



GUIDE

Spectro

Quick Start



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Project Owner: HSG labs

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 Routing for Document Approval
 Approved
 Unapproved

Applicable from version 1.0.0 of the software package

First, we thank you for purchasing the Spectro. Please carefully read this quick start guide before operating your Spectro and keep it for future reference. This user guide will help you to use it properly, safely, and take full advantage of its features.

Manufacturer Details



151 voie H Impasse des Bruyères
06370 Mouans-Sartoux
France
VAT FR69 948058813

Calibration

Calibration is an important process during which the device biases are evaluated. The biases compensation data are computed and stored as a calibration file. Each Spectro is calibrated before shipment. However, spectrometers physical parameters drift over time. The Spectro then needs to be re-calibrated periodically.

HSG-Labs recommends calibration once per year.

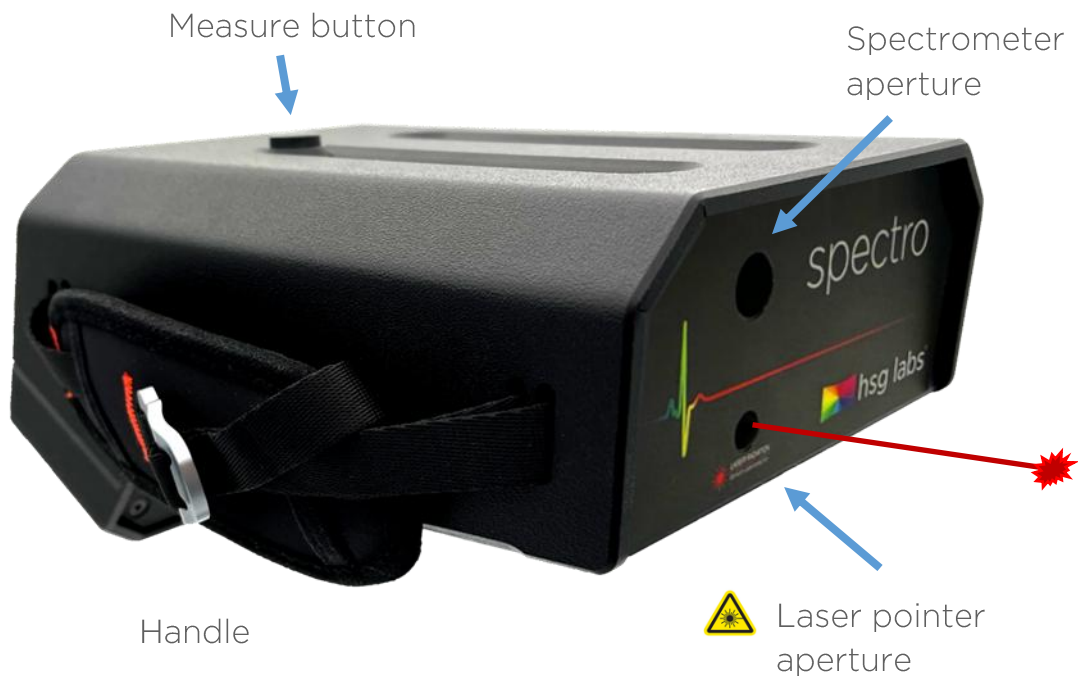
Package content

- *Hard Suitcase*
- *HSG Labs | Spectro*
- *Quick start guide*
- *Safety instructions*
- *Calibration Certificate*
- *Accessory bag*
 - *Power supply*
 - *International plugs*
 - *USB-C to USB-A cable*
 - *Capacitive Stylus Pen*
 - *Wi-Fi dongle*
 - *Magnetic filter holder*
- *Extra on demand:*
 - *Magnetic light integration tube for direct contact measurement*
 - *Diffusing filter*

