

Pro Fusion User Manual



Pro Fusion User Manual

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1 Introduction

Tobii Pro Fusion is a compact, high performance data collection solution that you can take into the field. Use Pro Fusion when your research takes you to locations and to subjects that would otherwise be hard to bring to the lab. You can collect data in schools, hospitals, libraries, and other locations where your subjects are easier to recruit.

With sampling frequencies of up to 250 Hz, two eye tracking cameras, and two pupil tracking modes (bright and dark pupil), Pro Fusion enables you to adapt your data collection setup to different research populations, scenarios, and data requirements.

Use Pro Fusion for studies on:

- Windows laptop and desktop computers
- Monitors with optimum size 24" (16:9) or less as optimum size
- Real-world setups such as physical objects and social interactions (using the Tripod Stand)
- Projections, simulators, and larger screens (using the Tripod Stand)

Tobii Pro Fusion is primarily designed for use in indoor office environments with adult participants.

1.1 Symbols used in this document

Three different symbols are used in this document:



The Information symbol means something is important or needs special attention.



The Tip symbol denotes additional information that can make a process or function easier.



The Warning symbol means there is a possible risk of harm if the warning is ignored.

1.2 Tobii Pro Eye Tracker Manager

Tobii Pro Eye Tracker Manager is free software available on [Tobii Pro Connect](#).

Pro Eye Tracker Manager helps you manage your Tobii Pro eye tracker. It lets you see which eye tracker firmware and software versions you are running and also facilitates updates (where applicable). It provides:

- Drivers and Firmware installation or updates
- Display setup
- Positioning guide
- User calibration

- Gaze visualization¹
- Eye images²



References in product documentation to Tobii Pro Eye Tracker Manager refer to the latest version available on Tobii Pro's website.

¹Gaze visualization in Pro Eye Tracker Manager lets you quickly evaluate the quality of the eye tracking data. The Gaze visualization overlaps data only on the Pro Eye Tracker Manager screen while Pro Eye Tracker Manager is open.

²Applicable when Pro Eye Tracker Manager is used with eye trackers that support eye images (Tobii Pro Spectrum and Tobii Pro Fusion).

2 System Requirements

2.1 Pro Fusion system requirements

Operating system:	Windows 10 macOS 10.14 Mojave and 10.15 Catalina Linux Ubuntu 20.04
CPU:	1 GHz, 2 cores
RAM:	2 GB RAM memory* *Software for eye tracking research may require higher RAM
Port:	USB Type-A or USB Type-C

2.2 Additional software options

Pro Lab tobiipro.com/product-listing/tobii-pro-lab/	Pro Lab is a comprehensive research software platform for eye tracking designed to meet the highest demands on different research scenarios with exact timing accuracy. This software offers an efficient workflow, making it easy to design experiments, record data, analyze and visualize eye tracking data, and to sync this data with other biometric data streams.
Pro SDK tobiipro.com/product-listing/tobii-pro-sdk/	Pro SDK offers a broad set of tools that makes it simple to develop a variety of niche applications or scripts across multiple platforms, using a wide range of programming languages. This SDK gives the researcher access to the full set of relevant gaze data streams, such as 3D eye coordinates, raw data, pupil data, etc.
Third-party software	This term refers to any application built on Pro SDK.

3 Safety

3.1 Mounting warning



Tobii Pro eye trackers should be mounted according to Tobii Pro's instructions for approved mounts.

The mounting bracket is designed for adhesion to a wide variety of surfaces, such as monitors or laptop screens. It is also designed for clean removability. Failure to follow the recommended removal instructions can result in damage to both the monitor/laptop and the mounting bracket. Do not mount the eye tracker on monitors positioned above the head or face of a user, as it might fall.

3.2 Emergency warning



Tobii Pro eye trackers are designed to be used only for research purposes. Be aware that due to the low, but possible risk of failure or distraction, the eye tracker should not be relied upon or used in dangerous or critical situations.

3.3 Epilepsy warning



Some people with photosensitive epilepsy are susceptible to epileptic seizures or loss of consciousness when exposed to certain flashing lights or light patterns in everyday life. This may happen even if the person has no medical history of epilepsy or has never had any epileptic seizures.

A person with photosensitive epilepsy would also be likely to have problems with TV screens, some arcade games, and flickering fluorescent bulbs. Such people may have a seizure while watching certain images or patterns on a monitor, or even when exposed to the light sources of an eye tracker. It is estimated that about 3-5% of people with epilepsy have this type of photosensitive epilepsy. Many people with photosensitive epilepsy experience an "aura" or feel odd sensations before the seizure occurs. If you feel odd during use, move your eyes away from the eye tracker.

3.4 Infrared warning



When activated, the Tobii Pro eye tracker emits pulsed infrared (IR) light. Certain medical devices are susceptible to disturbance by IR light and/or radiation. Do not use the eye tracker in the vicinity of these kinds of susceptible medical devices, as their accuracy or proper functionality could be inhibited. Do not stare into the LED lights at a close distance (<15cm).

3.5 Magnetic field warning



This Tobii Pro eye tracker contains magnets. Magnetic fields may interfere with the function of cardiac pacemakers and implantable cardioverter defibrillators. As a general rule, maintain a minimum distance of 6 inches (15 centimeters) between any item with magnets and your heart device.

3.6 Child safety



A Tobii Pro eye tracker is an advanced computer system and electronic device. As such, it is composed of numerous separate, assembled parts. In the hands of a child, some of these parts have the possibility of being separated from the device, possibly resulting in a choking hazard or other danger to the child.

Young children should not have access to, nor use of the device or its accessories without parental or guardian supervision.

3.7 Electricity



Do not open the casing of the Tobii Pro eye tracker, this could expose you to potentially hazardous electrical voltage. The device contains no user-serviceable parts. Non-compliance will result in loss of warranty! Contact Tobii Pro Support if your eye tracker is not working properly.

3.8 Accessories



Only use accessories provided by or approved by Tobii Pro AB.

3.9 Third party



Any use of a Tobii Pro eye tracker outside the intended use and together with any third-party software or hardware that changes the intended use is a risk, and Tobii Pro AB can not take any responsibility in these situations.

