



## GUIDE

# Spectro

## User Manual



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☒ *Approved*  
☐ *Unapproved*

*Applicable from version 1.0.0 of the software package*

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## Purpose

Describe the software possibilities offered by the new Spectro 3.2 version, with its basic commands.

## General Description

The HSG Spectro is a standalone portable ergonomic spectrometer that combines performance and ease of use.

Originally created for cinema world, (premium screenings, laboratories, post-production, broadcast) the Spectro has a spectral resolution insuring the highest accuracy: a 3 648 pixel array sensor with a resolution of 0.15nm/pixel and a spectral bandwidth (FWHM) of 1 or 2nm.

The laser pointer makes it easy to select and identify the area to be measured.

The web interface makes it extremely ergonomic to control and retrieve measurement results.

The embedded Lithium-ion battery confers to the Spectro a complete stand-alone operation for a use up to 4 hours continuously.

## Manufacturer Details



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

# Specifications

## GENERAL

Luminance Accuracy *	+/- 1%
Repeatability	≤ 1%
Size - Weight	229 x 130 x 103mm - 1,2 kg

## SPECTRO

Colour accuracy *	+/- 0.0015 for CIE 1931 xy
Bandwidth	2nm (1nm with Hi-Res version)
Resolution	0.15nm / pixel
Detector	3 648 pixels
Range	380 - 780nm
Luminance Range	Up to 200k cd/m <sup>2</sup> with the ND filter
Aperture	1.8°
Shutter	Mechanical
A/D Resolution	16 bits
Integration time	1ms - 60s
Linearity	> 99%




*\* For a standard A illuminant from NIST luminance standard*

# Safety, Environmental and Regulatory Information

## Safety Notice

Read and follow this important safety information. Failure to do so, or use of controls, adjustments, procedures, connections, or signal types other than those specified in this documentation, can result in personal injury or death, and damage to the equipment.

## Safety Legend

-  **NOTE:** A NOTE indicates important information that helps to make better usage of the device.
-  **CAUTION:** A CAUTION indicates potential damage to hardware or loss of data if instructions are not followed.
-  **WARNING:** A WARNING indicates a potential for property damage, personal injury, or death.

## Laser Pointer

The HSG device uses a laser pointer to target the zone to be measured. The laser emitting point is indicated by the following stickers on the unit.

As such, all precautions relative to laser device use must be respected.



-  **WARNING:** Do not stare directly at the laser beam and do not point the laser into someone else eyes.

## Laser Specifications:

- Class: Class 3R
- Power: 5mW
- Wavelength: 650nm (red)

## General Safety

 **WARNING:** OBSERVE THE FOLLOWING INSTRUCTIONS TO HELP PREVENT POTENTIAL FOR PROPERTY DAMAGE, PERSONAL INJURY, OR DEATH:

- To move the equipment safely, always carry the device by the handle if present or hold it with both hands.
- The power supply provided with the system may produce high voltages and energy hazards. Opening or removing covers that are marked with the triangle symbol with a lightning bolt may expose you to a risk of electric shock. Components inside these compartments should be serviced only by a trained service technician.
- Use only the provided AC adapter approved for use with this device. Use of another AC adapter may increase the risk of a fire or explosion.
- Do not operate the equipment with any cover(s) removed.
- Do not use damaged equipment, including exposed, frayed, or damaged power cords.
- Do not use the equipment where it can get wet. Protect equipment from liquid intrusion. If the equipment gets wet, turn it off and disconnect power to the equipment and to any attached devices. Contact an experienced electrical technician for further help.
- Do not push any objects into the openings of the equipment. Doing so can cause fire or electric shock.


 **CAUTION:** OBSERVE THE FOLLOWING INSTRUCTIONS TO HELP PREVENT DAMAGE TO HARDWARE OR LOSS OF DATA:


- Do not attempt to service the equipment yourself.
- When disconnecting power supply without battery system: turning off the operating system before unplugging the power supply.
- Operate the equipment only from the type of external power source indicated on the electrical ratings label.
- To avoid possible damage to the system board, wait 30 seconds after turning off the equipment before removing a component from the system board or disconnecting a peripheral device from the equipment.
- Ensure that nothing rests on the equipment's cables.
- Move equipment with care. Avoid sudden stop and uneven surface.
- Keep the unit away from radiators and heat sources.
- Keep the equipment away from extremely hot or cold temperatures to ensure that it is used within the specified operating range.
- Use only approved power cable(s) rated for the equipment. The voltage and current rating of the cable should be greater than the ratings marked on the equipment.
- Observe extension cable and power strip ratings. Ensure that the total ampere rating of all equipment plugged into the extension cable or power strip does not exceed 80 percent of the ampere ratings limit for the extension cable or power strip.


- To help protect the equipment from fluctuations in electrical power, use a surge suppressor, line conditioner, or uninterruptible power supply (UPS).
- Do not spill food or liquids on your equipment.
- Before cleaning the equipment, disconnect it from the electrical outlet. Clean the unit with a soft cloth. Do not use liquids or aerosol cleaners, which may contain flammable substances.
- If the equipment does not operate normally - in particular, if there are any unusual sounds or smells coming from it - unplug it immediately and contact an authorized dealer or service center.
- Use only the 1/4" pitch to hang your equipment.
- Your equipment can be installed right side up or upside down.

## AC Adapter Safety

The Spectro is provided with a 5V 2.88A, 3A or 3.2A AC adapter and a USB-A to USB-C cable that has been designed with the unit. **This adapter and only this adapter must be used to charge and to use the unit.**

 **CAUTION:** The AC adapter may become hot during normal operation of the equipment. Ensure adequate ventilation and use care when handling the adapter during or immediately after operation. Do not cover the AC adapter with papers or other items that will reduce cooling; also, do not use the AC adapter inside a carrying case.

 **WARNING:** If the AC adapter does not operate normally unplug it immediately from the unit and from the main line. Use of another AC adapter may increase the risk of a fire or explosion.

 **NOTE:** A minimum of 7mm length USB-C connector must be used to plug the unit.

## Ergonomic Instructions

Prolonged use of the device, not installed on tripod, can lead to frequent muscle aches and nerve pain if not done correctly unless a few guidelines are followed.

- The wrists should be in a neutral or straight position when holding the unit or the stylus.

 **CAUTION:** Improper or prolonged stylus use may result in injury

- Take breaks. These breaks can be brief and should include stretches for optimal results.
- Rest your eyes by refocusing on distant objects intermittently when working.

 **CAUTION:** Viewing a display or external monitor screen for extended periods of time may result in eye strain.

## Wireless Adapter Safety

Some HSG-Labs products can be provided with an USB WLAN / 802.11ac Wi-Fi adapter. To ensure the safe operation of the device and its users, please read and act in accordance with the following safety instructions.

- The wireless adapter is designed for indoor use only; do not place the wireless adapter outdoors.
- Do not place the wireless adapter in or near hot/humid places, such as a kitchen or bathroom.
- The wireless adapter contains small parts that are a danger to small children under 3 years old. Please keep the wireless adapter out of reach of children.
- Do not place the wireless adapter on paper, cloth, or other flammable materials. The wireless adapter will become hot during use.
- There are no user-serviceable parts inside the wireless adapter. If you experience problems with the wireless adapter, please contact your dealer of purchase and ask for help.
- The wireless adapter is an electrical device and as such, if it becomes wet for any reason, stop using it immediately. Contact an experienced electrical technician for further help.
- The Country Code is set to FRANCE.

## Regulatory Information

HSG-Labs is not responsible for any radio or television interference caused by unauthorized modification of the Wireless WLAN devices, or the substitution or attachment of connecting cables and equipment other than that installed by HSG-Labs. The correction of interference caused by such unauthorized modification, substitution or attachment is the responsibility of the user. HSG-Labs and its authorized resellers or distributors are not liable for any damage or violation of government regulations that may arise from the user failing to comply with these guidelines.

## Disposal and Recycling Information



HSG-Labs recommends that customers dispose of their used equipment in an environmentally sound manner. Potential methods include reuse of parts or whole products and recycling of products, components, and/or materials.



This marking on the product, accessories or literature indicates that the product and its electronic accessories (e.g. charger, USB-cable) should not be disposed of with other household waste. To prevent possible harm to the environment or human health from uncontrolled waste disposal, please separate these items from other types of waste and recycle them responsibly to promote the sustainable reuse of material resources. Business users should

contact their supplier and check the terms and conditions of the purchase contract. This product and its electronic accessories should not be mixed with other commercial wastes for disposal.

*SCIP number:* 280580ba-810c-4d14-8f08-0bb991263611.

*WEEE registration:* please ask your distributor.

## Take-back Solution

The product can be shipped back to HSG-Labs at any time for the correct disposal, ensure that on the packing there is clearly noted “end-of-life disposal”.

## Disposable Packing

Carton/cardboard, including packing material:

Total Weight: **550 g**                      97/129/EC classification: **PAP20**

Plastics included in the box used for packing, wrapping or protection (in grams): Total Weight: **0 g**

Any paper included in the box, including manuals, etc. (in grams):

Total Weight: **550 g**                      97/129/EC classification: **PAP22**

## European Waste Codes (EWC)

To help the correct management of the unit and the accessories we list the EWC Codes for each component. An EWC Code is a six-digit code used to identify waste as listed in the European Waste Catalogue. It is formatted as three pairs of numbers, for example 12 34 56. It identifies and classifies waste into categories according to how these wastes have been produced. It adequately describes the waste being transported, handled, or treated.

Item	EWC Code	Description
Cardboard box	15.01.06	mixed packaging
Suitcase	07.02.13	waste plastic
Bag	15.01.06	mixed packaging
Bag Foam	07.02.13	waste plastic
Manual	20.01.01	paper and cardboard
Neoprene Bag	15.01.06	mixed packaging
AC adapter	16.02.14	discarded equipment
PS Cable	16.02.14	discarded equipment
Magnetic holders	15.01.06	mixed packaging
Touch screen pen	15.01.06	mixed packaging
Spectro	16.02.14	discarded equipment

## Battery

The marking on the battery, manual or packaging indicates that the battery in this product should not be disposed of with other household waste.



