

MT CAN Protocol

Xsens User Manual

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Table of Contents

MT CAN Protocol Documentation 1

Introduction 2

Hardware Hookup 3

Enabling CAN through MT Manager 4

Configuring CAN output through Xbus 7

CAN Output Messages 13

MT CAN Protocol Documentation



Click the icon to download the entire document in PDF.

Introduction

This document describes how to communicate over CAN and CAN-FD with Xsens’ range of miniature MEMS-based inertial Motion Trackers with the MTi 600-series, the Avior series and the Sirius series. This document assumes at least a basic understanding of CAN protocols, hardware, interfacing and general workings.

Not all products support the same functionality. There are several different products described in this document. The description of each message ID contains a table showing the supported products:

610	620	630	670	680	Avior IMU	Avior VRU	Avior AHRS	Sirius IMU	Sirius VRU	Sirius AHRS
-----	-----	-----	-----	-----	--------------	--------------	---------------	---------------	---------------	----------------

For the MTi 600-series, numbers in this table correspond to the following products:

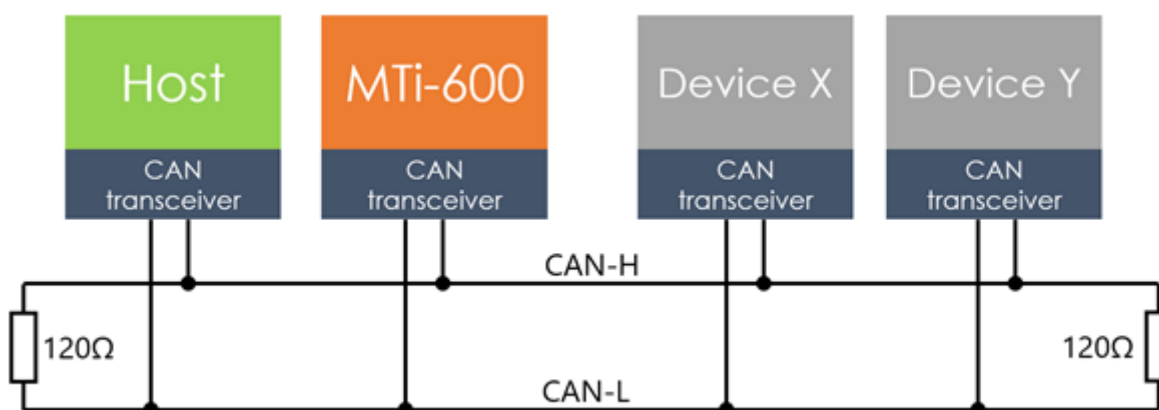
- 610: MTi-610 IMU
- 620: MTi-620 VRU/AHT
- 630: MTi-630(R) AHRS
- 670: MTi-670(G) GNSS/INS
- 680: MTi-680(G) RTK GNSS/INS

An empty field indicates that the corresponding product does not support the message.

Hardware Hookup

- Termination Resistor

The MTi 600-series, Avior series, and Sirius series follow the basic CANbus 2.0 A/B hardware guidelines. It is able to work in a normal CANbus environment. See the figure below for a typical CANbus network.



A schematic CAN setup using the MTi-600

Termination Resistor

- **Xsens Avior series:** There is a 120 Ohm termination resistor on the Avior series development board (the standalone Avior series module does not have a termination resistor).
- **Xsens Sirius series:** The Sirius series devices have an internal 120 Ohm termination resistor, which is disabled by default, and can be enabled via either MT Manager or an Xbus message.
- **MTi 600 series:** The MTi-600 series devices do not have an internal 120 Ohm termination resistor. They can be used in a CAN bus that already incorporates the required termination. If used in a single-device connection, a 120 Ω termination resistor must be added between the CAN_H and CAN_L pins.

To ensure stable operation, unused inputs should be grounded. Additionally, ensure that both ground pins are properly grounded.

