



PSI SpectraPen Mini Software User Guide

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PSI SpectraPen Mini Software



SOFTWARE INSTALLATION

- 1. Download the SpectraPen software from the PSI website <https://handheld.psi.cz/products/spectrapen-mini/#download> to your computer and launch the SpectraPen program.
- To activate all software features register the SpectraPen software as follows (Fig. 1).
- Select: Help > Register
- Enter serial registration number, which is available in the download section on PSI website
- Select: OK

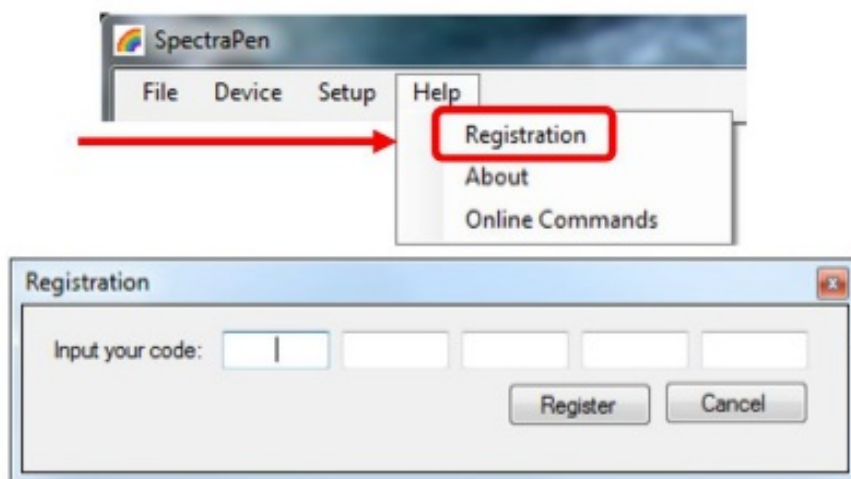


Fig. 1 Software registration.

It is not possible to download data from the SpectraPen device without software registration.

DATA TRANSFER

For data transfer from mobile application to your computer select Share and choose your preferred option (Fig. 2).

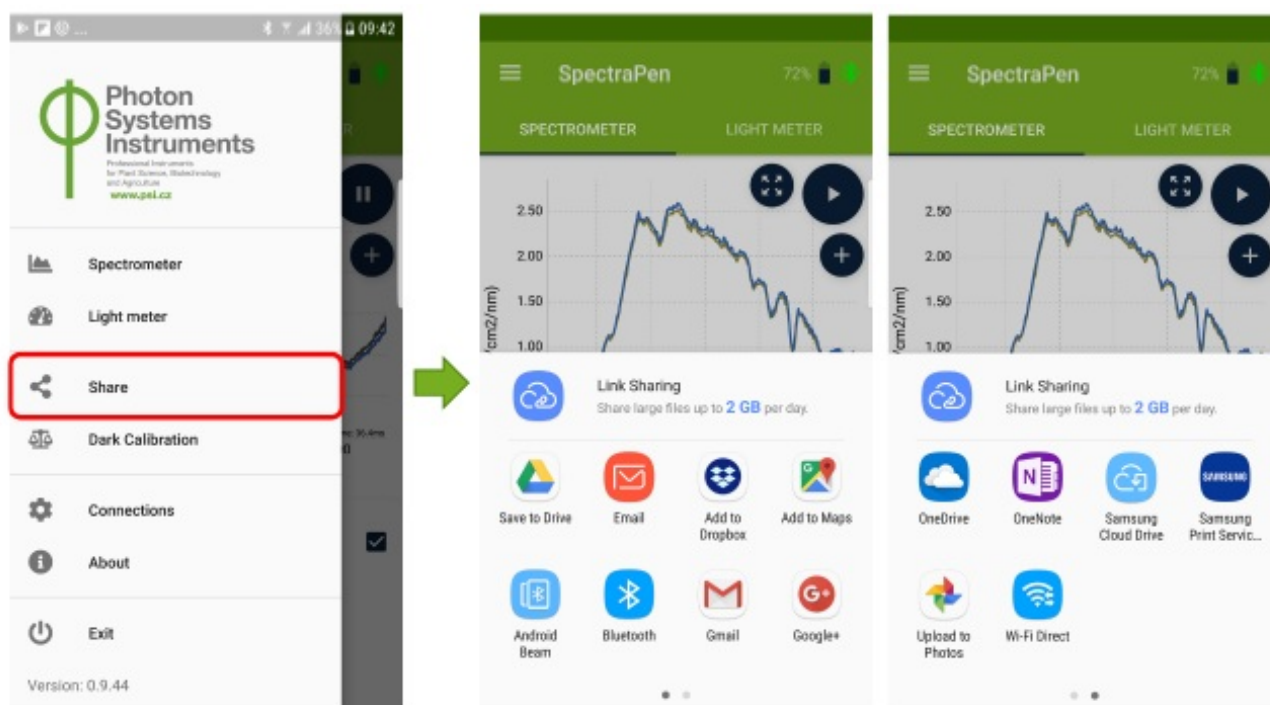


Fig. 2 Data export and sharing via available communication channels.

It is not possible to download data from the SpectraPen device without software registration.

Open your data in .spec format using the SpectraPen software (Fig. 3).

