

# 2WIN

## Applications MANUAL



## Revision notes

Software configuration version	2WIN/2WIN-S 5.6.3
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## General notes

**Family:** 2WIN VISION ANALYZER


**Family intended use:** Portable instruments for the measurement of binocular and monocular refraction based on infrared photorefracton

**Models:** 2WIN, 2WIN-S, 2WIN-S PLUS

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# 1 Introduction

 For a detailed description of the functionalities of 2WIN, please refer to the Operator manual.

It is possible to increase the 2WIN's functions with the installation of additional Applications.

Each Application is described in Chapter 2. This chapter describes instead the installation and management of the additional Applications.

 For further information on buttons' functionalities, please refer to *2WIN Operator Manual*.

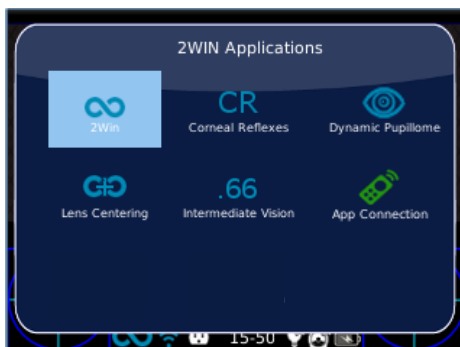
## 1.1 Installation

Send an e-mail to [contact@adaptica.com](mailto:contact@adaptica.com) requesting an application's purchase (whether not already installed), with the serial number of your 2WIN

An activation file will be sent to you by e-mail; copy this file in the root of your MicroSD card and restart the 2WIN.

## 1.2 Selection

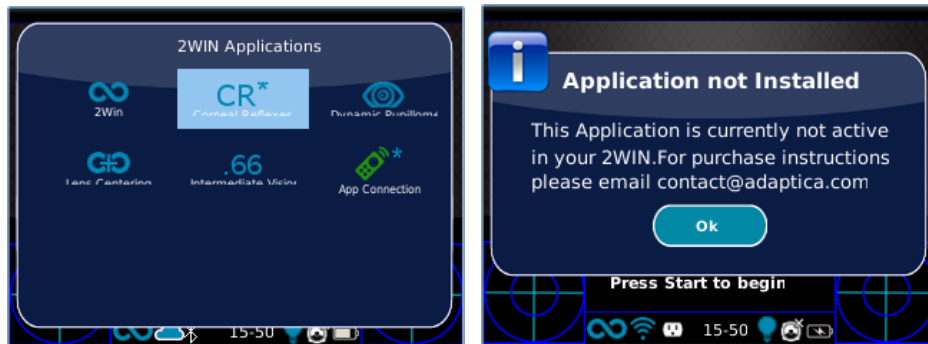
If you click BUTTON A, the "2WIN Applications" screen appears:



There are two sets of icons: blue ones and green ones. The formers allow the 2WIN to perform completely different measurements. Instead, the latter are options of the 2WIN that, if enabled, add special functionalities. For example, the CR-APP icon (second blue icon) means that in that 2WIN is enabled the Corneal Reflex application feature.

By clicking with the JOYSTICK on the desired Application icon (blue), this Application will be activated and set for the next measurements.

If close to an icon in the 2WIN Applications window a “\*” symbol is present, it means that the specific Application is not installed in the device. If the user tries to activate it, a warning message is displayed:




 For further information regarding 2WIN’s Applications, please refer to video tutorials that can be found in the Adaptica’s YouTube channel: <https://www.youtube.com/user/AdapticaSrl>.

## 2 Applications

### 2.1 Corneal Reflexes Application (CR-App)

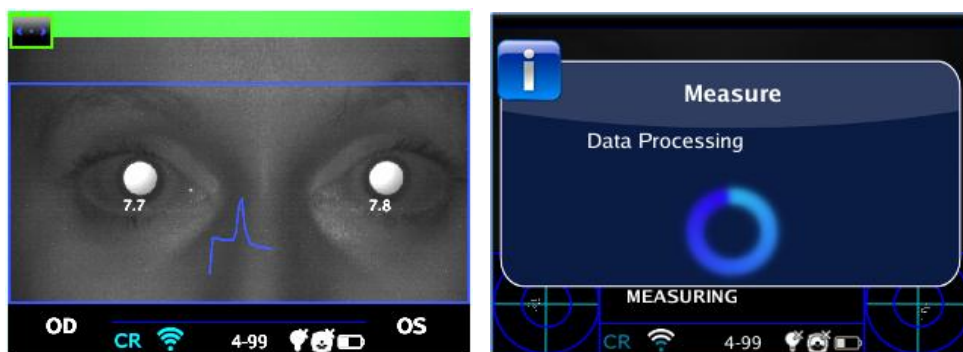
The CR-App Application provides information regarding the corneal reflexes position, giving hints about possible phorias and tropias up to 30 prismatic diopters. It collects data from 3 measurements, one binocular and two cover tests under an IR occluder. Results are expressed in prismatic diopters or in degrees.

 The patient must look at the white led that turns on during the measurement:

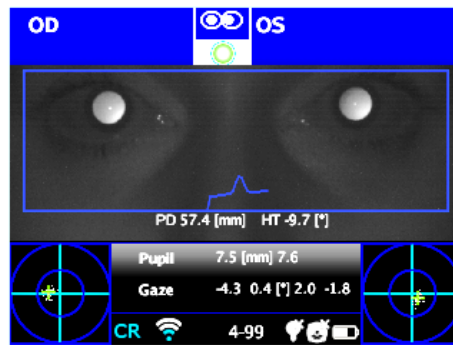


The measurement procedure is described below:

