

Spectangle PRO Troubleshooting Guide

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1.0 Problems Capturing the Image

1.1 Having to Retake the Picture Multiple Times

Practicing taking images with the Spectangle PRO between colleagues is advisable prior to taking measurements with patients. This experience will reduce the time required to capture a proper picture.

Please note that upon capturing an image, if no warning popups appear, retaking the image is not required unless the frame fitting is observed to be incorrect.

The following scenarios do not require retaking the image:

- **Nasal Sensors Out of Alignment (sensors not side-by-side)**
If the nasal sensors appear slightly out of alignment, the software will compensate for this misalignment without the need to retake the picture. The software has a built-in tolerance that will warn the user with a Head Tilt error popup when retaking the picture is required.
- **Pupils/Lines Not Found**
If the pupil or frame-edges are not found automatically, the user can manually place the markers manually without having to retake the picture.
- **Blurry Image**
If a small amount of blur is present in the image, this does not require the image to be retaken. As long as the pupil and frame lines can be accurately placed on the image, this blur will not affect the measurement results. However, if a large blur is present, retaking the picture is required.

1.2 Blurry Images

Prior to capturing pictures with Spectangle PRO, please make sure to press the Focus button prior to taking an image. If the camera has trouble focusing on the subject, try to point to iPad slightly below the EY-Stick when pressing the Focus button and re-center the tablet to take the image.

Blurry images can also be caused by moving the tablet while the image is being taken. Holding the iPad up for an extended period of time will cause arm fatigue that may cause undue movement. To avoid fatigue, hold the iPad up right before attempting to take the image. If the image taking process has taken a few seconds of holding up the iPad due to focus, positioning and verification, hold the iPad down for a few seconds and lift the iPad again to take the image.

Another method to avoid capturing blurry images is to firmly rest your elbows on the dispensing table. Raise the iPad so that the EY-Stick is within the viewing area of the blue rectangle. If needed, ask the

patient to slightly raise or lower their chin, and to gently rotate their head left or right. Preferably, you should mimic the action requested of the patient while asking them to follow through.

Additionally, cleaning the iPad's camera lens can also help reduce image blurriness.

1.3 Detection Error

A Detection Error popup will occur when the software is unable to properly detect the green sensors on the EY-Stick.

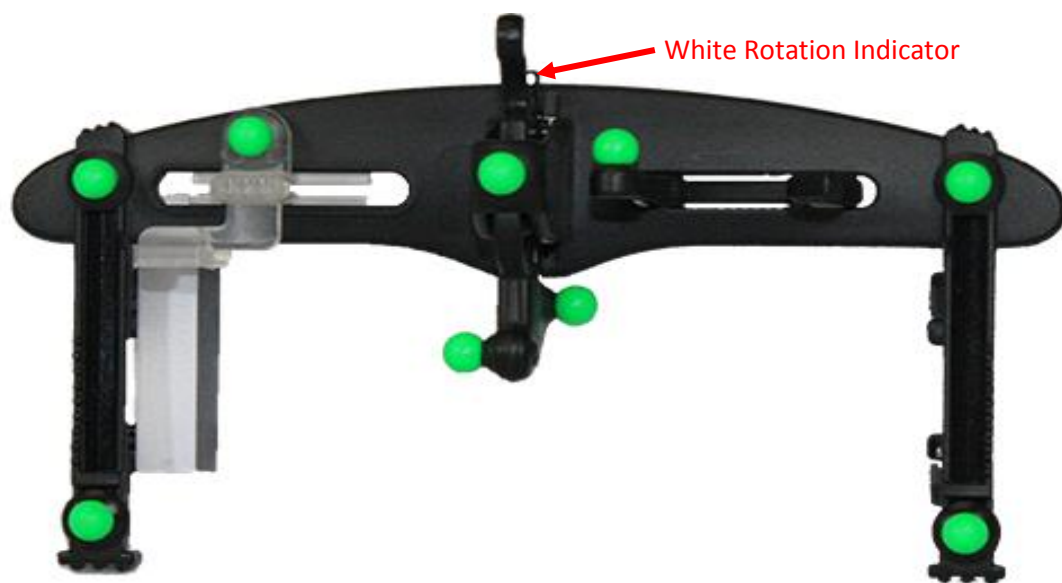
If this error occurs, please make sure that the entire EY-Stick device is visible inside the blue rectangle when capturing the picture.

