compatibility - Show a warning when opening Data Viewers XDA options: - Allows to load an alternative filter profiles file (use by Xsens support department only)
		Logging	Here you can change Logging Settings (refer to section 5.5.1) - Name of the log file (template)
		Exporters	Here you can change the export settings (refer to section 5.5.3) - ASCII o Output file name o Delimiter options o Empty field options o Exported data - KMZ/KML o Output file name o Markers per second o Choice KMZ or KML
	Restore Communication		Restores the communication settings to the default factory settings (RS422 and legacy product only)
	Wireless configuration		Opens the wireless configuration window (MTw only)
	Synchronization configuration		Opens the synchronization configuration window, refer to section 4.7.1.4
	Power off	All Docked MTws	Powers off all docked and USB connected MTws
		Wireless system	Powers off all MTws that have a wireless connection
		All Devices	Powers off all MTws
Window	Tile		Tiles the open graph windows. Tiling will be done in order of opening. With 3 graphs, opening the graphs in a specific order determines which graph is over the entire height of the window in the left column and which graphs are placed as smaller windows in the right column.
	Cascade		Cascades the open graph windows
Help	About MT Manager		Display version information and includes EULA
	Xsens Online Shop		Opens the webpage http://shop.xsens.com where accessories and MT’s can be ordered.
	Documentation	MT Manager User Manual	Opens the MT Manager User Manual (PDF)
		MTi User Manual	Opens the MTi User Manual (PDF)
		Other documentation	Opens documentation folder (…\Program Files (x86)\Xsens\Documentation)

4.7 Sub-windows, toolbars and buttons

In this section the sub-windows, toolbars and buttons of the MT Manager are explained:

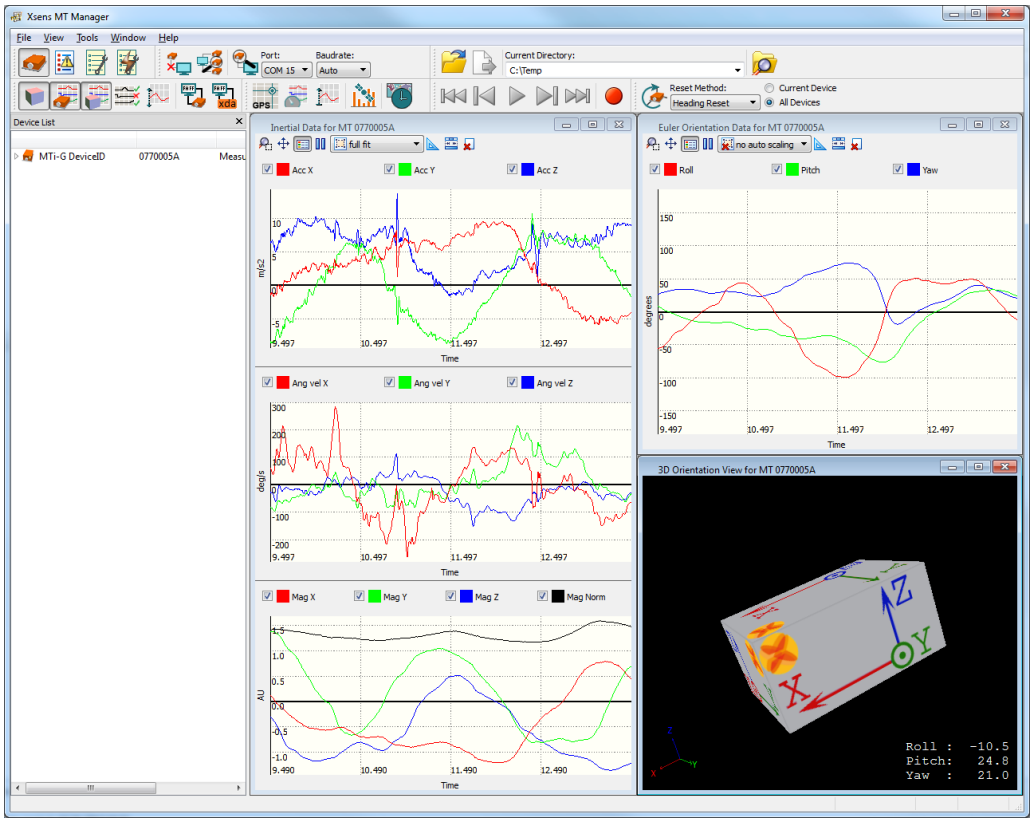


Figure 6: MT Manager showing inertial data, orientation data and a 3D view of an MTi-G-700 GPS/INS

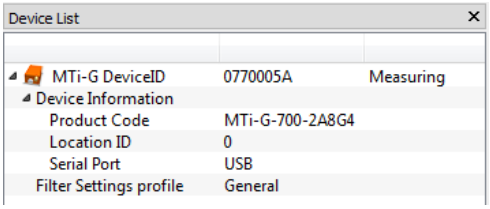
4.7.1 The sub-windows

The MT Manager offers a wide range of information displayed in its sub-windows, which can be opened and closed via the (Main Views and GPS) toolbar buttons or the menubar:

The individual buttons and their functionality will be explained in the next sub-sections; availability of some of the buttons and related sub-windows depends on the type of the connected device (e.g. position and velocity information will not be accessible with e.g. MTi-20 VRU or MTi-300 AHRS). The icons corresponding with the button that activates a specific sub-window are displayed on the top left of each subsection.

4.7.1.1 The Device List

By default, the Device List is displayed in a sub-window, showing useful information about your MT. Note that the Device List is read only.



The following information is available:

Parameter	Description	Comments
DeviceID	A unique DeviceID. See [MTi_10s_100s] for explanation of the DeviceID	Fixed value, retrieved from device
Product Code	Product code, built up from type of device, product serie, interface, accelerometer range and gyroscope range.	Fixed value, retrieved from device
Location ID	Location ID that allows identifying the MTi in a system setup	Can be set in MT Settings Dialog
Serial Port	USB or COM port number	Automatically detected
Filter Settings Profile	The filter setting profile used for orientation	Can be set in MT Settings dialog

The MT System state can show the following:

MT System State	Description	Comments
Measuring	The MT is outputting data	
Recording	Data is being saved to file	
Flushing	Data is being retransmitted after recording has been stopped	Applies to Awinda MTw only
Config Mode	MT is in config mode. This happens when configuration messages are sent to the MT or when the user puts the MT in config mode	
File Mode (open)	A file is selected. MT Manager is waiting for the user to process the file.	
File Mode (loading)	A file is being loaded and processed	Progress is displayed in the fourth column.
File Mode (ready)	Displayed when a file is loaded and when the entire file has been processed.	
File Mode (playing)	Displayed when the file is being played back	

With the Device List, it is possible to disconnect specific devices. Right-click on any parameter associated with the MTi that needs to be disconnected, right click and choose Disconnect. The MTi will be removed from the Device List.

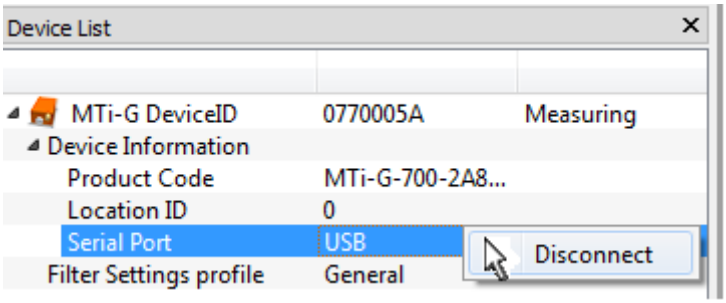


Figure 7: Right-click on the Device allows to disconnect a single MT

4.7.1.2 MT Settings

In the MT Settings sub-window several (low-level) settings can be changed.
Caution is advised to avoid unwanted changes, causing your devices to work improperly and/or inaccurately. In this window it is possible to save and load a set of device-specific settings, including the output configuration, that can be copied to other devices (with the same product code). You can always revert a device to its Factory Settings using the Revert button.

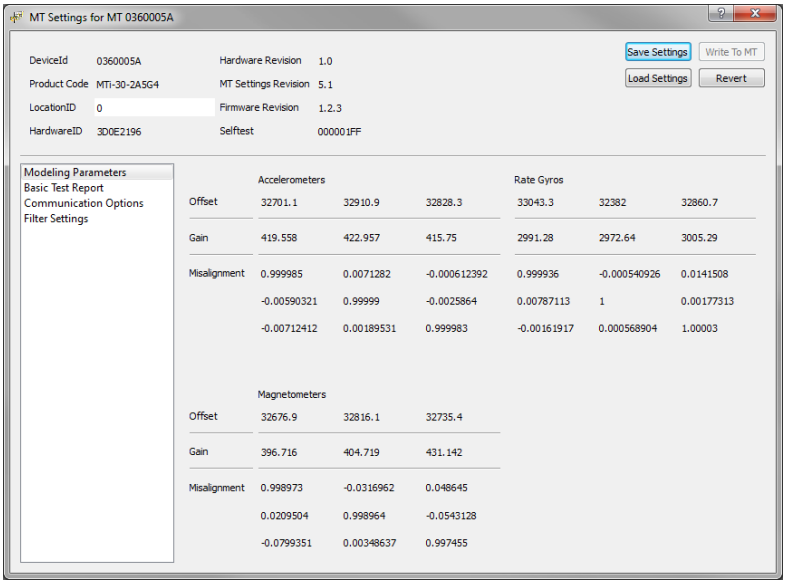


Figure 8: An MT Settings dialog for an MTi-30 AHRS

For details on the MT Settings, please refer to the documentation of the devices: [MTi_10s_100s].

4.7.1.3 Output configuration settings

In the Output Configuration settings windows, all output options of the MTi can be set, including frequencies and formats.

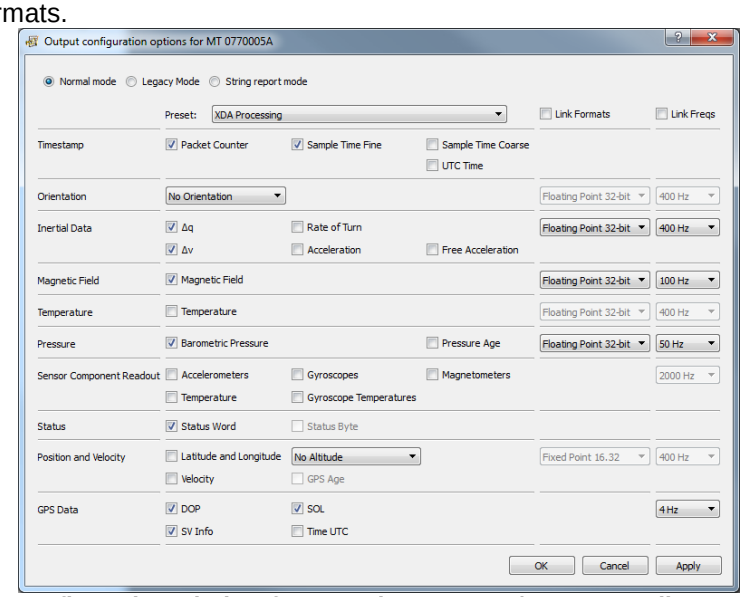


Figure 9: the Output Configuration window for an MTi-G-700 GPS/INS. Depending on the MTi attached, the Output Configuration window may show fewer options.

4.7.1.4 Synchronization configuration window

The MT Manager allows you to set up Synchronization functions on the MTi. The MTi has three synchronization lines (SyncOut, SyncIn, ClockSync, Software line); you can apply in total 4 different synchronization functions to these four lines. In section 5.3, the various options are discussed in detail.

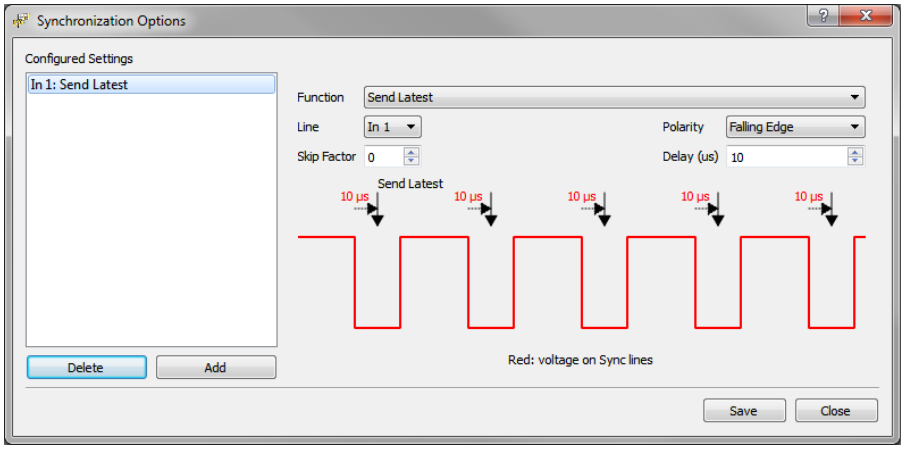


Figure 10: The Synchronization options windows allows for setting synchronization options

4.7.1.5 3D Box View

The 3D Box View is a real-time graphical (OpenGL) representation of the MT orientation measurements, i.e. roll, pitch and yaw.

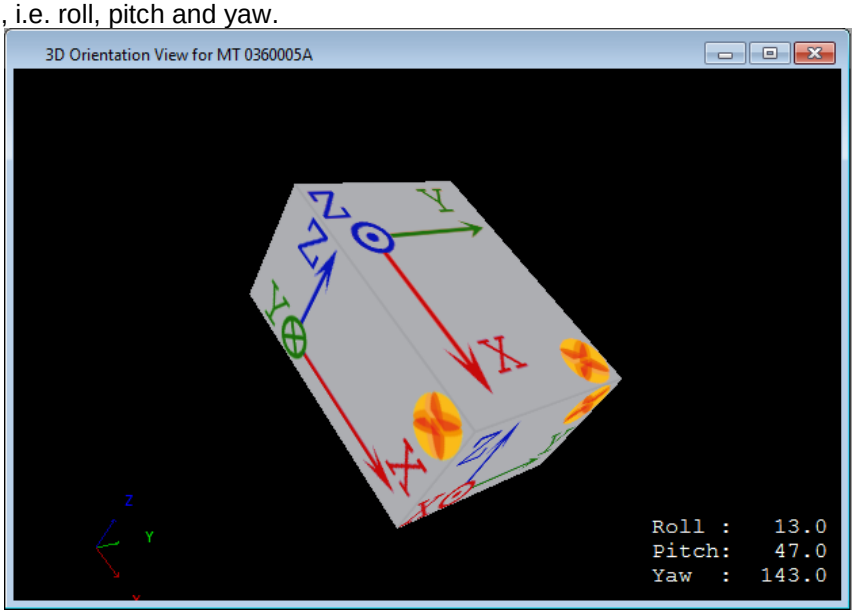


Figure 11: The 3D Box view is an easy way of visualizing the orientation of any MTi

4.7.1.6 Inertial Data view

Per sensor type, the Inertial Data view graphically shows the 3D calibrated measurement data vs. time:

- acceleration (from the accelerometers) in m/s^2;
- angular velocity (from the gyroscopes) in deg/s;
- magnetic field (from the magnetometers) in normalised arbitrary units (a.u.).

Figure 12: The Inertial data view for acceleration, angular velocity and magnetic field

The following tables explain the line colours and the buttons in this view:

Colour	Corresponding axis
Red	Acceleration, angular velocity (roll) and normalised magnetic field in X direction
Green	Acceleration, angular velocity (pitch) and normalised magnetic field in Y direction
Blue	Acceleration, angular velocity (yaw) and normalised magnetic field in Z direction
Black	Total acceleration, angular velocity or magnetic field, if available

Automatic scaling

It is possible to choose the scaling of the inertial data plot using the pull-down dialog.

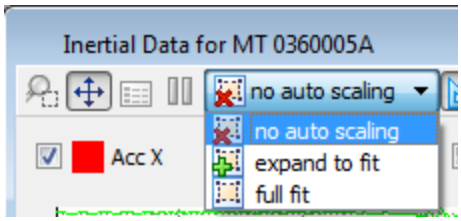


Figure 13: Tools let you configure the graphs

Scaling option	Functionality
No auto scaling	Y-scale will no longer be scaled
Expand to fit	Y-scale will be stretched to show all data in plot
Full fit	Y-scale will be stretched to show all data in plot

Zooming

When the Zoom-icon  is selected, you have several options to zoom.

Option 1: Press and hold either mouse button, drag mouse to make a zoom rectangle (right button zooms out, left button zooms in):

Figure 14: A zoom rectangle in the Euler angles graph

-Release mouse button to zoom in/out to the zoom rectangle
-Press other mouse button to cancel the zoom
-Use scroll wheel to make minor adjustment to first point of the rectangle

Option 2: Double click and hold one of the mouse buttons to generate a default zoom rectangle centered around the mouse position with zoom factor 2.0 (right button zooms out, left button zooms in):
Then:

-Release mouse button to zoom in/out to the zoom rectangle
-Press other mouse button to cancel the zoom
-Move the mouse to move the zoom rectangle
-Use the scroll wheel to increase/decrease the zoom factor

Option 3: Use scroll wheel without buttons pressed to simulate a double click centered around the mouse position and immediately applying the zoom i.e. apply a default zoom rectangle centered around the mouse position (right button zooms out, left button zooms in).

- NOTE: Zooming is not allowed when the autoscale method is full fit

Zooming in y-direction only

When zooming with the above option, it can happen that new data will not be shown in the zoom box, as the x-scale (time) ends before the place where new data is created. In order to zoom only in y-direction, enable the function “show all samples” with the following button:

When “show all samples” is enabled, the x dimension of the zoom rectangle is always the complete width of the graph:

Figure 15: Zooming in y-direction only can be enabled with the button "show all samples"

Panning the graph

When the pan icon  is enabled, you can pan the graph with the following actions:
- Press and hold left/right mouse button
- Release the mouse to stop panning
- Move the mouse to pan the graph

NOTE: Panning is not allowed when the autoscale method is full fit

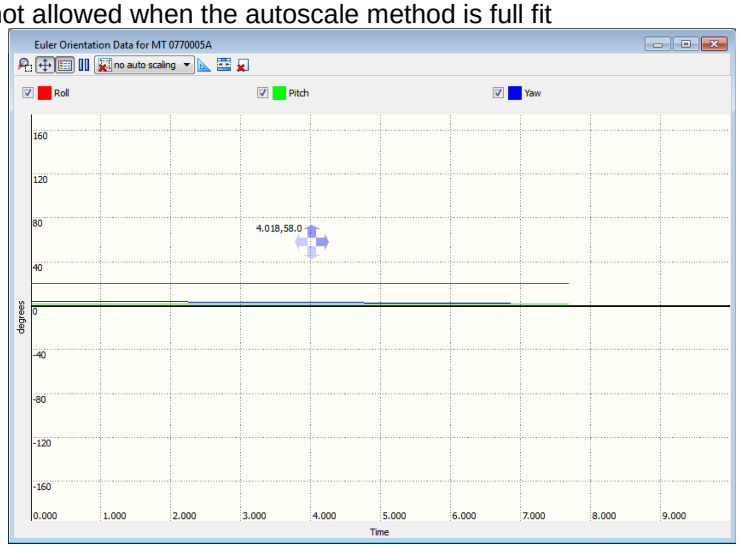


Figure 16: Panning is available in all directions

Showing less data channels

With the checkboxes, it is possible to omit data from the plot. This way, you can really investigate one particular signal.