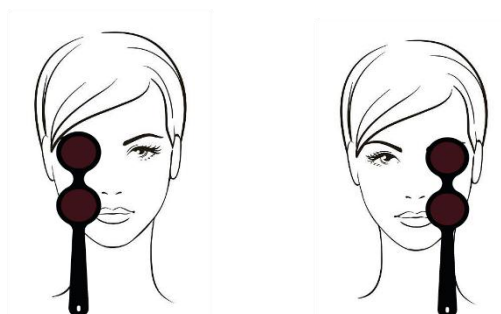
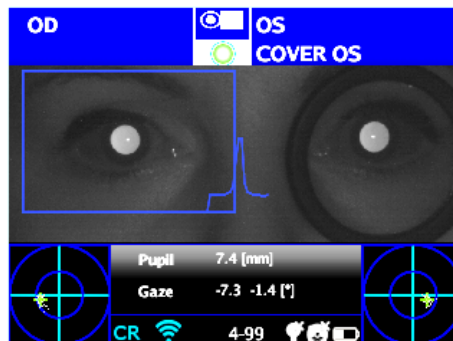
1. Once the right conditions for the measurement are met, point the device towards the patient.
2. Press and hold BUTTON S1 or S2 to start the measurement.
3. Center the eyes of the patient in the display's live area, inside the blue rectangle.
4. Adjust the distance to focus the image until the top bar is green.
5. When the top bar is STEADILY green release the BUTTON S1/S2. Hold 2WIN's position until the message "Data Processing" appears on the display.



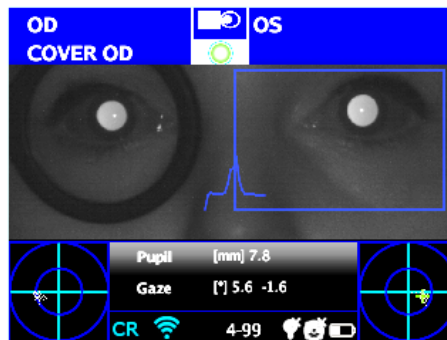
6. After the measure, a green indicator in the center of the top bar, will signal the correct acquisition.



7. Click BUTTON C and select the eye that will undergo the cover test, using the Binocular Occluder provided by Adaptica to cover the contralateral eye – **do not use other occluders.**



8. Repeat steps 1 to 6 to perform the measurement for the selected eye.
9. Click BUTTON C to select the other eye, moving the occluder accordingly.

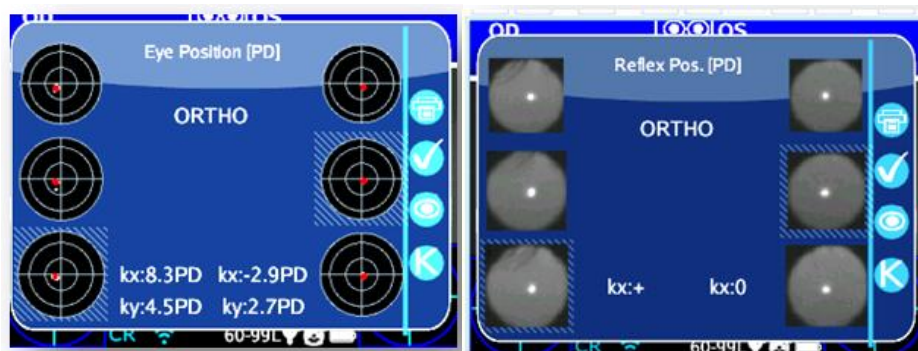


10. Repeat steps 1 to 6 to perform the measurement for the selected eye.

## Exam Results

Once completed the test, the auxiliary window for the corneal reflexes analysis is opened automatically whether selected on **Menu > Functions > 2WIN Applications > Corneal Reflexes > Options > Show at End**.

This is an example of exam results of CR-App:



There are two columns with three circles each, related to the left and the right eye information. The size of the circle is proportional to the pupil size.

The images represent from top to bottom:

- Both eyes free (not covered)
- Right eye free, left eye covered
- Right eye covered, left eye free

 The covered eye is highlighted by a light blue square.



The cloud of points in each image graphically represents the corneal reflexes collected during the exam. Whereas the red point in the mean of each distribution is the average position of the corneal reflexes.

The operator can switch between this description (barycentric fixation) and the pictures of the pupils by pressing **BUTTON C**.

When the position of the corneal reflexes, comparing the binocular test with the monocular cover test of each eye, is not significantly changing, the barycenter changes its position less than the threshold value (mm) selected in the app's settings – **Menu > Functions > 2WIN Applications > Corneal Reflexes > Options > Threshold**. The output is **"ORTHO"**.

When a manifest asymmetry of the corneal reflexes is detected without the cover test, the output is: **ET – Esotropia; XT – Exotropia**.

When an asymmetry of the corneal reflexes appears only under the infrared cover test, the output is: **EP – Esophoria – XP: Exophoria**.

If a vertical deviation is present, the output follows the same rules as above: **HT – Hypertropia; IT – Hypotropia; HP – Hyperphoria; IP – Hypophoria**.



The messages ET, XT, EP, XP, HT, IT, HP, and IP must not be misunderstood as a diagnosis. The measurement shall be used to refer the patient to an eye-care professional.

K-angles values are displayed on the bottom of the auxiliary window. The default output shows the following:

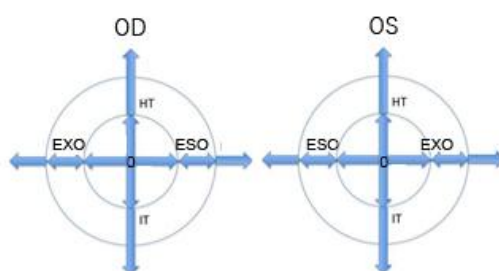
- **Horizontal k angle** (labelled as **"kx"**): the output is "+" when the corneal reflex lays nasal to the center of the pupil; "0" when the corneal reflex coincides with the geometrical center of the pupil; "-" when the corneal reflex is on the temporal side.
- **Vertical k angle** (labelled as **"ky"**): the output is "S/D" when the corneal reflex of the left eye lays superior to the corneal reflex of the right eye; "D/S" in the opposite case. When there is a vertical disparity inferior or equal to the established threshold, no vertical disparity message is given.

