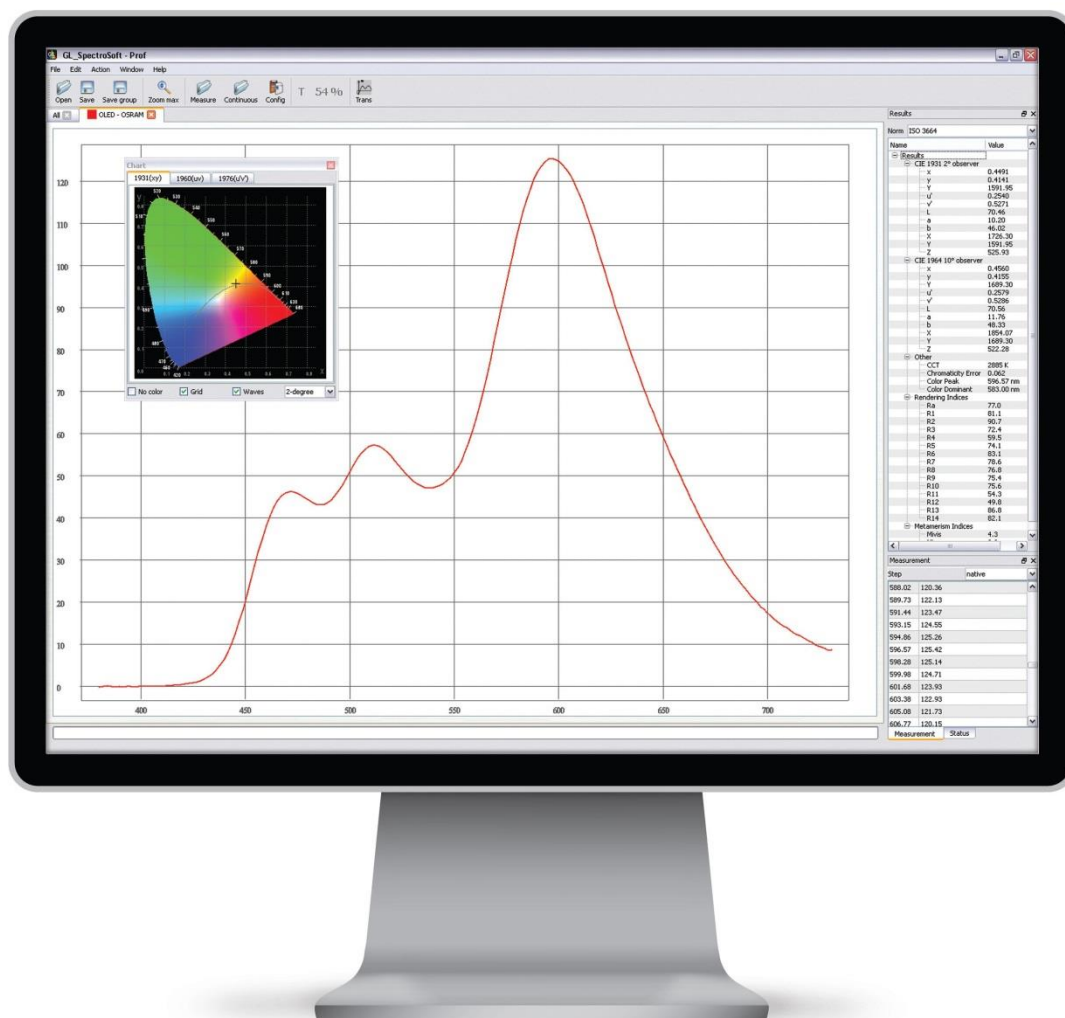


GL SpectroSoft

Operation And Evaluation Software

1/06.14



Thank you for selecting this state of the art GOSSEN product. We hope you are enjoying the easy operation, the high quality, precision and wide functionality.

GL SPECTROSOFT BASIC is an operation and evaluation software for MAVOSPEC with standard functionalities.

GL SPECTRASOFT BASIC standard functionality:

- **Spectral power distribution** – graphic display of the spectrum with scaling function and assignment of colors to wavelengths.
- **Tabular measured value display** – table with spectral data in native or calculated step sizes of 1, 2 or 5 nm
- **Evaluation of the spectra** – calculation of photometric and colorimetric quantities, chromaticity (XYZ; x,y; u',v'; CIE Lab), correlated color temperature, chromaticity error, peak wavelength and value, dominant wavelength, color rendering index Ra and individual indices R1 through R14
- **Chromaticity display** – in in the CIE standard color table, CIE 1931 [x,y], CIE 1960 [u,v] or CIE 1976 [u', v'] with a selectable standard observer of 2° or 10°
- **Basic photometric quantities** – depending on utilized accessories, illuminance, luminance or luminous flux is calculated from the spectrum.
- **Personalized measurement reports** – can be generated in HTML format for the momentarily displayed measurement for the purpose of documentation.
- **Remote control of and data transfer** – for the MAVOSPEC via USB or WiFi interface. Individual, continuous and interval controlled measurements are supported.
- **Universal exchange of spectra** – externally generated spectra can be imported from TXT files and subsequently evaluated. Internal data can be exported via TXT files or the clipboard and processed with other applications.
- **Individually configurable desktop** – individual windows can be arranged and scaled as desired, and saved as a configuration.
- **International use** – selectable user interface language: German, English, French, Italian or Polish

GL SPECTROSOFT PRO is an operation and evaluation software for MAVOSPEC with an enhanced range of functions. It includes all of the GL SPECTROSOFT BASIC functions.

GL SPECTRASOFT PRO enhanced functionality:

- **LED binning** – brightness and color bins can be set up with the integrated editor. LEDs are assigned to the predefined classes during measurement.
- **Indices of metamerism** – are ascertained for the UV and visible ranges.
- **Approval of color matching stations** – measured quantities required in accordance with ISO 3664 are ascertained during the course of a test run and an approval report is generated.
- **Candle power (cd)** – calculation of candle power via the illuminance measurement with standard diffuser and specified distance.
- **Transmission and reflection** – of optical components can be implemented with an external light source and optical measuring accessories.
- **Measured values at a glance** – selectable measured quantities can be displayed in a special window.
- **Clear-cut comparison** – selectable measured quantities from various measurements can be summarized in a table and displayed in a special window.
- **MacAdam ellipse** – in preparation

i

If you have further requirements for the GL SPECTROSOFT, like special functions for your measuring and testing process, specific reports or further measurands that can be calculated from the spectrum, please ask us for customer specific adaptations.

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1 Introduction

GL SpectroSoft is optional evaluation software with an intuitive user interface and extensive measuring functions for the spectral analysis of light sources, as well as transmission and reflection measurements. Spectral values measured with the MAVOSPEC and the respectively required accessories, as well as externally generated spectra, can be evaluated in accordance with current CIE standards. The software calculates colorimetric magnitudes such as chromaticity in accordance with various CIE standards, correlated color temperature, chromaticity error, peak wavelength, dominant wavelength, color rendering index and index of metamerism. Extensions such as scotopic and photopic values, PAR and PPFD values and MacAdam ellipses can be implemented upon request.

The software is extremely well suited for general light assessments, for laboratory applications and for quality assurance in production. The configurable desktop can be adapted to the respective measuring task, and displays only the required information in a clear-cut fashion. Various program versions are available to match different requirements.

1.1 System Requirements

The following prerequisites must be fulfilled in order to use GL SpectroSoft at your PC:

- IBM or 100% IBM compatible PC
- Your PC must be equipped with an USB port
- Microsoft Windows operating system (all service packs have to be installed)
 - Windows XP and XP x64
 - Windows Server 2003 and Server 2003 x64
 - Windows Vista and Vista x64
 - Windows Server 2008 and Server 2008 x64
 - Windows 7 und 7 x64
 - Windows Server 2008 R2
 - Windows 8 and 8 x64
- Installation is not possible under all other operating systems.
- Approximately 4 MB of free hard disk space for GOSSEN software

1.2 License Types

The GL SPECTROSOFT software is available in three versions: BASIC, PRO and LAB. You can also extend the PRO version with individual functionalities available in the LAB version. You can extend and change versions by adding appropriate licence keys.

GL SPECTROSOFT license list and software options		
Licence name	Options	Description
BASIC (CRI)	SPD	Graphical representation of spectra
	Results Window	Calculation of the following photometric results: <ul style="list-style-type: none"> - Color coordinates according to CIE 1931 2° observer - Color coordinates according to CIE 1964 10° observer - Color Rendering Indices Ra , R1 – R14 - Chromaticity error - Color Peak - Color Dominant - Lambda 2 (FWHM) - Purity
	Measurement Window	Including spectra data in Native, 1nm , 2nm and 5nm step incremental.
	Export / import	Function to export and import data in TXT format
	Report	Editor to generate report after the measurement.
	Chromaticity charts	Color diagrams according to CIE <ul style="list-style-type: none"> - 1931 (x y) - 1960 (u v) - 1976 (u'v')
PRO¹	SELECTED RESULTS	Additional window displaying selected results.
	COMPARISON WINDOW	Additional window showing the complete set of measurements
	BINING TOOL	Editor to set the brightness and color bins.
	ISO evaluation	Measurement protocol according to ISO 3664 standard
	MI calculation	Metamerism indices in UV and VIS range
	INTENSITY [cd]	Allows to calculate intensity values using the standard diffusor and distance value setting.
	MacAdam	comming soon

	Transmission, Reflection		This software option can be used for transmission or reflection measurements of optical components. Enables to take reference measurement and then make T or R measurement of the sample with the use of external light source and optical accessories.
	Scotopic / Photopic		Option for calculating S/P values
LAB²	TIMER/SERIAL	Product – No.	Setting of the automatic measurements schedule. Set
	RELATIVE measurements comparison	Product – No.	Allows to choose a reference measurements and compare other measurements to the reference one. Option to show percentage or real values change.
	PASS/FAIL	Product – No.	Editor to choose the set of parameters as criteria for pass / fail selection
	RANGE	Product – No.	Allows to change the spectral range in which measurement results are calculated.
	AMBIENT	Product – No.	This function compensates the influence of the ambient light where the measurements are mad. The ambient light measurement can be detected before the test measurement.
	PPFD/PAR [µmol]	Product – No.	Calculations of photon flux density and photosynthetically active radiation
CALIB	Available only as ad-on for PRO or LAB license		Software for Illuminance, Luminous Flux and Lumiance calibration of GL Optic instruments.