3.10 Power supply



Only use the AC power adapter provided by Tobii Pro to power your Tobii Pro eye tracker. If the AC power adapter is damaged, it should be replaced only by Tobii Pro Service Personnel. If damaged, do not use the AC power adapter until it has been replaced. Tobii Pro and its agents are not liable for any damages or injuries to a person or property due to incorrect use of the provided accessories.

4 Overview of Tobii Pro Fusion

Tobii Pro Fusion is the next generation of compact high-performance eye trackers from Tobii Pro. It provides a flexible solution that supports different research scenarios and study designs.

Pro Fusion has a slim design that integrates well with external monitors up to 24 inches and laptop screens. The eye tracker can also be mounted on a tripod and coupled with a scene camera so it can be used in study setups that use real-world stimuli such as physical objects or scenes. The sampling speed of up to 250 Hz allows you to capture data for a wide range of experimental paradigms (fixation, smooth pursuit, and saccade-based).

With high, selectable, sampling rates (up to 250 Hz), two eye tracking cameras and two pupil tracking modes (bright and dark pupil), Pro Fusion enables you to adapt your data collection setup to different research populations, scenarios, and data requirements.

Use Pro Fusion for studies on:

- Laptop and desktop computers
- PC monitors, 24" (16:9) or less
- Real-world setups such as physical objects and social interactions (using the Tripod Stand)
- Larger screens, projections, simulators (using the [Tripod Stand](#), available separately)

4.1 Pro Fusion versions

Pro Fusion is available in three different product versions: 60 Hz, 120 Hz, and 250 Hz.

The 60 Hz and 120 Hz versions can be upgraded to a faster version by contacting your sales representative. [Contact Tobii Pro](#).



All versions of the Pro Fusion eye tracker can also run in 30 Hz mode.

4.2 Key features

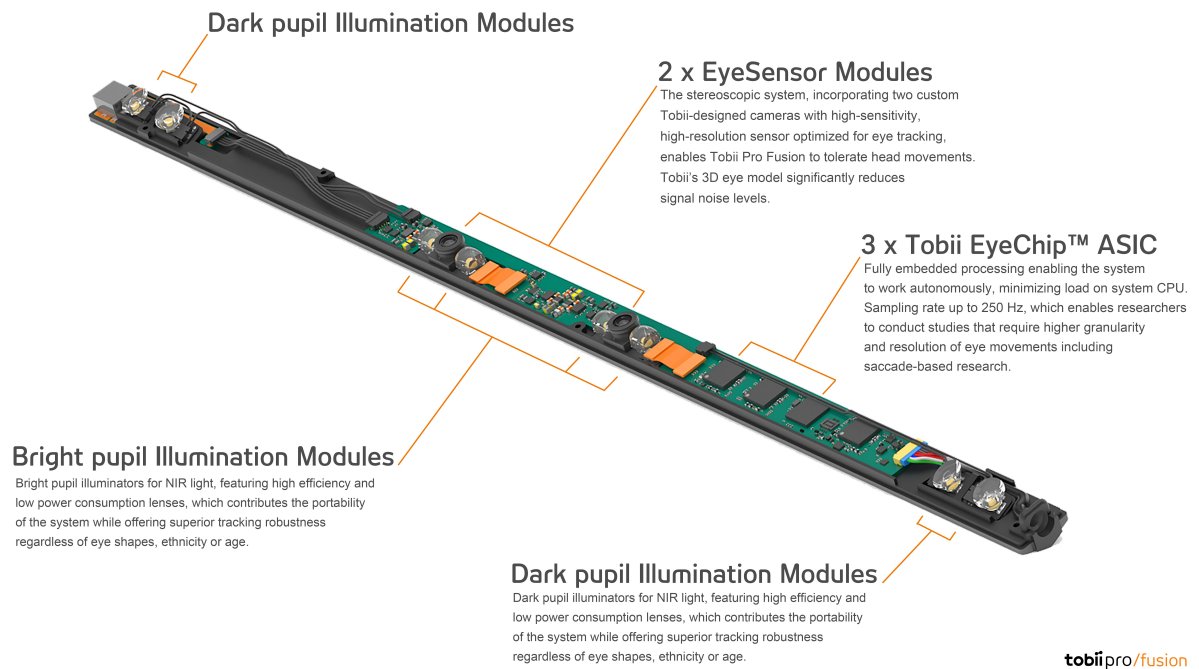


Figure 1. Pro Fusion's key features

4.3 How Tobii Pro Fusion works

During tracking, eye trackers from Tobii Pro use infrared illuminators to generate reflection patterns on the corneas of the participant's eyes. These reflection patterns, together with other visual data about the participant, are collected by image sensors. Sophisticated image processing algorithms identify relevant features, including the eyes and the corneal reflection patterns. Tobii Pro Fusion is a dual camera system that automatically chooses when to use dark or bright pupil tracking. Complex mathematics is used to calculate the 3D position of each eyeball along with the gaze point (where the participant is looking).

4.4 What's in the Pro Fusion box



Figure 2. What's in the Pro Fusion box

#	Item	Additional information
1	Travel case	Stores, protects, and carries Pro Fusion and the included accessories
2	Pro Fusion eye tracker	Used for eye tracking

3	AC power adapter	Provides the additional power required when the USB Type-A to Type-C adapter is used
4	Safety and Compliance	Printed versions of important information
5	USB Type-A to Type-C adapter plug	Used when the computer does not have a USB Type-C port
6	6 International plug adapters	Used with the AC power adapter to match international outlets
7	Cleaning cloth	For cleaning the surface of the eye tracker
8	Four mounting plates with non-permanent adhesive	Attaches the Pro Fusion eye tracker to the screen bezel
9	Four cleaning wipes	Removes any dust and grease in the area around the screen before attaching a mounting plate

4.5 USB and power adapter



Figure 3. The fixed USB cable is on the right side of Pro Fusion and the power supply port is on the left side.

The right side of the Pro Fusion eye tracker has a fixed USB cable that plugs into the computer's Type-C port or into a Type-A port using the included USB Type-A to Type-C adapter. For more information, read [How to use the USB Type-A to Type-C adapter](#).