Substances in batteries can have a potential negative impact on health and environment and you have a role in recycling waste batteries thus contributing to the protection a, preservation, and improvement of the quality of the environment. You should contact your local authority or retailer for details of the collection and recycling schemes available.

Where marked, the chemical symbols Hg, Cd or Pb indicate that the battery contains mercury, cadmium, or lead above the reference levels in EC Directive 2006/66.

Contact the manufacturer for replacement information.

**⚠ WARNING:** Do not disassemble, break, or puncture the battery or attempt to dispose of it in fire. If you intend to dispose of the product, the waste collection center will apply the appropriate measures for recycling and treatment of the product, including the battery.

The unit contains a Li-ion battery composed by 3 cells of 8.14Wh each for a combined total of 24.42Wh.


## Composition

Chemical Name	Concentration range (%)	CAS Number
Lithium Cobalt Oxide	35-38	12190-79-3
Graphite	20-22	7782-42-5
Copper	9-10	7440-50-8
Aluminum	5-6	7429-90-5
Ethylene carbonate	14-16	96-49-1
Polypropylene	5-6	9003-07-0
Carbonate methyl ethyl	4-5	623-53-0
Phosphate (1-), hexafluoro-lithium	5-6	21324-40-3

**📝 NOTE:** Addition information about the battery can be found at the end of this document.

**⚠ WARNING:** Do not dismantle, open or shred the battery; ingredient contained within, or their ingredients products could be harmful. The battery is not dangerous with normal use.



 **WARNING:** In case of battery fire, toxic fumes, gases, or vapors may evolve on burning. The combustion produces carbon monoxide, carbon dioxide, lithium oxide fumes and so on.

## End-of-Life Disassembly


The disassembly of the unit should be performed by qualified technician only, with the right tools only and under HSG-Labs approval.

Before working on the equipment, make sure the equipment is not damaged or burned. Make sure this operation is done in good condition and in a ventilated area.

- Discharge the battery below 25%. A charged lithium-ion battery can catch fire and/or explode if accidentally punctured.
- Always power off and unplug completely the unit from the AC adapter before working on it.
- Plan the work carefully, try to anticipate potential hazards, and take steps to avoid them. Ensure to work on a hard and stable surface.
- Be careful when disassembling, components are fragile and can be sharp, parts may fall off and injure or cause death.

 **CAUTION:** Disassembly of the unit will void the warranty.

## Unit Servicing

 **WARNING:** Hazardous moving parts. Keep away from the moving fan blades or servo.

- Disconnect the battery and wait 10 minutes before touching the electronic boards.
- To prevent electrostatic discharge (ESD) from damaging the system, be aware of the precautions to consider when setting up the system or handling parts. A discharge of static electricity from a finger or other conductor may damage system boards or other static-sensitive devices.
- Avoid touching pins, leads, or circuitry.
- Always be properly grounded when touching a static-sensitive component or assembly.
- Check the voltage rating before connecting the equipment to an electrical outlet to ensure that the required voltage and frequency match the available power source.

## 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.

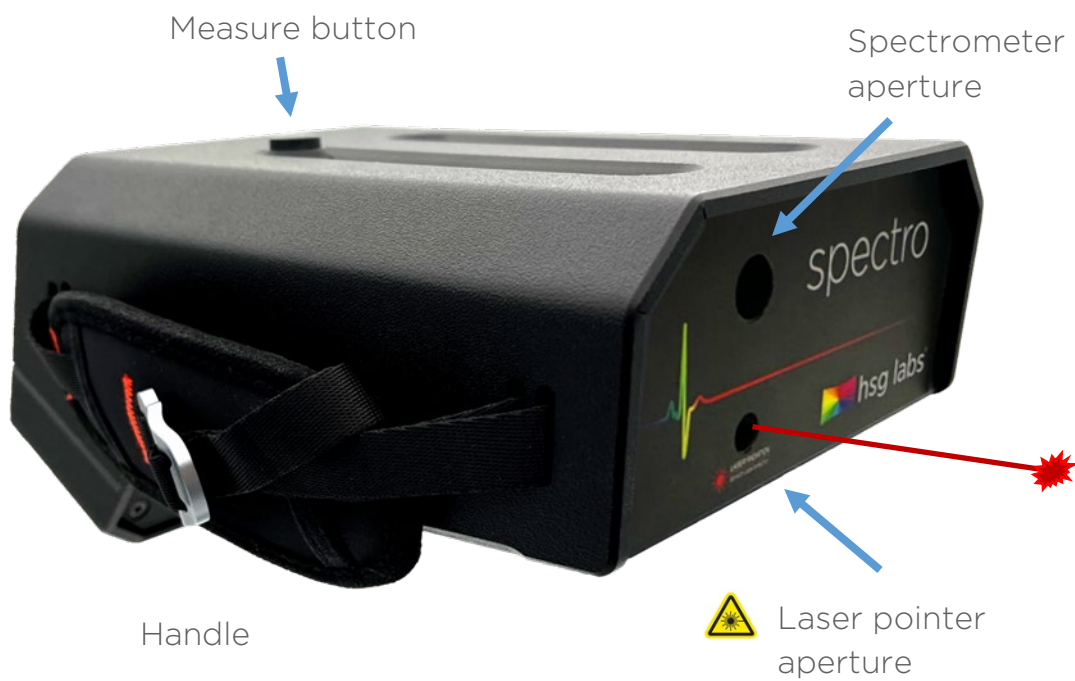
## Package Contents

- *Hard Suitcase*
- *Soft Bag with personalized foam*
- *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*