By clicking **BUTTON C**, it's possible to toggle between this and a second layout, where the k-angle is expressed in terms of its horizontal and vertical coordinates.



Default threshold levels are factory set to 5 Prismatic Diopter (PD) for the **"kx"** output and to 4 PD for the **"ky"** output.

The following picture gives a graphical representation of the codes:

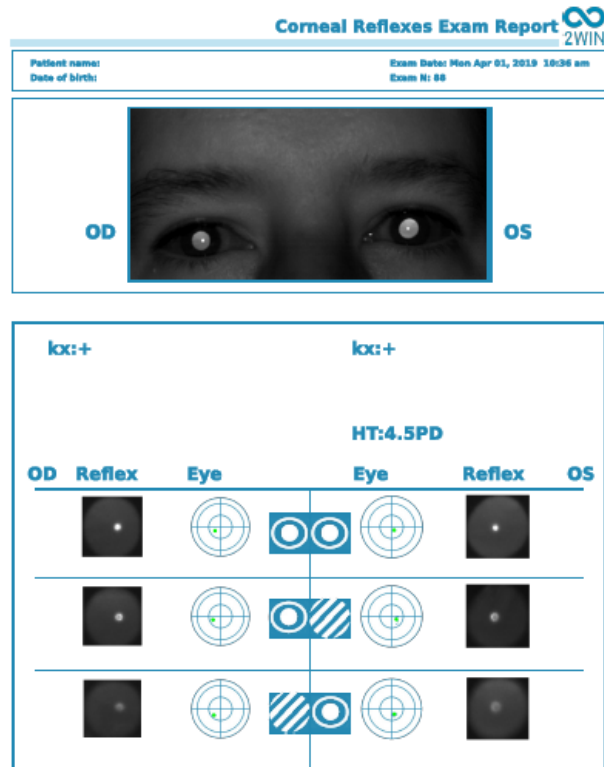




The corneal reflex is represented on the graph in an inverted position: if the corneal reflex is nasal to the center, it is represented as temporal in the 2WIN's diagram.

## PDF report

Results can be saved on the MicroSD card by long pressing BUTTON B from the Auxiliary window displayed.



In the printout, the results are displayed in degrees (°) or prismatic diopters (PD); the concentric circles representing steps of 10 units (10, 20, 30 PD or °). The pupil is sized accordingly and cropped if bigger than 7 mm.

To choose between degrees or prismatic diopters: **Menu > Functions > 2WIN Applications > Corneal Reflexes > Options > Notation.**

## Measurement reset

To perform a new examination or to cancel the results just obtained, the measurement may be reset in two ways:

- choosing a new Application;
- clicking “Reset” in **Menu > Functions > 2WIN Applications > Corneal Reflexes.**

New measurements overwrite old data with new data automatically.

## 2.2 Dynamic Pupillometry Application (DP-App)

The DP-App Application provides information regarding the pupils' response (diameter during time) when the eyes are stimulated with a known visible and programmable white light shine from the 2WIN.

The visible stimulus can also be programmed by the operator in intensity and duration.

Results are expressed in a graphical image showing the pupils' response to the visible stimulus and through some parameters showing the estimation of pupil response time, reaction time and slopes of the changes of diameter versus time.

### Exam modes

There are three operative modes for the DP-App:

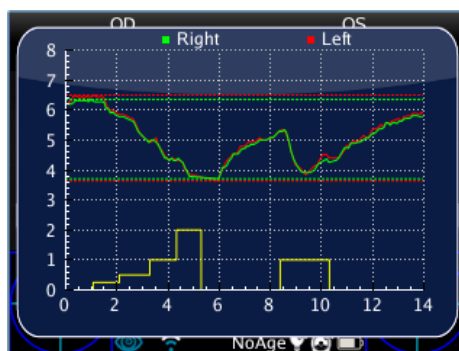
- 1) **Default mode:** it makes a first calibration of the eye's response parameters also considering the ambient illumination, then it performs the measurement.
- 2) **Manual mode:** the operator can configure manually the set of visible light stimuli. The duration of each stimulus lasts minimum 2 seconds.
- 3) **Calibration mode:** at the beginning of the exam, it illuminates the patient's eyes with four operator-selected calibration impulses to find a good final impulse. The latter is used in the last part of the measurement. 2WIN also considers the ambient light.

The overall measurement lasts 14 seconds in all the operative modes.

### Exam procedure

**Focusing phase:** start the focusing aiming at the eyes of the patient and keep pressed BUTTON S1/S2. Move the 2WIN forwards or backwards to maximize the length of the color-moving bar on the bottom of the display. When you reach the maximum, release BUTTON S1/S2 to start the measurement phase.

**Measurement phase:** the patient shall stay in the same position, until BUTTON S1/S2 is released, and the exam automatically finishes (after 14 seconds).



## Default mode

It's activated in the DP-App only if another configuration file is not present in the 2WIN's MicroSD card or that file is corrupted. The default mode creates (after a dark second) a sequence of 4 bright light impulses. During these pulses the 2WIN detects the pupillary reaction. If the pupil diameter, during any of the 4 pulses, decreases below 10% of the initial state or it reaches a dimension less than 3.5mm, the initial calibration stops, and a final bright pulse is turned on (this pulse will have double intensity compared to the previous, that caused the end of the calibration). Moreover, if the ambient light is too low all the pulses will be reduced by half (in 2WIN's display the maximum value is 1 instead of 2).

## Manual mode

To activate it, the operator creates a text file named "**pupilresponse.txt**" in the MicroSD card of the 2WIN. The file must contain 7 rows, of which each represents a 2 second phase of the measurement. The numerical value assigned to the rows represents the intensity of light in the scale from 0 to 100.

