Document Xsens Manual, Revision A, 12 11 2025

Xsens Link User Manual

Date	By	Changes
12 11 2025	AR	Link Next Generation MVN 2025.4

Table of Contents

1. Abbreviations and Terms

Abbreviation / Term	Description
API	Application Programming Interface
AP	Access Point: The method of transporting data from the Hub to the PC
.BVH	Biovision Hierarchy character animation file format
.C3D	Coordinate 3D export format
Character	Subject in 3D view
.FBX	Filmbox animation file format
IK	Inverse kinematics
MTx3	Xsens Inertial Motion Trackers for the Xsens Link system
MT	Xsens Inertial and Magnetic Measurement Unit (generic reference to MTx)
MVN	Xsens native file format
Xsens eSuit	Lycra suit
Xsens system	Complete Xsens product (hardware and software)
.MVNA	Xsens subject dimensions file
.MVNS	Xsens session file
.MVNX	Xsens open XML file format
SDK	Software Development Kit
Sensor	Components of the MTx, e.g. gyroscope, accelerometer
Subject	Person in the suit
UDP	User Datagram Protocol (for data streaming over Local Area Network (LAN))

2. Default Folders

Description	Files	Location
Main program	mvn_studio64.exe	C:\Program Files\Xsens\Xsens MVN <version>\MVN Studio
Documentation	Xsens Quick Setup Sheet.pdf	C:\Program Files\Xsens\Xsens MVN <version>\Documentation

3.Introduction

The Xsens inertial motion capture system is an easy to use, cost efficient system for full-body human motion capture. It is based on Xsens' state-of-the-art miniature inertial motion trackers and wireless communication solutions combined with advanced sensor fusion algorithms, using assumptions of biomechanical models.

Xsens is a completely portable system; it is not restricted to a studio or lab. It can be used anywhere: outside, in the office, and on the work floor. There are no limitations in measurement volume (except the wireless range).

This Xsens system is a full body inertial kinematic measurement system, incorporating synchronized video data. Instant graphical output is provided, including joint angles. An additional C3D exporter has been implemented, as well as improved MVNX (XML) output, containing all the segment information included in the Xsens system as well as joint angle data, center of mass and factory calibrated sensor data.

Examples of fields of use:
Biomechanics, sport, rehabilitation, ergonomics and human-machine interaction.
Benefit from the fully ambulant measurement system, advanced functional axes calibration, no need to palpate bony landmarks for marker placement, direct low-noise measurement of acceleration and angular velocity enabling easier internal forces/momentum calculations.

3D Animation.
Enjoy unprecedented ease-of-use, rich and smooth data, very short setup time, and the absence of cumbersome post-processing of markers or lost data.

Virtual reality, training & simulation.
Benefit from the highly portable system and a price-point enabling full-body insertion of (multiple) subjects in VR for highest degree of immersion, low-latency smooth motion data.

Humanoid robot training
Train humanoid robots to move with Xsens motion capture and balance them with Xsens industrial IMUs. One partner, one motion intelligence stack.

4. The Hardware

4.1 Xsens Link suitcase with content

Figure	Description
 Figure 1: Suitcase containing the Xsens Link System	The Xsens Link System arrives in a strong, durable and watertight case. The case has wheels and an extendable handle for easy transportation. The suitcase dimensions meet the requirements for most airline hand-luggage. The suitcase contains: - 18 Motion Trackers (MTx3) - 1 Xsens Hub - 1 Battery Pack - 1 Battery charger - 1 Access Point - 1 Battery Cable - 1 Prop Cable - Charger for Hub - eSuit including headband, hand straps, shorts, footpads, cable harnass - 1 Segmometer - Quick setup-sheet

4.2 Motion Trackers (MTx3)

Figure	Description
 Figure 2: Motion Tracker (MTx3)	The Xsens Link system contains 1 type of motion sensor; the MTx3, which is a removable trackers that slides into place on the integrated eSuit cable. The motion trackers, MTx3, the miniature inertial measurement units containing 3D linear accelerometers, 3D rate gyroscopes and 3D magnetometers. These trackers are placed at strategic locations on the body (fixed by the suit), to measure the motions of each body segment. The MTx3 which must be docked in the cable harness sockets, The cable harness must be connected to the Hub.

4.3 Hub, Battery Pack, and Access Point (AP)

The Hub interconnects with the MTx3's that are docked in the cable harness. The Hub delivers power from its internal battery or external Battery pack to the connected MTx3's and retrieves their data ensuring exactly synchronized samples. The collected data is transmitted by an 2.4, 5.0 or 6.0 GHz spread spectrum wireless link to the Access Point connected to the PC or can be stored on the Hub. Additionally, if the user chooses, there is the option of transmitting motion data to the PC from the Hub by directly using an Ethernet cable between Hub and the Access Point (by connecting the rugged USB-C connector).
The internal battery can be charged via the USB-C connector on the device.
Note: During mocap charging of the internal battery via USB is not allowed and will stop the mocap session.
When the external battery is connected it will soft charge the internal battery so that there is enough charge available to make hot swap of the external battery possible. This is also possible during mocap sessions.

On the bottom of the Hub, there is a USB-C connector to configure the Hub, to charge the internal battery and future use support.
The external Battery Pack, which connects to the Hub via the Battery Cable. The Battery Pack is a single unit made up of 3 Lithium-Ion rechargeable cells and has a typical rating of 10.8V and 3.1Ah. This Battery charges via the supplied single bay standard smart charger CH5000 and provides up to 9.5 hours of continuous recording time to the system.

