

**Practical guide for operating the  
Oculus C-Quant straylight meter  
(software version 1.09)**

## **Introduction**

This document is intended as help when working with the Oculus C-Quant straylight meter. It gives some examples of possible measurement outcomes, which can be useful to interpret your own results, especially when measurement reliability is not optimal. It is assumed that you are already familiar with basic operation of the C-Quant. If not, please refer to the C-Quant Instruction Manual.

Please start to familiarize yourself with the measurement by testing your own eye. Play with different range settings (including “G”) and (erroneous) corrective lenses up till errors of + and - 4D. Study the response patterns (lower graph of the C-Quant screen) obtained and compare them with the examples in this document.

## ***Startup and patient data entry (Patient Data Management screen)***

- Start up the C-Quant program by double clicking the Oculus Company logo on the desk top. A screen-filling company logo appears. Click again to go to the Patient Data Management screen.
- Enter the appropriate patient data or select the appropriate patient from the patient list. **Note:** the <First name> field needs at least two characters before the patient data can be added to the patient list.
- Start up the examination program by single clicking the [C-Quant] button. **Note:** Double clicking will give an error!
- If the message “C-Quant could not be found” appears, either the C-Quant is not switched on, the C-Quant is not properly connected to the (laptop) computer, or the <Mode> setting in the <System settings> dialog of the examination program (go to <Settings> → <System>) does not correspond to the type of connection you are using (serial or USB). After making the necessary adjustments, close down the examination program and start it up again.

## ***The examination program (Oculus C-Quant screen)***

### **Before the measurement**

Three settings need to be made on the screen before a measurement can be started:

#### **1. Eye:**

If both eyes are to be measured, start with the better/dominant eye. The other eye should be occluded with an eye patch or something similar. **Note:** see under “Range” below.

#### **2. Correction:**

The refractive correction is not critical for the C-Quant measurement. A deviation of the best corrected value of up to 2 diopters can easily be tolerated. Cylindrical errors of up to 3 diopters may be corrected with the spherical equivalent. It is recommended to use only one trial lens for refractive correction, unless the cylindrical correction is more than 3 diopters. **Note:** for visual acuities down to 0.2, it should still be possible to perform the test. For visual acuities of 0.1 or lower, the test will be very difficult to perform.

#### **3. Range:**

The default <Range> setting is “E(>75)”. This will be a proper setting in many cases, if straylight increase is mild. If high straylight values are expected (e.g. with cataract or corneal turbidities), settings “F(cataract)” or “G” must be used. “G” can also be used if you want an easy (first) test.

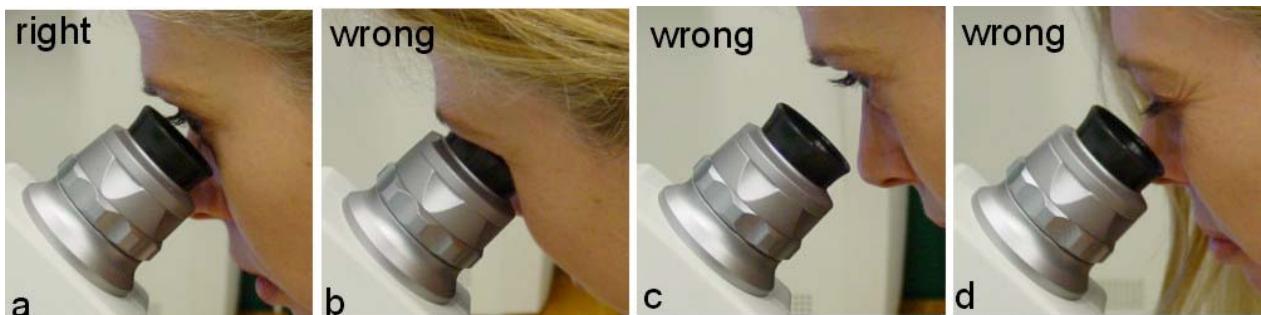
The response pattern obtained will guide you how to proceed. **Note:** change the <Range> setting before changing the <Eye> setting, otherwise the <Eye> setting will jump back to “Left”. **Note:** the chosen <Range> setting might turn out to be not optimal for the actual patient. Depending on the circumstances, it might be necessary to repeat the measurement with a different <Range> setting in order to obtain a (more) reliable measurement (see “After the measurement” below).