<i>Example configuration file:</i>	<i>It creates the following sequences of exam phases:</i>
0	Phase1 = dark condition (no visible illumination), 2 seconds
8	Phase2 = 8% of the maximum visible light is turned on, 2 seconds
0	Phase3 = dark condition, 2 seconds
16	Phase4 = 16% of the maximum visible light is turned on, 2 seconds
0	Phase5 = dark condition, 2 seconds
32	Phase6 = 32% of the maximum visible light is turned on, 2 seconds
0	Phase7 = dark condition, 2 seconds

Any value greater than 100 is considered 100%, while 0 stands for dark condition. The configuration file is not considered if there is a different number of rows or characters; the default mode is used instead.

## Calibration mode

To activate it, the operator creates a text file named "**pupilresponse.txt**" in the MicroSD card of the 2WIN. The operator must decide 3 parameters and then 4 intensities of light for the calibration of the system in this specific mode.

The three parameters are:

- T = minimum threshold limit of pupil diameter. If during the 4 calibrating lights the pupil diameter of the patient goes under this value, during the last and final measurement phase the 2WIN will use the corresponding light intensity that caused that threshold crossing.
- M = multiplication factor of the calibration impulse.
- P = desired percentage of pupil diameter variation

The 4 calibration intensities are written in the configuration as A, B, C, D letters. A, B, C, D values must be placed in ascending order.

The 2WIN during the calibration mode starts the exam with 1 second of dark condition, then it switches between the four A, B, C, D calibration intensities, each of them turned on for 1 second.

If the pupil diameter's percentage variation is greater than P, or if the minimum pupil diameter is lower than T, the 2WIN will store the intensity value (one of either A, B, C, D) that caused one of these two conditions. This value will be used to illuminate the patient's eye in the final phase of the measurement.

Example of "*pupilresponse.txt*" in 2WIN'S MicroSD card:

T4.2

P15

M1.5

A8

B16

C32

D64

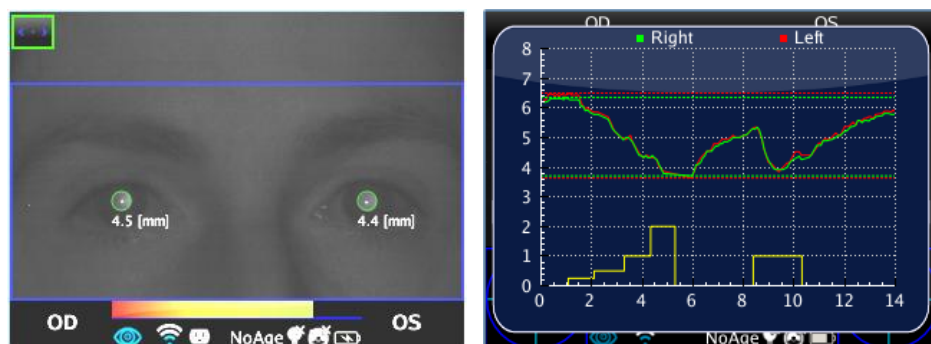
The 4 light intensities at the beginning of the measurement are 8%, 16%, 32%, and 64% of the maximum intensity. At the end of the measurement, a final light impulse is used to cause a pupil diameter lower than 4.2 mm or a pupil variation that overcomes the 15% value, multiplied finally by a factor of 1.5.

In case the T value is missing in the configuration file, the standard mode will be used. If any of the other numerical values (P, A, B, C, D) are missed in the configuration file (or written in the wrong format), the 2WIN uses the calibration mode with a default sequence of: T=4, P=10, A=8, B=16, C=32, D=64, where M depends on environment's light intensity.

## Exam display

While the examination is running, 2WIN shows the pupil diameter value close to the pupils of the patient (after the release of BUTTON S1/S2). The exam is complete after 14 seconds.

Afterwards, the main window of the 2WIN displays in the upper part the maximum and minimum pupil diameter for OD and OS. By pushing the JOYSTICK to right, the complete results window of the exam is shown:





## Browsing mode

It's possible to load a previously saved DP-App exam: long push the JOYSTICK downwards on the main screen of 2WIN. Then, the main window of the 2WIN will display in the upper part the maximum and minimum pupil diameter for each eye. Pushing the JOYSTICK to the right the complete result of the exam is displayed.

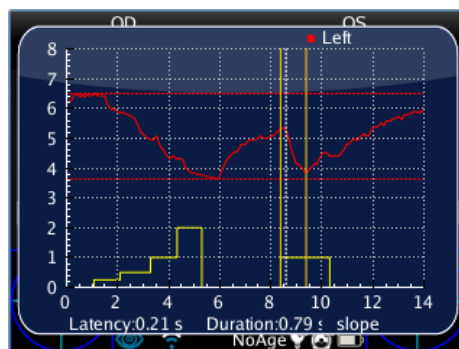
## Post exam measurements

It's possible to analyze some parameters from the results of the DP-App. To do so, press BUTTON C when displaying the auxiliary window. The system automatically places several lines in the graph starting with the left pupil.

-  If the DP-App is in default or calibration mode, 2WIN automatically recognizes the calibration pulses. It's possible to measure only the last pulse (not the calibration one).
-  If the DP-App is in manual mode, 2WIN permits to measure all the single pulses but in the final PDF report data is saved only referring to the first valid impulse.

The first line is automatically placed on the first front of variation of the emitted light (this line's position is not adjustable). The second line can be adjusted manually by pressing the JOYSTICK. When the line is selected it becomes dashed and white colored, and the operator can move it by pushing the JOYSTICK left or right. This line represents the starting time, when the pupil diameter starts to react to the light stimulus.