Figure	Description
 Figure: Hub	The Hub for Xsens Link system. It connects the motion trackers through the cable harness and collects the motion capture data.
 Figure: Access Point (AP)	The Access Point pairs with the Hub to handle the data traffic between the hub and the computer. This Access Point connects to the PC or laptop via Ethernet cable or wirelessly and is powered using a proprietary power adapter or laptop battery. One Access Point can connect to multiple Xsens systems.
 Figure: External battery	The Battery Pack, which connects to the Hub via the Battery Cable. The Battery Pack is a single unit made up of 3 Lithium-Ion rechargeable cells and has a typical rating of 10.8V and 2.9Ah. This battery charges via a single bay standard smart charger and provides up to 9.5 hours of continuous recording time to the system.
 Figure: RF pad	When using the Wi-Fi 6 for the wireless communication. The RF pad need to be placed between the Hub and the eSuit

4.4 Awinda Station

Figure	Description
 Figure: Awinda Sync station	The Awinda Station controls the reception of synchronized wireless data from the Xsens Awinda system. This station also functions as a synchronization station through BNC ports

4.5 The eSuit

The eSuit has been designed for Xsens Link, the generic term is simply "The Suit". Each mounting system is dedicated to ensuring a good fixation to the body to minimize skin motion artefact. The motion trackers are secured to the extremities – the head, hands and feet, using a headband, hand straps and a foot pads, as can be seen in the figures below
The eSuit is required with the Xsens Link system. The Xsens eSuit is available in 5 different sizes (S, M, L, XL, XXL). Before putting on a suit, ensure that the size is appropriate. The suit must be tight fitting, therefore choose the appropriate suit size.
Note that the fabric is stretchable, a medium-sized suit can fit both a short muscular athlete (e.g., 1.60 m, 70 kg) and a tall slim person (e.g., 1.75 m, 65 kg).

Putting on the eSuit

Through the link below it will give you a video showing a few simple steps to help put on the eSuit. It is advised to watch the video on the tutorial portal for more details.
https://www.movella.com/tutorials
Take care when putting on the eSuit; you are working with delicate materials. The subject is advised to wear closely fitting shorts and a tight shirt underneath the Xsens eSuit. Other clothing can be worn on top; no connection or line-of-sight is needed to the external world other than the wireless data link.
Important:

- The zip is at the front of the eSuit.
- Do not pull aggressively on the material, work gradually from the feet to the neck.

Placing the MTx3's in the eSuit

Upon delivery, the eSuit will come with cable but without MTx3 inside already. The placement of the motion trackers onto the correct segment is very important, as each tracker has a given ID, which is used throughout the motion capturing procedure. Additionally, it is important that the motion trackers are positioned on the segment in a place where maximal range of motion and a minimal amount of skin motion artefact occurs. When wearing the Lycra suit, it is most likely that the MTx3's are positioned correctly. Therefore, please refer closely to the following information to ensure the best placement. The table below describes the positioning of the motion trackers.

Location	Abbreviation	Optimal position
Foot	FOOT	Middle of bridge of foot
Lower leg	LLEG	Flat on the shin bone (medial surface of the tibia)
Upper leg	ULEG	Lateral side above knee
Pelvis	PELV	Flat on sacrum
Sternum	STERN	Flat, in the middle of the chest
Shoulder	SHOU	Scapula (shoulder blades)
Upper arm	UARM	Lateral side above elbow
Fore arm	FARM	Lateral and flat side of the wrist
Hand	HAND	Backside of hand
Head	HEAD	Any comfortable position

Putting on the remaining Motion Trackers

When the suit has been put on, motion trackers for the head, hands and feet will remain outside of the Lycra. The head Strap is fitted with a Velcro patch, and hand straps are fitted with a pocket for motion tracker placement. The motion trackers for the feet are secured to the shoes using foot pads.
Foot pads
Dedicated foot pads have been made to facilitate placement of the motion trackers on the feet. These pads can be used with many different types of shoes and remain fixed to the feet, minimizing motion of the tracker on the foot and ensuring reliable motion capture data and foot contact detection. To use, place the pads with the motion tracker attached onto the bridge

of the foot, tongue of the shoe. It is best to push this a little further to the front of the foot, since when the shoes are fastened, it can slip upwards. Make sure the shoe fastening e.g. prevent the tracker from shifting within the shoe.

Figure

Figure: eSuit & sensor placement

Putting on the Hub and Battery Pack

The Hub and Battery Packs are placed into the pockets at the back of the eSuit. While it is not crucial, it is more comfortable if you place the Hub on the right and the Battery Pack on the left. The Hub has multiple connections, see below

Picture	Description
	1.-External Battery Pack connection 2.-Synchronisation port (reserved for future use) 3.-5. Connections for the cable harness

5.Software

The Xsens system is controlled by a software application called Xsens Software. Xsens Software is a 64-bit application for Windows 11. There are multiple versions of Xsens Software based on license: Xsens Animate, Xsens Analyze, and Xsens Humanoid.

Additional software packages are available for users with specific needs:

For users wishing to use the facilities offered by Xsens, such as the biomechanical model and various other dedicated functionalities, for visualizing and collecting data the Xsens Software Development Kit (Xsens SDK) is available, where users can create their own user interface.

Xsens Record is our license free version. This version enables the view of recorded files and ability to record files. No exporting or streaming is enabled. Different software versions are available dedicated for your application.

For entertainment (Animation, Games, Film production, VFX, Streaming)
Xsens Animate: https://www.movella.com/motion-capture/xsens-mvn-animate

For Health & Sports (Research, Occupational health & safety, sports performance)
Xsens Analyze: https://www.movella.com/motion-capture/mvn-analyze

For Humanoid training
Xsens Humanoid: https://www.movella.com/health-sports/humanoid-robotics-motion-training

5.1 Installation of software

Note: Do not connect your Xsens System (either Access Point) until software installation is complete (software installation includes installation of relevant drivers which can be finalized when the hardware is connected).

