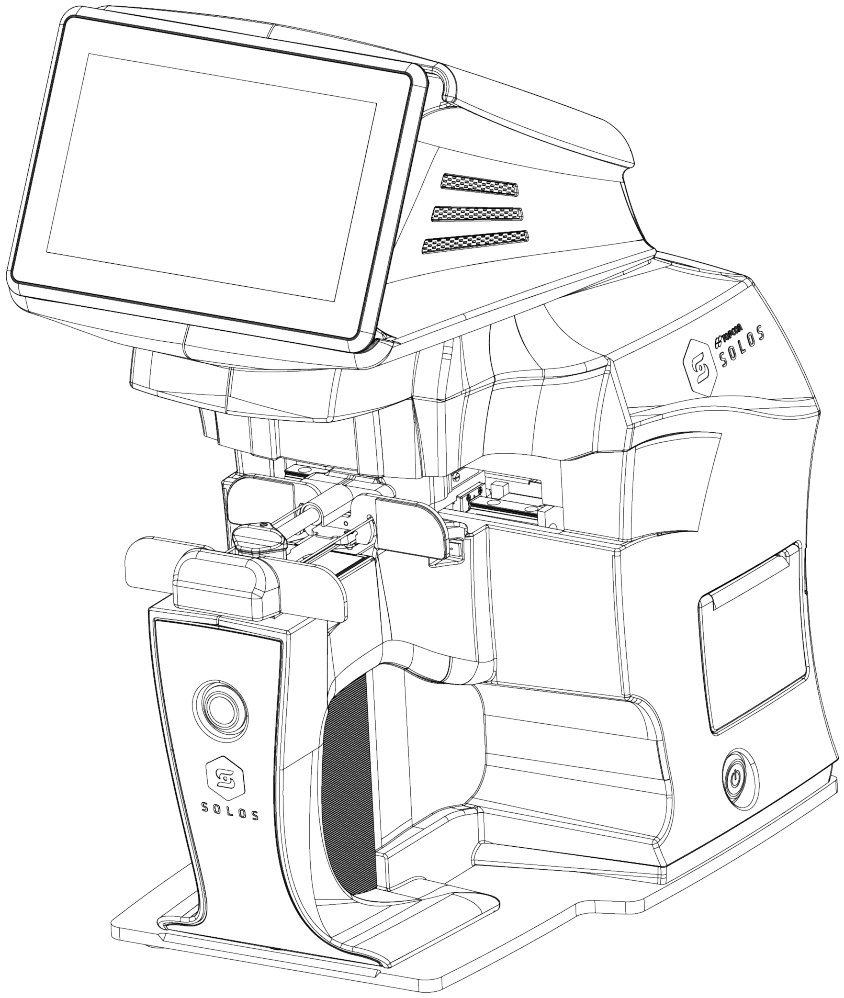

SOLOS
Automatic Lens Analyzer

User Manual

Cod. 42-0001417 SOLOS

CE

Rev. 15 – 2024/01/26

Thank you for choosing this product.

Please read the information in this manual carefully. You must be knowledgeable with its contents in order to work with the device.

Keep these instructions in a safe place and in the immediate vicinity of the device. The manual must be readily available at all times.

The purpose of this manual is to inform the user about functions, settings, safety, installation, maintenance, cleaning and conservation of the device.

The manufacturer has a policy of continuous improvement of its products, so it is possible that some instructions, specifications and pictures in this manual may differ slightly from the product you purchased. The manufacturer also reserves the right to make any changes to this manual without notice. The original text of this manual is in English.

SW v.: 1.1.x

Manufacturer	*Distributor*
VISIA imaging S.r.l. Via Martiri della Libertà 95/e 52027 San Giovanni Valdarno (AR) Italy	Topcon Europe Medical B.V. Essebaan 11 2908 LJ Capelle a/d IJssel The Netherlands www.topconhealthcare.eu medical@topcon.com

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1 INTRODUCTION

1.1 ABOUT THIS MANUAL

Please read this manual thoroughly so that safe and effective operation is ensured.

1. The information contained in this manual is subject to change without notice.
2. While reasonable efforts have been made in the preparation of this document to ensure its accuracy, you should contact your local distributor immediately if any quarries arise due to editorial errors or omissions etc.
3. If you find any imperfect collating or missing pages, contact your local distributor for replacement.

This manual contains important contents in order to use this device safely and to prevent users or others from harms.

Read this manual after understanding the symbols below and follow the instructions in use.

 This manual contains the information about basic operation, inspection and maintenance etc. of SOLOS.

The most up to date version of this manual is available on the following website using password "harlem": **https://www.visiaimaging.com/manuals.php**

2 INDICATIONS FOR USE

2.1 INTENDED USE

SOLOS is a device intended for use by an optometric/ ophthalmic professional to monitor the visual defects through the measurements of the optical properties of spectacles and single lenses.

2.2 INTENDED USERS

The device must be used by qualified personnel: eye specialists, ophthalmologists, opticians and optometrists.

2.3 PLACE OF USE

Health centers, optician shops, eye hospitals and other eye-care related facilities.

2.4 CONTRAINDICATIONS

There aren't any known contraindications to the use of this medical equipment.

2.5 DEVICE INSTALLATION

Before the first usage of this medical equipment unpack the device and place on a suitable flat surface, with no part of the unit over hanging the edge of the surface. Then connect it to the socket by using the power cord provided. For more detail information refer to Chapter 6.

3 PRECAUTIONS AND SAFETY

This device is an electronic precision unit and must therefore be stored in controlled temperature, humidity and atmospheric pressure conditions. Avoid direct exposure to sunlight.

To ensure proper operation, place it on a suitable flat surface, with no part of the unit over hanging the edge of the surface. Do not put anything on top of the device.

Properly connect all the cables before use.

Use at the recommended power voltage.

When the device is unused, switch off the power source and protect it against sunlight and dust.For accurate functioning, keep the device clean and spot and dust free.

3.1 ELECTROMAGNETIC COMPATIBILITY

This product is in compliance with the EMC standard (IEC 60601-1-2 4th Edition).

- ELECTRICAL MEDICAL DEVICES require special EMC precautions and must be installed and activated in accordance with the EMC instructions provided in the accompanying documentation.
- Portable RF communications equipment should be used no closer than 30 cm to any part of the equipment, including specified cables. Otherwise, degradation of the performance of this equipment could result.
- Use of accessories and cables other than those supplied with the instrument, except cables sold by the equipment manufacturer as spare parts, may lead to an increase in emissions and reduce the device's or system's immunity.
- The cables that could be connected to USB, LAN and Serial ports must be less than 3 meters length.
- The device should not be used adjacent to or stacked with other equipment; if adjacent or stacked use is inevitable, the equipment should be observed to verify normal operation in the configuration in which it will be used.
- The internal Power Amplifier (PA) has a maximum output power of +14dBm for IEEE 802.11g/n and +16dBm for IEEE 802.11b. The module internally compensates for PA gain and reference oscillator frequency drifts with varying temperature and supply voltage.

3.1.1 EM Emission

SOLOS device fulfills requirements of IEC 60601-1-2 4th Edition:

Table 1: Emission guidance

Emission Limit	Standard	Compliance
Conducted and radiated RF	CISPR 11	Class B
Harmonic distortion	IEC 61000-3-2	Class A
Voltage Fluctuations - flicker emissions	IEC 61000-3-3	Compliant

3.1.2 EM Immunity

SOLOS device fulfills requirements of IEC 60601-1-2 4th Edition:

Table 2: Immunity guidance

Immunity Test	Standard	Test Level		
Electrostatic discharge (ESD)	IEC 61000-4-2	± 8kV contact15kV air		
Electrical fast transien-t/Burst	IEC 61000-4-4	± 2kV 100kHz repetition frequency		
Surges	IEC 61000-4-5	± 2kV common mode ± 1kV differential mode		
Rated Power frequency magnetic field	IEC 61000-4-8	30 A/m		
Conducted disturbances induced by RF fields	IEC 61000-4-6	Level	Frequency	Modulation
		3V	150kHz÷80MHz	1kHz 80% AM
		6V	6,765MHz÷6,795MHz	1kHz 80% AM
		6V	13,553MHz÷13,567MHz	1kHz 80% AM
		6V	26,957MHz÷27,283MHz	1kHz 80% AM
		6V	40,66 MHz ÷ 40,70 MHz	1kHz 80% AM
Radiated RF EM fields	IEC 61000-4-3	Field (V/m)	Frequency	Modulation
		10	80MHz÷2700MHz	1kHz 80% AM
		27	380MHz÷390MHz	18Hz 50% PM
		28	430MHz÷470MHz	18Hz 50% PM
		9	704MHz÷787MHz	217Hz 50% PM
		28	800MHz÷960MHz	18Hz 50% PM
		28	1700MHz÷1990MHz	217Hz 50% PM
		28	2400MHz÷2570MHz	217Hz 50% PM
		9	5100MHz÷5800MHz	217Hz 50% PM
Voltage Dips	IEC 61000-4-11	Dip Level	Phase	
		0% U_1 - 0.5 cycle	0°, 45°, 90°, 135°, 180°, 225°, 270°, 315°	
		0% U_1 - 1 cycle	0°	
		70% U_1 - 25/30 cycles	0°	
Voltage Interruptions	IEC 61000-4-11	Interruption Level		
		0% U_1 - 250/300 cycles		

Table 3: Recommended separation distance between portable and mobile RF communications equipment and SOLOS device according to the frequency of the transmitter. Distances in meters.

Rated maximum output power of the transmitter (W)	**150 kHz to 80 MHz** $d = 1.2\sqrt{P}$	**80 MHz to 800 MHz** $d = 1.2\sqrt{P}$	**800 MHz to 2 GHz** $d = 2.3\sqrt{P}$
0.01	0.12	0.12	0.23
0.1	0.38	0.38	0.73
1	1.2	1.2	2.3
10	3.8	3.8	7.3
100	12	12	23

For transmitters rated at a maximum output power not listed above, the recommended separation distance d in meters (m) can be estimated using the equation applicable to the frequency of the transmitter, where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.

Note:

1 At 80 MHz and 800 MHz is applied the separation distance of the higher frequency range.

2 These guidelines may not be applicable in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

3.2 SYMBOLS

Table 4: Symbol

Symbols	Standard Reference	Description
CE		Class I Product compliant with Regulation (EU) 2017/745
	IEC 60417-5032	Alternate current
	ISO 7010-M002	Read the instructions for use before usage
	ISO 7010-W001	Warning Sign *Symbol used to alert users to potential hazards*
	ISO 7010-W024	Crushing Hands *Symbol used to alert users to potential hazards*
	ISO 7000-3082	Manufacturer
	ISO 7000-2497	Date of Manufacture
	ISO 7000-2493	Catalogue number
Group 0	IEC 62471	Product classifiable as Group 0 (risk exempt) in accordance with IEC 62471
	ISO 15223-1	Medical device
	ISO 7000-0632	Temperature limitation *Indicates the temperature limits to which the medical device can be safely exposed*
	ISO 7000-0224	Humidity limitation *Indicates the range of humidity to which the medical device can be safely exposed*

Table 4: Symbols (continue)

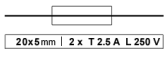
Symbols	Standard Reference	Description
	ISO 7000-2621	Atmospheric pressure limitation *Indicates the range of atmospheric pressure to which the medical device can be safely exposed*
	ISO 7000-0626	Keep dry *Indicates a medical device that needs to be protected from moisture*
	ISO 7000-0621	Fragile, Handle with care
	ISO 7000 - 0623	This way up *Indicates correct upright position of the transport package*
		WiFi
		Ethernet
		USB
		Micro-USB
		Serial Port
		Micro-SD
	ISO 7000-2498	Serial Number
	IEC 60417-5016	Fuses

Table 4: Symbols (continue)

Symbols	Standard Reference	Description
		This symbol is solely applicable in EU countries. In order to avoid any negative consequences on the environment and possibly also on human health, this instrument must be disposed of according to the current provisions (i) in EU countries in compliance with the WEEE provision (Directive for waste consisting of electrical and electronic devices), or (ii) for all the other countries, in compliance with the local provisions and laws on recycling.

3.3 LABELING

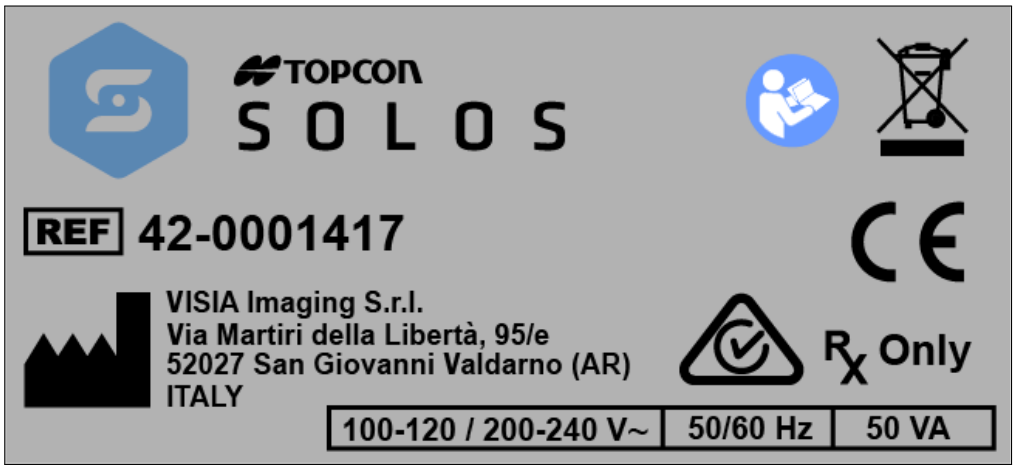


Figure 1: SOLOS Product label

3.4 SAFETY GUIDELINES

- SOLOS devices can only be used for the design purposes described in this manual.
- The device must be used in the environmental conditions as specified in this document.
- The least favorable environment is defined as the maximum values of temperature for the device to be operating in, while the unit is consuming the maximum current. The environmental value is stated as +40 °C.
- The device must be connected to an appropriate power source, otherwise its performance may be reduced.
- ⚠ Position the unit so that it is not difficult to disconnect the plug for connection to the main supply.
- ⚠ To satisfy RF exposure requirements, a separation distance of 20 cm or more should be maintained between this device and operators during device operation. To ensure compliance, operating at closer than this distance is not recommended.
- Keep this manual at hand and close to the device at all times.
- Turn off the device if it is not going to be used for a long period of time.
- Only use original SOLOS accessories and spare parts.
- Do not use the device in the vicinity of highly flammable materials or in areas with an explosion risk.

- Unauthorized software installation in the device is not permitted.

3.5 ELECTRICAL SAFETY

- ⚠ To avoid the risk of electric shocks, this equipment must only be connected to supply mains with protective ground.
- ⚠ The device is isolated from the mains power supply only with the plug/cable disconnected.
- The device has an onboard power supply unit installed. For connection to the mains, use only the manufacturer-approved cables provided with the device.
- Before performing maintenance on the device, turn it off and disconnect the power cable.

3.6 LED EMISSION SAFETY

SOLOS has LEDs of various types and powers installed.

The device is classified as Class 0 (Exempt Risk) according to IEC 62471:2006

3.7 INTERACTIONS WITH EXTERNAL DEVICES

SOLOS complies with the CE marking requirements.

- ⚠ External equipment intended for connection to signal inputs/outputs on the Medical Electrical Equipment shall comply with the relevant product standard for such equipment e.g. IEC 60950-1 or IEC 62368-1 for IT-equipment and the IEC 60601 for Medical Electrical Equipment. In addition, all such combinations – Medical Electrical Systems – shall comply with the requirements stated in clause 16 of IEC 60601-1.
- Any equipment not complying with the leakage current requirements in IEC 60601-1 shall be kept outside the operating environment i.e. at least 1.5 m from the device or shall be supplied via a Separation transformer to reduce the leakage currents.
- Any person who connects external equipment to the Medical Electrical Equipment has formed a Medical Electrical System and is therefore responsible for the system to comply with the requirements in clause 16 of IEC 60601-1. If in doubt, contact qualified medical technician or your local representative.
- A Separation Device (isolation device) is needed to isolate the equipment located outside the operating environment from the equipment located inside the operating environment. In particular such a Separation Device is required when a network

connection is made. The requirement for the Separation Device is defined in clause 16.5 of IEC 60601-1.

