

VICON CAPTURE.U USER GUIDE

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About Vicon Capture.U

Working seamlessly with Vicon Blue Trident sensors, Vicon Capture.U is a visual application for capturing raw inertial and analytic data, which is not limited by laboratory settings. It offers real-time data overlaid on video, enabling you to analyze movement both on the field and in the lab.

With capture modes for collecting and analyzing raw data, Capture.U enables you to view graphical and statistics information in real time. You can also save video or export data as CSV, X1D or PDF files, for further analysis.

For a brief introduction to Capture.U, see the PDF *Vicon Capture.U Quick Start Guide*.

This guide provides information on using both the Capture.U app, for iOS devices; and Capture.U Desktop, for use on Windows PCs and Macs.

- [Use the Vicon Capture.U app, page 5](#)
- [Use Vicon Capture.U Desktop, page 60](#)

 You can also watch [Vicon Capture.U videos](#)¹, covering all aspects of using Capture.U, on YouTube.

¹ https://www.youtube.com/playlist?list=PLoL-MR-_fJaCjzWBdev3S8jBnS6DW164u

Understand Vicon IMU sensor status

Understand Vicon IMU sensor status

The LEDs on each Vicon IMU display information about the sensor's status.

Vicon IMU status	LED display
Charging	Both LEDs slow blink (50% duty)
Charged	Both LEDs on steady
Battery indication	Both LEDs blink 1–4 times, pause; pattern repeats 3 times. For example, full battery – LEDs blink 4 times, pause; pattern repeats 3 times.
Sampling	Single or both LEDs brief blink (<10% duty); single or both depending on left or right
Bootloader waiting*	Single LED on steady
Bootloader connected*	Both LEDs on steady
Bootloader exiting*	Both LEDs twinkle
Error during a session <ul style="list-style-type: none"> Error overrun Error storage Error sync timeout Error sync 	Rapid blinking LEDs

* To enter bootloader mode, hold down the USB adapter button for at least 10 seconds, then release the button. To exit bootloader mode, wait 60 seconds.

Use the Vicon Capture.U app

Use the Vicon Capture.U app

About this guide

This part of the guide covers topics related to using the Vicon Capture.U app:

- [Before you install the Capture.U app, page 6](#)
- [Calibrate IMUs, page 11](#)
- [Attach IMU sensors to a subject, page 14](#)
- [Start Capture.U and choose a capture mode, page 16](#)
- [Reset IMU sensors, page 53](#)
- [Get help on the Capture.U app, page 56](#)

For information on Capture.U Desktop, see [Use Vicon Capture.U Desktop, page 60](#).

Use the Vicon Capture.U app

Before you install the Capture.U app

These topics contain information about the hardware and software required to run the app, and notes about downloading and installing it.

- [Requirements for the Capture.U app, page 7](#)
- [Download and install the Capture.U app, page 10](#)

Use the Vicon Capture.U app

Requirements for the Capture.U app

The Vicon Capture.U app is available for iOS devices only.

Before you begin, ensure your iOS device meets or exceeds these requirements:

- iOS 11 and later - with BLE 4.2 and later devices (1.1 and 1.2)
To access AR Visualization capture mode, Vicon recommends an iOS 14 device, BLE 5 and an Apple A12 Bionic or later chip device.
- iOS 14 and BLE 4.2 devices:
 - iPad 5th generation (2017) (A9), iPad Air 2 (A8X), iPad mini 4 (A8), 9.7-inch: iPad Pro (A9X), iPad 6th generation (2018) (A10), 10.5-inch: iPad Pro (A10X), 12.9-inch: iPad Pro 1st generation (A9X) and iPad Pro 2nd generation (A10X)
 - iPhone 6s (A9), iPhone 6s Plus (A9), iPhone 7 (A10), iPhone 7 Plus (A10)

For optimum performance, and to access all available capture modes, this specification is recommended:

- iOS 14, BLE 5.0 and Apple A12 Bionic (or later) chip devices.

Use the Vicon Capture.U app

This table lists the latest iOS 14 supported devices:

iOS devices (iOS 14)	Bluetooth 4.2 (Bionic chip)	Bluetooth 5 (Bionic chip)	Bluetooth 5 with Apple A12 Bionic chip or later (recommended)
iPhones	iPhone 6s (A9)	iPhone 8 (A11)	iPhone Xs (A12)
	iPhone 6s Plus (A9)	iPhone 8 Plus (A11)	iPhone Xs Max (A12)
	iPhone 7 (A10)	iPhone X (A11)	iPhone XR (A12)
	iPhone 7 Plus (A10)		iPhone 11 (A13)
			iPhone 11 Pro (A13)
			iPhone 11 Pro Max (A13)
			iPhone SE (A13)
			iPhone 12 mini (A14)
			iPhone 12 (A14)
			iPhone 12 Pro (A14)
			iPhone 12 Pro Max (A14)

Use the Vicon Capture.U app

iOS devices (iOS 14)	Bluetooth 4.2 (Bionic chip)	Bluetooth 5 (Bionic chip)	Bluetooth 5 with Apple A12 Bionic chip or later (recommended)
iPads	12.9-inch iPad Pro 2nd generation (2017) (A10X)		12.9-inch iPad Pro 3rd generation ((2018) A12X)
	12.9-inch iPad Pro 1st generation (2015) (A9X)		12.9-inch iPad Pro 4th generation (2020) (A12Z)
	10.5-inch iPad Pro (2017) (A10X)		11-inch iPad Pro (2018) (A12X)
	9.7-inch iPad Pro (2016) (A9X)		11-inch iPad Pro (2020) (A12Z)
	9.7-inch iPad 6th generation (2018) (A10)		iPad Air 3rd generation (2019) (A12)
	iPad 5th generation (2017) (A9)		iPad Air 4th generation (A14)
	iPad 7th generation (2019) (A10)		iPad mini 5th generation (2019) (A12)
	iPad Air 2 (2014) (A8X)		iPad 8th generation (A12)
	iPad mini 4 (2015) (A8)		

Use the Vicon Capture.U app

Download and install the Capture.U app

To install Capture.U:


- Download the Vicon Capture.U app  from the App Store to your iOS device.

 Capture.U supports only Vicon Blue Trident sensors. Blue Thunder sensors are not supported.

Use the Vicon Capture.U app


Calibrate IMUs

In all capture modes, if you plan to capture global angles, to ensure that the IMU sensor data is stable and to minimize drift, you must calibrate each of the IMU sensors.

-  With Firmware 10 and later, sensor calibration is retained between trials when you capture global angles. Calibration is continuous when global angles are either being streamed or captured onboard the sensor. You must re-calibrate for the next global angles trial if:
- The subsequent trial does not capture global angles, for example, if you capture global angles and then capture a raw data trial.
 - The sensors are inactive for longer than two hours.


To calibrate the sensors:

1. Start streaming global angles. (If you're not sure how to do this, see [Start Capture.U and choose a capture mode, page 16.](#))

-  If you want to use real-time feedback to verify the calibration, you can calibrate in Real-Time Insight capture mode and then after calibration, capture global angles in To Sensor mode.

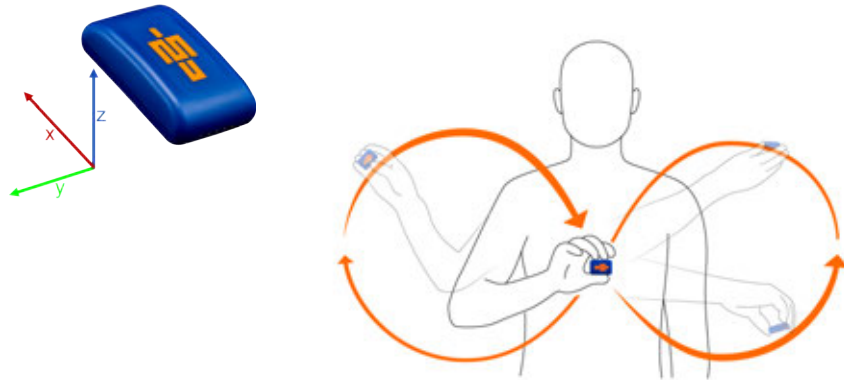
In all capture modes, when you start a capture, if the sensors need calibrating, a warning message informs you that sensor calibration is required.

In To Sensor and To Device modes, when you're selecting sensors, or streaming or capturing global angles, IMU sensors that require calibration are

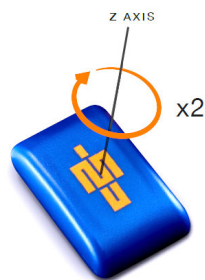
displayed with a 'Require calibration' icon at the top right of the sensor . (In Real-Time Insight and AR Visualization modes, the sensor calibration indicator is only displayed when you select the sensors.)

Use the Vicon Capture.U app


- Wave the sensor in a figure-of-eight for at least 10 seconds, ensuring that it rotates through all three axes during the motion.



- Put the sensor on a flat surface and spin it through two full rotations around the z axis.



✓ To avoid any unwanted influence on the sensor, avoid placing it in proximity to anything metallic.

- Wait at least five seconds until the data has stabilized.
In Real-Time Insight and AR Visualization modes, you can observe that x angle is 0 and the y angle is 0 (the figure-of-eight provides enough information for the sensor to self-calibrate). However, the z angle may have a non-zero value, depending on how it is rotated to the magnetic north.
- Rotate the sensor on the flat surface for at least five seconds until z is also 0.
In To Device and To Sensor modes, to let you know that a sensor is calibrated, after 60 seconds, a C (Calibrated) icon  is displayed at the top right of the sensor.
In Real-Time Insight and AR Visualization modes, check that the graphs for all three axes are now at zero.

Use the Vicon Capture.U app

6. After you have calibrated each sensor, you can [attach the sensors to your subject, page 14](#) and capture data in the required [capture mode, page 17](#).



If you plan to capture global angles, after the sensors are attached to a subject, allow a few seconds for onboard calibration to initiate before starting the movement that is to be captured.

Use the Vicon Capture.U app

Attach IMU sensors to a subject

The method you use to attach the sensors to your subject depends on the type of movement you want to capture.

- To capture the movement of a subject's limbs, you can attach the sensors using the supplied straps.
- To capture the movement of other parts of the anatomy (for example, where movement of the vertebrae is of interest), you can attach sensors directly, using suitable tape.

To attach sensors to a subject using the supplied straps:

1. Insert each sensor into its strap with the IMU symbol facing outwards.



2. Attach the straps to the subject, ensuring that:
 - a. The strap sits snugly against the limb.
 - b. The sensor is oriented with the top (head) pointing in the same direction as the movement of the subject.
 - c. The flashing LED is at the top of the strap.

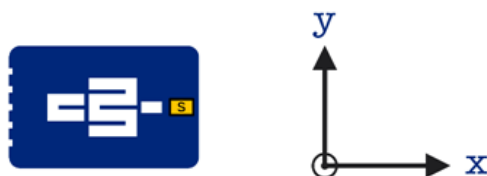
The following example shows a strap attached so that the sensor sits directly on the medial aspect of the tibia, just above the medial malleolus:



Use the Vicon Capture.U app

To attach sensors to a subject where straps are not used:

1. Position the sensor on the subject, depending on the required sensor orientation.



2. Secure the sensors using your preferred type of tape (for example, hypoallergenic, double-sided, micropore surgical tape).

⚠ If you plan to capture global angles, after the sensors are attached to a subject, allow a few seconds for onboard calibration to initiate before starting the movement that is to be captured.

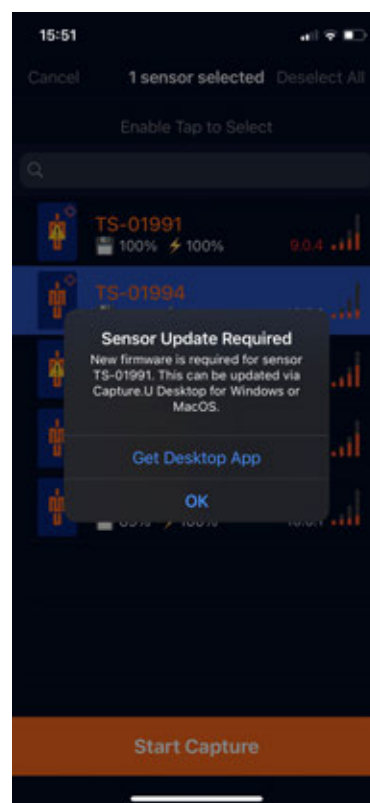
Use the Vicon Capture.U app

Start Capture.U and choose a capture mode

To start Capture.U and choose the way in which you want to capture data:

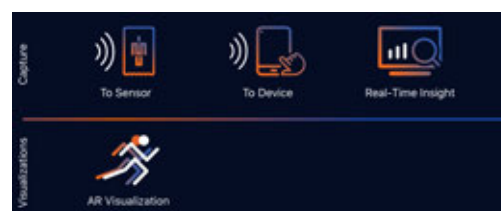
1. On your iOS device, start Capture.U.

If you need to upgrade the firmware for your Blue Trident sensors, when you start Capture.U the sensors are displayed with a yellow warning symbol, and a message alerts you to their status:



Click **Get Desktop App** to directly open Capture.U Desktop, or click **OK** to close the message, and upgrade the sensor firmware with Capture.U Desktop (see [Update sensor firmware, page 106](#)).


2. Tap to choose a capture mode.



Use the Vicon Capture.U app


Your choice of capture mode depends on the number of sensors you want to use, the range you require and the type of output you want:

- For unlimited range and up to 20 sensors, with reference video data directly from the device, choose **To Sensor**. After you have captured the data, download it to your computer with Capture.U Desktop for further analysis.
- For data that is saved directly to your device (where the capture range is constrained by the Bluetooth® range of the device), choose **To Device** or **Real-Time Insight** mode.
- For access to Apple's ARKit video-based visualization (the iOS device must be compatible with Apple ARKit 3), choose **AR Visualization** mode.

 In all capture modes, there may be a lag in data frames (a small offset) between sensors when starting capture, but the data will be synced.

The capture modes are explained in more detail in the following sections:

- [Capture to sensor, page 18](#)
- [Capture to device, page 30](#)
- [Capture in Real-Time Insight mode, page 34](#)
- [Capture in AR Visualization mode, page 42](#)
- [Run Activity Widget demo, page 52](#)

 If you plan to capture global angles, after the sensors are attached to a subject, allow a few seconds for onboard calibration to initiate before starting the movement that is to be captured.

Use the Vicon Capture.U app

Capture to sensor



Choose the **To Sensor** mode when you want a high sensor count and unlimited range. After capturing the required movement, you can download your data with Vicon Capture.U Desktop.

An example of this type of usage might be to monitor the track performance of multiple athletes who are running a marathon. After capturing data from all the athletes, you can download the data from the sensors to your computer with Capture.U Desktop (see [Use Vicon Capture.U Desktop](#), page 60).

 Watch the Vicon video, [Capture to Sensor²](#) on YouTube.

Summary of To sensor mode:

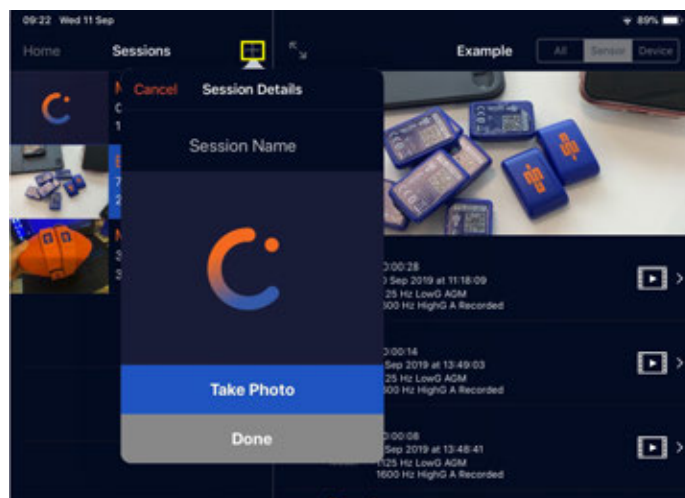
No. of sensors:	Up to 20
Data type:	IMU data
Video:	Reference video
Axes:	15 High G and Low G accelerometer Gyroscope and Magnetometer (option to capture all axes) Global Angles
Output:	Data (.csv, with Desktop) Video (.mp4) and notes (.txt)
Range:	Unlimited
Capture rate:	High G accelerometer (default): 1600 Hz Low G accelerometer and Gyroscope: 1125 Hz Low G Magnetometer: 112 Hz Global Angles (with Low G accelerometer, Gyroscope, Magnetometer): 225 Hz (A, G) and 70 Hz (M)

² https://youtu.be/yR6tCPH_iJU

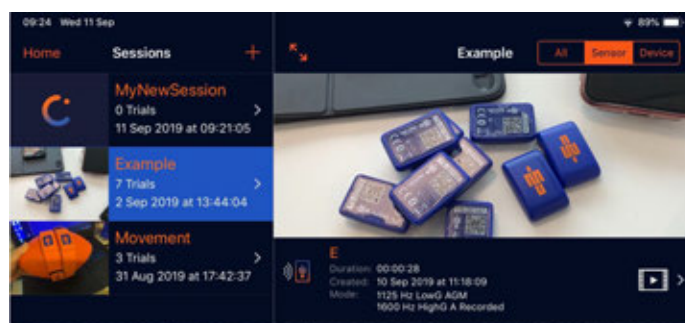
Use the Vicon Capture.U app

To capture to sensors:

1. Open the Capture.U app.
2. In the Capture section tap To Sensor.
3. Either create a new session or select an existing one:
 - To create a new session:
 - i. At the top of the screen, tap the plus sign + to the right of Sessions.