## Patient instruction:

The instruction for the patient should include the following elements:

### Eye position

- Position the eye close to the eyepiece, keeping a minimal distance (figure a). A slight touch is good, but not firmly against it. If the eye is tightly against the eyepiece, condensation may form on the lens of the C-Quant, which will influence the measurement outcome (figure b). Also, if the eye is too far from the eyepiece, this will give a wrong test result (figure c).
- Keep your eye normally open and do not squeeze, as this may also influence the measurement outcome (figure d).



### Task during the test

- Only concentrate on the two half fields in the center of the field; ignore the flickering ring.
- Compare the two half fields, decide which one flickers more clearly/strongly, and press the corresponding button on the C-Quant (left button if the left test field flickers stronger, right button if the right test field flickers stronger). This procedure will be repeated for a series of stimulus presentations, until the test is finished.
- React by first impression and react promptly. Do not try to think about a presentation. The buttons can be pressed as soon as flicker appears, shortly after the beep.
- For several presentations, it will be hard to tell the difference between the two half fields (they seem to be flickering equally strong). This is normal, and also here you must make a choice following your first impulse.
- Optional information (only if the patients asks): one measurement consists of about 25 presentations and usually takes 1.5 to 2 minutes.

Make sure the patient is seated comfortably and the measurement takes place in a quiet environment with a minimum of background noise and other people around. The measurement requires full attention from the patient.

Start the measurement by clicking the [Start] button. A <Start Examination> dialog appears where you can check if you entered the correct <Eye> and <Correction> settings. This information must be correct, as it can not be altered afterwards. The settings can be altered in the dialog box.

Click the [OK] button to start the actual measurement.

## **During the measurement**

If the patient is too hesitant to choose between the two half fields and/or refuses to press a button, you can enter responses yourself with the arrow keys on the computer/laptop. If you need to generate a random answer (in case the patient is undecisive with respect to the left/right choice), it is best to always press the same key (e.g. the left arrow key). Use this option cautiously.

## **After the measurement**

When the measurement is finished, reliability is automatically verified. The measurement is considered reliable when  $esd \leq 0.08$  and  $Q \geq 1$ . In this case, both numbers are shown in black (**Example 1**).

When  $esd > 0.08$  and/or  $Q < 1$ , these values are shown in red, and the message “Reliability not optimal. Consider to repeat the measurement” appears. What to do in such a case? This depends on the actual value of  $esd$ . The reliability requirements employed in the C-Quant are rather strict. In most clinical cases, measurements with  $esd \leq 0.1$  or even  $esd \leq 0.12$  are sufficiently reliable, even ignoring the  $Q$  value (**Example 2**). To really get the best out of the measurement, you could consider to repeat the measurement in order to obtain a measurement with  $esd \leq 0.08$ . Before repeating the measurement, you should verify if a correct  $\langle Range \rangle$  setting was chosen (see below).

If  $esd > 0.12$ , the measurement should be considered not reliable (but see below). The measurement should be replaced to obtain a measurement with  $esd \leq 0.12$ . Again, you should first verify if a correct  $\langle Range \rangle$  setting was chosen (see below).

If reliability does not improve, the test may be too difficult for the patient (e.g. because of very low visual acuity). In this case, the “G” setting for  $\langle Range \rangle$  may help. The “G” setting is the easiest for everybody, and should be used for difficult cases.

If  $esd > 0.12$  using a high  $\langle Range \rangle$  setting (e.g. “G”), the result might still contain valuable information. For many clinical applications, it is not necessary to know the exact straylight value, but only whether or not the value is increased. In some cases, this information can be deduced from a measurement, even if  $esd > 0.12$  (**Examples 3a, 3b, and 3c**).