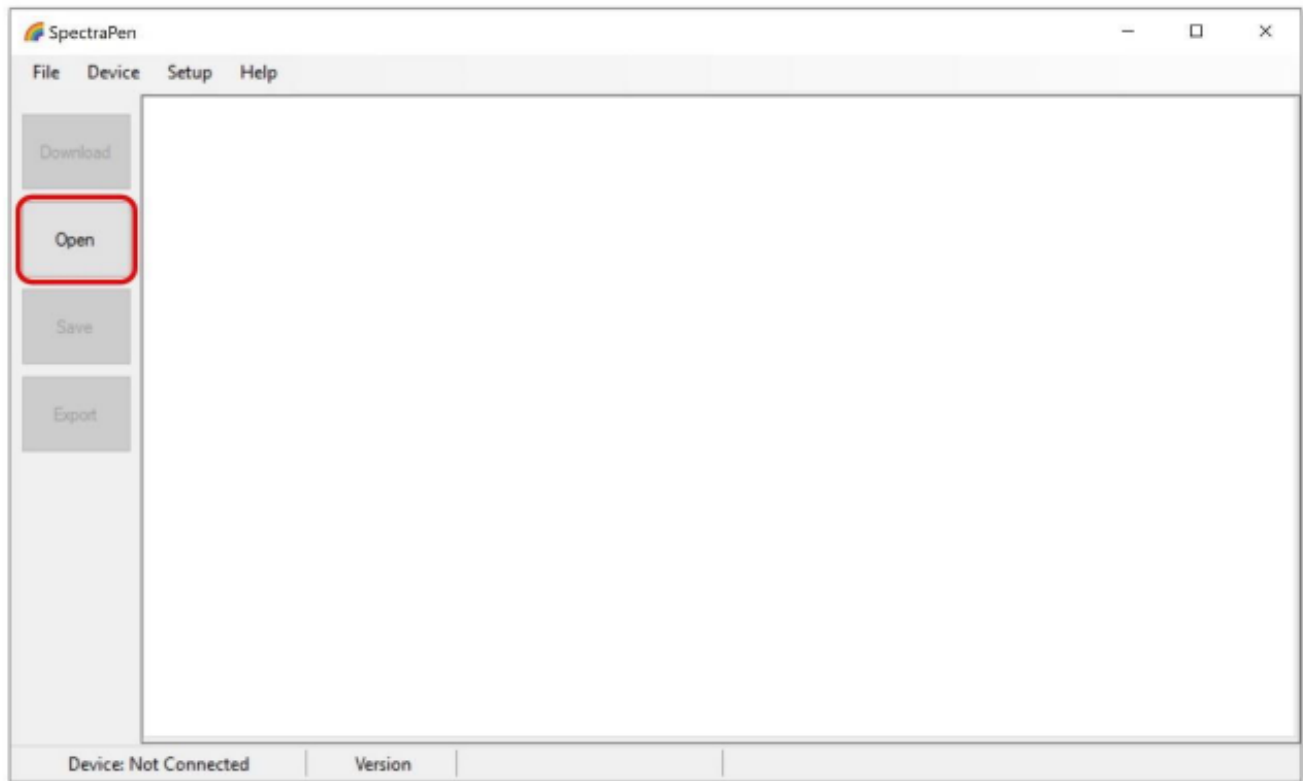
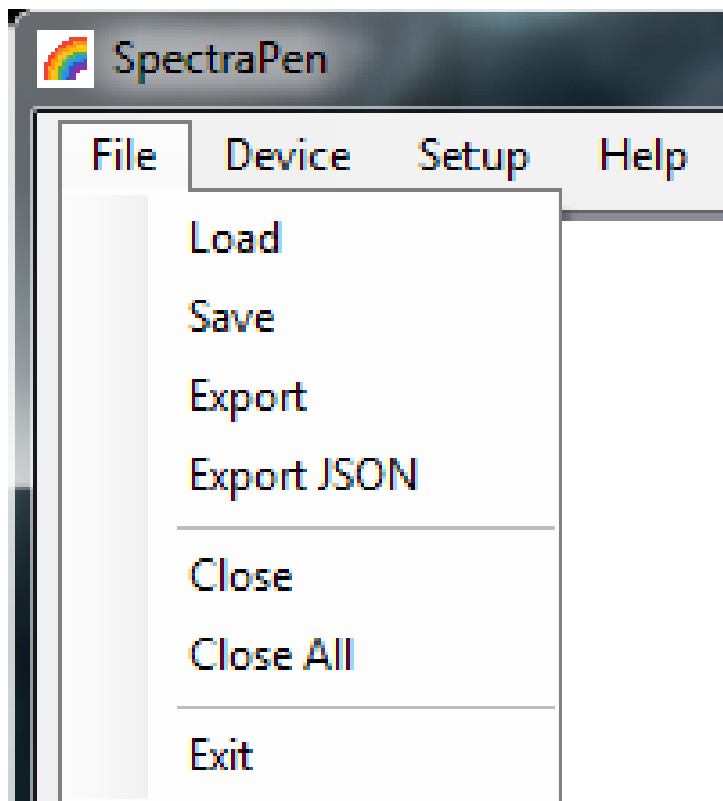


Fig. 3 Opening data in SpectraPen software.

SOFTWARE MENU

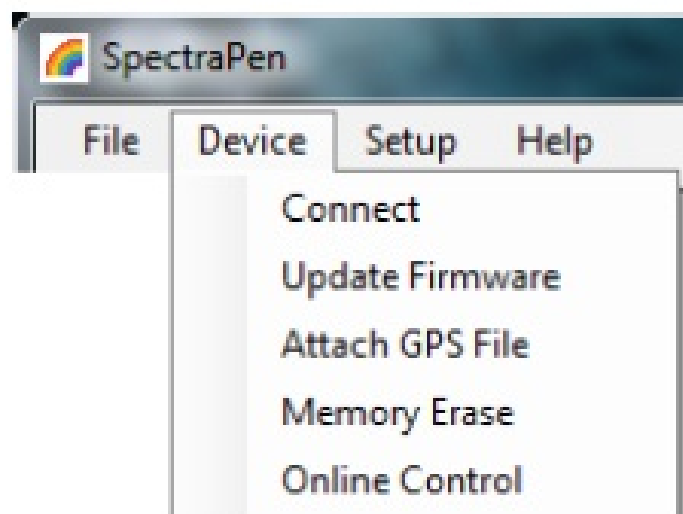
- | | |
|--------------------------|--|
| • MENU: | File |
| • Load : | Loads previously saved data files. |
| • Save: | Saves data to hard disc |
| • Export: | Exports data in .txt format. |
| • Export to JSON: | Exports data in JavaScript Object |
| • Close: | Notation. Closes the current experiment. |
| • Close All: | Closes all open experiments. |
| • Exit: | Exits the program |



MENU:

Device – NOT ACTIVE FOR SP mini

- **Connect :** Detects and connects the device.
- **Update Firmware :** Used for firmware updates.
- **Attach GPS File:** Used to download data from the GPS module of the old versions of the SpectraPen or PolyPen.
- **Memory Erase:** Erases data from the memory of connected device.
- **Online Control:** Online control of the device.

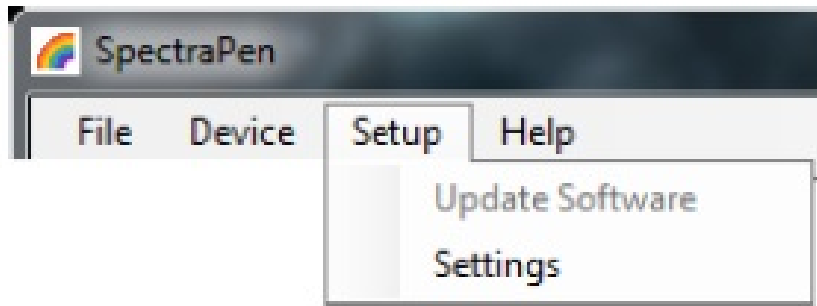


MENU:

Setup

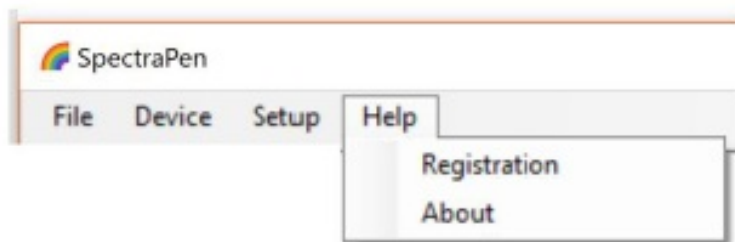
- **Update Software:** Used for software updates.