- In case a Multiple Socket Outlet is used to conveniently supply the system, a Medical Electrical System has been created, even if there is no signal connection to other equipment. This might lead to an increase of leakage currents and protective earth impedances. Therefore, a Multiple Socket Outlet should always be used with a Separation transformer as described in clause 16.9 of IEC 60601-1. Note that the total protective earth impedance, from each equipment in a system, should be maximum 0.2 ohm measured to the earth pin in the mains plug of the Multiple Socket Outlet.
- ⚠ Connecting electrical equipment to the device actually results in the creation of medical system, and may jeopardize safety.
- When SOLOS is installed in rooms for medical use, eventual PC and connected printer must be powered using an IEC 60601-1 compliant insulating transformer.
- If SOLOS is installed in rooms for medical use without a computer, it is not necessary to use an insulating transformer.
- Do not use mobile phones or other devices not compliant with the requirements of class B EMC in the vicinity of SOLOS.
- ⚠ Every external device that has to be connected to SOLOS Series must have a connection cable (USB or LAN) with a maximum length of 3 m.

The purpose of SOLOS connection to an IT network is report printing and remote technical assistance.

SOLOS can be connected to a Local Area Network (LAN) through the LAN connector. The network must have Ethernet protocol (IEEE 802.3). Ask Topcon technical assistance and the system administrator for SOLOS and network settings.

The purpose of SOLOS connection is saving PDF report on an external network folder or technical service intervention on the machine.

Connection of SOLOS to a computer network that includes other equipment could result in previously unidentified RISKS; identify, analyze, and control such RISKS (refer to IEC 60601-1:2005).

Subsequent changes to a computer network could introduce new RISKS and require new analysis.

Changes to the computer network include:

- changes in computer or data network configuration;
- connection of additional items to computer network;
- disconnecting items from computer network;
- update of equipment connected to computer network;
- upgrade of equipment connected to computer network.

The term “computer network” used here corresponds to the term “network/data coupling” in IEC 60601-1:2005.

3.8 TRANSPORT AND PACKAGING

- The device must be transported and stored in its original packaging.
- For the storage and transport conditions please refer to the specifications contained in this document.
- Keep the original packaging with care in case the device needs to be transported again.

3.9 CLEANING

- ⚠ Before cleaning make sure to shutdown the device and remove the power cable.
- Regularly (once per day) clean the external device components (see figure 2) removing dust using a soft cloth. In the case of more persistent surface dirt, use a soft cloth soaked with water or alcohol (70% max).
- ⚠ Be careful not to wet the device and only clean it as indicated in order to prevent it from damaging. Never use solvents or other abrasive agents.

3.10 STARTUP CHECK

- During device startup mechanical, optical and electronical components are initialized and verified.

4 WARRANTY AND RELIABILITY OF THE PRODUCT

- ⚠ The product warranty is valid only if all the instructions detailed in this document are followed.
- The product warranty is forfeited in the event of loss or damage due to improper or incorrect use of the device.
- The product warranty is valid only if the device is equipped with its original accessories.
- ⚠ If the device is opened by unauthorized staff, the manufacturer is relieved of all responsibility and the warranty will become null and void.
- **WARNING:** Modifications or repairs to the product, especially where they require opening the device, may only be carried out by technical staff authorized by the manufacturer.

4.1 LEGAL PROVISIONS

- Regulation (EU) 2017/745: Class I medical device
- IEC 60601-1: Class I continuous operation
- IEC 60601-1-2: See EMC Table
- EN 62471: all the sources are Group 0 (exempt risk)

4.2 TECHNICAL ASSISTANCE

⚠ The technical assistance can only be carried out by specifically trained technicians. Visia will make available on request circuit diagrams, component part lists, descriptions or other information that will assist technicians to repair those parts of SOLOS that are designated by Visia as repairable by Service Personnel.

4.3 LIABILITY

The manufacturer shall not be held liable for damages caused by fire, earthquakes, actions by third parties and other accidents, or negligence and misuse of the instrument by the user.

The manufacturer shall in no way be liable for damages caused by the user or by unavailability of the device, such as a loss of profits or suspension of business.

The manufacturer shall not be held liable for damages caused by use of the device for purposes other than those described in this instruction manual.

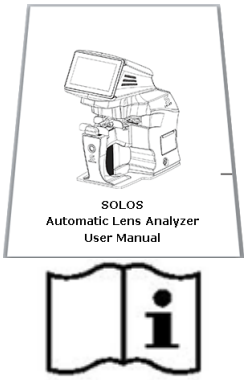
The manufacturer shall not be held liable for the result of the diagnoses performed with this device.

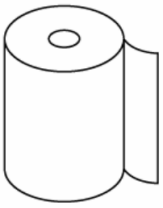
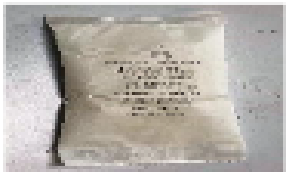
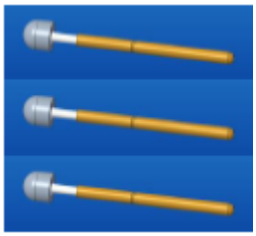
4.4 WARNING LABELS AND PLATES

In order to safely use this device and prevent risks to the operator and other persons as well as damage to the device, the instruction manual provides a description of the safety warning labels and plates on the device body (Chapter 3).

Carefully read Chapter 3 as well as the entire manual and observe the instructions contained therein.

5 PACKAGING CONTENT

Check Calibration Tool	
Power cable (country specific)	
User Manual	
Dust Cover	

Printer Paper	
Silica gel salt sachet	
Cushioned contact probes	

6 INSTALLATION

6.1 UNPACKING AND PACKING OF THE SYSTEM

⚠ **Keep the original packaging for future use. The system must always be handled/-shipped in its original packaging, which is specifically designed to protect it against damages.** Before installing the system, read chapter 3 in this manual.

The steps are illustrated in the following pictures:

(1)

(2)

(3)

(4)

(5)

7 GENERAL DESCRIPTION

SOLOS is a device intended for use by an optometric and ophthalmic professional to measure spectacles and single lens properties. SOLOS integrate a full spectrum (visible and UV) analyzer able to calculate the response of light at different wavelengths. It can be used prior to an eye examination to obtain the last prescription the patient was given, in order to speed up the subsequent examination. The device has been designed:

- to measure Vertex power and prismatic effects of spectacles
- to orientate and Mark uncut lenses
- to provide specific markings on lenses in spectacle frames
- to verify the correct mounting of lenses in spectacle frames
- to measure pupil distance of lenses in spectacle frames
- to provide color coded maps indicating the distribution of refraction properties
- to measure transmittance properties within the relevant bandwidth of light, such as UV and Blue bandwidth
- to measure the color coordinate of lens material

The main external hardware components are shown in Figure 2:

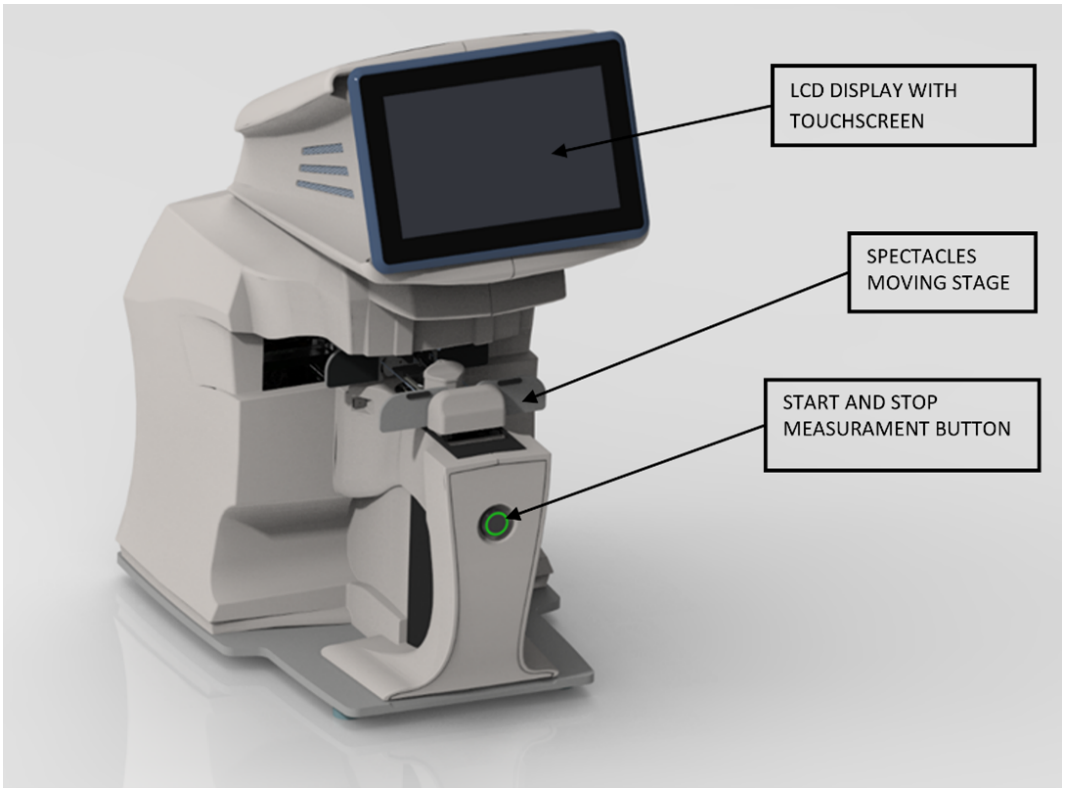


Figure 2: SOLOS main components

8 OPERATIONS

8.1 SWITCH ON

After properly connecting the power cable to the socket, press the switch on button located in the bottom right side of SOLOS.

8.2 INITIALIZATION

After switching on the SOLOS, the initialization procedure verifies that every component has been correctly initialized. In case of initialization error, SOLOS gets into a fault state and warn the user with an initialization failure pop up.

8.3 PREPARING

After SOLOS initialization, main view shows up:

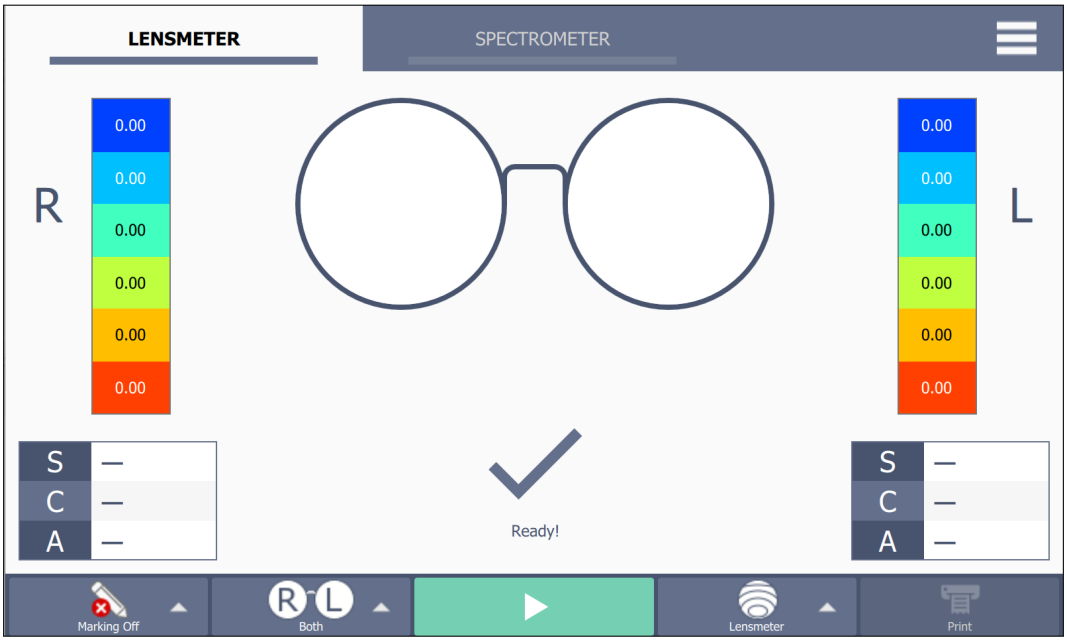
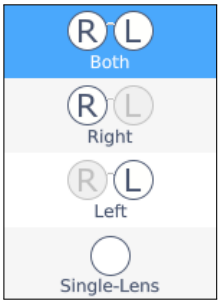


Figure 3: Spectacles main view.

Bottom acquisition bar

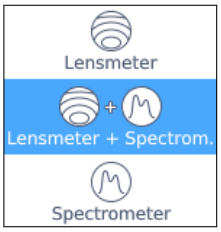
By using this toolbar user can configure the incoming acquisition:

Marking mode: enable or disable lens marking (for details see subsection 8.4.4).



Acquisition type selection: select the acquisition type between full spectacles, spectacles right lens, spectacles left lens and single lens.

Play/Stop acquisition button: press play icon to start an acquisition. The acquisition can be stopped in any moment by pressing the stop icon.



Functionalities selection: select the functionalities between Lensmeter + Spectrometer, Lensmeter only, Spectrometer only.

Output button: press to Print, Export or Print and Export the measured data. Export Popup allows the user to select a different option each time (see Chapter 10 for details). This button is only enabled after an acquisition.

Top acquisition bar

Options menu: it opens the option menu. See details in Chapter 10.

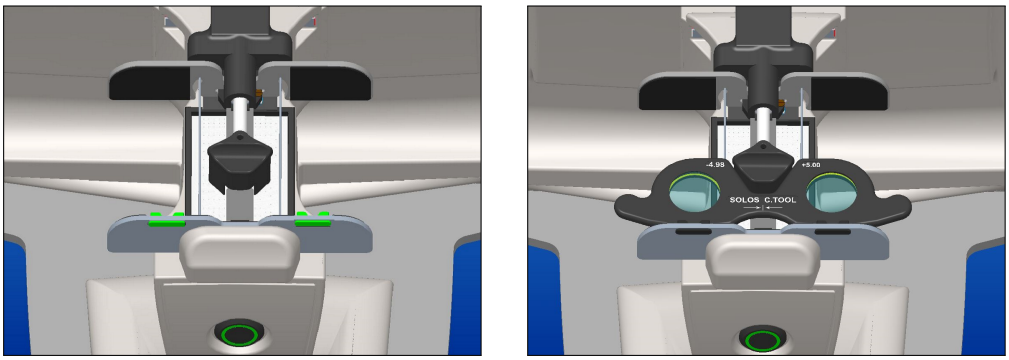
Patient ID: it shows the patient ID. Click to edit the ID manually or by barcode. See details in Chapter 10.

View selection: it shows the measurement view selected. Lensmeter view is the default one. Spectrometer view is enabled only if Lensmeter + Spectrometer or Spectrometer-Only acquisition functionalities are selected.

8.3.1 Preparing spectacles

To perform a spectacles acquisition the user has to comply the following steps:

- Remove any kind of occlusion or obstacle along the stage movement path.
- Select acquisition type (Right, Left or Both) by using the acquisition type selection. Stage will move to loading spectacles position.
- Select acquisition functionalities (Lensmeter, Spectrometer or Lensmeter + Spectrometer) by using the acquisition functionalities selection.
- Enable or disable marking.
- Place the spectacles on the stage. The stage is composed by the black nosepiece, the wires and the metallic bands (Figure 4a) . Upon the metallics bands, the safety stops (green in Figure 4a) protect the spectacles during the acquisition. Spectacles must be oriented such that the nosepads are adherent with the stage nosepiece, as shown in figure 4b. Make sure that the nosepads don't get caught under the wires and that the safety stops are upon the spectacles. Verify that any block or stuck prevent stage from movement.