When it is desirable to know the exact straylight value (e.g. for follow-up measurements) after performing the test with the “G” range, another attempt could be made to obtain a reliable measurement at the patient’s proper  $\langle Range \rangle$  setting (the patient might have improved his performance after performing the test with the “G” range).

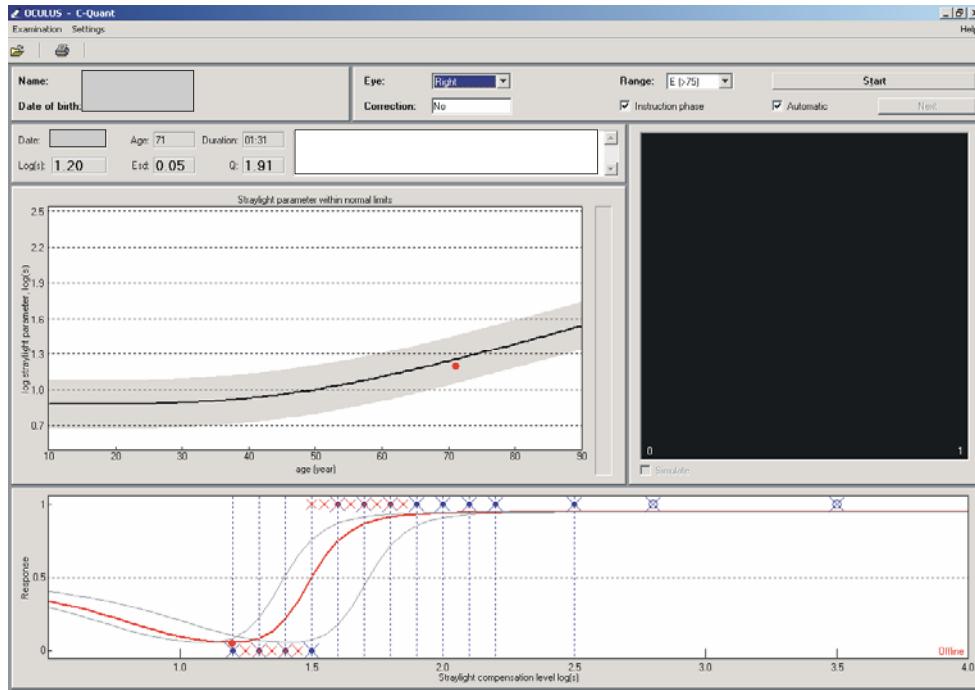
## **When to choose a different $\langle Range \rangle$ setting?**

The  $\langle Range \rangle$  setting might be too high if the straylight value of the patient is low. In this case, there are too many 1 responses and not enough 0 responses (**Example 4**). The  $\langle Range \rangle$  setting might be too low if the straylight value of the patient is much increased. In this case, there are too many 0 responses and not enough 1 responses (**Example 5**). In both cases, repeating the measurement with the same  $\langle Range \rangle$  setting will not yield a lower  $esd$  value. You can only improve reliability by choosing a different  $\langle Range \rangle$  setting. **Note:** It is not always clear if the chosen range was too low (**Example 6**). In such a case it is anyway a good idea to choose a higher  $\langle Range \rangle$  setting, because the test will be easier to perform then. **Example 7** shows that the patient from Example 6 is perfectly able to do the measurement. The chosen range in Example 6 was apparently too low.