When using the Type-A to Type-C adapter, you should also use the AC power adapter since Type-A ports can deliver less power. Your computer's power settings can also influence the amount of power delivered to peripherals.

4.6 How to use the USB Type-A to Type-C adapter

Pro Fusion is connected to a computer via a standard USB Type-C interface.

The USB Type-C interface enables a better user experience over the older Type-A interface due to its higher data transfer rate, symmetrical connector which eliminates the “right side up” problem, and increased power. **If your computer doesnot have a USB Type-C connection, you must use the included USB Type-A to Type-C adapter *and* the power adapter with your Pro Fusion.**



Figure 4. USB Type-A to Type-C adapter

What to do:

1. Plug the USB Type-A to Type-C adapter into the USB end of the cable.
2. Plug the cable with the adapter into the computer.
3. Attach the correct adapter plug for your country to the AC power adapter. For more information, read [Attach the adapter plug](#).
4. Plug the AC power adapter into the left-hand side jack on the eye tracker.
5. Plug the AC power adapter and adapter plug into a power outlet.

4.7 Attach the adapter plug

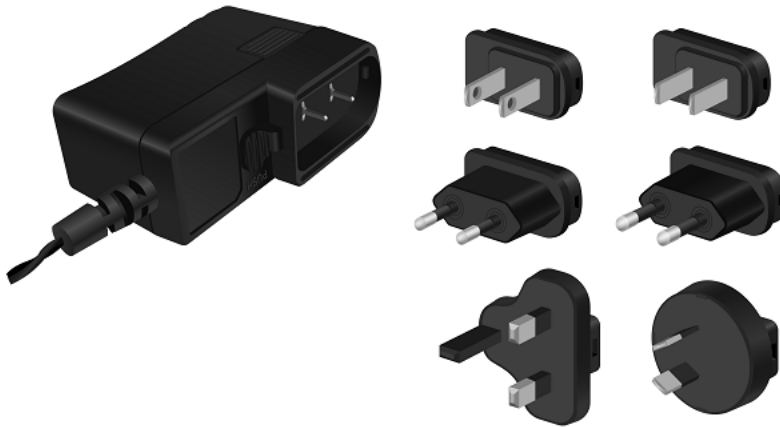


Figure 5. International plug adapters

How to use the international adapter plugs:

1. Select the correct plug adapter for your region.
2. Line up the rounded top of the plug adapter with the top of the AC power adapter.
3. Click the adapter plug into the AC power adapter at an angle, starting with the upper part first and then the lower part.



Figure 6. The adapter plug snaps in

4.8 Remove the adapter plug from the AC power adapter

When storing the AC power adapter in the eye tracker case, you will need to remove the adapter plug so that it fits in the case. You may also need to exchange one plug adapter for another if you travel with your eye tracker to another country.

How to remove an adapter plug:

1. Use your thumb to draw the latch underneath the AC power adapter down to release the clip.
2. Remove the adapter plug starting by withdrawing the lower part first and then the upper part.

4.9 Tobii Pro accessories

Find out more about Tobii Pro products and accessories on tobii.com.

4.10 Additional software options

Pro Lab tobii.com/product-listing/tobii-pro-lab/	Pro Lab is a comprehensive research software platform for eye tracking designed to meet the highest demands on different research scenarios with exact timing accuracy. This software offers an efficient workflow, making it easy to design experiments, record data, analyze and visualize eye tracking data, and to sync this data with other biometric data streams.
Pro SDK tobii.com/product-listing/tobii-pro-sdk/	Pro SDK offers a broad set of tools that makes it simple to develop a variety of niche applications or scripts across multiple platforms, using a wide range of programming languages. This SDK gives the researcher access to the full set of relevant gaze data streams, such as 3D eye coordinates, raw data, pupil data, etc.
Third-party software	This term refers to any application built on Pro SDK.

5 Set up your Tobii Pro eye tracker

At the end of this setup, you will have a verified installation that is ready for use.

5.1 Download and install Tobii Pro Eye Tracker Manager

The first step is to get the free software, Pro Eye Tracker Manager on your computer. Setting up your eye tracker involves installing the necessary drivers and software on your computer. Pro Eye Tracker Manager makes this easy. For more information, read [Tobii Pro Eye Tracker Manager](#).



Your eye tracker does *not* need to be connected to the computer to install Pro Eye Tracker Manager.

1. Before starting, double-check the hardware and system requirements, [System Requirements](#). You should also check the requirements for your analysis software, for example, Tobii Pro Lab.
2. Download Pro Eye Tracker Manager from the [Tobii Pro product page](#).
3. Open Pro Eye Tracker Manager and follow the prompts to finish installation.

5.2 Install Pro Fusion in Tobii Pro Eye Tracker Manager

Now it's time to make sure your computer can communicate with your eye tracker. This is necessary for downloading the proper driver updates.

1. Open Pro Eye Tracker Manager if it is not already open.
2. Connect Pro Fusion's USB cable to a Type-C port in your computer. If your computer does not have a USB Type-C port, read [How to use the USB Type-A to Type-C adapter](#). Do not mount the eye tracker just yet, just plug in the USB so you can make sure everything's working.



If the included USB Type-A to Type-C adapter is used then the AC power adapter must also be used.

3. If your Pro Fusion is connected to the USB port but doesn't appear in the list of connected eye trackers, click the plus (+) symbol in the upper right corner to install (or reinstall in some cases) the required drivers. Sometimes removing the USB and plugging it in again is necessary.
4. Select **Pro Fusion** and click the **Install** button.
5. Follow the prompts in Pro Eye Tracker Manager to finish the installation.

5.3 Mount the eye tracker on a laptop or monitor

To ensure quality in eye tracking data, the Pro Fusion hardware package includes several mounting brackets that can be affixed to a laptop or monitor. You can easily snap the eye tracker on and off the laptop using the magnetic mounting bracket. The mounting bracket sticks to the frame with

a special adhesive that doesn't damage the underlying surface when the bracket is removed. For more information, read [Detach the eye tracker](#).