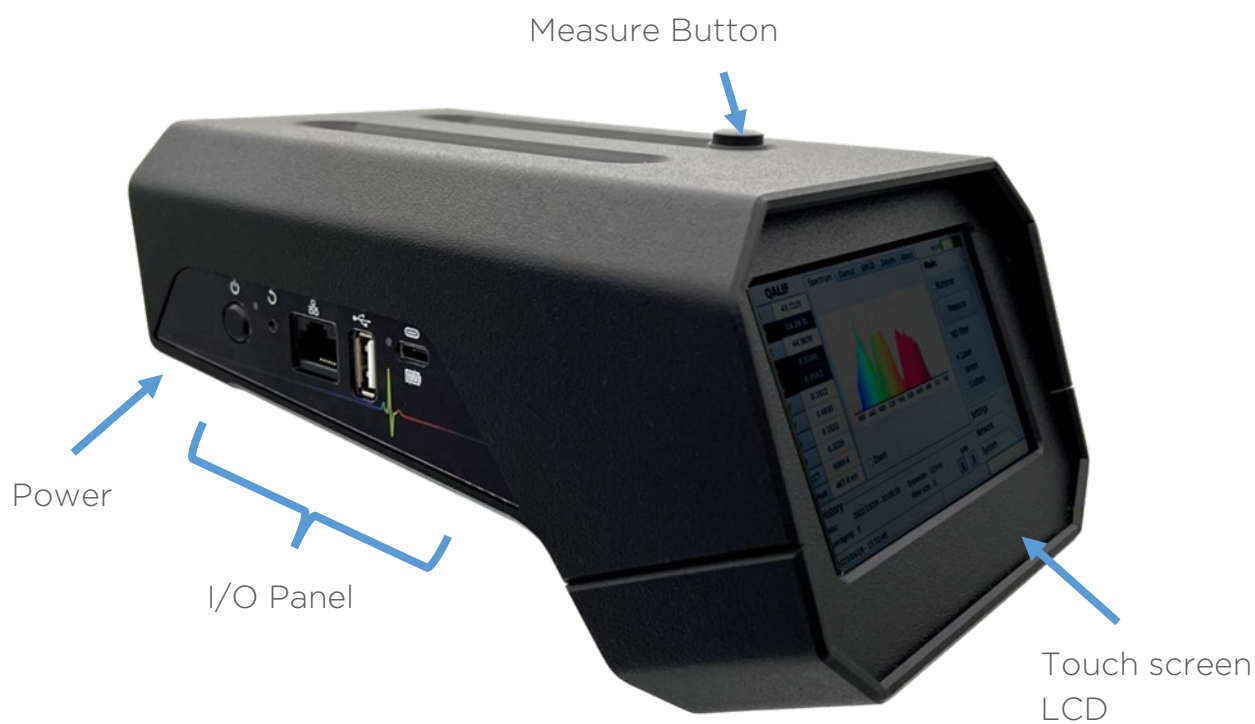


## Unit Photos and Details

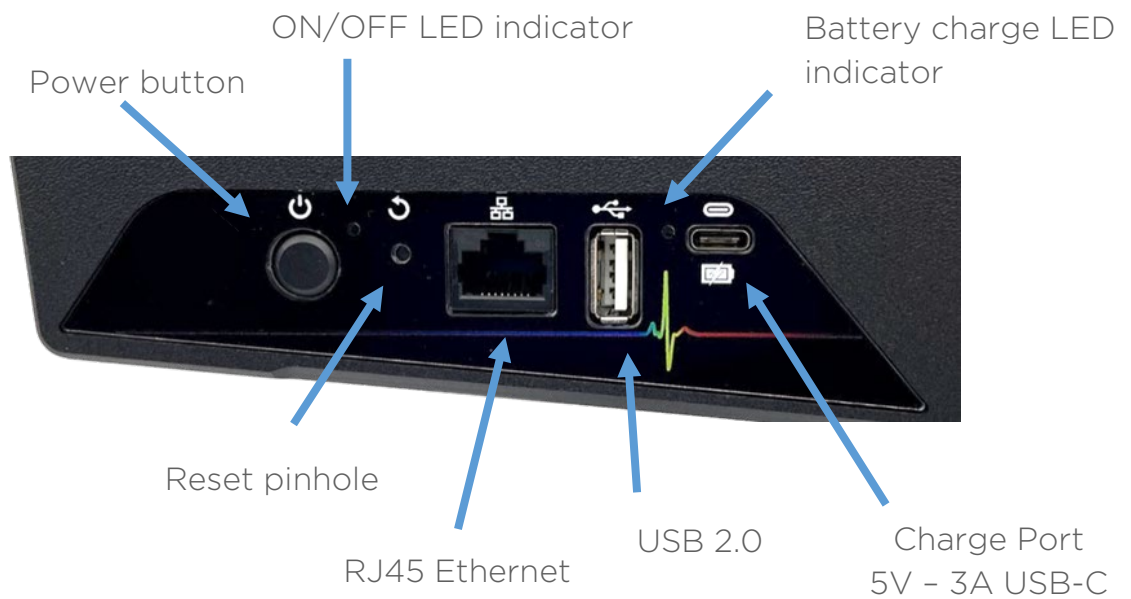
Front view



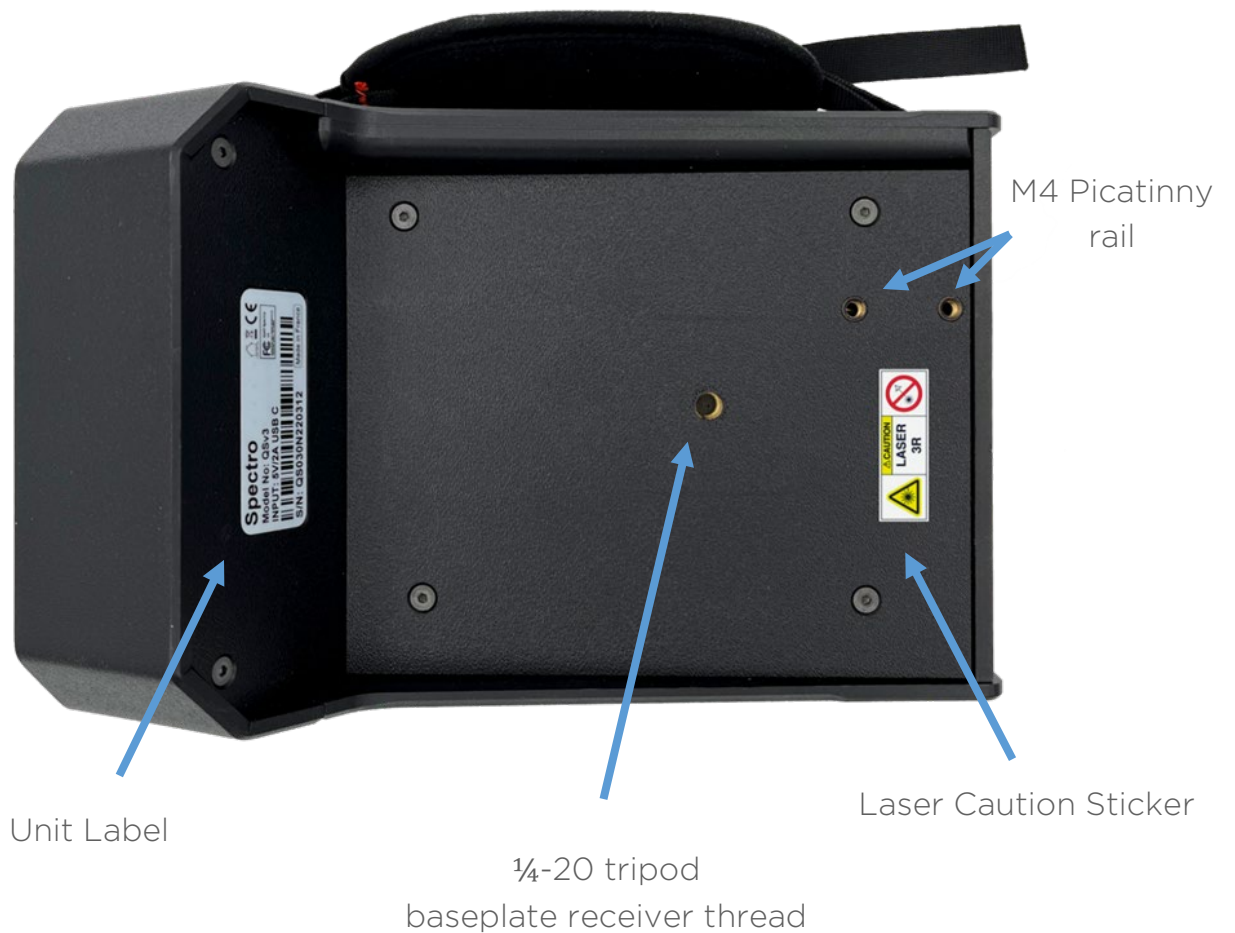
Rear View



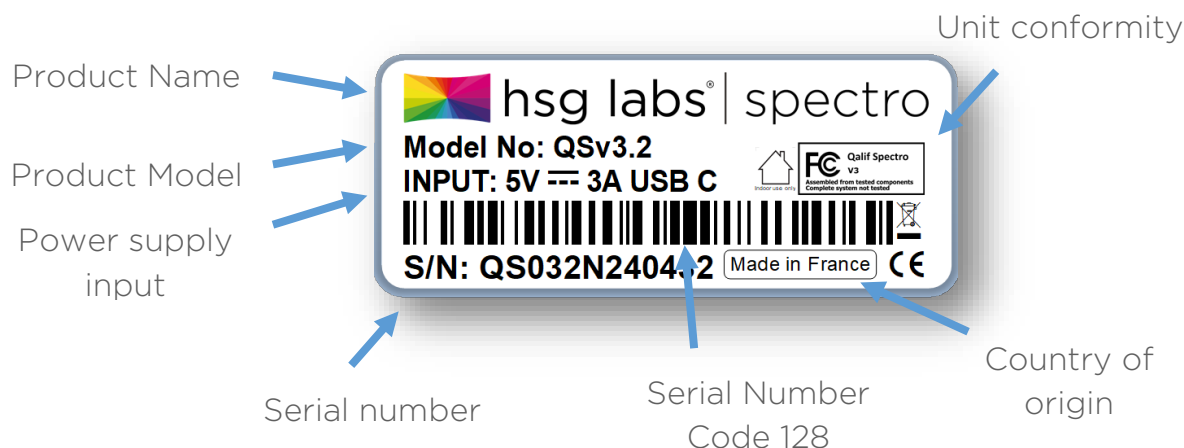
## I/O Panel



## Bottom View



## Product Label



## Detailed Technical 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/m² up to 200 000 cd/m² 0.001 fL up to -58 000 fL
Measuring Values	cd/m² 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 ~2.646 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
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\*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: veeone
sFTP (File Transport Protocol)	User: sysadmin Password: veeone Port: 22
SSH (Secure Shell)	User: sysadmin Password: veeone Port: 22

## Control Interfaces

The unit is based on a stand-alone Linux system with preinstalled software. This allows control of the unit locally from the touch screen LCD or from any system capable of using network access with HTTP, no specific software installation is required. There are several connection options described below.

### Touch Screen LCD


Spectro could be controlled from the built-in capacitive touch screen LCD. The measurement could be quickly taken by pressing the measure button on the top of the unit but for changing settings and browse history data we suggest using the provided screen pen to have a better accuracy on the operations.



## Browser

A standard Browser can be used to connect to the Spectro and access to the main interface using the configured IP address.



 **NOTE:** There are two ways to connect over network with the equipment, one is via Ethernet cable and the other via the local Wi-Fi hotspot using the USB dongle. More details are available in the [APPENDIX](#) section of this document.


 **NOTE:** VNC can still be used as a second remote control option.


## 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 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.

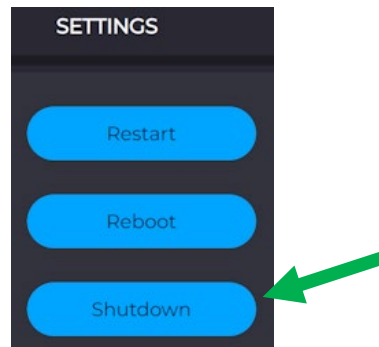
 **CAUTION:** If the unit does not start, it could be due by low battery power, please connect to a power source, wait and test again after 10min.

## Power OFF the unit

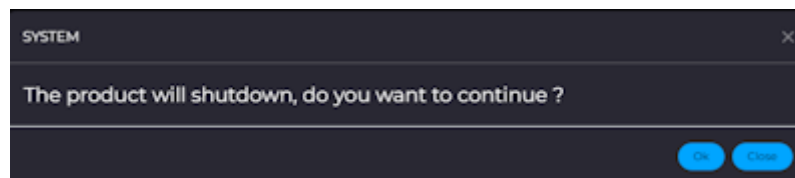
To power OFF the unit, two options are available:



- 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.

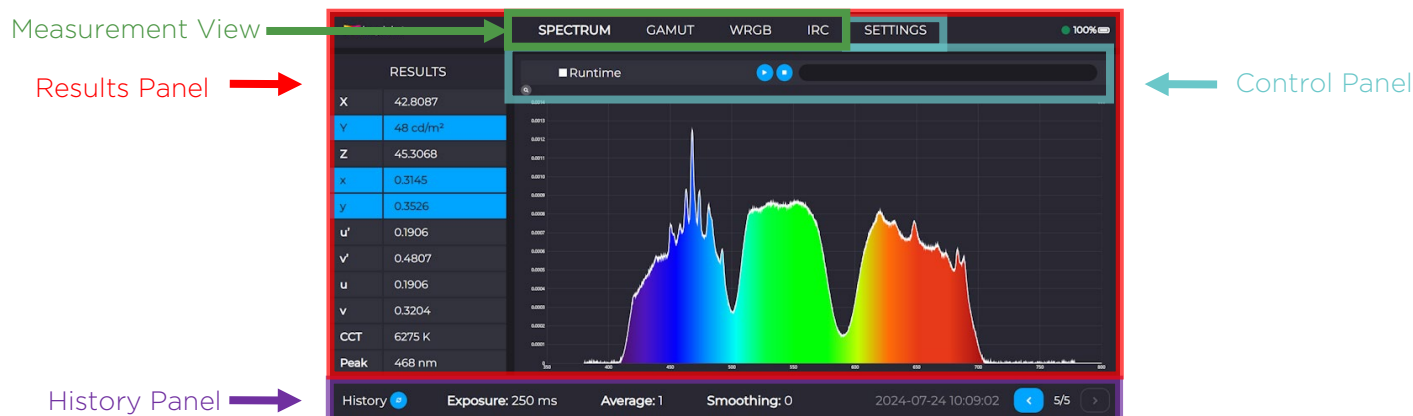
## Reset

In case of problem, or strange 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 below the reset logo: 



# Software Interface



## Results Panel

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

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

## Measurement View Panel

On the top side, there are 4 selectable measurement view tabs: SPECTRUM, GAMUT, WRGB, and IRC.