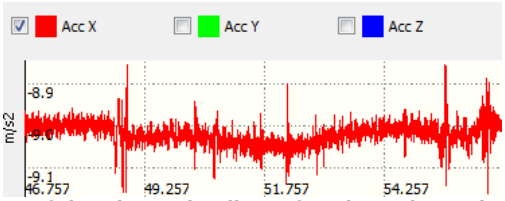


Figure 17: Turning off some of the channels allows for closer investigation of a particular signal

Freezing a graph

When you are using an MTi in live view, you can't pause the file (see section 4.7.4), to investigate data further. In that case, you can use the freeze button (and zoom and pan on data up to 10 seconds old):

Clearing and resetting graphs

There are two ways of clearing and resetting graphs. To clear the graph, use the clear button:

Another way to reset the zoom that is very convenient when you have used zoom and pan functions, is to close and open the graph.

Orientation data view

The Orientation data view shows the 3D orientation (calculated from the angular velocities) in either Euler angles in degrees vs. time or Quaternions vs. time

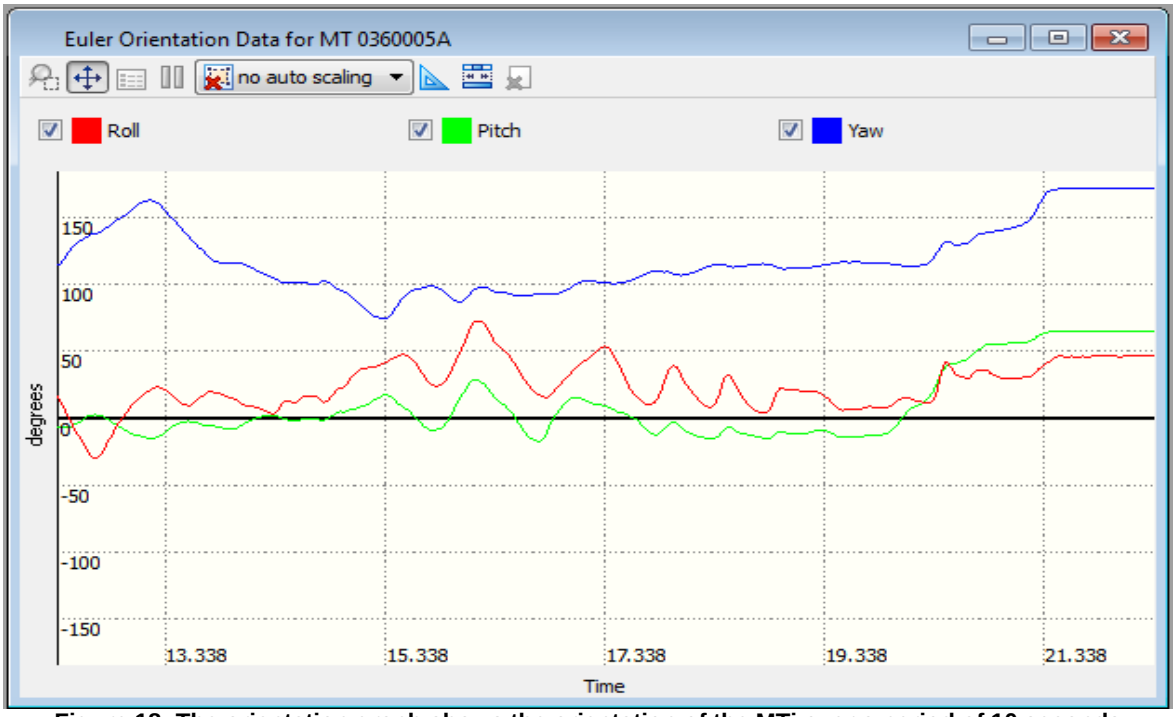


Figure 18: The orientation graph shows the orientation of the MTi over a period of 10 seconds

The following table explains the line colours in “degrees vs. time” view:

Colour	Corresponding axis
Red	Orientation of the X-axis
Green	Orientation of the Y-axis
Blue	Orientation of the Z-axis

Figure 19: The quaternion graph shows the imaginary component (q0) and the three other components in one graph

The following table explains the line colours in the “Quaternions vs. time” view:

Colour	Description
Red	q1
Green	q2
Blue	q3
Black	q0

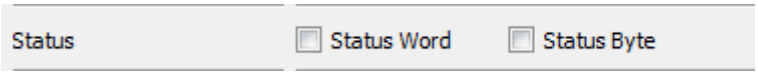
Please refer section 4.7.1.6 for explanation of the various buttons and checkboxes.

4.7.1.7 MT Status

The MT Status sub-window displays the status for the following quantities:

- Selftest enabled
- XKF accuracy
- Individual status
- GPS fix and Filter Mode (MTi-G-700 only)
- Clipping flags (indicate whether a measurement of a sensor exceeds the sensors full range)

Be sure to enable the Status Data Output in MT Output Configuration dialog:



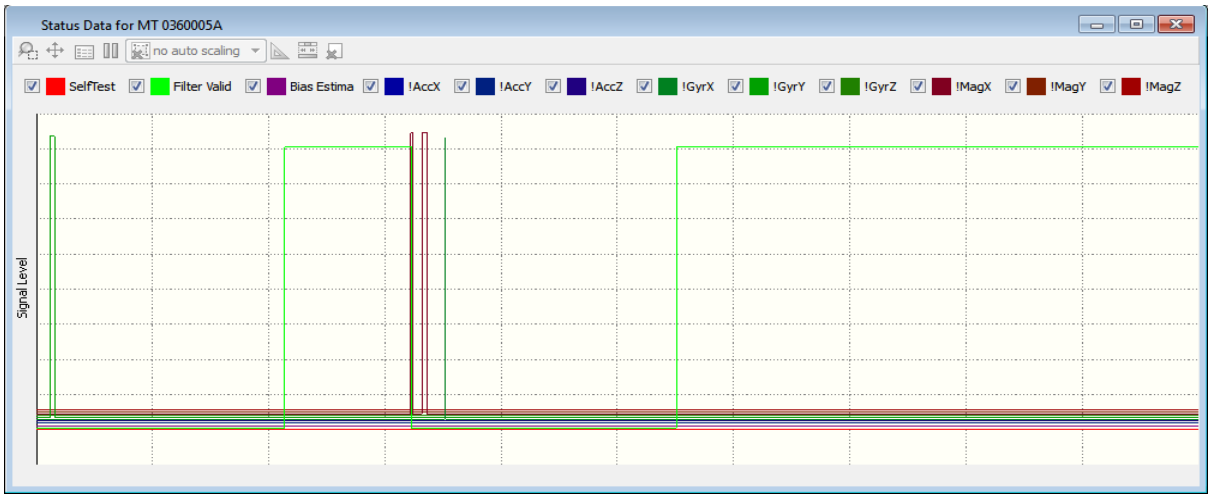


Figure 20: The status window of an MTi-30 AHRS. There is no scale on this graph, as status comes in with every data packet and timing intervals may thus be irregular. In this particular screen shot, one gyroscope and one magnetometer is clipping

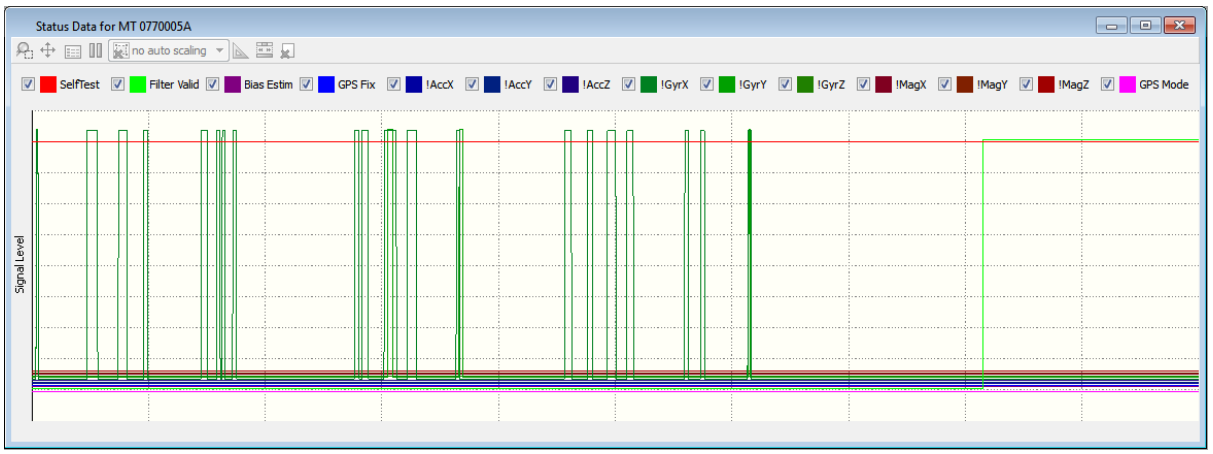


Figure 21: The status windows of the MTi-G has two extra channels, GPS Fix and Filter Mode

Please refer section 4.7.1.6 for explanation of the various buttons and checkboxes.

Colour	Status data description
Red	Motion Tracker has passed the self test (see [LLCP], **`RunSelfTest`**)
Light green	Filter accuracy indicator; low="not accurate", high="accurate"
Dark purple	Bias estimation (refer to section 5.2.2.6 and [MTi_10s_100s]): 1 (high): running with no rotation assumption at $^2/_3$ of the y-axis: error: rotation detected, procedure not started at $^1/_3$ of the y-axis: estimation complete, some samples rejected 0 (low): estimation complete, no errors
Dark blue (3x)	Clipping flags for the accelerometers, 5g or 15g
Dark green (3x)	Clipping flags for the gyroscopes, 450 deg/s or 1000 deg/s
Dark red (3x)	Clipping flags for the magnetometers, 2.a.u.
Bright blue	GPS fix; indicates if the GPS receiver has a valid fix
Magenta	Filter mode; indicates what the state of the filter in the MTi-G-700 is, see [MTi_10s_100s]

4.7.1.8 Message terminals

The message terminal shows in real-time messages sent to and received from the device or the Xsens Device API (XDA). The message terminal can also be used to compose low-level messages in order to quickly understand the communication protocol. See section 5.4 for more information about the message terminals.

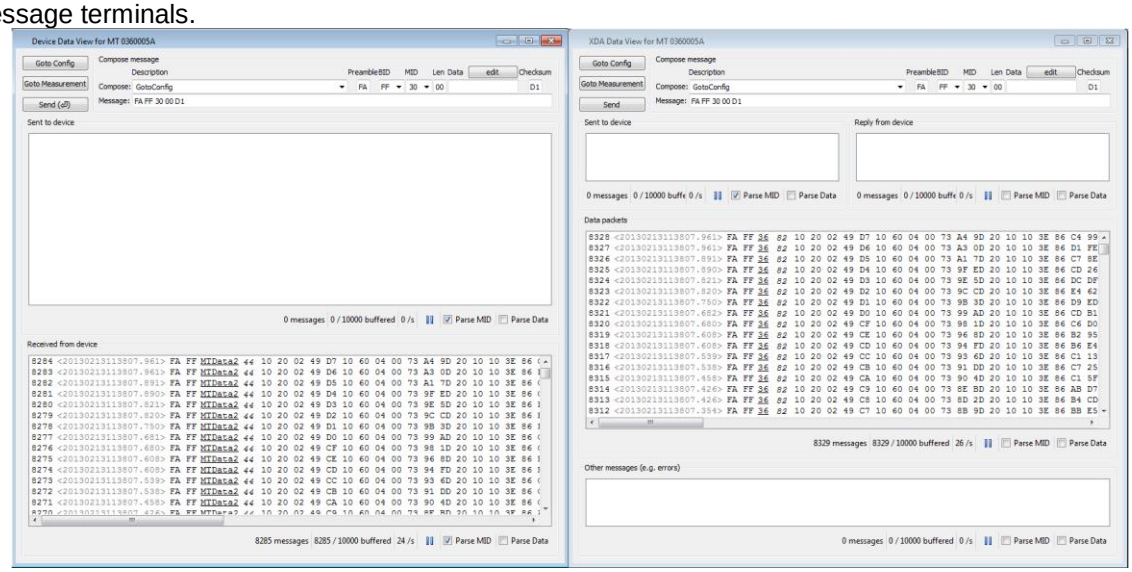


Figure 22: The message terminals for the device (left) and XDA (right)

4.7.1.9 The message window

The message window shows warnings and other informational messages.

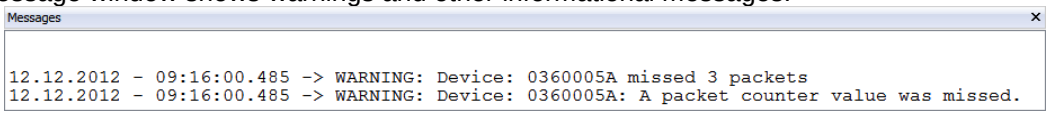
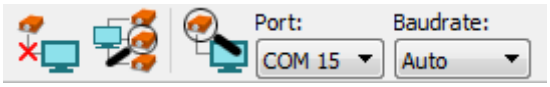


Figure 23: The messages window may show warnings on e.g. missed data packets

4.7.2 Connectivity

With the Connectivity toolbar you can control connecting your devices:



Please refer to section 3.2 for details on how to connect and disconnect your devices.

4.7.3 File control

The file control tool bar makes it possible to choose where files are stored and opened

Icon	Action
	Open a previously recorded file (see also “File → Open…”)
	Export an opened log file (see also “File → Export…”)
	Set the Current Directory (by browsing)

4.7.4 Playback & recording

To be able to record data and playback recorded data, the MT Manager offers the Playback & Recording toolbar.

Figure 24: The Playback and recording bar when an MTi is attached

Figure 25: The Playback and Recording bar when a file is loaded into MT Manager

In the table below the functionality of each button is explained.

Button name	Button icon	Functionality
Record/ Stop Record		Pressing this button will turn on the logging of data to a file (see also section 5.5.1) Releasing this button in recording mode, will turn off the logging
Play		Pressing this button will start (or continue) playback of logged data (see also section 5.5.2)
Rewind		During playback, pressing this button will go to the start of the logging

The other buttons are currently unused.

4.7.5 Orientation resets

The Orientation resets toolbar offers functionality to reset specific sensor and local coordinate system related quantities:

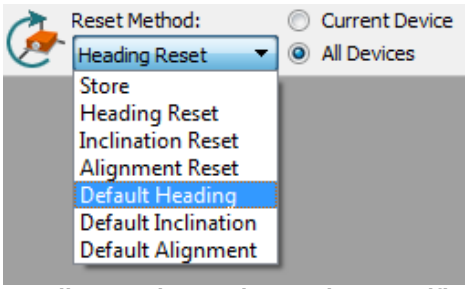


Figure 26: The orientation resets toolbar can be used to apply a specific reference coordinate system to the MTi's orientation, velocity and sensors data output

Note: be cautious to use the orientation resets. Please refer to [MTi_10s_100s] for detailed information about orientation resets and the effects these have.

The following resets are available:

Reset type	Functionality
Heading reset	redefines North to the x-axis of the device – applies to RotLocal
Inclination reset	redefines device coordinates system such that momentary inclination is zero – Applies to RotSensor
Alignment reset	combines the heading reset and the object reset – applies to both RotLocal and RotSensor

After choosing the reset type, press the Reset Orientation button:

You can also choose to apply the reset on the current device or on all connected devices.
After a reset you can store the new values to the MT Settings by selecting “Store” and pressing the button again.

5 Operating guidelines

5.1 Overview

This section describes the configuration and typical utilisations for managing your devices with the MT Manager.

5.2 Configuring the MT Manager and your devices

5.2.1 General settings

Changing the settings of your devices can be done (dependent on the setting) in:

1. MT Settings sub-window (refer to section 4.7.1).
2. Output configurations window (refer to section 4.7.1.3)
3. Message terminals (refer to section 5.4). Be cautious when changing settings here, as you can send any message to the MTi, even if the specific MTi doesn't support the message.

Note: changing the settings in the *MT Settings* and *Output Configuration* window requires the user to explicitly invoke writing to the MT:

Press the "Write to MT" button, **to actually save your changes** to non-volatile memory in the MT device. MT Manager will then write the settings to the device and rescan for devices:

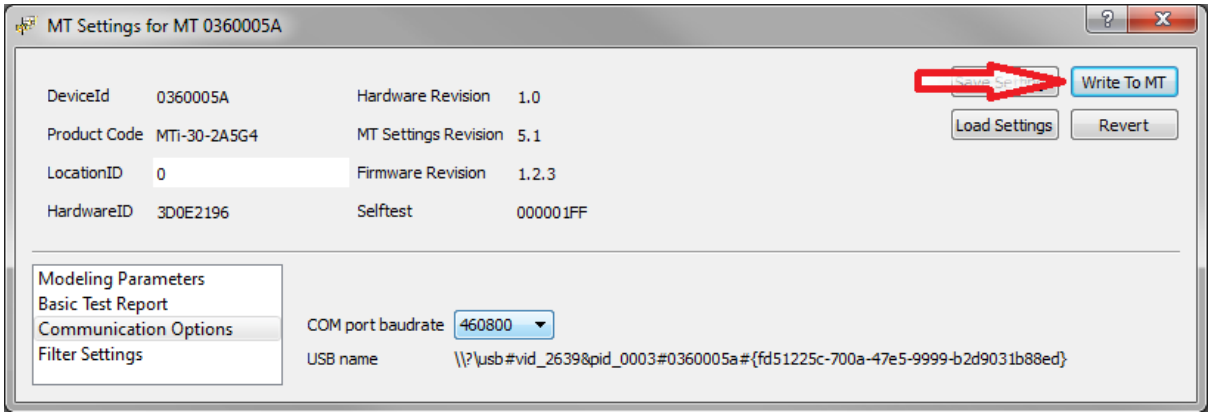


Figure 27: In the MT Settings window, it is important to write the changes made to the MTi

5.2.2 Using the MT Settings window

The MT Settings window (opened with this icon:) lets you modify all non-data output related settings, such as communication and filter settings.