Download software here: https://www.movella.com/support/software-documentation

Run the downloaded Xsens Installer (mvn_studio#_setup.exe). Install with "Administrator" rights. Follow the on-screen instructions. The Xsens Software installer will install:

- Xsens Software
- Documentation
- Example files
- Drivers for:
- Xsens Access Point
- Dlink drivers
- Bonjour drivers.
- Xsens MVN License Manager

Note: When starting Xsens Software for the first time, allow the Windows firewall to give permission to Xsens Software to start and connect to the internet.

Plug-ins, including: MotionBuilder plug-in, Time Code and Remote-Control plug-in and Xsens SDK are optional. Separate installers are available for the Xsens MotionBuilder and Maya plug-ins, and the Xsens SDK. Additionally, the plugins for Unreal, Unity, and Blender may be downloaded from their respective locations. The Time Code and Remote-Control plug-in is part of the Xsens Software installer and is activated through licensing.

All Xsens licenses need to be activated before use. Activation can be done by three types of license keys; Software; Dongle; Network.

Software License Key
When using a software license key, license activation is necessary. The Software

Activation tool can be started from Start Menu > Xsens MVN 2025.x > Xsens MVN License Manager. Follow the on-screen instructions to start the activation, use the product key sent to you by customer service in email and 'MVN Letter'.

Dongle License Key
Once Xsens Software has been installed and your license dongle is connected, the software will immediately recognize the license and open Xsens Software.
Extension licenses or upgrade licenses can be activated on the dongle using the Software Activation tool, which can be started from Start Menu > Xsens MVN 20xx.x> Xsens MVN 20xx.x > License Manager.

Network License Key
When using a network license key, the red dongle needs to be used on a pc (server) that runs a service called 'Sentinel LDK License Manager'. This service needs to be started by running an installer, which can be downloaded from:
Xsens website: https://www.xsens.com/software-downloads
Look for the download 'Sentinel HASP/LDK - Windows GUI Run-time Installer'.

The option to present the software in Mandarin, Korean or Japanese, as a replacement of English is available under the preferences tab.
By clicking in the User Interface section, one can change the language under the preferred language tab. Please note, this will require a restart.

6. Setup System

6.1 Setup Hardware

After installation of the software make sure you follow the steps below to set up the system:

Note: For first time use, make sure you fully charge the Hub before use.

- Connect the Access Point to the computer using the network cable optionally with the Ethernet-to-USBc adapter.
- Dress the subject in the eSuit. Cables have already been pre-installed but adjust them for optimal tracker placement on the subject's body.
- Connect trackers to the corresponding holders on subject's body
    - **Note: When setting up the Motion Trackers, make sure that they are all in the eSuit before the Hub is switched on.**
- Place the Hub on the right and the Battery Pack (if using external power) on the left of the back.
    - **Note: The hub can also be placed on the front of the thigh using the attached Velcro pockets in the upper legs of the eSuit.**
- Connect all strings of trackers to the Hub and optionally connect the external battery pack
- Press the power button on the side of the Hub once to power on the device.

6.2 Set up Xsens Software

Icon	Description
	**Run Xsens Software.**
	Start a new session. For Xsens Animate, Xsens Analyze, Xsens Humanoid users requiring additional hardware (reference camera or sync), initialize this hardware at the new session stage. Check the hardware status to make sure that all trackers that are needed for the given configuration have been detected by Xsens Software. See Section
	**Calibration.**
	For this step users should be in an area where they can walk back and forth for 5-10 meters. • Ensure that the 'Hardware and Fusion setup' icon is active in the workflow tool bar. • On the Body Dimensions tab enter the subject height and Foot or Shoe length. • Click the Calibration tab. Select N-pose + Walk and follow the instructions to perform a sensor to segment calibration. Additional calibration poses are also possible if expert calibration routines are enabled. • Pay attention to the calibration quality displayed in the Messages for Calibration window before applying the calibration to the character.
	**Preview and Record..**
	• The live characters can be seen in Xsens Software viewport. • To record a trial, click the red "Record" button.
	**Playback and editing.**
	• The recorded trials can be played, using familiar playback buttons.. • Contact editing is used to manually determine when contact is made between the subject and the surroundings..
	**Analysis.**
	• Graphical representation of all data, real-time and offline..
	Saving and Exporting.

Xsens trials are saved directly as files with the .mvn extension. Files with this extension can be opened in Xsens Software. Data can also be exported to:

- **BVH** (BioVision Hierarchical data)
- **C3D** (Coordinate 3D)
- **FBX** (Filmbox)
- **MVNX** is a human readable, XML format which can be imported to many other software programs, including MATLAB and Excel.
- **Movie Exporter** is an mpeg-4 (.mp4 or .avi)
- **Excel exporter**

For more information check https://www.movella.com/tutorials

6.3 Operating guidelines

6.3.1 Operating conditions

The recommended operating temperature of the Xsens Link System is between 0°C and +50°C ambient temperature. If operated outside this temperature range performance may decrease or the device might be damaged. Fast transient temperature fluctuations may cause significant temperature gradients across the device. Such gradients cannot be properly modelled by temperature compensation and may therefore decrease performance. For optimal performance the ambient temperature should remain constant as much as possible during the measurement. Please be aware that for product safety regulations (IEC 62368-1) it is not advised to wear devices on the body at temperatures above 43°C ambient.
Charging the internal battery of the Hub via USB-C, the ambient temperature may **not** exceed +30°C

The Access Point, Hub, External Battery Pack, and MTx3's must be always kept dry. Condensation and water may damage internal electronics.

MTx3's should be protected from electrostatic discharges or sources of radiation, as exposure to such sources will damage internal electronics.