- **Settings:** On/off – Auto memory erase after download.
Selection of separator for the csv file after its export and following opening in Excel (TAB, SEMICOLON, COMMA, SPACE).



MENU: Help

- **Registration:** Used for the SpectraPen software registration.
- **About:** Offers basic information about the program



DATA VISUALIZATION

- Visualization modes: The scope mode window is always displayed as the default. To view, irradiance data go to the Irradiance tab (Fig. 4).

Scope :mode represents non-calibrated spectrum.

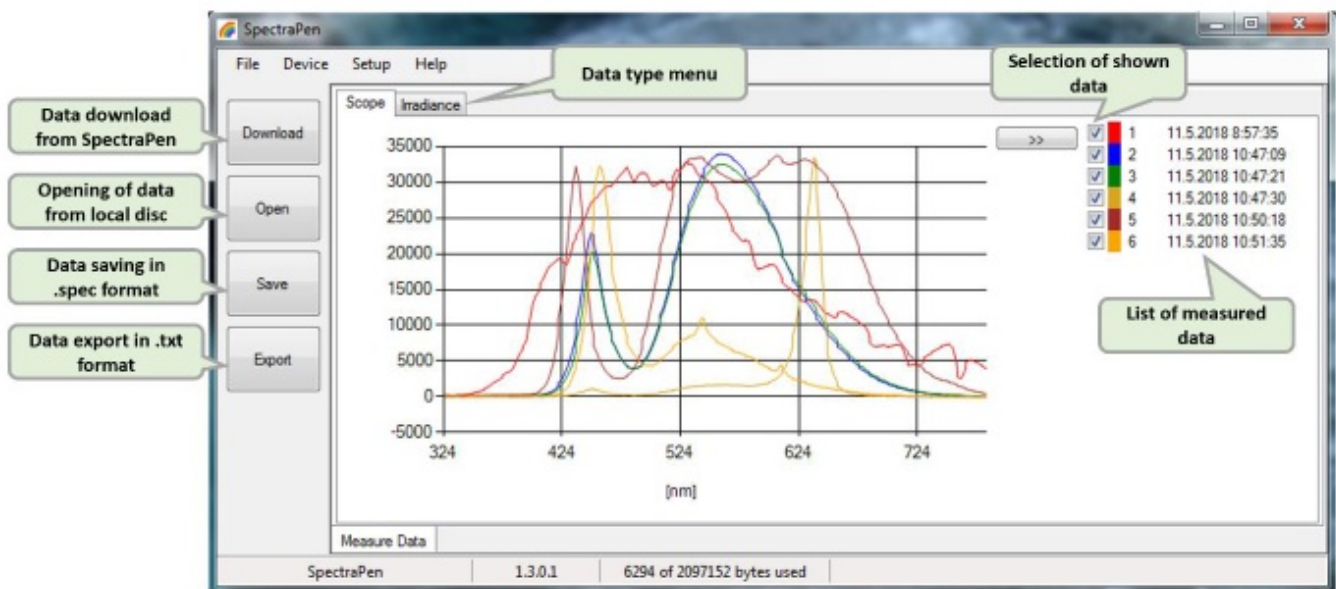


Fig. 4 Scope spectra.

- All data that are downloaded are displayed in the Scope window after download from the SpectraPen. The user can select the set of measurements to be displayed by marking and unmarking the data from the selection list (Fig. 4).
- Right click on list of measured data enables edit data name, delete selected measurement or show and hide all measured data in the graph– Select all measure and Clear all measure (Fig. 5).

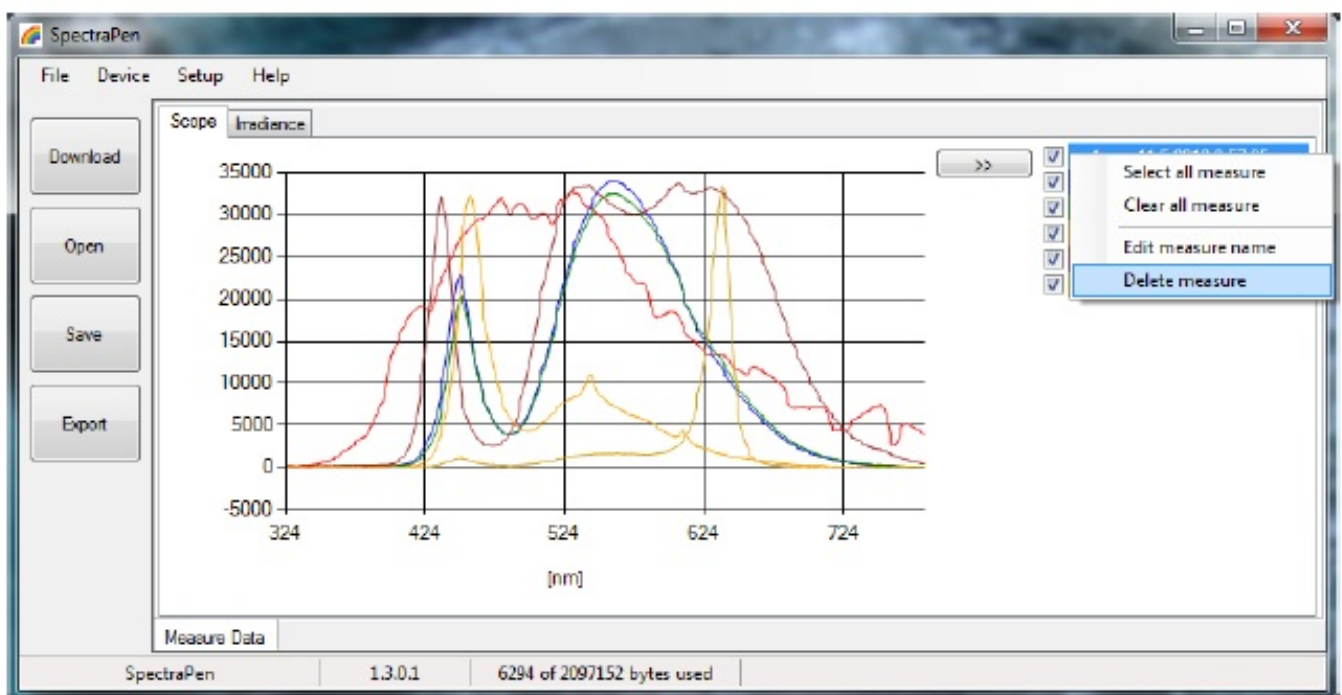


Fig. 5 Options for list of data.