## History Panel

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

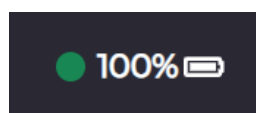
## Control Panel

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

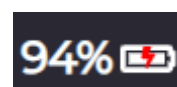
Located on top right the battery info displays the battery state.

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




Once under 20% the unit will still have 45 min battery (depending on battery life).

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



When the battery is fully charged, the bar is full and 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.

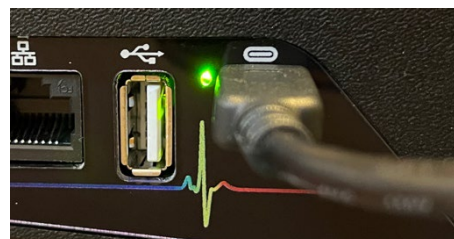
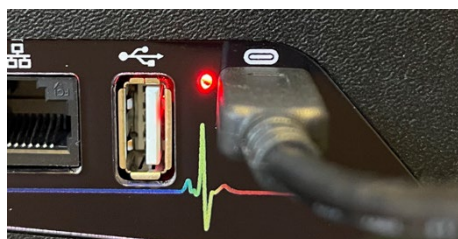
 **NOTE:** Not related to the battery status, the green or red circle flag on the left side indicates if the GUI (client) is connected to the Core (main embedded software). Red could be occurred in case of network connection lost, with remote access.

## 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 maintain the state of this option. 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 px 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  $\text{cd/m}^2$  to fL.

**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 (no turned 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 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 restart 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.

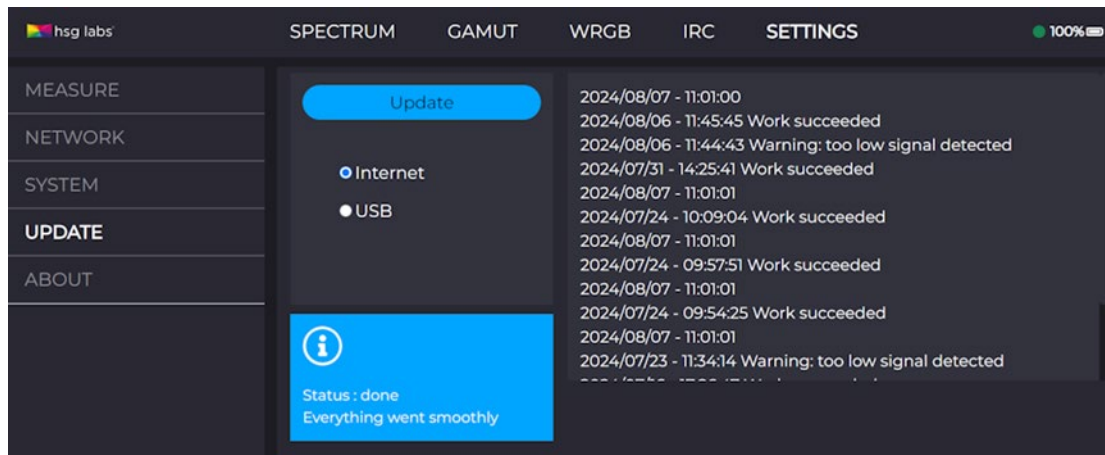
**Date Time** allows change the date and system time. The timezone change permits to use NTP server feature if available (auto setup). The changes need to be confirmed by clicking on Apply button.

**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 available for now. Other options could 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.

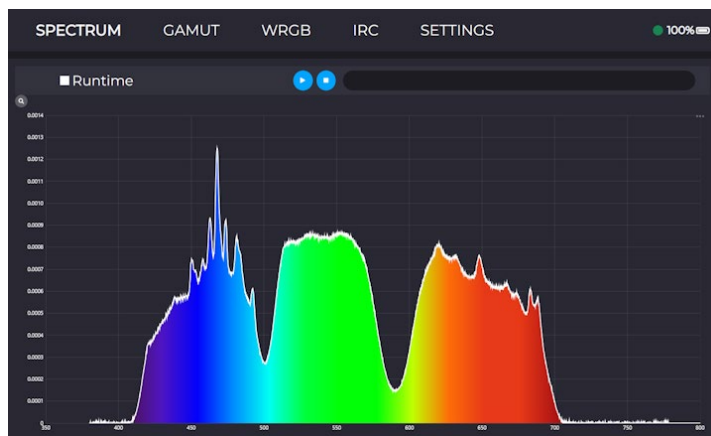
 **NOTE:** The information contained in the About panel must always be provided when contacting the Support team.

## 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).



## Zoom

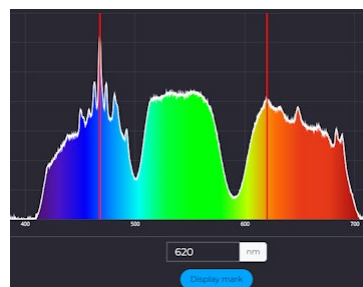
When zoom is activated,  the spectrum will open on a new window and gives access to new controls.



The bars allow to zoom into the spectrum for vertical and horizontal zooming.

A Display mark feature allows to add guide lines to a specified wavelength expressed in nm. Each validation with a value adds a line. Closing the zoom windows will clean the guides.

In each view, the position of the mouse pointer or finger gives the value of the curve.

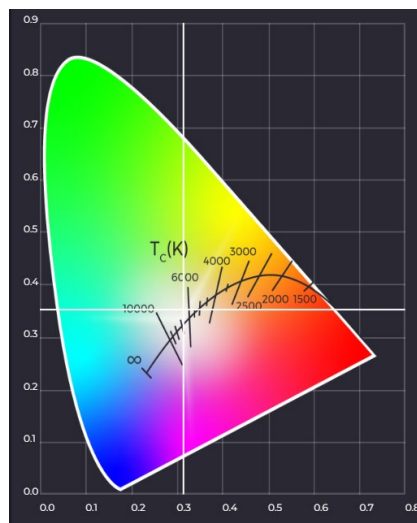


 **NOTE:** The zoom feature is more dedicated to a remote computer usage. It is not easy to process with the Touch Screen.

## Gamut Tab

The Gamut tab shows the visualization of the measure chromacity coordinates on a gamut. It both eases the verification that it really corresponds to what was measured and the perception of the measured color.

If it's a White measurement, a curve also represents the colour temperature of the measured value.



## WRGB Tab

The WRGB tab allows to summarize the last 4 measurement and in the professional projection market it gives the possibility to automatically apply an Offset to the White / Red / Green / Blue measures for special calibration purposes.

Runtime

▶

■





Work succeeded


Auto

No Offset

▼


i

▼	3	▲	47.5489 cd/m <sup>2</sup>		x = 0.3144	y = 0.3530
▼	6	▲	9.9458 cd/m <sup>2</sup>		x = 0.6805	y = 0.3174
▼	1	▲	57.0165 cd/m <sup>2</sup>		x = 0.2901	y = 0.6706
▼	2	▲	5.8173 cd/m <sup>2</sup>		x = 0.1496	y = 0.0654

 **CAUTION:** When enabled, the offset calculates and shows in this tab different values from the ones that are measured and should be used only by professional technicians that have complete consciousness of what they are doing.




## Automatic mode

With this selected mode , the 4 last measurements are sorted in the tab with the older measurement on top and the last one on the bottom of the list.

- First line: last measure -3
- Second line: last measure -2
- Third line: last measure -1
- Fourth line: last measure

When a new measure is taken the lines will shift up and the last value will be displayed in the bottom line.

## Manual mode

Disabling the Auto mode  allows the manual reorganization of the measure using the up and down buttons. When remotely connected, the number of the measure can also be entered.


Another way is to use the navigation buttons of the History and click on a color square to automatically apply this measure id to this line.

Each color square displays the similar color information relative to the selected measure to help the choice and the verification.

When the Auto mode is enabled, a click on a color square will deactivate it.

## Offset

In some cases, is necessary to apply an offset to the result of the measure. The ability to configure and apply an automatic offset calculation decrease the probability of human errors. The offset can be selected with both Auto mode enabled and disabled.

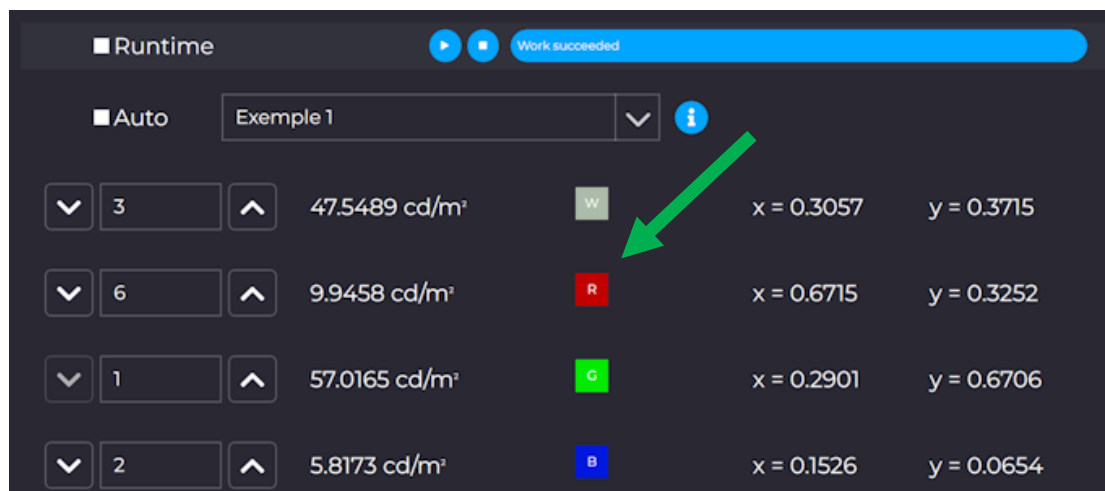
 **NOTE:** In the professional projection sector along with the usage of different light sources (Xenon Lamps, RB Laser, RGB Laser, High-pressure mercury Lamps, LED, ...) and technologies (3 Chip DLP's, Single DLP Chip, LCD, ...) sometimes is required to shift the measured value so that once the projector is configured with those values different target color are displayed. The key reason to perform those shifted calibrations is to reduce the different white point perception between the different technologies.