¹ PRO license is an upgrade of BASIC and includes all features of BASIC and a complete set of additional functions described.

² Individual functions from LAB can be ordered separately and add-on to PRO license or a complete LAB license is offered as a bundle.

2 Installation

This is a laboratory software for complete spectral analysis. Depending on the version you have purchased you have the access to a number of specific data of the spectral measurements.

Before starting the installation, please ensure that

- the operating system of the computer is at the latest state, that means all service packs and updates should be installed
- you have administrator rights
- the virus scan is disabled during the installation process

To start the installation simply run setup GL_SpectroSoft v----.exe program from your CD. The installation program will guide you through the installation process. The installation path is determined to enable remote upgrades in the future.

HASP Key

After successful installation of the software you should put the HASP key to USB socket in your PC. This unit contains the key for your software and you cannot use GL_SpectroSoft without that. Wait several seconds after connecting to you PC while Windows is installing the device. The LED will go on when the HASP key is installed.

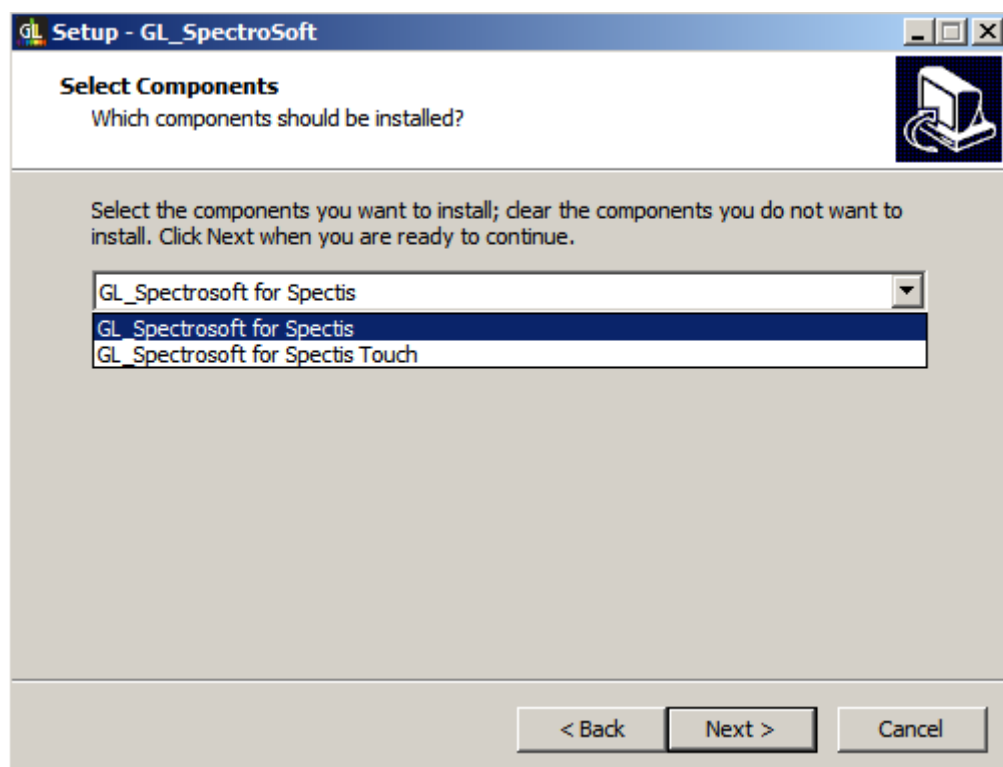
2.1 Connecting Devices

GL SPECTROSOFT software allows to connect to different types of devices using drivers:

- SPX Driver (GL SPECTIS 1.0, GL SPECTIS 8.0)
- Androdi USB Driver (MAVOSPEC, GL SPECTIS 1.0 touch, GL SPECTIS 5.0 touch)

During an installation process user can choose one of installation types in Select Components screen:

- GL SPECTROSOFT for GL SPECTIS
- GL SPECTROSOFT for GL SPECTIS touch



2.1.1 GL SPECTROSOFT for GL SPECTIS

Only GL_Spectrosoft is installed when you want to use devices using SPX Driver (GL SPECTIS 1.0, GL SPECTIS 8.0). SPX driver must be installed in addition. Software is set to work with SPX Driver devices.

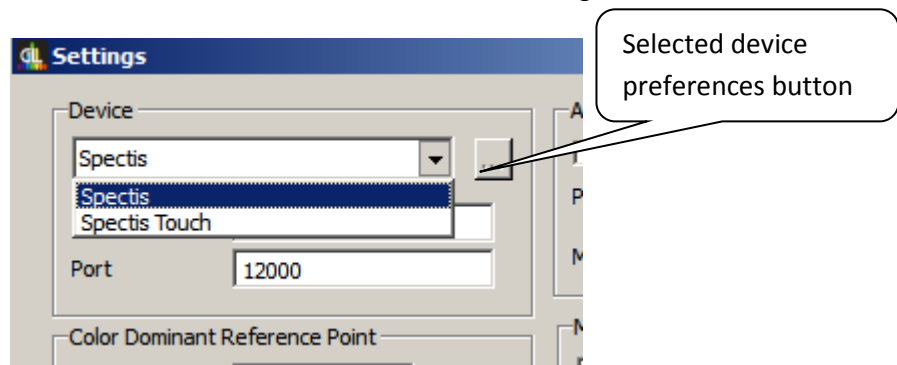
2.1.2 GL SPECTROSOFT for MAVOSPEC

GL_Spectrosoft and Androdi USB Driver is installed. This installation type set software to work with Androdi USB Driver devices MAVOSPEC via USB cable.

2.1.3 GL SPECTROSOFT with many Devices

When you need to work with different devices using SPX and Android drivers alternately:

1. Install **GL SPECTROSOFT for GL SPECTIS touch**.
2. Install **SPX Driver**.
3. Select *Device* in GL SPECTROSOFT main menu File->Settings



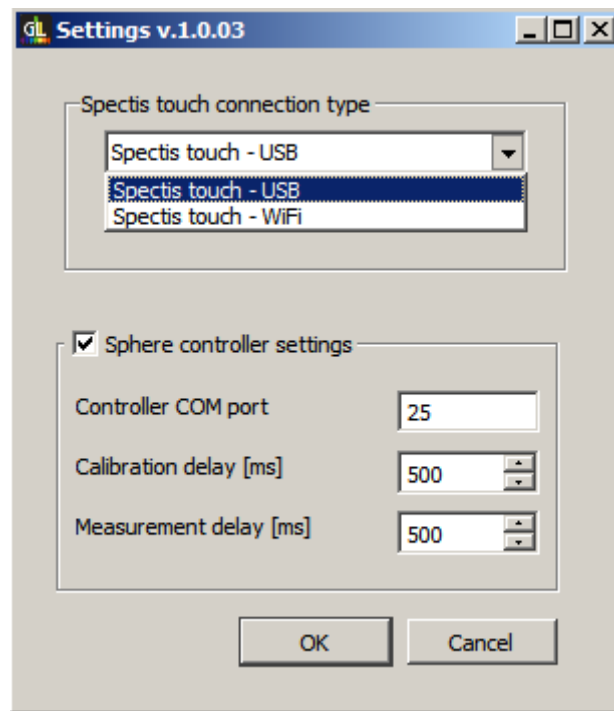
Types of connection:

1. **Spectis** - connect via SPX Driver (Spectis 1.0, Spectis 8.0).

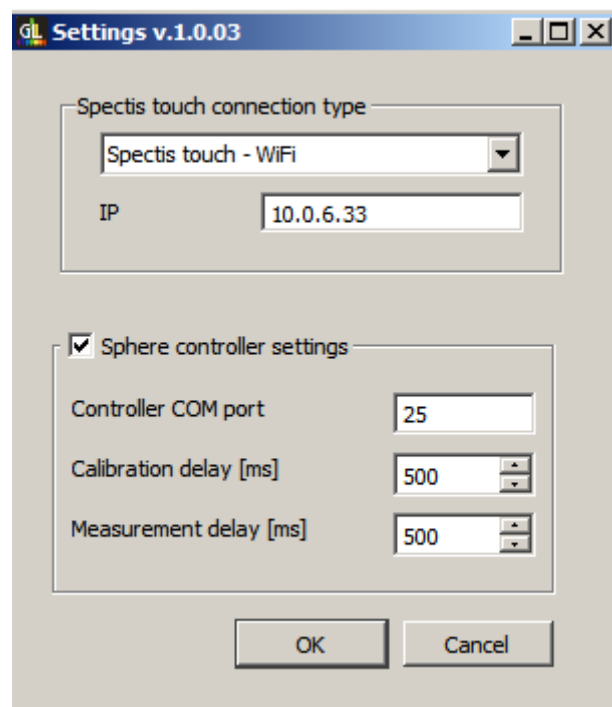
TCP connection via SPX Driver. SPX driver must be installed and started. Set IP address of a PC with SPX and device connected. Use default settings to connect on the same PC.

2. **MAVOSPEC** - connect to android device

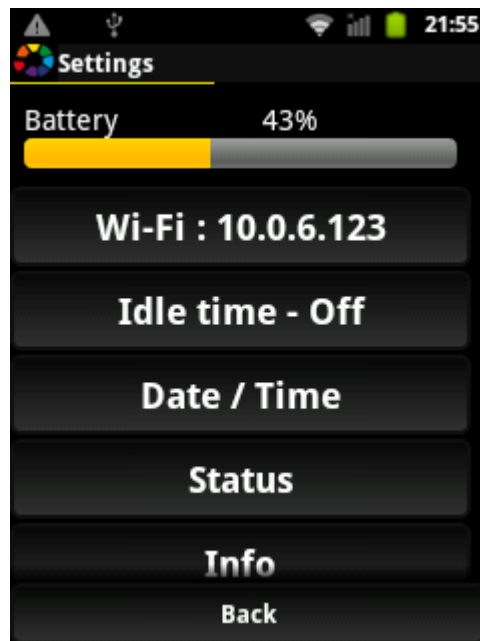
MAVOSPEC connection type can be set using a device preferences window.



3. MAVOSPEC - WiFi - connect via WiFi Driver



TCP connection via WiFi. Set IP address of a MAVOSPEC device from Settings (e.g 10.0.6.123 on the screen below).