(a) before loading **(b)** after loading

Figure 4: Spectacles laoding

8.3.2 Preparing single lens

To perform a single lens acquisition the user has to comply the following steps:

- Remove any kind of occlusion or obstacle along the stage movement path.

- Select single lens acquisition type. Single lens support will lift up as shown in Figure 5.

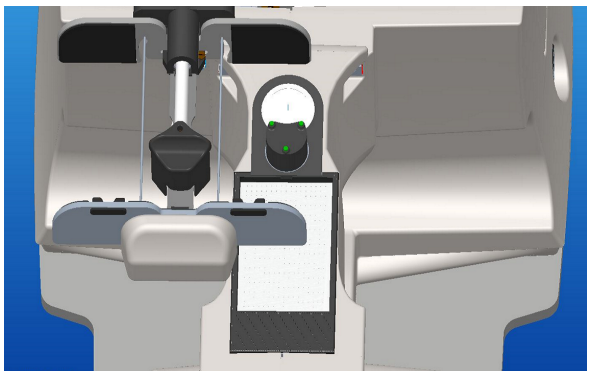
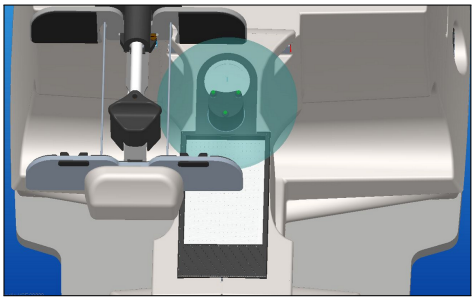


Figure 5: Single Lens Loading

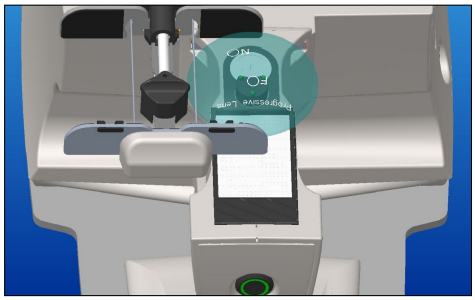
- Select acquisition functionalities (Lensmeter, Spectrometer or Lensmeter + Spectrometer) by using the acquisition functionalities selection.

- Enable or disable marking.

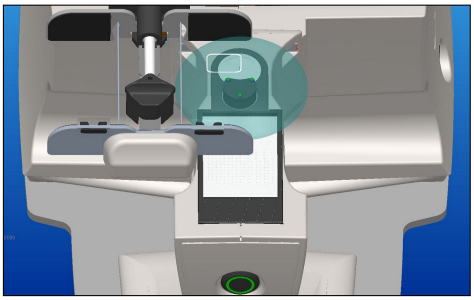
- Place the lens on the single lens support. Center and stabilize the lens on the support for a correct acquisition, as shown in Figure 6. Verify that no block or stuck prevent stage movement. In case of Progressive or Bifocal lens, always place the far-vision zone toward the user as the lens was part of a spectacles frame. (Figure 6)



(a) Single lens loaded



(b) Right Progressive lens



(c) Right Bifocal lens

Figure 6: Single lens loaded

8.4 MEASUREMENT

Once completed the loading operation, press the play acquisition button or the front physical button to perform the acquisition. During the acquisition, user can stop anytime the process using the stop acquisition button or, again, the front physical button.

⚠ Please do not remove or touch spectacles and lenses until the device has completed the acquisition. If the acquisition is stopped by the user before the natural ending, follow the steps indicated on screen for a safe release (Figure 7)

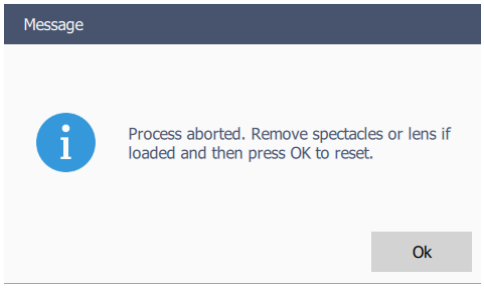


Figure 7: Pop up after emergency stop

⚠ When the spectacles or the lens are correctly loaded, the device will automatically detect the lens type. However, in case of wrong detection user can reprocess the lens by manually selecting the desired lens type via the lens type selection icon (See section 8.4.1).

8.4.1 Spectacles mapping

Result of a spectacles measurement in Lensmeter-only or Lensmeter + Spectrometer functionalities are shown in the spectacles view (Figure 8). It collects the overall refractive measured data as sphere, cylinder, axis and provides an overview of refractive maps. Press the left/right zoom button to see details of each lens (see Single lens mapping Section).

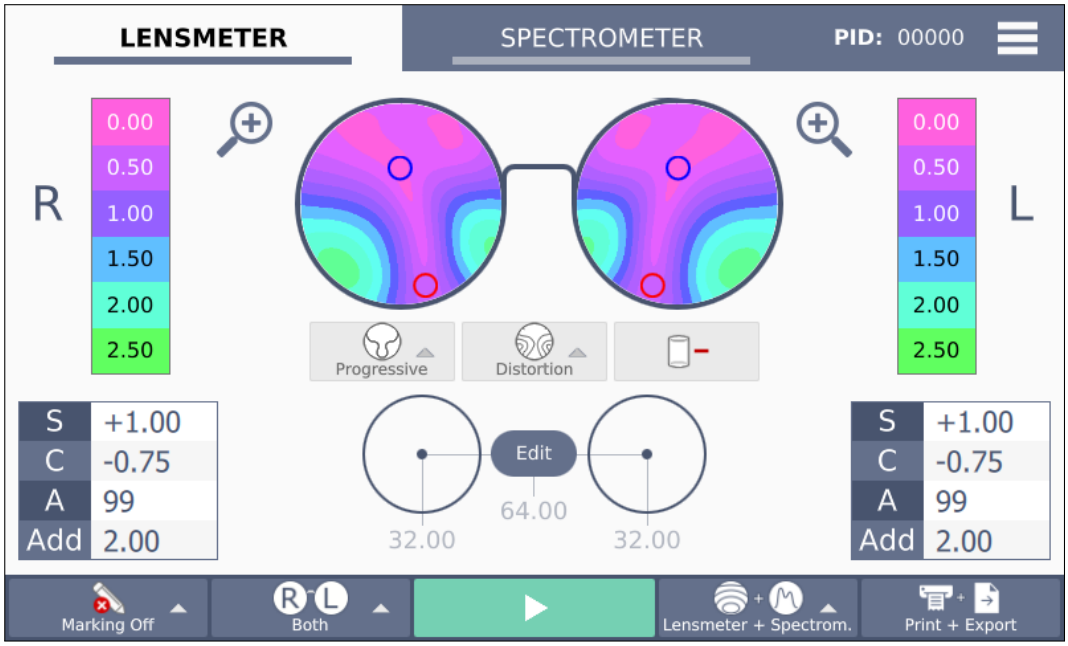
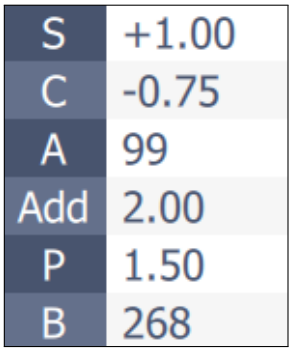
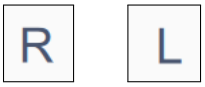


Figure 8: Lensmeter spectacles view.

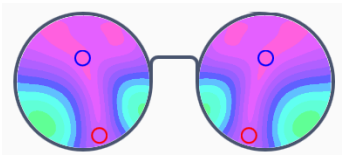


Lens data table: it contains the overall refractive data of the lens:

- spherical power **S**
- cylinder power **C**
- axis power **A**
- addition : **Add** in progressive, **R** in degressive
- prismatic power **P** (or **HP** using cartesian prism convention)
- prism base angle **B** (or **VP** using cartesian prism convention)



Lens side indicators: lens side indicators (from the patient point of view).

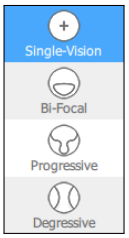


Spectacles maps: they show the selected spectacles maps. Map type can be changed using the lens handling bar (see below). In single-vision lenses the optical point is indicated by a blue circle. In progressive lenses the far vision point is indicated by a blue circle and the near vision point by a red circle.

Color scale: It shows the diopter value of each color band on the map.

Zoom button: For each lens, click it to access the single lens view.

Lens handling bar : This bar allows to visualize or change lens properties.



Lens type: it indicates lens type automatically detected by SOLOS. The user can manually reprocess the lens type by selecting between Single-vision, Bifocal, Progressive and Degressive. If the lens type selected by the user requires a re-acquisition, a Pop up will prompt the user to load again spectacles or lens (Figure 9)

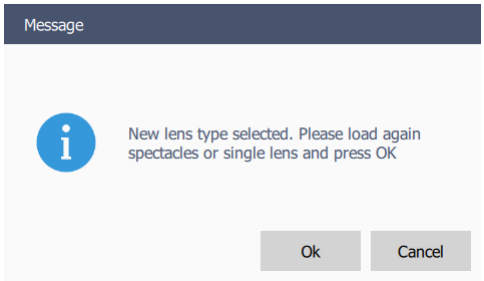
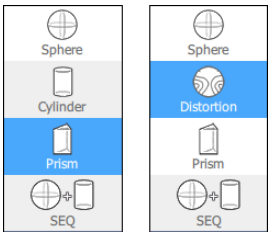
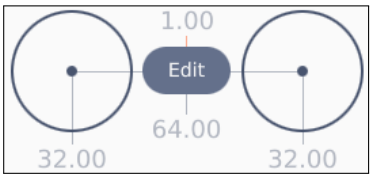


Figure 9: Pop up before reprocessing

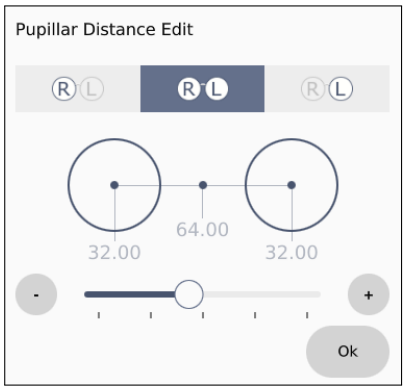


Map type: it indicates the current refractive map selected. Once the acquisition is completed, if the detected lens type is Progressive or Degressive then Distortion map is shown, otherwise Prism map is shown. The user can manually change map by selecting between Sphere map, Cylinder (or Distortion) map, Prism map and **S**phere **EQ**uivalent map.

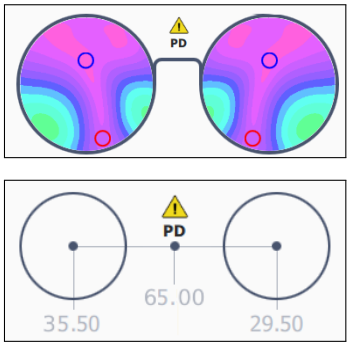
Pupil distance: this environment is only available after a spectacles acquisition.



Pupil distance view: the two lower extreme values are the right and the left pupil distances. The lower central value is the total pupil distance (right distance + left distance). The higher central value is the vertical displacement between left and right optical points, a negative value means that right points is higher than left point. The distances are expressed in mm. Press Edit to open the pupil distance editor.



Pupil distance editor: by using the upper checkboxes the user can edit the right, the left or the total pupil distance. Use the slider or the plus/minus buttons to select the desired value from a minimum of 22.0 to a maximum of 45.0 mm for each side. The minimum step is 0.5 mm. Press OK to confirm and return to spectacles view (Figure 10). Far points on the map are moved to the new positions. In the data tables, the prism values at the new optical centers are presented.



Pupil distance warning: a warning symbol appears when there is a large displacement between left and right pupil distances (Vertical or Horizontal). In case pupil distance is manually edited, the warning symbol disappears.

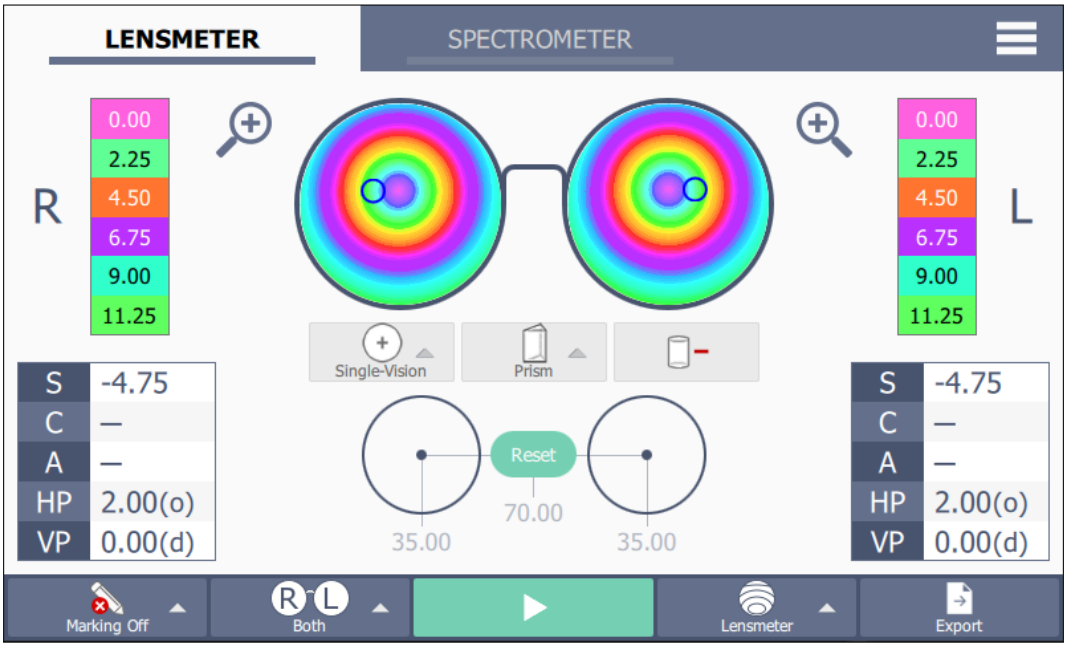


Figure 10: Spectacles view after editing pupil distance.

8.4.2 Single lens mapping

Results after a single lens measurement in Lensmeter-only or Lensmeter-Spectrometer mode are shown in the Single lens view (Figure 11). This view also collects results of a right or left side of a spectacles measurement, accessible by clicking the zooming button. It provides a point-by-point description of the lens refractive data.