5.2.2.1 Header

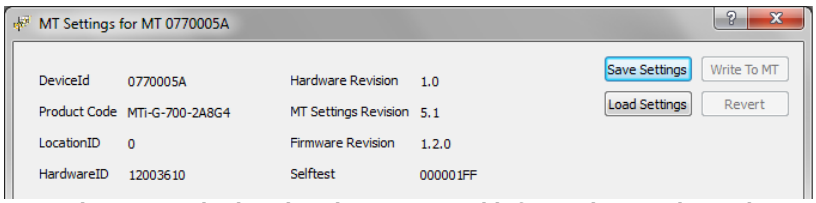


Figure 28: The header shows general information on the MTi

In the header, you will find the following parameters (all read-only, except for LocationID):

Parameter	Description
DeviceID	8-digit unique DeviceID of MTi (hexadecimal), refer to [MTi_10s_100s] for details on the format
Product Code	The product code of the connected MTi or file, refer to [MTi_10s_100s] for details on the format
LocationID	Can be used to identify Motion Tracker by a number (0-255) instead of its Device ID. This can be particularly useful when a fixed setup with multiple interchangeable MT's is used
HardwareID	HardwareID indicates the hardware DeviceID. This ID is assigned during assembly
Hardware Revision	Hardware revision of the MTi
MT Settings revision	The extended Motion Tracker Settings layout
Firmware Revision	Firmware revision of the currently connected MTi. In file mode, this shows 0.0.0
Self test	When all sensors passed the Built-in Selftest (BIT), this shows 00001FF. This field is only visible for MTis supporting the self test functionality

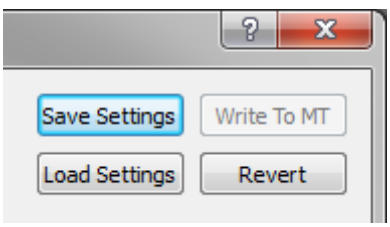
5.2.2.2 MTi configuration file

With the MT Manager it is possible to save and load predefined set of settings, such as synchronization settings, output configuration and baud rate. These settings can be copied from a device in a dedicated file. The file can then be loaded and the settings being applied on another MTi with the same product code, e.g. MTi-30. This feature is useful for system integrators that need to configure many MTi's. Note that this feature is only available with devices with a firmware version of 1.2.3 or higher.

The following settings are saved (message ID between square brackets):

1. Baudrate [0x18]
2. Filter profile (if available, otherwise the filter profile in the device will be used) [0x64]
3. Extended Output Mode [0x86]
4. Position (Latitude, Longitude, Altitude) [0x6E]
5. Location ID [0x84]
6. OutputConfiguration [0xC0]
7. OutputMode (legacy) [0xD0]
8. OutputSkipFactor (legacy) [0xD4]
9. Period (legacy) [0x04]
10. SyncSettings [0x2C]

To save a setting, click the "Save Settings" button in the MT Settings dialog:



A pop-up screen opens that allows you to save the settings in a name that you prefer. As the settings are product dependent, you could include the name of the product in your file name, e.g.”Test1_MTi-30.xsa”. You will receive a warning when saving the file did not work. In that case, contact www.xsens.com/support.

To load a settings file, click the “Load settings” button. Again, a window opens that lets you navigate to an xsa configuration file. Opening the file applies all the settings to the MTi in the order listed above. When no or only some settings cannot be applied, a warning will be issued. Settings that could be applied up till the incompatible setting will be applied though.

Although the configuration file can be read, it is not recommended to make changes in the file. It is easier to load the settings in the device, make the required changes and save the settings again (in the same file).

5.2.2.3 Modeling parameters

In the modeling parameters tab you can find the calibration parameters of the accelerometers, gyroscopes and magnetometers (offset, gain and misalignment, refer to [[MTi_10s_100s]] for details).

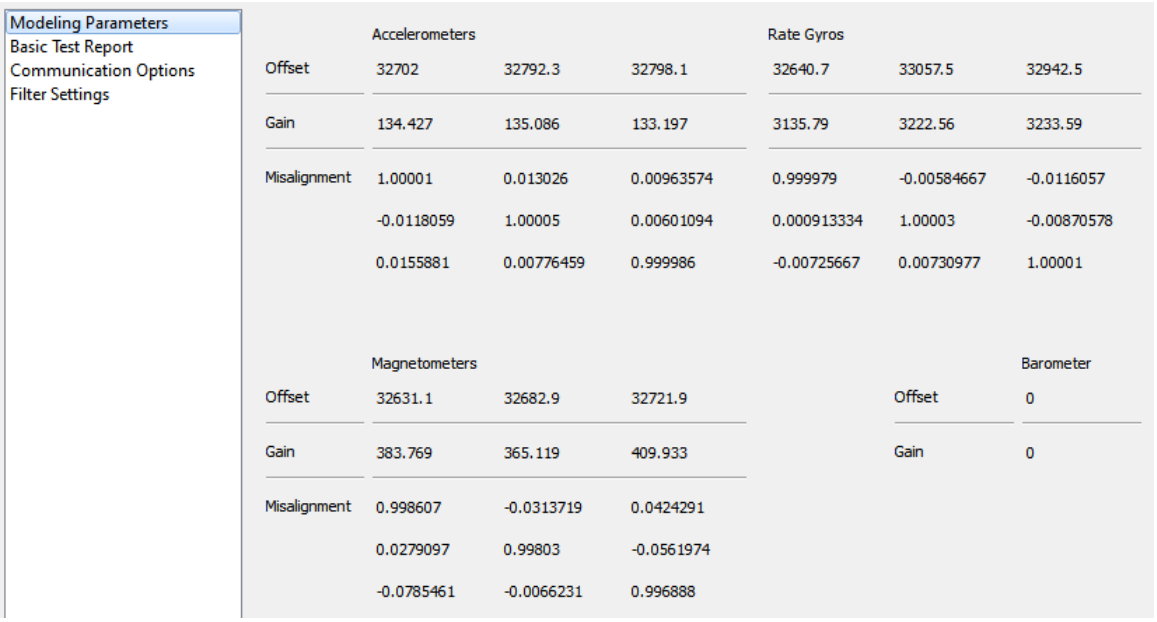


Figure 29: The modeling parameters show values determined in Xsens' calibration procedure

5.2.2.4 Basic test report

In the basic test report, you will find noise values, test and calibration date and the test person ID.

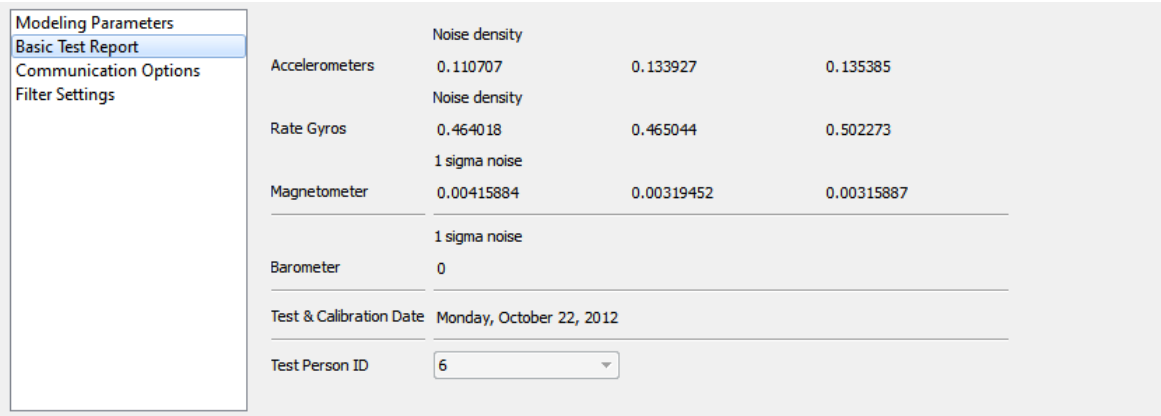


Figure 30: The basic test report shows noise values and the test date and person

5.2.2.5 Communication options

In the Communication Options, you will find the following options:

Parameter	Description
COM port baud rate	Although the easiest setup with MT Manager is to communicate with the USB cable that has no baud rate, it is possible to set the baud rate here. This can be used when you configure the MTi in MT Manager and later want to use the serial interface on another platform.
USB name	This string identifies the USB string. Use this string in your application when you want to communicate directly to the USB-port.

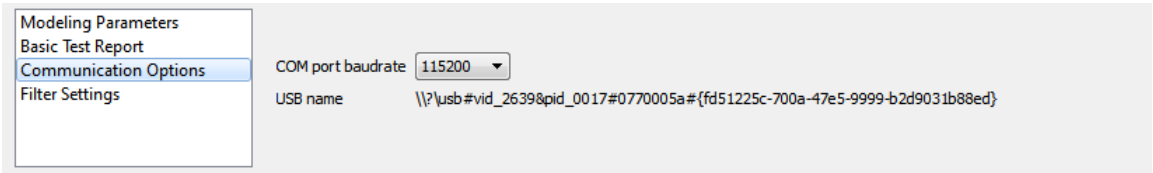


Figure 31: Communication options in the MT Settings shows the name of the USB connection and lets you setup the baud rate for serial interfaces

5.2.2.6 Filter Settings

In the MT Filter Settings tab it is possible to modify the behaviour of the Xsens sensor fusion algorithm. The following options are available.

Parameter	Description
Filter Settings 	Choose the filter profile that you want to have the orientation estimated with. When you choose an orientation output in the Output Configuration window, choose “Onboard: ….” If you are outputting **only** Δq/Δv, inertial data or SCR, choose the required setting profile in “XDA: …..” Refer to [MTi_10s_100s] for more information on the various filter profiles. Only filter profiles that are applicable for the attached MTi are shown
Position	This position is the last known position of the MTi, either inputted via a message (see [LLCP]) or via the GPS receiver. This data is used to estimate local magnetic declination and local gravity
Gyro Bias Estimation	With this functionality it is possible to estimate the gyro bias (in case of VRU_general filter profiles). See [LLCP] and [MTi_10s_100s] for more information on this so called NoRotation functionality.
RotSensor and RotLocal	These two rotation matrices are used to apply orientation resets or arbitrary alignments. Refer to [MTi_10s_100s] for more information on these two matrices. RotSensor rotates S to S’, RotLocal rotates L to L’
Heading offset	Heading offset is used in legacy MTi’s only, see rev G. of this manual

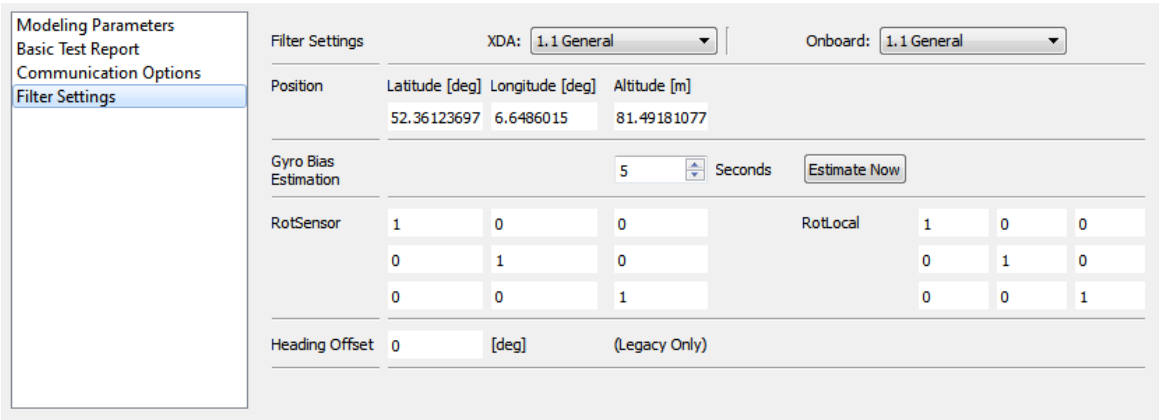


Figure 32: Filter settings greatly influence the correct functionality of the MTi

5.2.3 Using the Output Configuration window

The output of the MTi can be fully configured in terms of data packets in the data message, output frequency, and representation format. This can all be done in the Output Configuration Window. Click  to open this window.

There are three different modes in the output configuration dialog:

Mode	Description
Normal mode	Mode that supports MTData2 data packets. For MTi MkIV devices, this mode offers the most extensive configuration
Legacy mode	Mode that supports MTData data packets (as supported by legacy MTi and MTi-G). Legacy mode is the only mode available for legacy MTi's and MTi-G's.
String mode	Mode that supports ASCII Strings (NMEA).

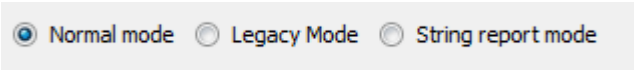


Figure 33: The mode can be selected with the radio buttons

5.2.3.1 Legacy Mode Output Configuration window

When the MTi is first used, or when it is in factory settings, the Output Configuration window will be in Legacy Mode with Quaternion and Sample Counter ticked. Information on the outputs can be found in [MTi-G], [MTi_MTx], [LLCP] and [MTi_10s_100s]. When a legacy MTi or MTi-G device is connected, the only available screen is the legacy mode screen.

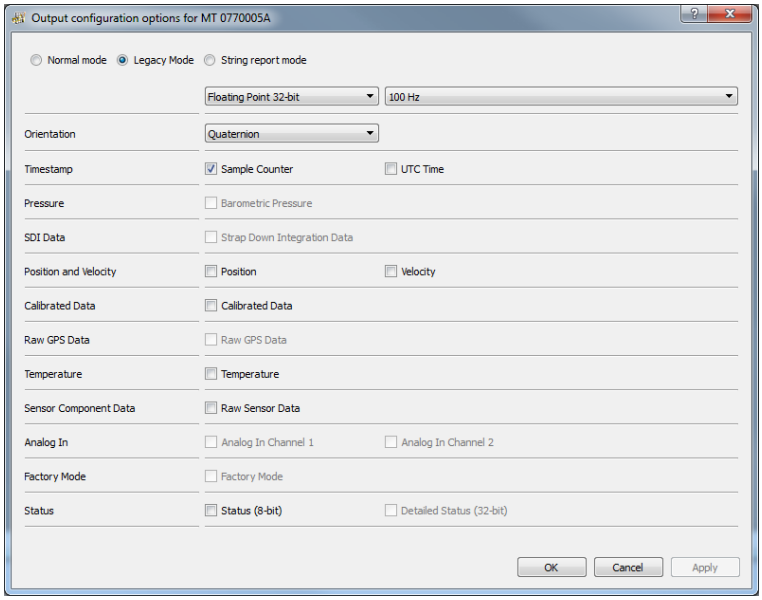


Figure 34: The legacy mode of the Output Configuration window can be used to setup the MTi in such a way that it can seamless be integrated in legacy code

5.2.3.2 Normal mode Output Configuration Window

For the MTi 10-series and the MTi 100-series, the most complete output configuration window is shows below. The legacy mode tick box is unchecked. This screen only shows the outputs available for the connected MTi.

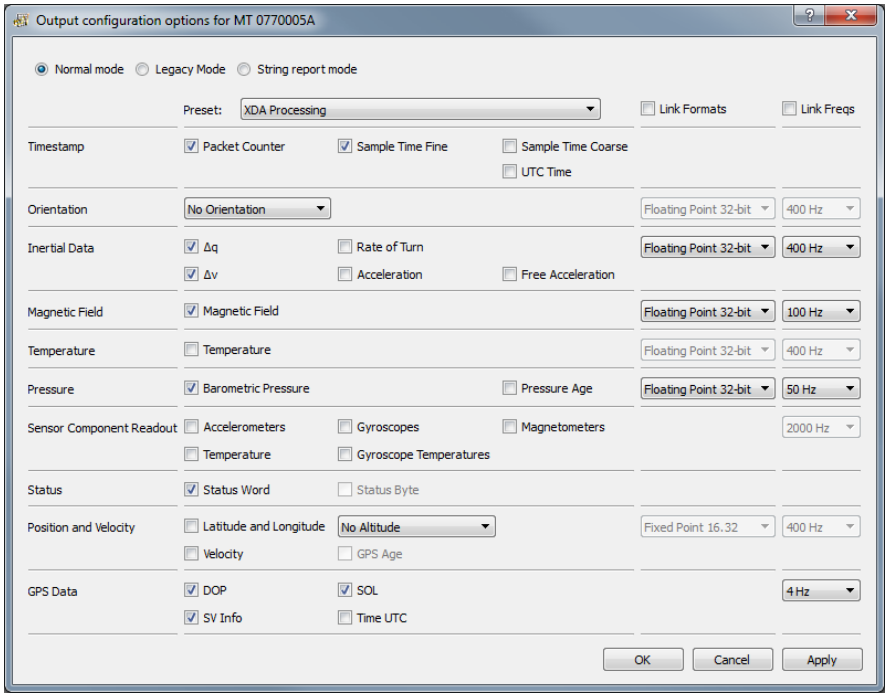


Figure 35: The Output Configuration window of an MTi-G-700 that is attached to MT Manager. When another device is attached, the output configuration window may contain fewer options.

5.2.3.3 String report mode Configuration Window

The String report mode Configuration Window allows setting the ASCII Strings. Note that only a single frequency can be chosen here. Setup the String reports with the message terminals or via XDA to apply different update frequencies per string output.

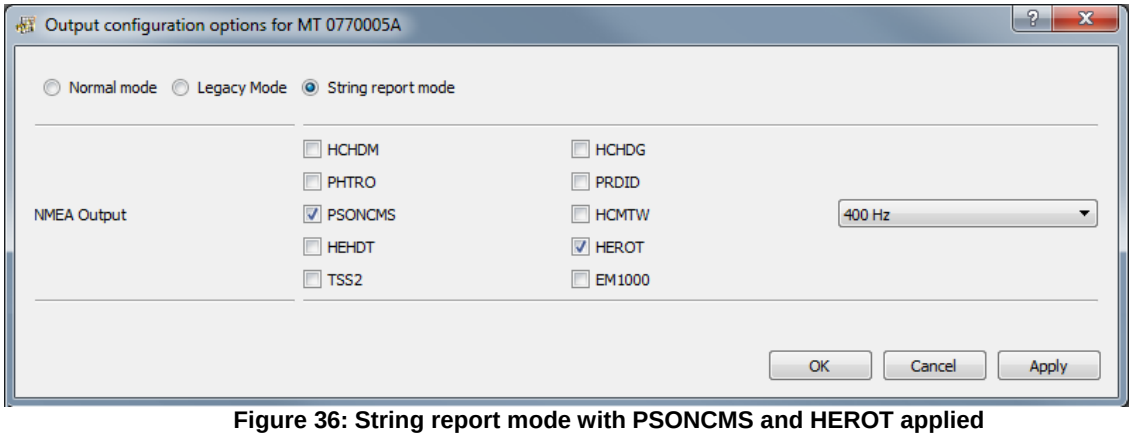


Figure 36: String report mode with PSONCMS and HEROT applied

In order to visualize data in MT Manager, it is required to enable the NMEA parser in XDA. To do this, first choose the required strings. Note that in order to visualize data, that data must be in the string; there is no possibility to run a filter in XDA. See [LLCP] for details on the various NMEA messages.