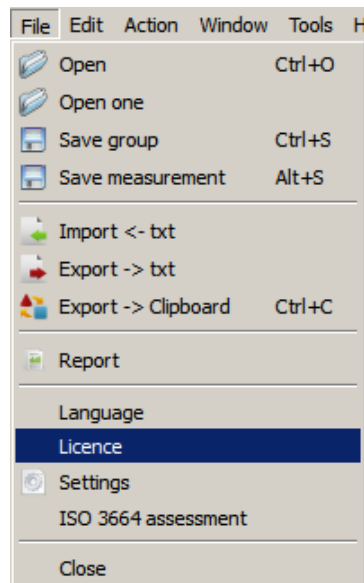


4. **MAVOSPEC - USB** - connect via Android USB Driver

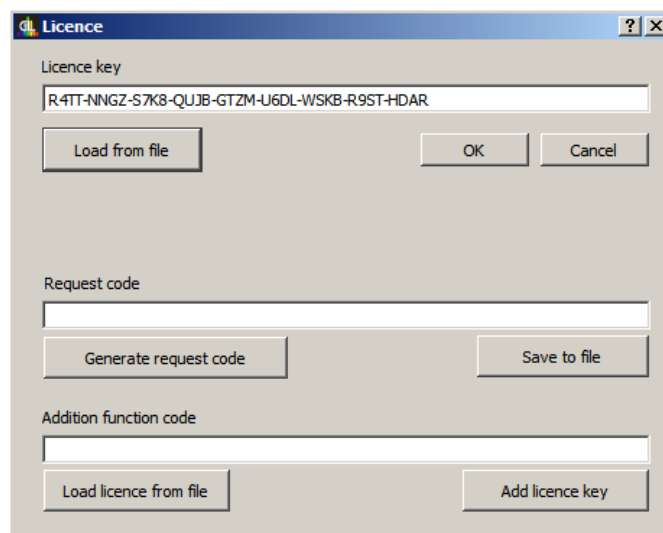
The connection is done via USB cable. Android USB driver must be installed.

2.2 Changing or Extending License

Select File->Licence from main menu to extend software functionality with a licence key.



Change License Version



To change the version of your software (e.g. when you want extend from the Basic version to Pro) :

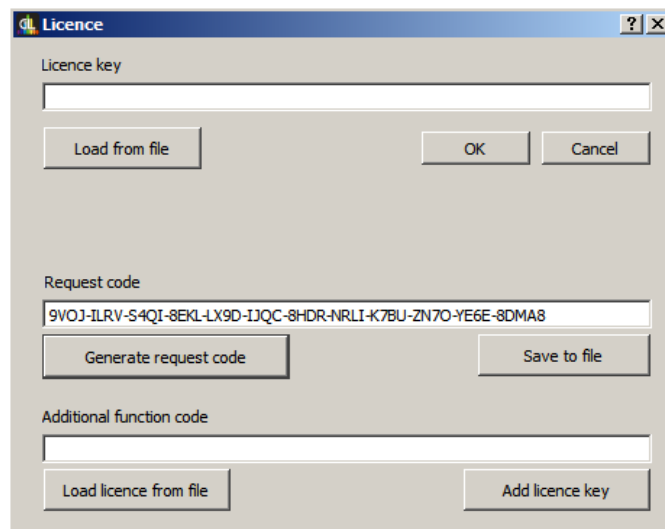
1. Copy the license version code to the *Licence key* field or load it from a file using *Load from file* button.
2. Press *OK* button below to accept.
3. Restart the software.

After the software restarts, the new version is available.

Additional Function License

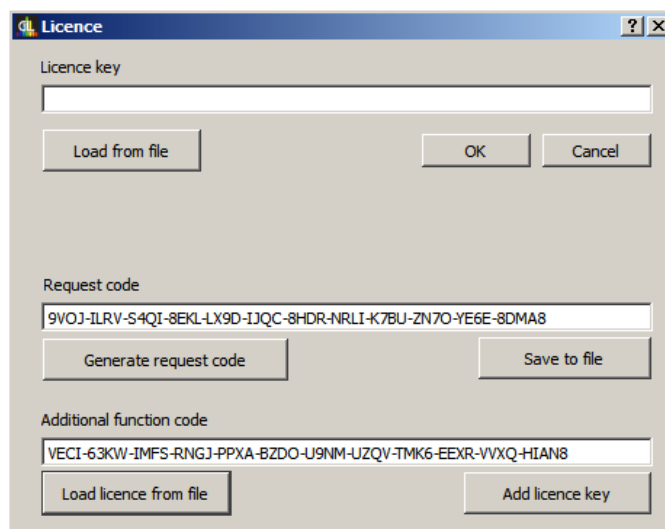
To add new functionality to your software:

1. Connect the device and make at least one measurement.
2. Generate a request code - request code appears in the *Request code* field.
3. Save the request code with the *Save to file* button and send it to your reseller.



The 'Licence' dialog box contains three main sections. The first section, 'Licence key', has an empty text field and buttons for 'Load from file', 'OK', and 'Cancel'. The second section, 'Request code', has a text field containing the code '9VOJ-ILRV-S4QI-8EKL-LX9D-IJQC-8HDR-NRLI-K7BU-ZN7O-YE6E-8DMA8', a 'Generate request code' button, and a 'Save to file' button. The third section, 'Additional function code', has an empty text field, a 'Load licence from file' button, and an 'Add licence key' button.

4. Get an additional function code from your reseller and load it with *Load licence from file* (a code should appear in the *Additional function code* field)



This screenshot shows the 'Licence' dialog box after the 'Load licence from file' button has been clicked. The 'Additional function code' text field now contains the code 'VECI-63KW-IMFS-RNGJ-PPXA-BZDO-U9NM-UZQV-TMK6-EEXR-VVXQ-HIAN8'. The other fields and buttons remain the same as in the previous screenshot.

5. Add a licence key with the *Add licence key* button.
6. Restart the software.

After the software restarts, the new functionality is available.

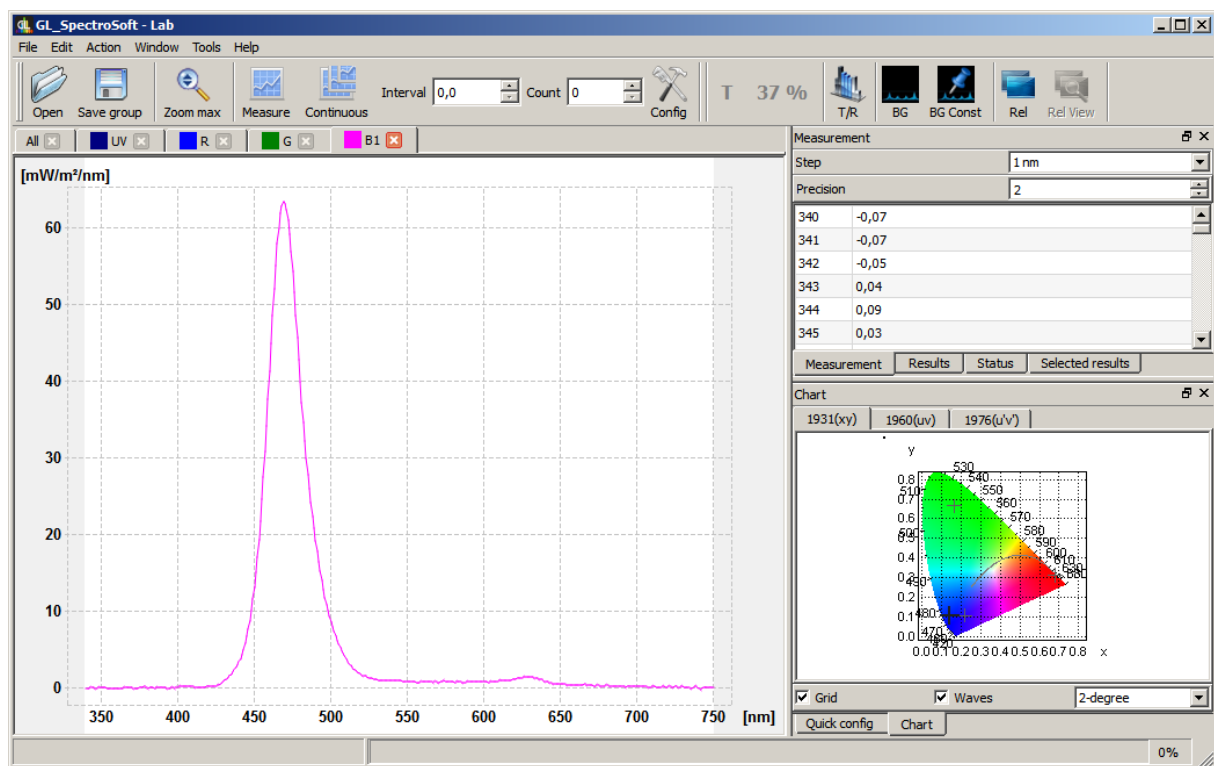
3 Startup

Measurement and analysis using GL SPECTROSOFT

Startup

1. Connect your measuring instrument with USB cable to your computer.
2. Start the SPX driver Software (only when use Spectis touch 1.0 or 8.0).
3. Select a device type in File->Settings (default device depends on the device you choose during installation).
4. Insert the HASP USB Key, and wait several seconds for the system to install the key.
5. Now you can run the GL SPECTROSOFT.

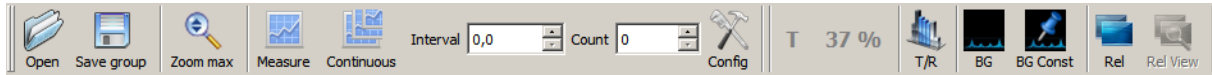
In the upper left corner there is a description of the currently running program options. Below you will find the icons bar for all functions of the program.



4 Basic Function Tool Bar

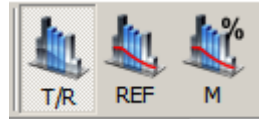
The different functions are accessible depend on the version / license of the program.

1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15.



1. **Open:** previously saved measurements can be open,
2. **Save group:** all currently open / active measurements can be saved in one file
3. **Zoom max** optimizes the view of the whole spectrum chart in the current window size.
 - a) Using the mouse wheel you can zoom image spectrum +/-
 - b) Hold Y and move the wheel to change the view in the Y-axis
 - c) Hold X and move the wheel to change the view of the X-axis
 - d) Click twice on the chart box and the view options set to max zoom
4. **Measure** To make measurements, or simply press the space bar. Additionally, the GL SPECTIS 1.0 is equipped with a trigger button located on the side of the body.
5. **Continuous** sets the measurement procedure in continuous mode according to preset parameters, integration time and number of repetitions. This allows for continuous monitoring of changes in the spectrum under certain conditions. To stop click Continuous again.
6. **Serial** measurement interval. Allows you to perform a series of measurements with a programmed time interval (see serial measurements chapter).
7. **Serial** measurement count. Allows you to perform a programmed count of measurements (see serial measurements chapter).
8. **Config** button allows access to set the basic parameters of measurements such as:
 - a) integration time;
 - b) number of repetitions of the measurement
 - c) data save path
 - d) range of spectral measurement
9. Indication of the **temperature**.
10. Indication of the **signal level**.