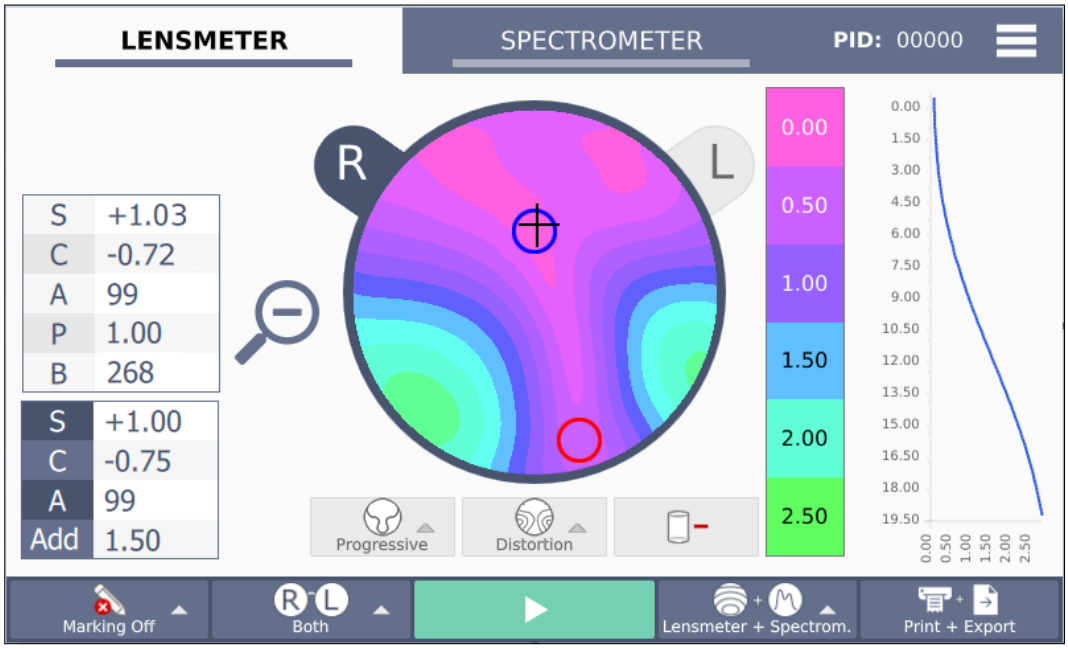
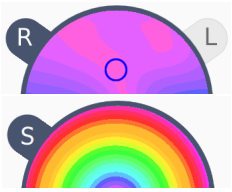


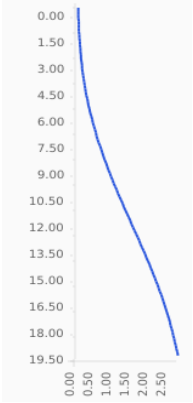
Figure 11: Lensmeter single lens mapping.



Lens side indicators: they indicate the side of the visualized lens.

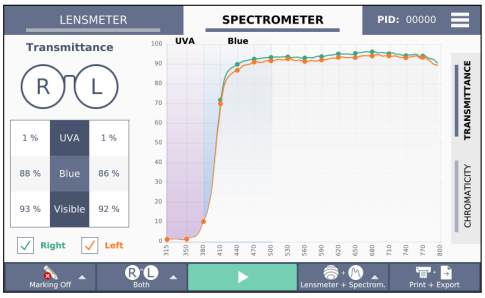
S	+1.03
C	-0.72
A	99
P	1.00
B	268

Local values table: it contains the lens refractive data at the location indicated by the black cross.



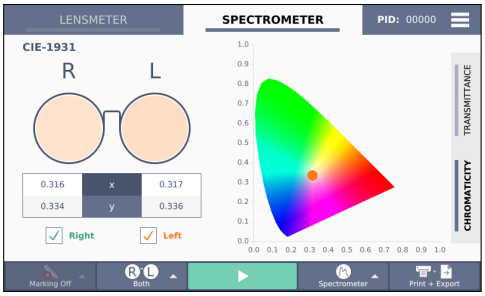
Addition chart: it is only available for progressive and degressive lenses. It describes the power profile between the far vision and the near vision points. The x-axis describes the power addition magnitude in diopters, while the y-axis describes the progression in mm from the top to the bottom of the lens.

8.4.3 Spectrometer mapping



(a) Spectacles **(b)** Single lens

Figure 12: Transmittance chart.



(a) Spectacles **(b)** Single lens

Figure 13: Chromaticity chart.

Results of a measurement in Spectrometer or Lensmeter + Spectrometer mode are shown in the spectrometer view (Figures 12 and 13). It is splitted in Transmittance chart and

Chromaticity chart. Transmittance chart shows the spectral response of the lens along different wavelengths. Chromaticity chart shows the color properties of the lens according to CIE-1931 color standard.

Figure 14 shows transmittance chart:

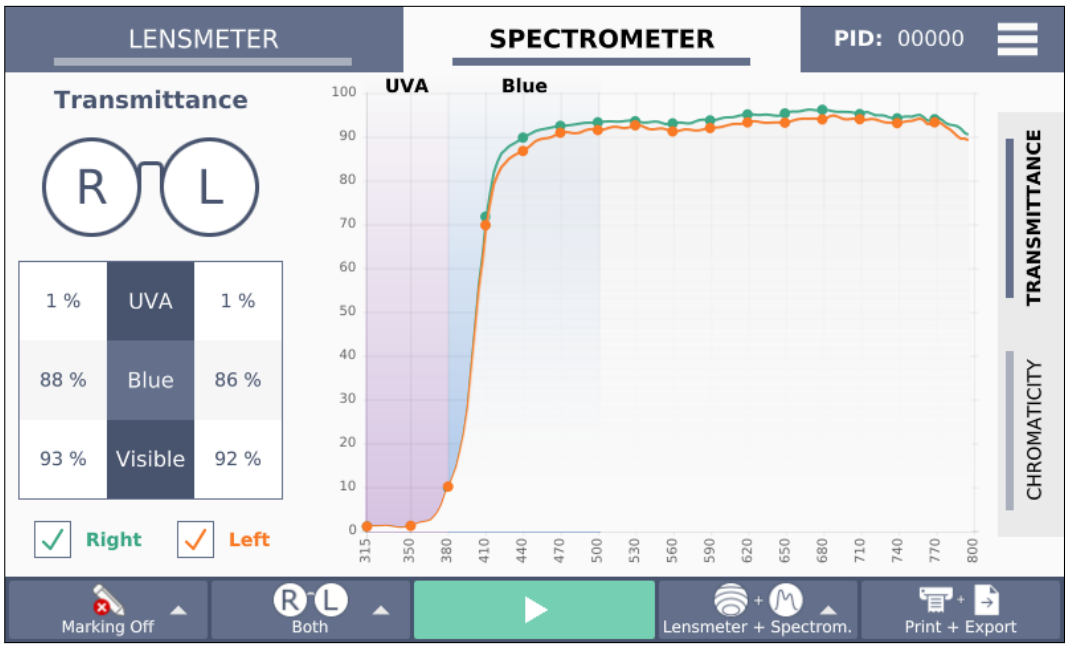
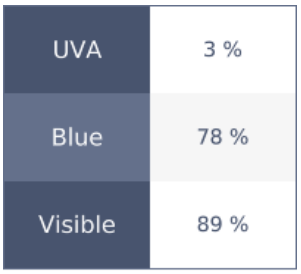
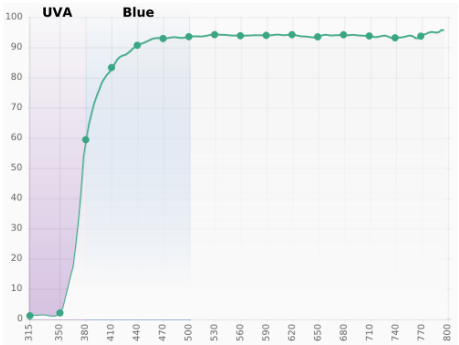


Figure 14: Transmittance chart.



Transmittance table: it contains the calculated percentage of light transmittance at three reference wavelength bands:

- UVA between 315 nm and 380 nm
- Blue between 380 nm and 500 nm
- Visible between 380 nm and 780 nm



Transmittance chart: it describes the transmittance of a lens along different light wavelengths. The x-axis collects the wavelengths from 315 nm to 800 nm, while the corresponding transmittance percentage is shown along the y-axis.

Lens side indicator: they handle transmittance chart visibility. Check or uncheck to show or hide the corresponding side.

Chart indicator: they indicate which one spectral Chart is currently visualized between Transmittance and Chromaticity. Click to switch between them.

Figure 15 shows chromaticity chart:

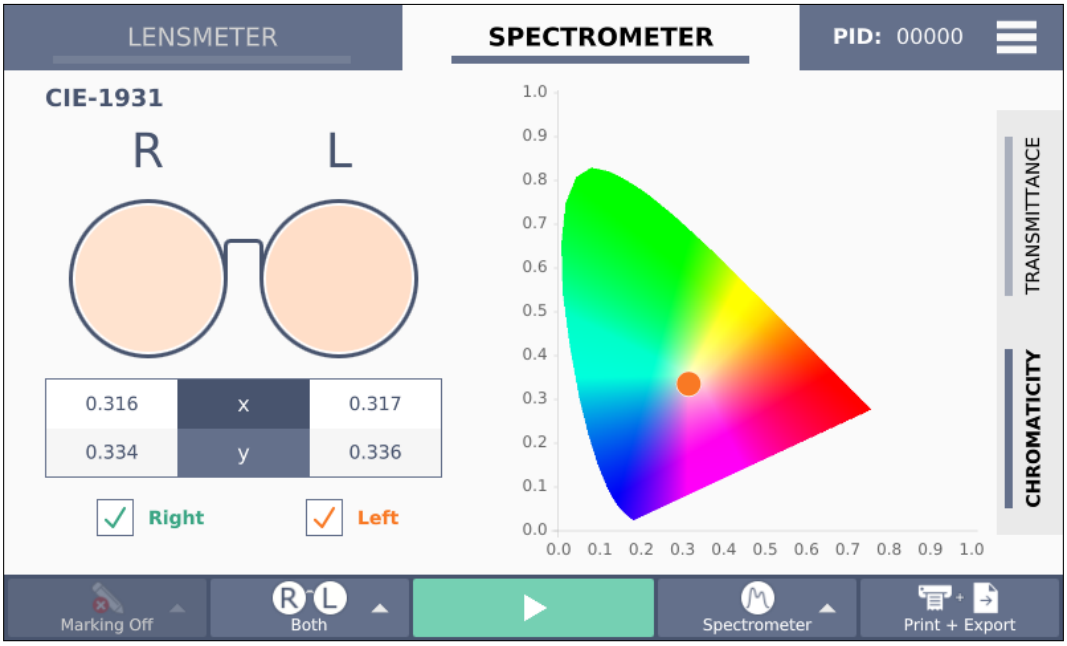
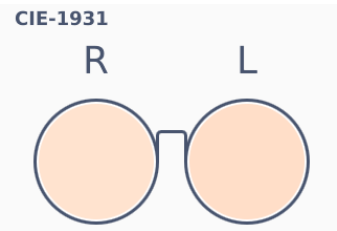


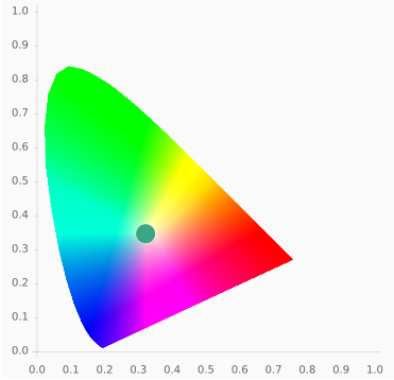
Figure 15: Chromaticity chart.



Lens CIE-1931 color: it shows the color of the lens according to CIE-1931 standard.

x	0.321
y	0.348

Lens color coordinates: it shows the (x, y) color coordinates of the lens. They represent the 2-dimensional normalized expression of the (X, Y, Z) color coordinates described by CIE-1931 color standard.



Gamut chart: is the 2-dimentional normalized representation of the color space described by CIE-1931 color standard. Dots describe the lens color position.

8.4.4 Marking

User can enable Marking before every spectacles or single lens acquisition by selecting Marking ON on the bottom bar, as shown in Figure 16.

Figure 16: Bottom bar with marking enabled.

Marking interface comes out after the lens measurement and before the lens release.

In case of single-vision or bifocal lenses, SOLOS marks three dots disposed on a line. The central dot is marked in the corrispondence of the optical point; the two other points make a line with the central one. User can manage position and orientation of this line using the Settings in the right-half of the marking view. In case of progressive lenses an additional point is marked in the location of the near vision point. Settings have different forms, depending on the acquisition type and the refractive properties of the lens:

- Spectacle lenses without cylinder power. (Section 8.4.4.1)
- Spectacle lenses with cylinder power. (Section 8.4.4.2)
- Single lenses without cylinder power. (Section 8.4.4.3)
- Single lenses with cylinder power. (Section 8.4.4.4)
- Progressive lenses (spectacles or single). (Section 8.4.4.5)
- Bifocal lenses (spectacles or single). (Section 8.4.4.6)

8.4.4.1 *Spectacle lenses without cylinder power*

In case of spherical spectacle lenses, Marking view is visualized in Figure 17.

SOLOS marks three dots disposed on an horizontal line. The central dot is the optical point. User can add a prismatic displacement using the Prism editing panel.

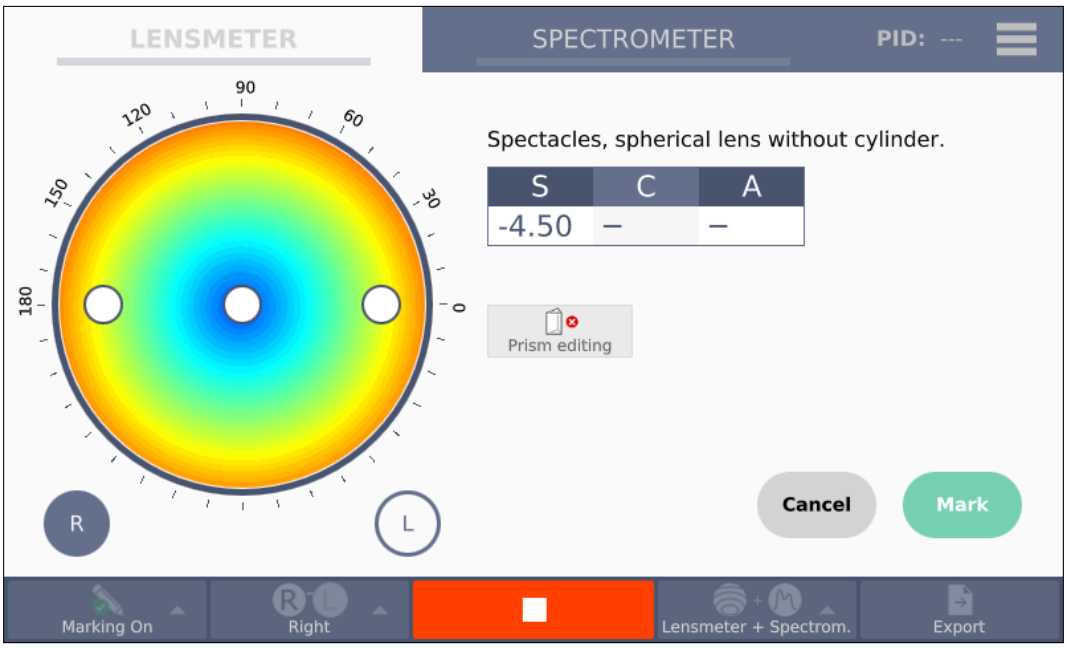
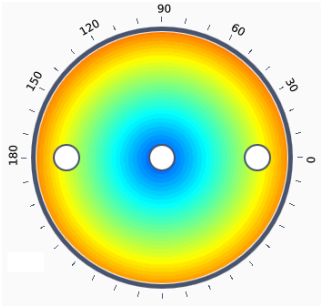
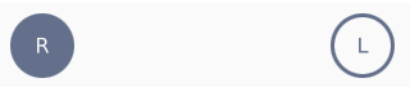


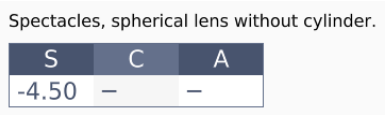
Figure 17: Marking view for spherical lenses.



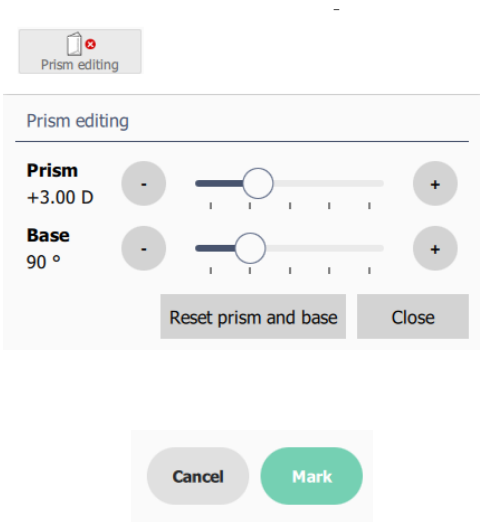
Lens marking preview: it provides a preview of the marking result. Angles in degrees are shown outside the gear and their orientation follows the selected prescription type (see Section 10.2). White circles are a preview of which positions will be marked. Prism map is displayed under the marking points.