- In the graph marker feature is available, which enables display of the numeric values for wavelength and light irradiance for the selected wavelength of the scan (Fig. 6). Use the mouse to select the given point. In top right corner of the graph (red rectangle) is displayed exact value for the selected point on the x-axis and y-axis.

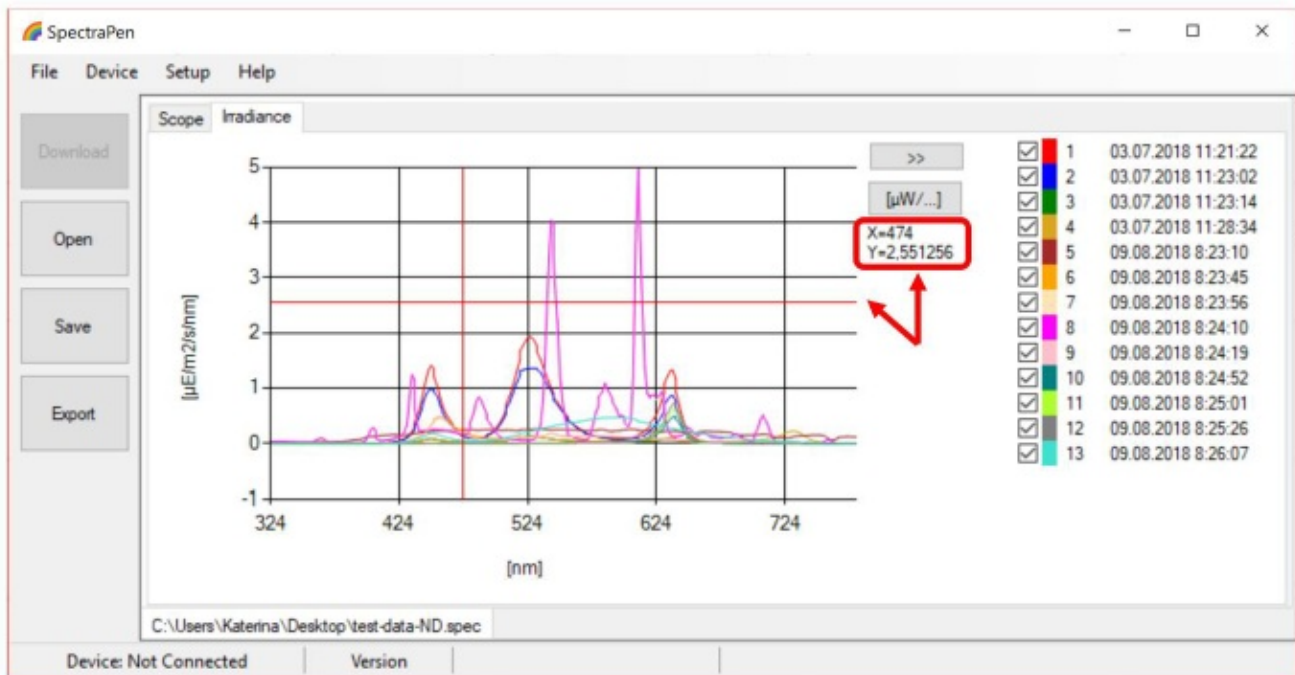


Fig. 6 Marker feature

- To zoom in on the data displayed in the graph select an area of the displayed graph (Fig. 7). To reverse these steps and return to original display use minus icon in the corners of the zoom area marked with red rectangles in Fig. 7.

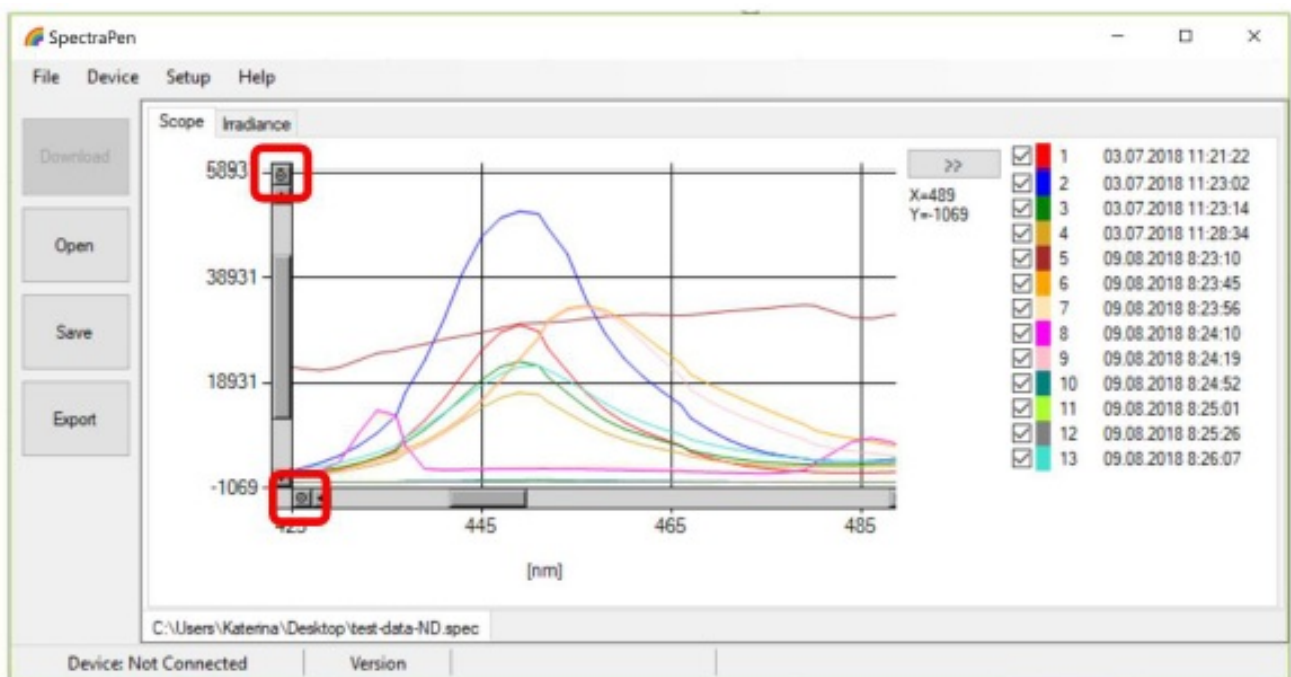


Fig. 7 Zoom function.

- Select Irradiance tab to view the irradiance data stored either as umol/m²/s/nm or per μWatts/cm²/nm. To change the units in which the spectra is displayed click on the unit icon as shown in (Fig. 8).
- To view the light meter data for the spectral scans acquired click on the unit icon as depicted by red arrow in Fig. 8. Irradiance and illuminance light meter numerical values for each scan are displayed as LUX, PAR or IRRADIANCE values (Fig.