11. Transmission/Reflectance mode



This mode allows to make comparative measurements. Reference measurement is triggered using REF button. Next measure triggered with M button is compared with the reference measurement and signal data are shown as a percent of reference signal.

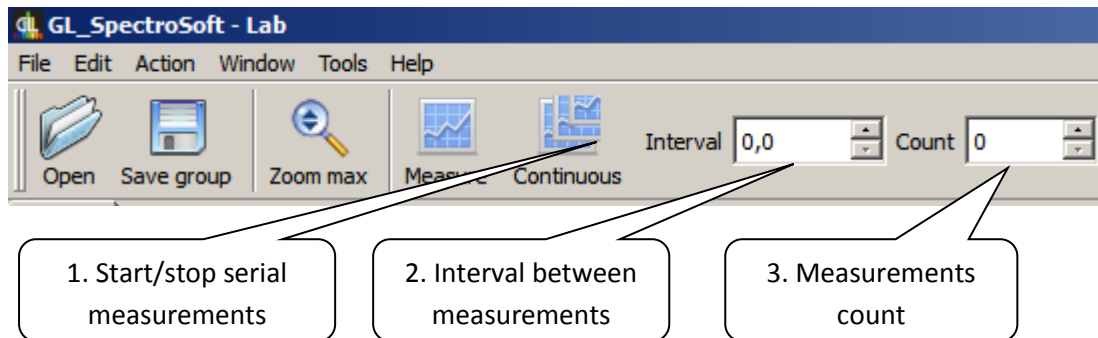
12. Background mark a current measurement as a ambient light measurement. Next user can using context menu subtract selected background signal from another measurement to compensate ambient light. In result next tab is created with the signal after an ambient light subtraction. This tool is useful when you can not completely eliminate an ambient light during the measurements.

13. Background const works in similar way like background but marked ambient light is subtracted after measurement and final signal after subtraction is presented immediately.

14. Relative mark a current measurement as a reference signal. Next using Relative View button user can trace how photometric and radiometric parameters of the signal are changing. Results window shows parameter differences.

15. Relative view turn on/off relative view in results window when relative mode is active.

4.1 Serial measurements



GL_SpectroSoft allows to program the serial measurements with defined interval and measurements count.

1. **Continuous** button starts/stops continuous and serial measurements.

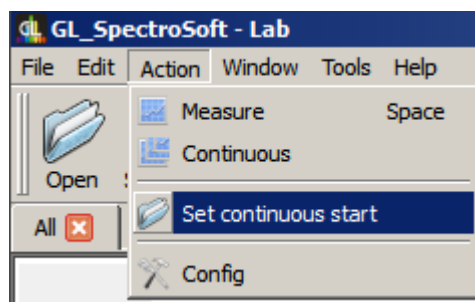
Continuous measurement (when interval and count is set to 0) triggers the measurements one after the other and shows spectrum on the same chart. The function is useful to trace change of spectrum and chromaticity parameters of a light source.


Serial measurements are also triggered by continuous button but when interval or count is set to a value other than 0. In this case results are shown in separate graphs.

2. **Interval** - interval between measurements in seconds. Measurements are triggered one after the other when interval is set to 0.
3. **Count** - number of measurements to do. When set to 0, measurements loop can be stopped by continuous button. During serial measurements Count field shows the current number of measurements to do.

The program allows also to set the start time of series measurements with interval and measurements count.

It can be set from *Action->Set continuous* start menu:




Dialog
✕

Interval

Count

Start

←
sierpień 2013
→

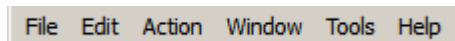
| | N | Pn | Wt | Śr | Cz | Pt | So |
|----|----|----|----|----|----|----|----|
| 31 | 28 | 29 | 30 | 31 | 1 | 2 | 3 |
| 32 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 33 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
| 34 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
| 35 | 25 | 26 | 27 | 28 | 29 | 30 | 31 |
| 36 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

OK

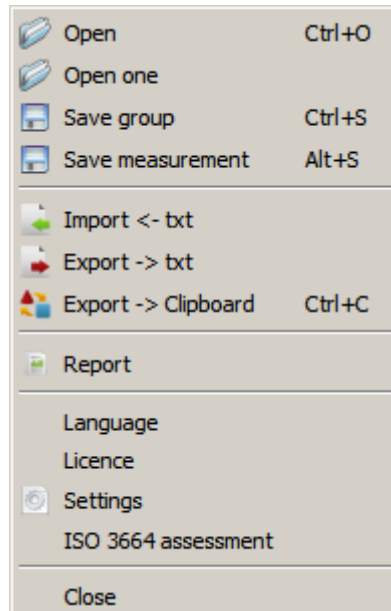
Cancel

5 Top Menu Options

In the upper left corner of the screen you will find the access to remaining menu functions.



5.1 File



Open - to open a previously saved measurements

Open group - to open only one measurement of a previously saved measurements

Save group - saves the currently open group of measurements

Save - saves only the current open measurement

Import - you can also open measurements made in other programs providing it is saved in a text format where the first column shows the wavelength and the second column measured values separated by tabulator sign

Export - allows to save the data in a text format.

Export >Clipboard - saves to the data in the system Clipboard

Report - generate measurement report for the currently displayed measurement

Language - language change

Licence - allows to change the software version type or add a new functionality (see Types of licenses section)

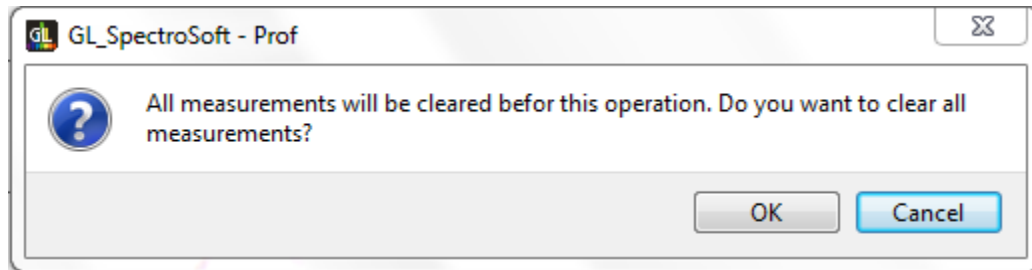
Settings- gives access to additional system settings.

5.2 ISO 3664 Assessment

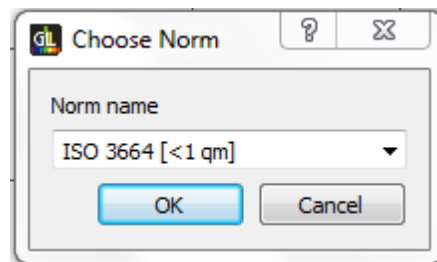
ISO 3664 assessment - it is a measuring procedure according to ISO 3664:2000 norm for Viewing Conditions in the Graphic technology and photography.

Note: before you start this procedure set the measurements parameters for integration time and number of repetitions

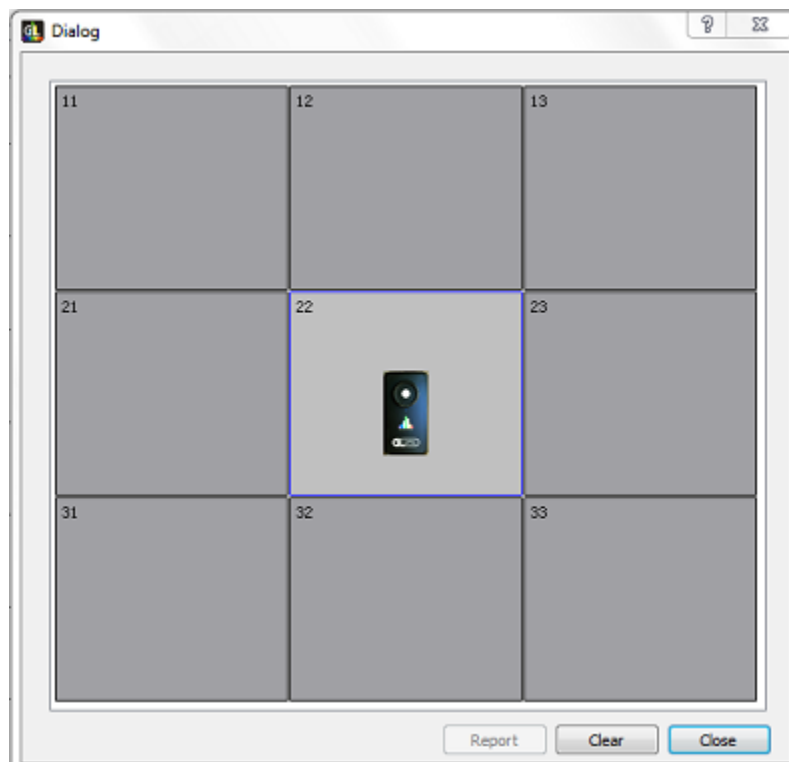
1. To start the procedure go to top menu and click File, ISO 3664 and the following dialog box will appear:



2. Accept this box and proceed to determine the illuminated surface area.



3. Once you select the proper Norm following window will appear:

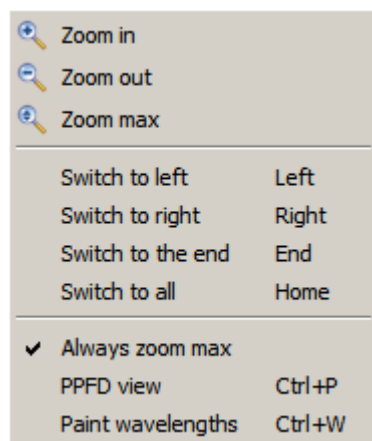


4. Place the GL SPECTIS 1.0 in the shown place and Click the icon twice to make measurement. The program sets the next measurement location in which to place the spectrometer and measure. Proceed until the procedure is finished.

5. After completing the measurements in all set locations the result dialog box will appear with indication of test results.