MTx3's should be protected from violent handling such as drops on hard surfaces. Excessive shocks or violent handling may damage the MTx3's. When handling an MTx3 at a desk, it is advised to place cushioning material on the desk.

6.3.2 Absolute maximum ratings

Stresses above Absolute Maximum Ratings may cause permanent damage to the device.

Description	Value (Xsens Link)
Shock (any axis):	100000 m/s^2 (10000 g) unpowered/powered
Operating/Storage Temperature:	0 °C - +50 °C

Stresses beyond those listed here may cause permanent damage to the device. These are stress ratings only and functional operation of the motion tracker at these or any other conditions beyond those indicated in the specifications are not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

Note: Drops onto hard surfaces can cause shocks of greater than 100000 m/s^2 (10000 g) exceeding the absolute maximum rating of the device. Care should be taken when handling to avoid damage. Drops causing shock greater than absolute maximum ratings may not destroy the device but will permanently alter the properties of the physical motion sensors, which may cause the device to become inaccurate.

6.3.3 Washing instruction

To wash the eSuit, remove all the sensors, Hub and Battery Pack. Place the head, feet and hand sockets inside the suit and fixate them. The hand socket should be placed on the velcro of the lower arms, the feet socket should be placed on the velcro of the lower legs and head socket in the pocket of the sternum. Put the eSuit including cable harness in the washing bag. Use liquid laundry detergents (without bleach) and follow the instructions on the label inside the suit:

Description	Icon
Machine wash at 30°C – 85 F	
Do not bleach	
Do not iron	
Drip dry flat (so lycra is not stretched/ damaged)	
Do not tumble dry	

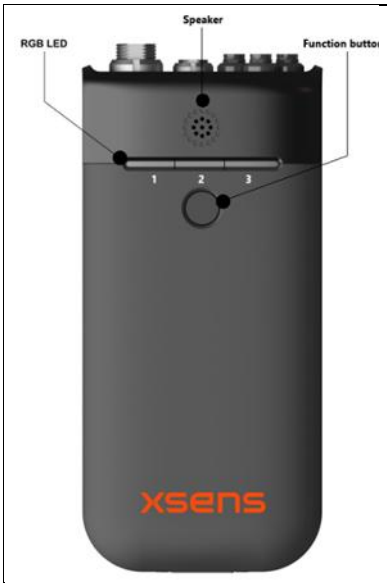
For the headband and gloves, remove the MTx3 and use only cold hand wash.

6.3.4 Warming up the motion capture engine

Xsens Software has an advanced motion capture engine that is initialized after the calibration procedure. For the best performance, it is recommended to warm up the system before making recordings. To do so, follow the calibration instructions to stand still when applying the calibration and move slowly (e.g. walk around) for the first 30 seconds after applying the calibration. See Section 23.8 and in particular, 23.8.2 for more details.

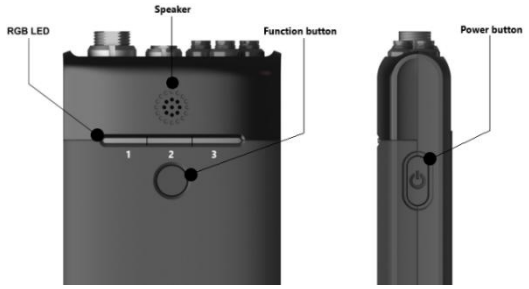
6.3.5 LED indications Hub

Picture	Description				
		LED 1	LED 2	LED 3	Note
	Startup			G	Single shot flash
	Power on, battery OK			G	
	Power on, battery warning			A	
	Power on, battery critical			A F	"Critical battery" means the user must act immediately to avoid loss of power. take it to mean "about 5 estimated minutes left". The user will probably want to know since they are about to lose the scene.

	Charging			G fff	
	Charge complete			G	
	Measurement mode		G fff		
	Synced with TimeCode		G F		The user will probably want to know if their TimeCode is synced before starting recording.
	Config mode		G		
	WiFi searching	A F			
	WiFi connected	G			
	WiFi sending	G F			
	BLE searching	B F			
	BLE connected	B			
	Both connected	G			
	No connection	R			WiFi connection lost unexpectedly. The user will probably want to know because their recording is messed up anyway. *

(G= Green, A = Amber, B = Blue, F = flickering, fff = fast flickering)

6.3.6 Button behavior

Picture	Description	
	Power Button	
	Single press <1s	Power on
	Triple press	Power off
	Press hold >45s	Forced power off
	Function button	
	Single press	Start / stop OBR recording

6.3.7 Audio feedback Hub

The system gives audio feedback during different instances like: connection, recording, power on/off and battery status.

6.3.8 Stealth mode

Putting your system in Stealth mode allows you to disable the LED's lights and the audio feedback on the HUB. To select/deselect the Stealth mode, please go to the menu of the Xsens Software > Options > Preferences > General > Recordings. You can find the Stealth mode option here. Click Save to apply the changes.

6.3.9 Operating Frequency and RF Power

Function	Band	Module Power	Antenna Gain	Total Tx Power
Proprietary radio	2360-2500 MHz	Up to +8 dBm	2 dBi	10 dBm
BLE	2400-2483.5 MHz	Up to +7 dBm	3.9 dBi	10.9 dBm
WiFi	2412-2484 MHz	Up to +17 dBm	3.8 dBi	20.8 dBm
	5150-5825 MHz	Up to +16.5 dBm	3.8 dBi	20.3 dBm
	5950-7115 MHz	Up to +15.5 dBm	3.8 dBi	19.3 dBm

Note: when operating between 5950 – 7115 MHz, the added RF pad must be used. This RF pad is place between the Hub and the eSuit.