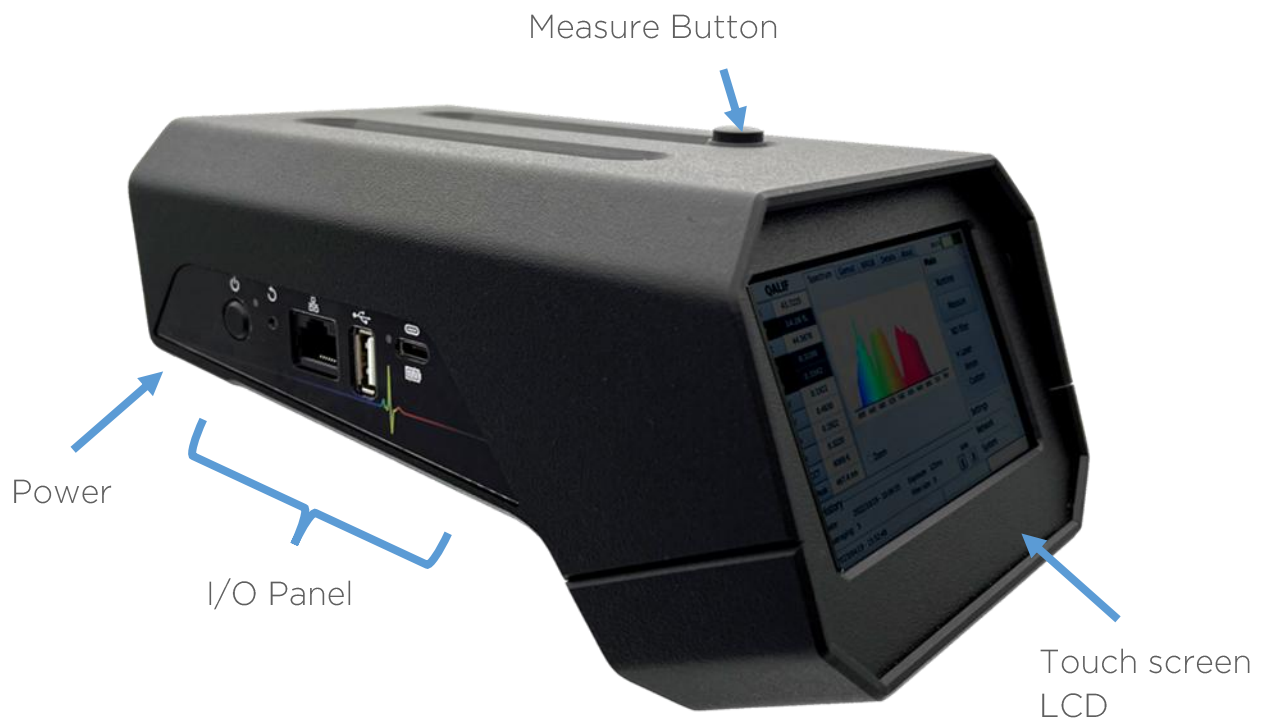


Unit photos and details

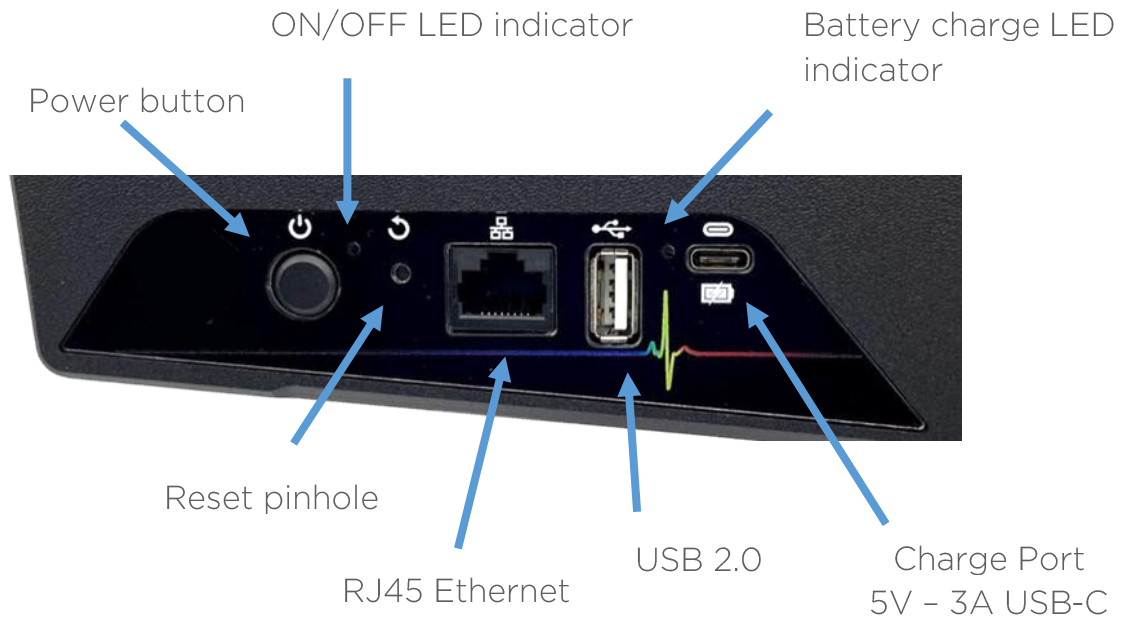
Front view



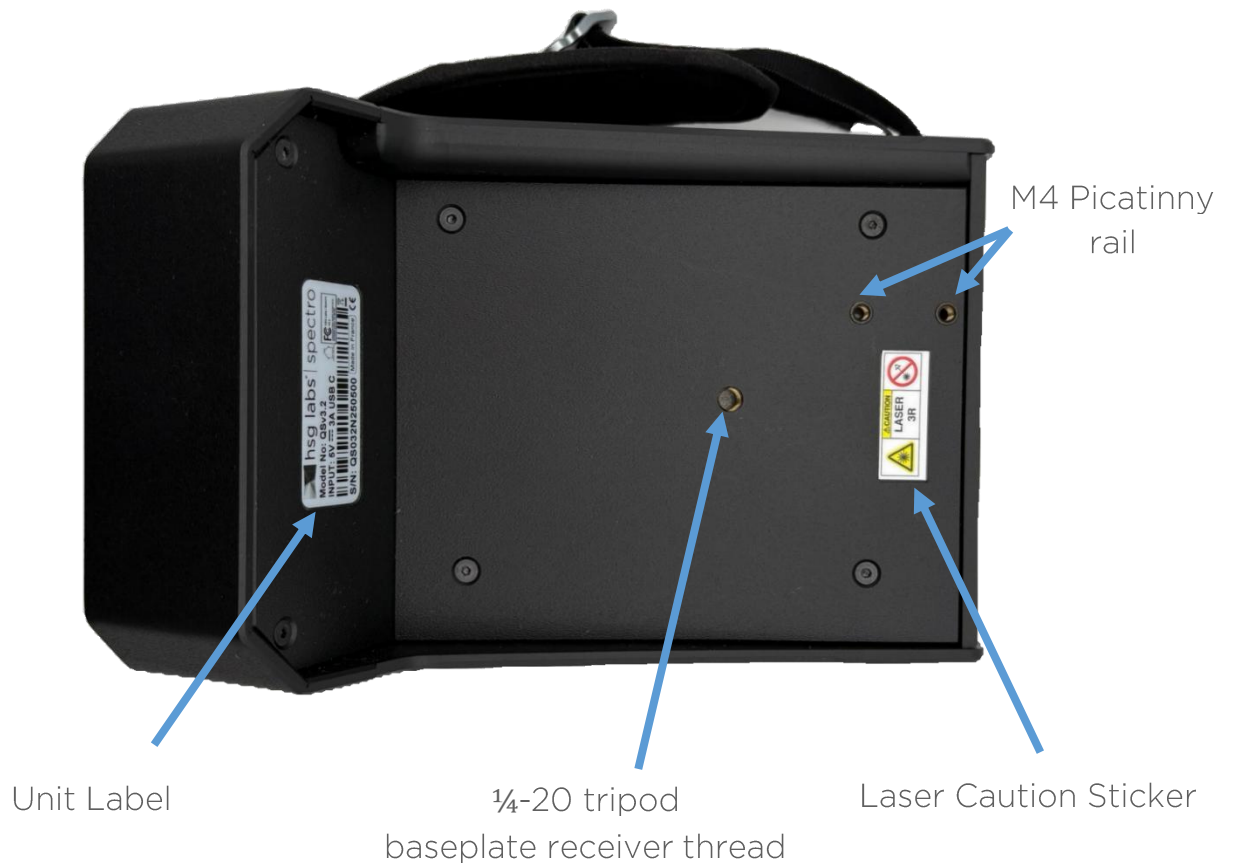
Rear View



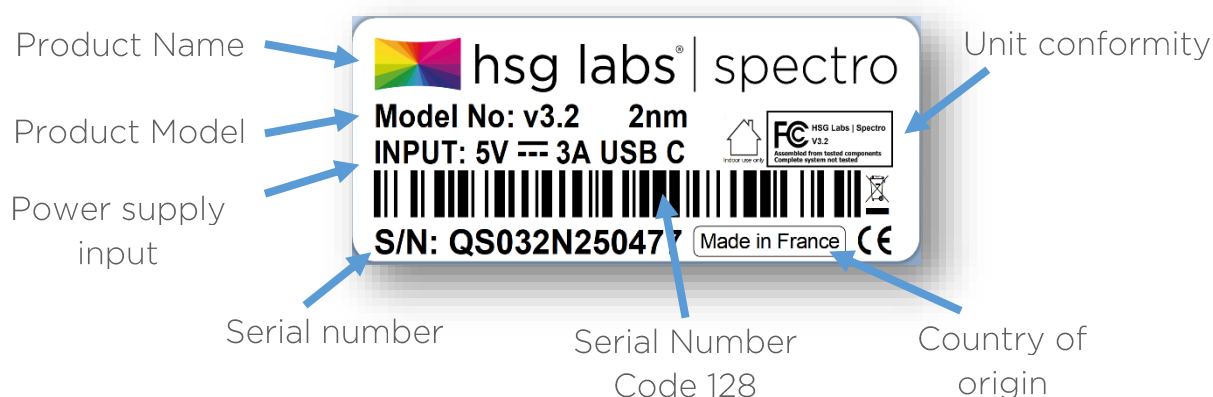
I/O Panel



Bottom View



Product Label



Technical detailed Specifications

Photometric CIE values spectral range	380 nm to 780 nm (200 nm to 850 nm on request)
Spectral Bandwidth FWHM	2 nm (1 nm on request)
Pixel Resolution	0.15 nm/pixel
Detector	3 648 pixels
Color Accuracy*	± 0.0015 for CIE 1931 xy
Luminance Accuracy*	± 1%
Luminance Range	0.005 cd/m ² up to 200 000 cd/m ² 0.001 fL up to -58 000 fL
Measuring Values	cd/m ² or fL CCT/xy/u'v'/wavelength peak/dominant color
Measuring Aperture	2° (FOV)
Size	229 x 109 x 103 mm ~ 9 x 4.3 x 4 inches
Weight	1.2 kg ~2.65 lb
Display Type	Color LCD with capacitive touch screen
Display Resolution & Sample rate	800x480 px - 60Hz
Battery Type & Capacity	Rechargeable Li-ion 3.7 V / 6600 mAh / 24.42 Wh
Battery controls	Protection Circuit Module (PCM) Battery Management System (BMS)
Battery life	up to 4 hours