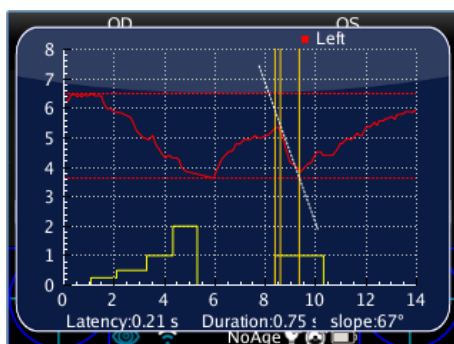
In the following figure an example of the second line positioning.



When the second line is positioned, automatically the response time of the pupil (in seconds) appears in the lower part of the auxiliary window. On the next pressing of the JOYSTICK, the selected line will be the third, showing the exact time the pupil response finishes to react to the light illumination impulse.

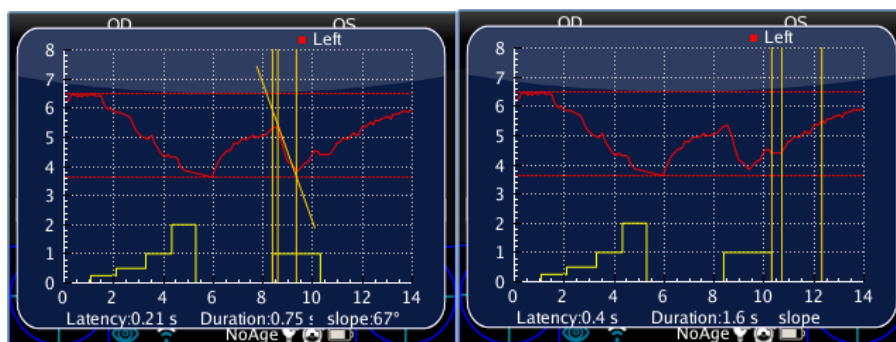
When the third line is positioned, after the next pressing of the JOYSTICK the overall reaction time of the pupil (in seconds) appears in the lower part of the auxiliary window.

On the next pressing of the JOYSTICK, a new line is introduced in the display. It represents the "slope" in the change of the pupil diameter. It's possible to move the slope line with all the directions of the JOYSTICK (up and down to move up and down, right and left to rotate it).

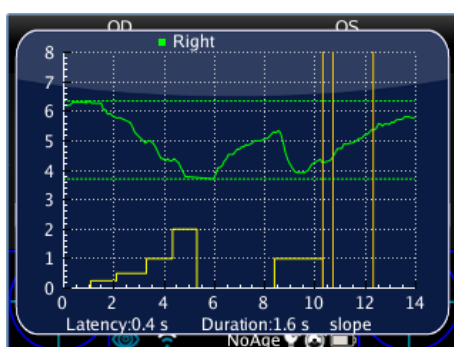


When the slope line is positioned, automatically the slope angle value appears in the lower part of the auxiliary window. This last line is white if it's related to a decrease in the pupil diameter, and it's black if it's related to an increase.

If the operator presses again the JOYSTICK, all the lines become yellow, and the positioning is finished. By pushing the JOYSTICK to the right or left it's possible to switch side of the light stimulation exam (from the descending to the ascending side) and repeat the axes positioning for that side.



By pressing BUTTON C, the system of four lines is displayed on the following event of transition in the pupil diameter. If BUTTON C is pressed again the entire measurement procedure starts in the right eye.

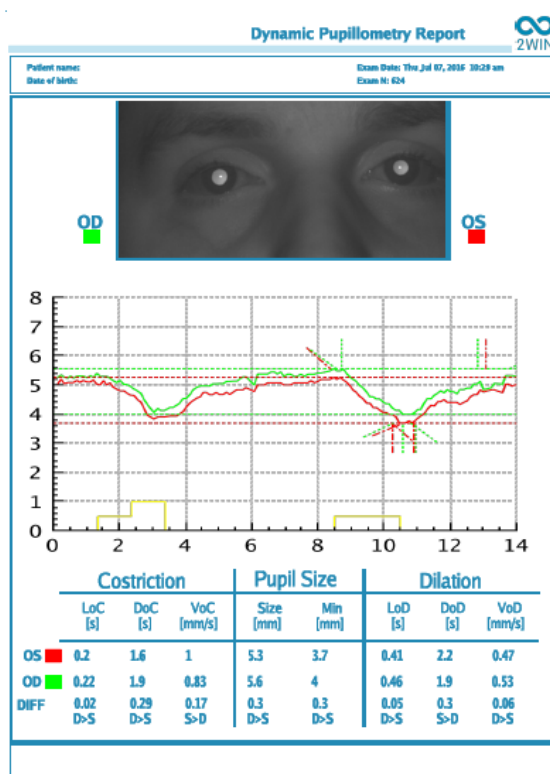


## Saving in MicroSD memory

When the measurement is finished, pressing BUTTON C, the primary screen of the 2WIN shows a single graph with both left and right pupil responses lines. This action store temporarily all the examination in the 2WIN's memory card. If the operator doesn't need to make further changes, to store permanently the exam in the 2WIN's MicroSD card, it's necessary to go to the home screen by pressing BUTTON A and then holding BUTTON B (this generates the final PDF report of the exam).

## PDF report

The PDF report is composed of the pupils' response graphic and the corresponding data.



The graphic includes both the pupils' responses and a partial reproduction of the axes that have been positioned previously.

The data area is divided in three parts, which refer to the second pupil stimulation (not to the calibration):

1. The "Constriction" phase.
2. The "Pupil Size" phase.
3. The "Dilation" phase.

The **Constriction** phase has three variables:

1. LoC = Latency of Constriction; the time used by the pupil to start constricting after the light switches on.
2. DoC = Duration of Constricting; the time used by the pupil to constrict and stabilize.
3. VoC = Velocity of Constriction; the pupil's velocity to constrict.

The **Dilation** phase has three variables:

1. LoD = Latency of Dilation; the time used by the pupil to start dilating after the light switches off.
2. DoD = Duration of Dilation; the time used by the pupil to dilate and stabilize.
3. VoD = Velocity of Dilation; the pupil's velocity to dilate.

