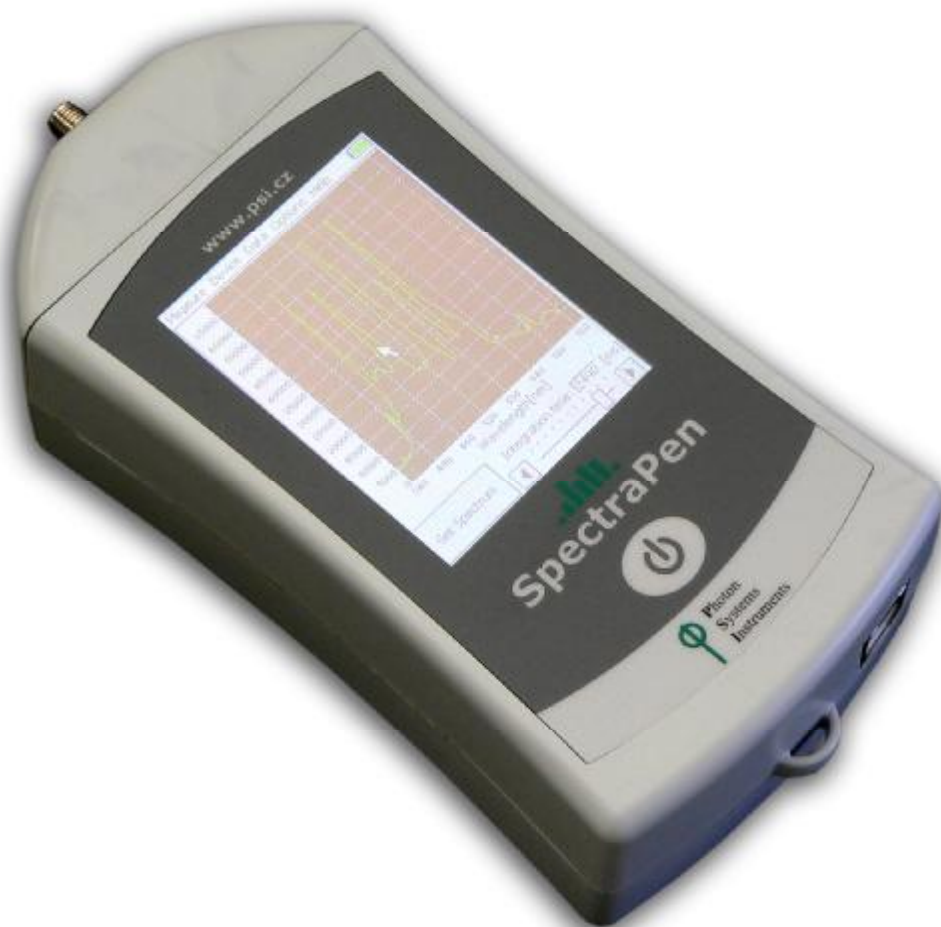


SpectraPen SP100

Operation Manual



Please read this guide before operating the SpectraPen device

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1. Technical Specification

Spectral response range:

SP100-UVIS: 340 nm-780nm

SP 100-NIR: 640 nm - 1050 nm

Spectral response half width:

SP100-UVIS: 9

SP 100-NIR: 8

Optical entrance:

SMA905 to 0.22 numerical aperture single-stand optical fiber

Spectral straylight*:

-30dB

Wavelength Reproducibility:

+/- 0.5 nm

Integration time:

5 ms to 10 s

Number of pixels:

256

System data:

16 bit AD conversion

Dynamic range:

High gain: 1:4300; Low gain: 1:13000

Communication:

USB

SpectraPen Software:

Windows XP, or higher compatible**

Memory Capacity:

Up to 32Mb

Internal Data Logging:

Up to 8000 measurements

Display:

240x320 pixel; 65k colors; touch screen

Battery:

Li-ion; rechargeable via USB port of a PC

Battery Life:

48 hours typical with full operation

Size:

15 x 7.5 x 4 cm

Weight:

300 g, 10.6 oz

Case:

Splash-proof

Operating Conditions:

Temperature: 0 to 55 °C; 32 to 130 °F Relative humidity: 0 to 95 % (non-condensing)

Storage Conditions:

Temperature: -10 to +60 °C; 14 to 140 °F Relative humidity: 0 to 95 % (non-condensing)

Warranty:

1 year parts and labor (see the last page of this Operation Manual for precise warranty conditions)

** When monochromatic light of $\lambda = 550 \text{ nm}$ or $\lambda = 850 \text{ nm}$ is input, spectral stray light is defined as the ratio of the count measured at the input wavelength, to the count measured at a wavelength 40 nm longer or shorter than the input wavelength*

*** Windows is a registered trademark of Microsoft Corporation.*

2. General Information

SpectraPen is a handheld spectrophotometer powered by a Li-ion re-chargeable battery. It does not require any PC as the light, wavelength and intensity readings are instantly shown on the SpectraPen touch screen display. The PC is used to plug in the SpectraPen for charging of the battery and data transfer. Measured are the following parameters:

Scope - rough spectrum data

Absorbance - calculated data using the following formula

$$A = \log(I_0/I)$$

Where: I_0 is reference light intensity
 I is measured light intensity

Transmittance - calculated data using the following formula

$$T = I/I_0$$

Where: I_0 is reference light intensity
 I is measured light intensity

3. List of Equipment

Carefully unpack the carton. You should have received the following items:

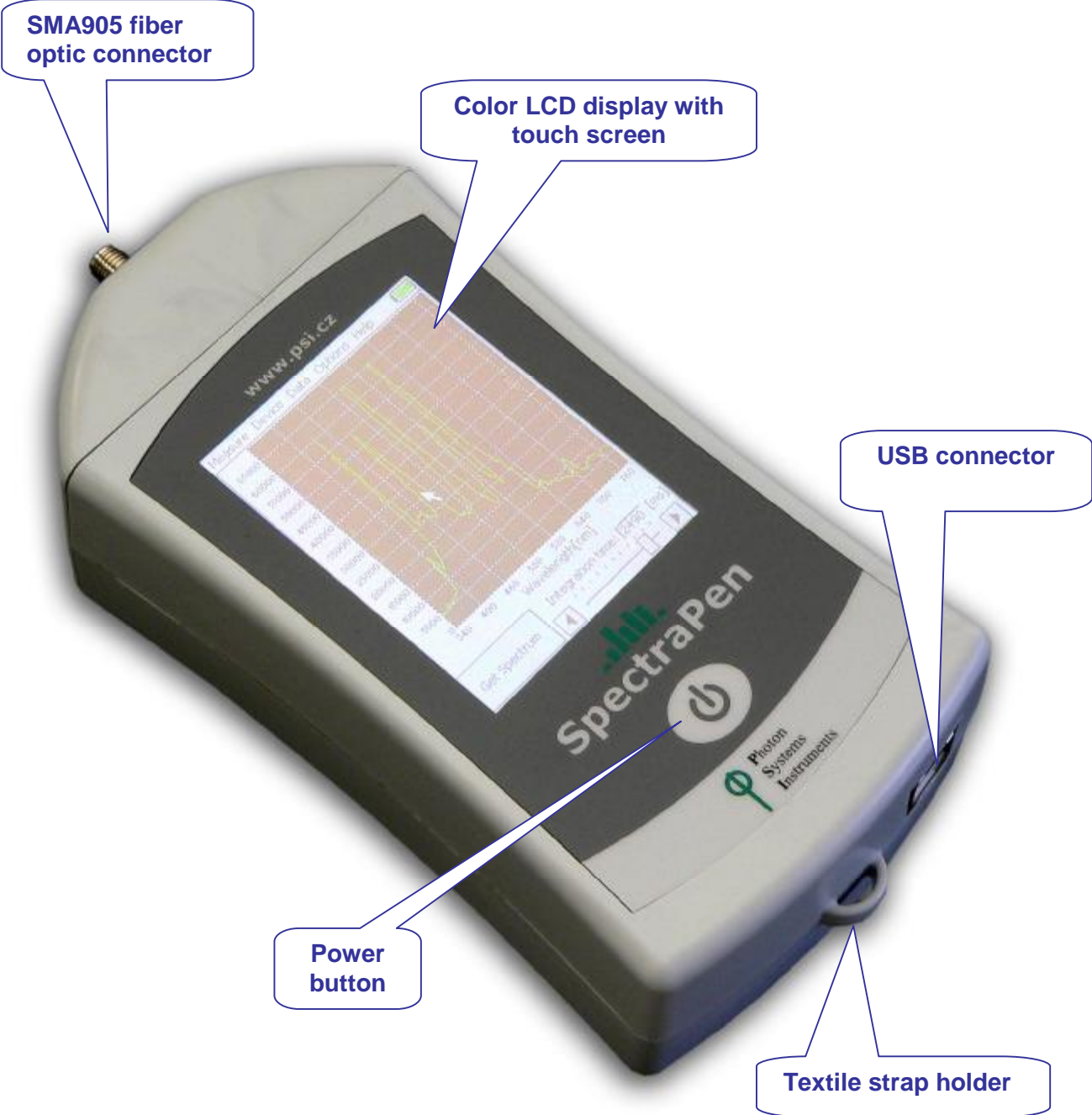
- SpectraPen SP100
- Stylus
- Carrying Case
- Textile Strap for Comfortable Wearing
- This Operation Manual (*on a CD or a printed version*)
- Install CD with the SpectraPen software and driver
- USB Communication Module
- Other Accessories or Optional Features (*according to your specific order*)