6. After completion of the measurement procedure you can generate the report. To do this, click the Report at the bottom of the measurement.

5.3 Edit



Zoom in - zoom in a spectrum chart

Zoom out - zoom out a spectrum chart

Zoom max - optimizes the view of the whole spectrum chart in the current window size.

Switch to left - switch spectrum chart view to the previous measurement

Switch to right - switch spectrum chart view to the next measurement

Switch to the end - switch spectrum chart view to the last measurements

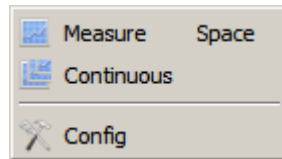
Switch to all - switch spectrum chart view to the all measurements view

Always zoom max - a new measurement always opens in the optimized view of the whole spectrum chart

PPFD view - turn on/off photosynthetic photon flux density view (spectrum chart background changes to light green colour in this mode). PPFD is the measure of the the number of photons (in the photosynthetically active range of 400nm-700nm) that fall on 1 square meter per second.

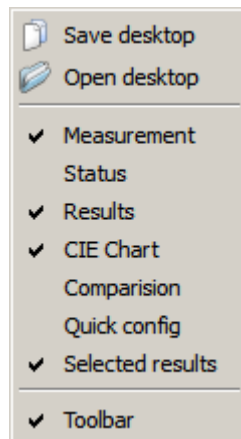
Paint wavelengths - turn on/off spectrum chart coloring.

5.4 Action



See basic functions tool bar

5.5 Window



Save desktop - save a current desktop layout

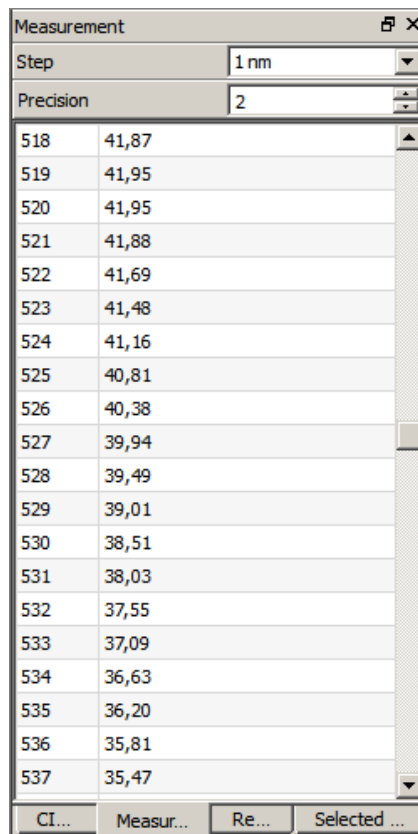
Open desktop - open previously saved desktop layout

Measurement, Status, Results, CIE Chart, Comparison, Quick config, Selected results, Toolbar - show/hide measurement views

6 Measurements Result Windows

6.1 Measurement

Measurement includes the results for each wavelength. Use the drop-down menu to select the presentation of results at specific intervals: Native – the source data as 1nm, 2nm and 5nm;



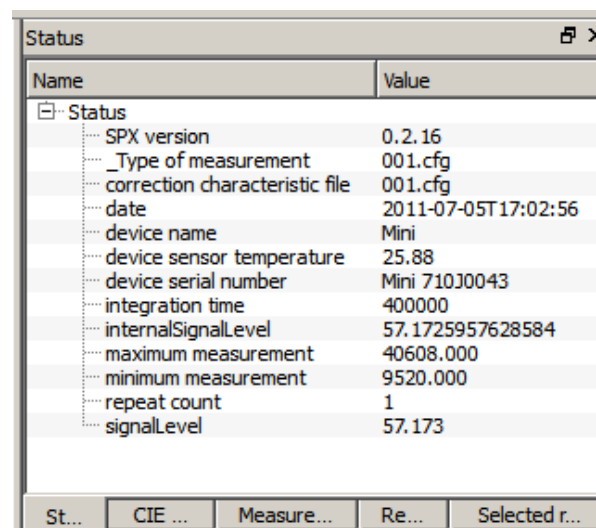
The Measurement window displays a table of measurement results. The 'Step' is set to 1 nm and 'Precision' is set to 2. The table lists wavelengths from 518 nm to 537 nm and their corresponding intensity values.

| Wavelength (nm) | Intensity |
|-----------------|-----------|
| 518 | 41,87 |
| 519 | 41,95 |
| 520 | 41,95 |
| 521 | 41,88 |
| 522 | 41,69 |
| 523 | 41,48 |
| 524 | 41,16 |
| 525 | 40,81 |
| 526 | 40,38 |
| 527 | 39,94 |
| 528 | 39,49 |
| 529 | 39,01 |
| 530 | 38,51 |
| 531 | 38,03 |
| 532 | 37,55 |
| 533 | 37,09 |
| 534 | 36,63 |
| 535 | 36,20 |
| 536 | 35,81 |
| 537 | 35,47 |

Buttons at the bottom: CI..., Measur..., Re..., Selected ...

6.2 Status

Status window shows the system data: the current calibration files, a connected device, the coefficients and other



The Status window displays system data in a table format. The table has two columns: Name and Value.

| Name | Value |
|--------------------------------|---------------------|
| Status | |
| SPX version | 0.2.16 |
| _Type of measurement | 001.cfg |
| correction characteristic file | 001.cfg |
| date | 2011-07-05T17:02:56 |
| device name | Mini |
| device sensor temperature | 25.88 |
| device serial number | Mini 710J0043 |
| integration time | 400000 |
| internalSignalLevel | 57.1725957628584 |
| maximum measurement | 40608.000 |
| minimum measurement | 9520.000 |
| repeat count | 1 |
| signalLevel | 57.173 |

Buttons at the bottom: St..., CIE ..., Measure..., Re..., Selected r...

6.3 Results

Results window contains the results of measurement in accordance with CIE 1931 2 ° observer and CIE 1964 10 ° observer

| Name | Value |
|----------------|------------|
| Results | |
| CIE 1931... | |
| x | 0,3102 |
| y | 0,3300 |
| Y | 2380,41 lx |
| u' | 0,1957 |
| v' | 0,4685 |
| L | 64,16 |
| a | -7,06 |
| b | -4,04 |
| X | 2237,46 |
| Y | 2380,41 |
| Z | 2595,33 |
| CIE 1964... | |
| x | 0,3128 |
| y | 0,3316 |
| Y | 2607,47 |
| u' | 0,1969 |
| v' | 0,4697 |
| L | 64,29 |
| a | -6,66 |
| b | -3,28 |
| X | 2459,71 |
| Y | 2607,47 |
| Z | 2797,07 |
| Other | |
| CCT | 6637 K |
| Chro... | 0,001 |
| Colo... | 401,88 nm |
| Colo... | 67,99 |

It also presents:

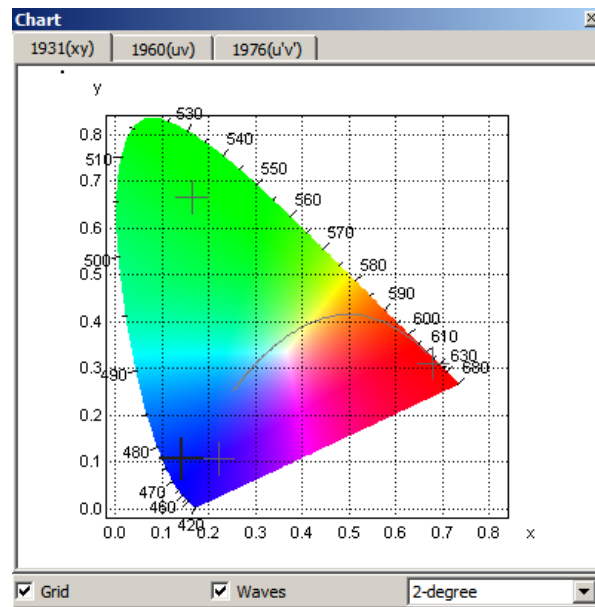
- Correlated Color Temperature of a light source CCT - Kelvin value
- Chromaticity Error
- Peak Color
- Color dominants

Depending on the software options following calculations are also available:

- Color rendering index CRI
- MI metamerysm factor
- Luminous intensity
- Purity
- Radiometric
- PPFD
- PAR
- Binning group
- Brightness group

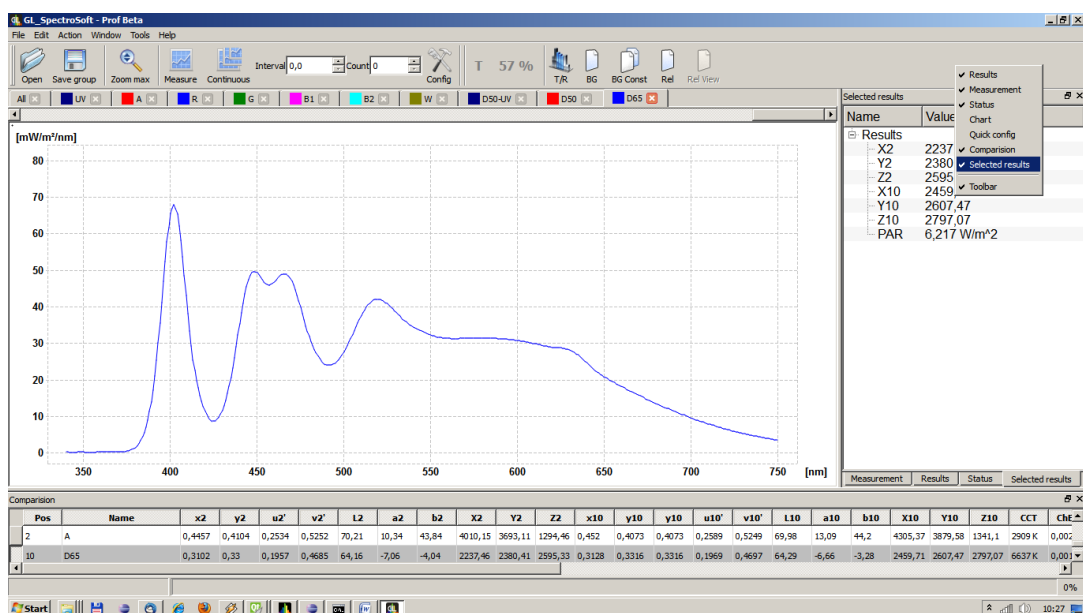
6.4 Chart

Chart window is a set of graphs representing chromacity diagrams determined by the CIE. Bookmarks allow you to select a particular chart type.