If the screen bezel is thinner than the height of the eye tracker, affix the mounting bracket as low as possible on the screen frame, or directly on the screen. Don't use this setup if you intend to put stimuli in the lower part of the screen, as they might become covered by the eye tracker.



Some laptops are very thin and there is little space between the screen and the keyboard when the laptop is closed. We recommend that you check whether the laptop can close with the mounting bracket present *before* you attach it.

What to do:

1. Make sure the eye tracker is attached to the monitor and connected to your computer. Open Pro Eye Tracker Manager. You should be able to see and expand your eye tracker's "card" in Pro Eye Tracker Manager. The serial number of your eye tracker should match the number displayed.
2. You can leave your eye tracker USB cable connected with the eye tracker to the side (for example on the table) *or* you can disconnect it while you attach the mounting bracket.
3. If you plan to attach the eye tracker to a laptop, make sure the laptop can close with the magnetic mounting bracket attached. Some laptops have very little space when closed.



You can test whether you can close the laptop with the mounting bracket by placing the mounting bracket (with the backing paper still attached) on the keyboard side of the laptop and carefully closing the laptop lid. Watch for any potential interference between the screen, bracket, and keyboard.

4. Find the center of the screen and clean the bezel with one of the included cleaning wipes.
5. Peel the adhesive tape off the mounting bracket and mount it on the bezel so that your Pro Fusion is as close to the bottom of the screen as possible without covering the screen. Press the bracket against the bezel for 30 seconds and wait one hour before attaching the eye tracker.

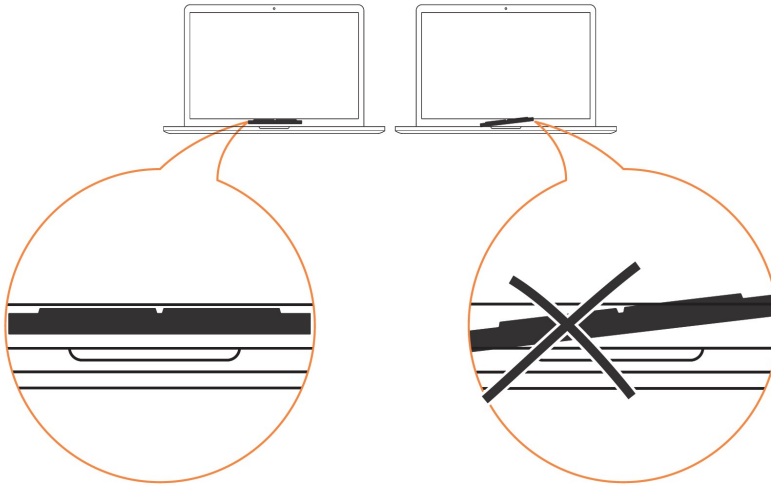


Figure 7. Align the mounting bracket properly. The magnet holds the eye tracker firmly in place when the slots are lined up correctly.

6. Attach the eye tracker, making sure that it aligns properly with the mounting bracket. The magnet holds the eye tracker firmly in place when the slots are lined up correctly.



Figure 8. Place the mounting bracket on the bezel so that the Pro Fusion is as close to the bottom of the screen as possible without covering the screen.

7. If it is not yet connected, plug in the eye tracker's USB cable to the correct USB port in your computer.



The included USB Type-A to Type-C adapter and the eye tracker AC power adapter must be used if the computer does not have a USB Type-C port. For more information, read [How to use the USB Type-A to Type-C adapter](#).

8. Move to the next step.

5.4 Display setup in Tobii Pro Eye Tracker Manager

Now the algorithms on the eye tracker need to understand where the eye tracker is in relation to the screen and map the gaze points accordingly.

1. Open Pro Eye Tracker Manager if it's not already running, and select your eye tracker.
2. On the Overview tab, locate **Display Setup** and click the ellipsis icon to the right. On the drop-down menu, click New.
3. Select **Regular setup** and click the **Next** button.
4. If multiple screens are used, select the screen that has the Pro Fusion attached to its bezel.
5. Enter the position of the eye tracker in relation to the screen. Use the radio buttons to select whether the eye tracker is positioned under or over the screen and enter the measurement in millimeters.
6. Align the dotted orange lines on the screen with the two outer white marks on the top of your Pro Fusion.
7. Save your display by naming the setup and clicking the **Save** button.
8. To confirm that Pro Fusion can detect your eyes, enable the Position Guide at the bottom left of Pro Eye Tracker Manager. Once activated, you should be able to see two "eyes" in a face contour.
9. Move to the next step. In the next section, you will test your setup by performing a calibration. For more information, read [Calibration](#).



You can always return to Pro Eye Tracker Manager and use it when you change computers or screens or want to recalibrate.

5.5 Calibration

When you are done configuring your eye tracker, you should run a calibration to test to see if the eye tracker is mapping the gaze points correctly to your display.

How to test your eye tracking setup in Pro Eye Tracker Manager:

1. Make sure the eye tracker is attached to the screen bezel and connected to your computer. Open Pro Eye Tracker Manager. For more information, read [Tobii Pro Eye Tracker Manager](#).

2. By now you should have also tested your setup as described in [Display setup in Tobii Pro Eye Tracker Manager](#).
3. Click the **Calibrate** button in Pro Eye Tracker Manager and follow the on-screen instructions.
4. Evaluate your calibration results. Large systematic errors i.e. a large distance between the average gaze point and the target gaze point may be indicative of a configuration error. No calibration feedback data on the targets located on the top of the screen may indicate that there is a mismatch between the screen size and eye tracker configuration. Click the **Recalibrate** button to improve an unsuccessful calibration (e.g. recalibrate points with missing data). Click the **Use Calibration** button when you are satisfied with the calibration.



You can toggle on and off Gaze Visualization in the upper left corner of the Calibration Results window (or on the Overview tab). This can be used to confirm the participant's calibration results.

5.5.1 What calibration does

The human eye shows a natural individual variation in its shape and geometry. For example, the exact location of the fovea, the area responsible for the part of the visual field that we perceive in focus and full color, varies from individual to individual. Tobii Pro Eye Trackers use an individual calibration procedure to optimize their gaze estimation algorithms (i.e. the 3D eye model) and account for this variation. The end result of this optimization is a fully customized and more accurate gaze point calculation. Additionally, some Tobii Pro eye trackers use the calibration procedure to select the detection mode (e.g. dark or bright pupil tracking) that provides the most accurate data.