Then, right-click on the MTi in the Device List and choose ”Enable NMEA protocol”.

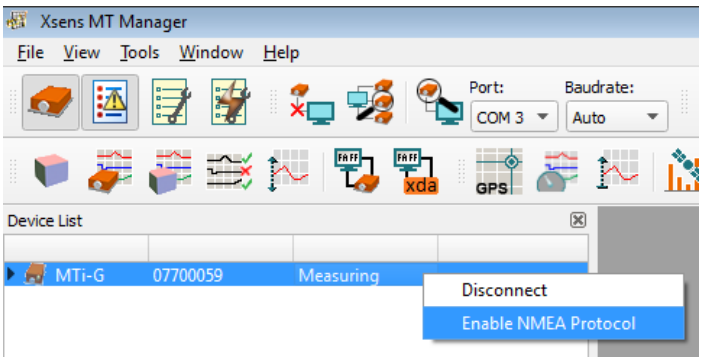


Figure 37: Right-click on the MTi in the Device List and choose "Enable NMEA protocol" to parse data into binary packets in MT Manager. Configure String report mode first to see this option

5.2.3.4 Output configuration window in file mode

The output configuration window will be read only when a file is loaded. It is possible however to view the settings of the recorded file.

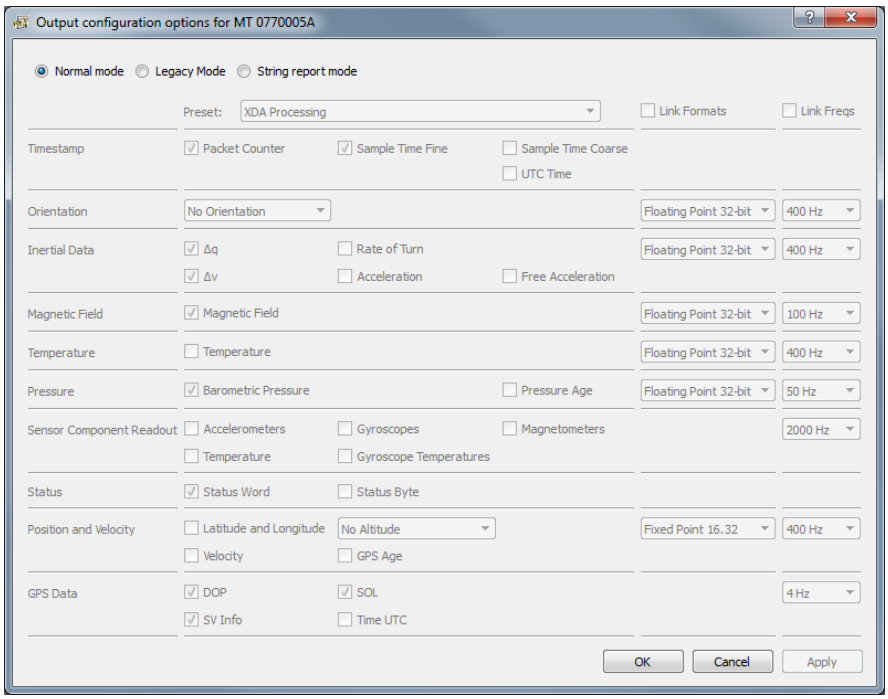
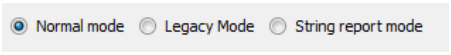
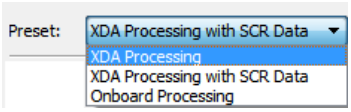


Figure 38: The Output Configuration Window of a file that contains data from an MTi-G. All outputs are shown, but cannot be edited.

The meaning of all data fields and screens is explained in [MTi_10s_100s] and [LLCP]. A few functionalities of the Output Configuration window are explained here:

Button/option/functionality	Description
	The radio buttons allow switching between Normal mode, Legacy Mode and String Report Mode.
	The presets are a sure choice if you don't know which data you need for later re-processing with other filter profiles, how to retrieve processed data etc. It is highly recommended to use these presets. There are three presets: - XDA processing - XDA processing with SCR data - Onboard processing XDA processing offers the most flexibility and is the recommended setting when you want to reprocess data later with different settings in XDA. The data of all sensors has already been processed in the SDI algorithm, so that the amount of data stored is relatively low, yet the accuracy is guaranteed. XDA processing with SCR Data includes Sensor Component Readout, which are 16-bit integers (basically the voltage of the sensor readout). Note that the amount of data stored is high with this option, as the output frequency is 2 kHz. Onboard processing is the desired setting, when you know what settings you need. All data is calculated onboard the MTi and doesn't need further processing. In all presets, you may add outputs, but note that the preset field will become empty when something is changed.
	Ticking this box will make all formats (Floating point, Fixed point etc) the same for each output as long as these are available. See [MTi_10s_100s] and [LLCP] for more information on the output formats.
	Ticking this box will make all output frequencies the same for each output if they are available. If a certain frequency is not available, the output frequency of that output will be rounded off to the next lower available output frequency
Frequency of Timestamp and Status	Timestamp and Status don't have an output frequency: they are outputted with every data message.
Sensor Component Read Out (SCR)	When any data of the SCR group is chosen, all other outputs grey out. SCR is only available as complete data package (accelerometers, gyroscopes, magnetic field and temperature). Note that gyroscope temperature can be chosen with several other selected data outputs

5.2.4 Getting ready for logging

Before you start logging your data, be sure to make the following steps first:

1. Set the Log File Name and set the desired working directory, refer to section 5.5.1
2. Choose the desired output format, refer to section 5.2.3. For future post-processing purposes, make sure to use Inertial Data and/or Magnetic Field and Temperature at 100 Hz or higher. MT Manager will select the required data packages for post-processing, so it is possible to add more outputs.
3. Setup the desired coordinate system (see section 4.7.5) using the Sensor Rotation Matrix and the Local Rotation Matrix. With the MT Manager, the coordinate system used in the sensors data cannot be changed during post-processing.
4. Choose the correct baud rate when using serial interfacing. Make sure this baud rate is high enough to accommodate data sent over the serial interface (total data size and frequency, see [LLCP]).
5. Choose the setting profile most appropriate for your application, refer to section 5.2.2.60. It is possible to process sensors data with another filter profile, but note that orientation data cannot be reprocessed at all.

   Note: The first packet counter is an arbitrary number between 0 and 65535 due to the recording concept used in MT Manager.

5.3 Synchronization options

When opening the Synchronization configuration, the Configured Settings list is empty. Press add to start configuration of a synchronization function.

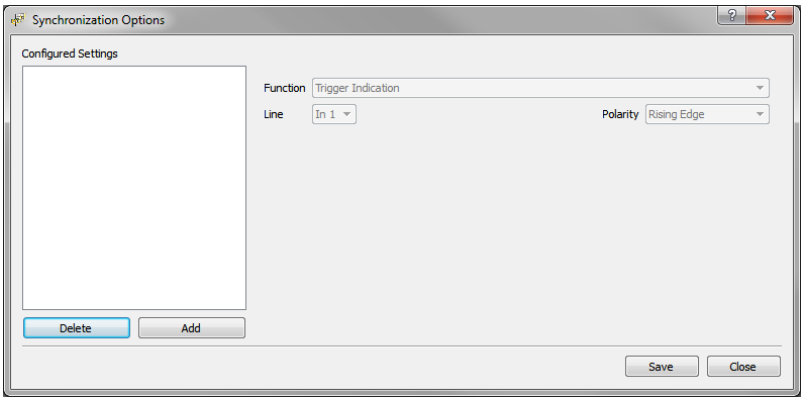


Figure 39: Starting the setup of a synchronization option

Function	Sync Line	Functionality
Trigger Indication	In 1	When a pulse is received, a marker is set in the MTData2 packet
Send Latest	In 1 ReqData message	When a pulse or specific (`ReqData`) message is received, the latest available data in the MTi is sent to the user
Interval Transition Measurement	SyncOut	A pulse is generated at 400 Hz and can be used to trigger external devices.
Clock Bias Estimation	ClockSync	Using this function allows you to synchronize the MTi with an external pulse (0.1 to 1000 Hz)
GPS Clock Sync	GPS Clock In	This (default on) synchronization pulse synchronizes the clock of the MTi-G-700 with the GPS clock
StartSampling	In1	When a pulse is received, samples will be sent to the digital signal processing pipeline. This

The graphic in the screen will help you determine the behaviour of each function and parameters. The red line in the graphic shows the voltage received or sent out; the grey arrows or grey lines show the MTData2 packets. If functions are on separate Sync lines, they can be used together.

Trigger Indication:
The function trigger indication can be used to get a marker inside the MTData2 packet without interfering with the data itself. Trigger Indication is the correct implementation for the workaround commonly used in the old MTi where an external signal was applied to the AnalogIn input.

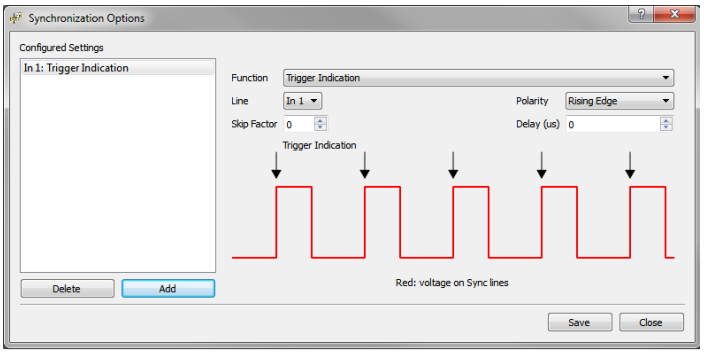


Figure 40: Trigger Indication sets a marker in the MTData2 packet when a voltage is read on the SyncIn line. The red line represents the voltage on the Sync line

Parameter	Options
Line	In1
Skip factor	Applying a Skip factor allows you to omit markers from the MTData2 packet. E.g. when a Skip Factor of 1 is used, Trigger Indication will omit every second marker.
Polarity	Rising Edge, Falling Edge or both: allows you to change the edge on which the TriggerIndication must be included
Delay (µs)	The number of microseconds before the marker must be included in the data

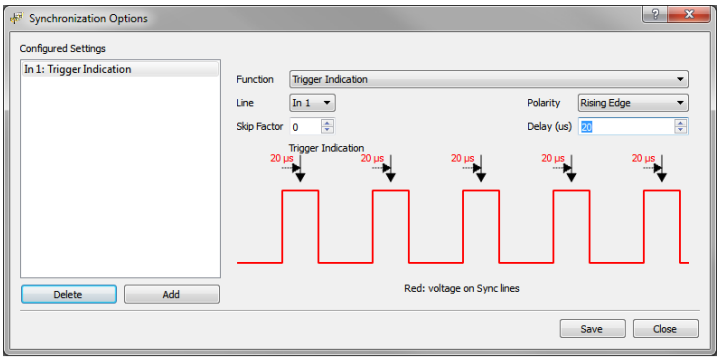


Figure 41: This screen shot shows that there is a delay of 20 µs before the Trigger Indication is included in the data packet.

Send Latest:
Send Latest allows to send the latest available data that has been processed onboard the MTi (it is thus used as a SyncIn). Send Latest ignores the output frequency selected in the Output Configuration window (but not which outputs are selected) and will prevent data from being outputted until a Send Latest pulse or `ReqData` message is received. As sampling is done at a very high frequency, it is not possible to let the sample moment be determined by the Send Latest function. However it is possible to adjust the frequency of the sampling, use the ClockBiasEstimation function for that. Remember that it is possible to use functions together if they are on separate Sync lines.

The following parameters can be used:

Parameter	Options
Line	In1 or via a message (`ReqData`)
Skip factor	Applying a Skip factor allows you to discard SyncIn pulses. This makes it possible to have e.g. a 1 Hz input pulse or ReqData message, but output MT Data only every 5 seconds.
Polarity	Rising Edge, Falling Edge or both: allows you to change the edge on which the Send Latest command must act. Not applicable to ReqData.
Delay (µs)	The number of microseconds before data must be sent. If new data is available after the reception of Send Latest and the delay together, that new data will be sent.

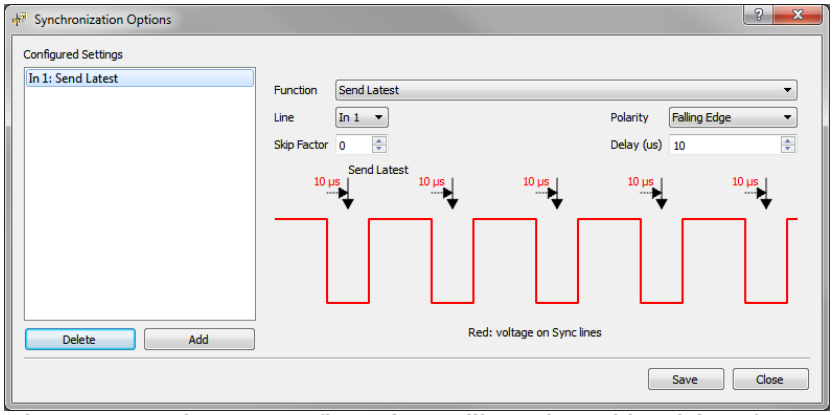


Figure 42: Send Latest configured as Falling Edge, with a delay of 10 µs

Interval Transition Measurement: Interval Transition Measurement sends out a pulse on the SyncOut line at a frequency of 400 Hz (when Skip factor is 0). Interval Transition Measurement can be used to trigger external devices.

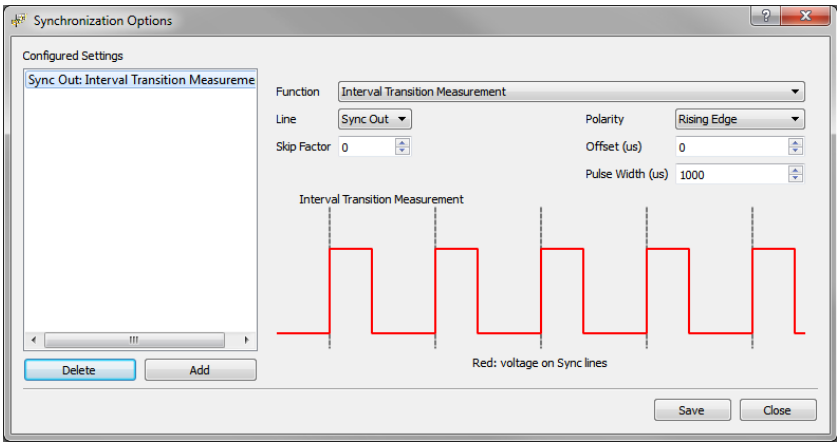


Figure 43: The Interval Transition Measurement with its default settings. With this function, the voltage is dependent on the data, whereas in all other functions in the Synchronization Options window, the voltage affects the data packets.

Parameter	Options
Line	SyncOut
Skip factor	Applying a Skip factor will reduce the number of sync pulses on the SyncOut line. In the MTData2 packet, a marker is included that allows you to see which data packet corresponds to the Interval Transition Measurement pulse. Note that it is recommended to have a resulting SyncOut frequency that is a integer division of the data output frequency. E.g. when a SyncOut frequency of 100 Hz is chosen and the data output is 80 Hz, you will miss markers in the data.
Polarity	The polarity field allows you to choose whether the pulse should be low and will rise upon a SyncOut pulse (Rising Edge), should be high and will fall upon a SyncOut pulse (Falling Edge) or should toggle between high and low upon a SyncOut pulse (Rising & Falling Edge). In the latter case, pulse width does not have an effect.
Offset (µs)	The offset allows you to send out a pulse before or after the MTData2 package it corresponds to, is sent to the host. As timing in the MTi is exactly known, it is possible to send out a pulse up to 3 seconds before the data package.
Pulse Width (µs)	Pulse Width allows you to determine the duration of the pulse on the SyncOut. If the pulse width is longer than 2500 µs and no Skip Factor is applied, the pulses will overlap.

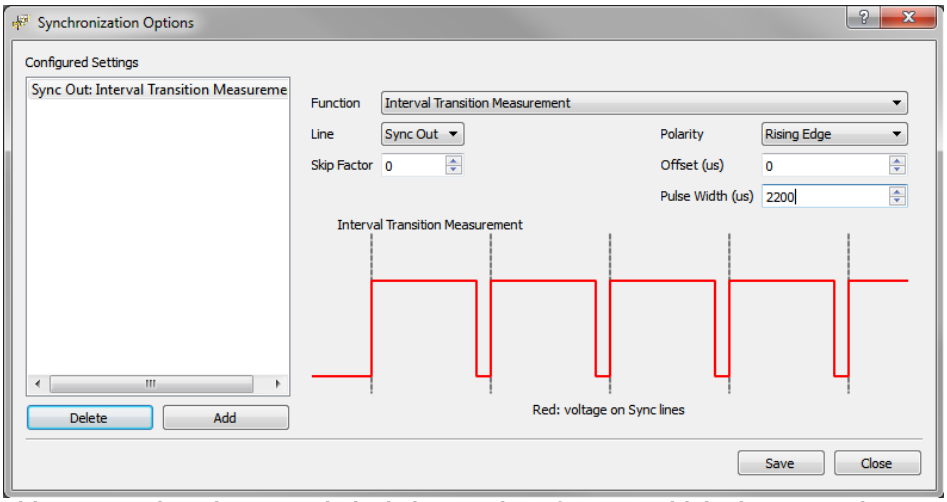


Figure 44: This screen shot shows a relatively long pulse of 2.2 ms which almost overlaps as pulses are generated at 400 Hz. Applying a Skip Factor will create more space between the pulses.

Clock Bias estimation: It is possible to slightly adjust the duration of the clock ticks of the internal sampling in the MTi. This can be useful when you have an accurate external clock (e.g. GPS time pulse, 1 PPS) that you want to synchronize the MTi to. It can also be useful to synchronize multiple MTi's, so that the number of data points in a certain amount of time is equal. For Clock Bias Estimation, it is needed to know the frequency of the signal you feed into the MTi.