With a selected offset, values are automatically displayed, only in this tab, with the calculated offset for each color. For this reason, it's mandatory to respect the WRGB order:

- First line: White
- Second line: Red
- Third line: Green
- Fourth line: Blue



When the offset is enabled WRGB letters will appear in the interface to help the user to verify that the color has been taken in the right order (White, Red, Green, and Blue)



The info button open a popup window containing the details of the offset values and the calculated results. When remotely connected to the unit, those values can be easily selected and copied.

**CAUTION:** The WRGB color positions should be respected for the correct offset calculation.

## Configuration

Multiple custom offsets can be configured on the Database according to the user need. The unit is provided with a default Example.

The ability of users to configure the Database will be available in a future version. Contact [info@hsg-labs.com](mailto:info@hsg-labs.com) to add Offsets now.

### Example

W (x, y)	;	-0.0087	;	+0.0185
R (x, y)	;	-0.0090	;	+0.0078
G (x, y)	;	0	;	0
B (x, y)	;	+0.0030	;	0

The values in **Blue** are the value that are customizable.

The Name (Example) configured in the file content will appears in Info.

## Use case

A non-exhaustive list of use case for the offset:

- Trick the Digital Projector color calibration to have the same white point color perception with different technologies (Xenon, Laser, ...)

- Compensate for UV Filter aging or misalignment of a primary color and always apply the same compensation at every calibration.
- For Festival, Premieres, Post-Production, Home Cinema or other places where there is a need to obtain a different look but always with the same offset from the measured values.

## CRI Tab (Colour Rendering Index)



The CRI is a measurement of how natural colours render under an artificial white light source when compared with sunlight. The index is measured from 0-100, with a perfect 100 indicating that colours of objects under the light source appear the same as they would under natural sunlight.



**NOTE:** The CRI is only available if the measured color is a WHITE, with all other colors inside. If not, the CRI values are not provided and the display is empty.

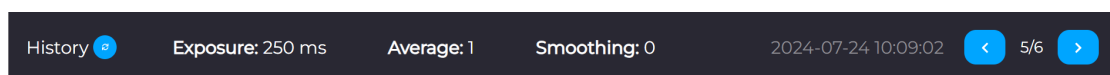
## Details popup

On the Results Panel, a click on RESULTS displays a popup to give information about all the data computed from the measure calibrated spectrum. Apart from the Peak value, the data are all based on CIE standards.

DETAILS					
XYZ		xy		uv	
x	21.3215	x	0.6805	u	0.4996
y	9.9458 cd/m <sup>2</sup>	y	0.3174	v	0.3496
z	0.0644			u'	0.4996
				v'	0.5244
Correlated color temperature		Max value		Main color	
T	3902 °K	$\lambda_{max}$	620 nm	$\lambda_d$	615 nm

## History Panel

The History Panel allow to browse the measures history by pressing on the navigation buttons.



It also displays relevant measure information's: **Exposure**, **Averaging**, **Smoothing**, **Date and Time** of the measurement.

The History mechanism is automatic and there is no need to explicitly press a save button. All measures taken in **One-shot** mode are then saved in the history for future retrieval. No measurements taken in **Continuous** mode are saved to the Spectro memory or recorded.

 **NOTE:** More details about **One-shot** and **Continuous** measurements could be found in [Take a Measure](#) section of this document.

## Status Panel

The Status Panel indicates what operation the Spectro is performing and its actual progression. This gives information about the waiting time before the operation terminates and is particularly useful when requesting a measure with a high integration-time.


## Take a Measure


Take a measure with the Spectro is simple and it is almost the same as taking a picture with a two-steps photo camera button.

Correct measure procedure:

- **Press** (and keep pressed) the measure button.
  - The laser pointer will turn on.
- **Target** or verify the measuring target using the laser pointer.
- **Release** the measure button:
  - The laser pointer will turn off.
  - The measure will be taken.

For a detailed list of actions and calculations that the Spectro does during a measure please refer to the [APPENDIX](#) section.


 **NOTE:** The Spectro have two measure buttons, a physical button on the top of the unit and a software button. Both buttons behave the same, but the software button can be used to start a measure remotely via remote access.

 **WARNING:** When the measure button is pressed the laser pointer will turn on, particular attention should be used when the measure is started remotely.

 **Continuous** The Spectro have two main measurement modes: **One-shot** and **Continuous**.

## One-shot Measure

**One-shot** mode is when only one measure is taken when the measure action is requested. At the end of the measure the Spectro returns to an idle state.


 **NOTE:** When the integration-time is in auto-adjust if the target to measure is too dark or too bright, the measure will not be taken, and an


error message will be displayed indicating the details of the problem and the possible solution.


## Continuous Measure

In **Continuous** mode, when the measure action is requested, the Spectro will continuously take measures and the interface will be regularly updated with new data from the continuous acquisition. In this mode, no measure is registered in the history. **Continuous** acquisition is stopped either by pressing the measure button or by changing the acquisition mode back to one-shot.

Low light and saturation are checked only during the first measurement. Afterward, no control is performed to avoid stopping the continuous acquisition.

 **CAUTION:** No control is performed during the continuous acquisition and the measure results can be biased and as much as the measure conditions varies over time. **The Continuous mode cannot be started if ND filter mode is not OFF.**

 **NOTE:** When a very low integration-time is used, not all the measures are displayed to prevent interface overwhelming and lagging. The interface cannot be refreshed at a rate of one measure per millisecond, which is the minimum integration-time applicable.

 **NOTE:** This mode can be used to verify that the laser is still aligned with the spectrometer. During the continuous measurement the laser can be activated in the settings, and if the targeted luminance is not too high, the laser ray peak will be visible @650nm.

## Neutral Filter

The Spectro is provided with an internal calibrated Neutral Density Filter (ND Filter) that can be used to decrease the light that will goes to the spectrometer that permit to reach very high Luminance values and/or increase the measurement time.

- **Auto:** according to the exposure time, the ND filter is automatically engaged or not if necessary (depends on frequency and number of iterations)
- **ON:** filter still in place
- **OFF:** no filter (default)

 **NOTE:** When the ND Filter is enabled, the Spectro changes the optical path mechanically and the software uses the ND Filter specific radiometric calibration.

### Use case

Non exhaustive list of possible usage of the ND Filter:

- Hight Luminance light source to measure that saturate the spectrometer,

- Unstable light that needs a longer integration time to have stable result,
- Home Cinema Projectors that use a 1 Chip and a color wheel that need an increased integration time due to the hi-speed of the Spectro,
- Some non-cinema Phosphor projectors.

## Measure parameters

In the following table are listed the configurable parameters that affect the result of the measure and that could be setup on the Spectro. For a detailed description on those parameters refer to the [Control Panel > Settings](#) section of this document.

Parameter	Possible values
Averaging parameter or Nb pass (avg)	[1 to 100] pass
Exposure	[1 to 999] ms, s or Auto Adjust
Filtering	[0 to 100] (e.g., 0 is 0.15nm resolution, 16 is 5nm resolution)

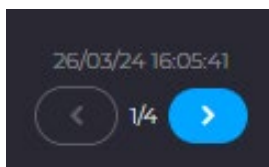
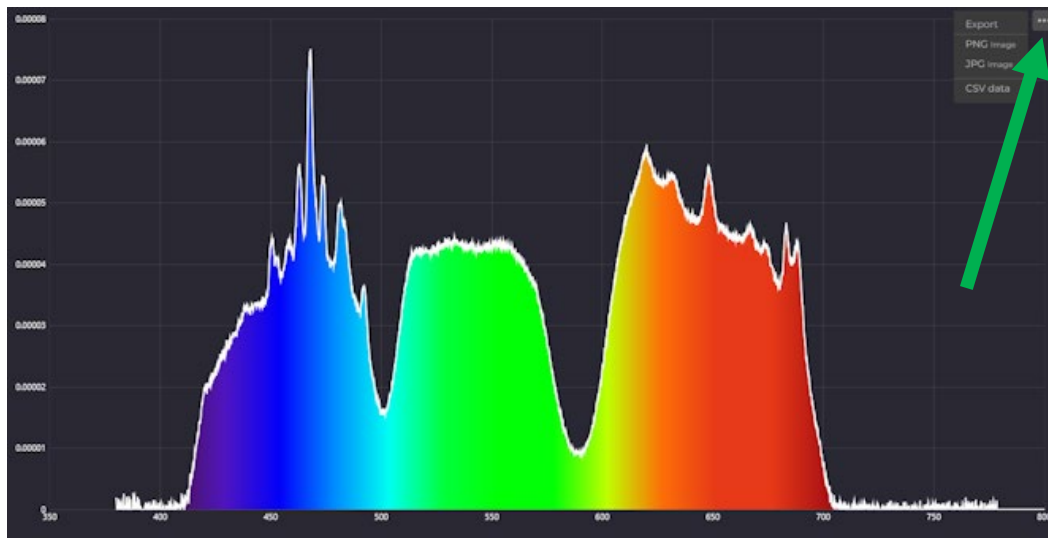
## Cancel a Measure

A running measure can always be cancelled but measure aborting is not instantaneous and is depending on the integration time of the current measure.

 **NOTE:** The maximum aborting time is defined by the maximum integration time available on the Spectro that is set to 60s.

## 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:



Use the selection buttons at bottom right to return to a past measurement. The measurement can be viewed or carried forward as if it were the current measurement.