## C-Quant Examples

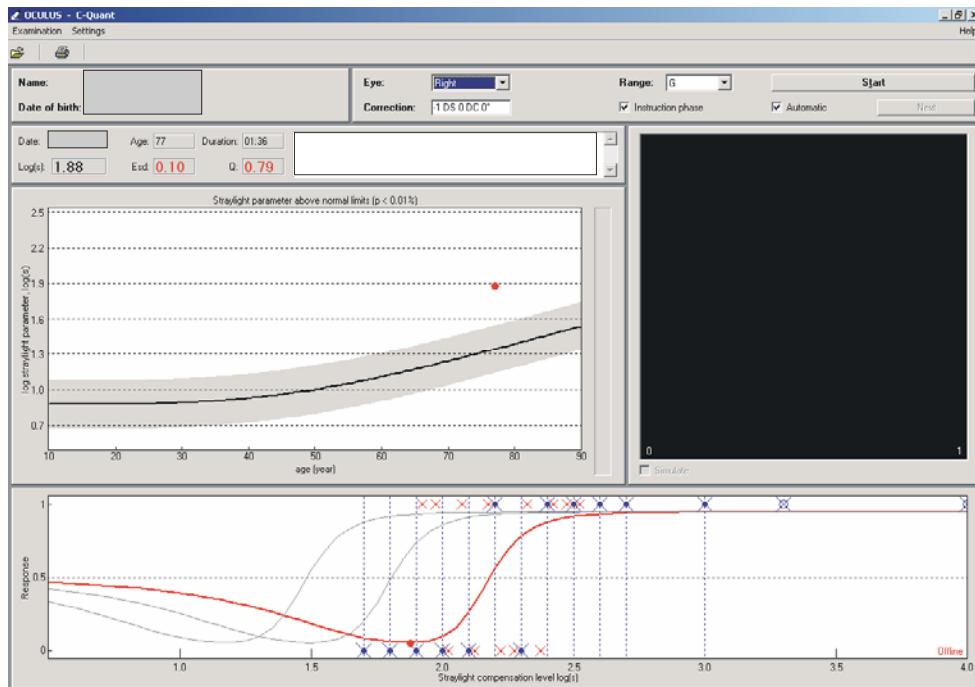
### Example 1: $esd \leq 0.08$ and $Q \geq 1$ .

This is a reliable measurement. Note that there is almost no overlap between the 0 and 1 responses. More overlap means a less reliable measurement.



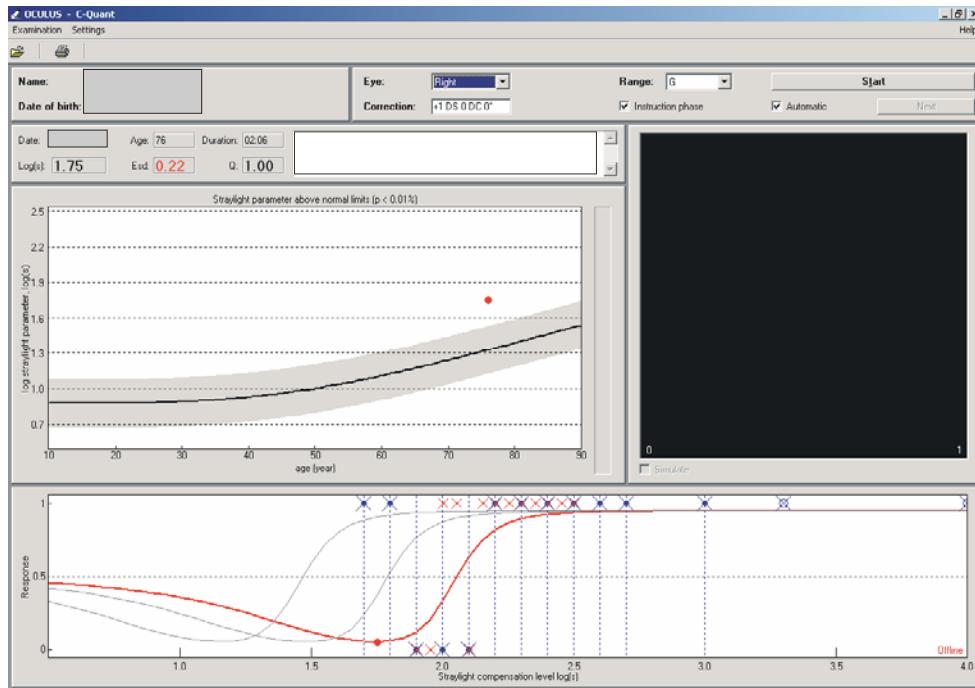
### Example 2: $0.08 < esd \leq 0.12$ .