Parameter	Options
Line	Clock In
Skip factor	Applying a Skip factor allows you to discard SyncIn pulses. Make sure however that the Clock Period matches the voltage frequency, including Skip Factor. Example: when applying a 100 Hz voltage signal with a skip factor of 1, the period should be 20 ms.
Polarity	Rising Edge, Falling Edge or both: allows you to change the edge on which the Clock Bias Estimation must calculate.
Delay (ms)	The number of milliseconds between pulses. Read Skip Factor (above) if you want to use Skip Factor as well.

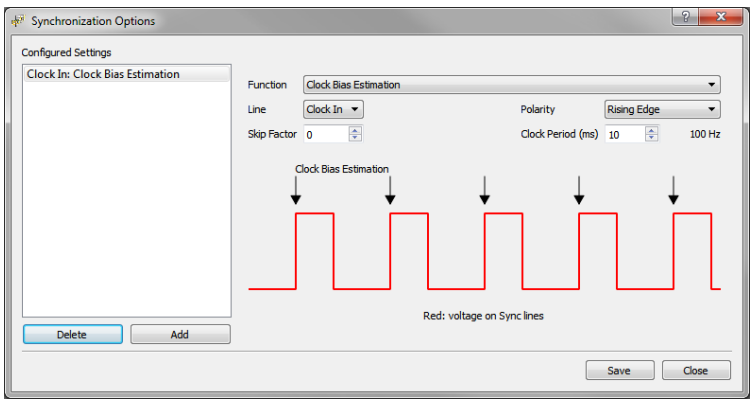


Figure 45: Clock bias estimation on a clock of 100 Hz. Note that you can still choose another output frequency, unrelated to Clock Bias Estimation.

GPS ClockSync:

When the MTi-G-700 has a valid GPS fix, the time pulse from the GPS receiver is used to synchronize the internal clock of the MTi-G. The functionality is identical to the (external) Clock Bias estimation.

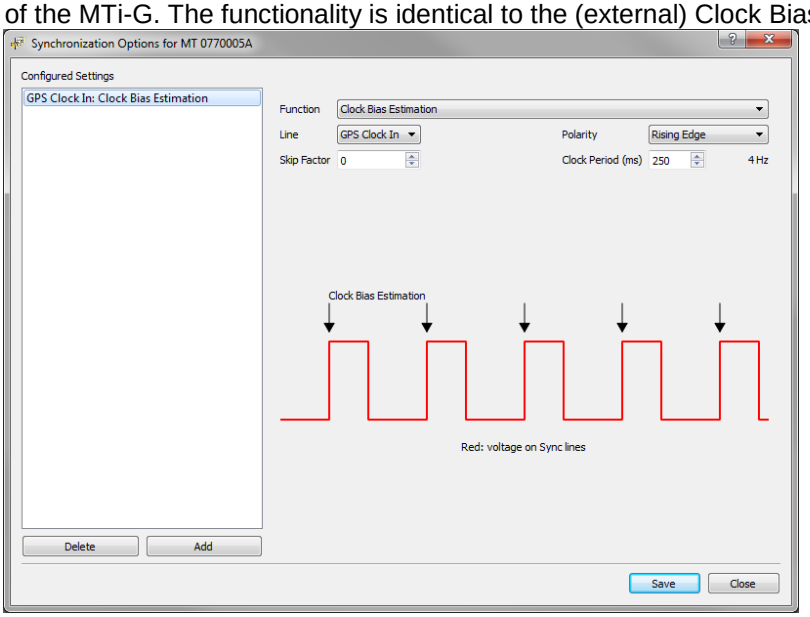


Figure 46: GPS Clock Sync synchronizes the MTi and GPS internally.

The GPS Sync function is enabled by default with specific settings; it is possible to disable the functionality or adapt the settings though. This is not recommended and should only be done when a more accurate clock is available or when a different clock bias estimation is required. A warning dialog will pop-up; choosing Yes will re-enable the GPS Sync.

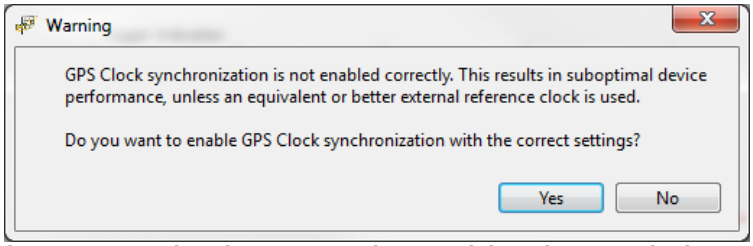


Figure 47: Warning that you are about to delete the GPS clock Sync

StartSampling

StartSampling can be used to accurately time the reception of the MTi data. It is not possible trigger every sample, but it is possible to start the digital signal processing. Refer to [MTi_10s_100s] for more info.

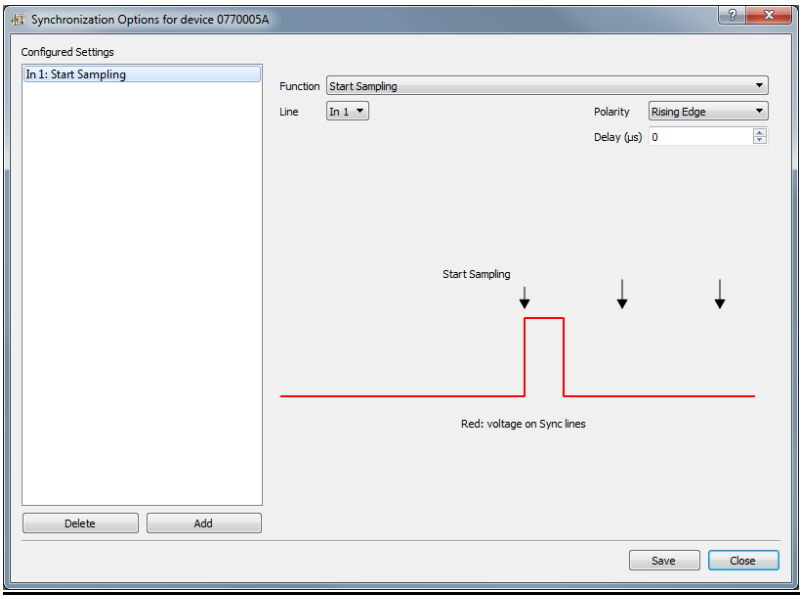


Figure 48: With StartSampling enabled, the MTi will only start sending data when a pulse has been received.

Multiple functions:
It is possible to configure multiple synchronization functions on the MTi. This can be useful if you need to synchronize multiple devices, see [MTi_10s_100s]. If multiple entries are set on the same line, an error is given (see below).

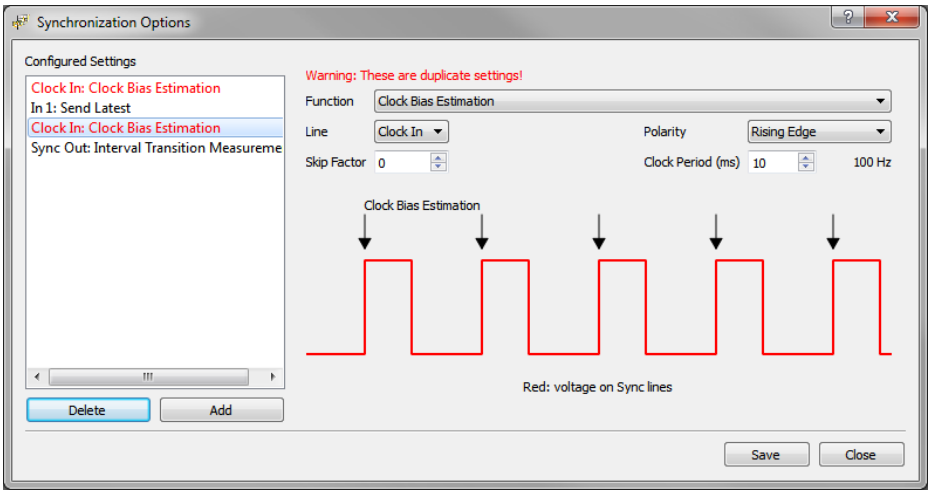


Figure 49: The Synchronization Options dialog returns an error when two settings are conflicting or duplicate

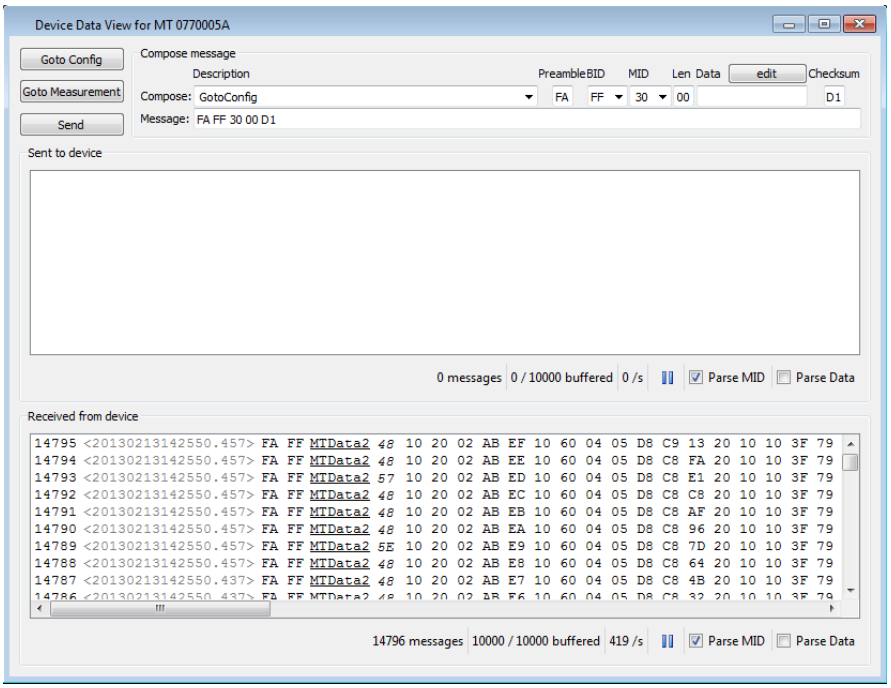
Deleting a configured setting:
In order to remove a setting, select the configured setting in the Configured Settings list and click Delete.

5.4 Using the message terminals

MT Manager has two message terminals: the device message terminal shows the communication over the serial or USB port; the XDA message terminal shows the communication between MT Manager and the Xsens Device API. To understand the low level XBus Communication protocol, it is recommended to use the device message terminal.

5.4.1 Device message terminal

The device message terminal allows monitoring the communication over the serial or USB interface of the MT (i.e. the XBus Communication protocol, see [LLCP]). It can also be used to compose messages in ASCII; the composer will set the required bits, will include the XBus header (preamble, message ID etc) and will calculate the correct checksum. The message can then be written to the device.



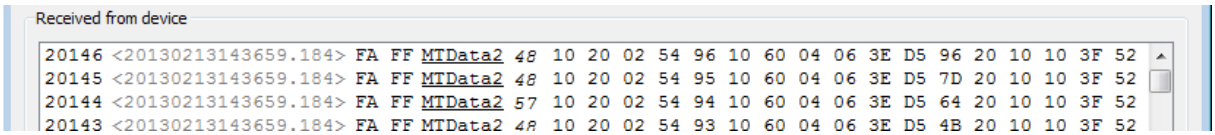
The device message terminal has the following functions:

Button/field	Description
GoTo Config	This button can be used to put the MT in Config mode. Config mode is required to set most messages.
GoTo Measurement	This button can be used to put the MT in Measurement mode. Measurement mode is the mode in which the MT sends data messages.
Send	The send button is used to send composed messages to the device.
Compose message	The part “compose message” contains several fields: - “Compose”: Use this field to find the message you want to send to the device. You may also start typing in this field; the field has an autofill function. - “Preamble”: This is always FA - “BID”: Bus Identifier, FF means that the message will be sent to all devices on the bus. - “MID”: Message Identifier, this field will be filled out automatically when the “Compose:” field is filled out. You can also insert a MID here, the correct “Compose”: message will then be chosen.

	- "Len data": this field indicates the length of the data field. Extended length appears automatically when data field is longer than 254 bytes. - "Data": The data field is used to set arguments for messages. Refer to [LLCP] for more interpretation. - "Edit": Use the edit button to easily set the "Data" field. - "Checksum": the checksum is calculated when composing a message - "Message": the entire message is shown in this field. It is possible to edit the message here as well.
Sent to Device and Received from device	This window shows all messages sent to/received from the device. The sent window includes messages that were generated by e.g. the user interface of MT Manager, so it is ideal to investigate which communication is used when using the MT Manager. - The number of total messages sent is shown - The number of messages in the buffer is shown. Right-clicking on the window allows you to change the buffer. - The rate of messages per second is shown. - A pause button is available to stop the message stream, so you can investigate and scroll - When Parse MID is checked, the Message ID is shown in human readable format. - When Parse Data is checked, the data is shown in human readable format.

5.4.1.1 Using the message dialogs

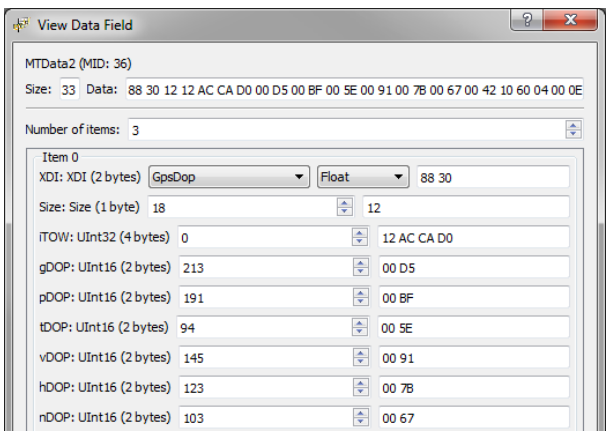
The device message terminal has two fields that display the messages sent to the device and received from the device. Both fields have the same features:



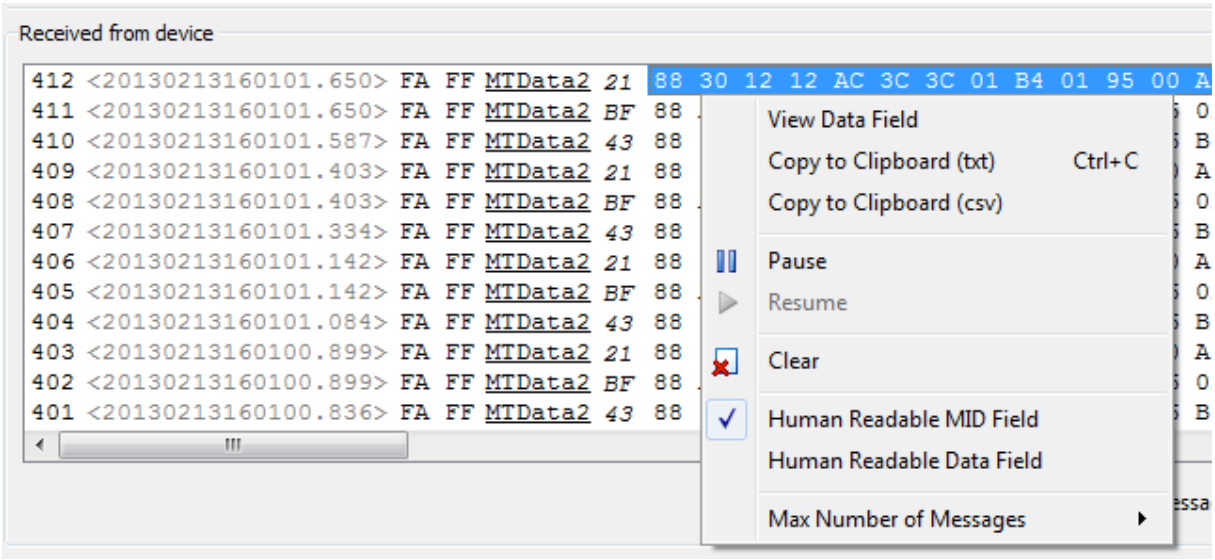
The first column contains a counter, not related to the Data ID "Packet Counter". The second column contains the time of the message (yyyymmddhhmmss.sss). The message itself is split into 5 different parts

- FA FF: Preamble and Bus ID
- MID: default shown in human-readable format, e.g. MTData2
- Length of the data message (in *italic*)
- Data in the message, default in hexadecimal format
- Checksum (in **bold**)

Double-clicking on the data message opens a dialog that shows which data is in the message. It shows the message ID, number of data items (if applicable) and a description of the individual items, both parsed and in hexadecimal format.