Note:

If any item is missing, please, contact the manufacturer. Also check the carton for any visible external damage. If you find any damage, notify the carrier and the manufacturer immediately. The carton and all packing materials should be retained for inspection by the carrier or insurer.

For customer support, please write to: support@psi.cz

4. Physical Features



5. Care and Maintenance

- Never submerge the device in water!
- The device should not come in contact with any organic solvents, strong acids or bases.
- § Battery life is approximately 48 hours when the SpectraPen is operated continuously.

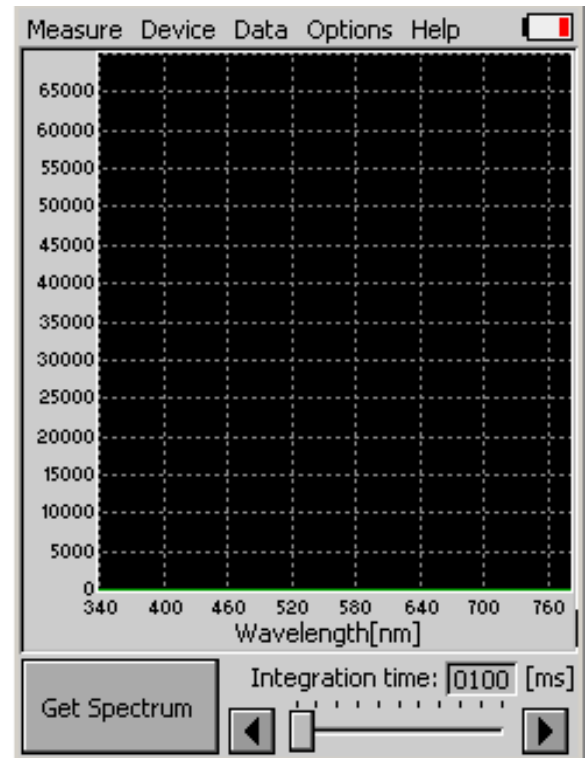
6. Operation Instructions

To switch the SpectraPen on, press Power button until the logo shows up.