Lens side indicators: they indicate the side of the lens under marking.



Resume table: it contains a short description of the lens under marking and a table of its refractive data.



Prism editing: the management of the prismatic displacement of the lens is made by using this panel. Using the sliders, user can set the magnitude (Prism) and the direction (Base) of the prismatic displacement. Prism is expressed in diopters while Base is expressed in degrees. Prism slider has a step of 0.25 D, Base slider has a step of 5 degrees; however user can change the value by 1 degree using + and − buttons.

Marking confirm button: click Mark to complete the marking procedure. Otherwise click Cancel to skip all the procedure.

8.4.4.2 Spectacle lenses with cylinder

In case of spectacle lens with cylinder, Marking view is visualized in Figure 18. SOLOS marks three dots disposed along the axis line. The central dot is the optical point. User can add a prismatic displacement by using the prism editing panel as in Section 8.4.4.1.

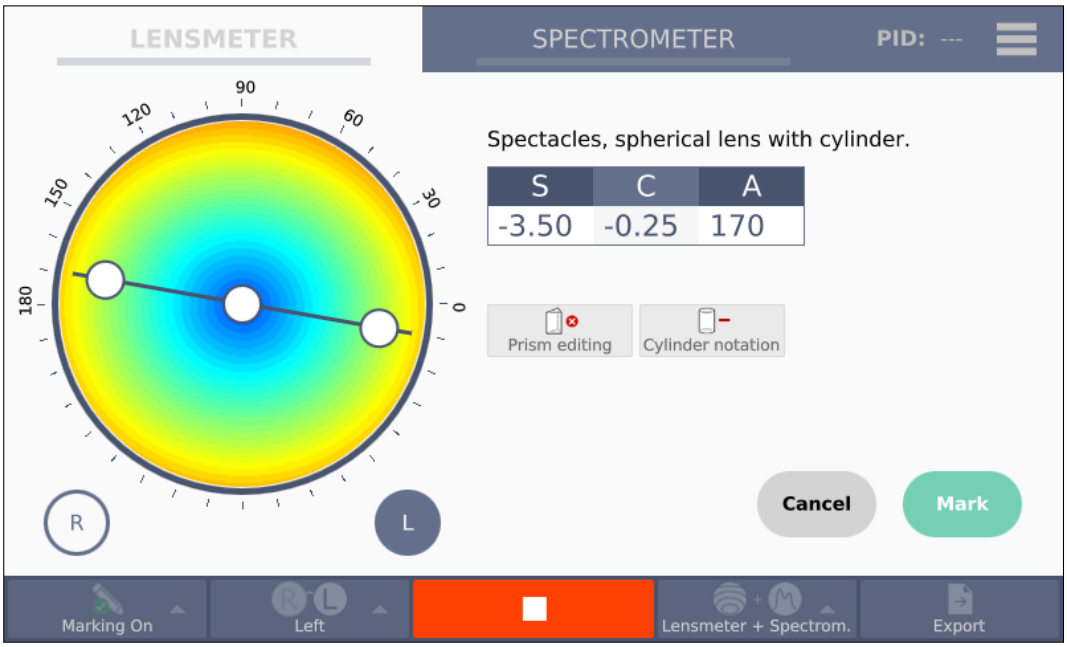
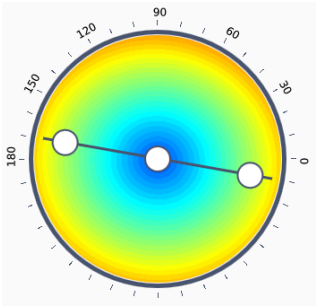


Figure 18: Marking view of a spectacle lens with cylinder.



Lens marking preview: it provides a preview of the marking result. Angles in degrees are shown outside the gear and their orientation follows the selected prescription type (see Section 10.2). White circles are a preview of which positions will be marked. Prism map is displayed under the marking points. The black line indicates the cylinder axis.

Spectacles, spherical lens with cylinder.

S	C	A
-3.50	-0.25	170

Resume table: it contains a short description of the lens under marking and a table of its refractive data.

Cylinder notation: click to switch between positive or negative cylinder notation. The preview map and the resume table will change accordingly to the notation

8.4.4.3 Single lenses without cylinder power

In case of spherical single lens, Marking view is visualized in Figure 19. SOLOS marks three dots disposed on an horizontal line. The central dot is the optical point. User can add a prismatic displacement by using the Prism editing as in Section 8.4.4.1.

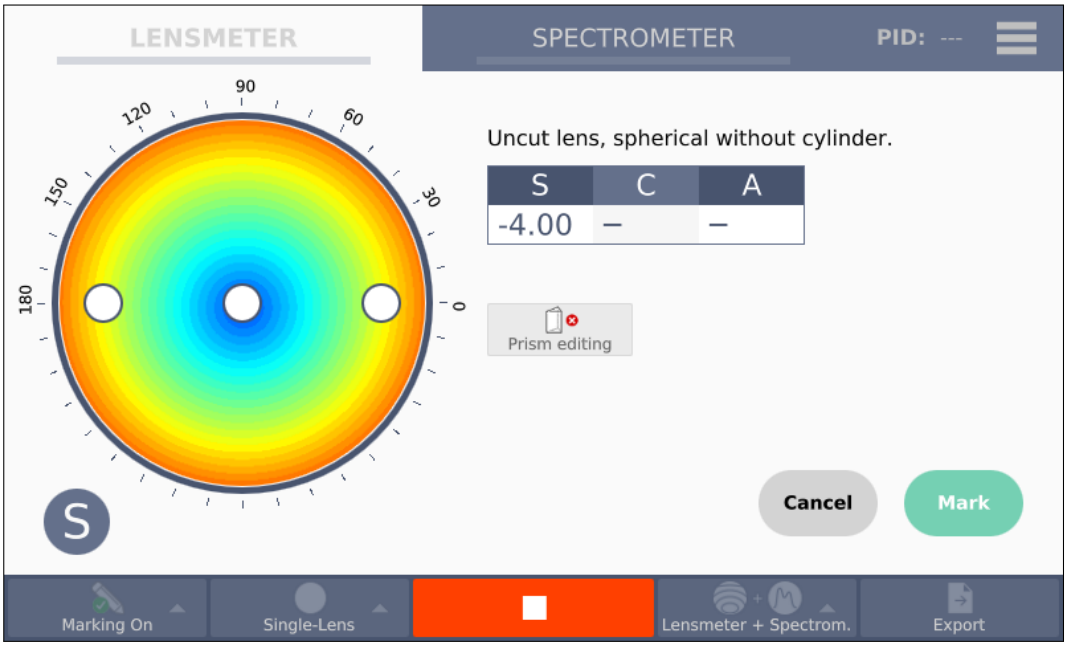
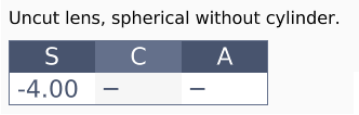


Figure 19: Marking view of spherical single lens.



Resume table: it contains a short description of the lens under marking and a table of its refractive data.

8.4.4.4 Single lenses with cylinder

In case of single lens with cylinder, Marking view is visualized in Figure 20. By using the axis rotation slider, user can decide what angle to position the cylinder axis at. Once the axis is set, SOLOS marks three dots disposed on a line that, when placed horizontally, ensures the axis at the selected value. The marked central point is the optical point. User can add a prismatic displacement using the Prism editing panel as in Section 8.4.4.1.

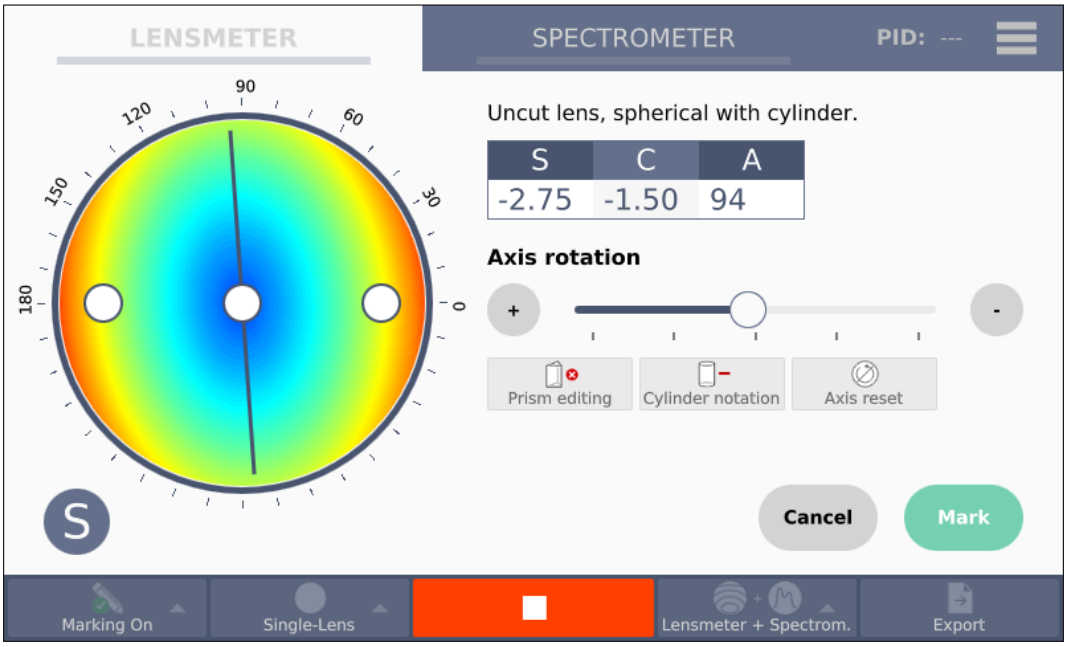
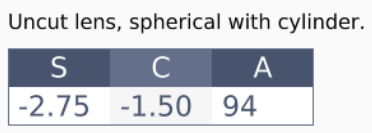


Figure 20: Marking view of single lenses with cylinder.



Resume table: it contains a short description of the lens under marking and a table of its refractive data.

Axis rotation slider: this slider can be used to decide the value of the cylinder axis (referring to the marked line). When moving the slider, the preview map will rotate accordingly to the angle selected. The slider step is 5 degrees, use the + and − to adjust the value. When the marking view is loaded, the slider value is set on the measured axis value at the current position. Click on axis reset button to restore the slider value to the measured axis.

After marking is completed, the map displayed in the Single lens view (Figure 11) is virtually rotated in accordance with the axis selected during the marking procedure.

8.4.4.5 Progressive lenses with cylinder

In case of progressive lenses (single lenses or spectacles), Marking view is visualized in Figure 21. SOLOS marks three dots disposed along the Far vision cylinder axis, if any,

otherwise the dots are marked horizontally as in Sections 8.4.4.3 and 8.4.4.1. The central dot is the Far vision point. User can add a prismatic displacement using the Prism editing panel as in Section 8.4.4.1. In addition, a further dot is marked in the location of Near vision point.

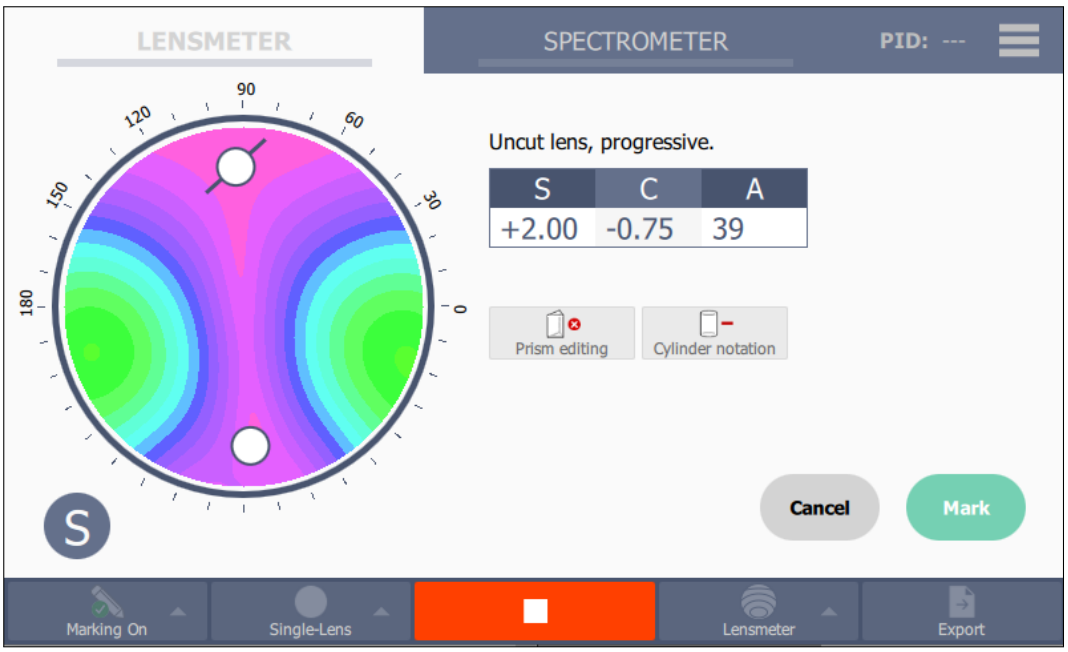
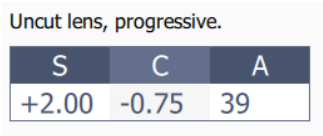
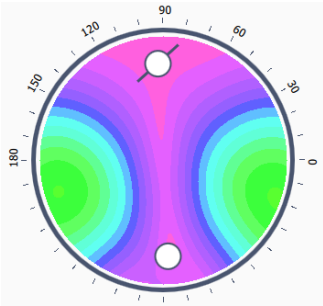


Figure 21: Marking view of a progressive lens.





Resume table: it contains a short description of the lens under marking and a table of its refractive data in Far vision location.

Lens marking preview: it provides a preview of the marking result. Angles in degrees are shown outside the gear and their orientation follows the selected prescription type (see Section 10.2). White circles are a preview of the Far and Near positions which will be marked. Distortion (or cylinder) map is displayed under the marking points. The black line indicates the Far cylinder axis.

8.4.4.6 Bifocal lenses

In case of bifocal lenses (single lenses or spectacles), Marking view is visualized in Figure 22. SOLOS marks three dots disposed along the Far vision cylinder axis, if any, otherwise

the dots are marked horizontally as in Sections 8.4.4.3 and 8.4.4.1. The central dot is optical point of the Far vision zone. User can add a prismatic displacement using the Prism editing panel as in Section 8.4.4.1.

