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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
- PC monitors, 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

In this manual we use symbols for three levels of information:

- The Note symbol is used for notifying the user of something important or of something that needs special attention.
- The Caution symbol is used to inform of something that could cause harm to, or malfunction of, the equipment.
- The Warning symbol is used to inform of something in which there is a conceivable risk of harm to the user if the Warning is ignored.

1.2 Tobii Pro Eye Tracker Manager

Pro Eye Tracker Manager is free software available on the Tobii Pro Products webpage.

It helps you manage your screen-based 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 visualization*

You can read more about Pro Eye Tracker Manager specifications and how it works with Tobii Pro eye trackers on the Tobii Pro Eye Tracker Manager Product page.

References in the manual to Tobii Pro Eye Tracker Manager refer to the latest version available on Tobii Pro’s website.

*Gaze 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 Eye Tracker Manager is open.
2 System Requirements

2.1 System requirements

<table>
<thead>
<tr>
<th>Operating system</th>
<th>Windows 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU</td>
<td>1 GHz, 2 cores</td>
</tr>
<tr>
<td>RAM</td>
<td>2 GB RAM memory*</td>
</tr>
<tr>
<td>*Software for eye tracking research may require higher RAM</td>
<td></td>
</tr>
<tr>
<td>Port</td>
<td>USB Type-A or USB Type-C</td>
</tr>
</tbody>
</table>

2.2 Additional Tobii Pro software

<table>
<thead>
<tr>
<th>Pro Lab</th>
<th>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.</th>
</tr>
</thead>
<tbody>
<tr>
<td>tobiipro.com/product-listing/tobii-pro-lab/</td>
<td></td>
</tr>
<tr>
<td>Pro SDK</td>
<td>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.</td>
</tr>
<tr>
<td>tobiipro.com/product-listing/tobii-pro-sdk/</td>
<td></td>
</tr>
</tbody>
</table>

| Third-party software | This term refers to any application built on Pro SDK. |
3 Safety

3.1 Mounting warning

Pro Fusion 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 Pro Fusion on monitors positioned above the head or face of a user, as it might fall.

3.2 Emergency warning

Pro Fusion is to be used for research purposes only. Be aware that due to the low, but possible risk of failure or distraction, Pro Fusion should not be relied upon or used in dangerous or otherwise 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, Pro Fusion emits pulsed infrared (IR) light. Certain medical devices are susceptible to disturbance by IR light and/or radiation. Do not use Pro Fusion when in the vicinity of such 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

Pro Fusion 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

Pro Fusion is an advanced computer system and electronic device. As such, it is composed of numerous separate, assembled parts. In the hands of a child, certain 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 Pro Fusion device, since you may be exposed to potentially hazardous electrical voltage. The device contains no user-serviceable parts. Noncompliance will result in loss of warranty! Contact Tobii Pro Support if your Pro Fusion 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 Pro Fusion outside the intended use and together with any third-party software or hardware that changes the intended use is a risk, and this is not a scenario for which Tobii Pro AB can take any responsibility.

3.10 Power supply

Only use the AC power adapter provided by Tobii Pro to power your Pro Fusion. If the AC power adapter is damaged, it should be replaced only by 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 wrong use of the provided accessories.
4 Overview of Tobii Pro Fusion

4.1 Key features

Figure 4.1 Tobii Pro Fusion key features

4.2 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).

4.3 Product versions

Pro Fusion is available in two product versions: 250 Hz and 120 Hz. The values denote the eye tracker’s maximum sampling frequency, but it can be used at lower settings as well.

250 Hz version:
The 250 Hz version can operate at these frequencies: 60, 120 & 250 Hz.
Dark pupil tracking is supported in all sample frequencies. Bright pupil tracking mode is supported at 60 and 120 Hz.

120 Hz version:
The 120 Hz version can operate at these frequencies: 60, 120 Hz. The 120 Hz version can be upgraded to the faster version by contacting your sales representative.
Dark pupil tracking is supported in all sample frequencies. Bright pupil tracking mode is supported at 60 and 120 Hz.