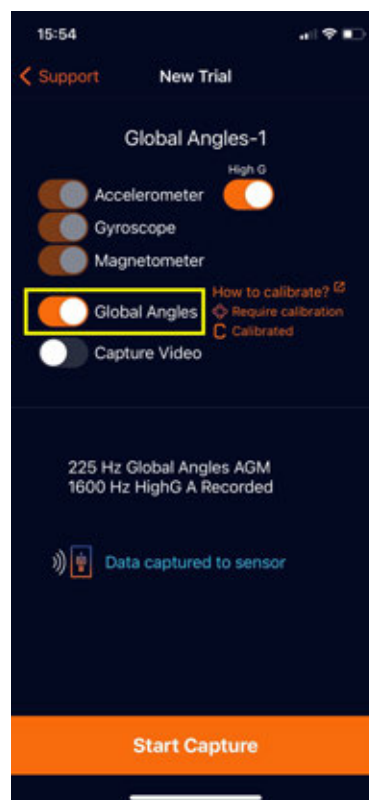


- ii. In the **Session Name** field, enter a name for your new session.
- iii. If you want to add an image as an identifier for the session, tap **Take Photo** and add the required image.
- iv. Tap **Done**.
Your new session is displayed in the list of sessions on the left.
(To make any changes, slide the session towards the left and tap **Edit**.)
- To select an existing session:
 - Tap an existing session in the list on the left.



Use the Vicon Capture.U app

- At the bottom, tap **New Trial**, then if required, enter a name for your trial. By default, the trial name is the same as the session name unless you rename the trial. Subsequent trial names are followed by a hyphen and a digit (for example, *MyTrial-1*) and are automatically incremented (for example, *MyTrial-2*).
- From the options below, select the data to stream (**Accelerometer (High G or Low G)**, **Gyroscope**, **Magnetometer**, **Global Angles**), and whether you want to capture a video. Note that if you select **Global Angles**, then **Low G** Accelerometer, **Gyroscope**, and **Magnetometer** are also captured and the capture rate is reduced to 225 Hz (A, G) and 70 Hz (M).



⚠ If you plan to capture global angles, before you start capture, you must calibrate the IMU sensors. For instructions on how to do this, tap the [How to calibrate](#) link or see [Calibrate IMUs](#), page 11.

If you turn on **Capture Video**, you can choose to record **High** (1920 x 1080), **Medium** (480 x 360, the default), or **Low** quality (192 x 144) video.

Use the Vicon Capture.U app

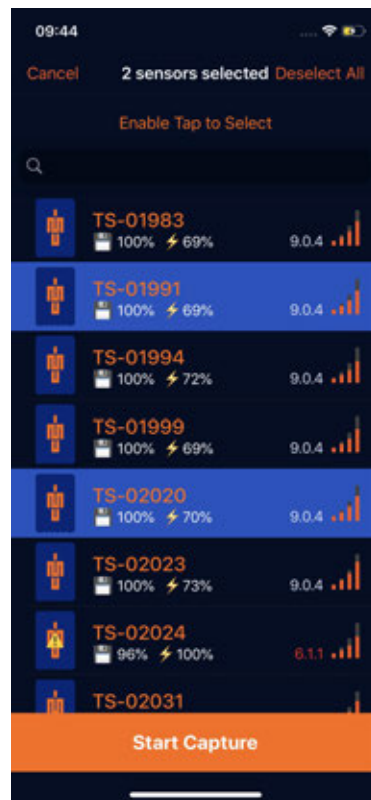
- When you have made your selections, check below on the screen, to make sure the data mode is correct (in this case, it is **Data captured to sensor**), and tap **Start Capture** at the bottom of the screen.





Use the Vicon Capture.U app

7. Select the sensors, by doing one of the following:

- Tap to select the required sensors from the list on the right.
or
- Tap **Enable Tap to Select** and then tap the required sensor(s) twice.
or
- At the top of the list on the right, in the Search field, enter the number of the required sensor.



⚠ If one or more of the sensors is displayed in orange and is labeled **Reset required**, see [Reset IMU sensors, page 53](#). If you chose to capture Global Angles, one or more of the sensors may be displayed with a 'Require calibration' icon  or a 'Calibrated' icon  at its top right. For further explanation, see the next step.

Use the Vicon Capture.U app

8. At the bottom, tap **Start Capture**.

If you chose to record a video, it is displayed at the bottom left of the screen.


If Video is not selected, you can capture two trials simultaneously.

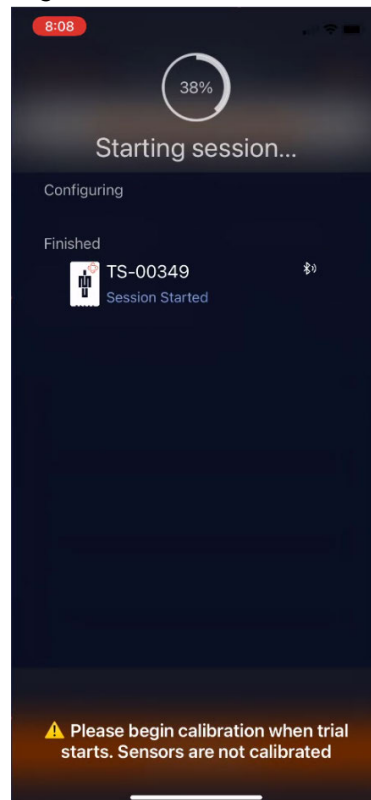
To add notes during capture, tap **Notes** (top right).

To add a region of interest, tap **Start a region of interest** at the top of the screen. For more details, see [Work with regions of interest, page 27](#).

If you chose to capture Global Angles:

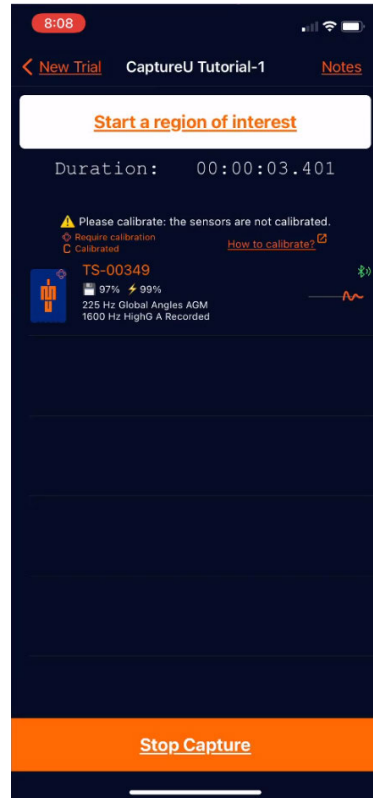
- a. If one or more of the selected sensors is displayed with a 'Require


calibration' icon  at the top right, after you tap **Start Capture**, on the next screen, a message at the bottom of the screen prompts you to begin calibration when the trial starts.



Use the Vicon Capture.U app

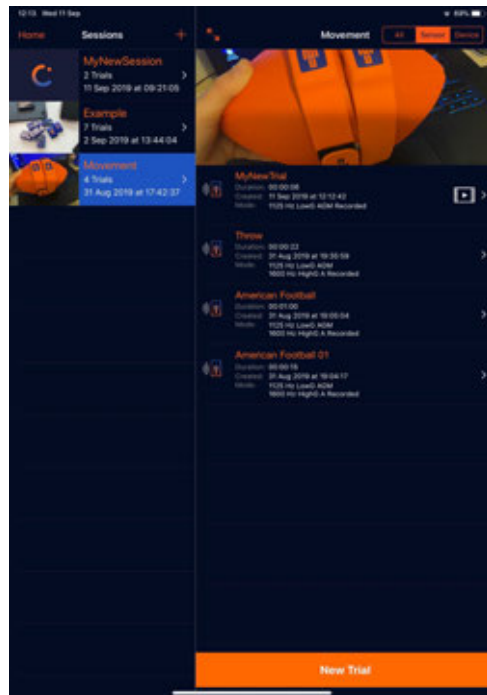
After several seconds, the capture pane is displayed. A message towards the top of the screen prompts you to calibrate.



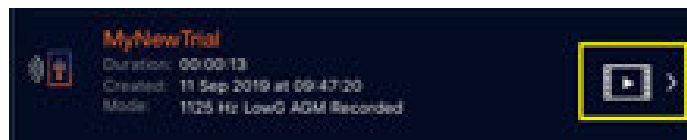
- b. For more information on calibration, tap the [How to calibrate](#) link or see [Calibrate IMUs](#), page 11.
- c. When you've finished moving the sensor, after 60 seconds the sensor icon changes to 'Calibrated'  to indicate that calibration is occurring (calibration is a continuous process).

Use the Vicon Capture.U app

9. When you have captured the required data, tap **Stop Capture**.
Your new trial is displayed in the list of trials on the right of the screen, with the most recent trial at the top.

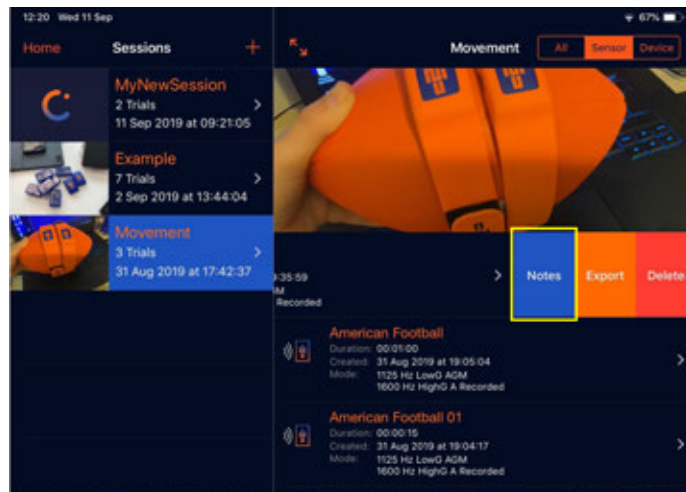


If you recorded a video, you can play it back on your iOS device without exiting Capture.U by tapping the video icon on the right.



Use the Vicon Capture.U app

To add notes after you have finished capturing, slide the trial towards the left and then tap Notes.



10. To export any video and/or notes that you created, slide the trial towards the left, and then tap Export.

✓ As long as the sensors remain within Bluetooth range, you can add notes after you finish capturing a trial. These notes are saved to the sensor and, together with any notes made during capture, are available for review and export in Capture.U Desktop. For details, see [Export notes from To Sensor mode, page 89](#).

If you recorded a video, you are asked if you want to include it in the export.

Tap **Yes**, then select the required export option.

A .zip file with the name of your trial, which contains any notes (.txt) and video (.mp4) is exported.

✓ Use Quicktime or another suitable video player, eg VLC Media Player, to view the downloaded video file.

11. Download your trial data (.csv) with Capture.U Desktop (see [Use Vicon Capture.U Desktop, page 60](#)).

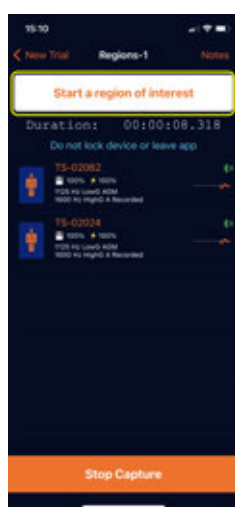
Use the Vicon Capture.U app

Work with regions of interest

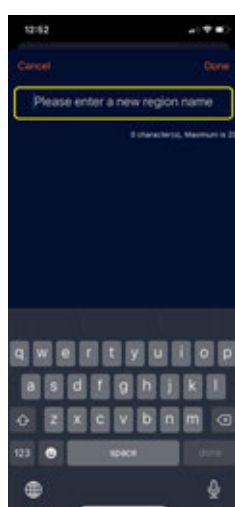
You can define regions of interest during capture in both To Sensor and To Device capture modes.

To define regions of interest:

1. In a new or existing session, create a new trial and start a capture.
2. To add a region of interest, tap **Start a region of interest**.

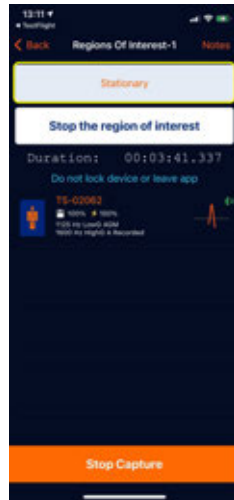


3. At the top of the screen, in the **Please enter a new region name** box, enter a name for the region of interest.



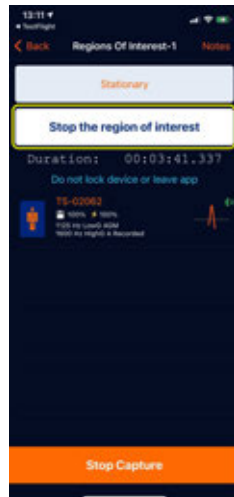
Use the Vicon Capture.U app

The name of the region of interest is displayed at the top of the screen. In the following example, it's named Stationary.



The name of the region of interest name flashes to indicate that the data is being associated with the region name.

4. To stop the region of interest, tap **Stop the region of interest**.




When the region of interested is stopped, the region name no longer flashes.

5. If required, you can now create a new region of interest.
6. When you have defined the required region(s) of interest, stop the capture.

Use the Vicon Capture.U app

Regions of interest are saved, so you can select the newly created region of interest for subsequent trials.

 You can add a region of interest's name to the Favourites list for easy selection in future. To do this, select the star icon next to the region of interest's name.

Export regions of interest

To export regions of interest from one or more sensors:

- Use Capture.U Desktop. For details, see [Export regions of interest, page 98](#).

To export regions of interest from a device:

- See [Export regions of interest from a device, page 33](#).

Use the Vicon Capture.U app

Capture to device



Choose the **To Device** mode when you need a higher sensor count than **Real-Time Insight** mode (which is restricted to two sensors). Data is captured within the Bluetooth range of the device only. In this mode, you can also use reference video.

Note that as data is streamed over Bluetooth, external factors can cause dropped samples. If this is an issue, you can either interpolate between samples or use **To Sensor** mode instead, to avoid dropped samples altogether.

 Watch the Vicon video, [Capture to Device³](https://youtu.be/uFW21vz9CZE) on YouTube.

Summary of To device mode:


No. of sensors:	Up to 14 (depending on device, eg, BLE 4.2 iOS devices are limited to 7 sensors)
Data type:	IMU data
Video:	Reference video
Axes:	3 or 12 High G Accelerometer or Low G Accelerometer, Gyroscope, Magnetometer and Global Angles
Output:	Data (.csv), video (.mp4) and notes (.txt)
Range:	Bluetooth: 20 m+
Capture rate:	High G accelerometer (default): 800 Hz Low G Accelerometer: 800 Hz 2-axes: Low G and Gyroscope: 500 Hz Low G, Gyroscope 250 Hz and Magnetometer: 112 Hz Magnetometer only: 112 Hz Global Angles (with Low G Accelerometer, Gyroscope, Magnetometer): 225 Hz (A, G) and 70 Hz (M)






³ <https://youtu.be/uFW21vz9CZE>

Use the Vicon Capture.U app

To capture to a device:

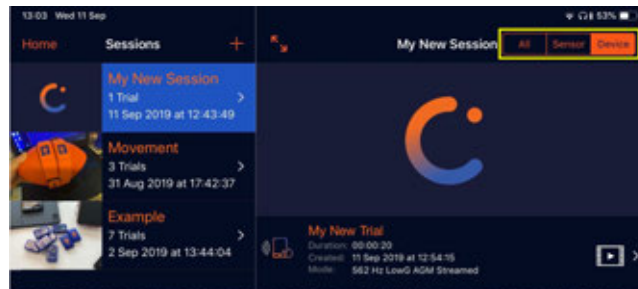
1. Open the Capture.U app.
2. In the Capture section tap **To Device**.
3. Add a new **Session** or select an existing one (see *Capture to sensor*, [Step 3, page 19](#)).

 If you plan to capture global angles, before you start capture, you must calibrate the IMU sensors. For instructions on how to do this, see [Calibrate IMUs, page 11](#).

4. Create a **New Trial** (see *Capture to sensor*, [Step 4, page 20](#), but note that the capture options differ, as shown in the above table).
5. Tap **Start Capture** at the bottom of the screen.
Note that when Global Angles is selected, Low G Accelerometer, Gyroscope, and Magnetometer are also captured and the capture rate is reduced to 225 Hz (A, G) 70 Hz (M) for the Low G sensor.
6. Select the required sensors (see *Capture to sensor*, [Step 7, page 22](#)).
If you chose to capture Global Angles, one or more of the sensors may be displayed with a 'Require calibration' icon  or a 'Calibrated' icon  at its top right. For further explanation, see the next step.
7. Tap **Start Capture**.
To add notes during capture, tap **Notes** (top right).
To add a region of interest, tap **Start a region of interest** at the top of the screen (for details, see [Work with regions of interest, page 27](#)).
If you chose to capture Global Angles:
 - a. If one or more of the selected sensors is displayed with a 'Require calibration' icon  at the top right, after you tap **Start Capture**, on the next screen, a message at the bottom of the screen prompts you to begin calibration when the trial starts.
After several seconds, the capture pane is displayed. A message towards the top of the screen prompts you to calibrate the sensors.
 - b. For more information on calibration, tap the **How to calibrate** link or see [Calibrate IMUs, page 11](#).
 - c. When you've finished moving the sensor, after 60 seconds the sensor icon  changes to 'Calibrated'  to indicate that calibration is occurring (calibration is a continuous process).