Main screen:

Get Spectrum - measures and saves spectrum to the internal memory

Integration Time - move the slider to set measuring time



Main menus:

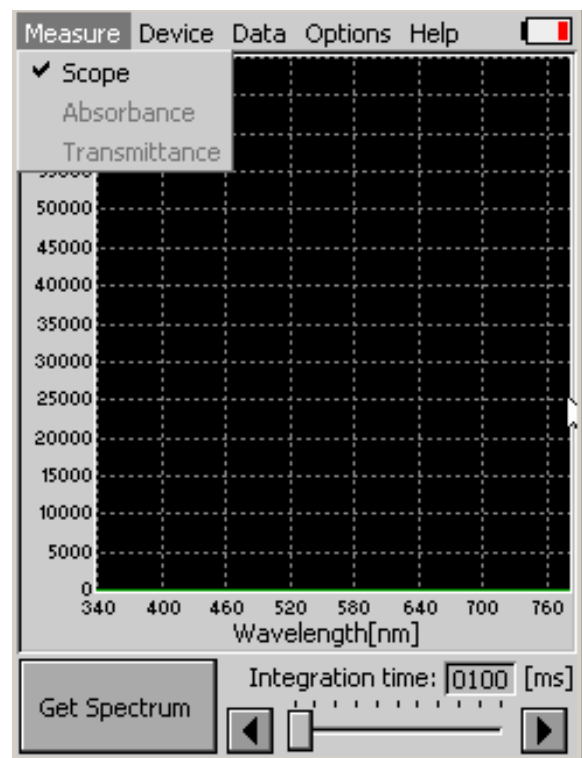
Measure:

Scope - rough spectrum data

Absorbance - calculated data

Transmittance - calculated data

-for absorbance and transmittance calculation a reference needs to be obtained first (light without the sample in the optical path)



Device:

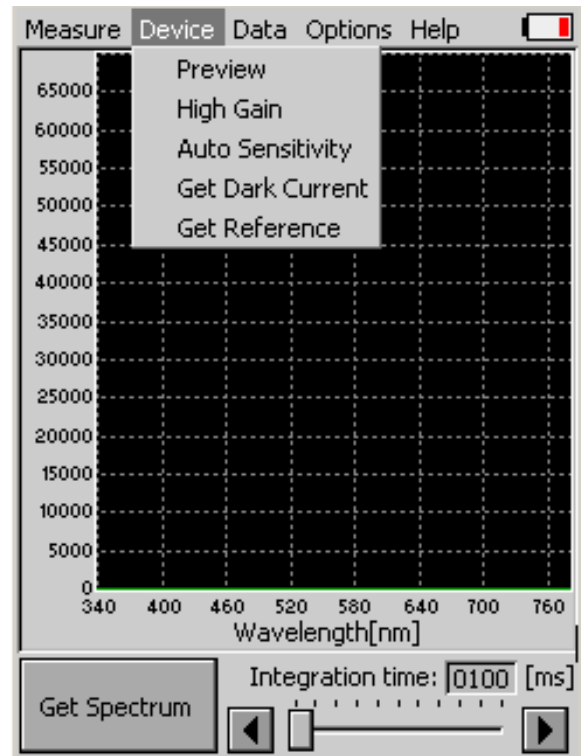
Preview - if checked, spectrophotometer continuously measures and displays current data, data is stored only after Get Spectrum button is pressed.

High Gain - if checked, high sensitivity mode is enabled.

Auto Sensitivity - if checked, integration time and gain is set automatically to reach optimal signal/noise ratio.

Get Dark Current - check to get dark current. After that, dark current is automatically subtracted from measured data.

Get Reference - check to get reference spectrum without the sample in the optical path. A reference needs to be obtained for absorbance or transmittance measurements.