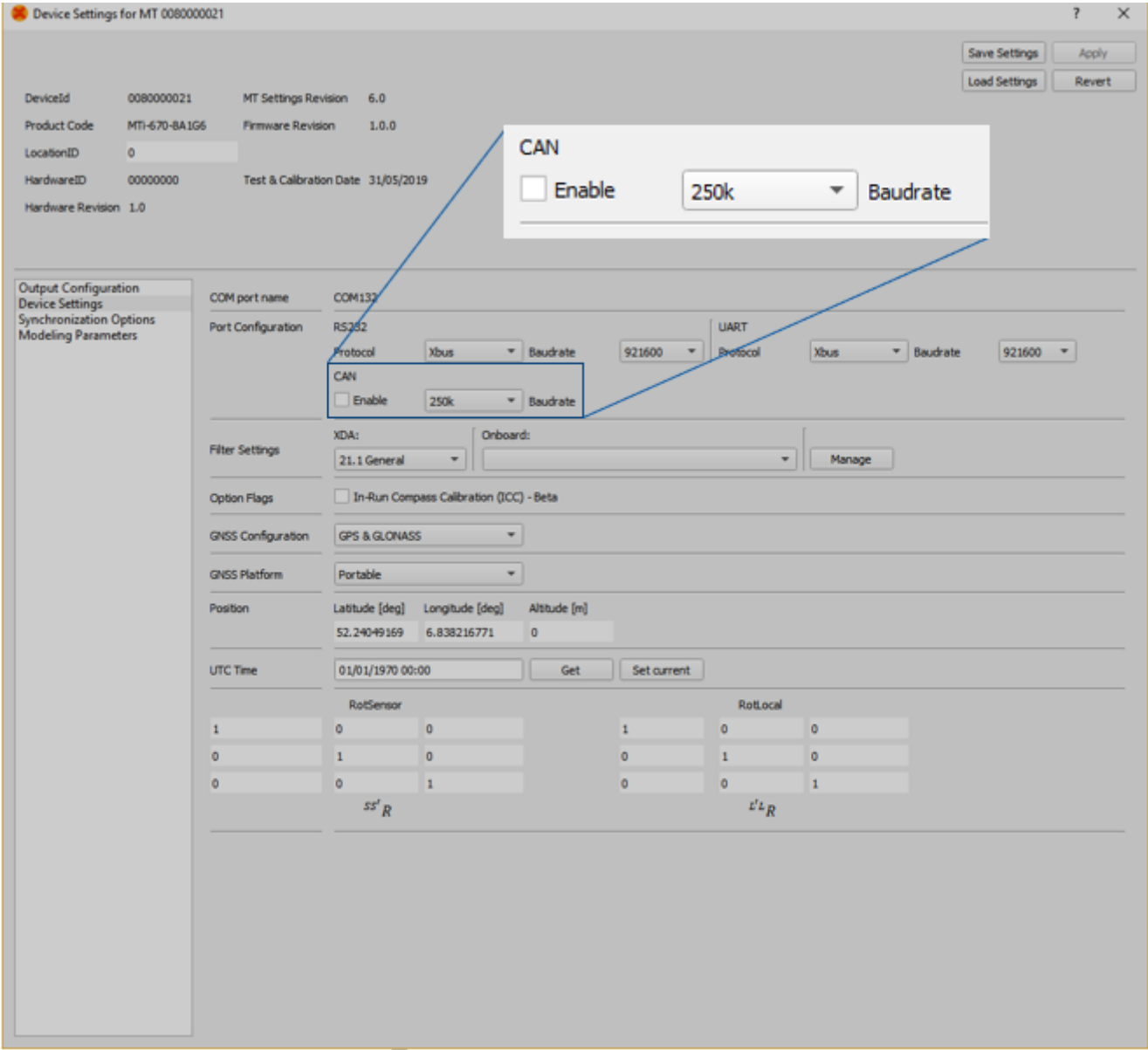
Please refer to the MTi 600-series Hardware Integration Manual, Avior Hardware Integration Manual, or the Sirius Hardware Integration Manual for more details on the pinout definition and other details.

Enabling CAN through MT Manager

The easiest way to get started with the CAN interface is through MT Manager. With an MTi connected, open the Device Settings menu, see figure below. Check the 'Enable' checkbox and select the desired Baudrate to enable the CAN output.

With the Xsens Avior and Xsens Sirius, CAN and CAN-FD functionality is enabled via a dropdown menu. Next to that, there is the possibility to set the data bit rate for CAN-FD. The Sirius allows for selecting whether to use the internal 120 Ohm termination resistor.

CAN-FD is only available for the Xsens Avior and Xsens Sirius with firmware version 1.3.0 and above, using MT Manager version 2025.3 and above.