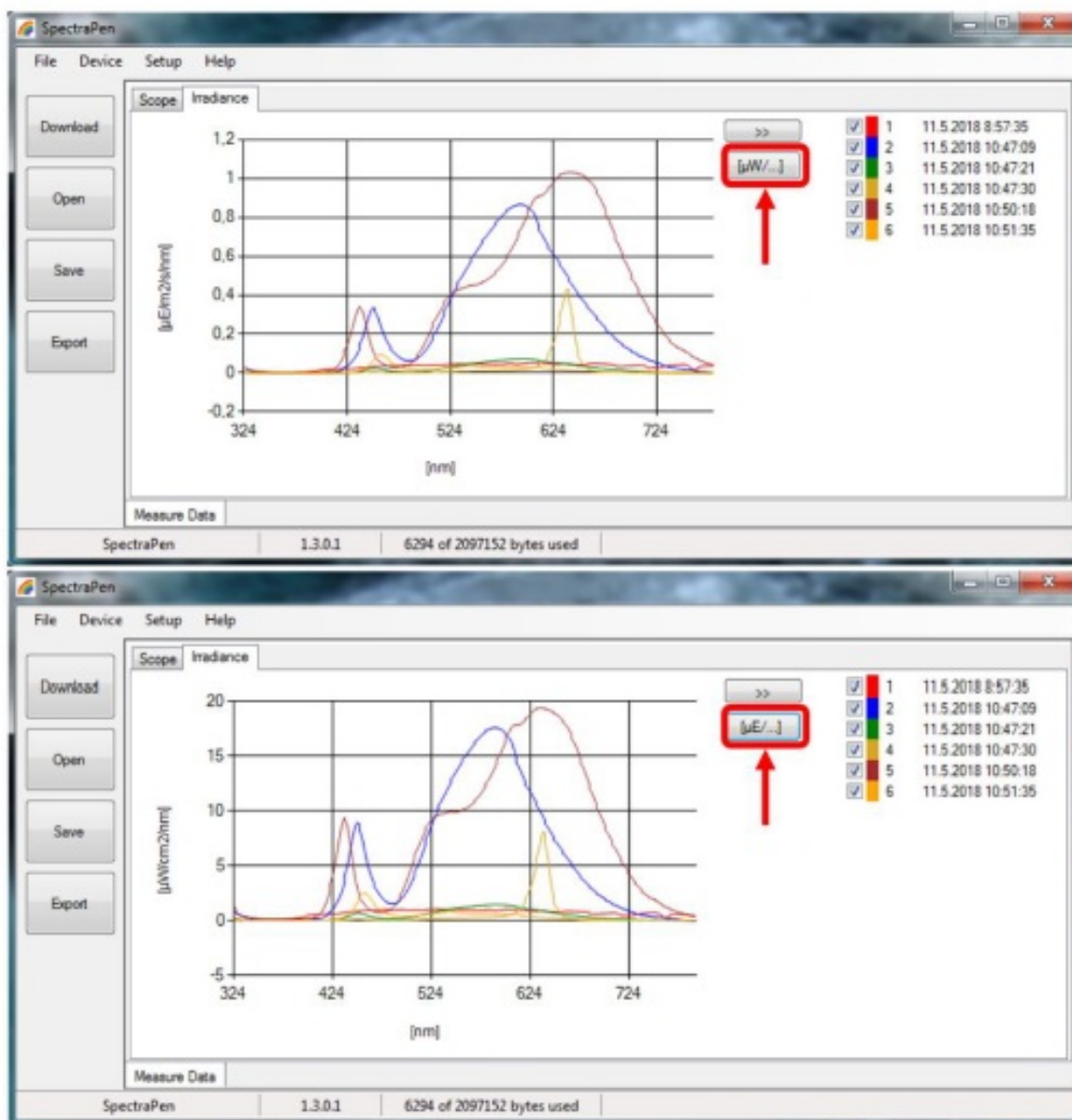


Fig. 8 Irradiance shown in different units.

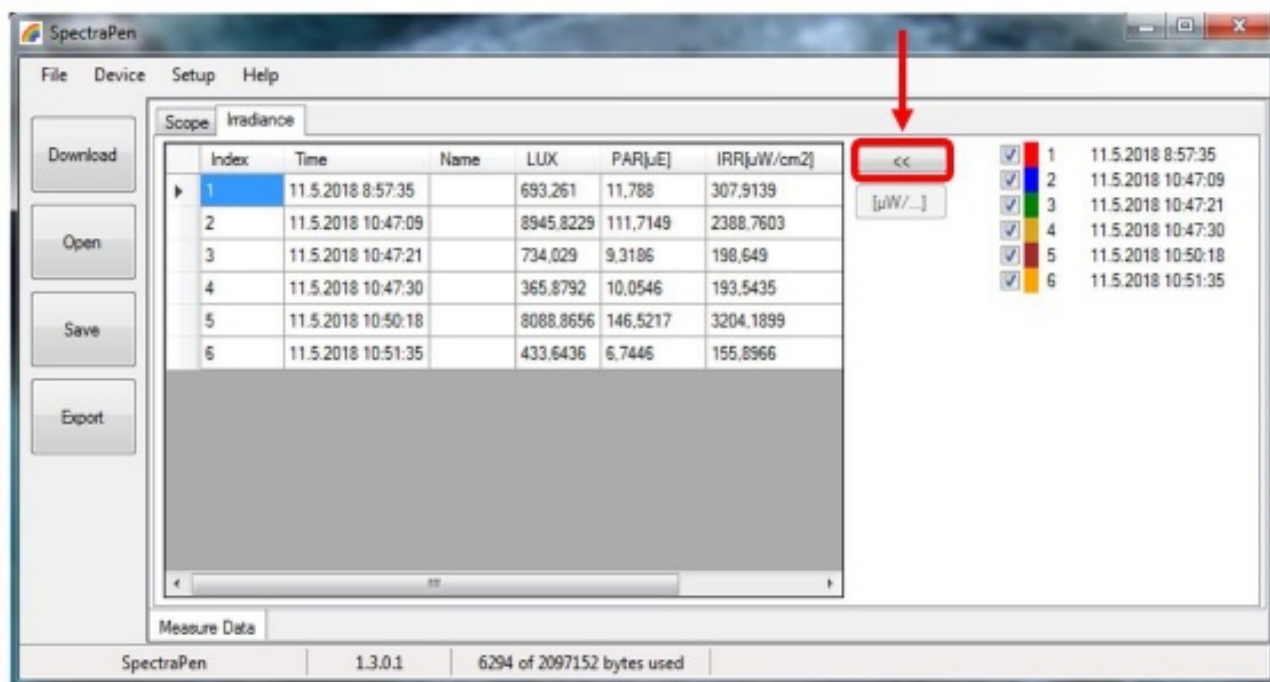


Fig. 9 Numerical values of measured light intensities.