Use the Vicon Capture.U app

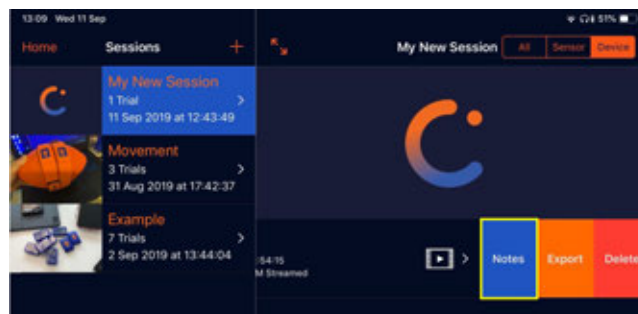
8. When you have captured the required data, tap **Stop Capture**.
Your new trial is displayed in the list of trials on the right of the screen (the most recent trial is at the top).
Notice that in the filter at the top, **Device** is automatically selected, to display trials recorded directly to your iOS device. If required, you can change this to display trials captured to sensors, or all trials.



You can play back a recorded video on your iOS device without exiting Capture.U by tapping the video icon in the list of trials.



To add notes after capturing, slide the trial left and tap **Notes**.



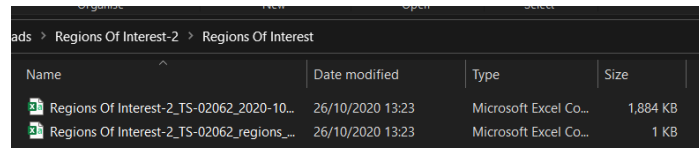
9. To export your data and any video/notes, slide the trial left and tap **Export**.
If you recorded a video, you are asked if you want to include it in the export. Tap **Yes**, then tap the required export option.
A .zip file containing your data (.csv), notes (.txt) and video (.mp4) is exported.
If you chose to capture Global Angles and export a .csv file, the CSV will include the Low G data (Low G accelerometer, gyroscope and magnetometer) and the global angles. The global angles are exported as quaternion components (Qx, Qy, Qz, Qr).

Use the Vicon Capture.U app

- ✓ Use Quicktime or another suitable video player, eg VLC Media Player, to view the downloaded video file.

Export regions of interest from a device

1. On the region of interest, swipe left and tap **Export**.
2. Locate the .zip file that is exported.
3. To access the regions of interest data, extract all files from the .zip file.
Two .csv files are extracted: one contains trial data and the other contains regions of interest data.



The screenshot shows a file explorer window with the path 'ads > Regions Of Interest-2 > Regions Of Interest'. It displays two files:

Name	Date modified	Type	Size
Regions Of Interest-2_TS-02062_2020-10...	26/10/2020 13:23	Microsoft Excel Co...	1,884 KB
Regions Of Interest-2_TS-02062_regions_...	26/10/2020 13:23	Microsoft Excel Co...	1 KB

Use the Vicon Capture.U app

Capture in Real-Time Insight mode



Choose **Real-Time Insight** mode to capture movement for real-time data streaming from two sensors with video overlay. You can also define your own benchmarks (that is, you can set a threshold for alerts). For example, you can choose to be notified by a sound when a specified level is reached, so that you can easily recognize when an athlete hits a ball hard enough.

An example of using Real-Time Insight mode might be a coach and an athlete who want to review performance data together over multiple trials on an iOS device, then have the coach send the athlete a report of what was reviewed.

Note that as data is streamed over Bluetooth, external factors can cause dropped samples. If this is an issue, you can either interpolate between samples or use To Sensor mode instead, to avoid dropped samples altogether.

 Watch the Vicon video, [Using Real-Time Insight⁴](https://youtu.be/zPk-WIS5OmY) on YouTube.

Summary of Real-Time Insight mode:

No. of sensors:	2
Data type:	IMU data
Video:	Video data real-time overlay
Axes:	3 High G Accelerometer (default) or Low G Accelerometer or Gyroscope (in either case, both exported) or Global Angles (with Low G Accelerometer, Gyroscope and Magnetometer)
Output:	Data (.csv), video (.mp4) and report (.pdf)
Range:	Bluetooth: 20 m+
Capture rate:	High G Accelerometer (default): 800 Hz Low G Accelerometer and Gyroscope: 500 Hz Global Angles with Low G Accelerometer, Gyroscope and Magnetometer: 225 Hz (A, G) and 70 Hz (M)

⁴ <https://youtu.be/zPk-WIS5OmY>

Use the Vicon Capture.U app

To use Real-Time Insight mode:

1. Open the Capture.U app.
2. In the Capture section tap **Real-Time Insight**.
3. At the bottom of the screen, select either **Acceleration** (x, y, z, or **Resultant** and **Low G** or **High G**) or **Rotation** (x, y, or z).

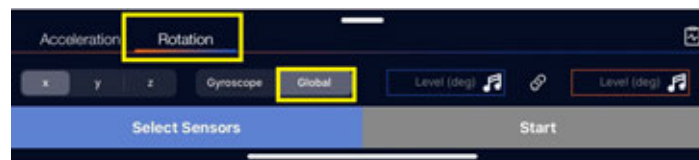
Note that **Resultant** is the peak resultant acceleration, which is calculated by

$$\sqrt{x^2 + y^2 + z^2}$$

With the **High G** accelerometer selected, the resultant acceleration can reach up to 346 G.

With the the **Low G** accelerometer selected, the resultant acceleration can reach up to 26 G.

To enable **Global Angles**, select **Rotation** and ensure **Global** is selected.

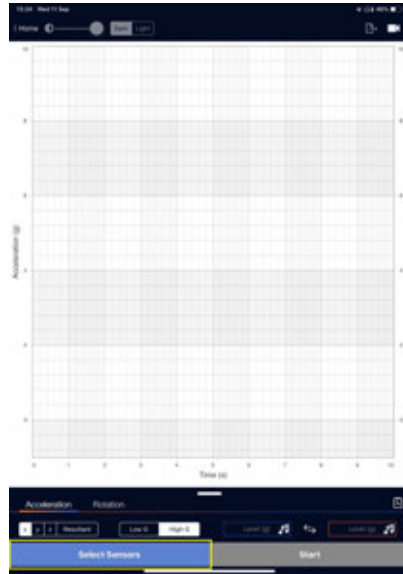




Global angles are streamed in real time on the graph. They are visualized as Euler angles (XYZ rotation order) and exported as quaternion components (Qx, Qy, Qz, Qr).

Note that when **Global Angles** is selected, **Low G Accelerometer**, **Gyroscope**, and **Magnetometer** are also captured and the capture rate is reduced to 225 Hz (A, G) 70 Hz (M) for the Low G sensor.

Use the Vicon Capture.U app

- At the bottom left of the screen, tap **Select Sensors**.



While you are selecting sensors, if you chose to capture Global Angles, one or more of the sensors may be displayed with a 'Require calibration' icon  or a 'Calibrated' icon  at its top right. For further explanation, see Step 6.


- Select up to two sensors (for details, see *Capture to sensor*, [Step 7, page 22](#)), and then tap **Set**.



- At the bottom of the screen, tap **Start**.


Use the Vicon Capture.U app

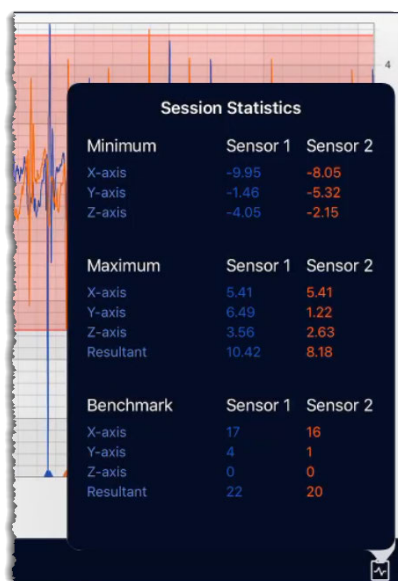
If you chose to capture Global Angles:

- a. If one or more of the selected sensors requires calibration, after you tap **Start** to start capture, on the next screen, a message at the the bottom of the screen prompts you to begin calibration when the trial starts.
 - b. Calibrate any sensors that are uncalibrated. For more information on calibration, see [Calibrate IMUs, page 11](#).
 - c. When you've finished moving the sensor, to verify your calibration, check that the graphs for all three axes are now at zero.
7. To play a sound when a specified level is reached, in the **Benchmarks** area, enter the required values in the benchmark fields.
The values are indicated by a shaded area on the graph.
 8. To view and optionally record real-time video (recorded at 1920 x 1080), tap the Video icon  at the top right of the screen.
The graph is overlaid on the video. To make the graph easier to see, the controls at the top of the screen enable you to change the thickness of the lines (slide right to increase line thickness), the opacity of the graph, and select a dark or light version.



Use the Vicon Capture.U app

9. To see statistics for the capture in real time, tap the Statistics icon , towards the bottom right of the screen.
The minimum and maximum values detected by the sensors are displayed, in addition to how many times the benchmark values have been reached.

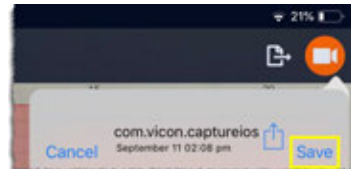


10. When you have captured the required movement, tap **Stop**.

Use the Vicon Capture.U app

11. From the export icons, select the required export type (file or video):

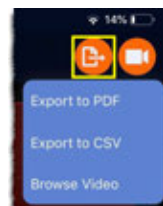
- To save a video to your device, tap the Video icon (top right) and then tap **Save**.



Depending on the length of your video, this may take some time. Don't tap **Save** again, but wait until the video is saved.

✓ Find saved videos on the Photos tab in the Photos app .

- To export either a report (.pdf) or data (.csv), or to browse previously recorded videos, tap the File icon (top right).

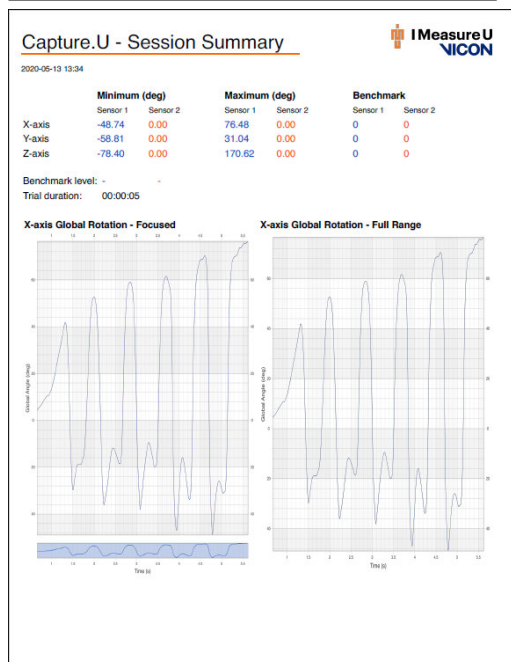
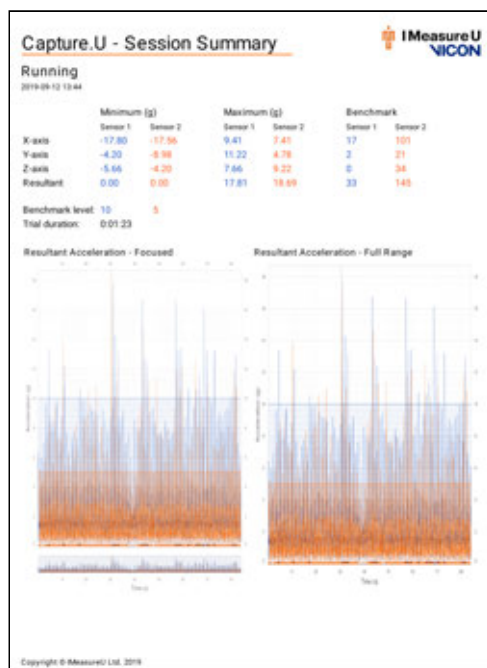


- If you choose **Export to PDF**, you can add a title in the PDF preview that is displayed.

The preview shows the information that will be displayed in the exported PDF, with statistics information at the top of the page, a Focused view of the graph (showing the region of interest) and Full Range view (showing the whole range). This lets you check that the graph is as required before you export it. If it isn't, tap **Cancel**, change the **Acceleration** and/or **Rotation** to show a graph of the required view (X, Y, Z, or Resultant) and tap **Export to PDF** again.

Use the Vicon Capture.U app

When you're happy with the preview, tap Export at the top to export the PDF.



Use the Vicon Capture.U app

- If you choose **Export to CSV**, the data values exported can be X, Y and Z, but not Resultant.

If you export **Global Angles**, the data is exported as quaternion components (Qx, Qy, Qz, Qr).

The screenshot displays the Microsoft Excel application window. The title bar shows 'Excel - [Book1]'. The ribbon at the top includes 'File', 'Home', 'Insert', 'Page Layout', 'Formulas', 'Data', 'Review', 'View', and 'Help'. The 'Home' ribbon is active, showing options for 'Font', 'Alignment', 'Number', 'Styles', 'Cells', and 'Editing'. The status bar at the bottom indicates 'TS 62625 Read Time (single) 2020'.

The data table is located in the range A1:W1000. The columns are labeled A through W. The rows contain numerical data, likely representing time measurements. The data is organized into several groups, with some rows having a label in column A (e.g., 'TS 62625 Read Time (single) 2020').

Column	Label	Value
A	TS 62625 Read Time (single) 2020	0.000000
B		0.000000
C		0.000000
D		0.000000
E		0.000000
F		0.000000
G		0.000000
H		0.000000
I		0.000000
J		0.000000
K		0.000000
L		0.000000
M		0.000000
N		0.000000
O		0.000000
P		0.000000
Q		0.000000
R		0.000000
S		0.000000
T		0.000000
U		0.000000
V		0.000000
W		0.000000

- ✔ If either Low G or Gyroscope is selected, both Low G and Gyroscope are exported.

- If you choose **Browse Video**, previously captured Real-Time Insight videos are listed. Tap to select a video, then play a minimized preview by tapping the Play icon at the bottom, or tap **Use** at the top right to play in full-screen mode.

Use the Vicon Capture.U app

Capture in AR Visualization mode



Choose **AR Visualization** mode to explore how using the ARKit with Capture.U can enhance your in-field capture experience while you're capturing IMU and reference video data.

Note that as data is streamed over Bluetooth, external factors can cause dropped samples. If this is an issue, you can either interpolate between samples or use **To Sensor** mode instead, to avoid dropped samples altogether.

Important

To access the AR Visualization capture mode, your iOS device must:

- Be compatible with the Apple ARKit 3
- Use iOS 13, with the Apple A12 Bionic chip (or later)

If you select this capture mode on an iOS device that doesn't meet these requirements, a message warns you that your device is incompatible, and you are unable to proceed in this mode.

Use the Vicon Capture.U app

Summary of AR Visualization mode:

No. of sensors:	2
Data type:	IMU data
Video:	Video data real-time overlay
Output variables:	4 Joint Angles (default) High G Accelerometer or Low G Accelerometer or Gyroscope (in either case, both exported) or Global Angles (with Low G Accelerometer, Gyroscope and Magnetometer)
Output:	Data (.csv), video (.mp4) and report (.pdf)
Range:	Bluetooth: 20 m+
Capture rate:	Joint Angles: 60 Hz High G Accelerometer (default): 800 Hz Low G Accelerometer and Gyroscope: 500 Hz Global Angles with Low G Accelerometer, Gyroscope and Magnetometer: 225 Hz (A, G) and 70 Hz (M)

Use the Vicon Capture.U app

To use AR Visualization mode:

1. Open the Capture.U app.
2. In the Visualizations section tap **AR Visualization**.
3. Select one of these options:

- **Acceleration (x, y, z, or Resultant and Low G or High G)**

Note that **Resultant** is the peak resultant acceleration, which is calculated by

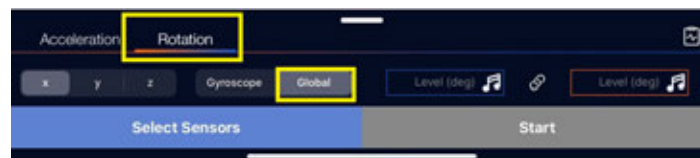
$$\sqrt{x^2 + y^2 + z^2}$$

With the **High G** accelerometer selected, the resultant acceleration can reach up to 346 G.

With the the **Low G** accelerometer selected, the resultant acceleration can reach up to 26 G.

- **Rotation (x, y, or z)**

To enable **Global Angles**, select **Rotation** and ensure **Global** is selected.

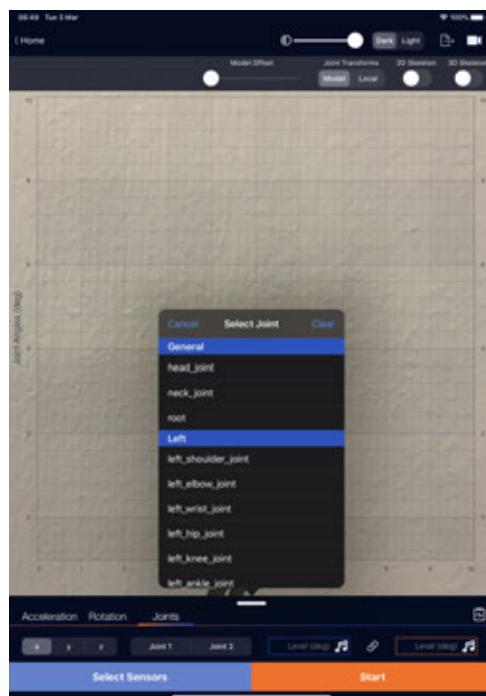


Global angles are streamed in real time on the graph. They are visualized as Euler angles (XYZ rotation order) and exported as quaternion components (Qx, Qy, Qz, Qr).

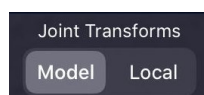
Note that when Global Angles is selected, Low G Accelerometer, Gyroscope, and Magnetometer are also captured and the capture rate is reduced to 225 Hz (A, G) 70 Hz (M) for the Low G sensor.