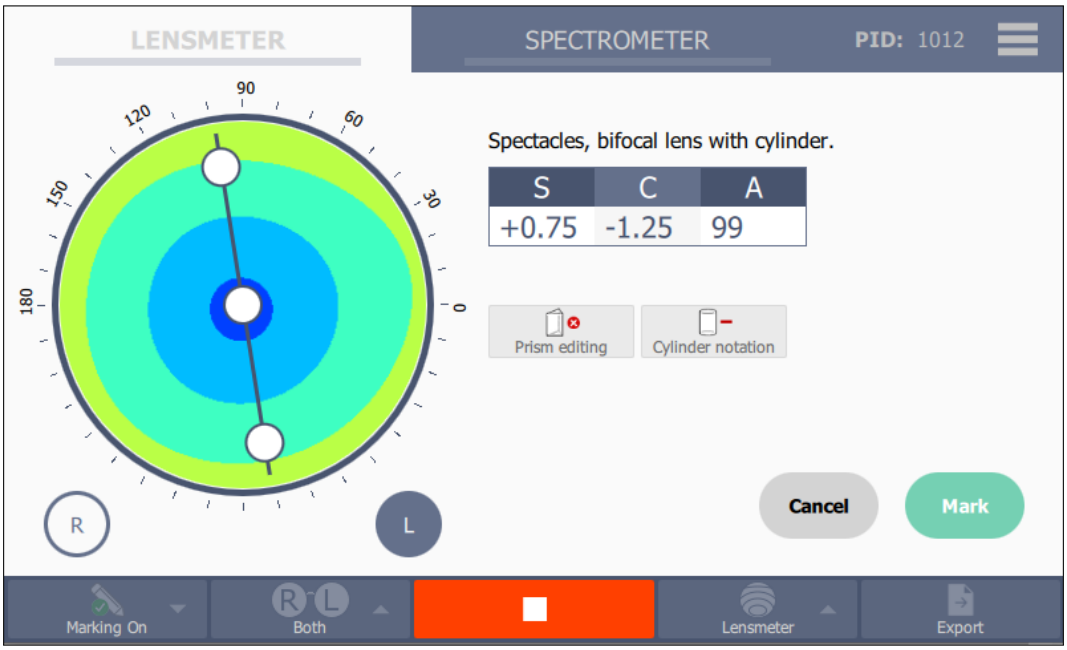
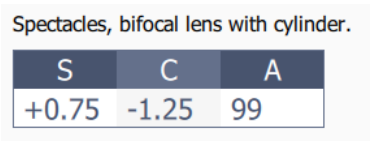
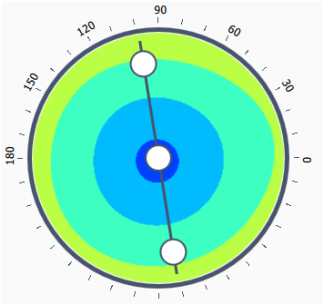


Figure 22: Marking view of a bifocal lens.





Resume table: it contains a short description of the lens under marking and a table of its refractive data in the Far vision zone.

Lens marking preview: it provides a preview of the marking result. Angles in degrees are shown outside the gear and their orientation follows the selected prescription type (see Section 10.2). White circles are a preview of which positions will be marked. Prism map is displayed under the marking points. The black line indicates the Far cylinder axis.

8.5 REMOVE SINGLE LENS

When single lens acquisition is completed, the lens remains locked to prevent possible falls. Press Ok to free and remove the lens safely.

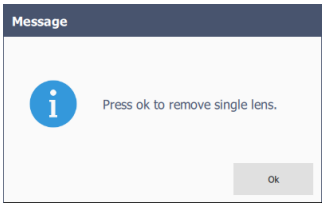
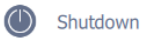


Figure 23: Single lens release pop up

8.6 SWITCH OFF THE DEVICE

8.6.1 Switch off: standby mode

SOLOS can be switched off in standby mode in two ways:

- Opening the main menu (see figure 31) and then click on shutdown button 

- Using the physical button in the bottom right side of SOLOS (see figure 24).

Figure 24: Switching off the instrument

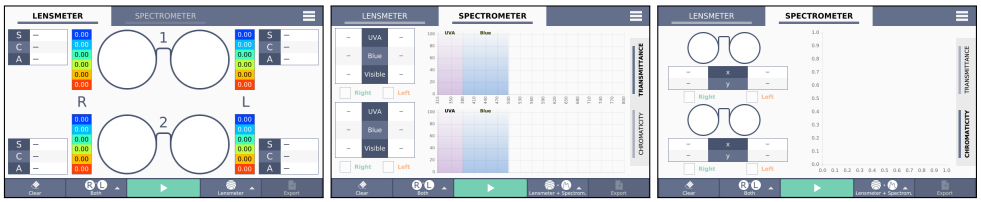
8.6.2 Switch off the main power supply

Switch Off the device and unplug the power cable.

9 OTHER FUNCTIONALITIES

9.1 COMPARISON

In the comparison environment user can compare two distinct pair of spectacles. Comparison is not available for single lenses.



(a) Lens mapping **(b)** Transmittance **(c)** Chromaticity

Figure 25: Comparison environment

9.1.1 Open comparison

Comparison can be opened through the options menu in the top acquisition bar. The user can access to comparison both before and after performing a measurement. In the latter case, the acquired lens will fill the first comparison slot, then a pop up will ask the user to place the second spectacles for comparison (Figure 26).

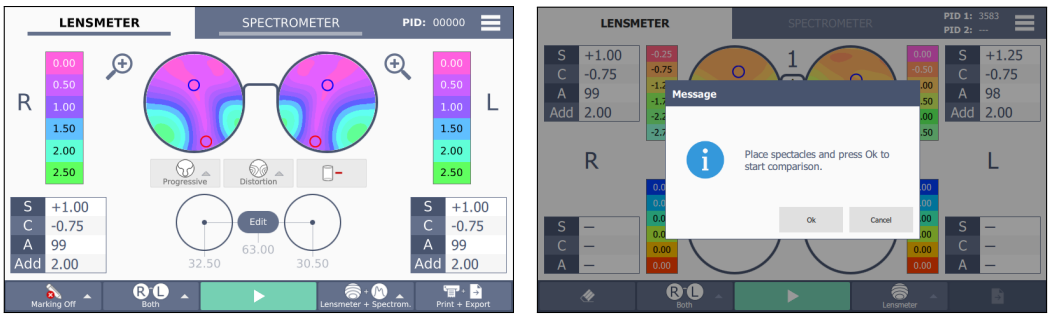


Figure 26: **Left** Before opening comparison. **Right** Opening comparison. The acquired lens is stored in the first slot and the user can directly start the second spectacles measurement.

9.1.2 Comparison environment

Figure 27 shows the comparison environment after the acquisition of the second spectacle:

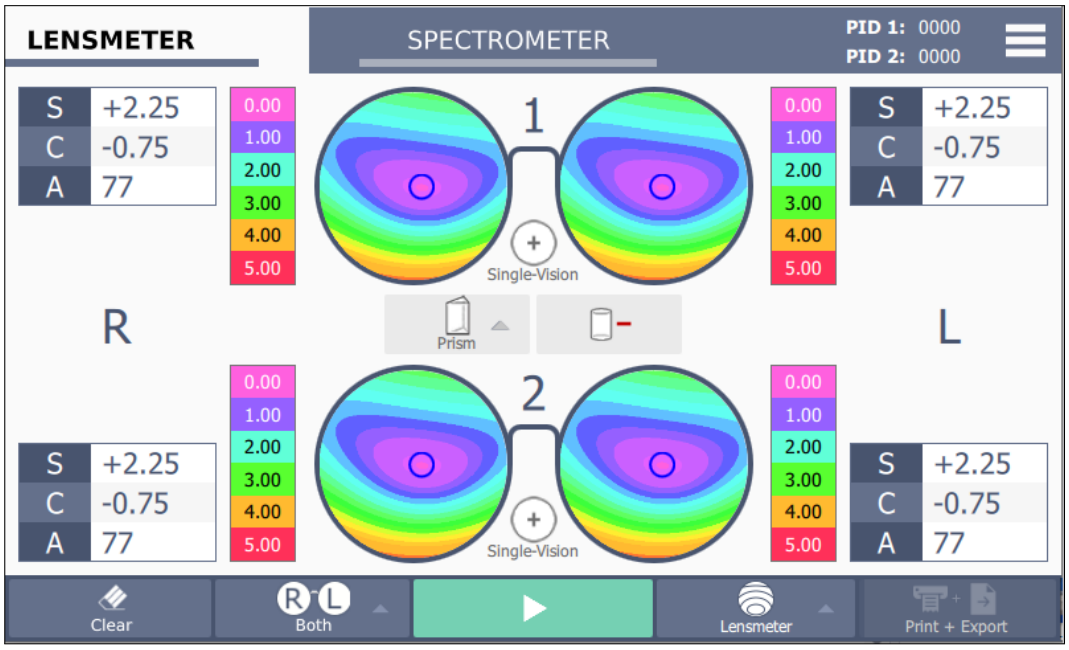
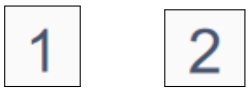
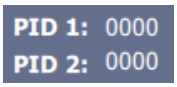


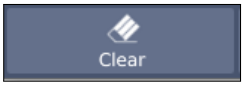
Figure 27: lensmeter comparison.



Position indicators: they are the label of the first and the second spectacles.



Patient ID: Show the patients' IDs. Click on the line to edit the IDs manually or by barcode. See details in Chapter 10.



Clear spectacles button: this button allows the user to clear one of the positions. Click and use the following pop up (Figure 28) to select the position to be cleared.

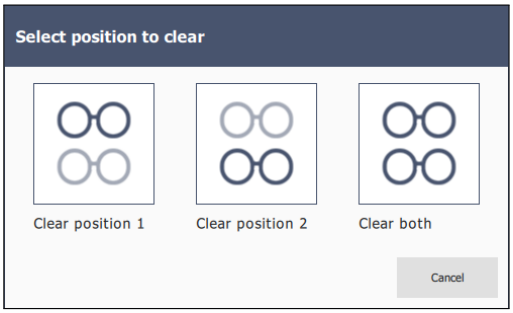


Figure 28: Clear position pop up.

Acquisition button: this button allows the user to add a new spectacles to the comparison. If one of the positions is empty, the incoming measurement will be set in that position. If both the positions are full, the user can select an option from pop up in Figure (29).

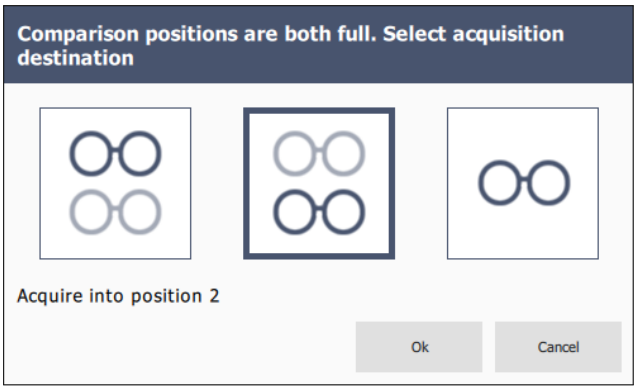


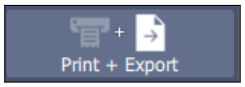
Figure 29: New lens acquisition pop up.

(a) Acquire into position 1.

(b) Acquire into position 2.

(c) Acquire and close.

Figure 30: Available acquisitions



Export button: enabled only when both the spectacles slots are full. Click to export a comparison resume in PDF format. Only PDF format is available in comparison. See details in Chapter 10.

The other interface items maintain the usual functionality described in Chapter 8.

9.1.3 Close comparison

Comparison can be closed through the options menu on the top acquisition bar. If any of the two positions is not empty, the corresponding spectacles is visualized in the Lensmeter/Spectrometer main view. If both the positions are full, the last slot acquired is the one visualized.

10 SETTINGS

User can access to settings through the option menu in the top acquisition bar (Figure 31)

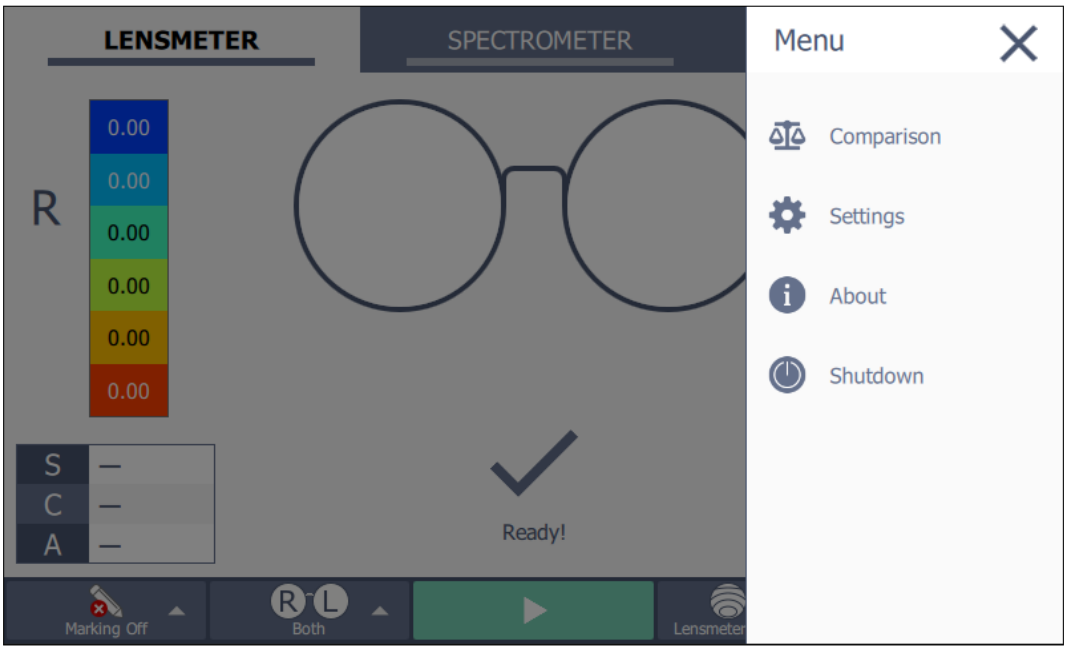
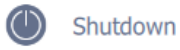


Figure 31: Option menu

Comparison: it opens the comparison environment. See Chapter 9.

Settings: it opens the Settings, which are described in Sections 10.1, 10.2, 10.3 here below.

About: it opens a view with general information about the device (See Section 10.4).



Shutdown: switch off or reboot SOLOS.

10.1 GENERAL SETTINGS

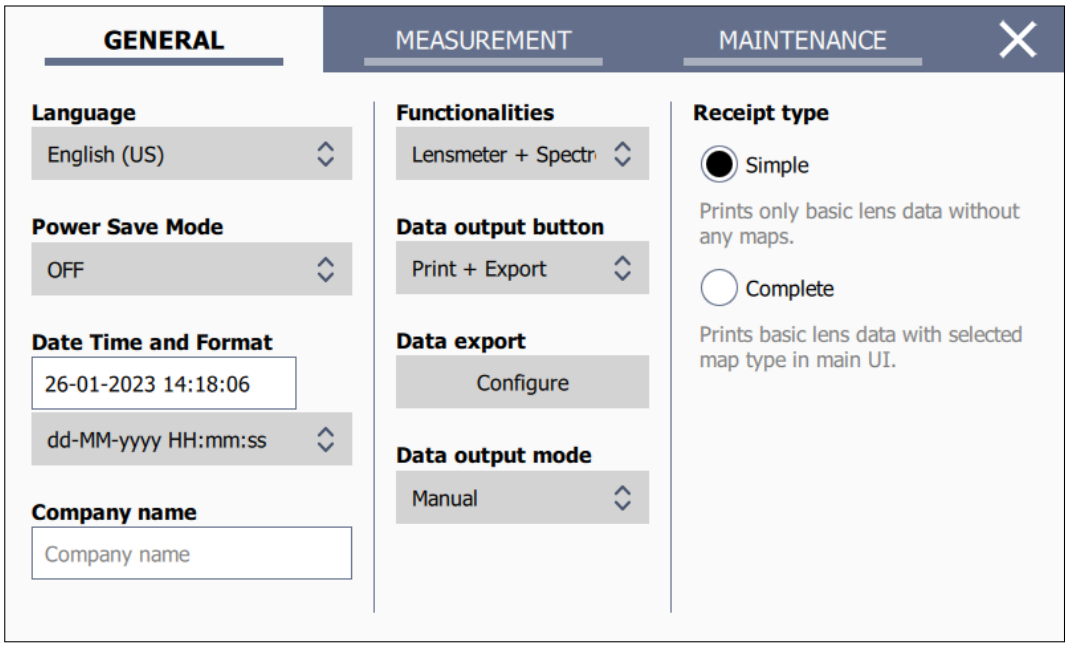
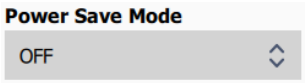
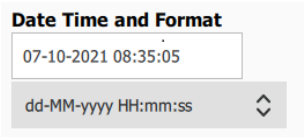


Figure 32: General settings

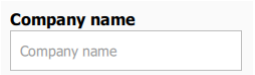
Language: this setting allows the user to select system language.