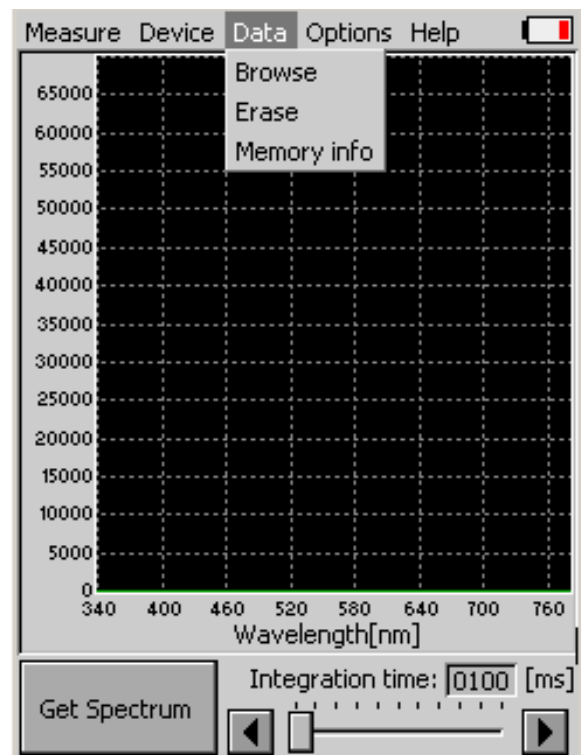


Data:

Browse - displays data browse dialog box

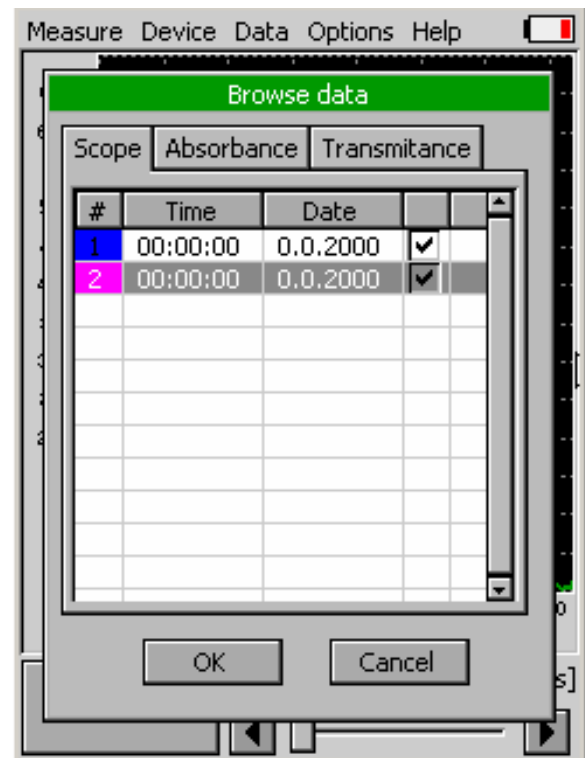
Erase - use this to erase internal data memory

Memory info - displays info on used memory



Browse data:

- select data type to be displayed (scope, absorbance or transmittance)
- up to 3 sets of data can be displayed at once
- data is displayed according to selected mode, i.e. if scope is activated only checked scope data are displayed



Settings:

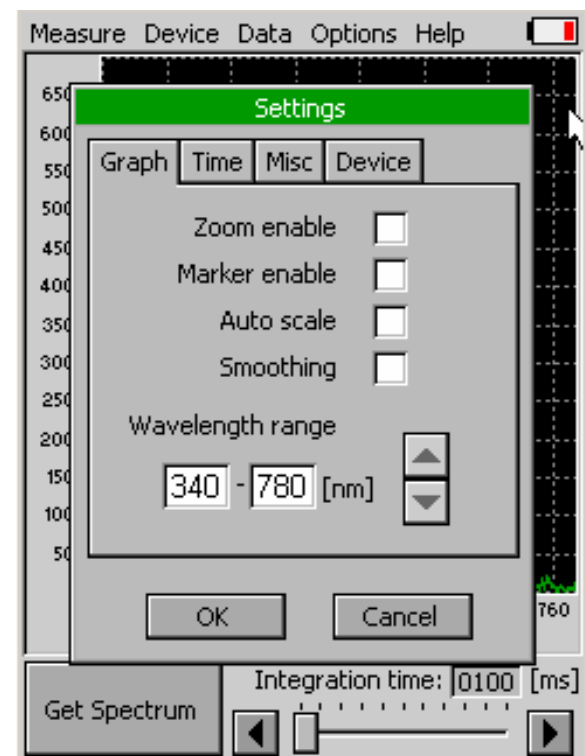
Graph:

Zoom enable - enables the zoom feature. With the stylus select an area (in the right-down direction) of the displayed graph to be enlarged. Reverse these steps to return to the original display.