- **Joints**, which lets you select two joint angles that are derived from the Apple ARKit 3 (tap **Joint 1**, select the required joint, then tap **Joint 2** to select it).

Use the Vicon Capture.U app

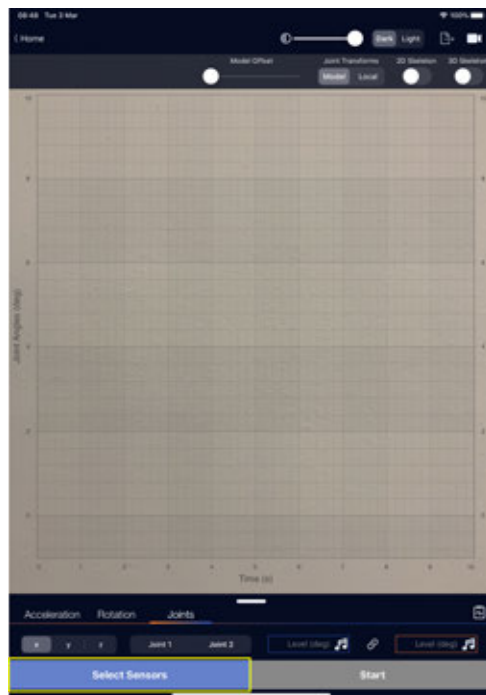




4. At the top right of the screen, you can select whether the joint transforms are model transforms (relative to the root joint) or local transforms (relative to the parent). The default setting is **Model**.



Use the Vicon Capture.U app

- At the bottom left of the screen, tap Select Sensors.




While you are selecting sensors, if you chose to capture Global Angles, one or more of the sensors may be displayed with a 'Require calibration' icon  or a 'Calibrated' icon  at its top right. For further explanation, see Step 7.

Use the Vicon Capture.U app

6. Select up to two sensors (for details, see *Capture to sensor*, [Step 7, page 22](#)), and then tap **Set**.



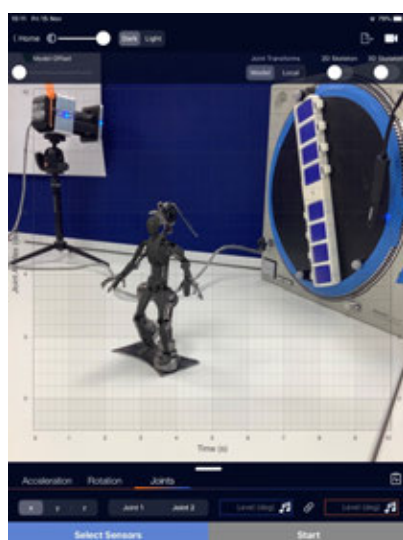
7. At the bottom of the screen, tap **Start**.
If you chose to capture Global Angles:
 - a. If one or more of the selected sensors requires calibration, after you tap **Start** to start capture, on the next screen, a message at the the bottom of the screen prompts you to begin calibration when the trial starts.
 - b. Calibrate any sensors that are uncalibrated. For more information on calibration, see [Calibrate IMUs, page 11](#).
 - c. When you've finished moving the sensor, to verify your calibration, check that the graphs for all three axes are now at zero.
8. To play a sound when a specified level is reached, in the **Benchmarks** area, enter the required values in the benchmark fields.
The values are indicated by a shaded area on the graph.
9. To record real-time video (recorded at 1920 x 1080), tap the Video icon  at the top right of the screen.
The graph is overlaid on the video. To make the graph easier to see, the controls at the top of the screen enable you to change the thickness of the

Use the Vicon Capture.U app

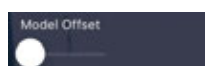
lines (slide right to increase line thickness), the opacity of the graph, and select a dark or light version.



When a subject is visible, the AR figure automatically overlays its image.




10. To offset the skeleton from the tracked subject, use the **Model Offset** slider at the top left of the screen to apply the required offset.

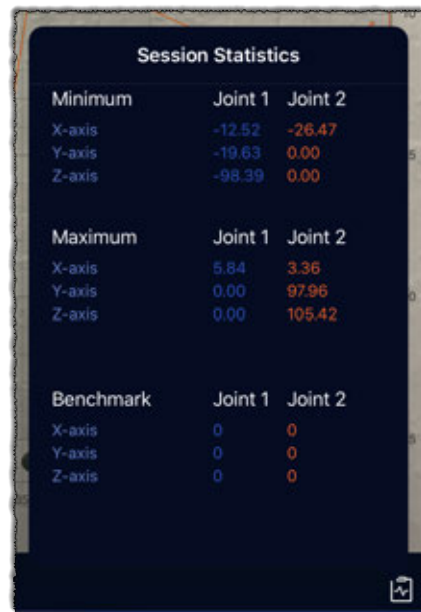


11. To enable or disable 2D and 3D skeleton visualization, select the required **2D Skeleton** and **3D Skeleton** option(s) below the Video icon. You can select 2D, 3D, or both.



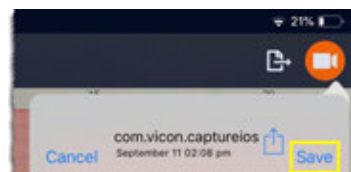
Use the Vicon Capture.U app

12. To see statistics for the capture in real time, tap the Statistics icon , towards the bottom right of the screen.
The minimum and maximum values detected by the sensors are displayed, in addition to how many times the benchmark values have been reached.




Session Statistics		
Minimum	Joint 1	Joint 2
X-axis	-12.52	-26.47
Y-axis	-19.63	0.00
Z-axis	-98.39	0.00
Maximum	Joint 1	Joint 2
X-axis	5.84	3.36
Y-axis	0.00	97.96
Z-axis	0.00	105.42
Benchmark	Joint 1	Joint 2
X-axis	0	0
Y-axis	0	0
Z-axis	0	0

13. When you have captured the required movement, tap **Stop**.
14. From the export icons, select the required export type (file or video):
 - To save a video to your device, tap the Video icon (top right) and then tap **Save**.



Depending on the length of your video, this may take some time. Don't tap Save again, but wait until the video is saved.

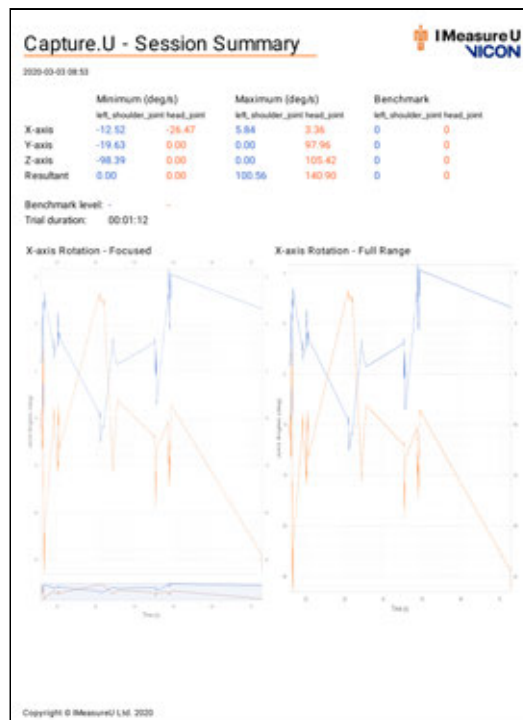


Find saved videos on the Photos tab in the Photos app .

Use the Vicon Capture.U app

- If you choose **Export to PDF**, you can add a title in the PDF preview that is displayed.

The preview shows the information that will be displayed in the exported PDF, with statistics information at the top of the page, a Focused view of the graph (showing the region of interest) and Full Range view (showing the whole range). This lets you check that the graph is as required before you export it. If it isn't, tap **Cancel**, change the **Joints**, **Acceleration** and/or **Rotation** to show a graph of the required view (X, Y, Z, or Resultant) and tap **Export to PDF** again. When you're happy with the preview, tap **Export** at the top to export the PDF.



- If you choose **Export to CSV**, the data values exported can be X, Y and Z, but not Resultant.

- ✓ If you chose to display High G acceleration, High-G and joint data is exported.
- If you chose to display Joints, Low-G accelerometer and gyroscope data is exported with the joint data.

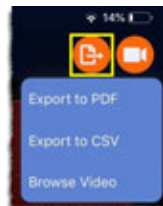
If you export Global Angles, the data exported is in the format: 2D joints (x and y, which are positions in screen space where the joint was tracked via image processing), 3D joint translations (Tx, Ty, Tz,

Use the Vicon Capture.U app

relative to the root joint if model transforms are selected, or relative to the parent joint if local transforms are selected) and in quaternion format: Qx, Qy, Qz, Qr, with Qr being the real component representing the rotation.

	A	B	C	D	E	F	G	H	I	J
1	time_s	2D_x	2D_y	3D_Tx	3D_Ty	3D_Tz	3D_Qx	3D_Qy	3D_Qz	3D_Qr
2	0.077364	0.57571	0.454173	0.042925	-0.37942	0.221128	-0.35412	0.600612	-0.44901	0.558795
3	0.089085	0.575697	0.454235	0.044229	-0.37718	0.225024	-0.35593	0.598309	-0.44913	0.560024
4	0.100145	0.575697	0.454235	0.042341	-0.37655	0.225541	-0.35747	0.594432	-0.4539	0.559323
5	0.111799	0.57515	0.4543	0.039861	-0.37517	0.227034	-0.35551	0.593345	-0.45633	0.559744
6	0.122928	0.574733	0.454362	0.03851	-0.37486	0.227142	-0.35521	0.591667	-0.45837	0.560047
7	0.136051	0.574733	0.454362	0.037834	-0.37384	0.228533	-0.35648	0.590127	-0.46084	0.558837
8	0.173517	0.573941	0.455383	0.036194	-0.37475	0.226662	-0.35604	0.589259	-0.46302	0.558231
9	0.184831	0.573941	0.455383	0.034557	-0.37382	0.227639	-0.35597	0.588285	-0.46573	0.557043
10	0.196563	0.573773	0.456017	0.034135	-0.37288	0.228956	-0.35587	0.587535	-0.46647	0.557285
11	0.207603	0.573636	0.456483	0.033048	-0.37216	0.229735	-0.35517	0.587262	-0.46767	0.557006
12	0.218696	0.573636	0.456483	0.031716	-0.37115	0.230868	-0.35505	0.586758	-0.46982	0.555805

To export either a report (.pdf) or data (.csv), or to browse previously recorded videos, tap the File icon (top right).



- If you choose **Browse Video**, previously captured videos are listed. Tap to select a video, then play a minimized preview by tapping the Play icon at the bottom, or tap **Use** at the top right to play in full-screen mode.

Use the Vicon Capture.U app

Run Activity Widget demo

The Activity Widgets provide pre-defined workflows that have output metrics.

Activity Widgets might be particularly useful in situations where a quick assessment with minimal/no user setup is required, for example, in undergraduate research projects, grass-roots sports, etc.

For a quick demonstration, you can view an animated GIF example. To do this:

1. From the **Activity Widgets**, select **Swimming**.
2. Hold the iOS device in landscape orientation.
3. Tap the screen to run the example through each workflow screen.
4. When you have tapped through all the screens, you are returned to the home screen.

This provides an overview of the workflow for the activity widgets.



To exit the Swimming GIF example at any time, tap **Home**.
You are returned to the Capture.U app home screen.

Further, fully interactive Activity Widgets are planned.

Use the Vicon Capture.U app

Reset IMU sensors

When you select a capture mode and tap **Select Sensors**, if one or more of the sensors needs a reset, it is displayed in orange and is labeled **Reset required**.



This may happen, for example, if you close the app before stopping a capture.

You can reset sensors using the **Reset sensors** option.

To reset sensors:

1. Tap the Settings icon (the cog symbol, bottom right).



Use the Vicon Capture.U app

2. Tap Reset sensors.



3. Select the sensor by doing one of the following:

- Select Tap to Select and then tap the sensor twice.
or
- In the list in the app, tap the sensor name.
or
- At the top of the sensor list, in the Search field, enter the number of the sensor.

The sensor is selected.

Use the Vicon Capture.U app

4. Tap Reset Selected.



The reset sensor(s) are now available and the app returns to the **Settings** window.

5. To close the **Settings** window, tap the **Back** button or tap a blank area of the Capture.U screen.

Use the Vicon Capture.U app

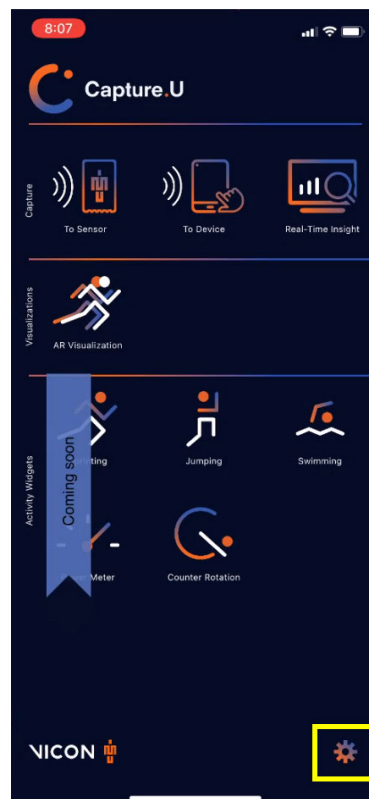
Get help on the Capture.U app

- [Access Support, documentation and legal information, page 57](#)
- [Get help on calibrating IMU sensors, page 58](#)

Use the Vicon Capture.U app

Access Support, documentation and legal information

1. On the Home screen, tap the Settings icon (the cog symbol, bottom right).



2. Tap Help.
3. Tap one of the options:
 - Customer Support Opens the [Vicon Support webpage](https://www.vicon.com/support)⁵.
 - User Guide Access online [user information](https://docs.vicon.com/display/IMU/Use+the+Vicon+Capture.U+app)⁶ about the Capture.U app.
 - How-to Tutorials Opens the [Capture.U tutorial playlist](https://www.youtube.com/playlist?list=PLoL-MR-_fJaCjzWBdev3S8jBnS6DW164u)⁷ on YouTube.
 - Privacy Policy Displays the [Vicon Capture.U legal policy](http://legal.vicon.com/app_privacy_policy.html)⁸.
 - Terms of Use Displays the [Vicon Capture.U terms of use](http://legal.vicon.com/ios_terms_of_use.html)⁹.

To close the Settings window, tap the Back button or tap a blank area of the Capture.U screen.

⁵ <https://www.vicon.com/support>

⁶ <https://docs.vicon.com/display/IMU/Use+the+Vicon+Capture.U+app>

⁷ https://www.youtube.com/playlist?list=PLoL-MR-_fJaCjzWBdev3S8jBnS6DW164u

⁸ http://legal.vicon.com/app_privacy_policy.html

⁹ http://legal.vicon.com/ios_terms_of_use.html

Use the Vicon Capture.U app

Get help on calibrating IMU sensors

You can get help on calibrating IMU sensors from several points in the workflow:

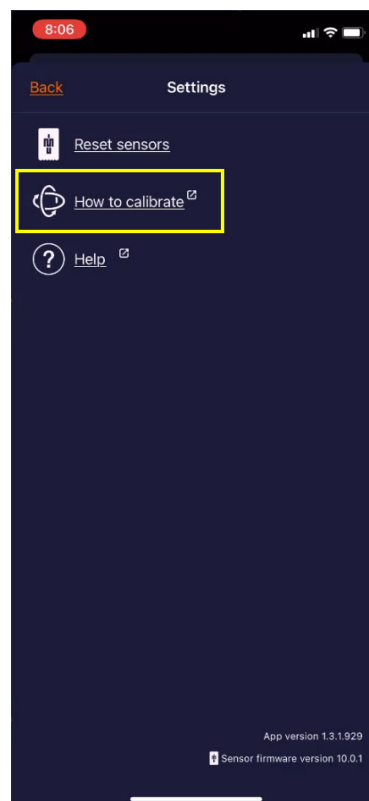
- [Access calibration walkthrough from Settings, page 58](#)
- [Access calibration walkthrough when capturing global angles, page 59](#)

Access calibration walkthrough from Settings

From the Home screen, you can quickly access an animated walkthrough that demonstrates how to calibrate your Blue Trident sensors.

To access the calibration walkthrough from Settings:

1. On the Home screen, tap the Settings icon (the cog symbol, bottom right).
2. From the options, select How to calibrate.



If you need more detailed information, click the **More Info** link at the bottom of the final screen of the walkthrough.

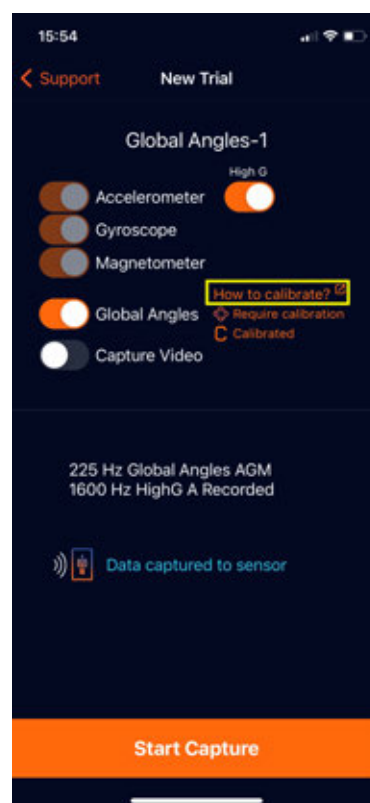
Use the Vicon Capture.U app

Access calibration walkthrough when capturing global angles

Calibration is a necessary step for capturing global angles. You can access an animated walkthrough that demonstrates how to calibrate your sensors when you choose your capture options.