- To Save the experiment select File>Save. All data stored in the device memory will be saved irrespective of the data selection in the SpectraPen software. The file will be stored as .spec. Spec files stores all Scope and Light meter data.
- Select File>Export to export the data in .txt format. Export function allows the user to specify the type of data. The options are: Spectrum (Fig. 10) – all raw scope data for entire range of measured wavelengths are exported including data for the dark scan. Spectrum scope – scope data normalized to dark spectrum scan are exported for all acquired scans or set of selected measurements.

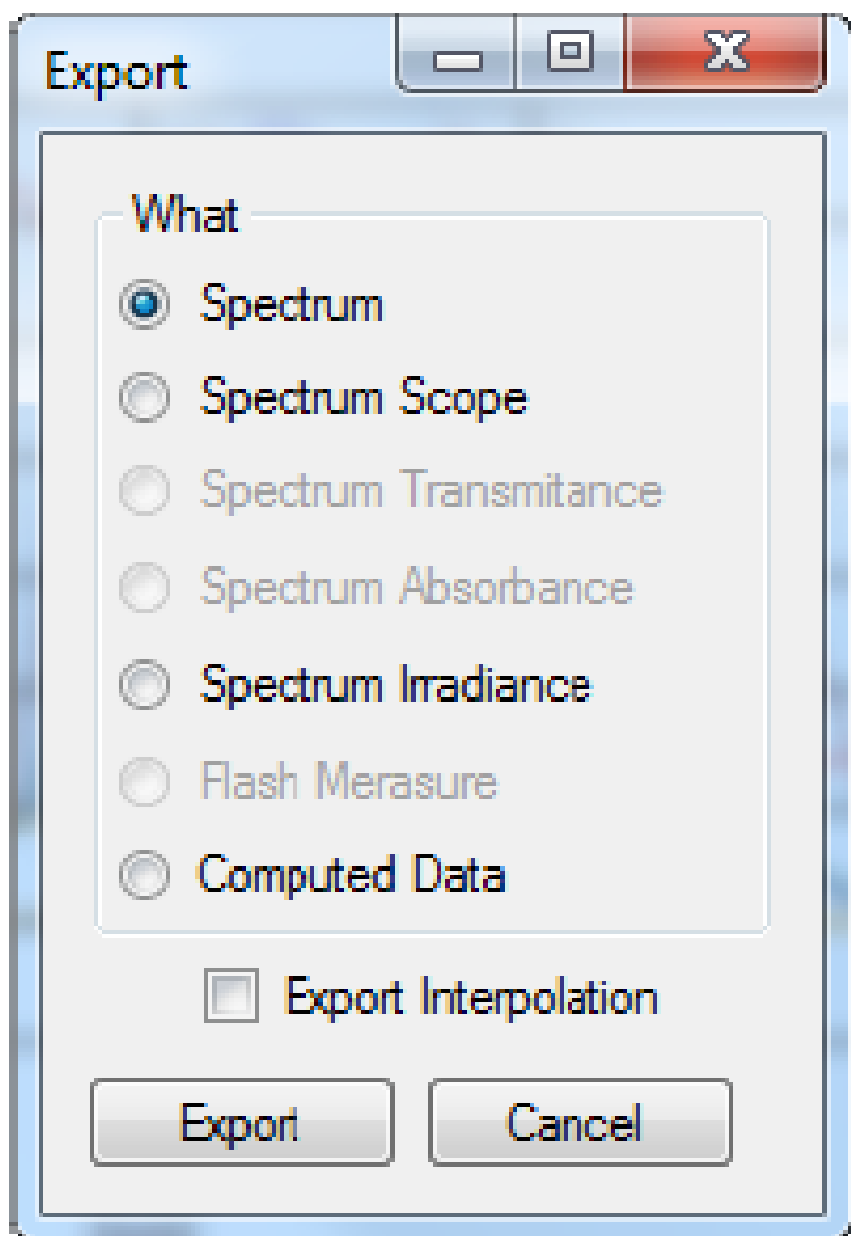


Fig. 10 Export options.

Spectrum Irradiance – irradiance data for all measurements are exported. The user can choose to export the numeric values either in $\mu\text{E}/\text{m}^2/\text{s}/\text{nm}$, $\mu\text{W}/\text{cm}^2/\text{nm}$ or both (Fig. 11).

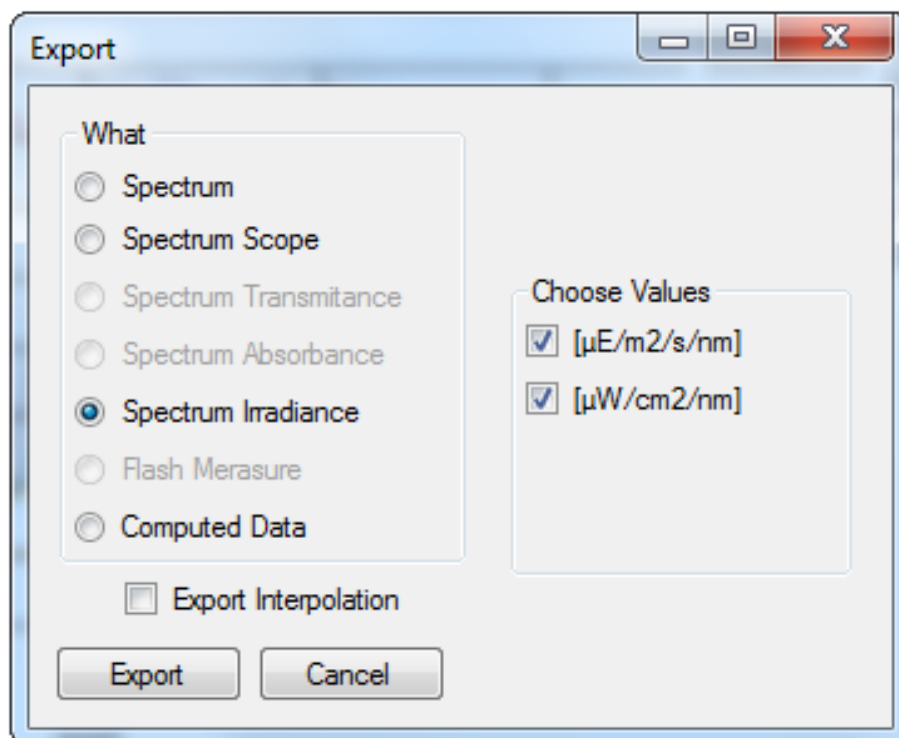


Fig. 11 Export of Irradiance spectrum.