For more information, read Appendix C Technical Specifications, page 22
### 4.4 What’s in the box

#### Figure 4.2 What’s in the box

<table>
<thead>
<tr>
<th>Number</th>
<th>Item</th>
<th>More information</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Travel case</td>
<td>Stores, protects, and carries Pro Fusion and the included accessories</td>
</tr>
<tr>
<td>2</td>
<td>Pro Fusion eye tracker</td>
<td>Used for eye tracking</td>
</tr>
<tr>
<td>3</td>
<td>AC power adapter</td>
<td>Provides the additional power required when the USB Type-A to Type-C adapter is used</td>
</tr>
<tr>
<td>4</td>
<td>Safety and Compliance leaflet</td>
<td>Printed version of important information</td>
</tr>
<tr>
<td>5</td>
<td>USB Type-A to Type-C adapter plug</td>
<td>Used when the computer does not have a USB Type-C port</td>
</tr>
<tr>
<td>6</td>
<td>6 plug adapters</td>
<td>Used with the AC power adapter to match region-specific outlets</td>
</tr>
<tr>
<td>7</td>
<td>Cleaning cloth</td>
<td>For cleaning the surface of the eye tracker</td>
</tr>
<tr>
<td>8</td>
<td>Four mounting brackets with non-permanent adhesive</td>
<td>Attaches the Pro Fusion eye tracker to the screen bezel</td>
</tr>
<tr>
<td>9</td>
<td>Four cleaning wipes</td>
<td>Removes any dust and grease in the area around the screen before attaching a mounting bracket</td>
</tr>
</tbody>
</table>
4.5 USB and power adapter

Figure 4.3 The fixed USB cable is on the right side of Pro Fusion and the power supply port is on the left side.

The left side of the Pro Fusion eye tracker has a jack for plugging in the AC power adapter.

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. Read 4.6 How to use the USB Type-A to Type-C adapter, page 7.

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 does
not 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 4.4 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. See 4.7 Attach the adapter plug, page 9.
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 4.5 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 4.6 Snap in the adapter plug, starting at the rounded top

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 the Tobii Pro website.
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. Read 1.2 Tobii Pro Eye Tracker Manager, page 1.

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, 2 System Requirements, page 2. You should also check the requirements for your analysis software, for example, Tobii Pro Lab.
2. Download Pro Eye Tracker Manager from Tobii Pro’s 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 4.6 How to use the USB Type-A to Type-C adapter, page 7. 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 AC power adapter must also be used. Read more in 4.6 How to use the USB Type-A to Type-C adapter, page 7.

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 re-install 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. To detach the eye tracker, see 5.6 Detach the eye tracker, page 14.

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.
   Tip: 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.

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.

7. If it is not still connected, plug in the eye tracker’s USB cable to the correct USB port in your computer. **Note:** 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. Read 4.6 How to use the USB Type-A to Type-C adapter, page 7.

8. Move to the next step.

---

**Figure 5.1** Align the eye tracker properly with the mounting bracket. The magnet holds the eye tracker firmly in place when the slots are lined up correctly.
Figure 5.2 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.

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.

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. In the next section, you will test your setup by performing a calibration. See 5.5 Calibration, page 14

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. Read 1.2 Tobii Pro Eye Tracker Manager, page 1.
2. By now you should have also tested your setup as described in 5.4 Display setup in Tobii Pro Eye Tracker Manager, page 13
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 nonpermanent 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.
6 Display Setups

6.1 Standard setup

The standard setup for using the 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. Read 5.4 Display setup in Tobii Pro Eye Tracker Manager, page 13.

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, visit the Tobii Pro website product page.

Figure 6.1 Tobii Pro Fusion with the Tripod Stand and external, large-size monitor
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 Appendix A Support, Learning Center, and Warranty , page 19
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)

8.1.1 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.

8.1.2 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.
- Don’t use window cleaners, household cleaners, aerosol sprays, solvents, alcohol, ammonia, or abrasives.

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

8.1.3 Disposal of the eye tracker

Do not dispose of a Tobii Pro eye tracker in general household or office waste. Follow your local regulations for disposal of electronic equipment.
Appendix A  Support, Learning Center, 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, links to our Learning Center, and much more. Log in or register to see information about your account and to reach Customer Support at Tobii Pro Connect.

A2  Learning Center

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, or browse through our extensive article library in our Learning Center.

For further product information and other support resources, please visit www.tobiipro.com.

A3  Warranty information

Read more about Tobii Pro Care and the Tobii Pro’s eye tracker warranty in Service Description.
Appendix B  Compliance Information

B1  Compliance

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

B1.1  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.

B1.2  Industry Canada statement

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

B1.3  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

B1.4  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)
- CAN/CSA-C22.2 No. 62368-1/UL 62368-1 Edition No. 2, including collateral standard IEC 62368-3 (US and Canadian Standard)
- J60950-1(H22) (Japanese Standard)
- GB 4943.1-2011 (Chinese Standard)

B1.5  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 C  Technical Specifications