**DIFF**: it's the difference between the right and left eye. It also reports which of the two values is greater.

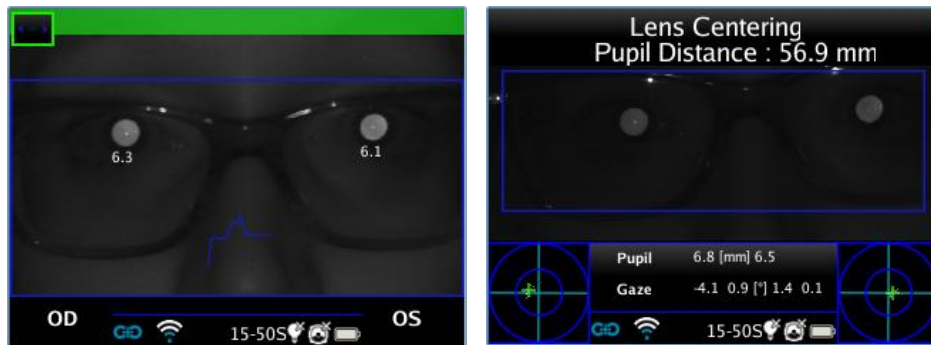


## 2.3 Lens Centering Application (LC-App)

The LC-App allows to verify if the patient's glasses are correctly centered. During the LC-App exam the patient must wear their glasses.

### Exam procedure

The measurement is taken as a standard refraction, using BUTTON S1/S2, while the patient is wearing the frame glasses. When the measurement is finished, the pupils' information is displayed.



### Browsing mode

To activate the LC-App in a measurement already saved, enter in the browsing mode by holding the JOYSTICK downwards until the exam's history is loaded. Afterwards, browse them and select the specific exam with the JOYSTICK.

### Exam results

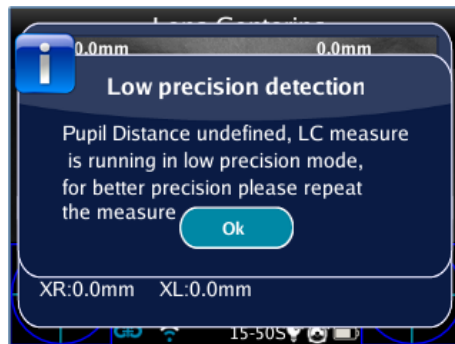
When the measurement is finished, the detailed results are displayed by pushing the JOYSTICK to the right. The display shows the image of the patient's eyes, and it sets the default positions of the measure axes. More specifically: the horizontal axis is aligned between the two pupils, whereas the two studs are positioned equidistant from the center.



The LC-App allows to position and tilt the axes to do the measuring.

If the measuring isn't valid or if it has been loaded another measure of a different App, an error message is displayed since the positions of the pupils (or an essential data) are not present for the measurement.

If the pupil distance is not valid, the LC-App shows a warning message because it has no reference for a high precision measure. Therefore, it runs on low precision mode.

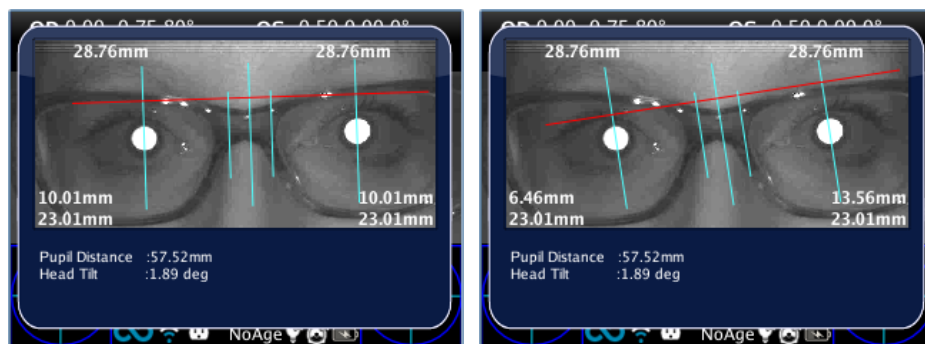


## Axis positioning

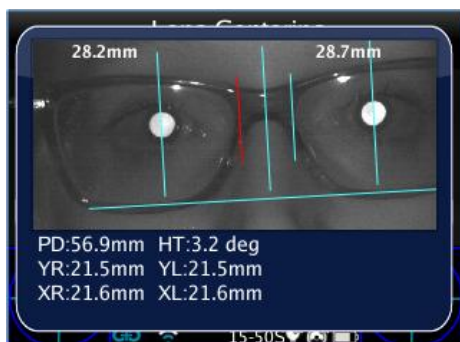
The axis to be moved is selected by pressing the JOYSTICK; it's highlight in red allowing the changes. The first pressing selects the horizontal axis, the second pressing selects the vertical axis on the left, the third pressing selects the vertical axis on the right, the fourth pressing returns at the first step.

### How to position the horizontal axis

This axis can be moved vertically by holding or repeatedly pushing the JOYSTICK up or down. The axis' tilt is changed by pushing to the right or left. This implicates an equivalent rotation of all the other axes.



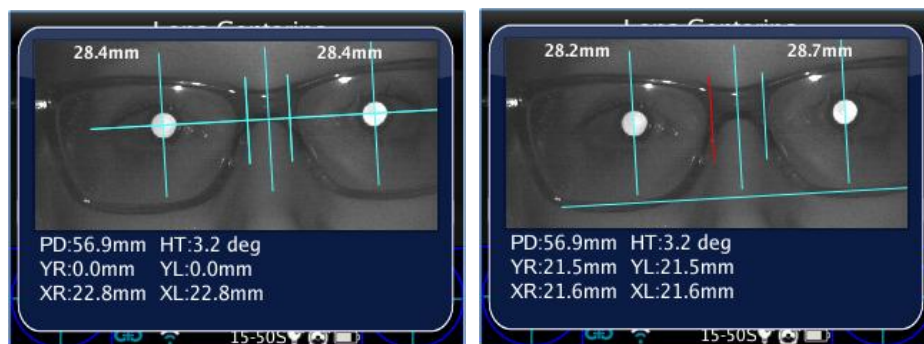
### How to position the vertical axes



These axes can be moved horizontally by pushing the JOYSTICK left or right. The central axis is automatically located between the two movable axes.