A detection error can also be caused by extreme lighting conditions. It is recommended that the patient not be placed in front of a window when taking the picture. Avoiding locations with bright overhead lights may also help reduce detection errors. Additionally, changing the Spectangle PRO lighting Preset can help reduce detection issues. The Preset button is located above the Focus button and will cycle through 1 of 5 lighting presets.

1.4 Head Rotation Error

A Head Rotation error popup will occur if the patient's head was rotated too far left or right when the picture was taken. If this occurs, the picture must be retaken.

The white rotation indicator, located on the back of the break arm, can be used to ensure no head rotation is present when taking the picture.



Please turn the iPad left or right until the white rotation indicator is not visible in live video prior to taking the picture. Alternatively you can ask the patient to rotate their head left or right until the white rotation indicator is not visible in live video prior to taking the picture.

1.5 Head Tilt Error

A Head Tilt error popup will occur if the two nasal sensors were too far apart when the picture was taken. If this occurs, the picture must be retaken.

When taking the picture, tilt the iPad or ask the patient to raise or lower their chin until the two green nasal sensors on the swing assembly of the EY-Stick are in horizontal alignment. The horizontal alignment ensures that the patient's primary line of sight is being used when capturing the image.



HEAD TILT



NO HEAD TILT

Note that some Head Tilt errors are associated with the improper capturing of the natural head posture. Please make sure to properly lock the swing assembly for each patient prior to capturing the picture.

Please note that if the nasal sensors appear slightly out of alignment and no Head Tilt error popup has appeared, the software will compensate for this misalignment without the need to retake the picture.

1.6 Corneal Reflection Not Visible

If the corneal reflection is not clearly visible after the image is taken, please increase the Flash Intensity slider when retaking the picture. The Flash Intensity slider is located at the bottom of the screen when taking the picture. A low Flash Intensity setting may not be suitable in bright lighting conditions. Please note that a high Flash Intensity setting may be uncomfortable for the patient. Once a proper Flash Intensity is determined for your practice, this value can be set as the default in the Settings panel.

Also, ensure that all smudges on the lenses are cleaned as this may affect the image taking process.

Please note that it is recommended that the patient not be placed in front of a window when taking the picture. Avoiding locations with bright overhead lights may also help reduce detection errors.

Additionally, changing the Spectangle PRO lighting Preset can help reduce detection issues. The Preset button is located above the Focus button and will cycle through 1 of 5 lighting presets.

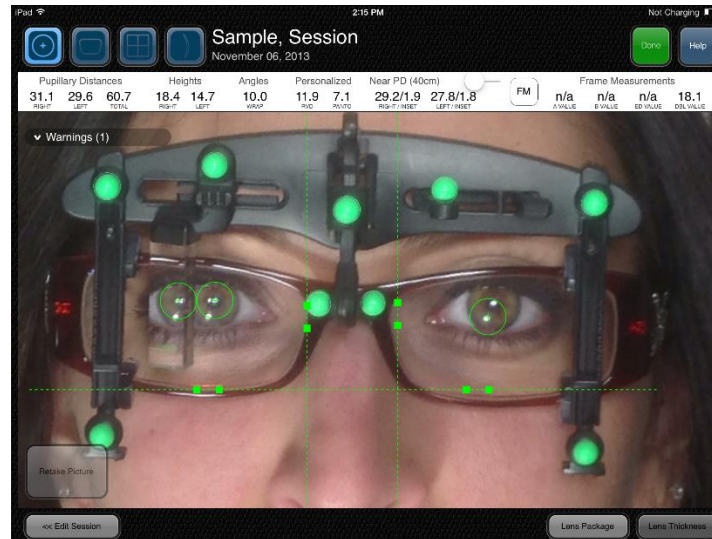
1.7 Live Detection Flickering

The live detection indicator may flicker due to lighting conditions. This indicator is meant as a training tool and is not required to take the picture. The operator should rely on the following:

- 1) The nasal sensors being side-by-side
- 2) The white rotation indicator to be not visible in live video
- 3) That the entire EY-stick is visible in the blue rectangle in live video

1.8 Incorrect Pupil and Line Detection displayed on captured picture

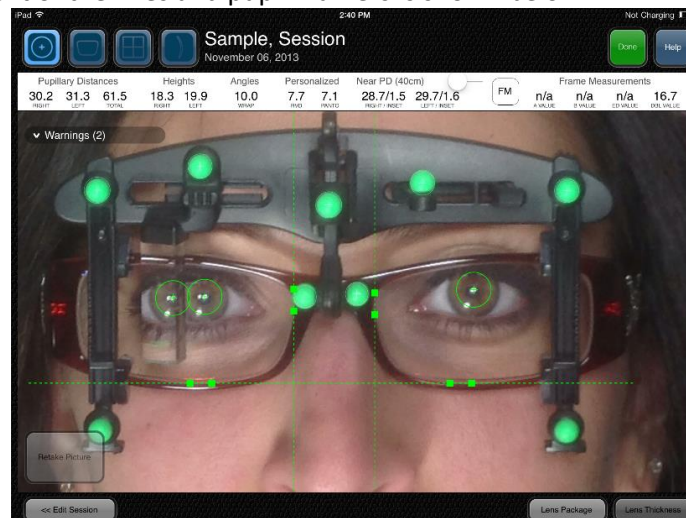
As part of the pre-fit analysis on a captured picture, it is important to verify that both the pupil and line markers be displayed at their proper locations. Occasionally, despite displaying the pupil and line markers in green, the software may have difficulty finding the proper locations. Glare and smudges on the lenses are the primary causes. The picture below is an example of improper line and pupil detection.



There are four issues with the picture above:

- 1) The corneal reflection of the right-side eye was not detected. Instead, a reflection from an overhead light displayed on the lens was found.
- 2) The marker indicating the deepest edge where the lens meets the frame on the right-side eye was not detected.
- 3) The vertical line on the right-side eye did not locate the edge where the bridge and the lens intersect.
- 4) The wrong corneal reflection was detected inside the prism. The marker should always be placed on the most nasal corneal reflection.

The corrected placement of the lines and pupil markers is shown below:



2.0 Measurement Differences between Spectangle PRO and Manual Measurements

2.1 Why am I getting different PD values with Spectangle PRO?

Pupilometer vs As-Worn Measurements

Please note that there will be a difference between monocular PD measurements taken with a pupilometer and those taken with the Spectangle PRO software. A pupilometer measures PDs anatomically based on the center of the patient's face. The Spectangle PRO software will measure PDs based on how the frame sits on the patient's face. The Spectangle PRO's "as-worn" measurements take into account face physiology and the frame fit. For this reason, it is extremely important to fit the frame the way it will be dispensed prior to capturing the measurements picture.

Additionally, the difference in measurement increments between the Spectangle PRO 0.1mm increment and the pupilometer 0.5mm increment will also cause the values to be different.

2.2 Why am I getting different Seg. Height values with Spectangle PRO?

Pupil Center vs Corneal Reflection vs Comfort Heights

When comparing Spectangle PRO Seg. Heights to manually obtained ones, please ensure that the same measurement reference points are being used. First establish what manual reference points are currently being used in your practice.

The following Seg. Height measurement methods are prevalent in the field:

- Corneal Reflection
- Pupil Center
- Pupil Center with a fixed X mm drop

The Spectangle PRO software will place the pupil markers based on the corneal reflection but will measure Seg. Heights based on the final position of the pupil marker.