Unit input power	DC 5 V, 3 A, USB-C-Type socket
Power supply input	AC 100 - 240 V, 50/60Hz, 0.3 A
Power supply output	DC 5 V, 3 A, USB A-type socket
Allowed mains supply voltage fluctuations	± 10%
IEC Overvoltage Category	Category II

*For A illuminant and against NIST Luminance standard

Environmental Specifications

Usage	Only for indoor use
Altitude	< 2 000 m above sea level < 6 600 ft above sea level
Operating Temperature	non-condensing 5 °C to 35 °C (41 °F to 95 °F)
Storage Temperature	-25 °C to 60 °C (-13 °F to 140 °F)
Relative Humidity	20 - 80 %
Pollution Degree of the intended environment (IEC 60947-1)	Degree 2: Normally, only non-conductive pollution occurs. Occasionally, however, a temporary conductivity caused by condensation may be expected.

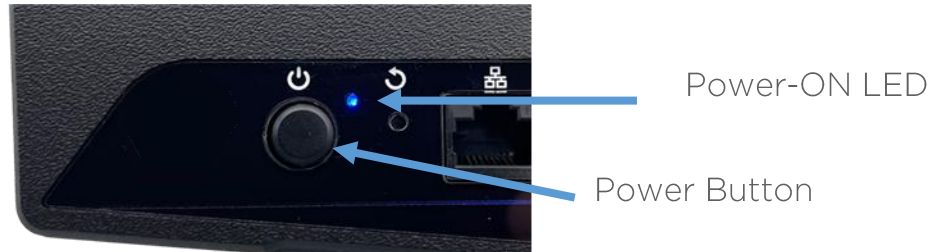
Access & Passwords


Ethernet Address	Assigned by DHCP
WiFi Hotspot (with USB dongle)	SSID: <UnitSerialNumber>-Hotspot Password: oblivion Default IP address: 10.10.0.1
VNC (Virtual Network Computing)	Password: veone
Web Browser Connection	No Password required
sFTP (File Transport Protocol)	User: sysadmin Password: veone Port: 22