## Centering values

The main values are written directly on the top of the screen; the auxiliary data is written on the bottom.



Values displayed on the image are:


- Semi inter-pupillary distance measures, located on the top. They represent the distances between the center of the optical axis and the central vertical axis, divided to the left and to the right in correspondence of the side they measure.
- On the bottom of the screen (R stands for right eye, L for left eye):
  - The greatest value and the distance between the center of the optical axis and the horizontal axis (YR, YL).
  - The lower value and the measurement between the center of the optical axis and the corresponding stud (XR, XL).

Under the image there are two additional values that represent the head tilt and the pupil distance.

## Saving on MicroSD memory

After locating the axes, to save their position hold BUTTON B after exiting the results window. A PDF report is created, and the values are saved for future reference.

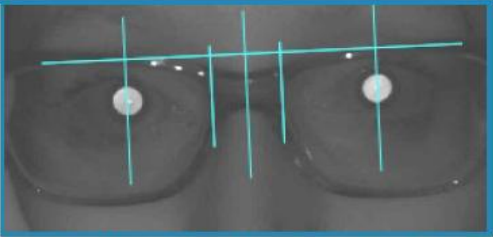
## PDF report

**Exam Report** 

Patient name:  
Date of birth:

Exam Date: Thu Jun 20, 2016 04:55 pm  
Exam ID: 362

**OD**



**OS**

EMI[mm]	X[mm]	Y[mm]	EMI[mm]	X[mm]	Y[mm]
27.44	21.72	9.17	29.73	19.44	9.67

Pupil Distance: 57 mm  
Inclination : -0.50  
Head Tilt: 3.23

Adaptica  
www.adaptica.com

Dr's signature:

The PDF report is composed of the lens centering graphic and the corresponding data.

The image contains the axes previously positioned.

The report is divided in right and left eye; the values expressed for each eye represent:


- **EMI:** The distance between the pupil and the central vertical axis.
- **X:** The distance between the optical axis center and the external vertical axis of the stud.
- **Y:** The distance between the optical axis center and the horizontal axis.

The other values are:

- **Pupil distance:** The distance between the pupils' optical axes.
- **Inclination:** The additional inclination added to the head tilt by the operator.
- **Head Tilt:** The optical axis tilt with respect to the horizontal axis.


## 2.4 Intermediate Vision Application (66cm-App)

The 66cm-App allows to measure the patient's refraction while reading at the distance of 66 cm (distance from a visual display unit, VDU). In all those cases when reading at such distance proves difficult, the 2WIN calculates the necessary additional power (ADD) to restore the best vision.

-  The 66cm-App requires the use of an additional lens, that is inserted in the central aperture of the 2WIN's front.

### Additional component


Add-on lens (must be placed on the frontal part of the 2WIN) with a Reading Chart with printed letters on it, for 66-cm VDU-related reading.

-  The add-on lens can be used and stored up to a maximum room temperature of 50°C (122°F).

### Exam Tips

- The exam must be carried out with the patient wearing their usual glasses (if used) or contact lenses – the measurement should not be taken with reading glasses.
- The chart and the lens must be applied on the front side of the 2WIN, into the central aperture. Push the add-on until a slight resistance is felt.



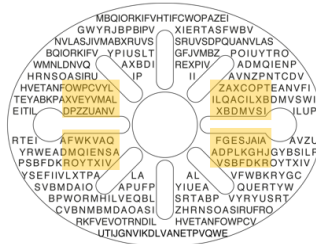
-  Do not to cover the frontal LEDs: measurement may not be possible with a wrong chart position.

- Remove the add-on taking the black prominence and rotating it while pulling outwards.
- Make sure that the chart is not directly enlightened but visible and readable in semi-darkness.

### Exam Procedure

- Apply the add-on on the front side of the 2WIN.
- Ask the patient to wear glasses, if typically worn (distance-vision glasses) or contact lenses. If the patient wears progressive glasses, ask them to look at the chart through the top part of the lenses.

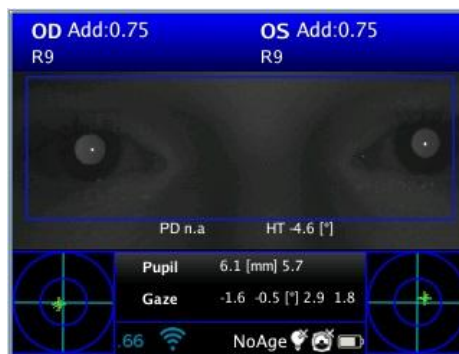
3. Ask the patient to focus the central characters of the chart. See the following picture:



4. The measurement is taken as a standard refraction, using BUTTON S1/S2.

- ① Due to the pupil distance of some patients, the binocular examination might be not possible. In these cases, it is highly recommended to take the measurement monocularly.
- ① Make sure that the central fixation is turned off.

5. At the end of the measurement, the results are displayed:



The topside values represent the spherical equivalent: the estimation of the necessary additional power (ADD) to restore best vision at 66 cm (spherical equivalent = sphere + ½ cylinder).

The measurement range of the ADD is within 0 D and 3.25 D.

Outside of this range the output is “N.A.”, with the indication of Myopia or Hyperopia.



## Exam's results

2WIN returns '0' if the patient does not need any additional power to focus at 66 cm.

On the contrary, if the patient needs additional power, 2WIN returns a positive value:

- If the exam is taken wearing glasses, the ADD must be summed to the current prescription.
- If the exam is taken without glasses, the ADD is the power of the reading glasses to be prescribed.