6.5 Selected results

A very convenient perspective of results preview is selected results window. To make this window visible right click on the tool bar and check "Selected results".



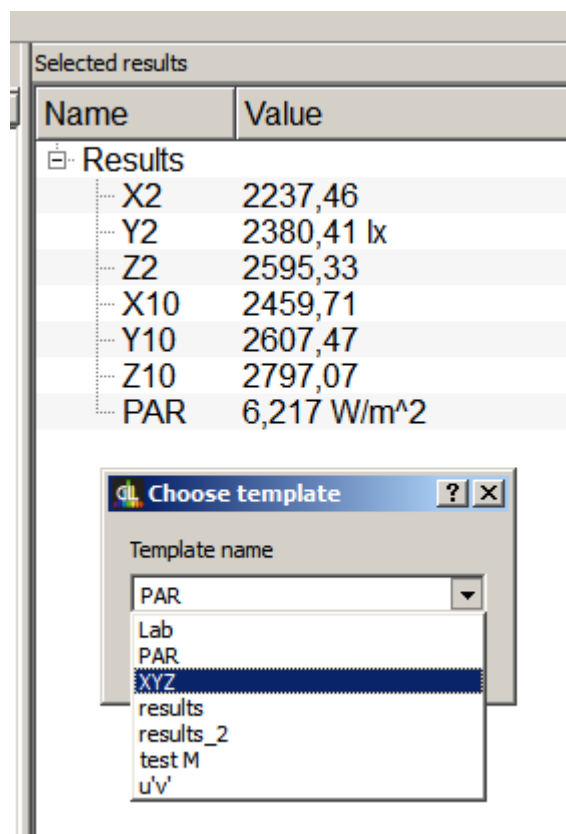
Now selected results window is visible and you can see a set of the most important measurement parameters. To change a template set of a parameters or font, right click on the selected results window - context menu appears.

| Selected results | |
|------------------|------------------------|
| Name | Value |
| Results | |
| X2 | 2237,46 |
| Y2 | 2380,41 lx |
| Z2 | 2595,33 |
| X10 | 2459,71 |
| Y10 | 2607,47 |
| Z10 | 2797,07 |
| PAR | 6,217 W/m ² |

Select template

Font size

Now you can select template containing set of parameter which will be shown in the selected results window.



Templates are stored in "C:\GL Optic\GL_Spectrosoft\tables\results" directory and are standard text files with codes of parameters which have to be presented each in a new line. A separator empty lines are allowed. Sample "XYZ.txt" file might look something like this:

X2
Y2
Z2

X10
Y10
Z10

The list of codes which can be used in selected results template file (depending on version):

x2, y2, u2', v2', L2, a2, b2, X2, Y2, Z2, x10, y10, y10, u10', v10', L10, a10, b10, X10, Y10, CCT, ChErr, ColPeak, ColPeakVal, ColDom, Purity, Radiometric, PAR, Ra, R1, R2, R3, R4, R5, R6, R8, R9, R10, R11, R12, R13, R14, Mivis, Miuuv, Binning, Brightness.

| Name | Value |
|-----------------------|-----------|
| Results | |
| CIE 1931 2° observer | |
| x | 0,1644 |
| y | 0,6655 |
| Y | 634,65 lx |
| u' | 0,0617 |
| v' | 0,5620 |
| L | 85,27 |
| a | -162,64 |
| b | 63,78 |
| X | 156,75 |
| Y | 634,65 |
| Z | 162,31 |
| CIE 1964 10° observer | |
| x | 0,1961 |
| y | 0,6667 |
| Y | 694,90 |
| u' | 0,0740 |
| v' | 0,5656 |
| L | 85,34 |
| a | -146,30 |
| b | 71,58 |
| X | 204,42 |
| Y | 694,90 |
| Z | 142,96 |
| Other | |
| CCT | 8269 K |
| Chromaticity Error | 0,161 |

Measurement Results Status Selected results

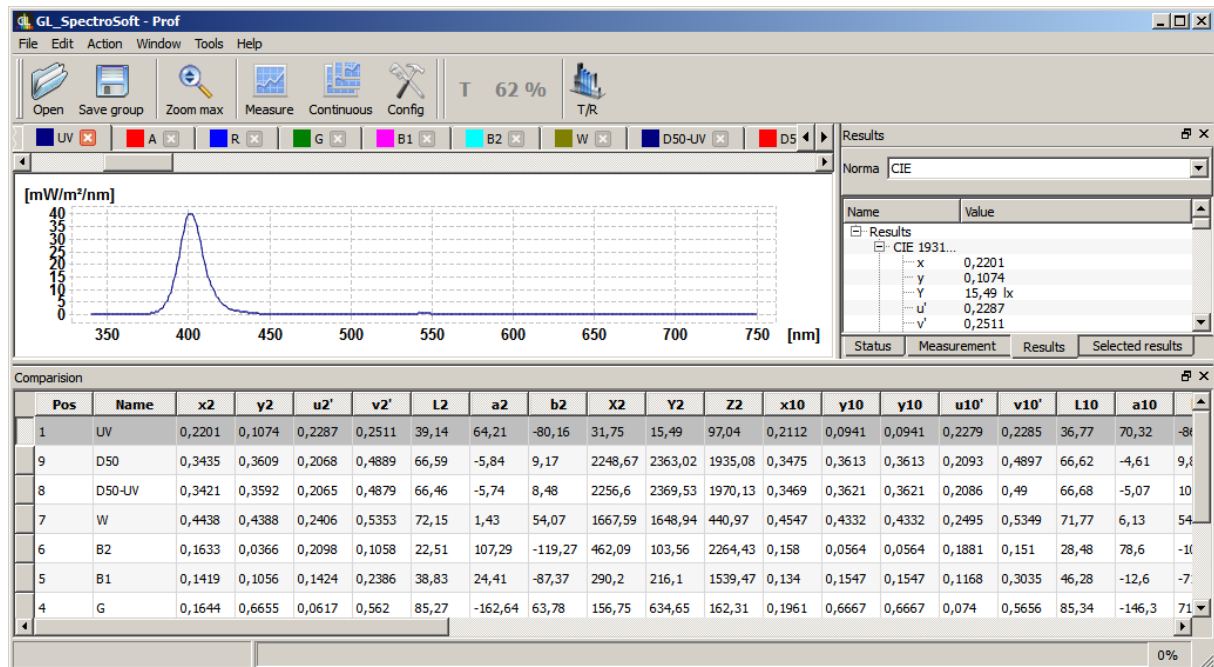
Codes corresponds with parameters which are presented in results window.

For instance:

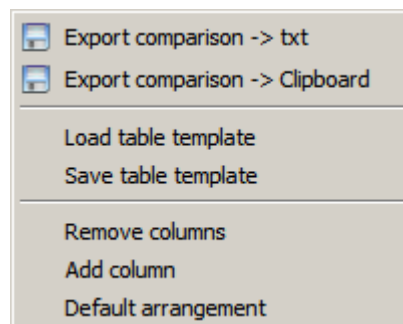
x2 - x CIE 1931 2° observer,
Y2 - Y CIE 1931 2° observer,
x10 - x CIE 1964 10° observer,
Y10 - Y CIE 1964 10° observer, etc.

6.6 Comparison Table

Comparison table allow to compare spectrometric values of many measurements in one table. This useful tool equips user with standard functions as designing custom sets of values, data sorting, export to text file (tab-separated values format) to use in a third-party software (e.g. a calculation sheet).



Context menu (right mouse button) allows to call functions connected with the comparison table.



Export comparison - > txt - export table to a text file (tab-separated values format)

Export comparison - > Clipboard - export table to system clipboard

Load table template - load previously saved table layout template from a file

Save table template - save table layout template to file

Remove columns - remove selected columns from the table layout

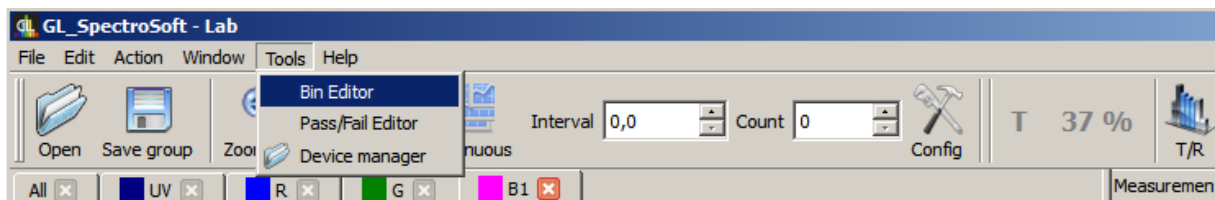
Add column - add column to the table layout