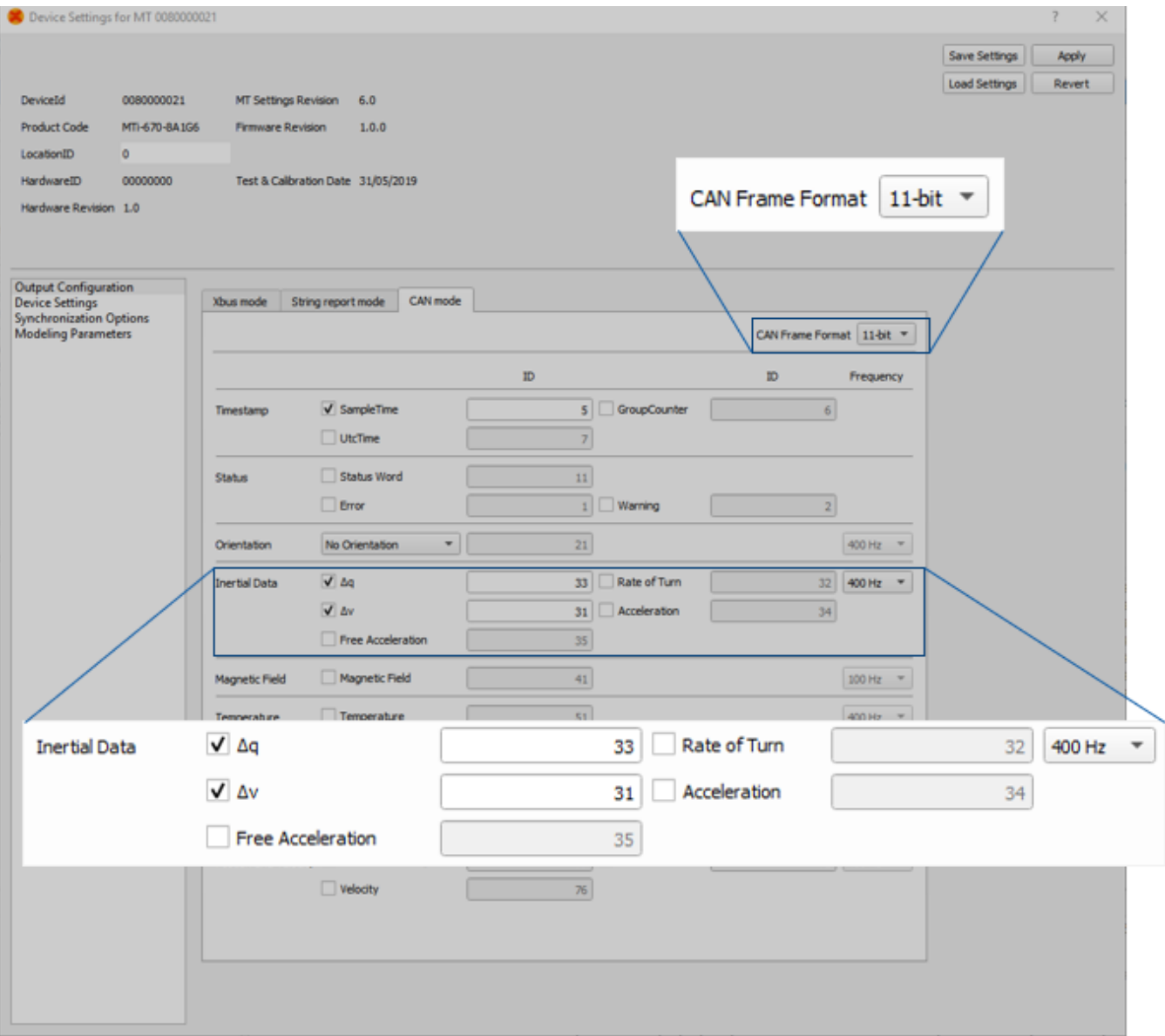
Enabling CAN output in Device Settings

Following this, you can select which data messages you would like to output (see the image below and CAN Output Messages) and their output frequencies. Note that with many outputs at a high frequency, the CANbus can be saturated easily. The maximum amount of different output messages that can be configured is 16.

After pressing 'Apply', the CAN output configuration is sent to the MTi and the configured output is available on the CANbus (see MTi 600-series Hardware Integration Manual or the Sirius Hardware Integration Manual for more details on the pin out).

Note: For stability reasons, connected Xsens devices will be forced into Configuration Mode when MT Manager is closed. This will also stop Xsens devices from outputting data over the CAN interface. In order to resume CAN output data, simply re-power your device. Alternatively, use Windows Task Manager (Ctrl+Alt+Del) to close MT Manager.

When configuring the CAN outputs using the Device Settings screen (see the image below), the ID's are in hexadecimal format. At the top right of the CAN output configuration screen, the CAN frame Format can be set, (11-bit or 29-bit).



Configuring CAN output in MT Manager

Configuring CAN output through Xbus

- Termination Resistor
- General CAN configuration messages

The MTi 600-series and Sirius series support a CAN output, but the CAN output must be configured through the UART or RS232 interface using Xbus messages. The method of configuring is described below. For more information on Xbus and its message structure, please review the *MT Low Level Communication Protocol Documentation*.

Termination Resistor

- **Xsens Avior series:** There is a 120 Ohm termination resistor on the Avior series development board (the standalone Avior series module does not have a termination resistor).
- **Xsens Sirius series:** The Sirius series devices have an internal 120 Ohm termination resistor which is disabled by default, and can be enabled.
- **MTi 600 series:** The MTi-600 series devices do not have an internal 120 Ohm termination resistor. They can be used in a CAN bus that already incorporates the required termination. If used in a single-device connection, a 120 Ω termination resistor must be added between the CAN_H and CAN_L pins.

General CAN configuration messages

ReqCanConfig

MID	230 (0xE6)
DATA	n/a
Direction	To MT
Valid in	Config State

610	620	630	670	680	Avior IMU	Avior VRU	Avior AHRS	Sirius IMU	Sirius VRU	Sirius AHRS
-----	-----	-----	-----	-----	--------------	--------------	---------------	---------------	---------------	----------------

Request the current CAN configuration – see **SetCanConfig** for information about the data field of the received **ReqCanConfigAck** acknowledgement message.

SetCanConfig

MID	230 (0xE6)
DATA	CAN enable flag (1bit) , Baud rate code (1byte)

Direction To MT
Valid in Config State

610	620	630	670	680	Avior IMU	Avior VRU	Avior AHRS	Sirius IMU	Sirius VRU	Sirius AHRS
-----	-----	-----	-----	-----	--------------	--------------	---------------	---------------	---------------	----------------

Set the general configuration settings of the CAN-Bus

32bit block															
31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
reserved												Baud code (Data)			
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Baud code (Data)				TR	res	FD	EN	Baud code (Nominal)							

Example usage:

- Enable regular CAN at 500k birate:
 - FA FF E6 04 00 00 01 0A 0C
- Enable CAN-FD at 500k nominal bitrate and 2M data bitrate
 - FA FF E6 04 00 00 D3 0A 3A

BAUDRATE

The BAUDRATE is a 1-byte code that specifies at which rate the CAN bus will send data. The CAN peripheral is internally automatically configured to best match a Sample-Point of 70% to 75%.

CAN config settings

Bit(s)	Setting	Size (bit)	Description	Products
31:20	reserved	12		
19:12	Data Bitrate/Baud Code (CAN-FD mode only, see table below)	8		Sirius, Avior
11	120 Ohm termination resistor enabled 0: disabled 1: enabled	1	Activates the 120 Ohm termination resistor between CAN_H and CAN_L if set. Supported by Xsens Sirius devices with FW v1.2.0 and higher only.	Sirius
10	reserved (for enabling CANopen)	1		
9	CAN-FD enabled (protocol only, also bit 8 required) 0: disabled 1: enabled	1		Sirius, Avior
8	CAN enabled 0: disabled 1: enabled	1	Enable CAN interface if set	Sirius, Avior, 600-series
7:0	Nominal Bitrate/Baud Code (see table below)	8	Bitrate/ Baud Code (see table below)	Sirius, Avior, 600-series

Available CAN baud codes

CAN Baud code (bps)	BAUD CODE	Note	Bit Timing Configuration (Sirius/Avior)*			
			Prescaler	TSEG1	TSEG2	Sync Jump Width
8M	15 (0x0F)	CAN-FD only (Applies to Sirius/Avior only)	1	7	2	4
5M	14 (0x0E)	CAN-FD only (Applies to Sirius/Avior only)	1	11	4	4
2M	13 (0x0D)	CAN-FD only (Applies to Sirius/Avior only)	1	31	8	4
1M	12 (0x0C)		4	16	4	4
800k	11 (0x0B)		10	7	2	2
500k	10 (0x0A)		16	7	2	2
250k (default)	0 (0x00)		4	63	16	16
125k	1 (0x01)		64	7	2	2
100k	2 (0x02)		80	7	2	2
83k3	3 (0x03)		12	63	16	16
62k5	4 (0x04)		128	7	2	2
50k	5 (0x05)		160	7	2	2
33k3	6 (0x06)		30	63	16	16
20k	7 (0x07)		400	7	2	2
10k	8 (0x08)		800	7	2	2
5k	9 (0x09)		1600	7	2	2

* Bit timing configuration parameters may be subject to change in future firmware releases.