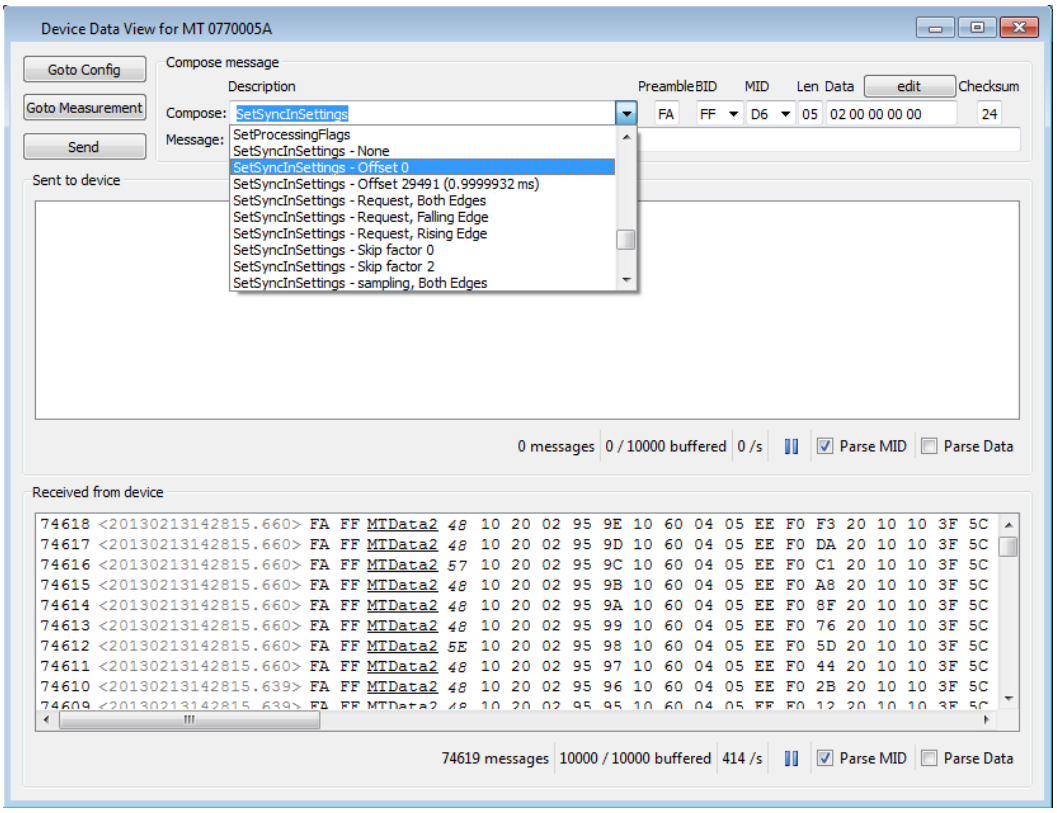
Right-clicking on the data in the window shows the following menu:



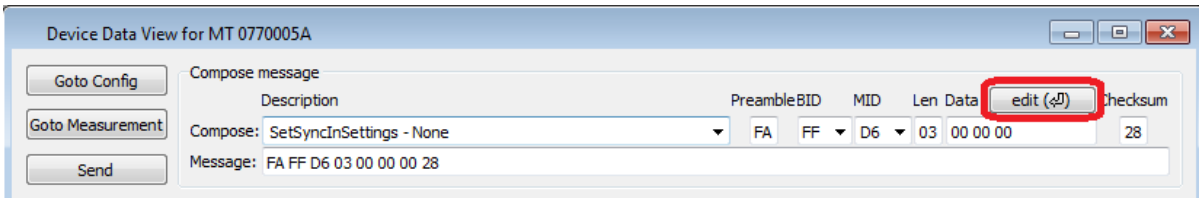
Menu option	Description
View Data Field	View Data Field opens the dialog that shows the components of the data message
Copy to Clipboard	Copies selected messages to .txt or .csv. Use CTRL+A to select all messages in the window
Pause	Pauses the message stream
Resume	Resumes the message stream
Clear	Clears the buffer and screen
Human readable MID field	When checked, the hexadecimal message ID's are parsed to human readable text. This field is checked when opening the message terminal
Human readable data field	When checked, the hexadecimal data values are parsed to human readable text
Max number of messages	This setting allows to change the buffer size

5.4.1.2 Composing a message

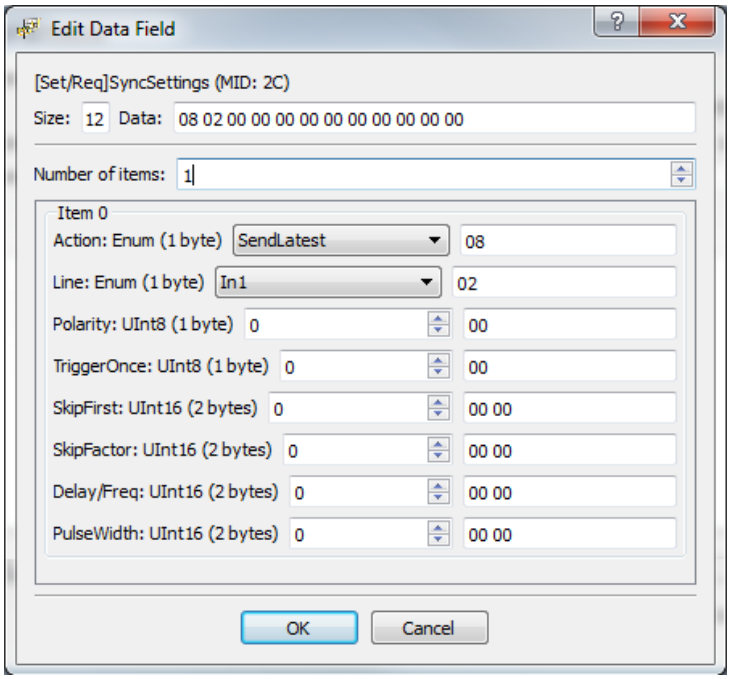
Using the message terminals to set the MTi is straightforward. Note that you often need to be in Config Mode to be able to write a message. Then, choose the Message you want to send, using the dropdown menu.



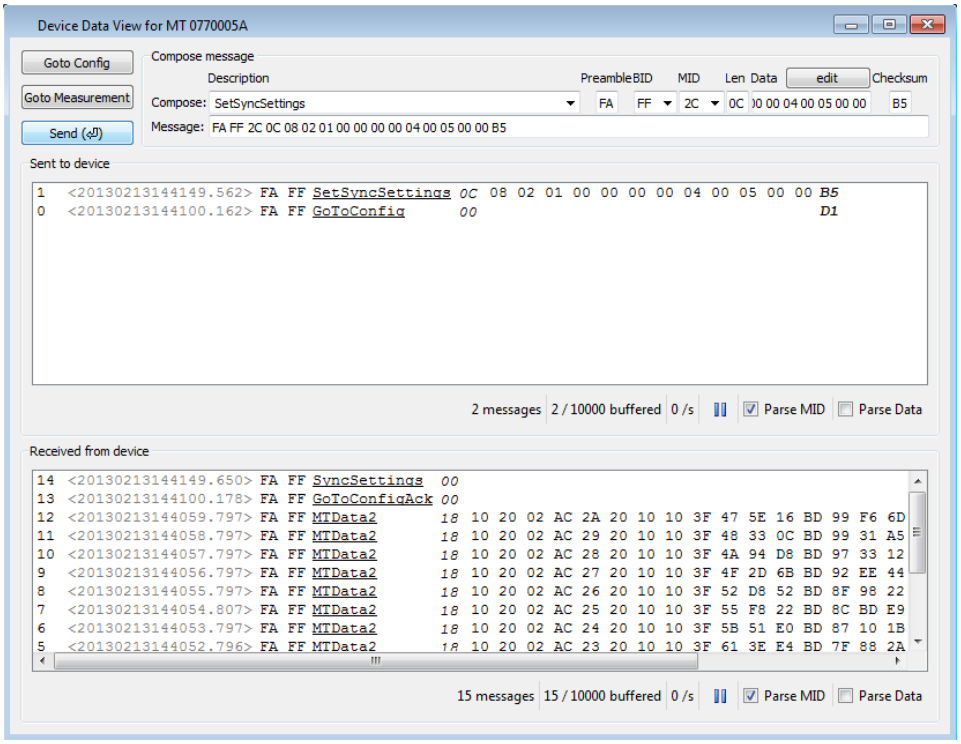
When you choose a message that starts with “Set” or that needs extra arguments, the text in the button marked “Edit” will be augmented with an Enter icon (⏎).



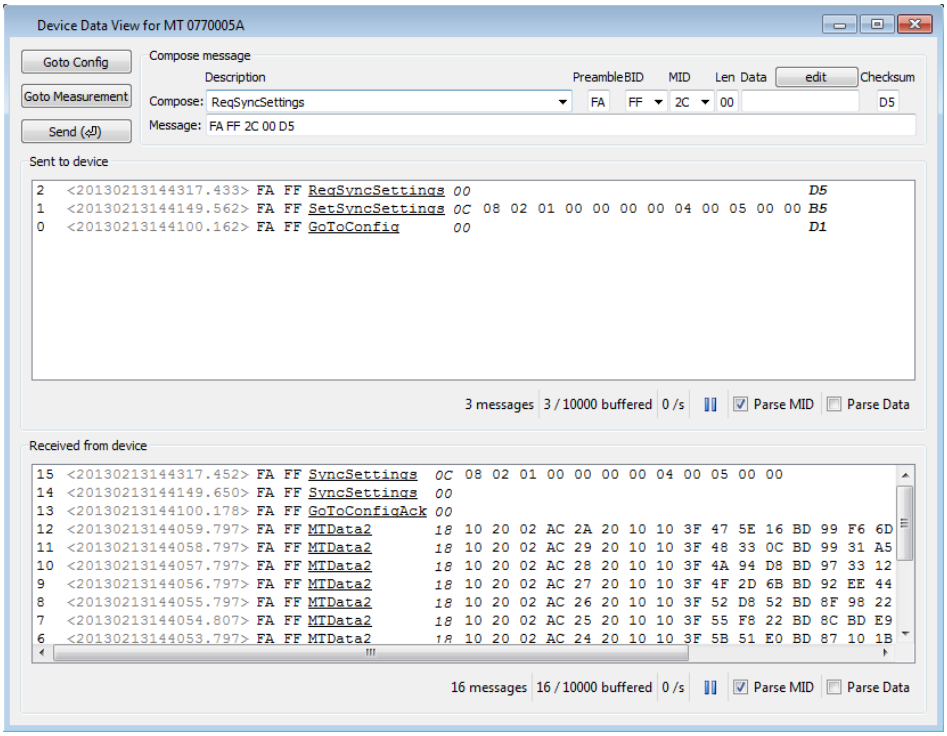
Press Enter or Edit to edit the Data field; you could make changes in the field itself as well.



When the data message is composed, the Send button is augmented with an Enter icon (⏎). Press Enter or the Send button to send the message to the MT. Note that you should receive an Acknowledge message; visible in the “Received from”-field.



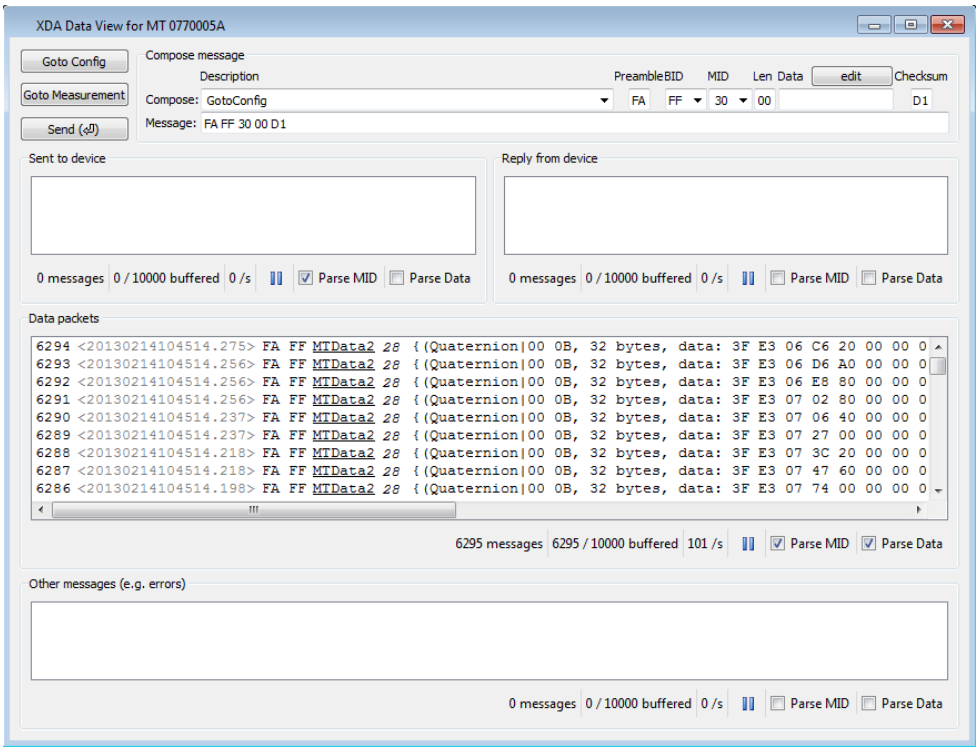
To verify the settings you just wrote to the device, you can request the settings, in this case the settings were correctly set:


Device Data View for MT 0770005A
Goto Config
Goto Measurement
Send (⏎)
Compose message
Description
Preamble BID MID Len Data edit Checksum
Compose: ReqSyncSettings FA FF 2C 00 D5
Message: FA FF 2C 00 D5
Sent to device
2 <20130213144317.433> FA FF ReqSyncSettings 00 D5
1 <20130213144149.562> FA FF SetSyncSettings 0C 08 02 01 00 00 00 00 04 00 05 00 00 B5
0 <20130213144100.162> FA FF GoToConfig 00 D1
3 messages 3 / 10000 buffered 0 /s Parse MID Parse Data
Received from device
15 <20130213144317.452> FA FF SyncSettings 0C 08 02 01 00 00 00 00 04 00 05 00 00
14 <20130213144149.650> FA FF SyncSettings 00
13 <20130213144100.178> FA FF GoToConfigAck 00
12 <20130213144059.797> FA FF MTData2 18 10 20 02 AC 2A 20 10 10 3F 47 5E 16 BD 99 F6 6D
11 <20130213144058.797> FA FF MTData2 18 10 20 02 AC 29 20 10 10 3F 48 33 0C BD 99 31 A5
10 <20130213144057.797> FA FF MTData2 18 10 20 02 AC 28 20 10 10 3F 4A 94 D8 BD 97 33 12
9 <20130213144056.797> FA FF MTData2 18 10 20 02 AC 27 20 10 10 3F 4F 2D 6B BD 92 EE 44
8 <20130213144055.797> FA FF MTData2 18 10 20 02 AC 26 20 10 10 3F 52 D8 52 BD 8F 98 22
7 <20130213144054.807> FA FF MTData2 18 10 20 02 AC 25 20 10 10 3F 55 F8 22 BD 8C BD E9
6 <20130213144053.797> FA FF MTData2 18 10 20 02 AC 24 20 10 10 3F 5B 51 E0 BD 87 10 1B
16 messages 16 / 10000 buffered 0 /s Parse MID Parse Data

5.4.2 XDA message terminal

The XDA message terminal allows monitoring the communication from XDA to MT Manager. Comparing this with the messages in the device message terminal shows which messages are added or calculated by XDA. The XDA message terminal can also be used to compose messages in ASCII; the composer will set the required bits, will include the XBus header (preamble, message ID etc) and will calculate the correct checksum. The message can then be written to the device.

The dialog for the XDA message terminal is very similar to the dialog of the device message terminal. Two fields are added: the “Data packets”-field and the “Other messages”-field. The fields “Sent to device” and “Received from device” are the same as the the fields in the device message terminal (see 5.4.1), with the exception that MTData2 messages are excluded from these fields (i.e. only Set-, Req-messages and their acknowledge messages are shown).



The “Data packets”-field shows the data packets that are generated by the Xsens Device API. These don’t have to be the same as the data messages that are sent by the MT: when XDA processes e.g. orientation data based on dq/dv, orientation data is added to the data packets stream (depending on the selected output configuration).

The “Other messages”- field shows warnings generated by XDA.

Documentation on all functionality can be found in 5.4.1.

5.5 Typical utilisations

This section describes a selection of typical utilisations of the MT Manager.

Note: It is necessary to let the system stabilise right after start-up (filter stabilisation can take up to 60 seconds) in order to get more reliable measurements.

5.5.1 Logging data

Logging data can be started and stopped by pressing the “Record / Stop Record” button (see also section 4.7.4):

The generated log file (`.MTB` file) will be written to the folder specified in the toolbar in the top of the main window under “Current directory”. By default, this is the root directory of the MT Manager installation (e.g. C:\Program Files (x86)\Xsens\MT Manager 4.1).
This setting can be changed in the toolbar in the top of the main window under “Current directory”. Make sure that you have administrator permission for the folder you want to save data in.

The default log file name can be changed by going to “Tools” ➔ “Preferences…” and selecting “Logging”:

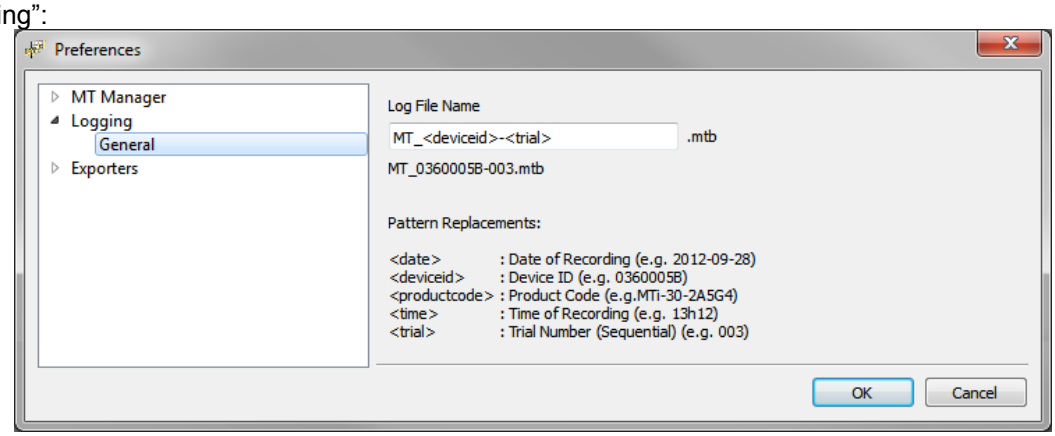


Figure 50: The logging name can be changed in the Preferences window. Use <time> and/or <trial> to ensure unique file names

5.5.2 Replaying logged data

Playback of logged data can be done by opening an `.MTB` file that has been previously recorded: Go to “File” ➔ “Open File…” (or by pressing “CTRL+O”) and select the `.MTB` file:

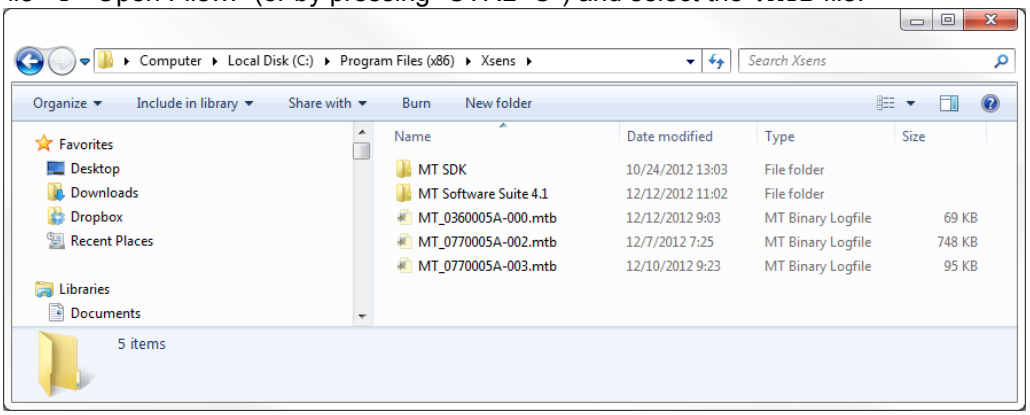


Figure 51: Log files of the MT Manager have an .mtb extension

A dialog will be opened that allows you to set the filter profile to process the data with (also exporting). If you want to process the data with a different filter profile, you have to reopen the file.