Although reliability is not optimal, this measurement may be accepted as a good measurement in most cases. However, if time allows, it is recommended to repeat the measurement in order to obtain a better reliability. Note that there is quite some overlap between the 0 and 1 responses.



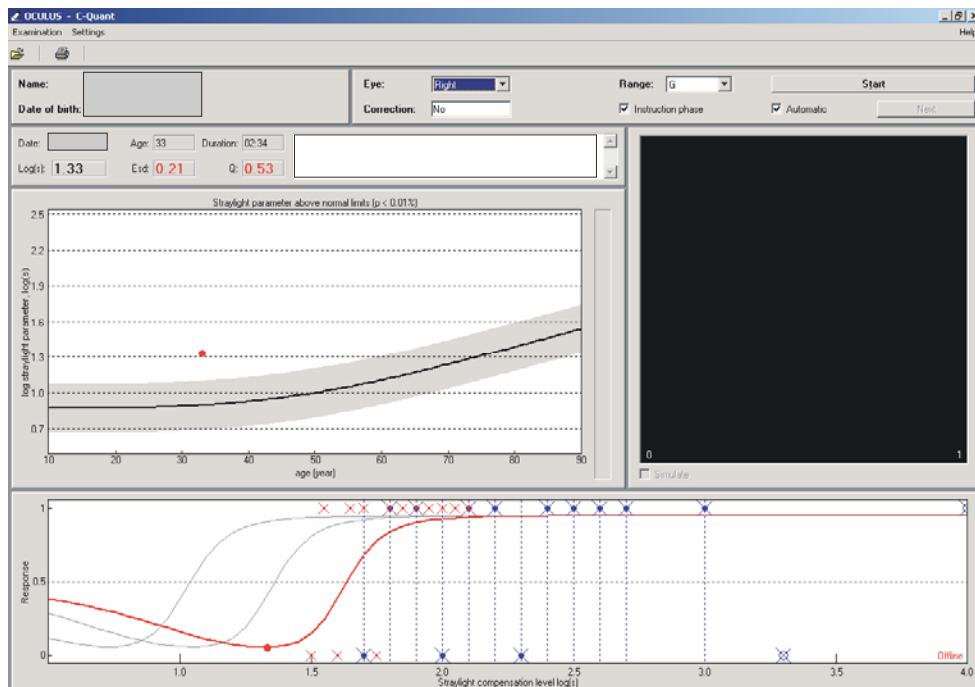
### Example 3a: esd>0.12 in “G” range

If there is no time to repeat the measurement, this measurement can be used to estimate an upper limit for the straylight value. Because there is a consistent row of 1 responses in the right part of the graph, it is quite certain that the patient does not have a straylight value higher than the outcome of the measurement. If you need a more reliable straylight value, just repeat the measurement.