You can do basic calibration in Tobii Pro Pro Eye Tracker Manager. There is more functionality, including calibration validation, in Tobii Pro Lab.

For more information, read the Learning articles [calibration](#) and [performing a calibration and validation in Pro Lab](#).

5.6 Detach the eye tracker

To temporarily remove the eye tracker, gently pull it away from the magnetic mounting bracket and leave the bracket in place.

To permanently remove the mounting bracket, you must remove the non permanent but strong adhesive that fastens your eye tracker mounting bracket to the screen bezel. Since it is fairly strong, you may not be able to take it away with only your fingers. If you want to remove it, we recommend using something very thin such as dental floss or a thin thread, a plastic guitar pick, or a credit card. Use this to slide between the mounting plate and the computer bezel (or whatever it is attached to). As you slide it behind the mounting plate, gently bend the mounting plate towards you so that it detaches.



The mounting bracket adhesive should be removed carefully. If placed over a manufacturer logo on the bezel, removing the mounting bracket could damage the logo.

You can purchase additional mounting brackets. For more information, read [Additional Mounting Brackets](#) on the Tobii Pro website.

5.7 Change Pro Fusion's frequency

You can change Pro Fusion's frequency using Tobii Pro Eye Tracker Manager or your analysis software, for example, Tobii Pro Lab.

In Pro Eye Tracker Manager, use the **Frequency** drop-down selector on the **Overview** tab to select an available frequency.

Read more about [Pro Fusion versions](#).



All versions of the Pro Fusion eye tracker can also run in 30 Hz mode.

6 Display Setups

6.1 Standard setup

The standard setup for using Tobii Pro Fusion is with a screen of maximum size 24". The eye tracker is attached below the screen whether it is a laptop screen or separate monitor. For more information, read [Display setup in Tobii Pro Eye Tracker Manager](#).

6.2 Advanced setup

Advanced setups include using the Tripod Stand or other setups in which the eye tracker is not attached to the screen bezel.

6.2.1 Setup with Tobii Pro Tripod Stand

Tobii Pro Fusion eye tracker mounts directly on the Tripod Stand. The Tripod Stand is ideal in test situations in which the subject is sitting at a table in front of a monitor or projected screen larger than 24". Using the Tripod Stand with Pro Fusion is also useful in scene camera setups when studying physical objects and social interactions between people. For more information about the Tobii Pro Tripod Stand, visit the [Tobii Pro product page](#).



Figure 9. Tobii Pro Fusion with the Tripod Stand and external, large-size monitor.

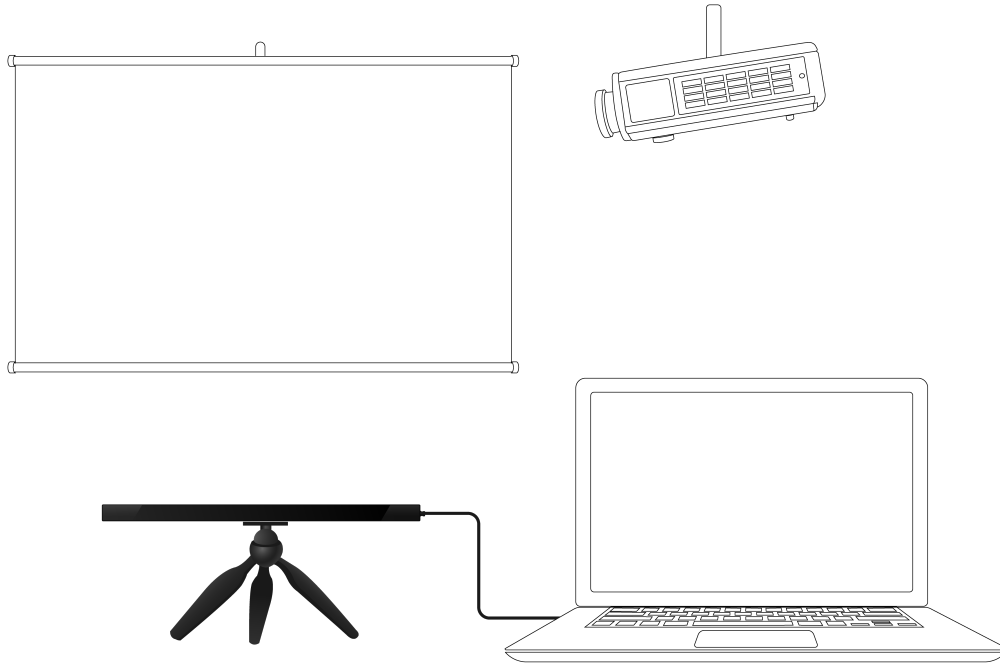


Figure 10. Tobii Pro Fusion with the Tripod Stand and projected screen .

How to set up Pro Fusion with a large monitor or projector screen:

1. Select a suitable location and set up the monitor/screen.
2. Set up the monitor/screen and connect it to the laptop.
3. Mount the eye tracker on a separate tripod and connect it to the laptop. If the USB Type-A to Type-C adapter is needed, use it along with the AC power adapter.
4. Place the participant 50-80 cm from the eye tracker and use the **Position Guide** in Pro Eye Tracker Manager's Overview to ensure that the eye tracker can detect the participant's eyes.
5. Select "New" in the drop-down **Display Setup** menu.
6. Select **Advanced setup** and click the **Next** button.
7. Enter the width and height of your screen in millimeters. The width must be at least 10 mm. Click the **Next** button.
8. Enter the angle of your screen in degrees. Click the **Next** button.
9. Enter the height difference in millimeters between the top of the eye tracker and the bottom of your screen. Click the **Next** button.
10. Enter the position of the eye tracker in relation to the screen. Use the radio buttons to select whether the eye tracker is positioned under or over the screen and enter a measurement in millimeters.
11. Enter the angle of your eye tracker in degrees. Click the **Next** button.
12. Save your display by naming the setup and clicking the **Save** button.