SSH (Secure Shell)	User: sysadmin Password: veone Port: 22

Power ON the unit

To power ON the unit press the power button for 2-3 seconds.

A blue LED will turn on and the LCD will turn on display the boot process. The boot process is complete when the GUI application is displayed.



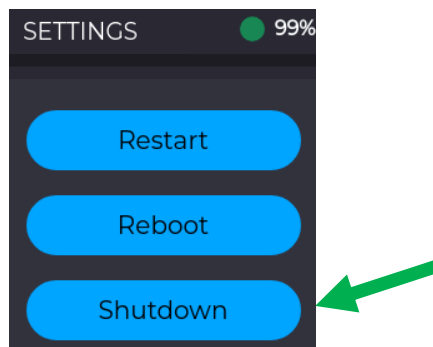
 **NOTE:** If it is the first time that the unit is turned on, please ensure to update it to the last software version. The update process is described in the [APPENDIX](#) section of this document.

 **CAUTION:** If the unit does not start, it could be due to low battery power, please connect to a power source, wait and test again after 10min.

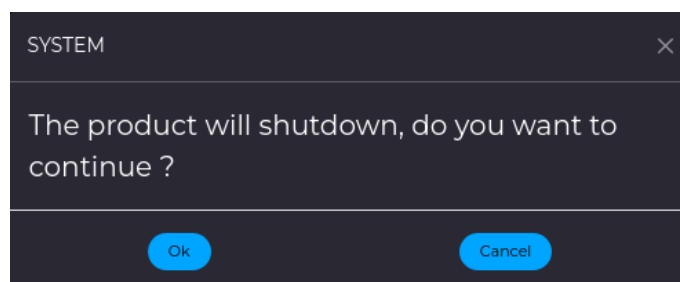
Power OFF the unit

To power OFF the unit, two options are available:

- a. Press shutdown button that could be found in Settings > System > Shutdown



When Restart, Reboot or Shutdown are clicked, a confirmation pop-up window appears:



- b. Press the power button for 4 seconds, the unit will “beep twice” when the shutdown process starts.