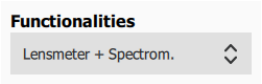
Power save mode: this setting allows the user to select the time after which Power Saving Mode switches on. User can select between 1, 3, 5 or 15 minutes. Selecting OFF PSM is disabled. While in PSM, the screen will be turned off and the physical button light will pulse. When PSM is on, just touch the screen or push the front physical button to reactivate the device.



Date time and format: this setting allows the user to select current date time in the required format.



Company name: this setting allows the user to manually insert the company name that will be printed in the top of the receipt.



Functionalities: this setting allows the user to select between Lensmeter, Spectrometer or Lensmeter + Spectrometer functionalities.

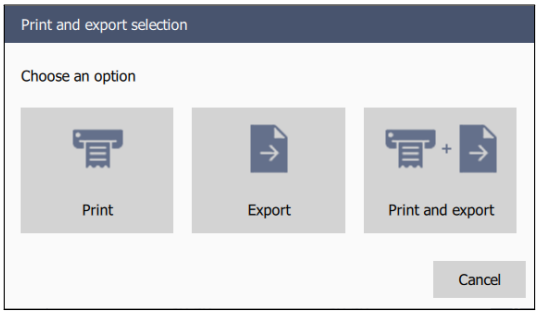
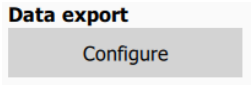
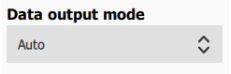


Figure 33: Output selection

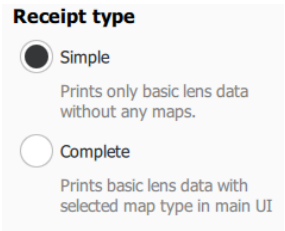
Data output button: this setting allows the user to select the data output mode between Print, Export or both. Selecting 'Popup', user can choose a different option each time by using pop up in Figure 33. Use Configure button to set up the export features.



Export configuration: this setting allows the user to open the export configuration panel. See subsection 10.1.1 for details.



Data output mode: this setting allows the user to select between Auto or Manual output mode. Selecting Auto, SOLOS automatically export/print after each acquisition. Selecting Manual, the only way to export/print is by clicking the output button in the bottom bar. Auto is not available during comparison .



Receipt type: this setting allows the user to select the printed receipt type.

10.1.1 Export configuration

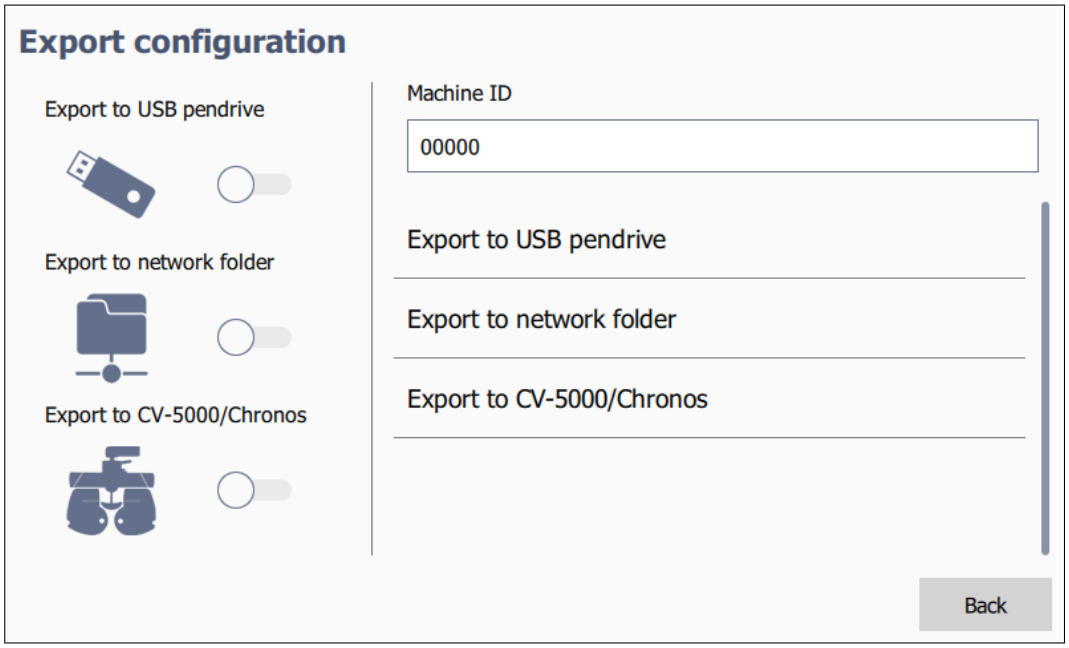
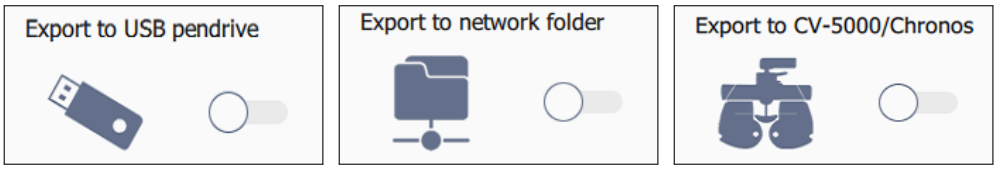


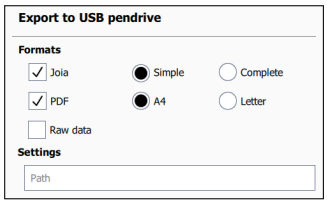
Figure 34: Export configuration panel



(a) USB export **(b)** Network export **(c)** CV-5000/Chronos export

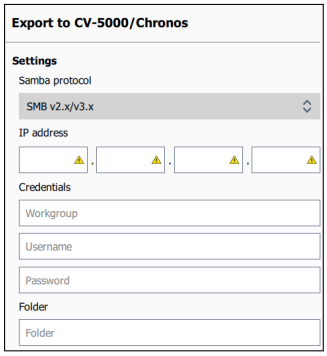
Figure 35: Export destinations

User can access to export configuration panel (Figure 34) through the 'Configure' button in the measurement settings. On the left side, user can select the export destinations (Figure 35). On the right side, for each export destination user can configure the export settings and select the exported data format. User can select or deselect each destination, multiple destinations can be selected at the same time. The export destinations are the following.



USB export: export to USB drive. User can select the formats and the destination path. Every path starts from USB main directory. The format available in USB export are Joia, PDF and raw data.

Network export: export to a shared network folder. User has to select the Samba protocol and add the destination IP address and the local user credentials. **Folder** is the shared directory destination, user can also add via **Subfolder** a subpath starting from the shared directory (referring to the left, data are exported in shared/export/patient1 folder). The format available in network export are Joia and PDF.

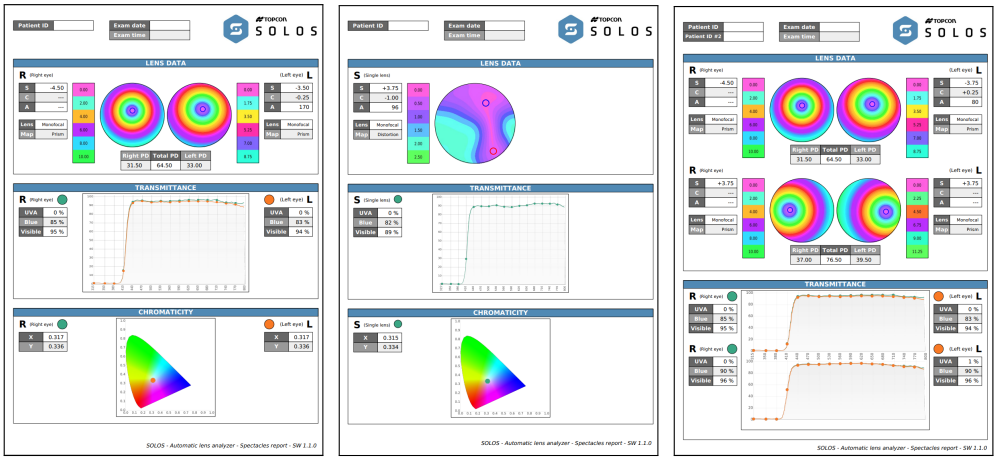


CV-5000/Chronos export: export to Chronos or CV-5000 devices. User has to select the Samba protocol and add the device IP address, the credentials and the destination folder.

User can select multiple formats at the same time. The data format available are the following.

- **Joia** it's a .xml report made according to the standard provided by Japanese Ophtalmic Instrument Association. In the **Complete** format the list of Transmittance values for each wavelength from 315 to 780 is added.

- **PDF** It's a PDF report containing the results of a spectacle or single lens measurement (Figure 36 (a) and (b)). The map in the report is the current map selected in the main view. PDF report can also be exported in comparison (Figure 36 (c)), but only when both the slot are full. User can select between **A4** and **Letter** pagesize format.



(a) Spectacle (b) Single Lens (c) Comparison

Figure 36: Report PDF

- **Raw data** provides the measured images and the input data of the current acquisition. It's available only via USB export.

10.2 MEASURE SETTINGS

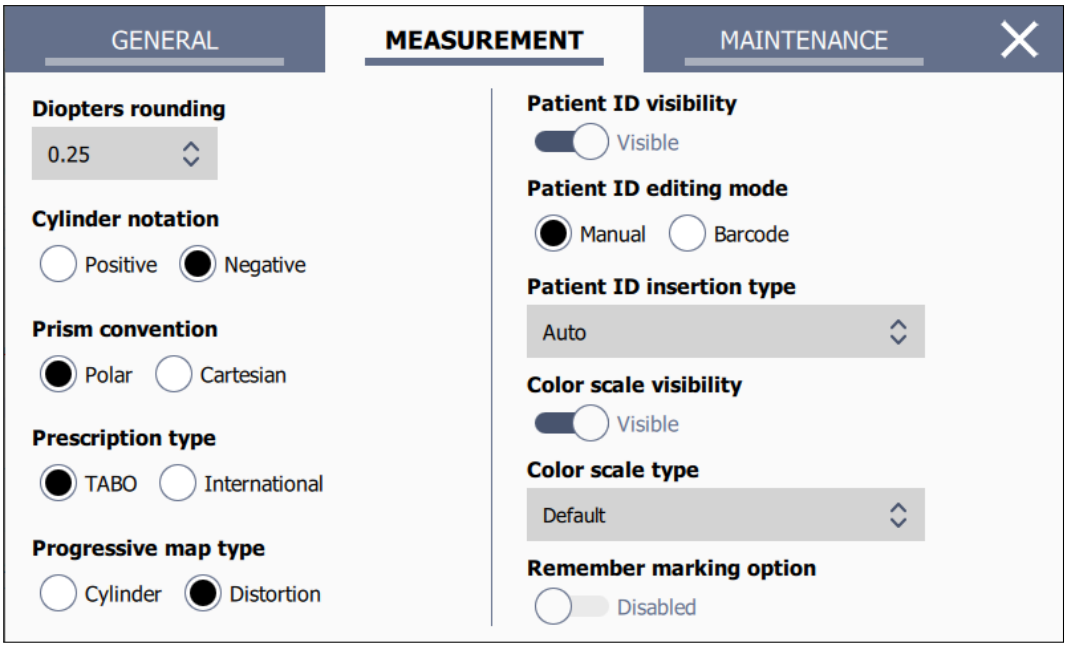


Figure 37: Measure settings

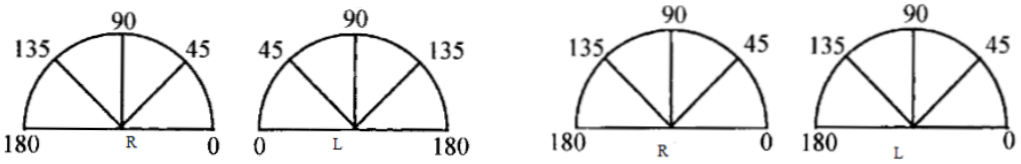
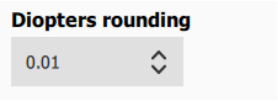
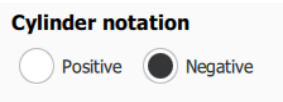


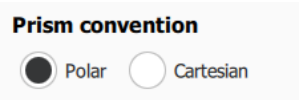
Figure 38: Angle prescriptions.



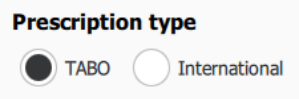
Diopters rounding: this setting allows the user to select the rounding of refractive data. The options are 0.01, 0.0625, 0.125 or 0.25 of diopter.



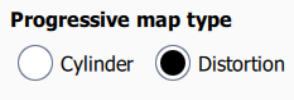
Cylinder notation: this setting allows the user to select the cylinder notation.



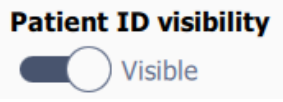
Prism convention: this setting allows the user to change prism convention. Polar convention describes prism as magnitude **P** in diopters and Base (angle) **B** in degrees. Cartesian convention describes prism as horizontal component **HP** (with orientation inside (i) or outside (o) the nose) and vertical component **VP** (with orientation up (u) or down (d)).



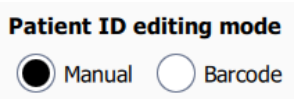
Prescription type: this setting allows the user to select the convention used for measuring angles. Figure 38 compares TABO and International. TABO and International are identical for right side, while for the left side the following rule holds: $\text{TABO} = 180° - \text{INT}$.
⚠ Please take care to use the same angle prescription before comparing SOLOS values with data from external sources.



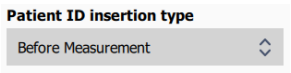
Progressive map type: this setting allows the user to select between Cylinder map and Distortion map for Progressive lenses.



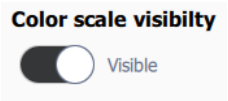
Patient ID visibility: this setting allow the user to hide or show the Patient ID.



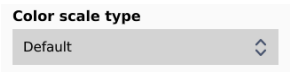
Patient ID editing mode: this setting allows the user to select the Patient ID editing mode. Selecting Manual, user can change ID by clicking on Patient ID textfield (right of the top bar). Selecting Barcode user can add an ID by barcode reading.



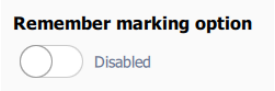
Patient ID insertion mode: this setting allows the user to select the Patient ID insertion mode. Selecting Before export, user is prompt to insert Patient ID before exporting data. Selecting before measurement user is prompt to insert Patient ID before performing an acquisition. Selecting Auto, patient ID will be assigned automatically after each acquisition.



Color scale visibility: this setting allows the user to hide or show the color scale.



Color scale type: this setting allows the user to select the color scale type between Default and Jet ColorMap. Default is an absolute color scale with a fixed relation between diopters and colors. Jet ColorMap it's a normalized color scale which presents blue for the lowest value and red for the highest, offering a clearer display of details.



Remember marking option: this setting allows the user to manage the status of the marking. Selecting Enabled, the device always preserves the marking states selected, otherwise marking is disabled after each acquisition. When SOLOS is turned off, the option returns to Disable.