ReqCanOutputConfig

MID 232 (0xE8)
DATA n/a
Direction To MT
Valid in Config State

610	620	630	670	680	Avior IMU	Avior VRU	Avior AHRS	Sirius IMU	Sirius VRU	Sirius AHRS
-----	-----	-----	-----	-----	-----------	-----------	------------	------------	------------	-------------

Request the general configuration settings of the CANBus.

SetCanOutputConfig

MID 232 (0xE8)
DATA Xsens CAN data id (7 bits) , ID length flag (1bit), ID mask (29 bits), Output frequency (11 bits)
Direction To MT
Valid in Config State

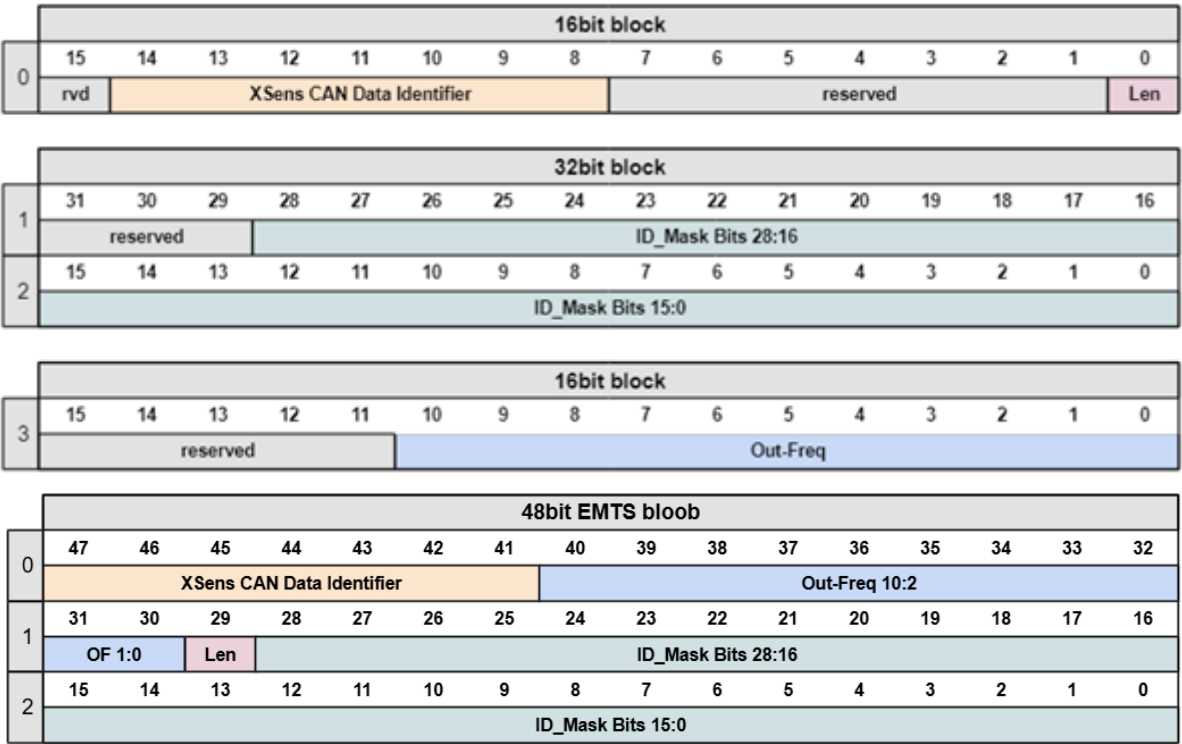
610	620	630	670	680	Avior IMU	Avior VRU	Avior AHRS	Sirius IMU	Sirius VRU	Sirius AHRS
-----	-----	-----	-----	-----	-----------	-----------	------------	------------	------------	-------------

Set the output configuration of the CAN-Bus.

The data is a repeating sequence of Xsens CAN data id, ID length flag (11- or 29-bit length, indicated by the value 0 or 1), ID mask, Output frequency. See the figure below for the message structure, and the table below for the Xsens CAN Data Identifiers.

The maximum number of different output messages that can be configured is 16.

If this message is sent without using the Xsens Device API, make sure to serialize to BigEndian prior to sending the message. Also, adhere to the block size.