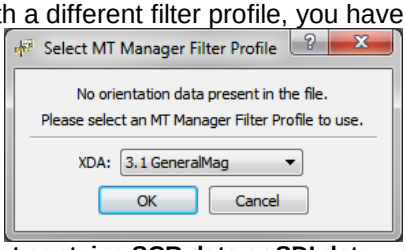


Figure 52: When opening a .mtb that contains SCR data or SDI data, you have to choose the desired filter profile

When you have selected the applicable filter profile, a dialog opens that shows the file loading progress.

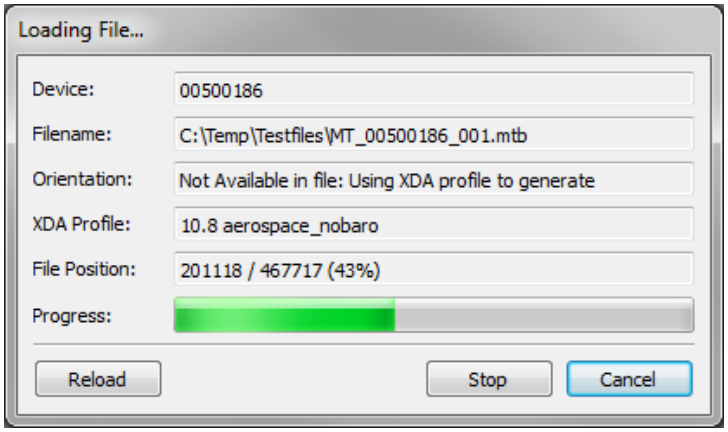


Figure 53: The file loading screen, displaying relevant information on file

Button/field	Description
Device	Shows the DeviceID of the Motion Tracker of which data is being loaded
Filename	Full path and file name of the file being loaded
Orientation	Not available in file: XDA processes orientation (and position) data with the filter profile selected. Available in file: orientation and position data is not reprocessed, not even when dq/dv is available in the file. The filter profile is ignored
XDA profile	When XDA (MT Manager) is processing orientation data, this file shows the XDA profile being used. When orientation data is in the file, this field shows <ignored>
File position and Progress	Data is processed from beginning to end. This bar shows the number of bytes from the file that is already processed. The total file size (in bytes) is shown after the slash
Reload	This button can be used to process the file with a different XDA profile. The current loading procedure will be cancelled.
Stop	Processing the file will be stopped. Already processed data is available in MT Manager
Cancel	Loading the file will be cancelled. Data is not available in MT Manager

Logged data can either be presented at once in a graph or played back in real time. These two settings can be chosen via “Tools” → “Preferences...” → MT Manager → Graphs → File Plotting Method: Realtime or All Data

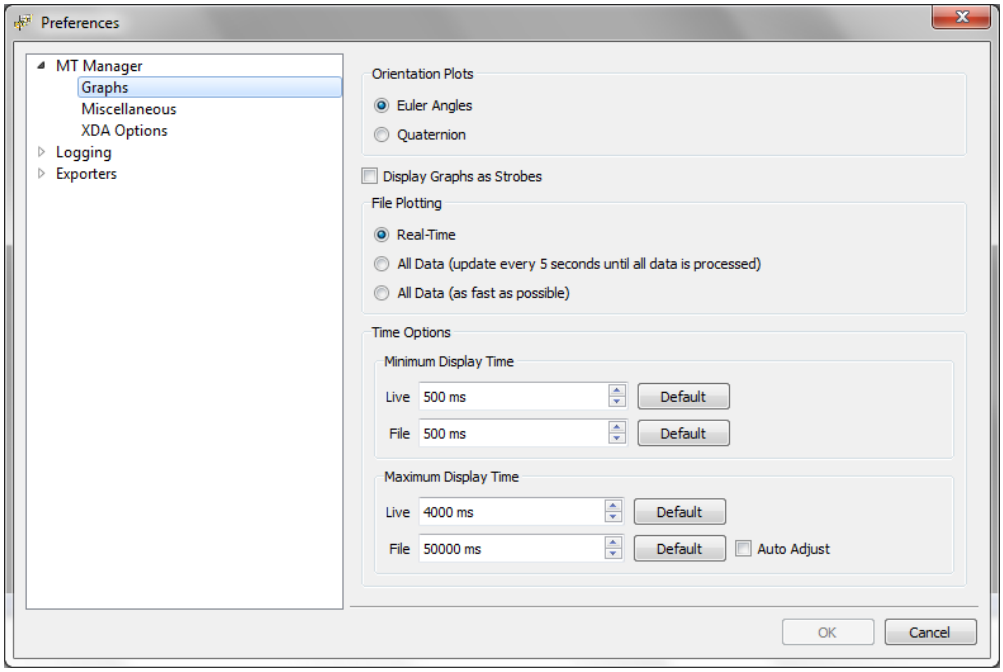


Figure 54: The behaviour of the graphs can be adapted in the Preferences - Graphs window

Time options:

The number of points in the graphs can be chosen in this dialog. When setting the time to a higher value, the data in the graphs can be investigated over a long period of time.

The “Play” and “Rewind” buttons can then be used to control the playback (see also section 4.7.3):

It is recommended to open the desired views before starting the playback.

5.5.3 Exporting ASCII data

Data previously logged into an .MTB file can be exported to the ASCII format (see section 5.5.2 on how to open log files).

The default export file name can be changed by going to “Tools” ➔ “Options…” and selecting “Exporters” in this dialog:

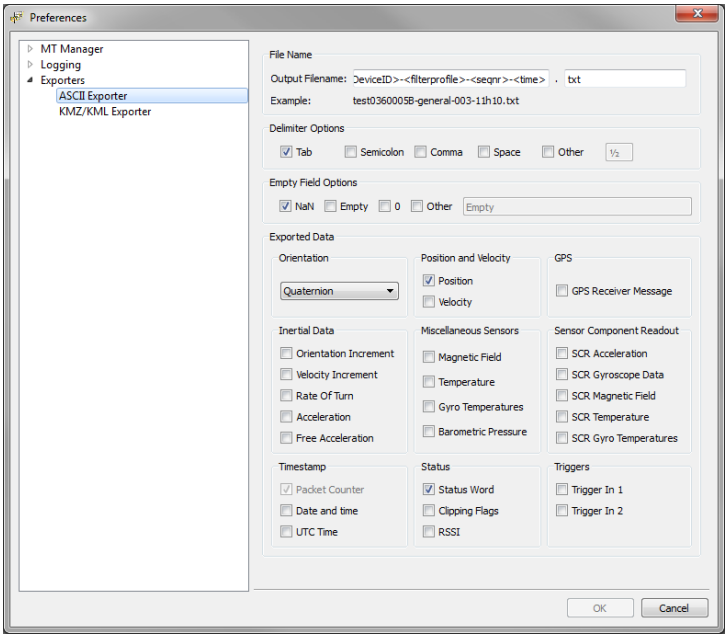


Figure 55: There are many characteristics of the ASCII exporter that you can configure in the Preferences window

Here the default file name is defined as:

`<inputfile>-<seqnr>-<time>.txt`, where

`inputfile` is the original name of the logged file

`seqnr` is incremented each time the corresponding .MTB file is processed.

`time` is the time read from the system (Windows) clock

Go to “File” ➔ “Export…” (or by pressing “CTRL+E”) and browse to the desired destination folder:

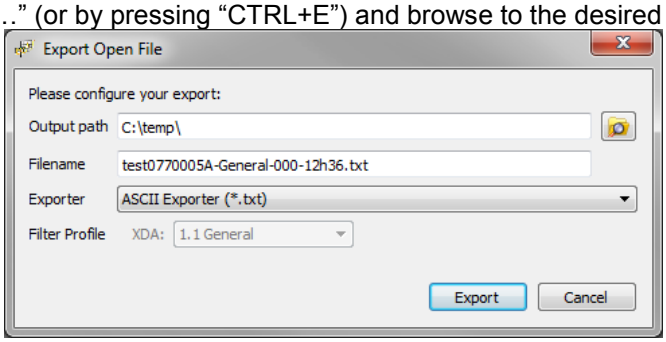


Figure 56: When exporting, you can choose the output path and adapt the file name

You can change the output path in this screen (the output path is the same as the “current directory” in MT Manager). The default export file name is displayed in the Filename field. You can edit this name before exporting. Press the “Export” button to complete the export. Make sure you have writing rights for the specified folder.

In the next sub-sections you will find details of the exporter types.

5.5.3.1 ASCII Exporter – File Name

The file name can be configured with the following parameters:

Parameter	Description
<date>	Data of export (e.g. 2012-09-28)
<deviceid>	Device ID (e.g. 0360005B)
<inputfile>	Original Filename without extension (e.g. MT0360005B-005)
<seqnr>	Sequential number (e.g. 003)
<productcode>	Product code (e.g.MTi-30-2A5G4)
<scenario>	Filter profile used (e.g. general)
<time>	Time read from the system clock.
Any text	It is possible to add any text, such as dashes, underscores, but also words and digits in the file name format.

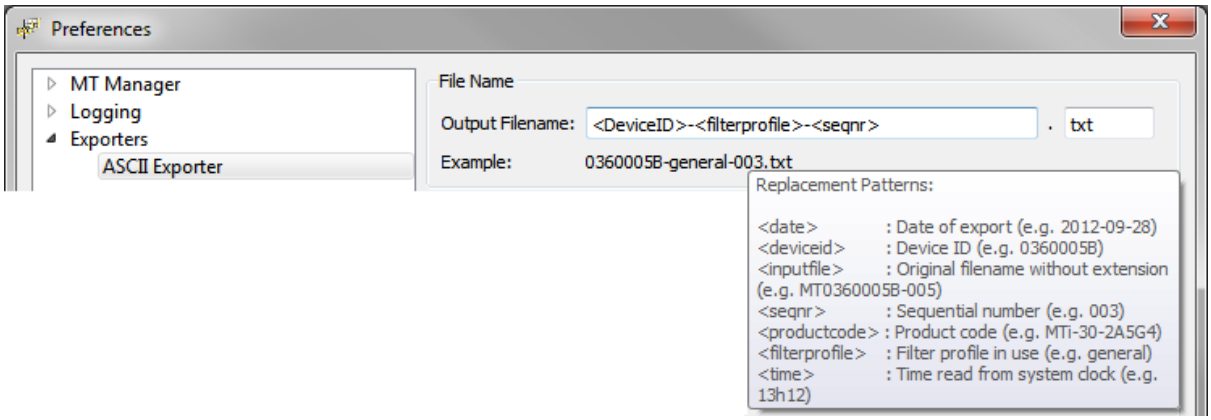


Figure 57: Hoover over the box in order to see the replacement patterns of the output file name. Include <seqnr> and/or <time> to ensure unique output file names

5.5.3.2 ASCII Exporter – Delimiter Options

It is possible to choose the delimiter options that can help you to import the columns of data of the exported file into an external program. You can also define your own delimiter (one character from the extended ASCII table).

Figure 58: In the delimiter options, you can even choose your own exotic delimiter (single character), e.g. § or ¼

5.5.3.3 ASCII Exporter – Empty field options

As the MTi can export data at different rates per data output, it is required to choose the behaviour when data does not exist in one (exported) data package. You can choose with which placeholder this field is filled. You can also insert your own string (unlimited). The empty field placeholder will help you when importing the data into an external program.

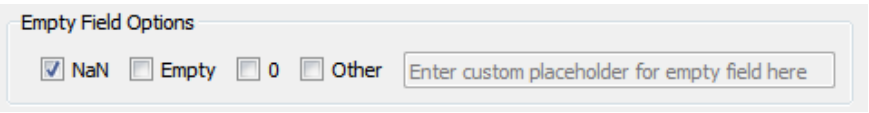


Figure 59: Data packets in the MTData2 format arrive at different rates, so when no data is available in the row, you can specify your own characters for the empty cell/field; NaN is commonly used in Excel

5.5.3.4 ASCII Exporter – Exported data

The ASCII exporter can export many data quantities. Select those required in the Exported Data section:

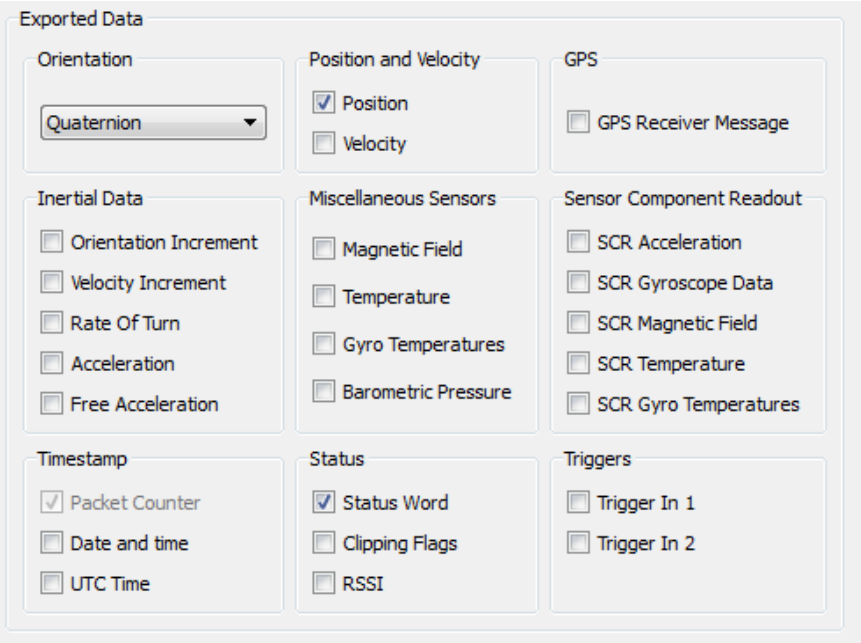
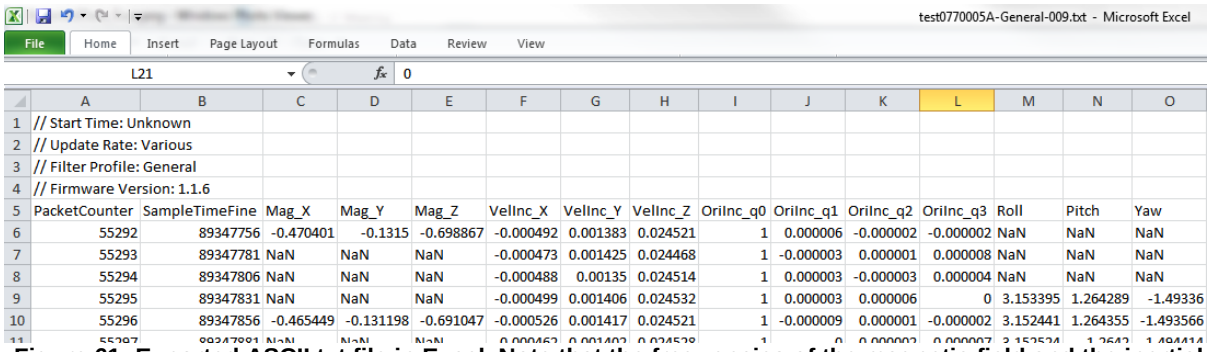


Figure 60: The export options are grouped into three levels: the top level outputs data generated by the Xsens fusion algorithm and the GPS message; the second row includes all sensor data; the third row lets you choose auxiliary data, such as time and status.

5.5.3.5 ASCII Exporter – file format

The output consists of a header with settings information and the actual data which is delimited by the delimiter chosen.
The following picture shows the first part of an example exported ASCII data file in Excel, still as .txt format:



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	// Start Time: Unknown														
2	// Update Rate: Various														
3	// Filter Profile: General														
4	// Firmware Version: 1.1.6														
5	PacketCounter	SampleTimeFine	Mag_X	Mag_Y	Mag_Z	VelInc_X	VelInc_Y	VelInc_Z	OriInc_q0	OriInc_q1	OriInc_q2	OriInc_q3	Roll	Pitch	Yaw
6	55292	89347756	-0.470401	-0.1315	-0.698867	-0.000492	0.001383	0.024521	1	0.000006	-0.000002	-0.000002	NaN	NaN	NaN
7	55293	89347781	NaN	NaN	NaN	-0.000473	0.001425	0.024468	1	-0.000003	0.000001	0.000008	NaN	NaN	NaN
8	55294	89347806	NaN	NaN	NaN	-0.000488	0.00135	0.024514	1	0.000003	-0.000003	0.000004	NaN	NaN	NaN
9	55295	89347831	NaN	NaN	NaN	-0.000499	0.001406	0.024532	1	0.000003	0.000006	0	3.153395	1.264289	-1.49336
10	55296	89347856	-0.465449	-0.131198	-0.691047	-0.000526	0.001417	0.024521	1	-0.000009	0.000001	-0.000002	3.152441	1.264355	-1.493566

Figure 61: Exported ASCII txt file in Excel. Note that the frequencies of the magnetic field and the inertial data/orientation differ with a factor 4. Therefore, the empty fields are filled with NaN (configurable in the Preferences window).

The table below describes the column headers in the ASCII exported file.