7 Start Experimenting

7.1 Start eye tracking

To see where the participant's focus is, open Pro Eye Tracker Manager and activate **Gaze Visualization** by toggling the switch on the Overview tab. A hazy blob appears on the screen, indicating where attention is focused. Use this functionality to verify that your eye tracker is running, that the display is correctly set up, and that your eye tracker is calibrated.

7.2 Tobii Pro Lab

Tobii Pro Lab provides a comprehensive platform for the recording and analysis of eye gaze data, which helps in the interpretation of human behavior, consumer responses, and psychology. Combining simple preparation for testing procedures and advanced tools for Visualization and analysis, eye-tracking data is easily processed for useful comparison, interpretation, and presentation. A broad range of studies are supported, from usability testing and market research, to psychology and oculomotor physiological experiments. Pro Lab's intuitive workflow, along with its advanced analysis tools, enables large and small studies in a timely and cost-efficient way without the need for extensive training.

In addition to offering powerful analysis tools, Pro Lab is also designed to work with other software commonly used for recording and analyzing data. This is done by synchronizing with recording software using TTL, as well as by enabling data exports in standardized formats, for example for Microsoft Excel, Matlab, and SPSS.

7.3 Keeping your eye tracker software and display setup updated

Updates

From time to time, Tobii Pro releases updates for an eye tracker's applicable driver and firmware in order to improve performance and/or introduce new functionalities. Please check the Tobii Pro website regularly for news and information about updates about your eye tracker. We recommend that you leave updates and notifications in Tobii Pro Eye Tracker Manager activated. (They are activated by default and the sliders are colored orange.)

How to activate notifications and updates in Pro Eye Tracker Manager:

1. Click to expand the drop-down list at the top of Pro Eye Tracker Manager.
2. Toggle the switches for notifications. Orange means they are activated.
3. If a software update is available, the available update has a clickable orange link.
4. Select an interface language. The default is English.

Display setup updates

Use Pro Eye Tracker Manager whenever you change computers or display setups.



All references to Tobii Pro Eye Tracker Manager assume that you are using the latest version of this free software.

7.4 Customer Support

Help online

Visit Customer Support (connect.tobiipro.com) for help with your Tobii Pro device. It contains the latest information about contacting Support, links to our Learning Center, and much more.

Product support

For questions or problems with your product, contact your Tobii Pro sales representative or authorized reseller for assistance. They are most familiar with your personal setup and can best help you with tips and product training.

Read more about Tobii Pro's Support options, our in-depth learning articles, and much more in section [Support, Training, and Warranty](#).

8 Product Care

8.1 Operational environment

The recommended range for temperature and humidity during operations is:

- **Temperature:** 10°C to 35°C (50°F to 95°F)
- **Humidity:** Max 20% to 95% (no condensation on the device)

8.2 Transportation and storage

Use the provided case when traveling with the eye tracker. For shipping and storage, use the original packing.

For transportation and storage, the recommended range for temperature and humidity for the device is as follows:

- **Temperature:** -40°C to 70°C (-40°F to 158°F)
- **Humidity:** 20% to 95% (no condensation on the device)



Tobii Pro eye trackers are not waterproof or water resistant. The eye tracker should not be kept in excessively humid, damp or wet conditions. Do not submerge the eye tracker in water or in any other liquid. Be careful not to spill liquids on the device.

8.3 Cleaning

- Before cleaning your Tobii Pro eye tracker, unplug its USB cable and electrical cable if there is one.
- Use the included cleaning cloth and clean the eye tracker's front gently.
- Avoid getting moisture in openings on the device.
- Do not use window cleaners, household cleaners, aerosol sprays, solvents, alcohol, ammonia, or abrasives.



Scratches on the front surface of the eye tracker may impair its performance.

8.4 Disposal of the eye tracker

Do not dispose of your Tobii Pro eye tracker in general household or office garbage receptacles. Follow your local regulations for the proper disposal of electrical and electronic equipment.

8.5 Limitation of liability

Except where prohibited by law, Tobii Pro AB is not liable for any loss or damage arising from the use or misuse of a Tobii Pro eye tracker or the mounting plate, whether direct, indirect, spe-

cial, incidental or consequential, regardless of the legal theory asserted, including warranty, contract, negligence, or strict liability.

9 Technical Specifications

Tobii Pro Fusion's eye tracking specifications and the eye tracker's physical specifications are presented below.

9.1 Eye tracking specifications

Eye tracking technique	Video-based pupil- and corneal reflection eye tracking with dark and bright pupil illumination modes. ¹ Two cameras capture stereo images of both eyes for robust accurate measurement of eye gaze and eye position in 3D space, as well as pupil diameter.
Sampling frequency	60, 120, & 250 Hz or 60 & 120 Hz, depending on the hardware version
Precision ²	0.04° RMS at optimal conditions ³ 0.2° RMS in optimal conditions (raw signal)
Accuracy ⁴	0.3° in optimal conditions
Binocular eye tracking	Yes
Total system latency ⁵	Mean latency < 13 ms @ 250 Hz (SD < 1.2 ms)
Blink recovery time	1 frame (immediate)
Gaze recovery time	250 ms
Data sample output ⁶	Timestamp Gaze origin Gaze point Pupil diameter
Eye image data stream	Eye image data stream frequency is approximately 4 Hz (one image per eye). Zoomed-in eye images available in tracking mode. Full-frame camera images are available in gaze recovery mode.
TTL input stream	Not Available
Tracker and client time synchronization	Integrated between the eye tracker time domain and the client computer time domain

¹Dark pupil tracking is supported in all sample frequencies. Bright pupil tracking mode is supported at 60 and 120 Hz

²Tobii Pro uses an extensive test method to measure and report performance and quality of data. Please download the [Tobii Pro Fusion Eye Tracker Data Quality Test Report](#) for more detailed information.

³Applying Savitzky-Golay filtering (settings listed in the [Tobii Pro Fusion Eye Tracker Data Quality Test Report](#)).

⁴(see footnote 2)

⁵Visit [Tobii Pro Connect](#) for more information on how to optimize your Pro Fusion setup.