Default arrangement - set default table layout

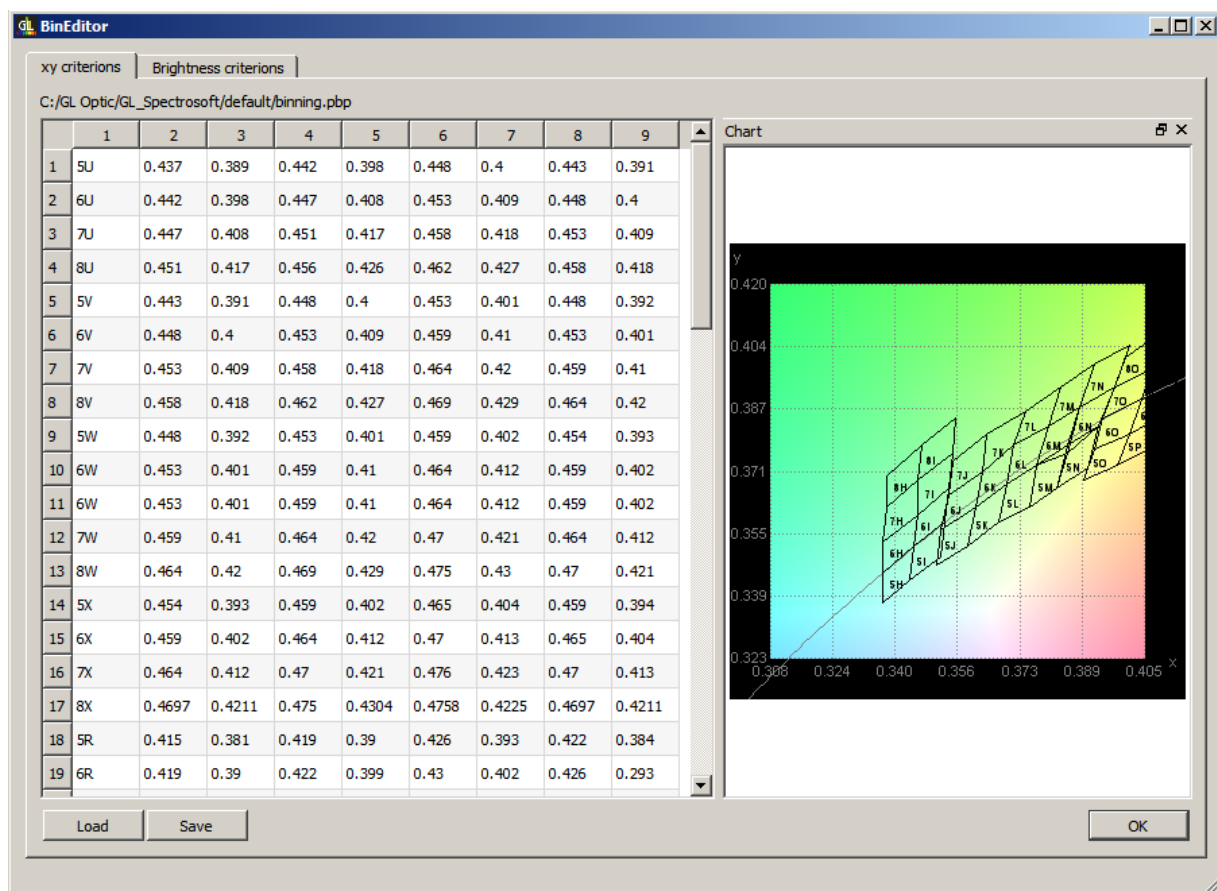
7 TOOLS

7.1 Bin Editor

Binning groups can be defined by Bin Editor tool (Tools->Bin Editor)



In the first tab user can define xy criterions. Each row is definition for one polygon which determines location of x, y parameters.



Columns meaning:

1. Name of a group.
2. x coordinate of the first point of the polygon.
3. y coordinate of the first point of the polygon.
4. x coordinate of the second point of the polygon.
5. y coordinate of the second point of the polygon, and so on.
- 6,7. The third point.
- 8,9. The fourth point.

You can specify more points if it's needed.

Definition of binning groups may be saved to or load from a text file. Software always use the last used group which path is shown above the table.
Sometimes it's easier to edit or import binning groups directly to a text file.
Sample text file structure is presented below:

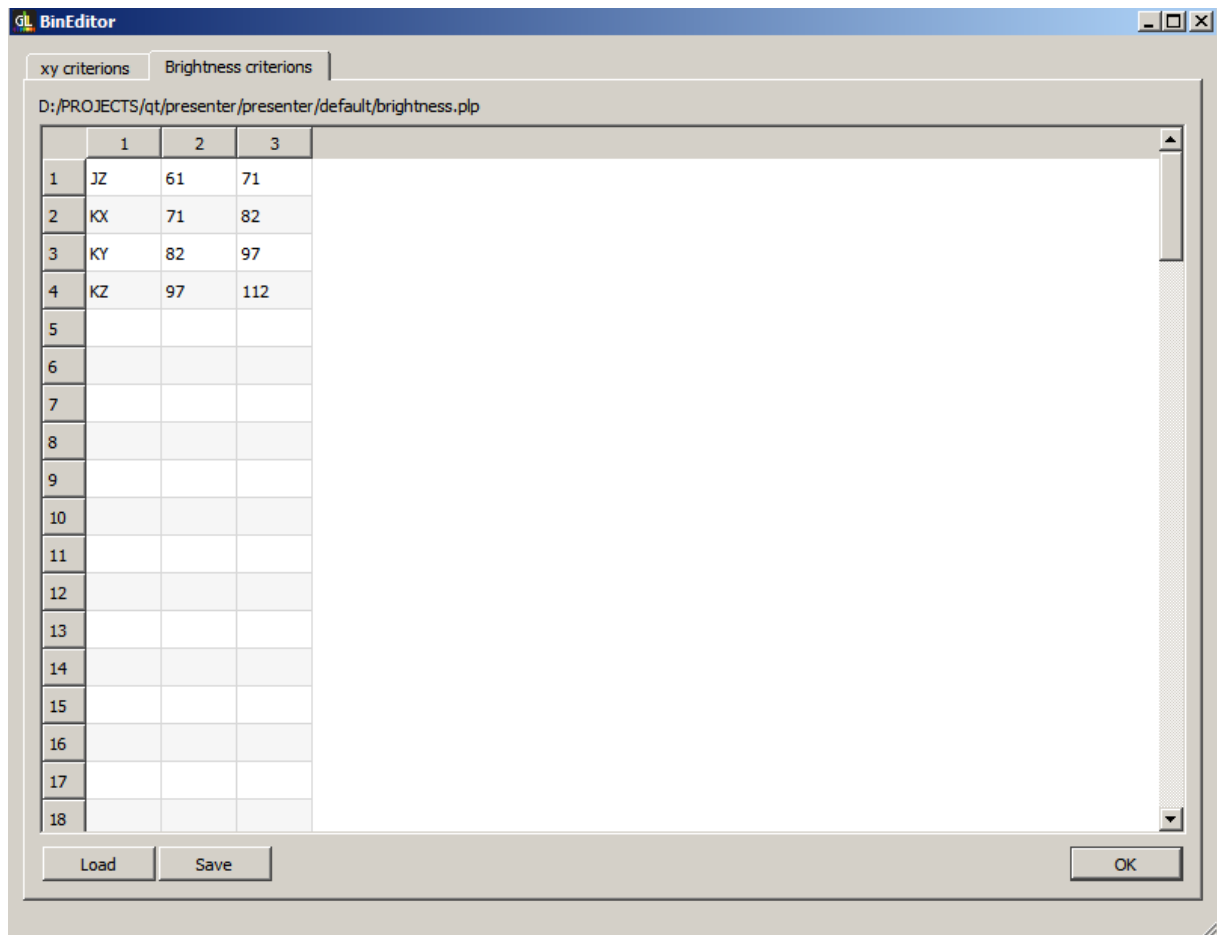
| | | |
|----|-------|-------|
| 5U | 0.437 | 0.389 |
| | 0.442 | 0.398 |
| | 0.448 | 0.400 |
| | 0.443 | 0.391 |
| 6U | 0.442 | 0.398 |
| | 0.447 | 0.408 |
| | 0.453 | 0.409 |
| | 0.448 | 0.400 |
| 7U | 0.447 | 0.408 |
| | 0.451 | 0.417 |
| | 0.458 | 0.418 |
| | 0.453 | 0.409 |
| 8U | 0.451 | 0.417 |
| | 0.456 | 0.426 |
| | 0.462 | 0.427 |
| | 0.458 | 0.418 |

Names and values in the file are separated by the tab character. Last selected set is stored in the file C:\GL Optic\GL_Spectrosoft\default\binning.pbp.

Brightness groups are stored in similar way. You can edit them, save and load using the second tab in Bin Editor.

Columns meaning:

1. Name of a group.
2. Brightness minimum value.
3. Brightness maximum value.

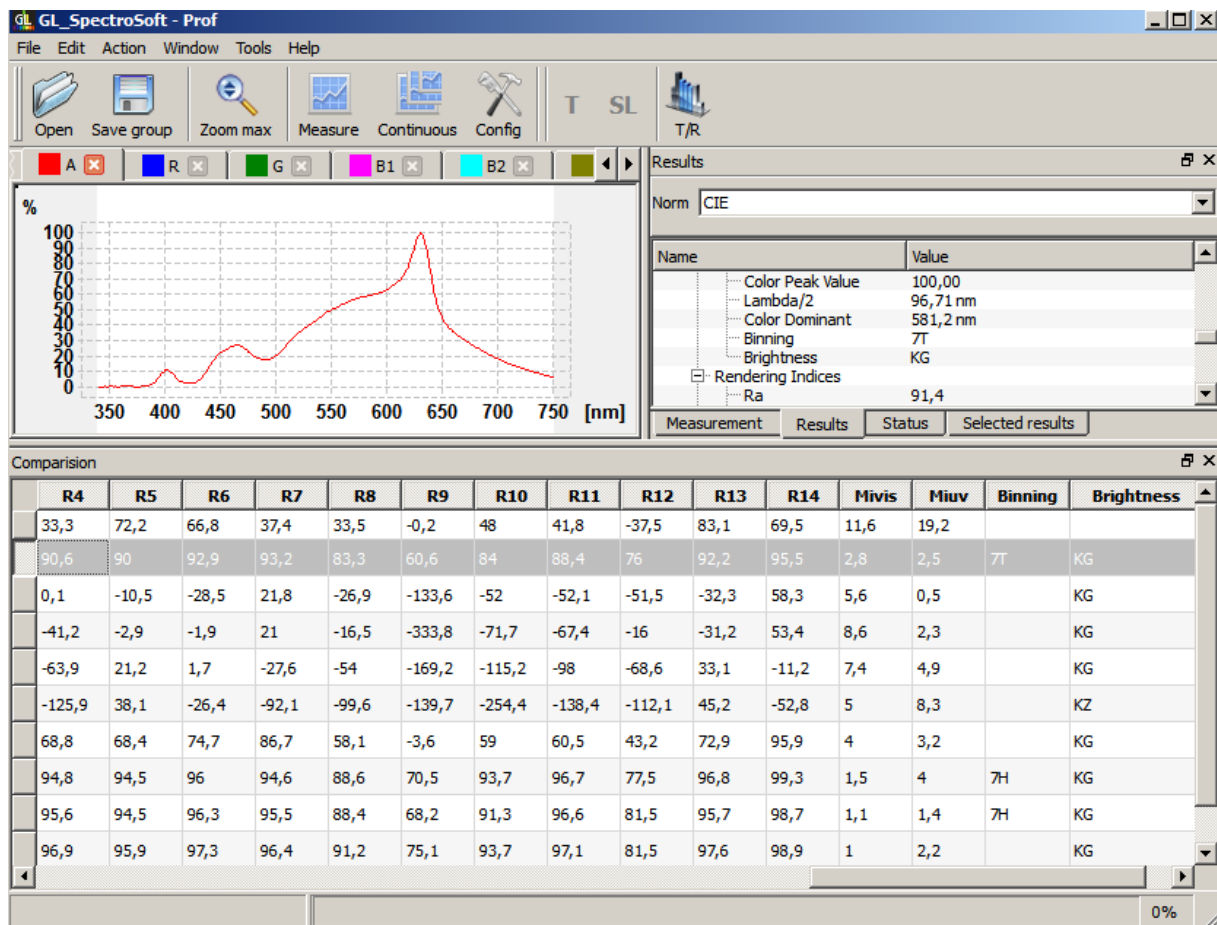


Sample text file structure is presented below:

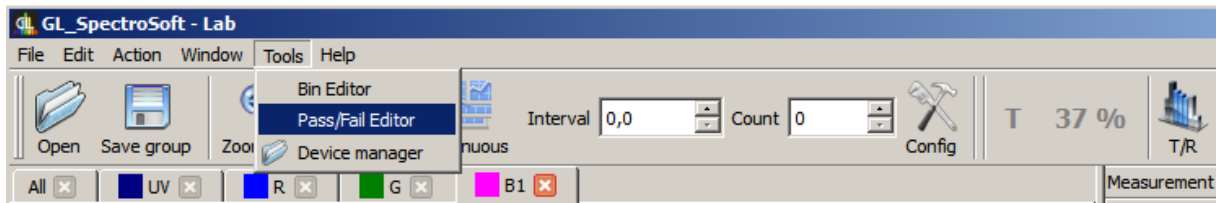
```
JZ    61    71
KX    71    82
KY    82    97
KZ    97   112
```

Names and values in the file are separated by the tab character. Last selected set is stored in the file C:\GL Optic\GL_Spectrosoft\default\brightness.plp.