Once the Power LED is off the unit is correctly shutdown.

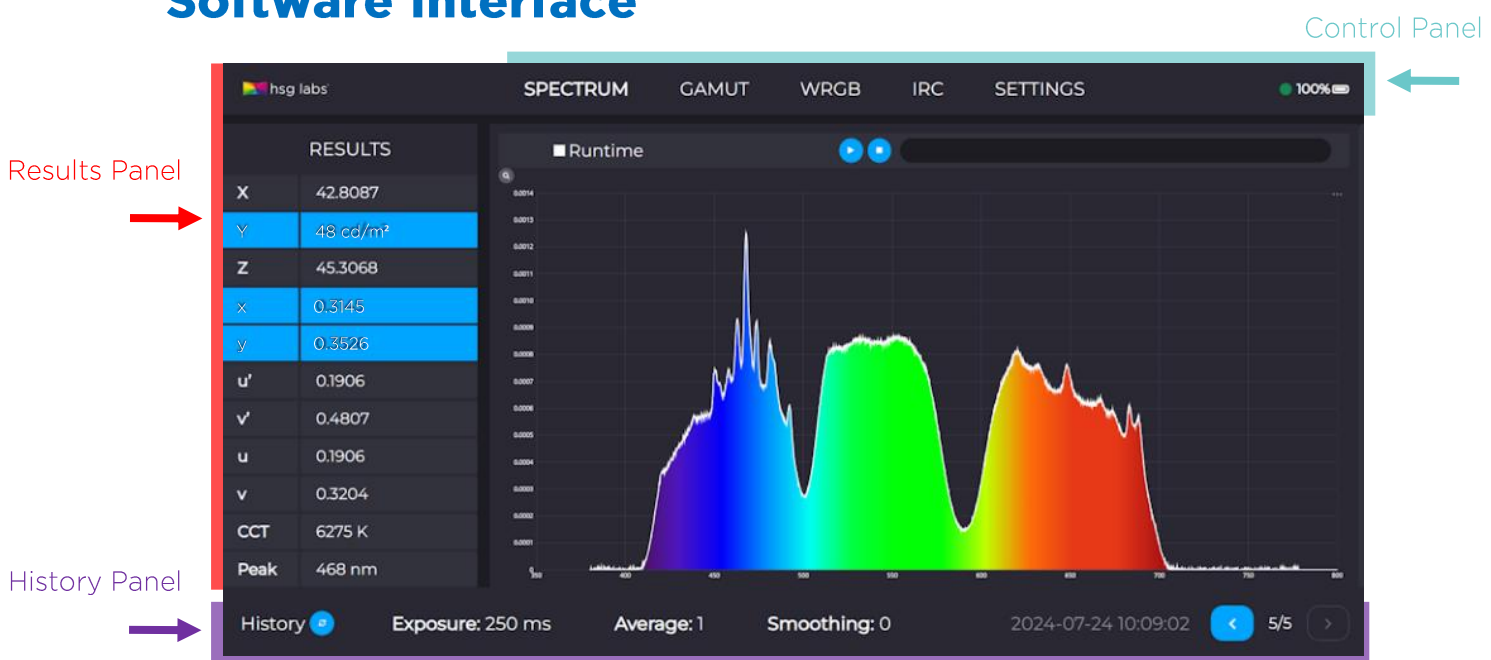
Reset

In case of problem, or undesired behaviour, a Reset can be performed by several methods according to severity, from low to high:

- a. Press restart button that could be found in Settings > System > Restart
- b. Press reboot button that could be found in Settings > System > Reboot
- c. Perform a hard Reset by inserting a paper clip into the I/O Panel



Software Interface



Results Panel

The Result Panel will show by default the last measurement taken with the unit.

The luminance Y and the colorimetric coordinates x and y are highlighted.

On the top side, there are 5 selectable tabs: SPECTRUM, GAMUT, WRGB, IRC and SETTINGS.

History Panel

The History Panel contains information about the current date time, the unit status and allows the user to navigate through the past measurement history. The full measurement detail will be displayed in the Result Panel.

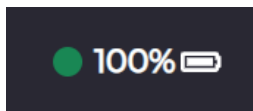
Control Panel

In this section are the details of the Control Panel section, the battery status and the sub-menus that allows the user to take actions and change unit configuration settings.

Battery and connection status

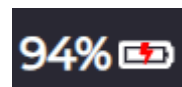
Located on top right the battery info displays the battery state.

A text percentage and a bar indicate the current charge level.