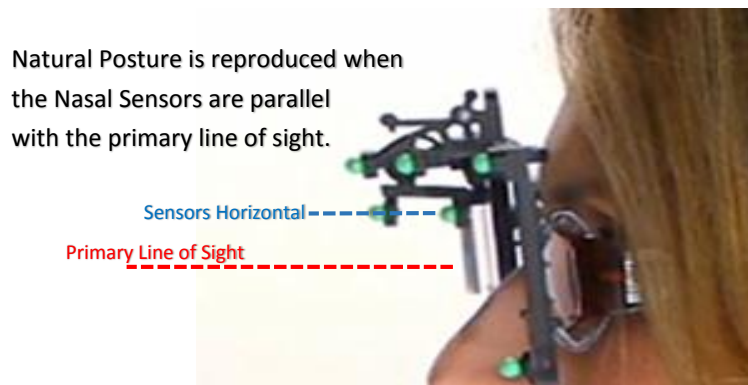
The technique of measuring the Seg. Heights from the pupil center and then dropping the Heights by a few millimeters is common practice. If this is the case in your practice, Spectangle PRO facilitates keeping this protocol in place through the use of the Comfort Heights feature. This feature allows a fixed millimeter drop of the Seg. Heights to be performed once the image is taken. This millimeter drop is best determined by investigating your practice's current measurement offset from the pupil center. Please note that the operator always has the ability to adjust the pupil marker position in the Spectangle PRO software using the arrows or with Comfort Height feature.

Pre-fit Analysis

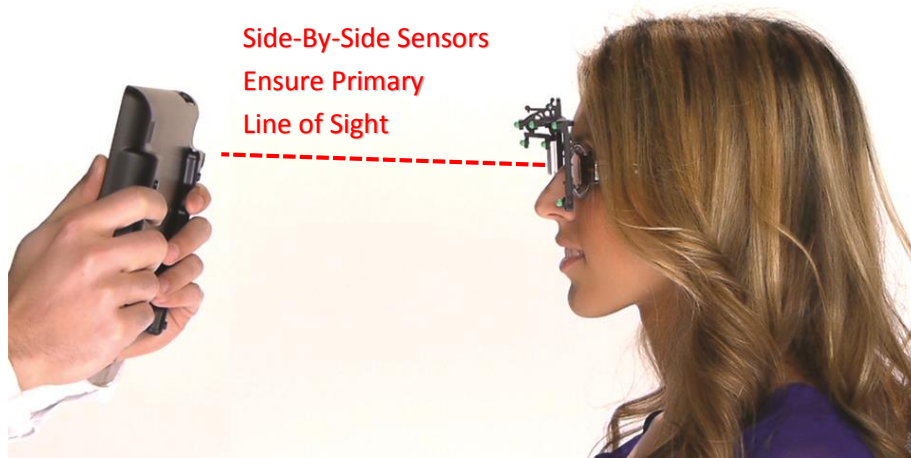
When analyzing the captured image it is important, as part of verifying the fitting, to take note of where the eyes sit in the lenses. As with manual measurement taking, if the Seg Heights appear "too high", it is possible that the pre-fit must be re-done or the posture must be recaptured with the EY-Stick.

Dotting vs Locking

When the EY-Stick's locking mechanism is open, the nasal sensors on the swing assembly will always be parallel to the ground for ANY given head posture. When the operator asks the patient to gaze at a distance in his natural posture and locking the swing assembly, he is capturing the point within the lens through which the patient sees. This is known as capturing the line of sight. This process is the equivalent of manually dotting the lens. Just like dotting, different head postures will produce different Seg Heights.



When the operator positions the Spectangle PRO to capture the picture, he is attempting to re-create the line of sight previously captured by the EY-Stick. When observing in video that the nasal sensors are side-by-side, this means that the patient is looking at the Spectangle PRO's camera using their primary line of sight. This explains why the Spectangle PRO need not be at eye level when capturing the picture.



Please note that the patient must be looking at the camera lens when the picture is taken. It is best to ask the patient to look into the camera lens and to hold still until the flash is fired to ensure best results.

Seated vs Standing Posture

A given person's seg. heights may vary depending on whether the posture is captured standing or sitting. For instance, a very tall person may have a different standing posture as opposed to a seated one. That person when holding a conversation may feel the need to stoop their chin in order to view the other person. This will place their eyes higher in the lenses. However, that same person, if seated, may not feel the need to lower their chin. They will place their eyes lower in the lenses. The difference in heights for the same frame may be over 1mm.

A person's lifestyle should be taken into account when locking the natural posture. If a person's daily activities have them moving around often, then the posture should be captured standing. However, if a person spends most of their day seated at a desk, the posture should be captured seated.

Your professional judgment should be used in ensuring that the patient is in their natural posture when locking the swing assembly.