Computed Data – computed numeric values for Scope and Irradiance are exported for all measurements. The user can choose if only Scope numeric values or Irradiance numeric values are exported. For irradiance values, numeric data for Photon flux density and PAR in $\mu\text{mol}/\text{m}^2/\text{s}$ units, irradiance in $\mu\text{W}/\text{cm}^2$ units and illuminance in LUX units are exported (Fig. 12).

Export interpolation – if this option is marked the spectrum is exported with step of 1 nm. Export interpolation – if this option is marked the spectrum is exported with step of 1 nm.

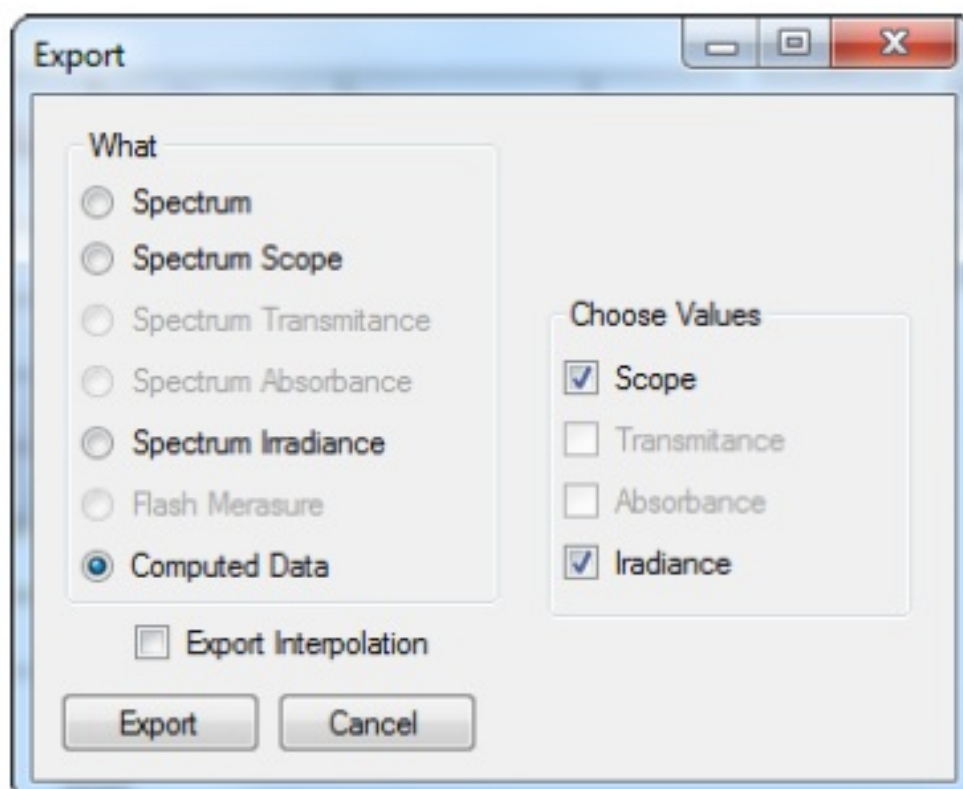


Fig. 12 Export of computed values.

TROUBLESHOOTING AND CUSTOMER SUPPORT

- In case of problems with the SpectraPen SW visit FAQ on our websites (<http://psi.cz/support/faq>) or contact customer support by email to support@psi.cz, or contact your local distributor.

APPENDIX

PROGRAMMING CUSTOM INDEX IN SPECTRAPEN

The SpectraPen software enables programming custom indexes, which can be used for wide range of calculation based on the measured spectrum.

- Go to the main SpectraPen folder in your PC (Usually in Program Files).
- Open the file Config > Formulas.txt.
- Write your index into this .txt file and save it (Fig. 13).

Index example:

Scope:PSIindex:PSI test index:Scope[600nm]/ Scope[500nm]

Scope – the index is placed in the bookmark Scope in data in the software

PSIindex – name of the index in the SpectraPen software and in exported data

PSI test index – full name of the index (not showed)

Scope[600nm]/ Scope[500nm] – equation for calculation; calculated from 500 and 600 nm of Scope spectra



```
Formulas - Poznamkovy blok
Soubor Úpravy Formát Zobrazení Návod
Transmittance:NDVI:Normalized Difference Vegetation Index:(Transmittance[780nm]-Transmittance[650nm])/(Transmittance[780nm]+Transmittance[650nm])
Transmittance:SR:Simple Ratio Index:Transmittance[780nm]/Transmittance[680nm]
Transmittance:MCARI:Modified Chlorophyll Absorption Ratio Index 1:1.2*(2.5*(Transmittance[780nm]-Transmittance[670nm]))-1.3*(Transmittance[780nm]-Transmittance[550nm])
Transmittance:OSAVI:Optimized Soil-Adjusted Vegetation Index:(1+0.16)*(Transmittance[780nm]-Transmittance[670nm])/(Transmittance[780nm]+Transmittance[670nm]+0.16)
Transmittance:G:Greenness Index:Transmittance[554nm]/Transmittance[677nm]
Transmittance:MCARI:Modified Chlorophyll Absorption Ratio Index:(Transmittance[700nm]-Transmittance[670nm])-(0.2*(Transmittance[700nm]-Transmittance[550nm]))*(Transmittance[780nm]/Transmittance[670nm])
Transmittance:TCARI:Transformed CAR Index:3*((Transmittance[700nm]-Transmittance[670nm])-(0.2*(Transmittance[700nm]+Transmittance[550nm]))*(Transmittance[780nm]/Transmittance[670nm]))
Transmittance:TVI:Triangular Vegetation Index:0.5*(120*(Transmittance[750nm]-Transmittance[550nm]))-200*(Transmittance[670nm]-Transmittance[550nm])
Transmittance:ZMI:Zarco-Tejada & Miller Index:Transmittance[750nm]/Transmittance[710nm]
Transmittance:SPRI:Simple Ratio Pigment Index:Transmittance[430nm]/Transmittance[680nm]
Transmittance:NPQI:Normalized Phaeophytinization Index:(Transmittance[415nm]-Transmittance[435nm])/(Transmittance[415nm]+Transmittance[435nm])
Transmittance:PRI:Photochemical Reflectance Index:(Transmittance[531nm]-Transmittance[570nm])/(Transmittance[531nm]+Transmittance[570nm])
Transmittance:NPQI:Normalized Pigment Chlorophyll Index:(Transmittance[680nm]-Transmittance[430nm])/(Transmittance[680nm]+Transmittance[430nm])
Transmittance:Ctri:Carter Indices 1:Transmittance[695nm]/Transmittance[428nm]
Transmittance:Ctri2:Carter Indices 2:Transmittance[695nm]/Transmittance[760nm]
Transmittance:Lic1:Lichtenthaler Indices 1:(Transmittance[700nm]-Transmittance[680nm])/(Transmittance[700nm]+Transmittance[680nm])
Transmittance:Lic2:Lichtenthaler Indices 2:Transmittance[440nm]/Transmittance[690nm]
Transmittance:SIP:Structure Intensive Pigment Index:(Transmittance[780nm]-Transmittance[450nm])/(Transmittance[780nm]+Transmittance[650nm])
Transmittance:GMI:Gitelson and Merzlyak Indices 1:Transmittance[750nm]/Transmittance[550nm]
Transmittance:GMI:Gitelson and Merzlyak Indices 2:Transmittance[750nm]/Transmittance[780nm]
Transmittance:ARI1:Anthocyanin Reflectance Index 1:1/Transmittance[550nm]-1/Transmittance[780nm]
Transmittance:ARI2:Anthocyanin Reflectance Index 2:Transmittance[790nm]*(1/Transmittance[550nm]-1/Transmittance[780nm])
Transmittance:CRI1:Carotenoid Reflectance Index 1:1/Transmittance[510nm]-1/Transmittance[550nm]
Transmittance:CRI2:Carotenoid Reflectance Index 2:1/Transmittance[510nm]-1/Transmittance[780nm]
Transmittance:RDVI:Renormalized Difference Vegetation Index:(Transmittance[780nm]-Transmittance[670nm])/(Transmittance[780nm]+Transmittance[670nm])^0.5
Irradiance:LUX:683*Integral(IrradianceL,380nm,780nm)
Irradiance:PAR[uE]:PAR[uE]:Integral(IrradianceL, 400nm, 700nm)
Irradiance:IRR[uW/cm2]:Irradiance[uW/cm2]:Integral(IrradianceL, 340nm, 780nm)
Irradiance:IRR:IRR:1000*Irradiance[uW/cm2]
Scope:PSIindex:PSI test index:Scope[600nm]/ Scope[500nm]
```