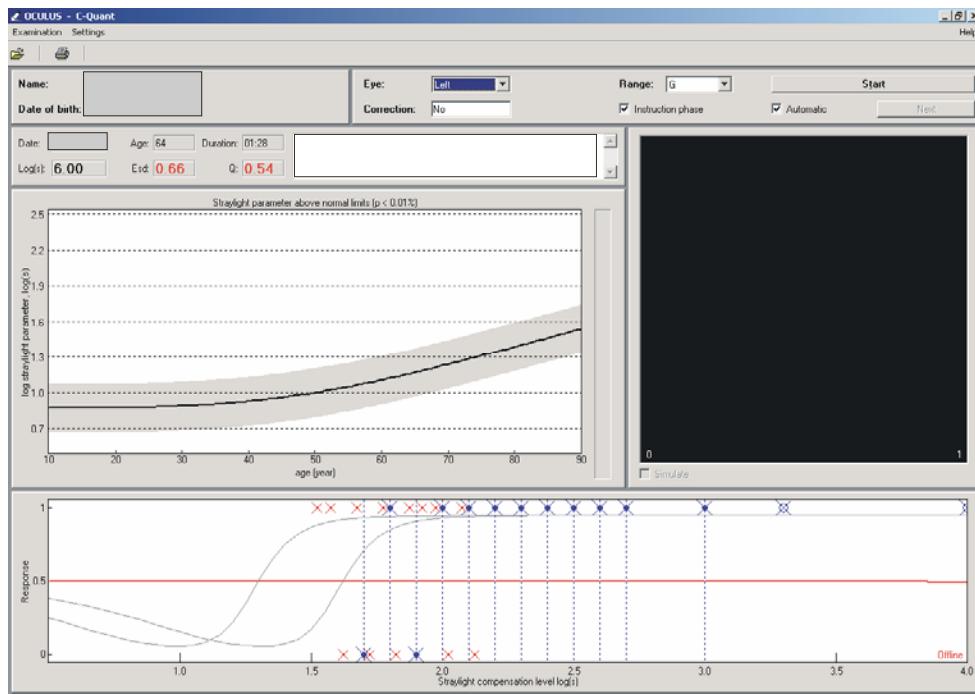
### Example 3b: esd>0.12 in “G” range

This example is similar to Example 3a: if there is no time to repeat the measurement, the outcome of this measurement can be used to estimate an upper limit for the straylight value. If you decide to repeat the measurement, the surplus of 1 responses would suggest choosing a lower <Range> setting (as in Example 6), but the presence of some erroneous points (blue points at 2.0, 2.3 and 3.3) indicates that this patient has difficulties to perform the test. Note that the same <Range> setting (“G”) is the easiest for the patient.



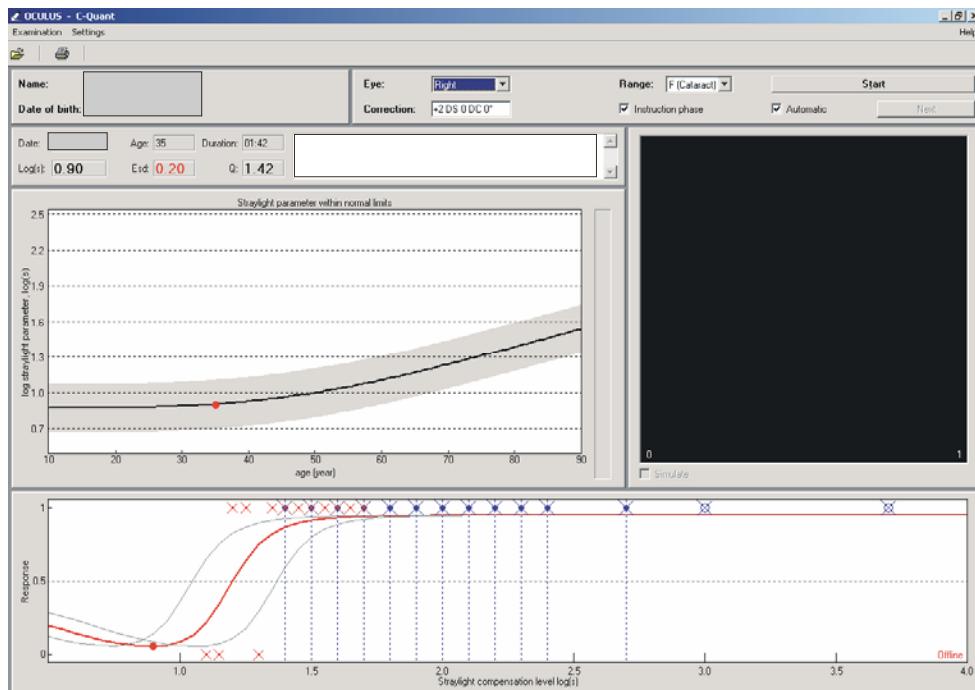
### Example 3c: esd>0.12 in “G” range

This example is similar to Examples 3a and 3b, only esd is so high that no estimation for the straylight value could be calculated ( $\log(s)=6.00$  is a meaningless value). However, you can make this estimation yourself by looking at the 1 and 0 responses: the 50%-point of the curve will probably be not higher than 1.8, corresponding to a straylight value of 1.5, a moderately increased value.