Once under 20% the unit will still have about 45 minutes battery (depending on battery health).

When the unit is in charge, a red lightning icon is displayed:



When the battery is fully charged, the bar is full, the charge percentage will indicate 100% without plugin notification.

 **NOTE:** Due to the web architecture and pooling communication process, the plug or unplug information can take up to 30 seconds to be updated.

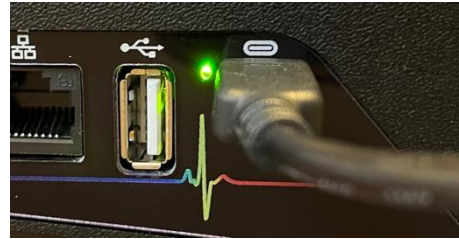
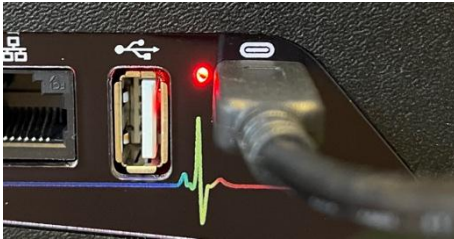
Not related to the battery status, the green or red circle flag on the left side indicates if the GUI (client) is connected to the Core (main embedded software). Red will occur in case of network connection has been lost, with remote access client. Please check your connection when in remote mode.

LED charge indicator

A LED located near the USB-C charging port will also indicate the charging status, this is particularly useful when the unit is powered off. The LED has two status indicators while the USB-C cable is connected. The LED will go off when the USB cable is disconnected.

Red: the unit is in charge

Green: the unit is fully charged



SETTINGS

Settings gives access to the main configuration of the Spectro.

Measure sub-menu - Exposure & Measure

This sub-menu contains most of the setting parameters concern the measurement parameters and will affect the measure results.

Exposure or Integration-time parameter is the duration while photoelectric information gathered from the light sensor are accumulated (integrated). Measure integration-time can be set following two modes:

- Auto-adjust mode: the Spectro automatically adjusts the integration-time to get the best acquisition exposure.
- Manual mode: the user can define manually the integration-time of the measure. This is useful to obtain measures with a fixed integration-time and to compare measures with the same integration-time. Integration-time range: [1 to 999] (in second [s] or millisecond [ms])



NOTE: The Exposure should be kept in Auto-adjust in normal usage.

Screen OFF button on the MEASURE section allows the system to automatically turn off the screen during a measurement. A Restart / Reboot / Shutdown maintains the state of this selection. It is used to ensure that the light emitted from the screen does not disturb the measure. This is useful when performing acquisitions in low light environment where every light source must be switched off.

When selected, **ND filter** modes activate or deactivate the ND filter for measurements. Please refer to the [Neutral Filter](#) section for more details.

The **Average** parameter is the number of measures taken and averaged to give one final resulting measure. An averaging of one is no average, the taken measure is the result. With an averaging parameter of N, N measures are taken, summed, and divided by N resulting in one averaged measure. Averaging acquisitions allows reducing the noise of the measure and thus reducing the results uncertainty. Averaging parameter range: [1 to 100]

Smoothing is used to smooth the spectrum curve and then remove some details; this allows to reduce the resolution of the measurements. The Spectro is using only one filtering type which is the box filter (square filter or also called simple moving average). This filter has only one parameter which is the filter half-length. This parameter refers to the group of considered pixel on each side of a central pixel to "reduce" the spectral resolution (not the bandwidth). [0 to 100]


 **NOTE:** A filter value of 0 correspond at the maximum spectral resolution of the unit.

For example, a value of 16 will take a central pixel plus 16 pixels left hand plus 16 pixels right hand and average the readings of those pixels.

$$16 + 1 + 16 = 33$$

This group of 33 points multiplied by the pixels per nm of the Spectro that is 0.15nm equals to a simulated resolution of 4.95nm.

$$33 \times 0.15\text{nm} = 4.95\text{nm}$$

 **NOTE:** To modify and set into account the settings on Exposure & Measure section, the user needs to modify the values in the interface and then click on the Apply button, otherwise the modifications are not considered.


Measure sub-menu - Commands

 **NOTE:** This section is based with auto-apply command and set into account immediately the selected option.

SCREEN OFF button on the SCREEN section allow to turn off the screen if the unit is used remotely and only from this remote control. **Only a Restart / Reboot / Shutdown can deactivate this option locally on the unit.**


The SHUTTER button allows to open/close or set the ND position the internal spectrometer shutter. This button should never be used and especially during a measure. This function is present only for mechanical testing purposes. This is a single action who engage the shutter, without any record of the status.

The LASER Auto / ON / OFF button allows to switch the laser pointer in normal mode (Auto), always turned ON or always turned OFF. When switching ON, the laser while taking a measure, the laser wavelength will appear in the spectrum.