6.3.10 Internal battery Charging

- Place the Hub on a flat, level surface in a cool spot away from sources of heat and moisture, before you connect the charger.
- Use the supplied charger, or USB-C PD certified charger.
- Do not charge the internal battery of the HUB above ambient temperature 30°C
- Remark: When you store the system always charge the internal battery to 50%

Note: If the Hub shows LED pattern RED-WHITE-RED (left to right) after plugging in, this means the battery is under-discharged. This can happen if the Hub has not been used in a long time. If the Hub does not resume to normal LED behavior after charging for at least 6 hours with the Xsens-supplied charger, this may indicate a problem with the internal battery please contact our Support

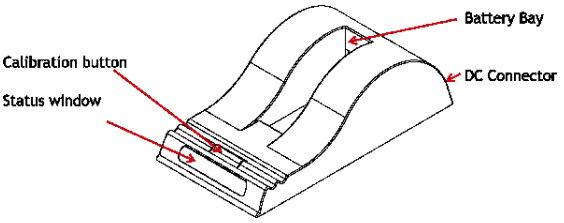
6.3.11 External battery Charger

The CH5000 is a standalone desktop smart, standard battery charger with the added ability to

recalibrate the fuel gauge on smart Battery Packs.

Using your Charger

Place the charger on a flat, level surface away from sources of heat and moisture. Plug the DC connector from the power supply into the back of the charger and connect the power supply to the mains AC supply using the cable supplied. Do not expose the charger or power supply to water or liquids. Do not open the charger or power supply case, no user serviceable parts are inside. Do not cover the fan exhaust or obstruct the airflow, this will cause overheating. Use only the manufacturer's power supply and observe terminal polarity. Place the charger in a cool spot, away from external heat sources. Caution - during recalibration, the charger may become warm.



Charging

Place the battery into the battery bay ensuring that the 5-way connector is fully seated. The LEDs in the status window will provide status information and the charger will automatically begin charging.

LED Indication:

The status of the battery is indicated by the LEDs visible in the status window:

LED indication	Active mode
Green flashing	Battery charging
Green solid	Battery fully charged
Blue flashing	Battery in calibration mode
Blue solid	Battery fuel gauge calibrated
Red flashing	Battery fuel gauge needs recalibration
Red solid	Error

Recharge and recalibration Time:

The recharge time for the battery (NC2040) is 3 hrs. The time given is for a full charge from 0% to 100% state of charge. Recalibration is 16-20 hrs. A calibration cycle will be faster if the battery is fully charged to begin with.

Fuel Gauge Recalibration

If fuel gauge recalibration is needed, the red LED on a calibrating charger will flash upon insertion of the battery. This provides feedback on the accuracy of the fuel gauge.
At this point you can choose to either calibrate the fuel gauge or to charge the battery. Calibration takes longer than charging and it may not be convenient to go through the calibration cycle at that moment. To recalibrate the fuel gauge, press the button on the front of the charger. The charger will automatically begin to charge the battery if the button is not pressed.
The blue LED will flash to indicate that the battery is undergoing the recalibration cycle. During calibration the discharge resistors will be cooled by the fan. Removing the battery, or pressing the calibration button again will re-start the process from the beginning.
At the end of this procedure the blue LED will stay constant, indicating a fully calibrated fuel gauge. Warm environments can cause calibration failure - keep the charger away from direct sunlight or heat sources.
For more details on smart charging and recalibration go to www.inspiredenergy.com
Impedance-Tracking fuel gauge recalibration is achieved by charging the battery, allowing it to

rest, discharging it and allowing it to rest again as shown below:

- Charge the battery to full charge and allow it to rest for at least 5¼ hrs.
- Discharge the battery to empty and allow it to rest for 5¼ hrs
- At this point the fuel gauge is calibrated, but the battery is partially discharged and will require a recharge

The temperature during the process must remain between 0°C & 45°C.

As the battery ages and is used, its available capacity shrinks - so with each cycle, your device's runtime gets a little bit less. A good rule of thumb is that Li-Ion batteries lose 5% capacity per 100 cycles & 5% per year.

7.On Body Recording

On-body Recording' allows you to record motions everywhere without the need for a laptop or PC by storing motions on the Hub (only for Xsens Link). The Hub has internal memory that has the capacity to record up to 50 hours of data.

See also the tutorial on how to configure the Hub: https://www.movella.com/tutorials

8. Xsens Peripheral Software

8.1 Xsens Animate / Analyze / Humanoid

Xsens is easy-to-use software, which can be used for real-time viewing, streaming and recording. Off-line playback, analyzing and editing of previously recorded sessions are also possible with Xsens. Figure 36 shows a typical view of Xsens when a recording has been made.