To access the walkthrough for calibrating sensors:

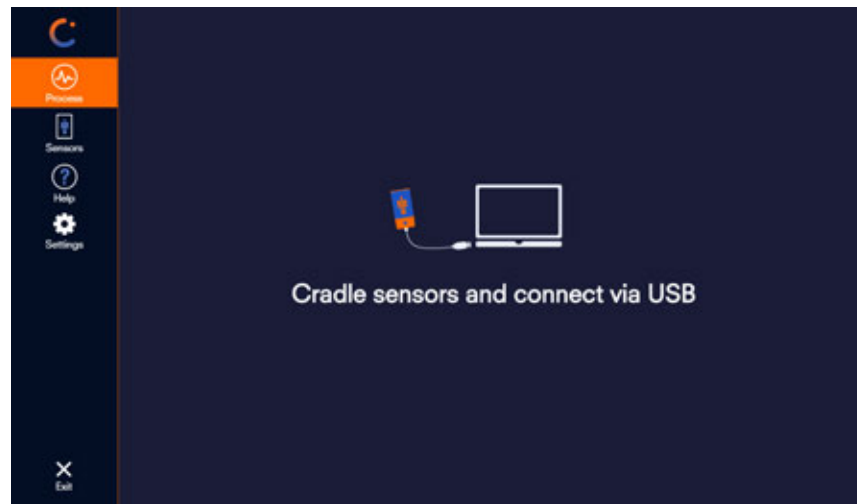
1. Ensure you have selected the To Sensor or To Device capture mode.
2. Start a new trial.
3. Select the options for the data that you want to capture.
4. Next to Global Angles, tap the How to calibrate? link.



If you need more detailed information, click the **More Info** link at the bottom of the final screen of the walkthrough.

Use Vicon Capture.U Desktop

Use Vicon Capture.U Desktop



Vicon Capture.U Desktop lets you download data that you collected with Vicon Blue Trident IMU sensors and access a walk-through and documentation.

From Capture.U Desktop, you can export data as CSV (both raw data export and Aligned CSV, for synchronized sensor data, enabling you to directly compare IMU axes), or X1D (for import to Nexus) for further analysis.

 Watch the Vicon video, [Using Capture.U Desktop](https://youtu.be/_RC28CXasrk)¹⁰ on YouTube.

When using Capture.U Desktop, note that:

- Capture.U Desktop is a fixed size window so can't be minimized or maximized.
- To close Capture.U Desktop, click the Exit button (bottom left of the window).
- Capture.U Desktop 1.1.1 and later is supported by Firmware 9.#. The Capture.U app, versions 1.2 and later, and Nexus 2.10 and later, are supported by Firmware 9.0.4 and later.

¹⁰ https://youtu.be/_RC28CXasrk

Use Vicon Capture.U Desktop

For more information about Capture.U Desktop, see:

- [Before you install Capture.U Desktop, page 62](#)
- [Connect sensors to Capture.U Desktop, page 64](#)
- [Download a trial from the sensors, page 67](#)
- [Edit a downloaded trial, page 92](#)
- [Manage regions of interest, page 93](#)
- [Manage connected sensors, page 101](#)
- [Get help on Capture.U Desktop, page 109](#)

For information about the Capture.U app, see [Use the Vicon Capture.U app, page 5](#).

Use Vicon Capture.U Desktop

Before you install Capture.U Desktop

These topics contain information about the software required to run Capture.U Desktop, and notes about downloading and installing it.

- [Requirements for Capture.U Desktop, page 63](#)
- [Download and install Capture.U Desktop, page 63](#)

Use Vicon Capture.U Desktop

Requirements for Capture.U Desktop

The following requirements are the minimum that are recommended and fully supported:

Capture.U Desktop for Windows

- Windows 10 (64-bit)

Capture.U Desktop for OSX

- macOS Sierra (10.12)

Download and install Capture.U Desktop

To install Capture.U Desktop on your computer:

1. Check that your computer software meets the recommended specification (see [Requirements for Capture.U Desktop, page 63](#)).
2. Download Capture.U Desktop from:
<https://www.vicon.com/software/capture-u/>
3. Unzip and double-click the .exe file to install.

Use Vicon Capture.U Desktop

Connect sensors to Capture.U Desktop

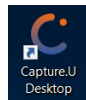
To connect sensors:

1. Insert each Blue Trident sensor into its USB adapter.
2. With the supplied micro-USB cables, connect the adapter(s) to the computer.



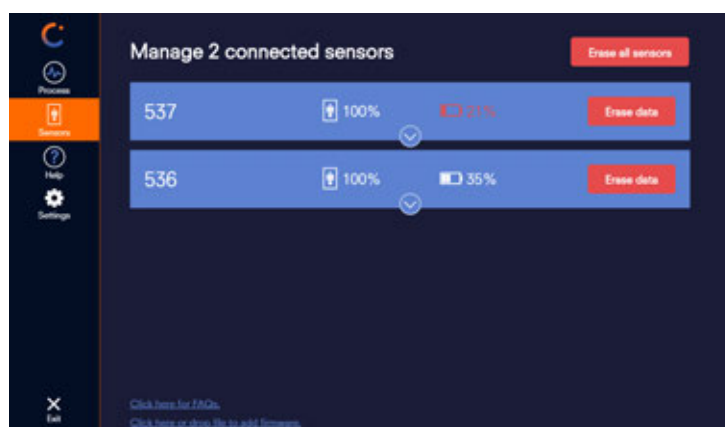
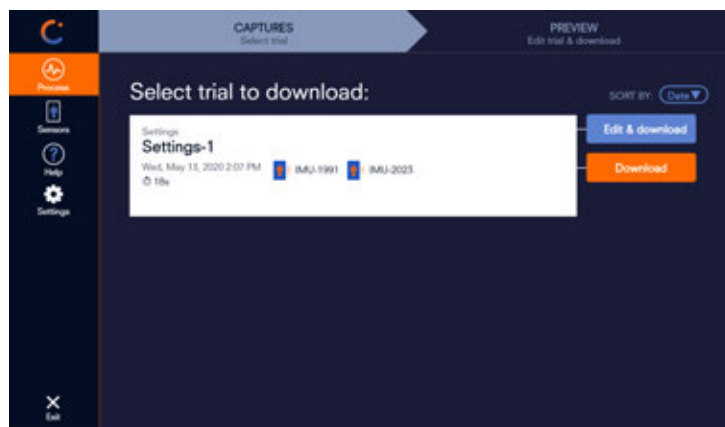
If you can't connect all the sensors that were used for capturing data because you used more sensors than you have USB ports, connect the sensors to the available ports. You will be able to connect the remaining sensors later. For more information, see [Download a trial when some sensors are not connected, page 77](#).

3. On your computer, start Capture.U Desktop.



Use Vicon Capture.U Desktop





4. To confirm that one or more sensor(s) is connected to Capture.U Desktop, click either **Process** or **Sensors**. All connected sensors are displayed.



Use Vicon Capture.U Desktop

Capture.U icons on the Captures tab

The following icons are displayed on the **Captures** tab to indicate the status of the sensors:

Icon	Meaning
 IMU-186	Blue Trident sensor is connected to Capture.U Desktop.
 IMU-4	Blue Trident sensor is not connected to Capture.U Desktop.
 IMU-3	Blue Trident sensor was selected for the trial, but no data has been recorded or data has been erased.
 IMU-31	Blue Trident sensor data has been downloaded for the trial.

Use Vicon Capture.U Desktop

Download a trial from the sensors

The following steps describe how to download a trial from the sensors where all the sensors used for the capture are connected, no data is missing, and you have not yet set up one-click downloading.

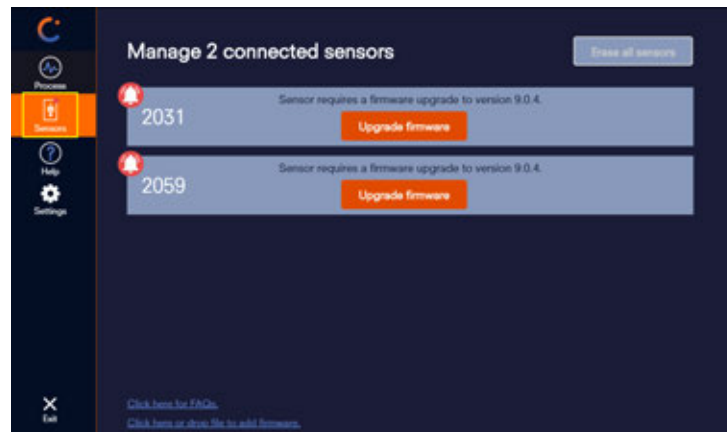
For information on other scenarios, see also:

- [Download a trial when some sensors are not connected, page 77](#)
- [Download a trial when sensor data has been erased, page 81](#)
- [Download with a single click, page 83](#)
- [Export global angles, page 85](#)
- [Export aligned data at a specified rate, page 86](#)
- [Export notes from To Sensor mode, page 89](#)

Use Vicon Capture.U Desktop

To download a trial from the sensors:

1. Ensure your Blue Trident sensors are connected to your computer (see [Connect sensors to Capture.U Desktop, page 64](#)).
If a red circle is displayed in the top right of the **Sensors** symbol, the Blue Trident sensors need a firmware update.



Before attempting to continue, update the firmware (see [Update sensor firmware, page 106](#)).

Note that you can't download trials that were captured with the **To Sensor** capture mode until the sensor firmware has been updated.

2. Click **Process** and on the **Captures** tab, under **Select trial to download**, click **Edit & download** to the right of the required trial.



Use Vicon Capture.U Desktop

The Process tab changes from the Captures tab to the Preview tab, showing preview data.



Note the graph legend at the top right, which enables you to easily identify which curve is related to each sensor. The legend displays an entry for each of the sensors associated with the trial and indicates which color on the graph belongs to which sensor.

An asterisk (*) is displayed when no preview is available for the sensor(s), for example, because data has been deleted from that particular sensor.

- ✓ Preview shows the Resultant acceleration, not the captured onboard data.

Use Vicon Capture.U Desktop

3. If required, before downloading the trial, you can edit the capture to rename it, crop it, add notes, and/or change the Save location:

- To rename the trial, click in the **Session** and/or **Trial** fields.



- To crop the trial, so that you download only the required region:
 - i. Click the **Crop** button at the bottom right of the graph.



- ii. Select the required part of the trial by clicking on the graph then dragging over the relevant region.
The selected region is indicated by a rectangle. If you need to adjust the size of the selected region, drag the sides of the rectangle.

Use Vicon Capture.U Desktop

In the following example, the selected region excludes the start and end of the trial.



iii. Click **Apply** to crop the trial.



Use Vicon Capture.U Desktop

The time of the trial changes to the cropped time.



- To add notes, click on the Notes tab (bottom left).



Use Vicon Capture.U Desktop

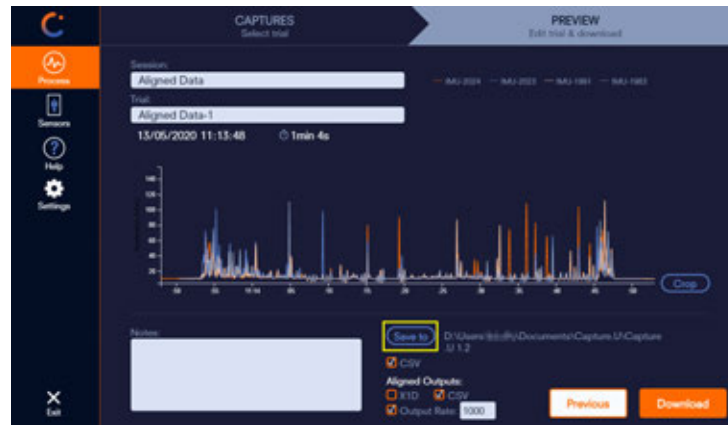
- To choose the file type to download, select from:
 - **CSV (raw data)** The default setting. If your data includes global angles, they are available in the exported `_lowg.csv` files. They are exported as helical angles (`x_deg`, `y_deg`, `z_deg`) and in a quaternion matrix (`qx`, `qy`, `qz`, `qr`).
 - **Aligned outputs:**
 - **X1D** For importing captured **To Sensor** trials into Vicon Nexus. The X1D file consists of `.imu` and `.system` files, and is imported into Nexus. If your data includes global angles, when they are imported into Nexus, you can display them in the Graph pane.
 - **CSV** Exports synchronized sensor data as a CSV file, so that you can directly compare your IMU axes. For example, the low-G (16-G) accelerometer, which captures at 1125 Hz, is synchronized and aligned to the high-G (200-G) accelerometer, which captures at 1600 Hz. The CSV file has the filename suffix `_aligned`. If your data includes global angles, they are exported as helical angles, which are represented as `x_deg`, `y_deg`, `z_deg`, and in a quaternion matrix, represented as `qx`, `qy`, `qz`, `qr`.
 - **Output Rate** The rate to which exported CSV data is aligned. Select **Output Rate** and enter a number between 25 and 3200 Hz. If you don't select the Output Rate, the data is aligned to the highest capture rate (ie, high-G acceleration), so all data aligns to 1600 Hz.
- The output rate applies to both the aligned CSV and X1D file to align all data to this rate.



Use Vicon Capture.U Desktop

For more information on setting the output rate, see [Export aligned data at a specified rate, page 86](#).

- To change the location for downloaded trials, click **Save to**. This displays the File Explorer, enabling you to select the required folder.



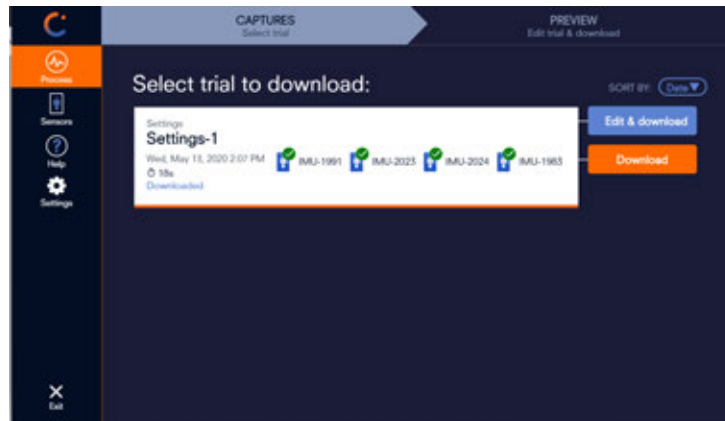
- When you have finished editing the trial, click **Download** to save the trial data to your computer.



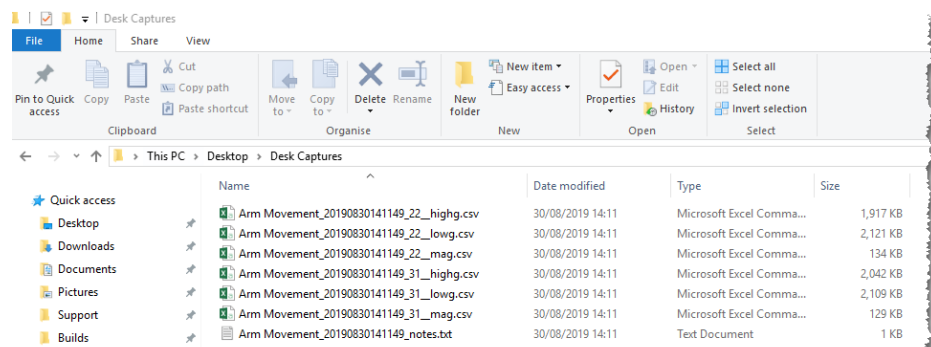
An orange progress bar indicates the download status.

Use Vicon Capture.U Desktop

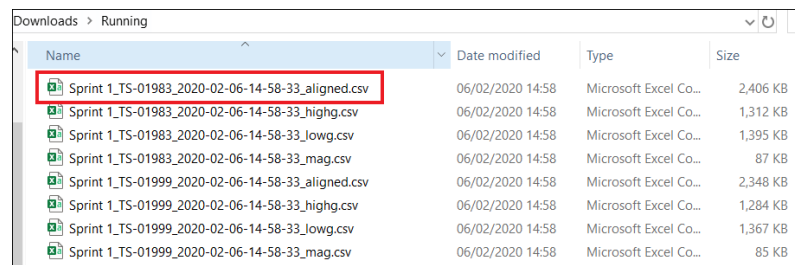
When the trial has finished downloading, the trial is labeled Downloaded and green check marks are displayed on each sensor.



The trial data and any notes you created are saved in the Save to folder.

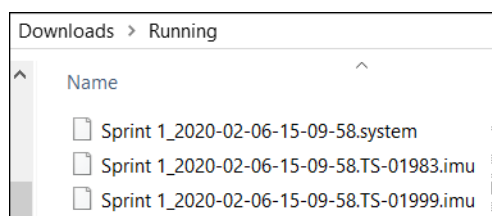


If you chose the Aligned CSV export option, all the synchronized and aligned CSV files include _aligned on the CSV export.