When binning and brightness groups are defined, the appropriate names are presented in results window and comparison table for each measurement.

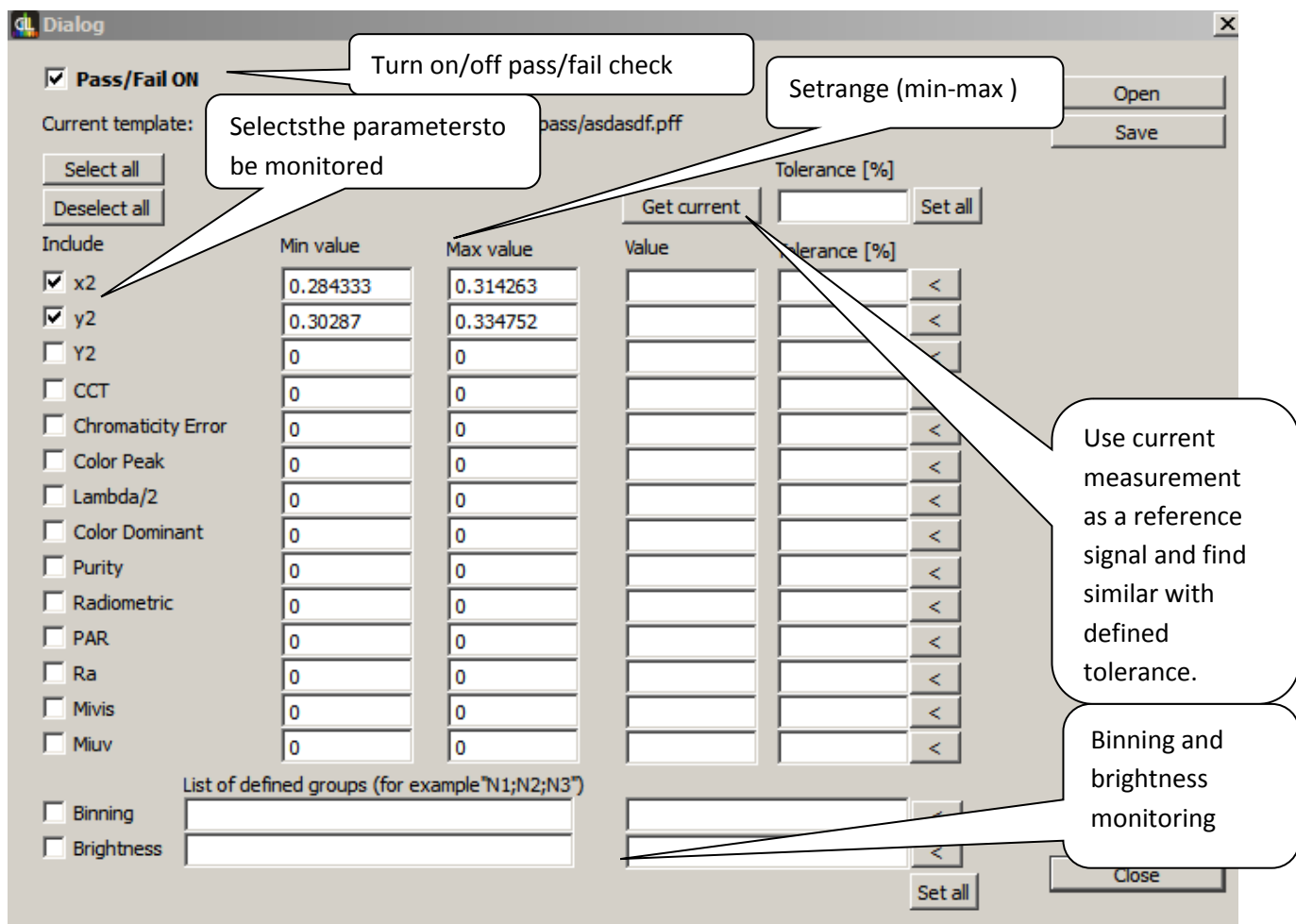


7.2 Pass/Fail Editor



Pass/Fail tool (Tools->Pass/Fail Editor) allows to define user conditions which light should meet and should be checked after a measurement.

Prepare conditions or open previously prepared and turn on pass/fail function.



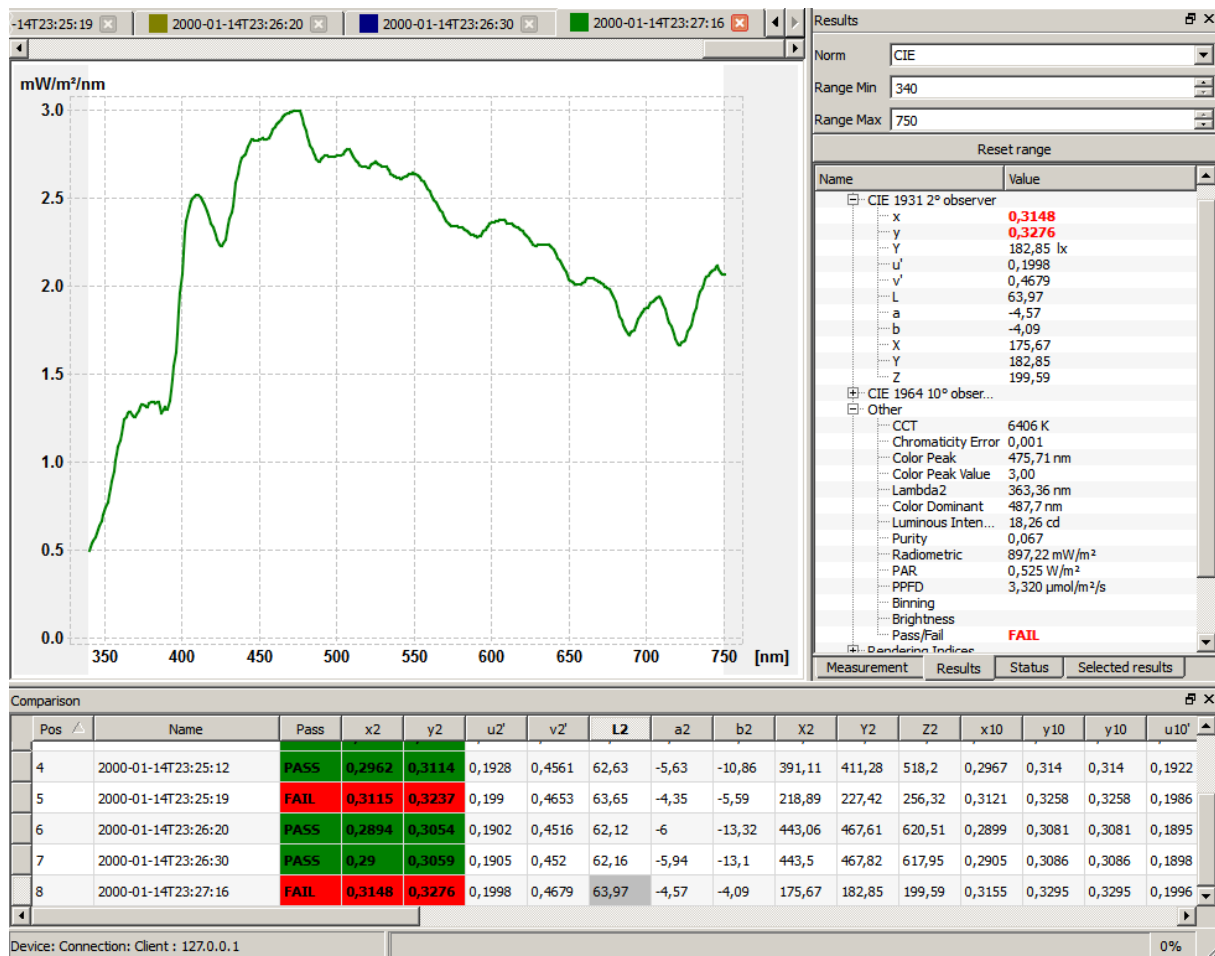
After measurement in results window and comparison table pass/fail check results are presented.

Each parameter which was selected to monitoring is shown as a:

- green - when meets conditions,
- red - when does not meet conditions,

what provides user with detailed information which parameters do not meet selected conditions.

Additionally Pass/Fail parameter shows the overall result of the test (PASS/FAIL). Using this parameter and the comparison table user can divide or compare measurements in an easy way.



8 Reports

A report template is a text file in HTML format. It can be created in any text or HTML. A generated report is opened in default HTML browser.

9 Practical Notes

- Make sure that the integration time is properly matched to the level of the tested source. The best results are obtained by measuring between 40% and 90% signal level. The value of the signal is visible on the top bar after each measurement.
- If recommended conditions and time of measurement allows set repeated measurements. This helps to reduce the impact of noise on the measurement results.
- When measuring narrow band light sources like LEDs set limited spectral range of the measurement. This significantly reduces the influence of stray light on the measurement results.

Printed in Germany – Subject changed without note

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