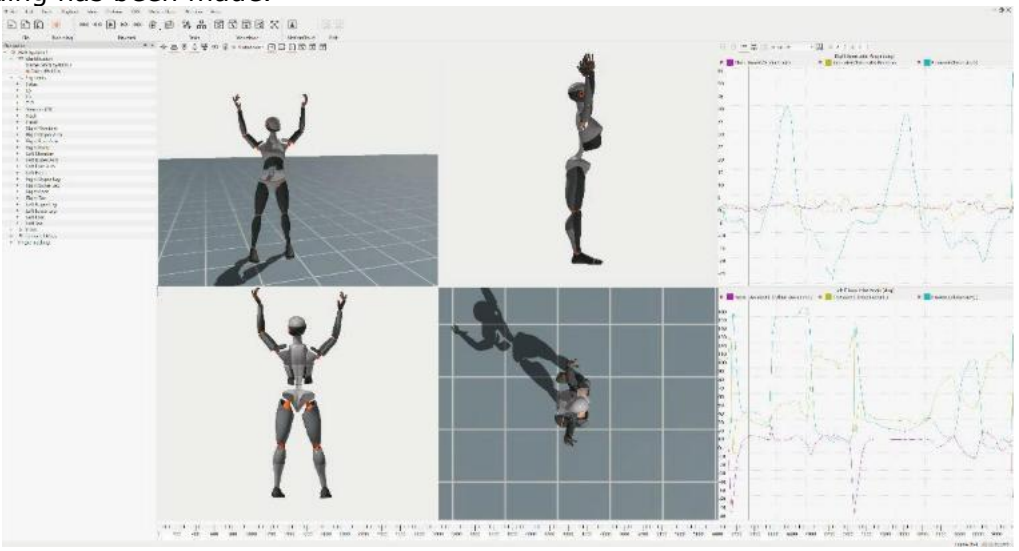


Figure 36: Xsens Software interface

8.2 Magnetic Field Mapper (MFM)

When a motion tracker is mounted to an object that contains ferromagnetic materials, the measured (Earth) magnetic field can become distorted, causing errors in measured orientation. To correct for known magnetic disturbances, for example, an MT attached to a steel prosthesis or prop, or simply that the magnetic field has become distorted due to an event or over time, a separate software product has been developed to allow users to remap the magnetic field. This software is called Magnetic Field Mapper (MFM). If MFM is needed, users should contact support@xsens.com for further support

8.3 Firmware updater

With new software releases, it can be expected that new firmware is required. For this purpose, Xsens supplies a firmware updater which can be downloaded separately from Xsens Software at https://www.xsens.com/software-downloads under 'Tools and Firmware'.

8.4 Xsens MVN License manager

Offline activation can be performed with the Xsens MVN license manager. In the offline activation process a Customer-to-Vendor (c2v) file is generated containing information on the status of the licenses in your Sentinel protection keys. You can then send this file to activate license or receive a license update

Note: if you are using a dongle, you must connect the dongle before performing either of the following procedures

Step 1: Retrieve the license information from a Sentinel protection key

1. Launch the Software Activation tool from the start menu or help menu in Xsens 2025.x
2. Click "Show advanced options".
3. Activating a Software License key for the first time: ensure that "Installation of a New Protection Key" is selected at the bottom of the screen. Updating an existing key or activate a dongle: ensure that "Update of existing protection key" is selected at the bottom of the screen.
4. Click "Create security key information file (C2V)"
5. Click "Next", the file is generated
6. Specify the directory where you want to store the C2V file. Enter a file name and click "Save".
7. The C2V file for the Sentinel protection key is generated and saved in the required location. The file can now be sent.

Step 2: Send the C2V file

1. Send the C2V file to Xsens support (support@xsens.com) requesting an offline license file.
2. You will receive a Vendor-to-Customer file (v2c) from Xsens support.

Step 3: Apply the received v2c file using the Software Activation tool.

1. Launch the Software Activation tool.
2. Click "Show advanced options".
3. Click "Apply license file (V2C)".
4. Click "Next" and browse to the V2C files you have received to open it. The license is activated/updated.

Xsens MVN license manager: Applying an Update

You can use the Software Activation tool to apply an update to the licenses stored in your Sentinel protection keys.
To update the licenses in the Sentinel protection keys:

1. Launch Xsens MVN license manager from the start menu or help menu in Xsens Software
2. Click "Show advanced options".
3. Click "Apply license file (V2C)".
4. Click "Next" and browse to the V2C files you have received to open it
5. The license is activated/updated.

9. Warranty and liability

Movella Technologies B.V. warrants the products manufactured by it to be free from defects in material and workmanship for a period of 2 years from the date of delivery. Products not subjected to misuse will be repaired, replaced or credit issued at the sole option of Movella Technologies B.V. Contact support: https://base.movella.com 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 Movella Technologies B.V. so as, in Movella Technologies B.V. opinion, to have adversely affected the product, products subjected to negligence, accidents or damaged by circumstances beyond Movella Technologies B.V.'s control.

Note: Movella 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.

9.1 Customer support

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

- ➔ by our forum: https://base.movella.com/s/?language=en_US
- ➔ telephone: Xsens HQ +31 88 97367 00 / Xsens US office 310-481-1800

To be able to help you, please mention the 8-digit number on the Xsens Sticker, you can find this at the handle of the Suitcase.

10. Regulatory Notices Xsens Link

10.1 Radio Frequency Exposure and Emission

This product contains multiple small radio transmitters and receivers. During communication with other products, the system receives and transmits radio frequency (RF) electromagnetic fields (microwaves) in the frequency range 2360 to 2500 MHz, 5150 to 5825 MHz, or 5950 to 7115 MHz. The output power of the radio transmitters is very low. When using the system, you will be exposed to some of the transmitted RF energy. For the 5950 to 7115 MHz we recommend using the supplied Hub pad. This exposure is well below the prescribed limits in all national and international RF safety standards and regulations. Most modern electronic equipment, for example, in hospitals and cars, is shielded from RF energy. However, certain electronic equipment is not.

Therefore:
Note: This equipment emits RF energy in the ISM (Industrial, Scientific, Medical) band. Please ensure that all medical devices used in proximity to this device meet appropriate susceptibility specifications for this type of RF energy.

Turn off this electronic device before entering an area with a potentially explosive atmosphere. It is very rare, but any electronic device could generate sparks. Sparks in such areas could cause an explosion or fire resulting in bodily injury or even death. Areas with a potentially explosive atmosphere are often, but not always, clearly marked. They include fueling areas, such as petrol station, below deck on boats, fuel or chemical transfer or storage facilities, and areas where the air contains chemicals or particles, such as grain, dust, or metal powders.