A file containing all the values and the complete spectrum curve will be automatically downloaded to your local download directory.

File format: CSV

Separator: « , »

Sequence:

- Row 1: Date “ ” hour
- Row 2: Product serial
- Row 3: Package version
- Row 5 to 11: Measure settings
- Row 14:  $X$ ,  $Y$ ,  $Z$ ,  $x$ ,  $y$ ,  $u$ ,  $v$ ,  $u'$ ,  $v'$ ,  $cct$  & Peak values
- From the row 17 to 3664nd: spectrum values (and chained with carriage return for each couple)

Another option is **PNG** or **JPEG** image to obtain a spectrum snapshot.

 **NOTE:** All reports are automatically recorded inside the unit and accessible on `/opt/qalif/user/reports`.

## Customer Support

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

[support@hsg-labs.com](mailto:support@hsg-labs.com)

## APPENDIX

### Connect 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 **o b l i v i o n**.

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.

hsg labs SPECTRUM GAMUT WRGB IRC SETTINGS 100%				
MEASURE				
NETWORK	Interface	IP	Gateway	Netmask
	eth0	172.18.20.109	172.18.20.255	255.255.255.0
SYSTEM				
UPDATE				
ABOUT				


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

Wlan0 is the IP address via wireless network connection

 **NOTE:** When nothing is connected to the Spectro, no Ethernet cable or USB Wifi dongle, the Network tab is empty.

## Via USB

Plugging an FAT formatted USB memory stick into the USB 2.0 port of the unit will launch a procedure that will create a file (**ifconfig.txt**) that contains the IP configuration for all the devices.

 **NOTE:** Please be sure that the Ethernet cable is connected before this operation.

Ifconfig.txt	
eth0	Link encap:Ethernet HWaddr 00:1e:06:12:1e:31 inet addr:192.168.1.97 Bcast:192.168.1.255 Mask:255.255.255.0 inet6 addr: fe80::21e:6ff:fe12:1e31/64 Scope:Link inet6 addr: fd38:ca53:7c92:490e:21e:6ff:fe12:1e31/64 Scope:Global UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1 RX packets:1027 errors:0 dropped:0 overruns:0 frame:0 TX packets:915 errors:0 dropped:0 overruns:0 carrier:0 collisions:0 txqueuelen:1000 RX bytes:150579 (150.5 KB) TX bytes:226931 (226.9 KB) Interrupt:40
lo	Link encap:Local Loopback inet addr:127.0.0.1 Mask:255.0.0.0 inet6 addr: ::1/128 Scope:Host UP LOOPBACK RUNNING MTU:65536 Metric:1 RX packets:30 errors:0 dropped:0 overruns:0 frame:0 TX packets:30 errors:0 dropped:0 overruns:0 carrier:0

```
collisions:0 txqueuelen:0
RX bytes:2028 (2.0 KB) TX bytes:2028 (2.0 KB)
```

## Reset the Battery Calibration

Every battery is calibrated in HSG facility. If the battery needs a new calibration (requested by the Support team), please follow the reset procedure:

1. Fully charge the battery with the unit turned on.
2. Unplug the power adapter from the Spectro and wait the complete discharge.



**NOTE:** While discharging, the unit **MUST NOT** be switched OFF.

3. Once discharged the Spectro can be plugged to the power to charge the Spectro again.

## Measurement Process Detailed

When a measure is requested, the Spectro software sequentially goes through the following steps.

### Exposure Auto-Adjust

To auto-adjust the integration-time the Spectro opens the shutter and takes a series of measures at different integration-time. The integration-time selected is the one that gives the best signal to noise ratio and avoids saturation and non-linearity of too strong signals.

The retained integration-time is used both for the Dark measure and for the measure itself to have a consistent dark correction.



**NOTE:** The auto-adjust step is performed only when the auto-adjust mode is enabled in [Settings > Measure > Exposure](#). Otherwise, the step is skipped, and the measure process uses the manually set integration-time.

### Measure

The measure step is the effective measure taken while the Spectro has the mechanical shutter open. Depending on Average number Spectro will take N measures and then calculates the average. Once performed, the dark measure is subtracted from that calculated result giving the sensor noise free signal. On this signal the unit will apply his own calibration curve to adjust the spectrum removing biases and drifts. The resulting signal then tightly corresponds to true target spectrum.

### Dark Measure

The Dark measure is a measure performed with the Spectro mechanical shutter closed. It allows measuring the sensor noise, the dark noise, i.e. what it sees when there is no signal. This dark measure will be subtracted from the effective measure as it is noise and not an effective signal.

### Filtering

If filtering is enabled, with a custom filter or with a registered filter, the signal is then filtered to smooth the spectrum.

## Result Panel Refresh

After the filtering the interface of the unit will be updated with the new result information. History will also be updated, and new measurements result file created in case of one-shot measurement.

## Measurement Result

### Spectrum

The primary result obtained from a measure is the spectrum. It represents the irradiance of the target for each wavelength in the visible domain. Apart from “purifying” the signal, the spectrum does not result from any processing. It represents the core result before any deeper analysis.

The spectrum corresponds to the spectrometer feature of the Spectro.

### XYZ Tristimulus and Derived Values

XYZ and its derivatives correspond to the colorimeter feature of the Spectro. All the computations provide information about the color of the target.

XYZ and its derivatives refer to the CIE Standard. There are various versions of the standard, ratified or not. All the computation performed in the Spectro are based on the CIE Standard referred as CIE 1931 2°, i.e. the XYZ curves established in 1931 with 2° viewing angle from the observer.

The XYZ Tristimulus results from the integration of the spectrum over the XYZ curves.

- X is the red stimulus.
- Y is the green stimulus.
- Z is the blue stimulus.

The XYZ Tristimulus is not of really use on its own apart from the Y stimulus which corresponds to the target luminance.

From the XYZ Tristimulus is computed the (x,y) pair, which is the chromacity coordinates.

The main information for color analysis is obtained using: the Yxy data, the luminance and the chromacity coordinates.

From these data, other values are computed:

- uv coordinates
- u'v' coordinates
- Dominant/Complementary/Achromatic color

The wavelength corresponding to the spectrum maximum is also provided.

## Remote update section

To be able to update the Spectro via Internet, the firewall should be configured with the following rule.

**ALLOW**: TCP port 443 OUT



**NOTE:** This rule will not affect the site security as Spectro does not need any open incoming connections.

## USB Memory Stick

The Spectro offers convenient features when an USB Drive is plugged-in. The copy feature is automatically launched when the USB drive is plugged in.

### Copy

When the USB drive is plugged in, the system automatically detects it and launches the Copy feature.

Copied files:

- *ifconfig.txt*
- *ipaddr.txt*
- *macaddr.txt*
- *all Logs available*
- *all Reports available*



**NOTE:** The process could take up to 5 minutes depending on the amount of history and log to copy.



**CAUTION:** Do not unplug the USB drive during the copy process, as this will cause a corruption with the data on the USB Drive.

## Reset

In case of booting or freeze problem, the pinhole reset button located in the I/O panel should be pressed.



This action cuts off the power, after pressing the pinhole reset button, the power button should be pressed to turn on the unit.

## CE Compliance



January 01, 2024

### CE COMPLIANCE NOTICE for SPECTRO

Version 3.0 and higher

Marking by the symbol  indicates compliance of the device to the EMC (Electromagnetic Compatibility) directive and to the Low Voltage directive of the European Community. Such marking is indicative that this device meets or exceeds the following technical standard:

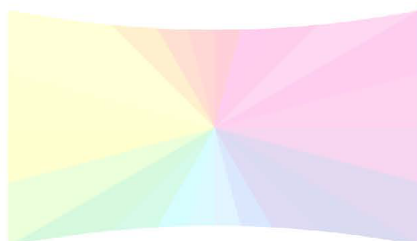
- *EN 55022 "Limits and Methods of Measurement of Radio Interface Characteristics of Information Technology Equipment."*
- *EN 62368-1 "Audio/video, information and communication technology equipment - Part 1: Safety requirements."*

A "Declaration of Conformity" in accordance with the above standard and our CB certification **FR3-000261** has been made.

Listed below are the Part numbers covered by this compliance notice:

Part #'s:     **SPECTRO**

**HSG LABS**  
**Impasse des Bruyères**  
**06370 Mouans-Sartoux**  
**SIREN 948058813**  
**TVA FR69948058813**



**HSG Labs**  
151 voie H Impasse des Bruyères  
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+33 (0) 769 540 926  
*SIREN 948058813*  
*VAT FR69948058813*

## RoHS Compliance



January 01, 2024

### Letter of Compliance RoHS for SPECTRO

Version 3.0 and higher

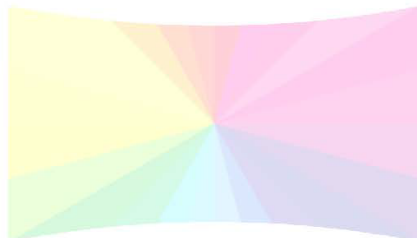
This letter is to confirm compliance with Directive 2002/95/EC and the amendment (EU) 2015/863 in addition to RoHS 2011/65/EU of the European Council on the Restriction of Hazardous Substances in electrical and electronic equipment.

We hereby certify that the materials found in this component meet the acceptable levels as stated by the RoHS directive confirming compliance.

Listed below are the Part numbers covered by this compliance notice:

Part #'s: SPECTRO

**HSG LABS**  
**Impasse des Bruyères**  
**06370 Mouans-Sartoux**  
**SIREN 948058813**  
**TVA FR69948058813**



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VAT FR69948058813

## Laser Pointer Accession Number (FDA 0820048-029)

This message is to acknowledge receipt of your **Product Report**, which was filed pursuant to the regulations for the administration and enforcement of the Radiation Control for Health and Safety Act of 1968 (Title 21, Code of Federal Regulations, Subchapter J) as they pertain to the submission information description below. If your submission is a report, it has been filed according to reporting requirements in Title 21, Code of Federal Regulations (CFR), Part 1002. Your submission has been assigned an informal subject title below after "Purpose:". Your submission has been assigned an **ACCESSION NUMBER** which can be used by you and FDA to identify your submission.