⁶For more information about output data and the supplementary data stream, read the [Tobii Pro SDK documentation](#).

9.2 Setup

Head movement tolerance*	Excellent. Dual-camera system with more images than a one camera system which gives a more accurate data calculation and the best level of precision and robustness for head movement.
Freedom of head movement * (at 65cm distance)	Width × height: 40 cm × 25 cm (15.7" × 9.84") (At least one eye tracked)
Freedom of head movement* (at 80 cm distance)	Width x height: 45 cm x 30 cm (17.7" x 11.8") (At least one eye tracked)
Operating distance (mounted on screen)	50-80 cm (19.69"-31.49") from the eye tracker
Tracker setup options	Tracker mounted on tripod, allows for even larger screens and physical objects to be tracked.
Optimal screen size	24" (16:9 aspect ratio)

* Describes the region in space where the participant can move their head and still have at least one eye within the eye tracker's field of view (trackbox) at the specific distance.

9.3 Software compatibility

Software and framework compatibility	Tobii Pro Lab Tobii Pro Eye Tracker Manager Tobii Pro SDK Any application built on the Tobii Pro SDK
Operating system	Windows, macOS, Linux

9.4 Hardware versions

60 HZ
120 Hz
250 Hz

9.5 Pro Fusion eye tracker specifications

Dimensions	374 mm L × 18 mm H × 13.7 mm W (14.72" × 0.70" × 0.53")
Weight	168g (5.9 oz.)
Connectors	USB Type-C (USB Type-A to Type-C adapter provided) AC power
Data processing	3 Tobii EyeChip™ ASIC with fully embedded data processing
Eye tracking cameras	2 x Tobii EyeSensor™ Modules

Illuminators	Dark Pupil Illumination Modules Bright Pupil Illumination Modules
Power consumption	Typical power consumption: 4.3 W Max. rated power consumption: 9 W
Power options	Directly via USB Type-C connector, or with provided AC power adapter, when using a computer with USB 2.0 Type-A port

10 Compliance Information

10.1 Pro Fusion compliance



This Tobii Pro eye tracker is CE-marked, indicating compliance with applicable health and safety legal requirements set out in the European Union and EEA.



この装置は、現在設置されている場所で妨害波の測定がされた情報技術装置です。この場所以外で使用する場合は、その場所で、再び妨害波の測定が必要となります。



This Tobii Pro eye tracker is registered in the Australian National Equipment Registration System.

The RCM (Regulatory Compliance Mark) label signifies compliance with the Australian and New Zealand product safety requirement for electrical and electronic equipment according to EESS and radio communication and electromagnetic compatibility according to ACMA.



This Tobii Pro eye tracker is KC-marked which signifies compliance with Korea's product safety requirements for electrical and electronic equipment and components.

10.1.1 FCC interference statement

Pro Fusion has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. Pro Fusion can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If Pro Fusion does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by increasing the separation between Pro Fusion and the receiver. Modifications not expressly approved by Tobii Pro AB could void the user's authority to operate the equipment under FCC rules.

10.1.2 Industry Canada statement

This Class B digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

10.1.3 CE statement

Pro Fusion is CE-marked, certifying compliance with the legal requirements for health, safety and environmental protection requirements for the European market. Pro Fusion complies with the following directives:

- 2011/65/EU (RoHS 2) - Restriction of Hazardous Substances Directive
- 2014/30/EU (EMC) - Electromagnetic Compatibility Directive

- 2012/19/EU (WEEE) - Waste Electrical and Electronic Equipment Directive
- 2014/35/EU (LVD) - Low Voltage Directive

10.1.4 UK statement

Pro Fusion is UKCA-marked, certifying compliance with the legal requirements for health, safety and environmental protection requirements for the European market. Pro Fusion complies with the following Statutory Instruments:

- The Electrical Equipment (Safety) Regulations 2016. UK Statutory Instruments 2016 No.1101.
- The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012. UK Statutory Instruments 2012 No.3032.
- The Electromagnetic Compatibility Regulations 2016. UK Statutory Instruments 2016 No.1091.

10.1.5 Safety compliance

Pro Fusion complies with the following standards:

- IEC/EN 62471:2008, Photo Biological Safety of Lamps and Lamp Systems
- IEC 60950-1:2005 +A1 +A2, Safety of Information Technology Equipment
- IEC/EN 62368-1, including collateral standard IEC 62368-3 (European Standard including UK)
- CAN/CSA-C22.2 No. 62368-1/UL 62368-1 Edition No. 2, including collateral standard IEC 62368-3 (US and Canadian Standard)
- J62368-1 (2020) (Japanese Standard)
- GB 4943.1-2011 (Chinese Standard)
- AS/NZS 62368.1:2018 (New Zealand, Australia)

10.1.6 EMC compliance

Pro Fusion complies with the following standards:

- EN 55032:2015, Electromagnetic compatibility of multimedia equipment. Emission requirements (European standard)
- EN 55035:2017 Electromagnetic compatibility of multimedia equipment - Immunity requirements
- FCC part 15 Class B, Regulations under which an intentional, unintentional, or incidental radiator that can be operated without an individual license (American Standard)
- ICES-003 Issue Class B, Interference-Causing Equipment Standard (Canadian Standard)
- CISPR32:2015, Electromagnetic compatibility of multimedia equipment - Emission requirements (International standard accepted in AS/NZS and Japan)
- GB17625.1-2012 and GB9254-2008 (Chinese national standard)
- KN32 (CISPR 32), KN35 (CISPR 35) (South Korean Standard)

Appendix A Support, Training, and Warranty

A1 Customer Support

If you need help, please contact [Customer Support](#) at Tobii Pro. In order to receive assistance as quickly as possible, make sure you have access to your Tobii Pro device and, if possible, an Internet connection. You should also be able to supply the serial number of the device, which you will find on a sticker on the back or bottom of the device.

A1.1 Get help online

Many questions can be answered by visiting Tobii Pro Connect. It contains the latest information about contacting Support, helpful articles and FAQs, links to downloads, and much more. Log in or register to see information about your account and to reach Customer Support on [Tobii Pro Connect](#).