 **NOTE:** This function could be used to check the alignment between the laser and the spectrometer.

UNIT changes the displayed unit for the Y in the Result Panel between candelas (cd/m²) or foot-lamberts (ft-L)

HISTORY SIZE permits to choose the number of past measures loaded into the interface. This could be useful to reduce this number in case of low connection between the Core and the GUI because the load could be long. The default settings is 50. The total measurements done with the unit is displayed with the ALL button. Possible choices are 1 / 10 / 50 / 100 / ALL.

 **NOTE:** Even with low history size selected, during a full run (unit not powered OFF), all the measurements done are available.

Example: with an HISTORY SIZE of 10, if 60 measures are performed without switch of the unit or the GUI connection, the 60 measures will be available on the History Panel (with potentially the first 10 if they were not empty).

Network sub-menu

The network sub-menu lists all the network interfaces available. Along with each network interface, the corresponding IP address is displayed. This sub-menu is useful when connecting the Spectro to an Ethernet LAN to retrieve the IP address allocated by the DHCP.

System sub-menu

The system sub-menu gives access to the Spectro system capabilities.

Restart button restarts the software. A confirmation via a popup will be requested.

Reboot button reboots the unit. A confirmation via a popup will be requested.

Shutdown button starts the unit shutdown. A confirmation via a popup will be requested.

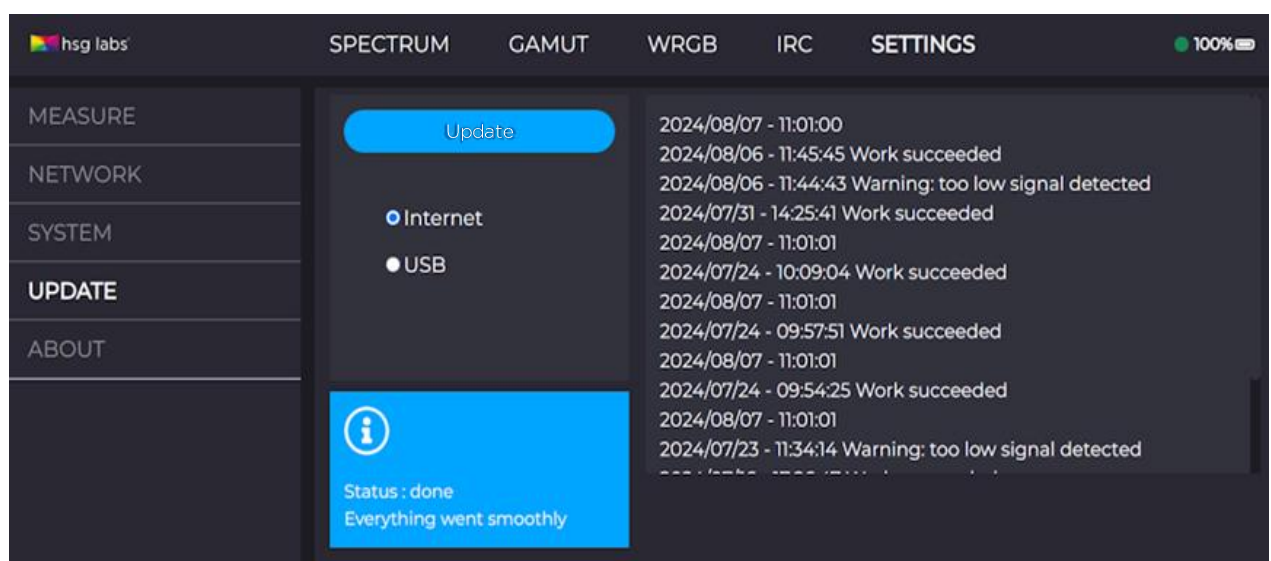
Date Time allows change the date and system time. The time zone change permits to use NTP server feature if available (auto setup). The changes need to be confirmed by clicking on Apply button.

History / Clear permits to clear all measure history content from the unit.

Language changes the displayed language of the unit. Only English (EN) and French (FR) are currently available. Other options will be considered on demand.


Update sub-menu


The update panel is in Settings > Update



By Internet (default)


1. Connect the unit to a RJ45 Network that have DHCP server and internet access.
2. From the Settings select Update.
3. Select Internet method.
4. Click on Update button.
5. The unit will install the update and reboot automatically.


 **NOTE:** The Spectro uses TCP communication port 443, please ensure with your system administrator that is open on your network.

 **NOTE:** VPN initialisation may take some time and several updates can fail immediately after start-up. Please wait and try again a few minutes later.

By USB

1. Take a USB Drive formatted (FAT Filesystem) and empty.
2. Copy the .deb package on the root directory of the USB Drive.
3. From the Settings select Update.
4. Select USB method.
5. Click on Update button.
6. The unit will install the update and reboot automatically.