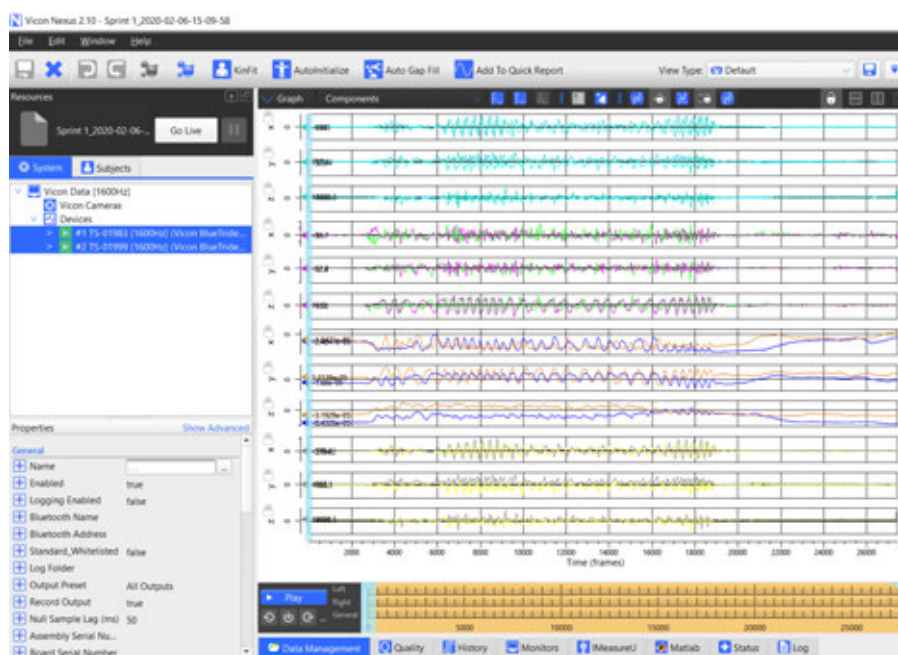


Use Vicon Capture.U Desktop

If you chose X1D export option, the X1D file is exported as *.imu* and *system* files.



You can then load this file into Nexus.



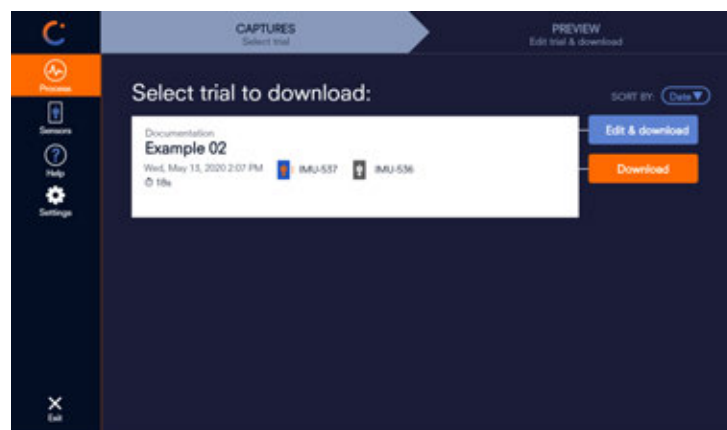
Use Vicon Capture.U Desktop

Download a trial when some sensors are not connected

If you can't connect all the sensors that were used for capturing data because you used more sensors than you have USB ports, connect the sensors to the available USB ports. You will be able to connect the remaining sensors later.

To download a trial when some sensors are not connected:

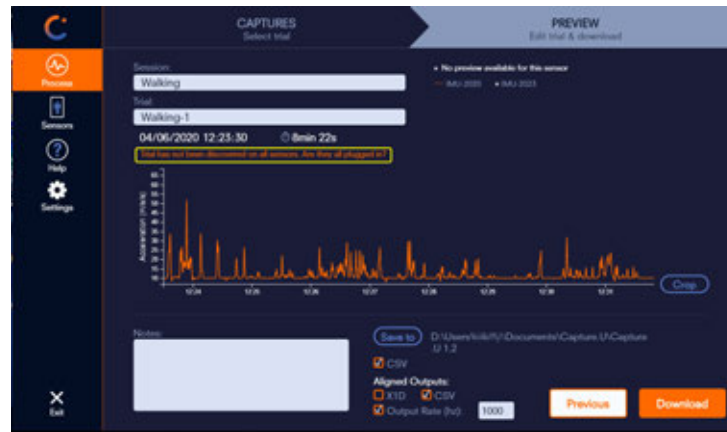
1. Connect sensors to the available USB ports on your computer (see [Connect sensors to Capture.U Desktop, page 64](#)).
2. Select **Process** and on the **Captures** tab, notice that connected sensors are displayed in blue and sensors that are not connected are displayed in gray. This example shows a trial that was captured with two sensors, but with only one of the sensors connected.



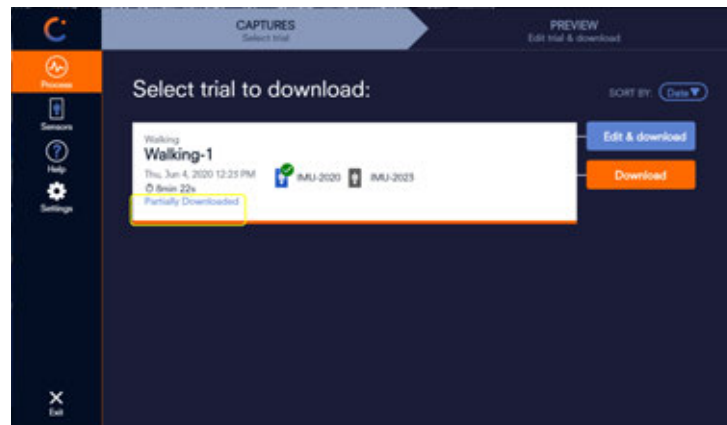
3. Under **Select trial to download**, click **Edit & download** to the right of the required trial.

Use Vicon Capture.U Desktop

On the Preview tab, a message warns you that not all sensors are connected.

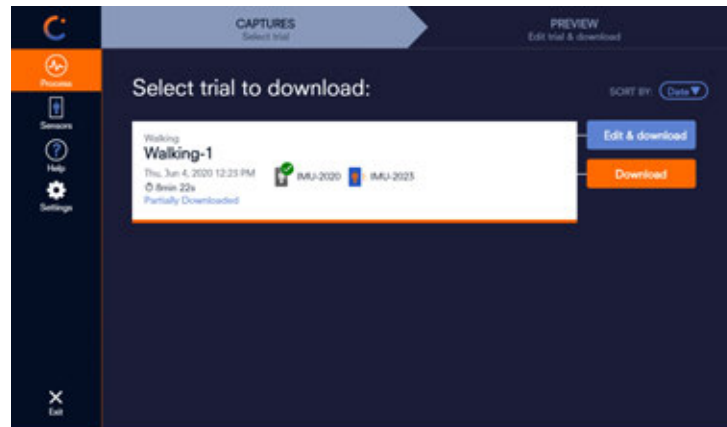


4. Edit the trial if required (see [Step 3, page 70](#) in *Download a trial from the sensors*). To ensure data formatting is consistent, any cropping of the data of the connected sensors is automatically applied when you connect the remaining sensors.
5. When you have finished any editing, click **Download**.
When the trial has been downloaded, it is labeled **Partially Downloaded**.



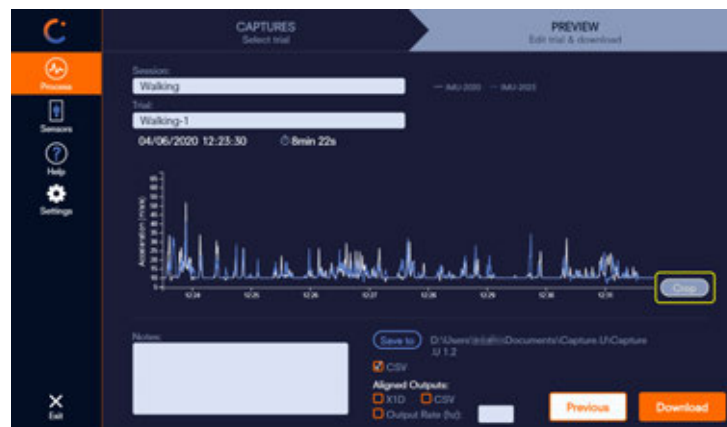
Use Vicon Capture.U Desktop

6. Connect the remaining sensor(s) to the computer.



7. Select the trial.

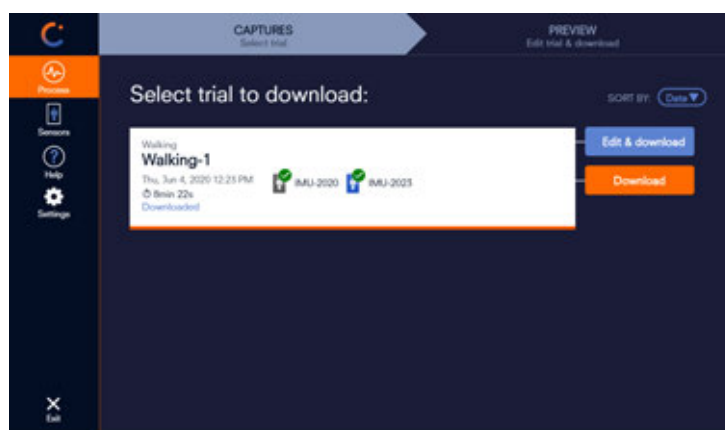
On the **Preview** tab, notice that the **Crop** button is unavailable, to ensure the data is formatted in the same way as the previously connected sensors. If you cropped the trial when you connected the first set of sensors, the trial is automatically cropped in the same way as the previously connected sensors.



8. Click Download.

Use Vicon Capture.U Desktop

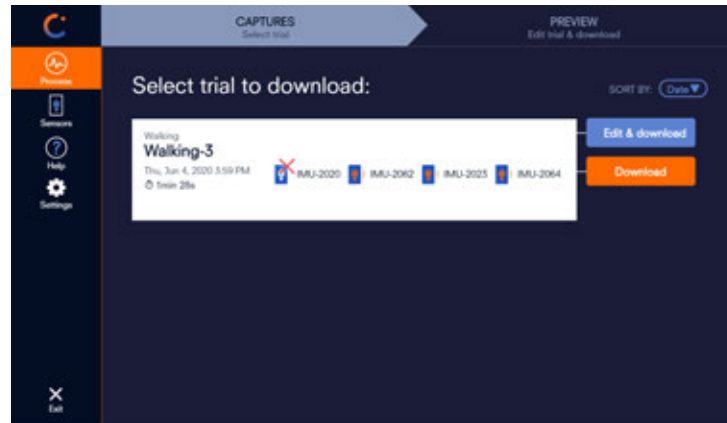
When data from all the sensors has been downloaded for the associated trial, green check marks are displayed for each sensor.



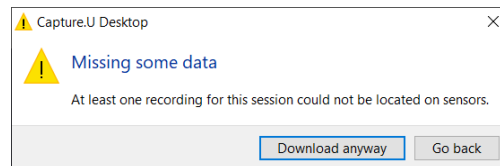
Use Vicon Capture.U Desktop

Download a trial when sensor data has been erased

1. If you deleted data from one or more sensors that were used in a trial before downloading the data, when you connect the relevant sensor(s), any sensor with deleted data is displayed with a red cross on the Captures tab:



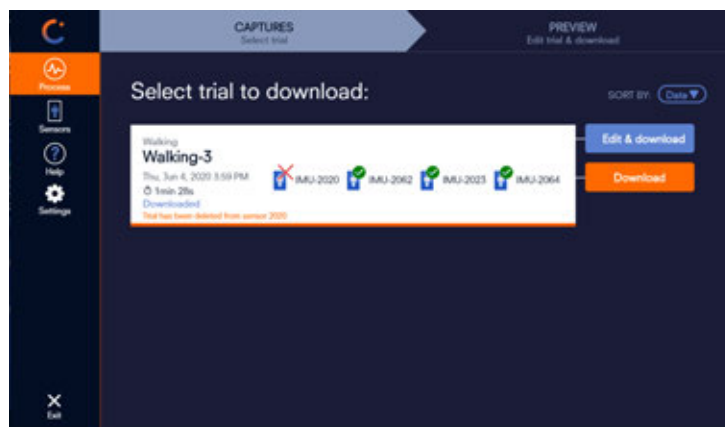
You can still download data from the other sensors, but when you select the trial, a message warns you that some data is missing.



2. To continue, select Download anyway.
3. Edit the trial if required (see [Step 3, page 70](#) in *Download a trial from the sensors*) and then click Download.

Use Vicon Capture.U Desktop

When the trial has been downloaded for all sensors, on the **Captures** tab, you are warned that the trial has not been discovered on all the required sensors.



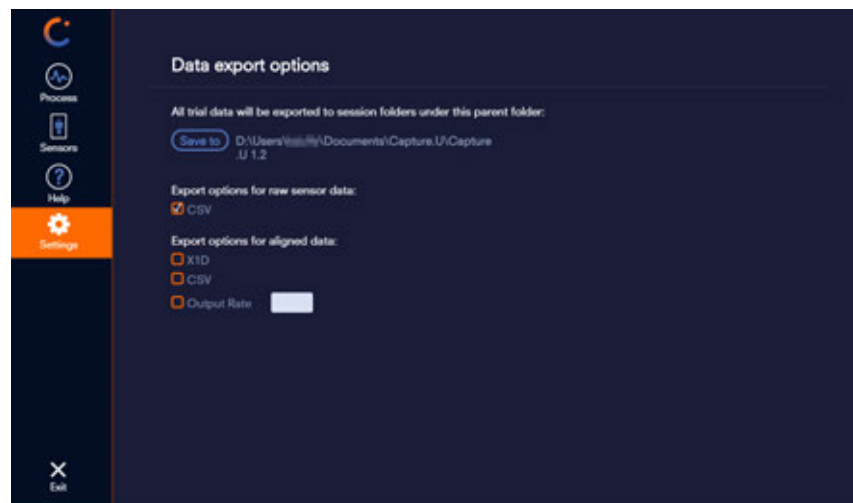
Use Vicon Capture.U Desktop

Download with a single click

When you have captured trials in To Sensor mode, you can download your data with a single click to a location and format you have previously chosen. You first set the required download options in the **Settings** tab, and then go to the **Process** tab and click the **Download** option for the required trial(s).

To specify the options for one-click download:

- On the **Settings** tab, set the data export options, which will be used for one-click download. These include the **Save To** location and the file format options for data export (e.g. X1D and CSV).



To change the file type to download, select from:

- **CSV** The default setting
- **Aligned outputs:**
 - **X1D** For importing captured To Sensor trials into Vicon Nexus. The X1D file consists of .imu and .system files, and is imported into Nexus.
 - **CSV** Exports synchronized sensor data as a CSV file, so that you can directly compare your IMU axes. For example, the low-G (16-G) accelerometer, which captures at 1125 Hz, is synchronized and aligned to the high-G (200-G) accelerometer, which captures at 1600 Hz. The CSV file has the filename suffix *_aligned*.
 - **Output Rate** The rate to which exported CSV data is aligned. Select **Output Rate** and enter a number between 25 and 3200 Hz. If you don't select the Output Rate, the data is aligned to the highest capture rate (ie, high-G acceleration), so all data aligns to 1600 Hz.

Use Vicon Capture.U Desktop

The output rate applies to both the aligned CSV and X1D file to align all data to this rate.

For more information on setting the output rate, see [Export aligned data at a specified rate, page 86](#).

To select one-click download for data export:

- On the Process tab, select the Download option for each capture To Sensor session.



The aligned data is generated in a CSV file with the filename suffix *_aligned*. If you selected X1D, an X1D file is generated (consisting of *.imu* and *.system* files, which are imported into Nexus).

Subsequent exports from this session are exported using the options you chose on the **Settings** tab.

i When you use one-click download, you can't trim the data. If you need to trim the data, use the **Edit & download** option. When you select **Edit & download**, the settings information is populated into the Preview pane.

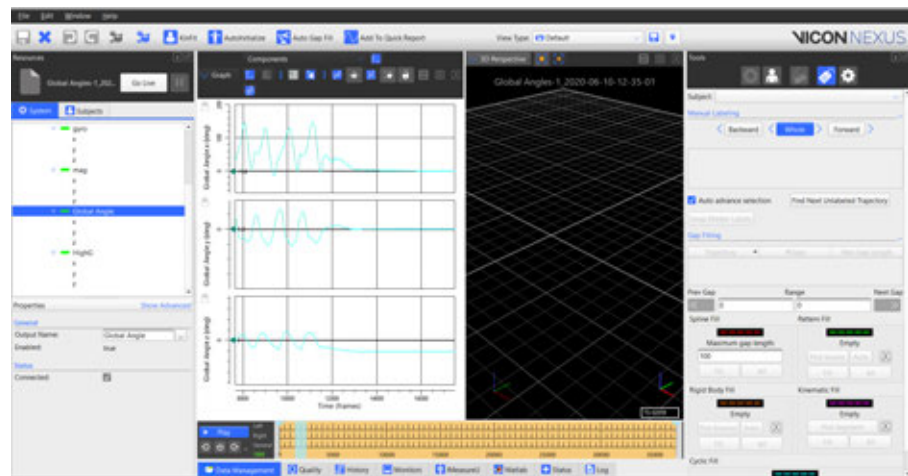
Use Vicon Capture.U Desktop

Export global angles

Capture.U Desktop enables you to export global angles that you captured in To Sensor mode with the Capture.U app. Global angles are automatically included in the **normal data export process**, [page 68](#).

You can export global angles data in all the usual data export formats:

- **CSV (raw data)** The global angles are available in the exported `_lowg.csv` files. They are exported as helical angles (`x_deg`, `y_deg`, `z_deg`) and in a quaternion matrix (`qx`, `qy`, `qz`, `qr`).
- **Aligned Outputs** (at either a specified output rate or the default rate):
 - **CSV (aligned)** The global angles are exported as helical angles, which are represented as `x_deg`, `y_deg`, `z_deg`, and in a quaternion matrix, represented as `qx`, `qy`, `qz`, `qr`.
 - **X1D (for import into Nexus)** When imported into Nexus, global angles can be visualized in the Graph pane and in the 3D Perspective view.



Use Vicon Capture.U Desktop

Export aligned data at a specified rate

You can choose the rate at which your aligned CSV data is exported. For example, if you specify 1000 Hz, all data exported is aligned to 1000 Hz.