Column header	# of col.	Unit	Description
Time and date related data			
PacketCounter	1	N/A	Packet counter, wraps on 65535
SampleTimeFine	1	N/A	Sample Time of the sensor in ticks of 10 kHz (note that data may come in the file asynchronous; sample times of rows don't necessarily have to increase). Sample time fine is a data packet, and is always exported. This means that if the recorded file has a higher frequency than the exported file (e.g. when you are not exporting all data), some rows may seem to be empty except for the PacketCounter and SampleTimeFine.
Year	1	N/A	Year
Month	1	N/A	Month
Day	1	N/A	Day
Second	1	s	Seconds from the day (midnight starts at 0.00)
UTC_Nano	1	ns	Nanosecond of second (UTC format, not necessarily UTC time)
UTC_Year	1	N/A	Year (yyyy) (UTC format, not necessarily UTC time)
UTC_Month	1	N/A	Month of the year (UTC format, not necessarily UTC time)
UTC_Day	1	N/A	Day of the month (UTC format, not necessarily UTC time)
UTC_Hour	1	hours	Hour of the day (UTC format, not necessarily UTC time)
UTC_Minute	1	min	Minute of the hour (UTC format, not necessarily UTC time)
UTC_Second	1	sec	Second of the minute (UTC format, not necessarily UTC time)
UTC_Valid	1	N/A	UTC_Valid is 0 when no GPS is used; otherwise it adopts UTC_Valid from GPSTimeValidity (see below)

Status data			
StatusWord	1	N/A	32-bit status, see [LLCP] for information on the Status Word
ClippingFlags			
RSSI			Received Signal Strength Indicator – used for Awinda to determine signal strength of MTw wireless communication
Sensors data			
Acc_X / _Y / _Z	3	m/s^2	3D acceleration, processed via SDI and inverse SDI. When exported from SCR data, this data is only compensated for bias, temperature, gain and misalignment (no SDI and inverse SDI)
FreeAcc_X / _Y / _Z	3	m/s^2	3D acceleration, where gravity has been subtracted from. Maximum frequency is 400 Hz
Gyr_X / _Y / _Z	3	rad/s	3D rate of turn, processed via SDI and inverse SDI. When exported from SCR data, this data is only compensated for bias, temperature, gain, misalignment and g-sensitivity (no SDI and inverse SDI)
Mag_X / _Y / _Z	3	a.u.	3D magnetic field, maximum output rate is 100 Hz When exported from SCR data, data is copied from 100 Hz to match output frequency
VelInc_X / _Y / _Z	3	m/s	3D delta_velocity (dv); result of SDI algorithm
OriInc_q#	4	deg	3D delta_quaternion (dq); result of SDI algorithm
Pressure	1	Pa	Static pressure (MTi 100-series only)
Orientation, Position and Velocity (data that is processed by the Xsens fusion filter algorithm)			
Roll / Pitch / Yaw	3	deg	Euler angles orientation output
Quat_q0 / q1 /q2 / q3	4	N/A	Quaternion orientation output
Mat[#][#]	9	N/A	Rotation Matrix orientation output
Latitude / Longitude	2	deg	Decimal representation of latitude and longitude – estimated by Xsens fusion filter algorithm – MTi-G-700 only
Altitude	1	m	Altitude above geoid (WGS84 datum) – estimated by Xsens fusion filter algorithm – MTi-G-700 only
Vel_X / _Y / _Z	3	m/s	3D velocity in same coordinate system as orientation – estimated by Xsens fusion filter algorithm – MTi-G-700 only
Sensor Component Readout			
Temperature	1	ºC	Reading of the general temperature sensor, located near the accelerometers and magnetometer
GyrTemp_X / _Y / _Z	3	ºC	Reading of the gyroscope temperature sensor, located inside each individual gyroscope
SCRAcc_X / _Y / _Z	3	N/A	Digitized (16-bits) analog readout of the accelerometers (bits)
SCRGyr_X / _Y / _Z	3	N/A	Digitized (16-bits) analog readout of the gyroscopes (bits)

SCRMag_X / _Y / _Z	3	N/A	Readout (no bias/gain compensation) of magnetometer (bits)
SCRTemperature	1	N/A	Readout of the general temperature sensor (bits)
SCRGyrTemp_X / _Y /_Z	3	N/A	Readout of the temperature sensors in the gyroscopes (bits)
GPS message (MTi-G only) – composed of 4 distinctive messages (NAV-…) that are in exported file in different rows			
NSTimeOfWeek	1	ms	Time of week of the GNSS Receiver message **NAV-SOL**
NanoSecRemainder	1	ns	Fractional nanoseconds remainder of rounded ms above (range -500000 … 500000)
GPSWeek	1	N/A	GPS week
GPSFixtype	1	N/A	0: no fix 1: dead-reckoning only 2: 2D fix 3: 3D fix 4: GPS + dead-reckoning fix 5: Time only fix
GPSFixStatusFlags	1	N/A	Bit 0 high: within DOP and ACC masks Bit 1 high: DGPS used Bit 2 high: Week number valid Bit 3 high: Time of week valid
ECEFX / _Y / _Z	3	cm	Position from GNSS receiver (no sensor fusion) in ECEF
PositionAccuracyEst	1	cm	3D position accuracy estimate
ECEFVelX / _Y / _Z	3	cm/s	Velocity from GNSS receiver (no sensor fusion) in ECEF
SpeedAccuracyEst	1	cm/s	Speed accuracy estimate, as outputted by GNSS receiver
PositionDOP	1	scaled by 100; e.g. 134 = 1.34	Position DOP
NumberOfSV	1	N/A	Number of SVs used in Nav solution
NDTimeOfWeek	1	ms	Time of week of the GNSS Receiver message **NAV-DOP**
***DOP	7	scaled by 100; e.g. 134 = 1.34	Include the DOP values as determined by the GNSS receiver. DOP values outputted: Geometric DOP, Position DOP, Time DOP, Vertical DOP, Horizontal DOP, Northing DOP, Easting DOP
NUTimeOfWeek	1	ms	Time of week of the GNSS Receiver message **NAV-TimeUTC**
TimeAccuracyEst	1	ns	Time accuracy estimate
<GPS UTC time>	7	Units according to column header	These 7 columns output the UTC time as outputted by the GNSS receiver: GPSNanoSecOfSec, GPSYear, GPSMonth, GPSDay, GPSHour, GPSMin, GPSSec
GPSTimeValidity	1	N/A	Status of the UTC time of the receiver: Bit 0 high: Valid time of the week Bit 1 high: Valid Week Number Bit 2 high: Valid UTC, including Leap Seconds

NSVTimeOfWeek	1		Time of week of the GNSS Receiver message **NAV-SVInfo**
SVID[#]; SVQI[#]	30	N/A	SVID: Satellite number SVQI: Quality indicator of satellite: 0: channel is idle 1: Channel is searching 2: Signal acquired 3: Signal detected but unusable 4: Code lock on signal 5, 6, 7: Code and Carrier locked
Triggers (Trigger1 and Trigger2); MTw only, Trigger Indication of MTi can be found in StatusWord			
TrigIn1_Polarity	1	N/A	Polarity of the signal received: 1: Rising Edge 2: Falling Edge 3: Both
TrigIn1_Timestamp	1	N/A	The time stamp of the trigger
TrigIn1_Framenumber	1	N/A	The frame number in which the trigger was received
TrigIn2_Polarity	1	N/A	Polarity of the signal received: 1: Rising Edge 2: Falling Edge 3: Both
TrigIn2_Timestamp	1	N/A	The time stamp of the trigger
TrigIn2_Framenumber	1	N/A	The frame number in which the trigger was received

5.5.4 Exporting KMZ/KML data

It is possible to export data from an MTi-G-700 to a KMZ or KML file. The KMZ file contains geo-referenced data points with corresponding orientation, velocity, GPS mode and times. The contents of the KMZ/KML file can be customized to match the user's preferences.

The steps to export a KMZ/KML file are:

1. Load an MTi-G-700 (or legacy MTi-G) file. It may contain processed orientation and position, SCR data or other data that needs XDA processing.
2. Set the preferences of the KMZ/KML exporter via Tools-Preferences-Exporters.
    a. Choose a Filename template (see 5.5.3.1).
    b. Choose the maximum numbers of markers per second. The default value is 1; you should adapt this value to your velocity: too many data points per second may cloud the data points in Google Earth.
    c. Choose the format (KMZ or KML). KML can be edited via e.g. Wordpad, KMZ is compressed format which is significantly smaller.
3. Export the file via File – Export. You can change the output path and file name here.

The file can now be loaded into e.g. Google Earth.

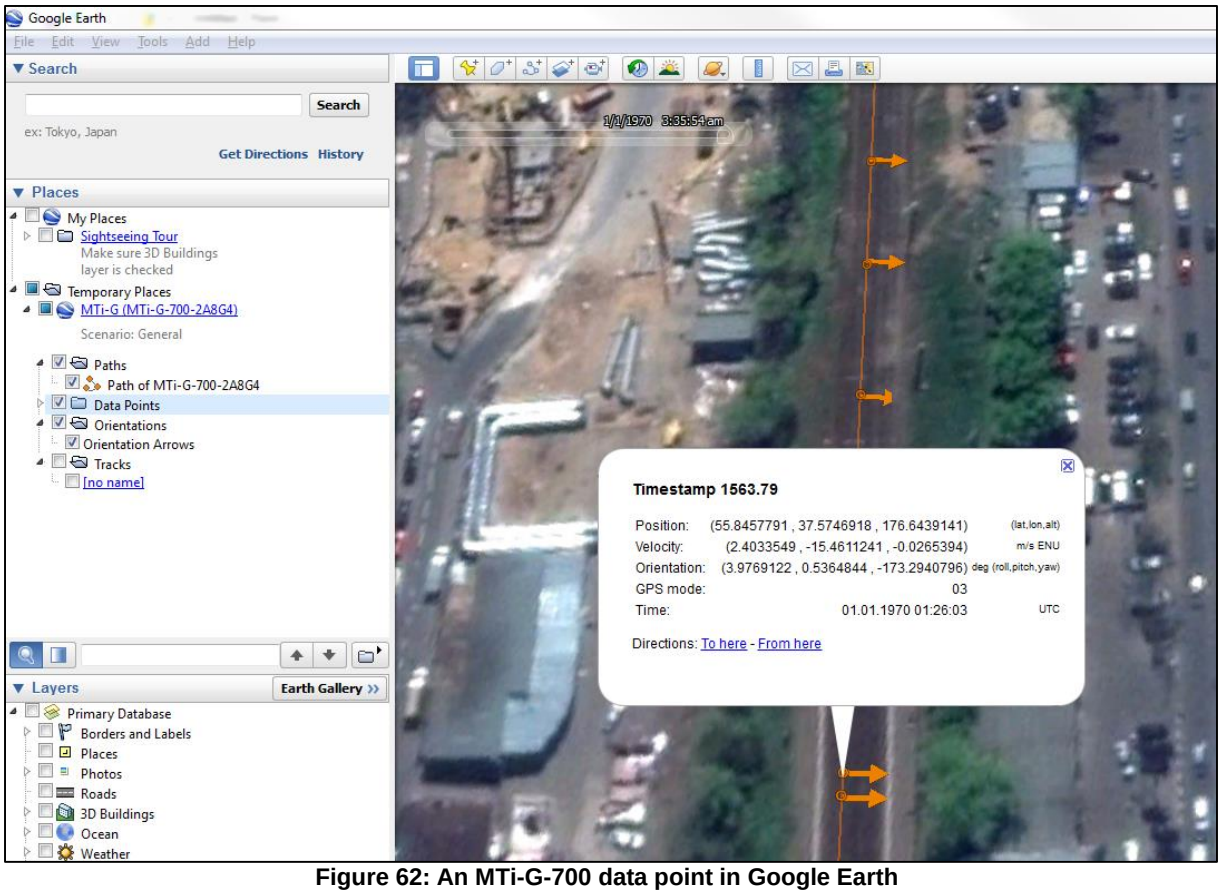


Figure 62: An MTi-G-700 data point in Google Earth

5.5.5 Using multiple MTs

Multiple Motion Trackers can be managed with the MT Manager with or without the Xbus Master.

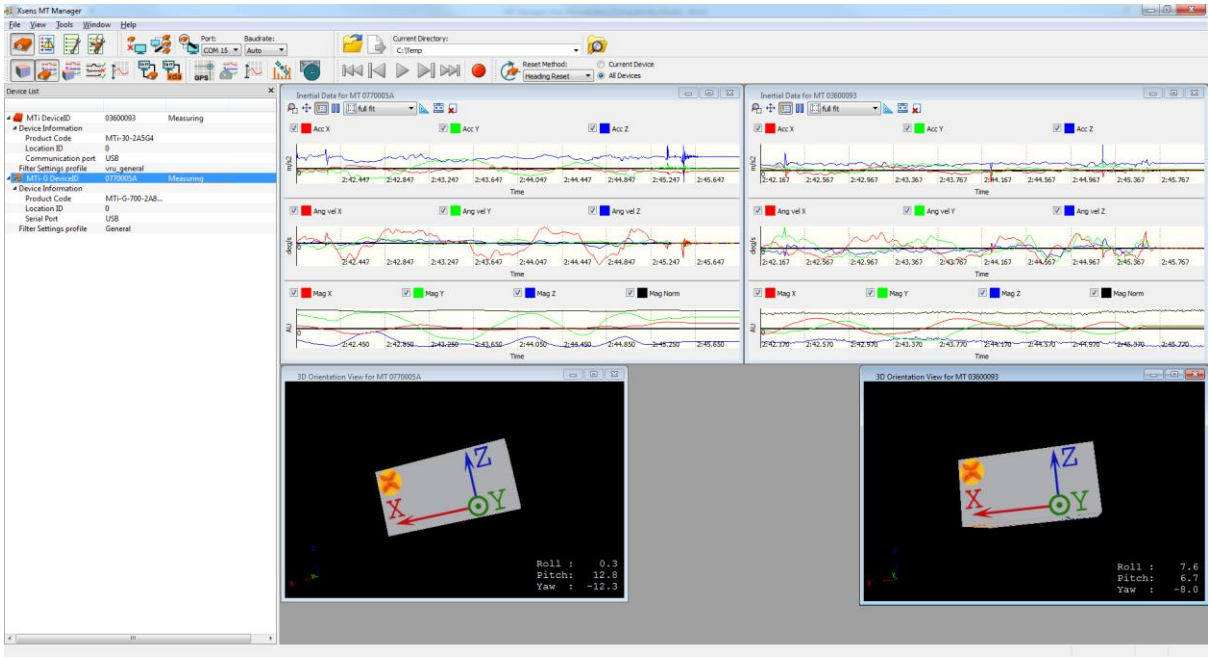


Figure 63: Managing an MTi-G-700 (left) and an MTi-30 (right)

6 System requirements

The MT Manager is designed for Windows XP/Vista/7 and the following system setup is recommended to properly run the software:

- Windows XP (Service Pack 2 installed), Windows Vista or Windows 7
- Intel® Pentium® or AMD® processor, 1 GHz (minimum) Pentium® IV 2.00 GHz or AMD Athlon® XP 2000+ or higher (recommended)
- USB port (1.1 or higher) or standard PC serial COM-port (RS-232) [4,5]
- Graphics card with 3D hardware acceleration and OpenGL support. Contact your graphics card manufacturer to ensure your graphics card drivers are up to date.

NOTE: MT Manager is designed to assign a low priority to graphics functions if your computer can not update the screen smoothly due to insufficient computing resources. This is done on purpose to avoid interfering with the core functionality of the MT Manager.

[4] RS-232 add-on cards are not supported
[5] Custom RS-232 USB converters are not supported

7 Important notices

7.1 Warranty and liability

Xsens Technologies B.V. warrants the products manufactured by it to be free from defects in material and workmanship for a period of 1 year from the date of delivery. Products not subjected to misuse will be repaired, replaced or credit issued at the sole option of Xsens Technologies B.V.
Visit http://www.xsens.com/support for return material authorization (RMA) prior to returning any items for calibration, repair or exchange. The product **must be returned in its original packaging** to prevent damage during shipping.

The warranty shall not apply to products repaired or altered or removed from the original casing by others than Xsens Technologies B.V. so as, in Xsens Technologies B.V. opinion, to have adversely affected the product, products subjected to negligence, accidents or damaged by circumstances beyond Xsens Technologies B.V.'s control.

NOTE: Xsens reserves the right to make changes in its products in order to improve design, performance, or reliability.

Subject to the conditions and limitations on liability stated herein, Xsens warrants that the Product as so delivered shall materially conform to Xsens' then current specifications for the Product, for a period of one year from the date of delivery. ANY LIABILITY OF XSENS WITH RESPECT TO THE SYSTEM OR THE PERFORMANCE THEREOF UNDER ANY WARRANTY, NEGLIGENCE, STRICT LIABILITY OR OTHER THEORY WILL BE LIMITED EXCLUSIVELY TO PRODUCT REPAIR, REPLACEMENT OR, IF REPLACEMENT IS INADEQUATE AS A REMEDY OR, IN XSENS' OPINION IMPRACTICAL, TO REFUND THE PRICE PAID FOR THE PRODUCT. XSENS DOES NOT WARRANT, GUARANTEE, OR MAKE ANY REPRESENTATIONS REGARDING THE USE, OR THE RESULTS OF THE USE, OF THE PRODUCT OR WRITTEN MATERIALS IN TERMS OF CORRECTNESS, ACCURACY, RELIABILITY, OR OTHERWISE. Xsens shall have no liability for delays or failures beyond its reasonable control.

7.2 Technical Support

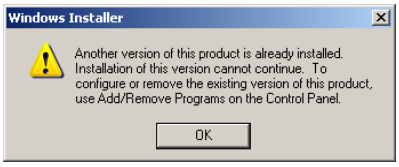
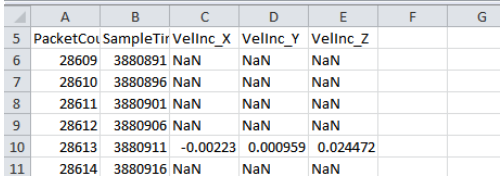
Xsens Technologies B.V. is glad to help you with any questions you may have about the MT Manager or about the use of the technology for your application. Please contact Xsens' Support Team:

Internet: http://www.xsens.com/support
telephone: +31(0)88-9736700 (+31 88 XSENS 00)

To be able to help you, please mention your **Device ID**, **MT Manager version number** and **software license registration number** in your request.

8 Troubleshooting

This section helps to solve problems you might encounter while using the MT Manager.
If your problem with the MT Manager is not mentioned here, please contact www.xsens.com/support.

Problem	Solution
Installation is aborted due to previously installed version 	Use Add/Remove Programs on the Control Panel to remove the previously installed version. Then re-try installing the desired version.
No device listed in the Device List	Make sure you connected your device to your computer: For USB cable connection • Reconnecting the USB cable to the MT or Xbus Master (so called power cycle) Then, press the “Rescan” button in the Connectivity toolbar.
Erratic mouse cursor movement (MTi’s with USB-serial converters only)	Disconnect the supplied USB cable from both your PC and your device (MT or Xbus Master). Then reconnect your device to your computer by: • First connecting the supplied USB cable to your PC and then • Connecting the USB cable to the MT or Xbus Master Then, press the “Rescan” button in the Connectivity toolbar.
RS-485 sensor not found	Enable the “RS-485 compatibility mode”: Go to the General options pane via “Tools” ➔ “Options…” and tick the “Enable RS-485 compatibility mode” option.
Incorrect orientation data and/or lag in visualisation	Increase the baud rate for the communication between sensor and PC: • Open the Device List • Increase the Baud Rate
The exporter shows rows with only NaN in column 3 and higher (only a valid PacketCounter and SampleTimeFine) 	PacketCounter and SampleTimeFine are regarded as data packets as well. When the original file has a higher recording frequency than the data that is exported, some rows seem to be empty. In the example on the left, the recorded file has a frequency of 2kHz, where the exported column has an update frequency of only 400 Hz. To prevent this, record only data that you are going to export.

	A	B	C	D	E	F	G
5	PacketCou	SampleTir	VelInc_X	VelInc_Y	VelInc_Z		
6	28609	3880891	NaN	NaN	NaN		
7	28610	3880896	NaN	NaN	NaN		
8	28611	3880901	NaN	NaN	NaN		
9	28612	3880906	NaN	NaN	NaN		
10	28613	3880911	-0.00223	0.000959	0.024472		
11	28614	3880916	NaN	NaN	NaN		