### WARNING:

THE ACCESSION NUMBER ASSIGNED TO YOUR SUBMISSION DOES NOT IMPLY, CONVEY OR CONSTITUTE FDA APPROVAL OF ANY REPORT, APPLICATION FOR VARIANCE OR EXEMPTION, NOTIFICATION, OR ANY OTHER SUBMISSION OR ITS CONTENTS. THE ACCESSION NUMBER IS ONLY AN ACKNOWLEDGMENT THAT FDA HAS RECEIVED YOUR SUBMISSION. IT MAY BE REVOKED BY FDA. ITS DISCLOSURE IS YOUR RESPONSIBILITY. IT IDENTIFIES YOUR SUBMISSION FOR PRODUCTS OR PRODUCT FAMILIES IDENTIFIED IN THIS MESSAGE.

Be advised that failure to comply with FDA regulations may result in notification of affected persons and corrective actions at no cost to the purchaser, pursuant to 21 CFR Part 1003 -- Discovery of Defect or Failure to Comply and 21 CFR Part 1004 -- Repurchase, Repairs, or Replacement of Electronic Products.

### ----- DOCUMENT RECEIVED, FILED, & ACKNOWLEDGED -----

This automated notification from the CeSub Submission Process contains general information about the aforementioned submission:

Accession Number: **0820048-029**

Date Loaded: **10/21/2013**

Document Date: **10/7/2013**

Establishment Name: **QUARTON INC.**

Purpose: **This submission is a(n) Product Report supplement. These Surveying, Leveling, Alignment Laser Products include designated VLM-650-01 LPA.**

Submitter: **Gordon Lien**

Email: [gordon\\_lien@mail.quarton.com.tw](mailto:gordon_lien@mail.quarton.com.tw)

Reporting Official: **Gordon Lien**

Email: [gordon\\_lien@mail.quarton.com.tw](mailto:gordon_lien@mail.quarton.com.tw)

Please note that your firm is required to submit an Annual Report to CDRH every year by September 1.

If you meet all other applicable FDA requirements, you may market the product(s) reported. Please be aware that additional electronic product radiation control or medical device regulations may apply to your product, such as:

21 CFR 1002.11, requiring report supplements under certain circumstances following the same reporting forms as used for product reports on your products

21 CFR 1002.13, requiring annual reports to be submitted each year by September 1 using the appropriate reporting form for annual reports




21 CFR 1010 - 1050, requiring certification to FDA radiation safety performance standards

21 CFR 807, requiring manufacturer registration and device listing, and

21 CFR 807, 812 and 814, requiring medical device clearance or approval



## CB Certification

		Ref. Certif. No. FR3-000261
<b>IEC SYSTEM FOR MUTUAL RECOGNITION OF TEST CERTIFICATES FOR ELECTRICAL EQUIPMENT (IECEE) CB SCHEME</b>		
<b>CB TEST CERTIFICATE</b>		
Product	Spectrocolorimeter	
Name and address of the applicant	HSG LABS 151 voie H, Impasse des bruyères Mouans-Sartoux, 06370 France	
Name and address of the manufacturer	HSG LABS 151 voie H, Impasse des bruyères Mouans-Sartoux, 06370 France	
Name and address of the factory	HSG LABS 151 voie H, Impasse des bruyères Mouans-Sartoux, 06370 France <input type="checkbox"/> Additional information on page 2	
Ratings and principal characteristics <small>Note: When more than one factory, please report on page 2</small>	Power supply : 100-240V, 50/60Hz, 0.3A v3.2 : 5VDC, 2A	
Trademark / Brand (if any)	HSG LABS	
Customer's Testing Facility (CTF) Stage used		
Model / Type Ref.	Spectro v3.2	
Additional information (if necessary may also be reported on page 2)	<input type="checkbox"/> Additional information on page 2	
A sample of the product was tested and found to be in conformity with	IEC 61010-1:2010/AMD1:2016 National differences: EU Group Differences, AT, BE, BG, CA, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MT, NL, NO, PL, PT, RO, SE, SI, SK, US	
As shown in the Test Report Ref. No. which forms part of this Certificate	1E41388-02	
This CB Test Certificate is issued by the National Certification Body		
APAVE Certification Immeuble Canopy , 6 rue du General Audran COURBEVOIE, 92400 France		
		
Date: 2025-04-15	Signature: Xavier Schmitt	

page 1 of 1



# LoA, Battery MSDS Report and ID and Classification report for Air Transport



January 01, 2024

Letter of Authority of the SPECTRO lithium-ion battery for air transport

Version 3.0 and higher

This letter is to confirm that common lithium batteries in the SPECTRO device are contained in equipment (UN3481).

MSDS of the initial battery before integration is attached with this letter.

Coordinates in case of problem:

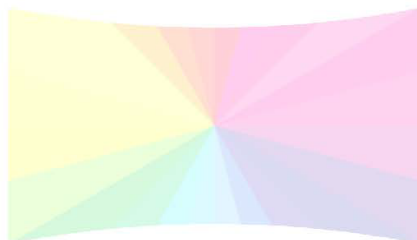
+33 (0)7 69 54 09 26

shipping@hsg-labs.com

Listed below are the Part numbers covered by this compliance notice:

Part #'s: SPECTRO

HSG LABS  
Impasse des Bruyères  
06370 Mouans-Sartoux  
SIREN 948058813  
TVA FR69948058813



HSG Labs  
151 voie H Impasse des Bruyères  
06370 Mouans-Sartoux - FRANCE  
+33 (0) 769 540 926  
SIREN 948058813  
VAT FR69948058813

## MSDS Report

<b>Prepared For :</b> 申请商:	SHENZHEN PKCELL BATTERY CO., LTD. 深圳市比苛电池有限公司 2nd Floor, 4th Building, Meitai Technology Park, No.1231, Guanguang Road, Osmanthus Community, Guanlan Town, Longhua New Area, Shenzhen 深圳市龙华新区观澜街道桂花社区观光路 1231 号美泰科技园 肆号厂房贰楼
<b>Product Name:</b> 产品名称:	Li-ion Battery 锂离子电池
<b>Model 型号:</b>	ICR18650 6600mAh 3.7V
<b>Nominal Voltage:</b> 标称电压	3.7V
<b>Typical Capacity:</b> 典型容量:	6600mAh, 24.42Wh
<b>Weight 重量:</b>	139.0g
<b>Dimension 尺寸:</b>	69.0mm X 55.5mm X 19.0mm (L×W×T)
<b>Prepared By :</b> 编制单位:	Shenzhen NCT Testing Technology Co., Ltd. 深圳诺测检测技术有限公司 1 / F, No. B Building, Mianshang Younger Pioneer Park, Han gcheng Road, Gushu Xixiang Street, Baoan District, Shenzhen, Guangdong, China 中国广东省深圳市宝安区西乡街道固戍航城大道绵商青年创业 园 B 栋第 1 层
<b>Report No.</b> 报告编号:	NCT20047404XM1-1

Written by 编写: Kathy NongApproved by 批准: Holy WangInspected by 审核: Holy WangDate 日期: 2021.01.02



中国认可  
检验  
INSPECTION  
CNAS IB0078

危险物品  
DANGEROUS GOODS

## 航空运输条件鉴别报告书

### Identification and Classification Report for Air Transport of Goods

年度有效  
年12月31日

此报告本年度有效  
有效期至2021年12月31日

报告编号: PEKGZ202012144354GX960001

Issued No.:

签发日期:

2021.01.01

Issued Date:

委托单位: 深圳市比苛电池有限公司

Applicant: SHENZHEN PKCELL BATTERY CO., LTD.

物品名称: 锂离子电池 ICR18650 6600mAh 3.7V 24.42Wh

Name of Goods: Li-ion Battery ICR18650 6600mAh 3.7V 24.42Wh

北京迪捷姆空运技术开发有限公司

Beijing DGM Air Transport Technology Development Co., Ltd.

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## 报告书使用约定 Terms of the Using of the Report

1. 本公司依据本年度国际航协《危险品规则》以及委托人（托运人或其代理人）提供的物品及其运输信息，确定货物的航空运输条件并出具此报告书。  
The report is issued by DGM China according to IATA *Dangerous Goods Regulations* published in the current year and the information of the goods and the information of its shipping provided by the applicant (shipper or his agent).
2. 依据鉴别的需要，本公司要求委托人提供真实、完整的货物样品及资料。  
According to the demand of identification and classification, DGM China requires the applicant to provide true and exact sample and data of the cargo.
3. 委托人保证申报的物品和/或提供的样品与交运的货物是同一种物质。  
The applicant guarantees that the declared goods and/or the sample who provides should be identical with the contents of cargo that is to be transported.
4. 本公司仅对样品的鉴别结果负责。  
DGM China is only responsible for the identification and classification of the sample provided by the applicant.
5. 本报告书经主检员、审核人和批准人签字并加盖本公司印章后生效。  
This report will be effective only after it is signed by the inspector, checker and approver, and stamped by DGM China.
6. 未经本公司书面批准，不得复制本报告书。  
The duplicating of this report is prohibited without the written approval of DGM China.
7. 私自转让、复制、盗用、冒用、涂改、或以任何媒体形式篡改的报告书无效。  
The report is invalid when anything of the following happens - illegal transfer, reproduce, embezzlement, imposture, modification or tampering in any media form.
8. 为适应国际航协《危险品规则》的年度变化，报告书仅在本年度内有效。  
This report is only valid within the year in which the IATA *Dangerous Goods Regulations* is effective.