SetCanOutputConfig structure

CAN Output Configuration

Block	Bit(s)	Description
1	14:8	Xsens internal Can Data Identifier
1	7:1	reserved
1	0	ID length 0: 11-bit identifier 1: 29-bit identifier
2	31:29	reserved
2	28:0	Can Message ID for given Data set
3	15:11	reserved

Block	Bit(s)	Description
3	10:0	Output Frequency

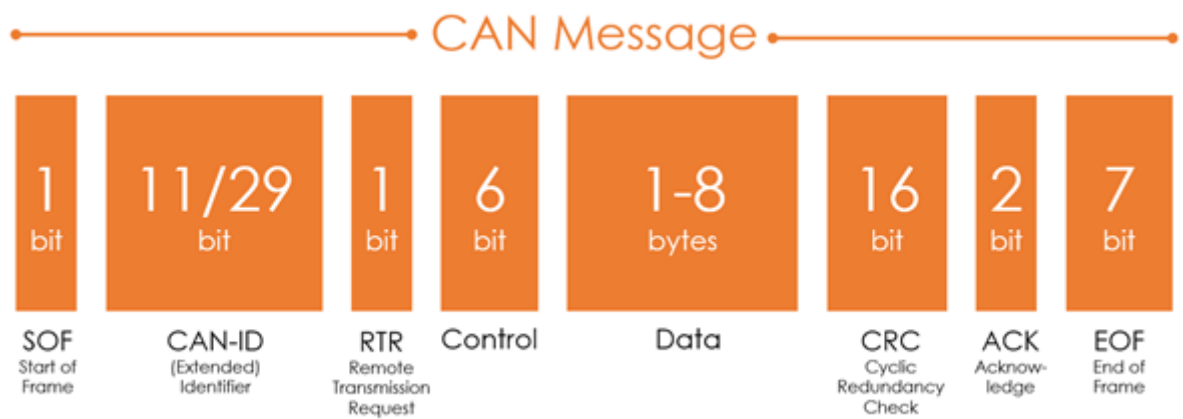
Xsens CAN Identifiers

ID	XsCanDataIdentifier
0x00	XCDI_Invalid
0x01	XCDI_Error
0x02	XCDI_Warning
0x05	XCDI_SampleTime
0x06	XCDI_GroupCounter
0x07	XCDI_UtcTime
0x11	XCDI_StatusWord
0x21	XCDI_Quaternion
0x22	XCDI_EulerAngles
0x23	XCDI_RotationMatrix
0x31	XCDI_DeltaV
0x32	XCDI_RateOfTurn
0x33	XCDI_DeltaQ
0x34	XCDI_Acceleration
0x35	XCDI_FreeAcceleration
0x41	XCDI_MagneticField
0x51	XCDI_Temperature
0x52	XCDI_BaroPressure
0x61	XCDI_RateOfTurnHR
0x62	XCDI_AccelerationHR
0x71	XCDI_LatLon

ID	XsCanDataIdentifier
0x72	XCDI_AltitudeEllipsoid
0x73	XCDI_PositionEcef_X
0x74	XCDI_PositionEcef_Y
0x75	XCDI_PositionEcef_Z
0x76	XCDI_VelocityXYZ
0x79	XCDI_GnssReceiverStatus
0x7A	XCDI_GnssReceiverDop

CAN Output Messages

- Group Information & Timestamp Messages (0x00x)
 - Error
 - SampleTime
 - GroupCounter
 - UTC
- Status Messages (0x010)
 - StatusWord
- Orientation Messages (0x020)
 - Quaternion
 - EulerAngles
- Inertial Data Messages (0x030)
 - DeltaV
 - RateOfTurn
 - DeltaQ
 - Acceleration
 - FreeAcceleration
- Magnetic Group (0x040)
 - MagneticField
- Temperature and Pressure Messages (0x050)
 - Temperature
 - BaroPressure
- High-Rate Data Messages (0x060)
 - AccelerationHR
 - RateOfTurnHR
- Position & Velocity Messages (0x070)
 - Latitude and Longitude
 - AltitudeEllipsoid
 - PositionEcef_X
 - PositionEcef_Y
 - PositionEcef_Z
 - VelocityXYZ
 - GnssReceiverStatus
 - GnssReceiverDop



Basic CAN message layout

The MTi 600-series and Sirius series follow the basic CAN protocol. Each message starts with an 11- or 29-bit identifier which also handles arbitration. The message with the lowest identifier value has the highest priority. Each message can contain up to 8 bytes of data, with a data rate of up to 1 Mbps.

A CAN database (.dbc) file is available to automatically translate the CAN output data messages of the MTi. The file can be downloaded from BASE: .dbc file for MTi 600-series, Sirius series, and Avior series

Group Information & Timestamp Messages (0x00x)

Error

610	620	630	670	680	Avior IMU	Avior VRU	Avior AHRS	Sirius IMU	Sirius VRU	Sirius AHRS
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Max. output frequency: n/a

Note: This error message can be disabled.

Message name (ID)	XCID_Error (0x001)				
Field	Scaling	Unit	Format	Size	Offset
Error Code	-	-	uint8	1	0
			Total size		1

Message name (ID)		XCID_Error (0x001)	
Error		Code	Message
CEI_OutputBufferOverflow		0x01	The output buffer is full, at least one message was dropped.

SampleTime

610	620	630	670	680	Avior IMU	Avior VRU	Avior AHRS	Sirius IMU	Sirius VRU	Sirius AHRS
-----	-----	-----	-----	-----	--------------	--------------	---------------	---------------	---------------	----------------

Xbus equivalent: XDI_SampleTimeFine
Max. output frequency: n/a

Note: This is a timestamp expressed in 10 kHz (100 μs) clock ticks.

Message name (ID)		XCID_SampleTime (0x005)				
Field		Scaling	Unit	Format	Size	Offset
SampleTime		-	-	uint32	4	0
				Total size		4

GroupCounter

610	620	630	670	680	Avior IMU	Avior VRU	Avior AHRS	Sirius IMU	Sirius VRU	Sirius AHRS
-----	-----	-----	-----	-----	--------------	--------------	---------------	---------------	---------------	----------------

Xbus equivalent: XDI_PacketCounter
Max. output frequency: n/a

Note: This is a CAN Frame counter or Group counter that is independent from the Xbus XDI_PacketCounter.