10.3 MAINTENANCE SETTINGS

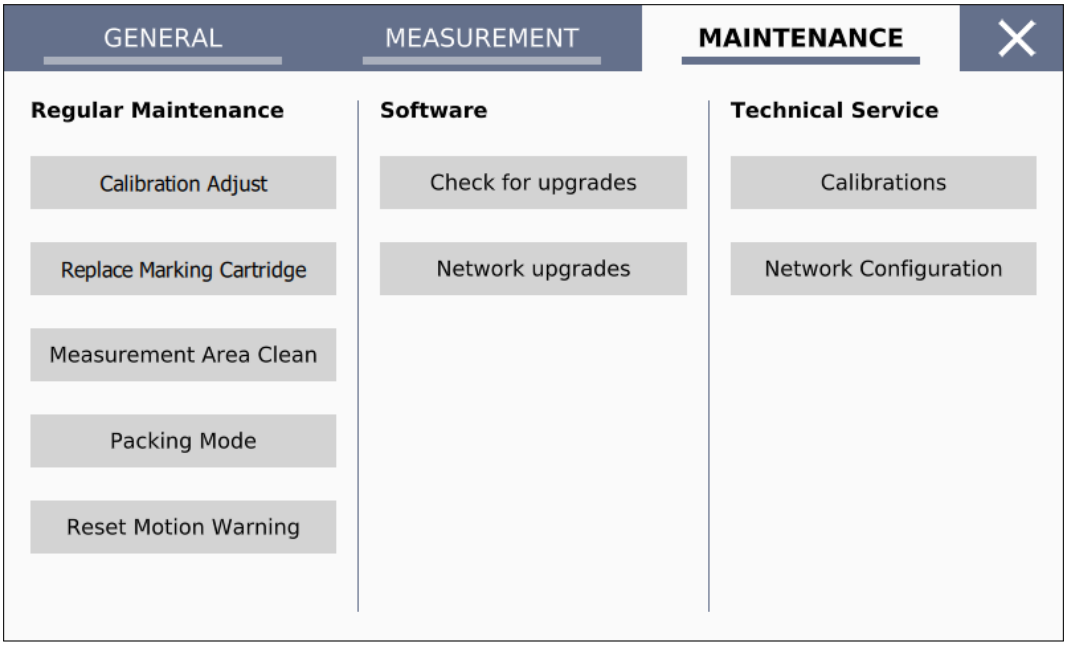
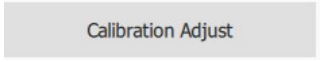


Figure 39: Maintenance settings

10.3.1 Regular Maintenance



Calibration adjust: it allows the user to check and adjust the current calibration. The Adjust calibration environment is shown in Figure 40. It is recommended to adjust the calibration every day when turning on the device. In case of failed calibration refer to technical assistance (see figure 41).

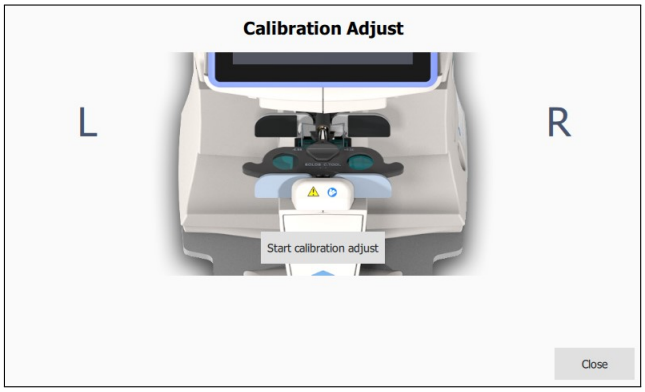


Figure 40: Calibration Adjust View

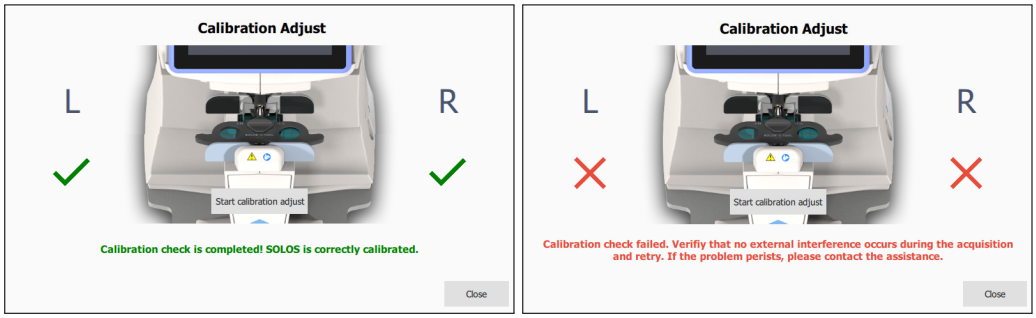


Figure 41: Calibration Adjust Result

Replace marking cartridge: it allows the user to remove and substitute the exhausted marking cartridge (see figure 42).

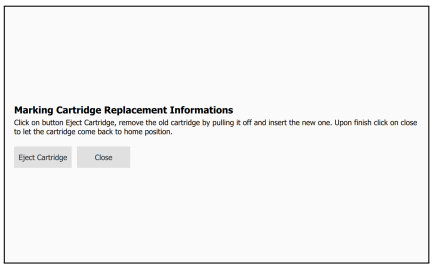


Figure 42: Replace Cartridge

Measurement area clean: it allows the user to clean the measurement area by moving the stage to the top left position. Pay attention to remove any spectacles or lens before this procedure. It is recommended to clean measurement area every month

Packing mode: it moves the stage to the best position for the device packing.

Reset motion warning: it restores the pop up inviting the user to remove loaded lenses or glasses when changing the acquisition target between Spectales and Single lens.) (Figure 43).

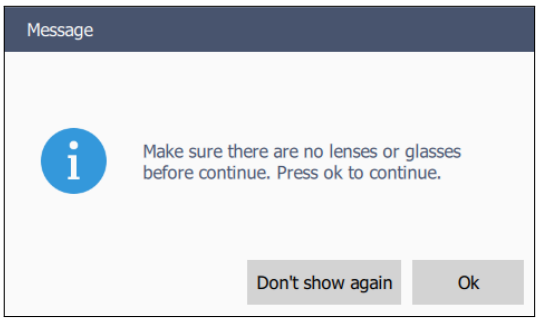
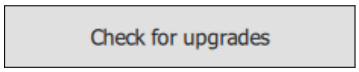


Figure 43: Motion warning pop up

10.3.2 Software



Software upgrades: it allows the user to Upgrade SOLOS software version via USB or via Network (See Figure 44). Click on "Refresh" to check if any new upgrade is available. If any, select it and click on "Upgrade" to install this new SOLOS version. Upgrade operations should last just a few seconds.

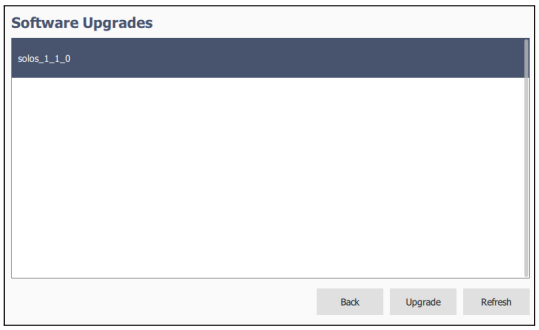
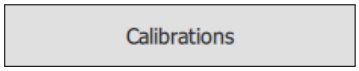


Figure 44: Software upgrades

10.3.3 Technical Service

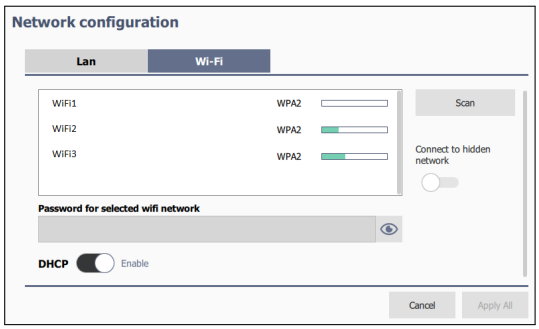


Calibrations: it allows a technician to log into the software and hardware calibration environment.

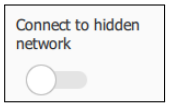
Network configuration: it allows the user to configure SOLOS network settings. Details are explained in subsection 10.3.3.1.

10.3.3.1 Network configuration

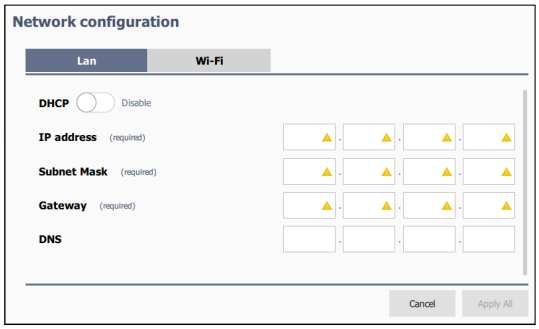
In this panel user can configure LAN and WiFi connection. Use the top buttons to switch between LAN or WiFi. Click on Apply All to save the Lan and WiFi network configuration. Click on Cancel to close the window without any change.



WiFi Configuration: click on Scan to search for available WiFi. User can select between a dynamic IP configuration (DHCP enabled) or manually configure the IP address and the other network settings.



Hidden WiFi Configuration: This toggle button allow to add and to configure a hidden WiFi.



LAN Configuration: user can select between a dynamic IP configuration (DHCP enabled) or manually configure the IP address and the other LAN network settings.

10.4 ABOUT

About view (Figure 45) provides an overview of Software, Hardware and Firmware versions of SOLOS components. User can also read about legal notes on third parties libraries involved in the project. Is also provided a brief guide for SOLOS preparation and lens measurement.

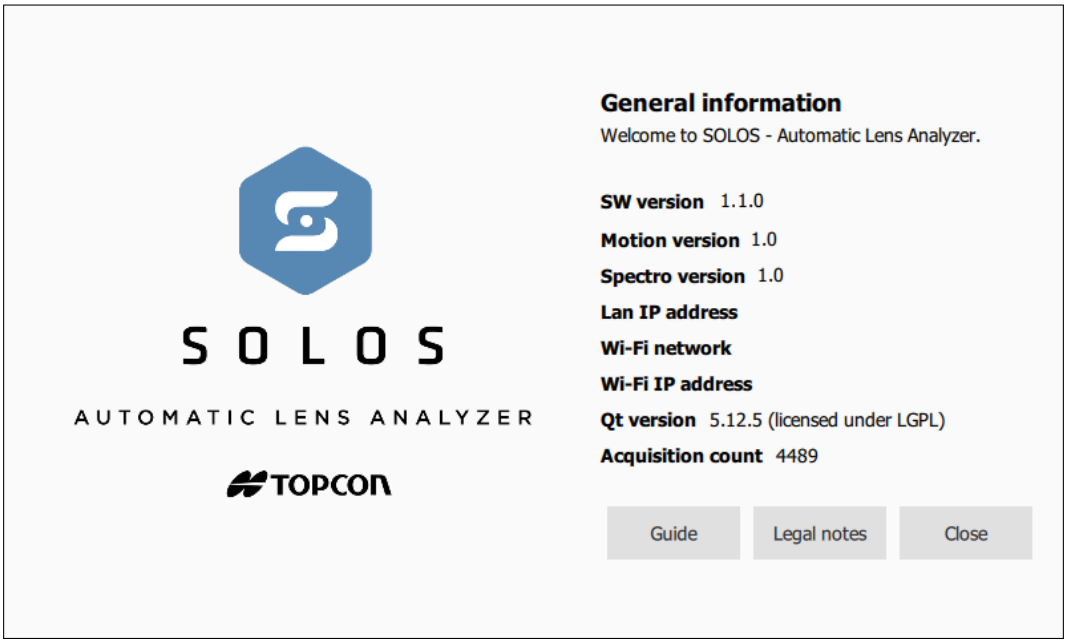


Figure 45: About View

11 TECHNICAL SPECIFICATIONS

General information	
Lens analysis	Focimeter, Lens Mapper, Spectrometer
Operating mode	Total automatic
Light Source	Green Led 535 nm ± 10 nm
Acquisition type	Single Lens, Spectacles
Lens type	Monofocal, Bifocal, Progressive and Degressive lens
Lens Detection	Automatic
Marking	Single Lens, Spectacles
Spectrometer	Transmittance and Chromaticity analysis

Measurement range	
Sphere power	from −20 D to 20 D (step 0.01 , 0.0625 , 0.125 , 0.25 D)
Cylinder power	from −10 D to 10 D (step 0.01 , 0.0625 , 0.125 , 0.25 D)
Cylinder axis	from 0° to 180° (step 1°)
Addition power	from −4 D to 4 D (step 0.01 , 0.0625 , 0.125 , 0.25 D)
Prism power	from 0 D to 20 D (step 0.01 , 0.0625 , 0.125 , 0.25 D)
Prism base	from 0° to 360° (step 1°)
PD Measurement	Mono/Bino
Spectrometer range	from 315 nm to 800 nm
Measurement Accuracy	ISO 8598-1:2014 Compliant

Electrical specifications	
Power supply	AC 100 - 120 V / 200 - 240 V — 50 / 60 Hz
Power input	50 VA
Fuse	T 2.5 A L 250 V (dimensions 20x5 mm)

Environmental conditions	Operation	Storage	Transport
Temperature	from 10 °C to 40 °C	from −20 °C to 70 °C	from −20 °C to 70 °C
Relative humidity	from 8% to 75% (no condensate)	from 8% to 75% (no condensate)	from 8% to 75% (no condensate)
Atmospheric pressure	from 700 hPa to 1060 hPa	from 700 hPa to 1060 hPa	from 700 hPa to 1060 hPa

Onboard components	
Operating system	Linux Custom Image
Processor	Icore MX8 Mini
RAM	1 GB
Hard Disk	4 GB eMMC
External connections	2 USB, 1 Ethernet, 1 RS-232
Connectivity	802.11 b/g/n WiFi, LAN

Mechanical specifications	
Width	245 mm
Height	450 mm
Depth	354 mm
Net Weight	8 kg

12 MAINTENANCE

For regular maintenance refer to 10.3.1. For more detail refer to SOLOS Service Manual.

12.1 CHANGING THE FUSES OF THE SOLOS DEVICE

⚠ Make sure that the power switch of the main body is off and the power cable is unplugged.

⚠ It is mandatory to use fuses only with the indicated characteristics.

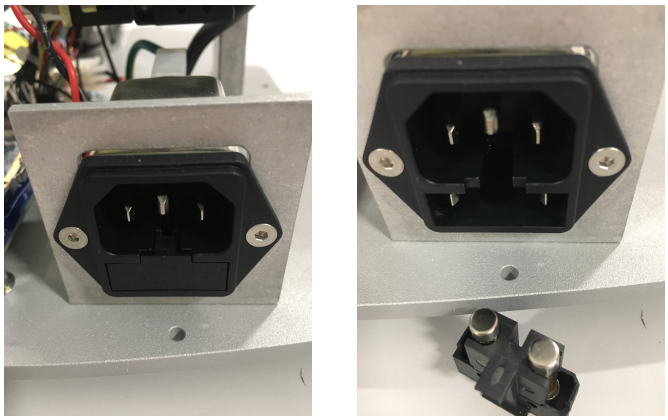
⚠ The use of undersized fuses can cause the interruption of power to the device during normal working conditions. In this case there is no risk to the user but the device turns off at inopportune moments, and this can cause data loss.

Remove the blown fuse from its seat and replace it with an identical as indicated in technical specifications.

⚠ Make sure that the power switch of the main body is off and the power cable is unplugged.

The procedure to change the fuse is the following (see figure 46):

1. open the fuse box cover using a screwdriver;
2. take out the fuse box (use a screwdriver to release it);
3. substitute the fuses and make sure they stay in the correct position;
4. push the fuse box carefully back into position;
5. close the black cover again and check if correct voltage is displayed in the opening.



(1) (2)

Figure 46: Fuse changing procedure