- Restart the SpectraPen Software.
- The new index appears in the selected bookmark in the data (Fig. 14).
- For export of this index choose the option “Computed values” and selected spectrum in the export table.

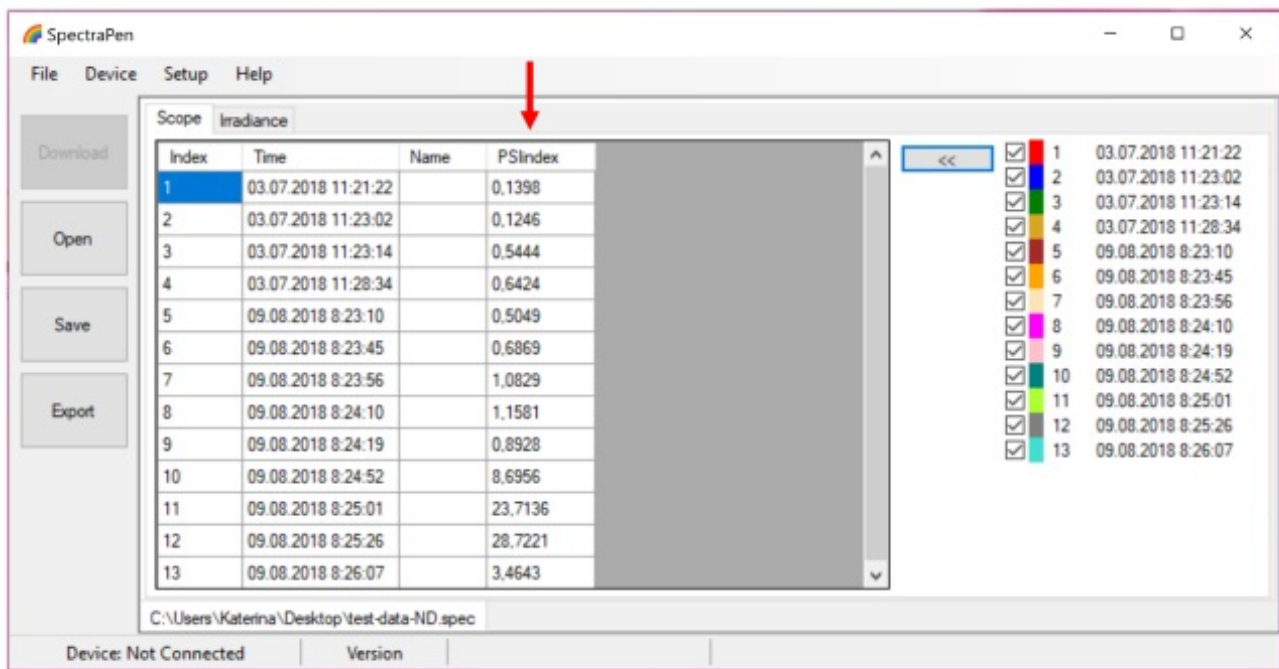


Fig. 14 New index.

FUNCTION DESCRIPTION

Different mathematical functions can be used in SpectraPen software syntax to create new custom formulas. min, max –

min(value1, value2) value1 – number, variable, function value2 – number, variable, function – only one value can be function! min(array) min(array)

- **example1:** max(Scope)
- **example2:** min(Irradiance)
- **example3:** min(Scope[760nm], max(Scope[450], Scope[680]))
- **example4:** max(Irradiance[550nm], (5+4)*4)

ln – the natural
(base e) logarithm of specified number

ln(value) value – number, variable, function

- **example1:** ln(5)
- **example2:** ln(Irradiance[760nm])
- **example3:** ln(max(Irradiance [550nm], Irradiance[480nm]))
- **example4:** ln((5+4)*4)

log – the
logarithm of specified number in a specified base.

logB(value) B – base – number value – number, variable, function

- **example1:** log2(5)
- **example2:** log5(Scope[760nm])

- **example3:** $\log_{10}(\max(\text{Scope}[550\text{nm}], \text{Scope}[480\text{nm}])))$
- **example4:** $\log_{10}((5+4)*4)$

sqrt – the square root of a specified number

sqrt(value) value – number, variable, function

- **example1:** sqrt(5)
- **example2:** sqrt(Scope[760nm])
- **example3:** sqrt(max(Scope[550nm], Scope[480nm]))
- **example4:** sqrt(((5+4)*4) + 6)

^ – specified number raised to the specified power

value^power value – number, variable, function power – number, variable, function

- **example1:** Irradiance[760nm]^ Irradiance[550nm]
- **example2:** min(Irradiance[760nm], Irradiance[550nm])^max(Irradiance[435nm], Irradiance[430nm])\
- **example3:** Transmittance[760nm]^0.5

integral – express the area under the curve of a graph of the function in the interval

integral(function_values, from, to) function_values – input values for integral compute from,to – limit values

- **example1:** integral(IrradianceL, 360nm, 700nm)
- **example2:** integral(IrradianceE, 360nm, 700nm) * IrradianceE[450]

Documents / Resources

	PSI SpectraPen Mini Software [pdf] User Guide SpectraPen Mini Software
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