Message name (ID)	XCID_GroupCounter (0x006)				
Field	Scaling	Unit	Format	Size	Offset
GroupCounter	-	-	uint16	2	0
			Total size		2

UTC

			670	680
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Xbus equivalent: XDI_UtcTime
Max. output frequency: n/a

Message name (ID)	XCID_UTC (0x007)				
Field	Scaling	Unit	Format	Size	Offset
YEAR	1	year	uint8	1	0
MONTH	1	month	uint8	1	1
DAY	1	d	uint8	1	2
HOUR	1	h	uint8	1	3
MIN	1	min	uint8	1	4
SEC	1	s	uint8	1	5
TENTHMS	10 ⁻⁴	s	uint16	2	6
			Total size		8

Status Messages (0x010)

StatusWord

610	620	630	670	680	Avior IMU	Avior VRU	Avior AHRS	Sirius IMU	Sirius VRU	Sirius AHRS
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Xbus equivalent: XDI_StatusWord

Max. output frequency: n/a

Note: Refer to the *MT Low Level Communication Protocol Document* for an explanation of the contents of this message.

Message name (ID)	XCDI_StatusWord (0x011)				
Field	Scaling	Unit	Format	Size	Offset
StatusWord	-	-	uint32	4	0
			Total size		4

Orientation Messages (0x020)

Quaternion

	620	630	670	680		Avior VRU	Avior AHRS		Sirius VRU	Sirius AHRS
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Xbus equivalent: XDI_Quaternion

Max. output frequency: 400 Hz

Sensor fusion output: Yes

Note: Be careful when converting the value 1.

Message name (ID)		XCDI_Quaternion (0x021)					
Field	Range	Scaling	Resolution	Unit	Format	Size	Offset
Q0	±1	$(2^{15}-1)^{-1}$	3.0519e-05	N/A	int16	2	0
Q1	±1	$(2^{15}-1)^{-1}$	3.0519e-05	N/A	int16	2	2
Q2	±1	$(2^{15}-1)^{-1}$	3.0519e-05	N/A	int16	2	4

Message name (ID)		XCDI_Quaternion (0x021)						
Q3	±1	$(2^{15}-1)^{-1}$	3.0519e-05	N/A	int16	2	6	
					Total size		8	

EulerAngles

	620	630	670	680		Avior VRU	Avior AHRS		Sirius VRU	Sirius AHRS
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Xbus equivalent: XDI_EulerAngles
Max. output frequency: 400 Hz
Sensor fusion output: Yes

Message name (ID)		XCDI_EulerAngles (0x022)						
Field	Range	Scaling	Resolution	Unit	Format	Size	Offset	
Roll	±180	2^{-7}	0.0078	deg	int16	2	0	
Pitch	±90	2^{-7}	0.0078	deg	int16	2	2	
Yaw	±180	2^{-7}	0.0078	deg	int16	2	4	
					Total size		6	

Inertial Data Messages (0x030)

DeltaV

610	620	630	670	680	Avior IMU	Avior VRU	Avior AHRS	Sirius IMU	Sirius VRU	Sirius AHRS
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Xbus equivalent: XDI_DeltaV → Delta V
Max. output frequency: 400 Hz
Sensor fusion output: No

Message name (ID)	XCDI_DeltaV (0x031)				
Field	Scaling	Unit	Format	Size	Offset
$\Delta v.x$	See table below	m/s	int16	2	0
$\Delta v.y$	See table below	m/s	int16	2	2
$\Delta v.z$	See table below	m/s	int16	2	4
Exponent of 2^{-x}	Based on the table below		uint8	1	6
			Total size		7

Note: The DeltaV values are scaled according to the selected output frequency and the scaling can be either read from a lookup-table such as the one below or by using the exponent sent as part of every message.

Δv scaling based on ODR

Exponent 2^{-x}	Freq	Range	Scaling	Resolution
17	400	± 0.25	2^{-17}	7.6294e-06
16	200	± 0.50	2^{-16}	1.5259e-05
15	100	± 1	2^{-15}	3.0518e-05
14	80	± 1.25	2^{-14}	6.1035e-05
14	50	± 2	2^{-14}	6.1035e-05
13	40	± 2.5	2^{-13}	1.2207e-04
13	25	± 4	2^{-13}	1.2207e-04
12	20	± 5	2^{-12}	2.4414e-04
12	16	± 6.25	2^{-12}	2.4414e-04
11	10	± 10	2^{-11}	4.8828e-04
11	8	± 12.5	2^{-11}	4.8828e-04
10	5	± 20	2^{-10}	9.7656e-04
10	4	± 25	2^{-10}	9.7656e-04

Exponent 2 ^x	Freq	Range	Scaling	Resolution
9	2	±50	2 ⁻⁹	0.0020
8	1	±100	2 ⁻⁸	0.0039

RateOfTurn

610	620	630	670	680	Avior IMU	Avior VRU	Avior AHRS	Sirius IMU	Sirius VRU	Sirius AHRS
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Xbus equivalent: XDI_RateOfTurn
Max. output frequency: 400 Hz
Sensor fusion output: No

For MTi-600 series

Message name (ID)	XCDI_RateOfTurn (0x032)						
Field	Range	Scaling	Resolution	Unit	Format	Size	Offset
gyrX	±35	2 ⁻⁹	0.0020	rad/s	int16	2	0
gyrY	±35	2 ⁻⁹	0.0020	rad/s	int16	2	2
gyrZ	±35	2 ⁻⁹	0.0020	rad/s	int16	2	4
					Total size		6

For Xsens Sirius series

Message name (ID)	XCDI_RateOfTurn (0x032)						
Field	Range	Scaling	Resolution	Unit	Format	Size	Offset
gyrX	±35	2 ⁻¹¹	0.00049	rad/s	int16	2	0
gyrY	±35	2 ⁻¹¹	0.00049	rad/s	int16	2	2
gyrZ	±35	2 ⁻¹¹	0.00049	rad/s	int16	2	4
					Total size		6

DeltaQ

610	620	630	670	680	Avior IMU	Avior VRU	Avior AHRS	Sirius IMU	Sirius VRU	Sirius AHRS
-----	-----	-----	-----	-----	--------------	--------------	---------------	---------------	---------------	----------------

Xbus equivalent: XDI_DeltaQ

Max. output frequency: 400 Hz

Sensor fusion output: No

Note: Be careful when converting the value 1.