10.2 CE Declaration of Conformity Xsens Link

EU Declaration of Conformity

Movella Technologies B.V.
T + 31 88 973 67 00
F + 31 88 973 67 01
E info@movella.com

Pantheon 6A
P.O. Box 559
7500 AN Enschede
The Netherlands

www.movella.com

Applicable objects:
XSENS LINK
- XS-HUB
- XSL-MTX3

This declaration of conformity is issued under the sole responsibility of the manufacturer.
The objects of the declaration described above are in conformity with the relevant Union harmonization legislation, based on the tested mode of operation(s), the applicable performance criteria, and specified acceptance criteria:

Short name	Directive
Radio Equipment Directive (RED)	2014/53/EU
Restriction of the use of certain hazardous substances (RoHS)	2011/65/EU 2015/863/EU

Relevant harmonized standards used:

Standard description	Standard	Result
EMC	EN 301 489-1 EN 301 489-3 EN 301 489-17	Pass
Radio	EN 300 328	Pass
	EN 303 687	Pass
	EN 301 893	Pass
Assessment of electronics related to human exposure	EN 62311	Pass
Product Safety	EN-IEC 62368-1	Pass

Signed for and on behalf of:
Enschede, 28 November 2025

Igor Ikink, Director Engineering

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CE

10.3 Certificate of Conformity for UKCA

[20]

UKCA Declaration of Conformity

Movella Technologies B.V.
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P.O. Box 559
7500 AN Enschede
The Netherlands

www.movella.com

Applicable objects:
XSENS LINK
- XS-HUB
- XSL-MTX3

This declaration of conformity is issued under the sole responsibility of the manufacturer.
The objects of the declaration described above are in conformity with the relevant Union harmonization legislation, based on the tested mode of operation(s), the applicable performance criteria, and specified acceptance criteria:

UK Legislation
Radio Equipment Regulations 2017
Electromagnetic Compatibility Regulations 2016
Electrical Equipment (Safety) Regulations 2016
Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012
Product Security and Telecommunications Infrastructure (Security Requirements for Relevant Connectable Products) Regulations 2023

Relevant harmonized standards used:

Standard description	Standard	Result
EMC	EN 301 489-1 EN 301 489-3 EN 301 489-17	Pass
Radio	EN 300 328	Pass
	EN 303 687	Pass
	EN 301 893	Pass
Assessment of electronics related to human exposure	EN 62311	Pass
Product Safety	EN-IEC 62368-1	Pass

Signed for and on behalf of:
Enschede, 28 November 2025

Igor Ikink, Director Engineering

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UK CA

10.4 **FCC Statement**

Note: **This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.**

However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

1. Reorient or relocate the receiving antenna
2. Increase the separation between the equipment and receiver
3. Connect the equipment into an outlet on a circuit different from that to which the receiver is connected

Consult the dealer or an experienced radio/TV technician for help

This device contains

FCC ID: SQG-SONAIF573 & SQG-BL54L15

IC: 3147-SONAIF573 & 9381A-BL54L15

10.5 **FCC Declaration of Conformity Xsens Link**

FCC/ISED Declaration of Conformity

Movella Technologies B.V.
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P.O. Box 559
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The Netherlands

www.movella.com

Applicable objects:
XSENS LINK
- XS-HUB
- XSL-MTX3

FCC ID: contains SQG-SONAIF573 & SQG-BL54L15
IC : contains 3147-SONAIF573 & 9381A-BL54L15

The objects of the declaration described above is in conformity with the relevant FCC regulations, based on the tested mode of operation(s), the applicable performance criteria, and specified acceptance criteria:

Object classification	Directive
Computers and other digital devices, unintentional radiator	47 CFR 15
Information Technology Equipment, Radio Standard	ICES, RSS

Relevant standards used:

Test description	FCC	ISED	Result
Emission	Part 15B: 15.109	ICES-GEN, ICES-003	Pass
RF	Part 15C: 15.205,15.209 15.247	RSS-GEN, RSS247	Pass
	Part 15E: 15.205, 15.407	RSS-GEN, RSS247	Pass
		RSS-GEN, RSS-248	Pass

Operation is subject to the following two conditions:

(1) this device may not cause harmful interference, and
(2) this device must accept any interference received, including interference that may cause undesired operation.

The following manufacturer/importer/entity is responsible for this declaration:

Company name: Movella Technologies B.V.
Name Title: Igor Ikink, Director Engineering
Address: Pantheon 6A, 7521 PR ENSCHEDE, THE NETHERLANDS
Phone: +31 (0)889736700
Fax: +31 (0)889736701

Signed for and on behalf of:
Enschede, 28 November 2025

Igor Ikink, Director Engineering

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10.6 **Radio qualifications and approvals**

The Xsens Link system is certified for EU(RED), UK(UKCA), USA(FCC) and Canada (ISED).

The radios of the Hub are certified by the manufacturer for the following countries/region. The radio design of the Hub makes use of same pre-certified combination tested by the manufacturer Ezurio/Laird:

- Ezurio Sona IF573 with antennas Ezurio FlexMIMO 6E and Ezurio FlexPIFA 6E
- Ezurio BL54L15 with antenna Ezurio FlexPIFA 2.4 GHz

Country/region	Ezurio SONAIF573	Ezurio BL54L15
EU (RED)	*No Regulatory ID required	*No Regulatory ID required
UK (UKCA)	*No Regulatory ID required	*No Regulatory ID required
USA (FCC)	SQG-SONAIF573	SQG-BL54L15
Canada (ISED)	3147A-SONAIF573	3147A-BL54L15
Japan (MIC)	201-220656	201-250023
Australia (AS)	*No Regulatory ID required	*No Regulatory ID required
New Zealand (NZS)	*No Regulatory ID required	*No Regulatory ID required

10.7 **WEEE Regulation**

The symbol indicates that this product must not be disposed of with other waste. Instead, it is the user's responsibility to dispose of the user's waste equipment by handing it over to a designated collection point for the recycling of waste electrical and electronic equipment. The separate collection and recycling of waste equipment at the time of disposal will help to conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment. For more information about where you can drop off your waste equipment for recycling, please contact your local city office, your household waste disposal service or the seller from whom you purchased the product.