地址：北京首都国际机场货运北路天竺综合保税区BGS货运楼249室 邮编：101300

电话：010-69479673 传真：010-69479621

网址：[www.dgmchina.com.cn](http://www.dgmchina.com.cn) E-mail: [test@dgmchina.com.cn](mailto:test@dgmchina.com.cn)


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项目编号 Item No.	PEKGZ202012144354	生效日期 Effective Date	2021.01.01
鉴别目的 Identification Purpose	是否属于航空运输危险物品 Dangerous Goods or not restricted	鉴别日期 Identification Date	2020.12.15
鉴别依据 Identification Criteria	IATA DGR 62nd, 2021		
物品名称 Name of Goods	中文 Chinese	锂离子电池 ICR18650 6600mAh 3.7V 24.42Wh	
	英文 English	Li-ion Battery ICR18650 6600mAh 3.7V 24.42Wh	
生产厂家 Manufacturer	深圳市比苛电池有限公司 SHENZHEN PKCELL BATTERY CO., LTD.		
件数 Pieces		注：本栏内容为托运人或其代理人在使用本报告书时候填写的运输信息，不属于鉴定内容。运输信息与报告书的关联性以及实际运输货物与报告书的一致性由托运人或其代理人保证，如发生任何不一致由托运人或其代理人承担全部责任。 (请认真填写本栏内容，并盖章) 负责人： 联系方式：	
运单号 Air waybill No.			
目的港 Destination			
物品信息 Nature of the goods	<p>该样品为蓝色近长方体电池。 型号：ICR18650 6600mAh 3.7V 尺寸：(69.0×55.5×19.0)mm 每包装件中电池/电芯数量：64 每包装件中电池/电芯净重：8.9kg 该电池已经做好防短路措施并装入坚固的外包装内。 该锂电池不属于召回电池，不属于废弃和回收电池，并按照DGR3.9.2.6(e)规定的质量体系进行制造 根据委托方所提供的声明：本报告所述锂离子电池（或电芯）交付运输时，其荷电状态不超过设计额定容量的30%。 (注：单块电池重量为139g。该电池的UN38.3检测报告由深圳诺测检测技术有限公司出具，报告编号：NCT180521076B1-1。该电池的1.2米跌落测试报告由深圳诺测检测技术有限公司出具，报告编号：NCT180521076B1-2。) 该电池的UN38.3试验概要由深圳诺测检测技术有限公司出具，详见附页。</p> <p>This sample is blue almost cuboid battery. Model: ICR18650 6600mAh 3.7V Size: (69.0×55.5×19.0)mm Number of batteries / cells per package: 64 Net quantity of batteries/cells per package: 8.9kg Batteries have been protected so as to prevent short circuits and packed in strong rigid outer packagings. The lithium batteries don't belong to batteries returned to the manufacturer for safety reasons, are not waste lithium batteries and not lithium batteries being shipped for recycling or disposal, are manufactured under a quality management program as described in 3.9.2.6(e). Lithium ion cells and batteries must be offered for transport at a state of charge (SoC) not exceeding 30% of their rated design capacity.</p>		



项目编号 Item No.		PEKGZ202012144354			
物品名称 Name of Goods	中文 Chinese	锂离子电池 ICR18650 6600mAh 3.7V 24.42Wh			
	英文 English	Li-ion Battery ICR18650 6600mAh 3.7V 24.42Wh			
鉴别结论 Conclusions		<p>该货物为锂离子/聚合物电池，单独包装。额定瓦特小时为24.42Wh。已通过 UN38.3 测试，已通过包装件1.2米跌落试验，每个包装件上均有锂电池标记。</p> <p>参考有关资料，根据DGR有关规定，该物质分类识别为第9类（或项）危险品，UN3480。 This goods is lithium ion/polymer battery, packed individually, Watt-hour rating is 24.42Wh. Each battery is of a type proved to meet the Requirements of each test in the UN MANUAL OF TESTS AND CRITERIA, Part III, sub-section 38.3, Each package is capable of withstanding a 1.2m drop test in any orientation without damage to the cells contained therein, without shifting of the contents so as to allow cell to cell contact and without release of contents, Each package is marked with lithium battery mark.</p> <p>According to IATA DGR this substance is classified as dangerous goods Class (or division) 9, UN3480.</p>			
建议运输条件 Suggestion for Transport Condition	UN/ID 编号 UN/ID No.	运输专用名称 Proper Shipping Name		类或项 Class or Div. (次要危险性) (Subsidiary Risk)	包装等级 Packing Group
	UN3480	Lithium ion batteries		9	/
	包装说明 Packing Inst.	客货机 Passenger and Cargo	Forbidden		
		仅限货机 Cargo Aircraft only	965, IB		
	注意事项 Remarks	<p>本货物仅限货机运输。 The goods can be transported on cargo aircraft only.</p>			
主检员 Prepared by:		审核人 Checked by:		批准人 Approved by:	
罗涛		梁小佳			

制单： 梁小佳

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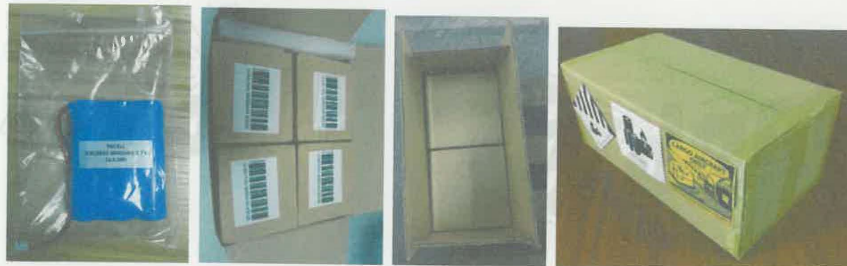
北京迪捷姆空运技术开发有限公司

项目编号: PEKGZ202012144354

电池 Battery:



包装件 Package:





## UN38.3 测试概要

### UN38.3 Test Summary

按照《试验和标准手册》第 38.3 小节对锂电池或锂电池组进行试验的情况概要  
Lithium cell or battery test summary in accordance with sub-section 38.3 of Manual of Tests and Criteria

Product Name 产品名称	Li-ion Battery 锂离子电池	Sample Model 样品型号	ICR18650 6600mAh 3.7V
Basic parameter 基本参数	3.7V, 6600mAh	Product Type 产品类型	Lithium ion battery 锂离子电池组
Rated Energy 额定能量	24.42Wh	Lithium Content 锂含量	--
Sample Mass 样品重量	139.0g	Sample Physical description 样品物理形态	Blue, Cylindrical 蓝色, 圆柱形
Client 委托方	SHENZHEN PKCELL BATTERY CO., LTD 深圳市比苛电池有限公司		
Client Address 委托方地址	2nd Floor, 4th Building, Meitai Technology Park, No.1231, Guanguang Road, Osmanthus Community, Guanlan Town, Longhua New Area, Shenzhen 深圳市龙华新区观澜街道桂花社区观光路 1231 号美泰科技园肆号厂房贰楼		
Manufacturer 制造商	SHENZHEN PKCELL BATTERY CO., LTD. 深圳市比苛电池有限公司		
Manufacturer Address 制造商地址	2nd Floor, 4th Building, Meitai Technology Park, No.1231, Guanguang Road, Osmanthus Community, Guanlan Town, Longhua New Area, Shenzhen 深圳市龙华新区观澜街道桂花社区观光路 1231 号美泰科技园肆号厂房贰楼		
Factory 工厂	SHENZHEN PKCELL BATTERY CO., LTD. 深圳市比苛电池有限公司		
Factory Address 工厂地址	2nd Floor, 4th Building, Meitai Technology Park, No.1231, Guanguang Road, Osmanthus Community, Guanlan Town, Longhua New Area, Shenzhen 深圳市龙华新区观澜街道桂花社区观光路 1231 号美泰科技园肆号厂房贰楼		
Manufacturer's contact information 制造商联系信息	Phone number 电话号码	+86-13727580105	
	Email address 电子邮箱地址	3004814533@qq.com	
	Website 网址	http://www.pkcell.com	

Report No. 报告编号: NCT20047404XB1-4



Hotline: 400-886-8419

Fax: 86-755-27790922

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<http://www.sznc testing.com>



<b>UN38.3 Test Report No.</b> UN38.3 测试报告编号	NCT180521076B1-1	<b>Test Date</b> 测试时间	2018.12.29-2019.01.14
<b>Test No. 测试编号</b>	<b>Test item 测试项目</b>	<b>Conclusion 结论</b>	
T1	Altitude simulation 高度模拟	Pass 合格	
T2	Thermal test 温度试验	Pass 合格	
T3	Vibration 振动	Pass 合格	
T4	Shock 冲击	Pass 合格	
T5	External short circuit 外部短路	Pass 合格	
T6	Impact/Crush 撞击/挤压	Pass 合格	
T7	Overcharge 过度充电	Pass 合格	
T8	Forced discharge 强制放电	Pass 合格	
<b>Test Reference</b> 测试依据	UNITED NATIONS "Recommendations on the Transport of Dangerous Goods, Manual of Tests and Criteria" (ST/SG/AC.10/11/Rev.6 Section 38.3) 联合国《关于危险货物运输的建议书 实验和标准手册》第六修订版第38.3节。		
<b>Assembled Battery Description</b> 集成电池组说明	Not applicable for 38.3.3(f), 38.3.3(g). 不适用 38.3.3(f), 38.3.3(g) 测试要求。		
<b>Test Laboratory</b> 测试实验室	Shenzhen NCT Testing Technology Co., Ltd. 深圳诺测试检测技术有限公司		
<b>Test Lab's Address</b> 测试实验室地址	1 / F, No. B Building, Mianshang Younger Pioneer Park, Hangcheng Road, Gushu Xixiang Street, Baoan District, Shenzhen, Guangdong, China 中国广东省深圳市宝安区西乡街道固戍航城大道绵商青年创业园B栋第1层		
<b>Test Lab's Phone</b> 测试实验室电话	+86-755-27790922		
<b>Test Lab's Email</b> 测试实验室邮箱	sales@nct-testing.com		
<b>Test Lab's Website</b> 测试实验室网址	http://www.szncntesting.com		
<b>Tested by</b> 主检人	Vide Fon.	<b>Test Engineer</b> 测试工程师	 
<b>Inspected by</b> 审核人	Hely Wang	<b>Technical Manager</b> 技术经理	
<b>Approved by</b> 批准人	Bon's Lam	<b>Technical Director</b> 技术总监	

Report No. 报告编号: NCT20047404XB1-4

Hotline: 400-886-8419

Fax: 86-755-27790922

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http://www.szncntesting.com

END OF DOCUMENT