Message name (ID)	XCDI_DeltaQ (0x033)						
Field	Range	Scaling	Resolution	Unit	Format	Size	Offset
Δq_0	± 1	$(2^{15}-1)^{-1}$	3.0518 e-05	-	int16	2	0
Δq_1	± 1	$(2^{15}-1)^{-1}$	3.0518 e-05	-	int16	2	2
Δq_2	± 1	$(2^{15}-1)^{-1}$	3.0518 e-05	-	int16	2	4
Δq_3	± 1	$(2^{15}-1)^{-1}$	3.0518 e-05	-	int16	2	6
					Total size		8

Acceleration

610	620	630	670	680	Avior IMU	Avior VRU	Avior AHRS	Sirius IMU	Sirius VRU	Sirius AHRS
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Xbus equivalent: XDI_Acceleration

Max. output frequency: 400 Hz

Sensor fusion output: No

Note: The range of accelerometer is +/- 10 g.

Message name (ID)	XCDI_Acceleration (0x034)						
Field	Range	Scaling	Resolution	Unit	Format	Size	Offset
accX	± 100	2^{-8}	0.0039	m/s ²	int16	2	0

Message name (ID)	XCDI_Acceleration (0x034)						
accY	±100	2 ⁻⁸	0.0039	m/s ²	int16	2	2
accZ	±100	2 ⁻⁸	0.0039	m/s ²	int16	2	4
					Total size		6

FreeAcceleration

	620	630	670	680		Avior VRU	Avior AHRS		Sirius VRU	Sirius AHRS
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Xbus equivalent: XDI_FreeAcceleration
Max. output frequency: 400 Hz
Sensor fusion output: Yes

Note: This is an output in the local (Earth-fixed) frame. The default local frame for the MTi series is East-North-Up (ENU).

Message name (ID)	XCDI_FreeAcceleration (0x035)						
Field	Range	Scaling	Resolution	Unit	Format	Size	Offset
freeAccX	±100	2 ⁻⁸	0.0039	m/s ²	int16	2	0
freeAccY	±100	2 ⁻⁸	0.0039	m/s ²	int16	2	2
freeAccZ	±100	2 ⁻⁸	0.0039	m/s ²	int16	2	4
					Total size		6

Magnetic Group (0x040)

MagneticField

610	620	630	670	680	Avior IMU	Avior VRU	Avior AHRS	Sirius IMU	Sirius VRU	Sirius AHRS
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Xbus equivalent: XDI_MagneticField
Max. output frequency: 100 Hz
Sensor fusion output: No

Message name (ID)	XCDI_MagneticField (0x041)						
Field	Range	Scaling	Resolution	Unit	Format	Size	Offset
magX	±32	2 ⁻¹⁰	9.7656e-04	a.u.	int16	2	0
magY	±32	2 ⁻¹⁰	9.7656e-04	a.u.	int16	2	2
magZ	±32	2 ⁻¹⁰	9.7656e-04	a.u.	int16	2	4
					Total size		6

Temperature and Pressure Messages (0x050)

Temperature

610	620	630	670	680	Avior IMU	Avior VRU	Avior AHRS	Sirius IMU	Sirius VRU	Sirius AHRS
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Xbus equivalent: XDI_Temperature
Max. output frequency: 400 Hz (update rate: 100 Hz)
Sensor fusion output: No

Message name (ID)	XCDI_Temperature (0x051)						
Field	Range	Scaling	Resolution	Unit	Format	Size	Offset
Temperature	[-40,+85]	2 ⁻⁸	0.0039	°C	int16	2	0
					Total size		2

BaroPressure

610	620	630	670	680
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Xbus equivalent: XDI_BaroPressure
Max. output frequency: 100 Hz
Sensor fusion output: No

Message name (ID)	XCDI_BaroPressure (0x052)						
Field	Range	Scaling	Resolution	Unit	Format	Size	Offset
Pressure	[30000, 125000]	1	1	Pa	uint32	4	0
					Total size		4

High-Rate Data Messages (0x060)

AccelerationHR

610	620	630	670	680	Avior IMU	Avior VRU	Avior AHRS	Sirius IMU	Sirius VRU	Sirius AHRS
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Xbus equivalent: XDI_AccelerationHR
Max. output frequency: 2000 Hz
Sensor fusion output: No

Message name (ID)	XCDI_AccelerationHR (0x062)						
Field	Range	Scaling	Resolution	Unit	Format	Size	Offset
accX	±100	2 ⁻⁸	0.0039	m/s ²	int16	2	0
accY	±100	2 ⁻⁸	0.0039	m/s ²	int16	2	2
accZ	±100	2 ⁻⁸	0.0039	m/s ²	int16	2	4
					Total size		6

RateOfTurnHR

610	620	630	670	680	Avior IMU	Avior VRU	Avior AHRS	Sirius IMU	Sirius VRU	Sirius AHRS
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Xbus equivalent: XDI_RateOfTurnHR
Max. output frequency: MTi 600-series: 1600 Hz, Sirius series: 2000 Hz
Sensor fusion output: No