You can do this in either of these ways:

- [Set the default output rate for subsequent downloads, page 87.](#)

or

- [Set the output rate for a single download, page 88.](#)

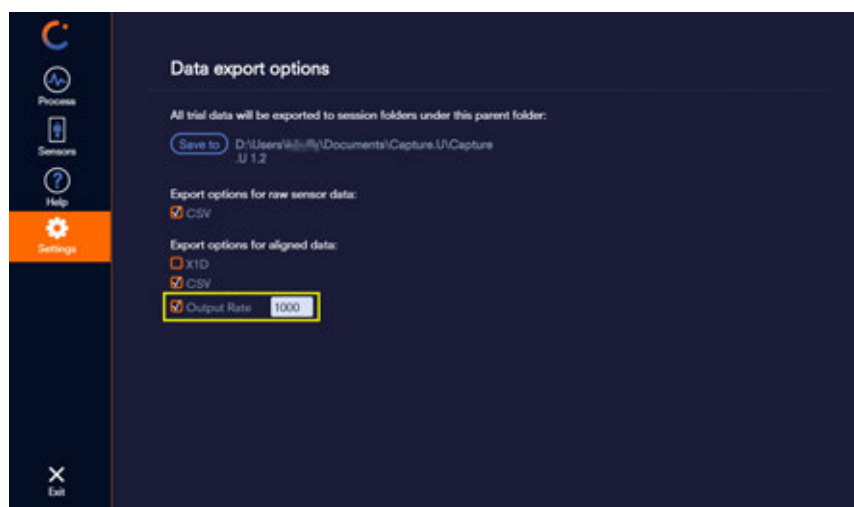
The Output Rate applies to both aligned CSV and X1D files to align all data to this rate.

If you don't set the Output Rate, the data is aligned to the highest capture rate (ie, high-G acceleration), so all data aligns to 1600 Hz.

Use Vicon Capture.U Desktop

Set the default output rate for subsequent downloads

1. On the **Settings** tab, select the required export options (for example, the location, raw data (CSV), and aligned data (X1D and CSV)).
2. Select **Output Rate** and in the text box, enter a value between 25 and 3200 Hz.

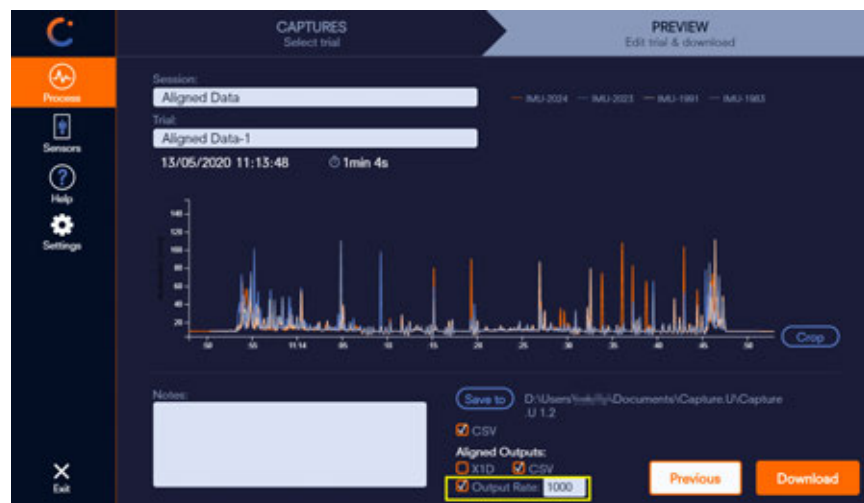


The specified output rate is applied to all trials subsequently downloaded, unless you change the settings, either on the **Settings** tab again or via **Edit & download** (see [Set the output rate for a single download, page 88](#)).

Use Vicon Capture.U Desktop

Set the output rate for a single download

1. On the Process tab, select the **Edit & download** option for the required trial. The Preview tab is displayed, showing the currently specified options for Aligned Outputs:
 - If you haven't set the default output rate (see [Set the default output rate for subsequent downloads, page 87](#)), the Aligned Output options are not selected and the Output Rate is blank.
 - If you have set the default output rate, the values you selected populate the Aligned Outputs options and you can choose to either leave them as they are or change them.
2. Set the required export options (for example, specify the required **Save to** location, raw data (CSV), and aligned data (X1D and CSV)).
3. Select **Output Rate** and in the text box, enter a value between 25 and 3200 Hz.



4. Click **Download** to apply the specified output rate to the selected trial.

Use Vicon Capture.U Desktop

Export notes from To Sensor mode

In Capture.U Desktop, you can review, edit and export as a .txt file any notes that you made during or after capturing data in the To Sensor mode of the Capture.U app.

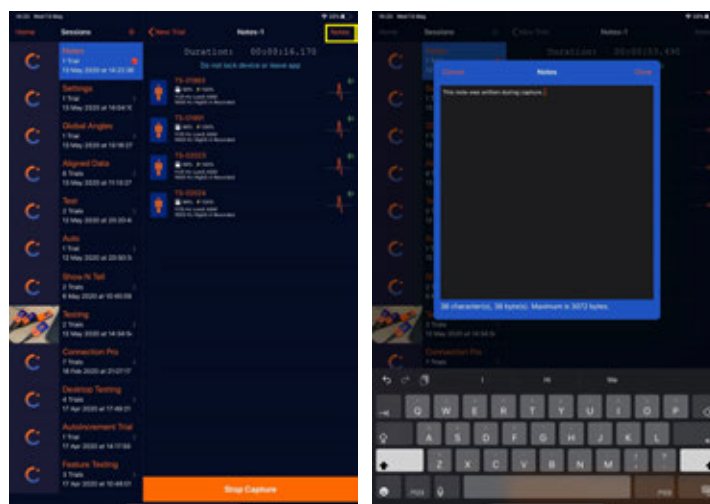
Notes that are written to the sensor populate the **Notes** tab on the **Preview** tab. Any notes that you add post-capture in the Capture.U app are synced to the sensor, as long as the sensor is within range. You can also export these post-capture notes from Capture.U Desktop.

Note that:

- Changes made to the notes in Capture.U Desktop are not synced to the sensor, so they are not retained after you exit the Capture.U app.
- You can continue to export notes directly from the Capture.U app, as previously.

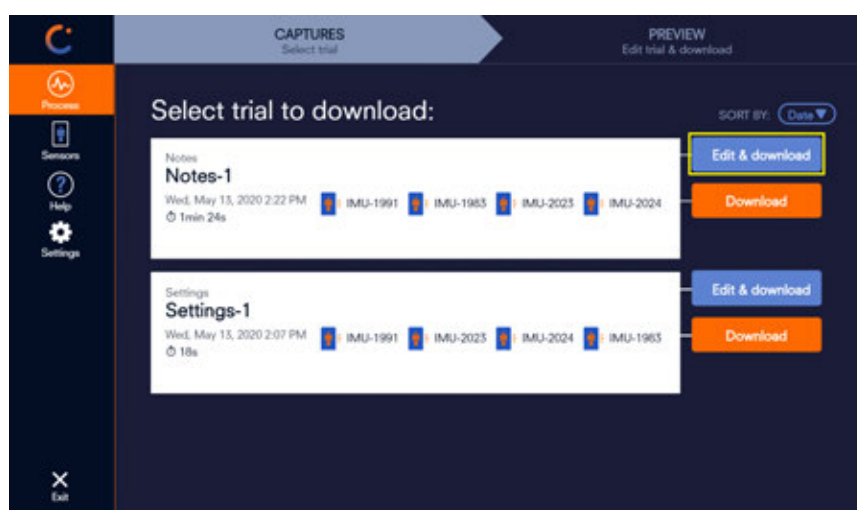
To export notes from the Capture.U app:

1. In the Capture.U app, create your note(s) during or after capture (remember that you can only add notes after capture if the sensors are still within Bluetooth range).



Use Vicon Capture.U Desktop

2. In Capture.U Desktop, on the **Captures** tab, to the right of the trial that you want to download:
 - To download your notes without making any further changes, click **Download**.
 - or
 - To edit the notes or make other changes to the data, click **Edit & download**.

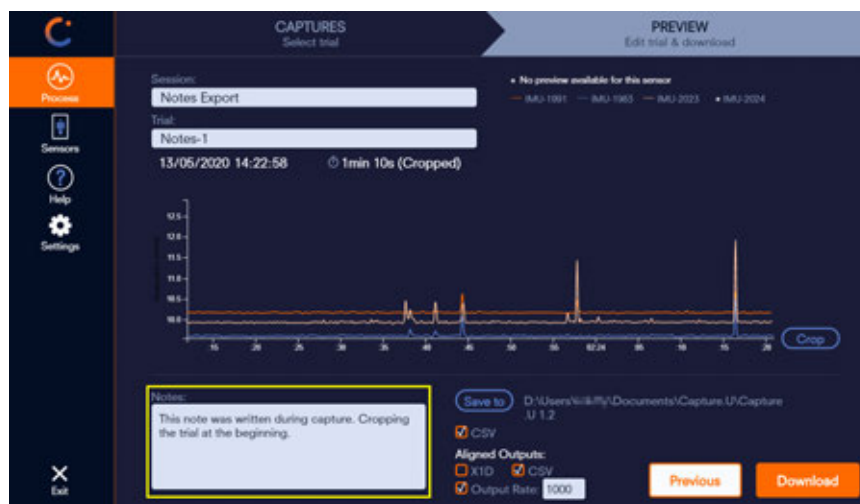


On the **Preview** tab, the notes you made in the Capture.U app are displayed on the **Notes** tab.

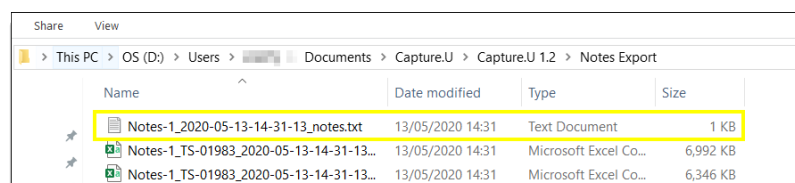


Use Vicon Capture.U Desktop

3. Make any required changes, such as cropping the trial and editing the notes.



4. When you click Download, a .txt file containing the notes is exported to the Save to location.



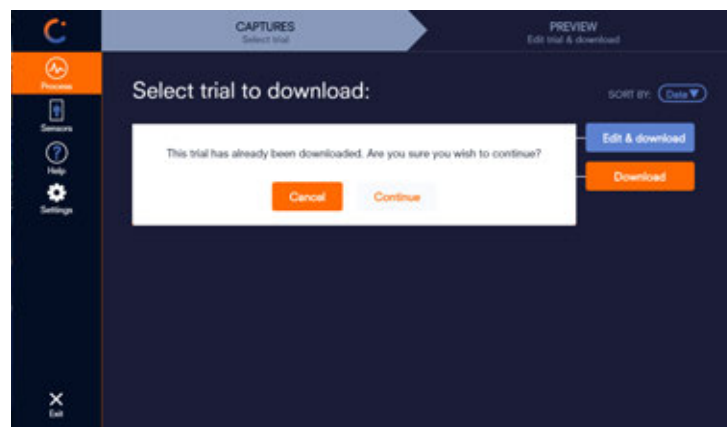
Use Vicon Capture.U Desktop

Edit a downloaded trial

To change a trial that you have downloaded (for example, if you want to crop the trial), provided that you haven't deleted the data from the sensor, you can re-download the trial and make the required changes.

1. With the relevant sensor connected, select **Process** and on the **Captures** tab, select the required trial.

A message notifies you that this session has already been downloaded and asks if you want to continue.



2. Click **Continue**.

You can then edit the trial as required and download in the same way as the original download (see [Download a trial from the sensors, page 67](#)).

i If you haven't changed the session/trial name and Save location, the trial export files are only differentiated by their download time.

Use Vicon Capture.U Desktop

Manage regions of interest

Capture.U Desktop enables you to view and, if required, to edit or delete regions of interest that were generated during data captured to sensor, prior to data export.

You can also create new regions of interest in Capture.U Desktop.

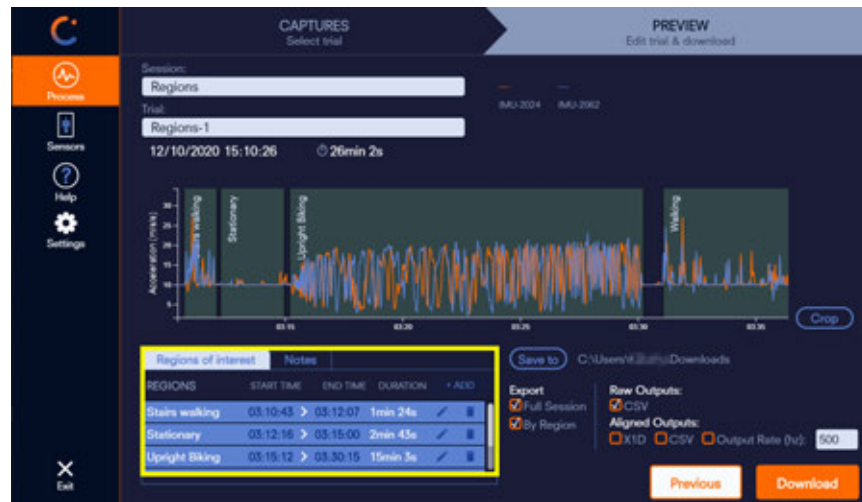
View and edit regions of interest

1. Ensure your sensors are connected to Capture.U Desktop (see [Connect sensors to Capture.U Desktop, page 64](#)), and that you've selected the relevant trial and clicked Edit & download (see [Download a trial from the sensors, page 67](#)).
2. On the **Preview** tab, any regions of interest that were defined during capture are displayed, both within the graph and on the **Regions of interest** tab at the bottom left.



Use Vicon Capture.U Desktop

- To edit a region of interest, either click its name on the Regions of interest tab or click the relevant Edit (pencil) icon .



- In the Edit region of interest dialog box, you can change the Start time and End time. To do this, either:
 - Enter new times in the Start time and End time boxes or
 - On the graph, drag the start and end time.



Note that if necessary, the regions can overlap.

- When you're happy with your changes, click **Save**.

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Delete regions of interest

You can delete regions of interest that were created during capture and any created later, with Capture.U Desktop.

To delete regions of interest:

- On the Regions of interest tab, go to the relevant line and click the trash icon.

⚠ As soon as you click the trash icon, the region of interest is immediately deleted with no further warning. You can recover deleted regions of interest only if they were created during data capture. To do this, exit Capture.U Desktop and restart.



Use Vicon Capture.U Desktop

Create regions of interest

You can create regions of interest in Capture.U Desktop, whether or not you created any during the original capture to sensor. If necessary, the regions you create can overlap existing regions.

1. On the Regions of interest tab, click +ADD.



2. In the Add region of interest dialog box, enter a name for the region of interest and specify a start and end time.

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To do this, either:

- Enter new times in the **Start time** and **End time** boxes
or
- On the graph, drag to select the region.



3. When you've finished adding the new region of interest, click **Save**.
The newly created region of interest is displayed on the graph and as a new line on the **Regions of interest** tab.

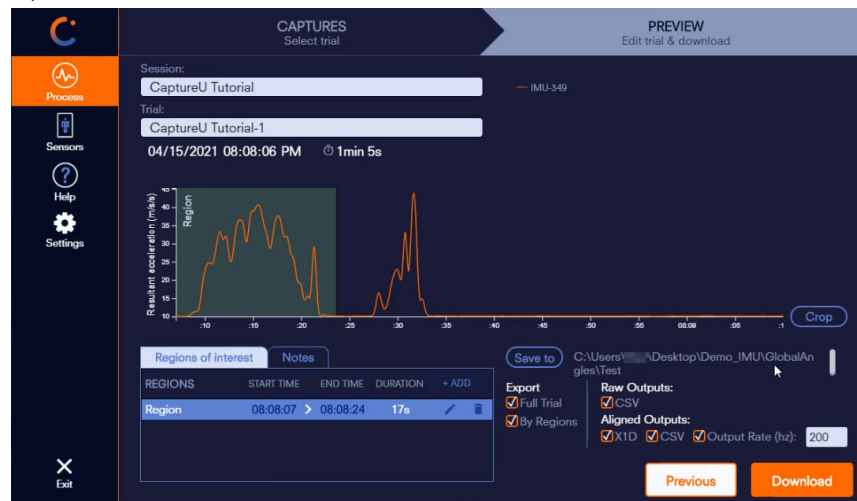
Use Vicon Capture.U Desktop

Export regions of interest

You can export regions of interest either by using the **Edit & download** option, or by ensuring the settings are as required on the **Settings** tab and then using the one-click **Download** option.

To export regions of interest via **Edit & download**:

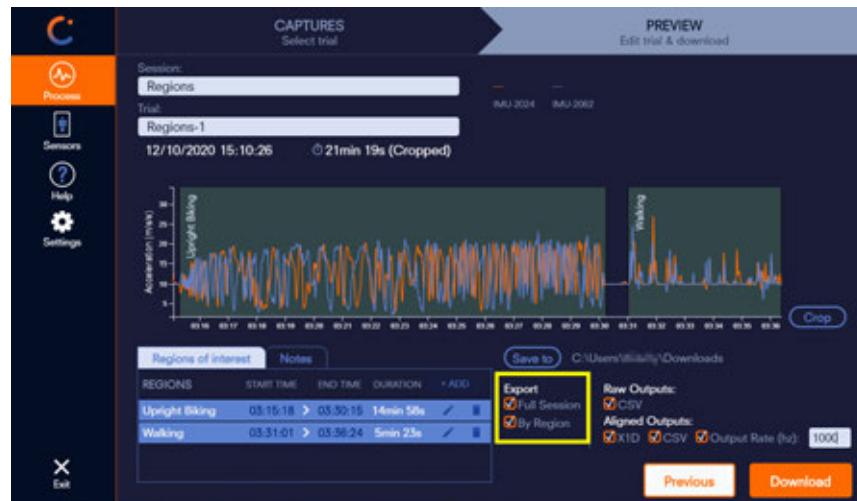
1. Ensure your sensors are connected to Capture.U Desktop (see [Connect sensors to Capture.U Desktop, page 64](#)), and that you've selected the relevant trial and clicked **Edit & download** (see [Download a trial from the sensors, page 67](#)).