 **NOTE:** Contact the HSG support to get the latest package available.

 **NOTE:** During an update, all the tabs or functionalities are deactivated to stay focus on the update feature and messages.

 **NOTE:** The update must be performed over a fast connection (at least 20Mb/s recommended). If the connection is too slow, a timeout error may occur (communicating error).

About sub-menu

The About tab contains information relative to the Spectro unit like the model, the serial number, and the current version.

 **NOTE:** The information contained in the About panel must always be provided when contacting the Support team.

Result Panel

In the Result Panel, there are 4 dedicated tabs, Spectrum, Gamut, WRGB and IRC, containing different representations of the measurements.

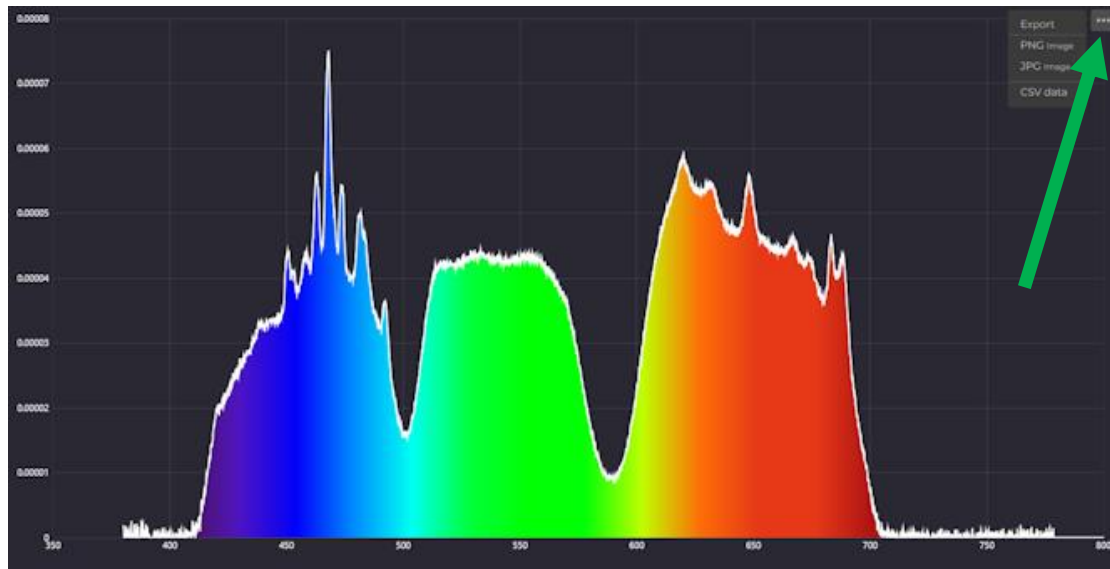
Spectrum Tab

This curve displays the real measured spectrum in the visible range (380 to 780 nm).

Report

To obtain a complete results file in the form of a table of values, for the current measurement or the one selected in the measurement history, use an external device (like a laptop) and a browser to display the interface and simply click on the top right-hand corner:

Export Options include: PNG image, JPG image, and CSV data



Remote connection to the unit

To connect on Spectro both Ethernet or Wi-Fi could be used.

Ethernet

The unit can be connected to the network via Ethernet by plugging a RJ45 cable in the RJ45 Ethernet port.

The Spectro is configured in DHCP mode. It then requires to be placed in a network with a DHCP. A procedure for setting the unit to fixed IP mode can be supplied on demand.

Wi-Fi Hotspot

The Spectro is provided with an on-demand Wi-Fi hotspot to allow access to the unit for wireless device such as Computer, Tablet or Phones. The Spectro does not embed Wi-Fi capabilities on its own, but the feature is offered by using a Wi-Fi dongle provided with the unit.



CAUTION: Please use only the provided and certified Wi-Fi USB dongle.

To enable the Wi-Fi hotspot, connect the Wi-Fi USB dongle to one USB port on the side of the Spectro.



Wi-Fi USB dongle

Few seconds after the connection of the Wi-Fi hotspot is enabled.

When enabled the hotspot is named `<UnitSerial>-Hotspot` (e.g. `qs032n210251-HotSpot`) to be unique for each Spectro. The password for the connection is **oblivion**.

To deactivate the hotspot, unplug the Wi-Fi USB Dongle.

Find IP

Via touch Screen LCD

Click on `Settings > Network`. The IP addresses of the current network interfaces will be listed.

Interface	IP	Gateway	Netmask
eth0	172.18.20.109	172.18.20.255	255.255.255.0

Eth0 is the IP address via ethernet (wired) connection.

Wlan0 is the IP address via wireless network connection

Please see the full manual for full network commands.

Customer Support

HSG provides users with support services for questions or problems related to the use of the equipment:

support@hsg-labs.com

Please access the full User Manual here:

hsg-labs.com