A2 Training and Education Services

If you are new to eye tracking, or want to extend your knowledge about eye tracking research, sign up for one of our learning programs and events on our website at [Training and Education Services](#).

A3 Warranty information

Read more online about [Tobii Pro Care and Tobii Pro's eye tracker warranty](#).

Appendix B Limitations and considerations

B1 Intended use



Tobii Pro eye trackers are intended to be used in research activities about human behavior including eye movements, in a dry and dust free indoor environment. The product should only be used as described in this User's Manual. Please read the User Manual and other supplied documentation thoroughly before using the product.

B2 Light conditions



Tobii Pro recommends that eye tracking studies be performed in a controlled environment. Sunlight should be avoided since it contains high levels of infrared light which will interfere with the eye tracker system. Sunlight affects eye tracking performance severely and longer exposure can overheat the eye tracker. This eye tracker is not designed for exposure to (direct) sunlight. Eye tracking generally does not work in strong direct sunlight.

Shielding the eye tracker adequately from the sun may prevent sunlight from interfering with eye tracking.

B3 Eyelashes



Long eyelashes can be obstructive when the participant's eyes are less open, especially if the participant is wearing mascara. In rare cases, eyelashes may completely block the view of the participant's pupils, making eye tracking impossible.

B4 Droopy eyelids



Droopy eyelids or otherwise obstructive eyelids can block the view of the participant's pupils. In rare cases, such eyelids may completely block the view of the participant's pupils, making eye tracking impossible.

Appendix C Glossary

Accuracy	The angular average distance from the actual gaze point to the one measured by the eye tracker. For more details on how accuracy is calculated, please read the Data Quality Test Report for this eye tracker on tobiipro.com .
Binocular calibration	The eye tracker collects data from both eyes the same time and processes the data for each eye independently. The calibration is valid when it succeeds in collecting and processing data from both eyes.
Binocular eye tracking	Tracks and reports data for both left and right eye.
Blink recovery time (time to tracking recovery for blinks)	When a participant blinks, the eye tracker loses the ability to track eye gaze because the eye is covered by the eyelid. If the pupil is occluded for only a short period (a few hundred milliseconds), the system will regain tracking immediately when the pupil becomes visible again, but only if the subject has maintained approximately the same head position during the blink. Data during blinks are only lost when the pupil is occluded, i.e. during the eye lid movement itself or when the eye is closed.
Bright pupil tracking	The process of capturing and processing eye images, with a set of illuminators that are placed close to the optical axis of the camera. This causes the pupil to appear lit up in the image (this is the same phenomenon that causes red eyes in photos). The eye tracking algorithms identify the pupil by searching for a bright elliptical form in the image.
Dark pupil tracking	The process of capturing and processing eye images, with a set of illuminators that are located further from the optical axis of the camera. This causes the pupil to appear darker than the rest of the eye in the image. The eye tracking algorithms identify the pupil by searching for a dark elliptical form in the eye image.
Data sample output	Type of data provided by the eye tracker
Eye image data stream frequency	The number of eye images per second outputted in the eye image data stream, expressed in Hz units. These images can be used to help to troubleshoot tracking issues.
Freedom of head movement	Describes the region in space where the participant may move his/her head and still have at least one eye within the eye tracker's field of view (trackbox).
Gaze recovery time	An eye tracker working in a natural user environment may occasionally lose track of the subject's eyes, e.g., when the subject completely turns away from the tracker. If a period of a few hundred millisecond elapses during which the eye tracker is unable to detect the eyes near where they were last detected, the eye tracker will start searching for the eyes within the entire head movement box. The stated measurement is the

typical time to tracking recovery once the eyes return to the field of view of the cameras again, i.e. when the subject is within the trackbox limits, with the eyes open and facing the eye tracker.

Maximum gaze angle	The maximum gaze angle for which the eye tracker can perform robust and accurate tracking on the eyes. The gaze angle is the angle ABC with A = center of the eye tracker (midpoint between the two eye tracking sensors), B = eye position (midpoint between the left and the right eye) and C = stimuli point.
Maximum screen size	The maximum screen size supported by the standard eye tracker setup (i.e. mounting the eye tracker directly on the screen).
Monocular calibration	Tracks and reports data for only one eye.
Operating distance	The minimum and maximum distances between the subject's eyes and the surface covering the eye tracker sensors at which eye tracking can be done while maintaining robust tracking.
Optimal conditions	Please download the Data Quality Test Report from tobiipro.com to read more about optimal conditions for this eye tracker.
Precision	Describes the spatial angular variation between individual and consecutive gaze samples (Root Mean Square), calculated on raw data. For more details on how precision is calculated, please read your eye tracker's Data Quality Test Report on tobiipro.com .
Sampling frequency	The number of data samples per second output for each eye. Expressed in Hz units, where 1 Hz = 1 sample per second.
Total system latency	The duration from the mid-point of the eye image exposure, to when a sample is available via the API on the client computer. This includes half of the image exposure time, image read-out and transfer time, processing time and time to transfer the data sample to a client computer.
Tracker and client time synchronization	The eye tracker and software client clocks can drift naturally during operation. To compensate for this, the Pro SDK will periodically ask the eye tracker about its current time stamp, noting the system time stamp when the request is sent and received. This data is then used to calculate how the system time corresponds to the device time.
Video-based pupil and corneal reflection eye tracking	At the center of this technique is a hardware setup that consists of one or two video cameras and one or multiple sets of infrared-light illuminators. The cameras capture images of the eyes and the illuminators produce reflections on its surface. These images are processed by algorithms that identify the pupil and the reflections caused by the illuminators. This information is then combined with different parameters from a 3D model of the eye and used to map the gaze onto the stimulus.



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Support for Your Tobii Pro Device

Get Help Online

Visit Tobii Pro Connect for help with your Tobii Pro device. It contains the latest information about contacting Support, links to our Learning Center, and much more. Visit connect.tobii.com.

Contact Your Solution Consultant or Reseller

For questions or problems with your product, contact your Tobii Pro sales representative or authorized reseller for assistance. They are most familiar with your personal setup and can best help you with tips and product training.

Visit tobii.com/contact.