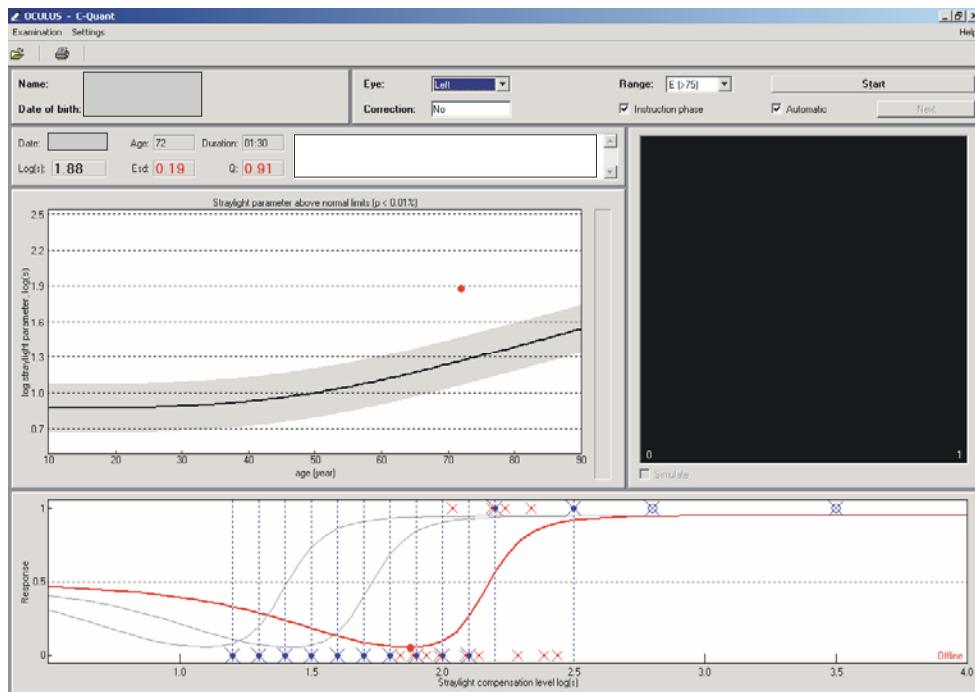
### Example 4: <Range> setting too high

This measurement went very well, only there are too many 1 responses and not enough 0 responses for a reliable estimation of the straylight value. Reliability can be improved by repeating the measurement at a lower <Range> setting.