## 2.5 Eye Morphology Feature (EM-App)

The EM-App measures different distances in the eye. It allows to identify eye without caring about the pupil's position.

### Exam procedure

Press BUTTON B to enter zoom mode, and then BUTTON C to enable eye morphology.



In the following pictures the EM values are called FAS, in reference to a previous software version.



The first click is for vertical mode measurements, second for the horizontal mode.





## Eye Morphology measure

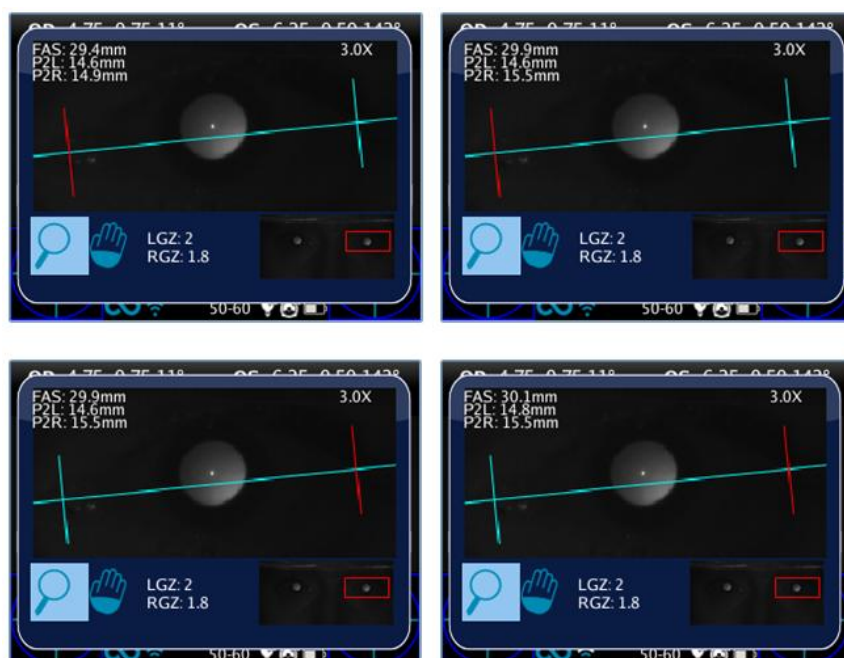
To change the selected eye, push the JOYSTICK to the left or right. To change the zoom value push it up or down. To get the Eye Morphology measure, the minimum zoom factor is 2.8x. It is possible to change the eye or the zoom when no axes are selected/active (all axes are blue).



Clicking on the JOYSTICK, it's possible to change axis to set its position. First click to move the horizontal axis: when selected, it can be moved up or down by pushing the JOYSTICK in the respective direction, left and right to change inclination and match the real eye position.



Press the JOYSTICK again to select the left and right vertical axes and move them with the button's left and right direction. Press the JOYSTICK again to exit the axes selection and change eye or zoom.



## Exam Results

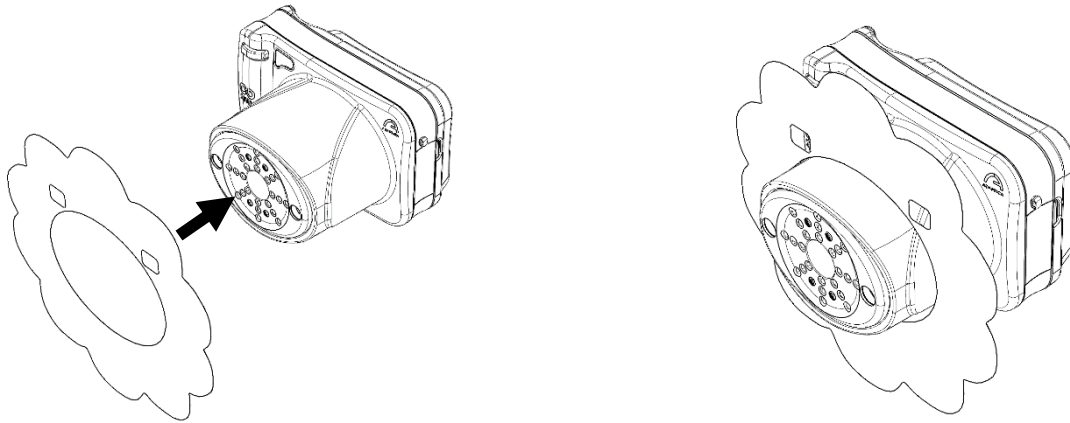
The EM-App extracts three parameters for each eye:

- EM (FAS) = vertical axes' distance in millimeters.
- P2L = distance in millimeters from the left vertical axis to the pupil's center.
- P2R = distance in millimeters from the right vertical axis to the pupil's center.

## 2.6 Further accessory: 2WINNY KIT

2WINNY is a kit of masks studied and designed to attract kid's attention. In this way the examination will be smoother and faster, especially for uncooperative children.

The masks must be applied on the front of 2WIN before starting the examination:



To allow the measurement to be as smooth and fast as possible, let the kids choose the mask according to their preferences.

Each kit contains:

- A set of double-faced masks;
- 25 stickers for each animal mask: gift them to the kids after the examination;
- 2 tumbling E of Albin;
- 1 door sticker to put in your practice room;
- 2WINNY Kit customized box set.

## 2.7 Anterior Segment Hint (AI-App)

The AI-App is an innovative A.I. (Artificial Intelligence) based algorithm running on Adaptica's Cloud, developed to give additional information to the user if the 2WIN is not able to refract the patient.



AI-App is available ONLY for the Adaptica's 2WIN-S *Plus* model. If interested, please refer to 2WIN-S *Operator Manual*.

## Information for assistance

For any service requirement, please contact your local distributor. Nevertheless, you can contact directly Adaptica at: [support@adaptica.com](mailto:support@adaptica.com).