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

C1  Eye tracking specifications

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eye tracking technique*</td>
<td>Video-based pupil- and corneal reflection eye tracking with dark and bright pupil tracking</td>
</tr>
<tr>
<td>Sampling frequency</td>
<td>60, 120 &amp; 250 Hz or 60 &amp; 120 Hz, depending on the hardware version</td>
</tr>
<tr>
<td>Accuracy**</td>
<td>Approximately 0.4° at optimal conditions</td>
</tr>
<tr>
<td>Precision**</td>
<td>Approximately 0.3° RMS at optimal conditions</td>
</tr>
<tr>
<td>Binocular eye tracking</td>
<td>Yes</td>
</tr>
<tr>
<td>Total system latency</td>
<td>3 frames</td>
</tr>
<tr>
<td>Blink recovery time</td>
<td>1 frame (immediate)</td>
</tr>
<tr>
<td>Gaze recovery time</td>
<td>250 ms</td>
</tr>
<tr>
<td>Freedom of head movement</td>
<td>Width × height: 30 cm × 25 cm (11.81&quot; × 9.84&quot;) at 65 cm</td>
</tr>
<tr>
<td>Operating distance</td>
<td>50–80 cm (19.69”–31.49&quot;)</td>
</tr>
<tr>
<td>Max gaze angle</td>
<td>30 degrees</td>
</tr>
<tr>
<td>Max screen size</td>
<td>24” (16:9 aspect ratio)</td>
</tr>
<tr>
<td>Data sample output***</td>
<td>Timestamp</td>
</tr>
<tr>
<td></td>
<td>Gaze origin</td>
</tr>
<tr>
<td></td>
<td>Gaze point</td>
</tr>
<tr>
<td></td>
<td>Pupil diameter</td>
</tr>
<tr>
<td></td>
<td>Validity code</td>
</tr>
<tr>
<td>Eye image data stream</td>
<td>Eye image data stream frequency is approximately 2 x 4 Hz</td>
</tr>
<tr>
<td>User calibration</td>
<td>Binocular</td>
</tr>
<tr>
<td>Tracker and client time synchronization</td>
<td>Integrated between the eye tracker time domain and the client computer time domain</td>
</tr>
</tbody>
</table>

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

**Tobii Pro uses an extensive test method to measure and report performance and quality of data. These accuracy and precision numbers are preliminary. Final numbers will be published as soon as they are available.

***For the complete list of available data and the supplementary data stream, download the Pro SDK documentation from Tobii Pro’s Developer website.

C2  Tobii Pro Fusion Eye Tracker specifications

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions</td>
<td>374 mm L × 18 mm H × 13.7 mm W (14.72&quot; × 0.70&quot; × 0.53&quot;)</td>
</tr>
<tr>
<td>Weight</td>
<td>168g (5.9 oz.)</td>
</tr>
<tr>
<td>Connectors</td>
<td>USB Type-C</td>
</tr>
<tr>
<td></td>
<td>(USB Type-A to Type-C adapter provided)</td>
</tr>
</tbody>
</table>
### C3 Limitations and considerations

#### C3.1 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’s Manual and other supplied documentation thoroughly before using the product.

#### C3.2 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. The 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.

#### C3.3 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.

#### C3.4 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 D  Glossary

#### D1  Glossary

<p>| <strong>Accuracy</strong> | 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 eye tracker accuracy and precision test report on tobii.pro.com. |
| <strong>Binocular calibration</strong> | 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. |
| <strong>Binocular eye tracking</strong> | Tracks and reports data for both left and right eye. |
| <strong>Blink recovery time (time to tracking recovery for blinks)</strong> | 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. |
| <strong>Bright pupil tracking</strong> | 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. |
| <strong>Dark pupil tracking</strong> | 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. |
| <strong>Data sample output</strong> | Type of data provided by the eye tracker |
| <strong>Eye image data stream frequency</strong> | 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. |
| <strong>Freedom of head movement</strong> | 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). |
| <strong>Gaze recovery time</strong> | 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. |
| <strong>Maximum gaze angle</strong> | 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. |
| <strong>Maximum screen size</strong> | The maximum screen size supported by the standard eye tracker setup (i.e. mounting the eye tracker directly on the screen). |
| <strong>Operating distance</strong> | 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. |
| <strong>Optimal conditions</strong> | Please download the data quality test report from tobii.pro.com. |
| <strong>Precision</strong> | 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 the eye tracker accuracy and precision test report on tobii.pro.com. |</p>
<table>
<thead>
<tr>
<th><strong>Sampling frequency</strong></th>
<th>The number of data samples per second output for each eye. Expressed in Hz units, where 1 Hz = 1 sample per second.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total system latency</strong></td>
<td>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.</td>
</tr>
<tr>
<td><strong>Tracker and client time synchronization</strong></td>
<td>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.</td>
</tr>
<tr>
<td><strong>Video-based pupil and corneal reflection eye tracking</strong></td>
<td>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.</td>
</tr>
</tbody>
</table>
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.tobiipro.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 tobiipro.com/contact