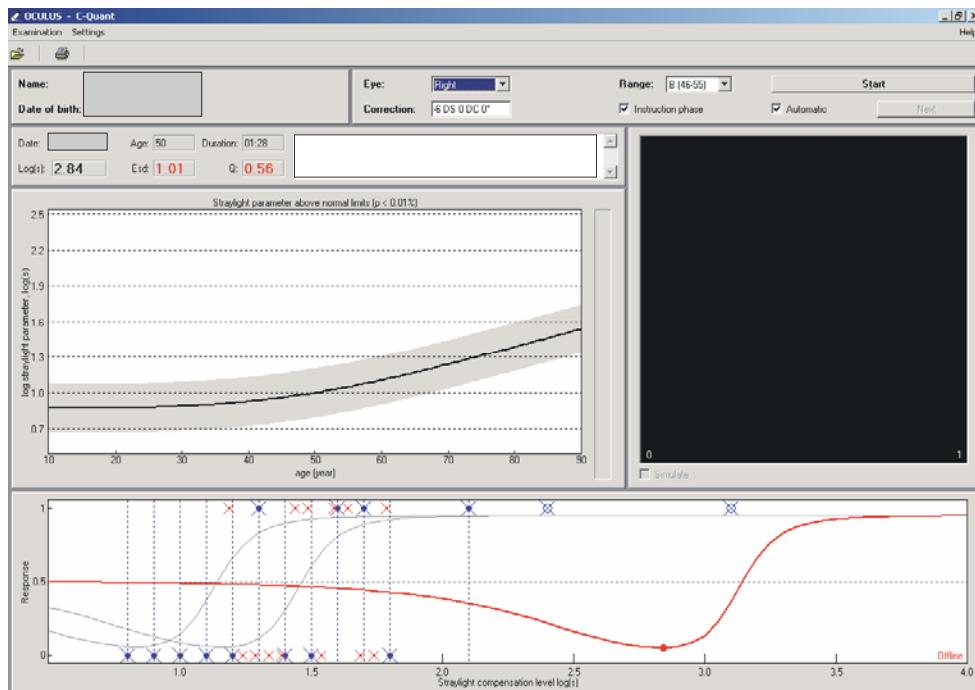
### Example 5: <Range> setting too low

There are too many 0 and not enough 1 responses for a reliable estimation of the straylight value. The measurement reliability can be improved by repeating the measurement at a higher <Range> setting (which will be “G” in this case).



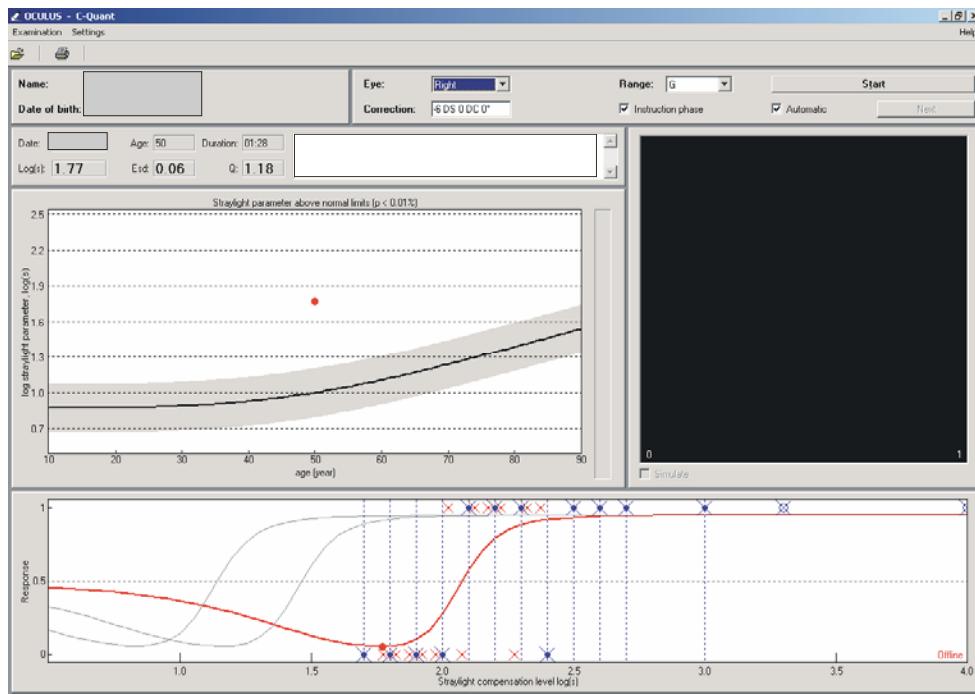
### Example 6: unreliable measurement at low <Range> setting

From this result you can not tell if the <Range> setting was chosen too low, or if the test is too difficult for the patient. In both cases it is wise to repeat the measurement at a higher <Range> setting, in this case the “G” setting (see Example 7).



### Example 7: reliable measurement at high <Range> setting

The same patient as in Example 6, but measured with the “G” setting. This is a reliable measurement ( $esd \leq 0.08$  and  $Q \geq 1$ ). The chosen range in Example 6 was apparently too low.



### Additional information

More information about the working principles of the C-Quant can be found in the separate document “Compensation Comparison in the Oculus C-Quant straylight meter”. More information about retinal straylight in general and its relation to other measures of visual function can be found in the separate document “Introduction to retinal straylight”. More thorough references related to these subjects can be found in the separate document “C-Quant literature overview”. For additional information, please contact:

Tom van den Berg  
Ocular Signal Transduction group  
Netherlands Institute for Neuroscience  
Amsterdam, The Netherlands  
Phone: +31-20-5665185  
Email: t.j.vandenberg