11. Xsens eSuit sizes overview

The typical height and Chest, waist and hip size of a subject that will fit into a given eSuit size is related. While this is generally accurate, it is an indication, therefore test the suit size, to ensure that it is tight enough to keep MTx3's in place during measurement while remaining relatively comfortable.

size eSuit	Length (cm)	Chest size (cm)	Waist size (cm)	Hip size (cm)
S	155 - 170	90-93	79-82	92-95
M	170 - 176	94-97	83-86	96-99
L	176 - 183	98-101	87-90	100-103
XL	183 - 189	102-105	91-94	104-107
XXL	189 - 215	106-109	95-99	108-111

12. System specifications

Recommended computer system	
Operating system	Windows 10/11 (64 bit)
Processor	Quad core or higher (2.7 GHz or faster)
Hard drive	SSD 256 GB or more
Memory	8 GB RAM (64-bit)
Graphics card	Hardware acceleration for DirectX 11 Dedicated memory 512 MB or more
Network card	Gigabit Ethernet, support for jumbo frames (9014 Bytes)
USB ports	USB 2.0 (1 per license dongle)

Xsens System		
Number of trackers per suit configuration:		
Full body	17	MTx3 (Motion trackers)
Extra prop /backup	1	MTx3 (Motion trackers)
eSuit:	Light weight revolutionary stretch fabric with exterior zippered channels for trackers and wires	
Sizes:	S, M, L, XL, XXL	
Accessories:	2 hand straps with tracker pockets 1 head band with tracker pocket 2 foot straps 1 pair of shorts	
Xsens Link on body cabling:	1 cable connects Hub to Battery Pack, all remaining strings of trackers connect to Hub.	
Data control units:	1 Hub (internal battery capacity 4.0 Ah, charge voltage 5V/3A)	
External Battery (including charger & power adapter)	External Battery: Part number: NC2040xx31 (3.1Ah) rechargeable smart Lithium-Ion Battery Pack	
	Charger: Part number: CH5000 battery charger with ability to recalibrate fuel gauge on Battery Packs	
	Power adapter: Part number: ATS065TP240 110-240VAC / 24VDC 2.71A (65W)	
Software compatibility	Xsens 2025.4 and beyond	
Internal Storage	50h motion capture date storage	

Interface	
Power and Data	USB-C, PD Compliant Requires PD-Compliant chargers.
External Sync connector	Will gain support for TimeCode and GenLock in future update.
External battery connector	Proprietary connector
WiFi	2.4 GHz, 5 GHz, 6 GHz
Bluetooth	2.4 GHz
Proprietary Radio for Movella wireless trackers	2.4 GHz

Communication	
Interface	Wireless (WiFi)
Wireless range radius (max)	Xsens Link
Outdoor	150 meter (492 ft.)
Indoor open space	150 meter (492 ft.)
Indoor office	50 meter (164 ft.)

Wireless receiver units:	
Number of Wireless Receivers	1 Access Point
RF technology	WiFi 2.4GHz, 5.0 GHz, 6.0 GHz
Interface	Ethernet

Physical	
Dimensions MTx3	33.8 x 24.5 x 11.05mm
Dimensions Hub	155,8 x 70.5 x 23.9 mm
Dimensions Xsens suitcase	559 x 351 x 229 mm (22 x 13 x 9 inches) Flight case with wheels & extendable handle. Durable & watertight
Weight MTx3	6 g
Weight Hub	268 g
Weight Xsens eSuit (size L, incl cables)	900 g
Weight total on-body system (size L with cables, Hub, MTx3 and Ext. Battery)	1500 g
Shipping weight	8.6 kg
Housing material products	PUR Cawiton PR12104B PC-ABS UL-94 V-0 PC UL-94 V-0 ADC12

Environmental	
Operating temperature range	0 deg C – 45 deg C
External Battery charge temperature range	0 deg C – 45 deg C
Humidity	20-80%RH NC

Tracker Performance	
Accelerometer range	MTx: ± 160 m/s^2 (16 g)
Gyroscope range	± 2000 deg/s
Static accuracy (roll/pitch)	0.2 deg
Static accuracy (heading)	0.5 deg

Dynamic accuracy	1 deg RMS

Electrical Characteristics	
Supported external battery capacity	3.1 Ah
Internal battery capacity	4.0 Ah
Internal battery charge voltage (USB-C power requirements)	5V/3A
Operating time (internal battery)	4hrs
Operating time (external battery)	9.5hrs

Xsens Fusion Engine	
Output	Full kinematics of each segment (position, velocity, acceleration, orientation, angular velocity and angular acceleration), joint angle and CoM. All at preset sample frequency (max 240Hz).
3D translation capture	~1% error in traveled distance (without external aiding). Advanced external contact model detects body-world contacts, to enable crawling, sitting, cartwheel etc. Various friction models (slippage etc.) are possible.[8] Seamless fusion with aiding technologies possible, e.g. 3D position from optical/GPS, or 2D image correspondences.[8]
Magnetic environment Local, permanent disturbances	Full immunity to any magnetic distortion.
Soft tissue artifacts	Minimized to ~2 degrees RMS using redundancy in measurement and biomechanical constraints.
Multiple person capture	Up to four person capturing on one pc

Legal Notice	
Warranty	2 Years
MVN and Xsens are trademarks of Movella Technologies B.V. (www.xsens.com)	

Package Label