For MTi-600 series

Message name (ID)	XCDI_RateOfTurnHR (0x061)						
Field	Range	Scaling	Resolution	Unit	Format	Size	Offset
gyrX	±35	2 ⁻⁹	0.0020	rad/s	int16	2	0
gyrY	±35	2 ⁻⁹	0.0020	rad/s	int16	2	2
gyrZ	±35	2 ⁻⁹	0.0020	rad/s	int16	2	4
					Total size		6

For Xsens Sirius series

Message name (ID)	XCDI_RateOfTurnHR (0x061)						
Field	Range	Scaling	Resolution	Unit	Format	Size	Offset
gyrX	±35	2 ⁻¹¹	0.00049	rad/s	int16	2	0
gyrY	±35	2 ⁻¹¹	0.00049	rad/s	int16	2	2
gyrZ	±35	2 ⁻¹¹	0.00049	rad/s	int16	2	4
					Total size		6

Position & Velocity Messages (0x070)

Latitude and Longitude

			670	680
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Xbus equivalent: XDI_LatLon
Max. output frequency: 400 Hz
Sensor fusion output: Yes

Message name (ID)	XCDI_LatLong (0x071)						
Field	Range	Scaling	Resolution	Unit	Format	Size	Offset
lat	±90	2 ⁻²⁴	5.9605e-08 (~7 mm)	deg	int32	4	0
lon	±180	2 ⁻²³	1.1921e-07 (~13 mm)		int32	4	
					Total size		8

AltitudeEllipsoid

			670	680
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Xbus equivalent: XDI_AltitudeEllipsoid
Max. output frequency: 400 Hz
Sensor fusion output: Yes

Note: Latitude, Longitude and Altitude messages are mutually exclusive with ECEF.

Message name (ID)	XCDI_AltitudeEllipsoid (0x072)						
Field	Range	Scaling	Resolution	Unit	Format	Size	Offset
altEllipsoid	[-1000, 80000]	2 ⁻¹⁵	3.0518e-05	m	int32	4	0
					Total size		4

PositionEcef_X

			670	680
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Xbus equivalent: This data is contained in XDI_PositionEcef
Max. output frequency: 400 Hz
Sensor fusion output: Yes

Note: Latitude, Longitude and Altitude messages are mutually exclusive with ECEF.

Note: This output cannot be enabled through the Device Settings window in MT Manager. Use Xbus configuration instead: Configuring CAN output through Xbus.

Message name (ID)	XCDI_PositionEcef_X (0x073)						
Field	Range	Scaling	Resolution	Unit	Format	Size	Offset
PositionEcef_X	~±6500000	2 ⁻⁸	0.0039	m	int32	4	0
					Total size		4

PositionEcef_Y



Xbus equivalent: This data is contained in XDI_PositionEcef
Max. output frequency: 400 Hz
Sensor fusion output: Yes

Note: Latitude, Longitude and Altitude messages are mutually exclusive with ECEF.

Note: This output cannot be enabled through the Device Settings window in MT Manager. Use Xbus configuration instead: Configuring CAN output through Xbus.

Message name (ID)	XCDI_PositionEcef_Y (0x074)						
Field	Range	Scaling	Resolution	Unit	Format	Size	Offset
PositionEcef_Y	~±6500000	2 ⁻⁸	0.0039	m	int32	4	0
					Total size		4

PositionEcef_Z



Xbus equivalent: This data is contained in XDI_PositionEcef

Max. output frequency: 400 Hz

Sensor fusion output: Yes

Note: Latitude, Longitude and Altitude messages are mutually exclusive with ECEF.

Note: This output cannot be enabled through the Device Settings window in MT Manager. Use Xbus configuration instead: Configuring CAN output through Xbus.

Message name (ID)	XCDI_PositionEcef_Z (0x075)						
Field	Range	Scaling	Resolution	Unit	Format	Size	Offset
PositionEcef_Z	~±6500000	2 ⁻⁸	0.0039	m	int32	4	0
					Total size		4

VelocityXYZ

			670	680
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Xbus equivalent: XDI_VelocityXYZ

Max. output frequency: 400 Hz

Sensor fusion output: Yes

Note: This is an output in the local (Earth-fixed) frame. The default local frame for the MTi series is East-North-Up (ENU).

Message name (ID)	XCDI_VelocityXYZ (0x076)						
Field	Range	Scaling	Resolution	Unit	Format	Size	Offset
velX	±500	2 ⁻⁶	0.0156	m/s	int16	2	0
velY	±500	2 ⁻⁶	0.0156	m/s	int16	2	2
velZ	±500	2 ⁻⁶	0.0156	m/s	int16	2	4
					Total size		6

GnssReceiverStatus



Xbus equivalent: This data is contained in XDI_GnssPvtData (fixType, numSv, flags, valid) and XDI_GnssSatInfo (numSvs)

Max. output frequency: 4 Hz

Sensor fusion output: No

Note: Available with firmware versions 1.7.0 and up.

Message name (ID)	XCDI_GnssReceiverStatus (0x079)					
Field	Range	Scaling	Unit	Format	Size	Offset
fixType	-	-	-	uint8	1	0
numSv	-	-	-	uint8	1	1
flags	-	-	-	uint8	1	2
valid	-	-	-	uint8	1	3
numSvs	-	-	-	uint8	1	4
				Total size		5

GnssReceiverDop



Xbus equivalent: This data is contained in XDI_GnssPvtData

Max. output frequency: 4 Hz

Sensor fusion output: No

Note: Available with firmware versions 1.7.0 and up.

Message name (ID)	XCDI_GnssReceiverDop (0x07A)					
Field	Range	Scaling	Unit	Format	Size	Offset
pdop	-	0.01	-	uint16	1	0
tdop	-	0.01	-	uint16	1	2
vdop	-	0.01	-	uint16	1	4
hdop	-	0.01	-	uint16	1	6
				Total size		8