2. On the **Preview** tab, go to the **Export** settings.

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3. In the Export settings, choose either Full trial or By regions, or both.



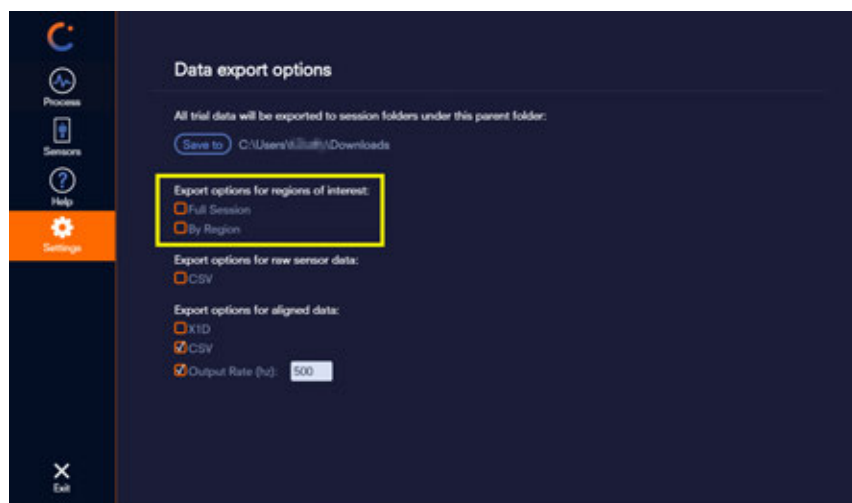
Select the relevant options to export the required output from your trial:

- Full Trial (exports all the trial data, including any regions of interest, although if the trial is cropped, only data from the non-cropped region is exported)
 - Raw data Exports the full trial raw data (may be a cropped trial)
 - Aligned data Exports the full trial raw data (may be a cropped trial) aligned to the specified output rate (Hz)
 - X1D Exports the full trial raw aligned data (may be a cropped trial) at the specified output rate (Hz). Note that no region of interest information will be displayed in Vicon Nexus.
 - _notes.txt Provides trial information (data capture timestamp, exported cropped trial information, timestamps for each region of interest)
 - By Regions (exports the trial data from any regions of interest only)
 - Raw data Exports the raw data from regions of interest only
 - Aligned data Exports the aligned raw data from regions of interest only
 - _notes.txt Provides trial information (data capture timestamp, exported cropped trial information, timestamps for each region of interest)
4. When you have finished specifying the required export and output settings, click Download.

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To export regions of interest via one-click Download:

If you're using the Download option to export regions of interest (see [Download with a single click, page 83](#)), before you click Download, make sure the required options are selected in the Settings.



For details of what can be exported, see the previous [Step 3, page 99](#).

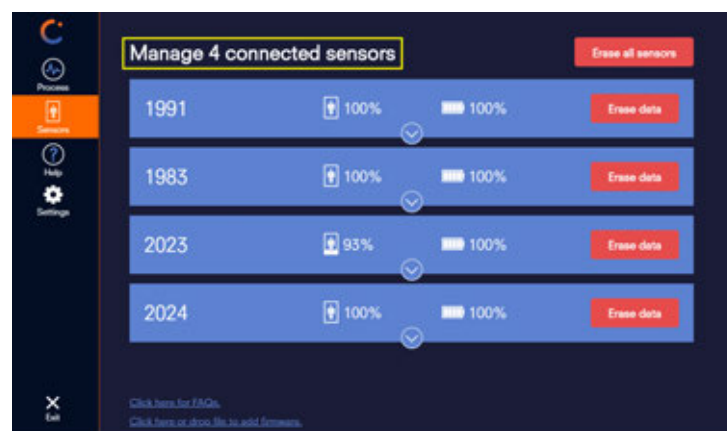
Use Vicon Capture.U Desktop

Manage connected sensors

To manage connected sensors, in the main Capture.U Desktop window, click **Sensors**.

From here you can update the firmware (see [Update sensor firmware, page 106](#)), delete data from the sensors (see [Erase data from sensors, page 103](#)), and display detailed information about each one.

At the top left of the window, the number of connected sensors is displayed.



For each connected sensor, the following information is displayed (left to right):

- Sensor ID number
- Percentage of storage available for the sensor
- Battery percentage. Connected sensors are charged if they are not already fully charged.

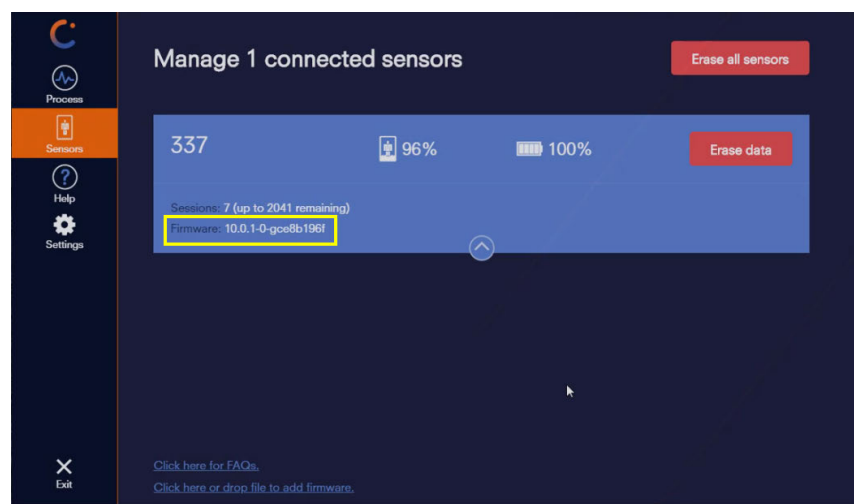
For further information, click the downward arrow.



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The following details are displayed:

- Sessions: Number of recorded trials on the sensor
- Firmware version



Use Vicon Capture.U Desktop

Erase data from sensors

To remove unwanted data from your sensors, you can delete it in one of these ways:

- [Erase data from a single sensor, page 104](#)
- [Erase data from all connected sensors, page 105](#)

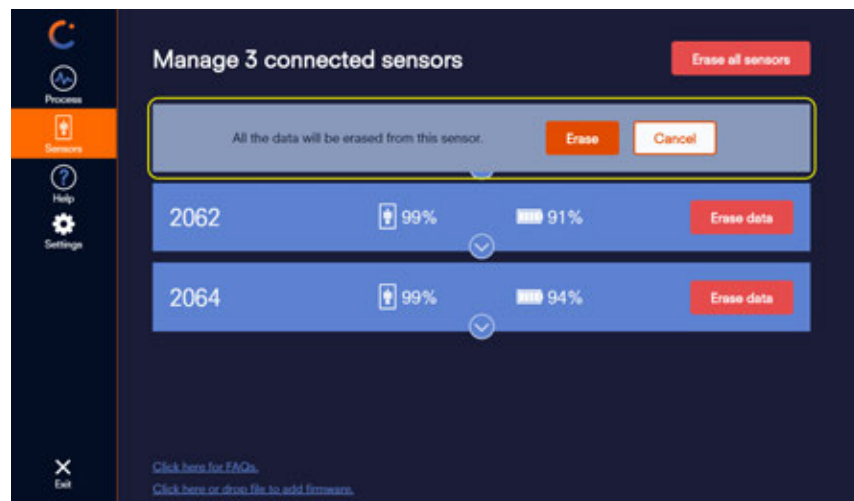
Use Vicon Capture.U Desktop

Erase data from a single sensor

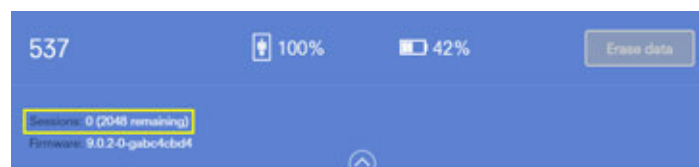
To erase data from one or more sensors, you can delete the data using the relevant Erase button on the **Sensors** tab.

To erase data from a sensor:

1. Ensure the sensor(s) from which you want to erase data is connected.
2. Click **Sensors** and then for the required sensor, click **Erase data**.
A message notifies you that all data will be erased from the sensor and you're given the opportunity to confirm or cancel.



3. To delete the data from the sensor, click **Erase**.
When the data has been erased from the sensor, the **Erase** button is disabled and if you click the down arrow, you can see that the **Sessions** information now shows a zero.



Use Vicon Capture.U Desktop

Erase data from all connected sensors

To erase sensor data from all connected sensors:

- On the Sensors tab, click Erase all sensors.



- i** If the firmware for any of the selected sensors needs updating, you are alerted that the data cannot be not erased from those sensors until the firmware is updated.

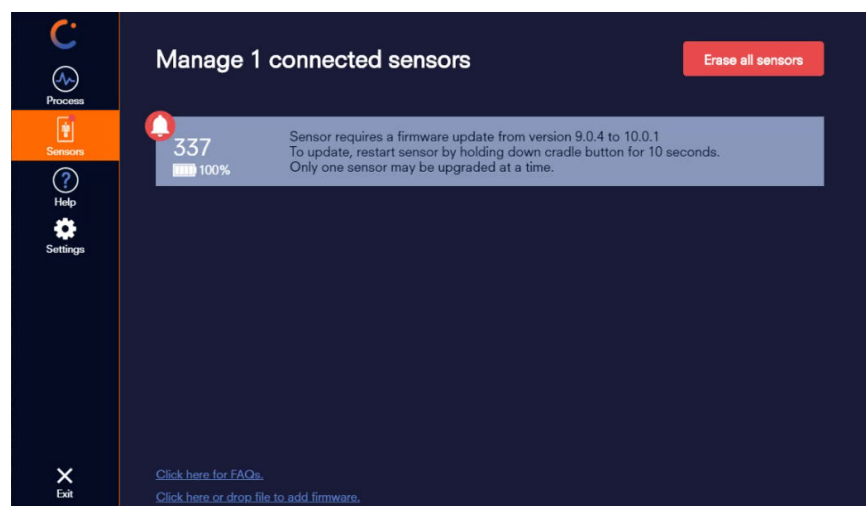
Use Vicon Capture.U Desktop

Update sensor firmware

Capture.U Desktop enables you to upgrade your Blue Trident sensors to the latest firmware.

To update sensor firmware:

1. If your sensors aren't plugged in, connect them to the computer (see [Connect sensors to Capture.U Desktop, page 64](#)) and launch Capture.U Desktop. To let you know that firmware needs to be upgraded, the Sensors icon displays a red circle at the top right.
2. Click **Sensors** on the left.
On the **Sensors** tab, the connected sensors display a red circle at the top left of each connected sensor display and Capture.U Desktop informs you that the connected sensor(s) require a firmware upgrade.

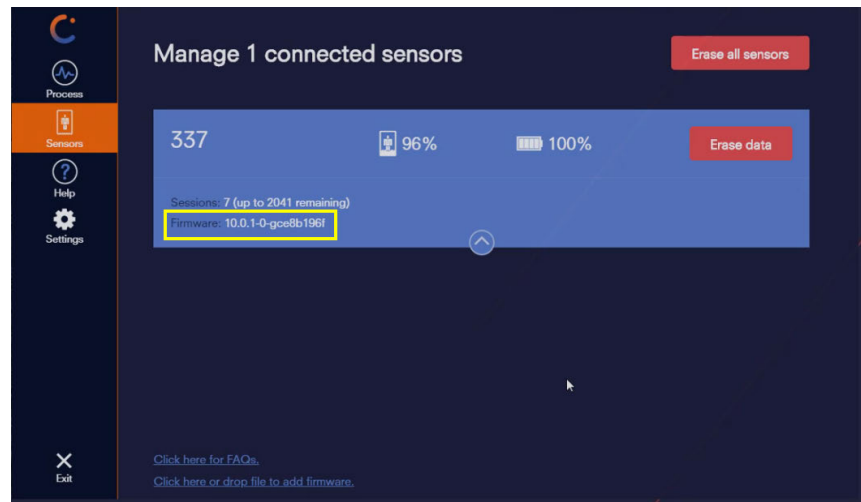


⚠ Downgrading sensor firmware

- If you're using second-generation Blue Trident sensors, **do not downgrade your firmware**, even if prompted to do so by Capture.U Desktop.
- If you have first-generation Blue Trident sensors, you can safely downgrade their firmware, if necessary. However, as Capture.U 1.3.1 Desktop is not compatible with firmware earlier than 10.#, if you downgrade the firmware from version 10, you must uninstall Capture.U 1.3.1 and use an earlier version of Capture.U.

Use Vicon Capture.U Desktop

- Follow the onscreen instructions by restarting each sensor, one at a time, holding down the button on the sensor's cradle for 10 seconds.
The status changes to **Waiting for sensor to restart for firmware update** and then **Firmware update in progress**, ending with a **Success!** status and a final reboot of the sensor.
- When the firmware has finished updating, you can expand the displayed information to view the updated firmware number on the **Sensors** tab.



- If other sensors need to have their firmware upgraded, repeat the above steps for each one.

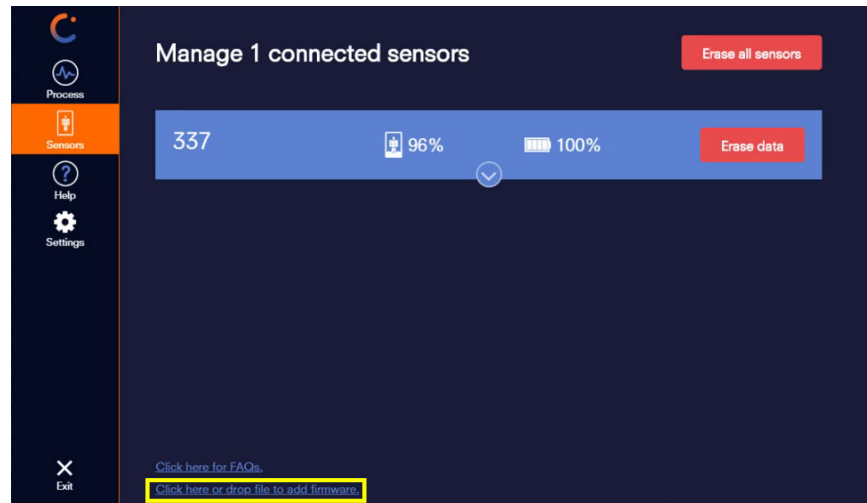
✓ If one or more sensors fails to upgrade, try disconnecting the sensor(s) from the computer and entering bootloader mode. To do this, hold down the USB adapter button on the sensor for at least 10 seconds. Release the button and wait 60 seconds for the sensor to exit bootloader mode, then reconnect and relaunch Capture.U Desktop. Retry upgrading the firmware as described above.

- You can now download trials that were captured using the **To Sensor** capture mode (see [Download a trial from the sensors](#), page 67 and [Capture to sensor](#), page 18).

Use Vicon Capture.U Desktop

Load updated firmware (10.#) to upgrade Blue Trident sensors

If new Blue Trident sensor firmware becomes available (that is, firmware later than 10.0.1), add this file to Capture.U Desktop either by clicking or dropping the firmware file onto the **Sensors** tab.



To revert back to 10.0.1 firmware, remove the added firmware file by deleting the firmware file located in:

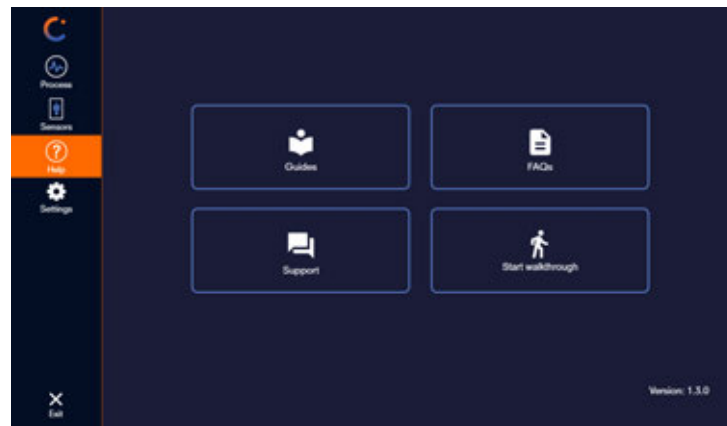
`C:\Users\Username\AppData\Roaming\Capture.UDesktop\firmware`

Use Vicon Capture.U Desktop

Get help on Capture.U Desktop

To get help on using Capture.U Desktop:

1. Start Capture.U Desktop and click **Help**.



2. Choose from the following options:

- **Guides*** Visit the [Vicon IMU documentation web page](https://docs.vicon.com/display/IMU/IMU+documentation)¹¹.
- **FAQs*** Visit the [Vicon FAQs web page](https://www.vicon.com/faqs/)¹².
- **Support*** Visit the [Vicon Support web page](https://www.vicon.com/support/)¹³.
- **Start walkthrough.** Launch a quick tour of Capture.U Desktop. To end the walkthrough at any stage, click **Help** and then click **End walkthrough**.
- **Version check.** Click the version number (bottom right) to display more detailed version information about Capture.U Desktop.

* Internet access required

¹¹ <https://docs.vicon.com/display/IMU/IMU+documentation>

¹² <https://www.vicon.com/faqs/>

¹³ <https://www.vicon.com/support/>