Marker enable - enables display of the numeric coordinates of the point touched on the graphical display (in the right hand corner).

Auto scale - enables the auto scale of the y-axis. The Y axis is automatically adjusted according to measured values.

Smoothing - enables noise reduction of the graphical display.

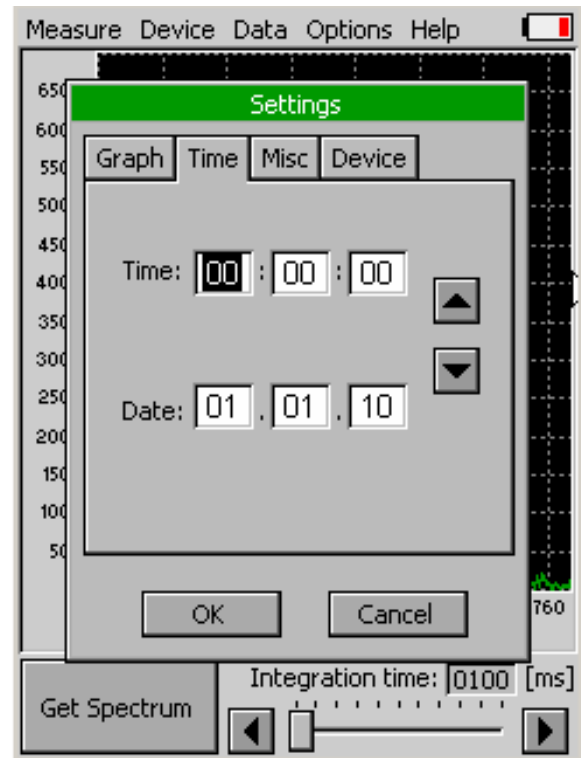


Wavelength range - select desired wavelength range for measurements or display of data by touching one of the values and adjust it via arrows

Time:

-displays actual time and date (all data files are stored by time and date signature)

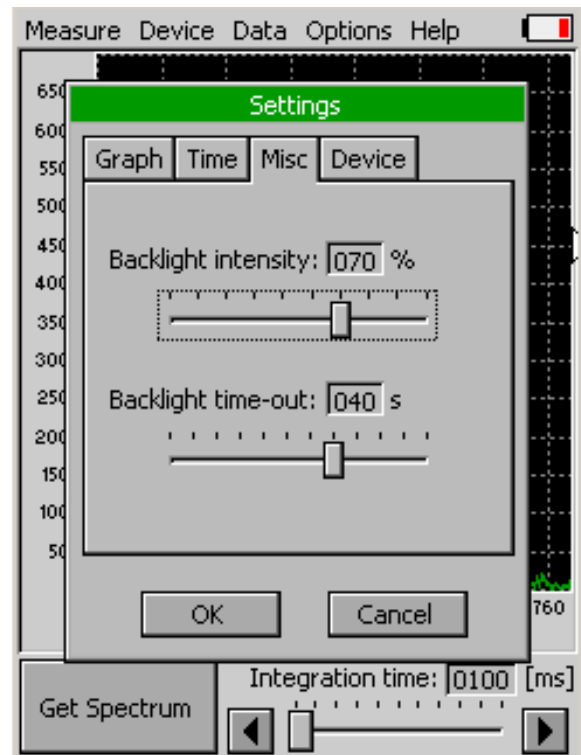
-to change time touch on one of the values and adjust it via arrows



Miscellaneous:

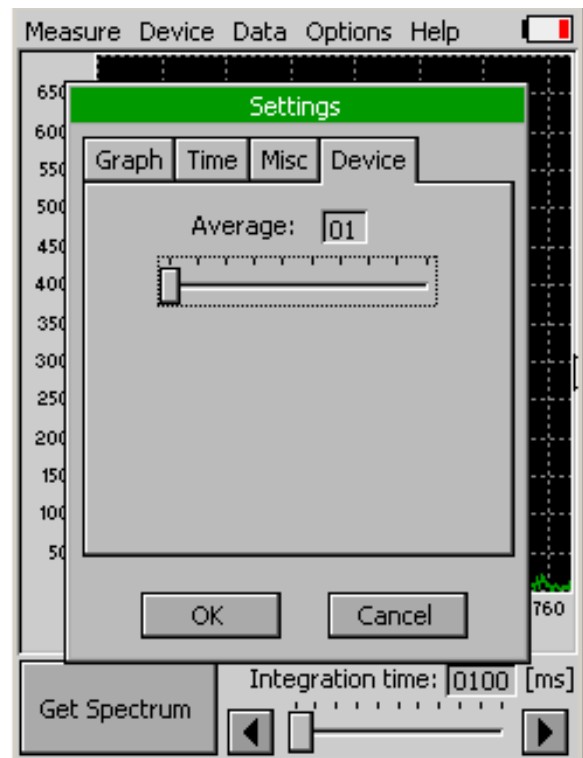
Backlight intensity - move slider to adjust backlight intensity

Backlight time-out - move slider to adjust backlight time-out (time of inactivity required before backlight will dim out to save battery life).



Device:

Average - move slider to set display of averaged values



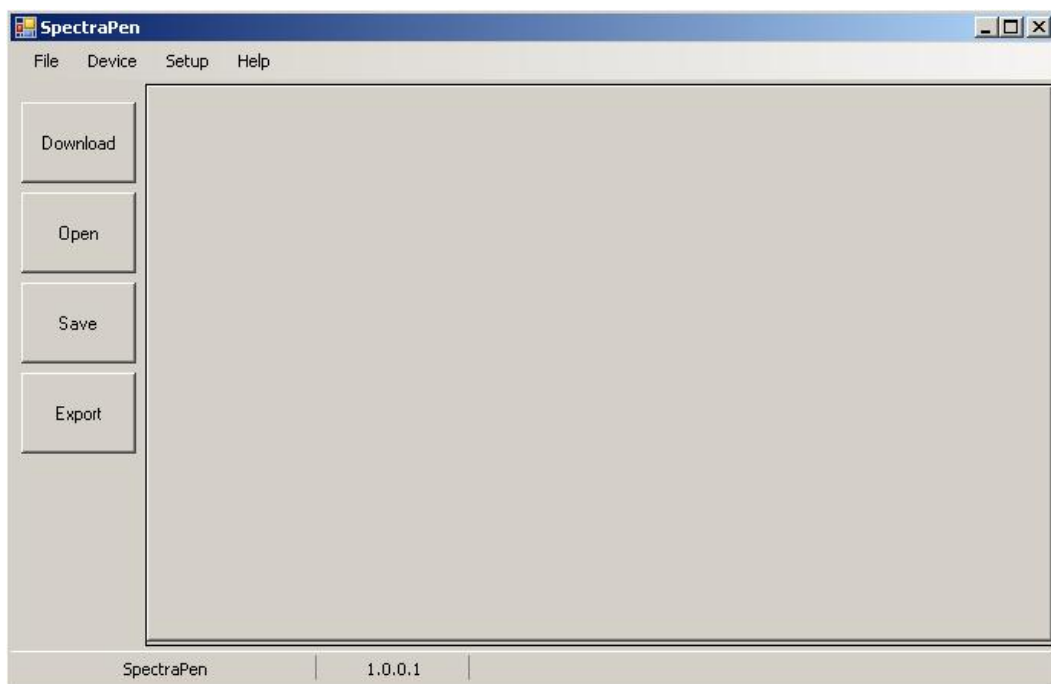
7. SpectraPen Software

Starting up:

1. Switch on the computer.
2. Switch on the SpectraPen and connect to PC via USB cable
3. If you connect the device for the first time please install USB driver which is located on the install CD
3. Copy SpectraPen program to your computer and start the SpectraPen program.

Connecting:

Select: Device->Connect

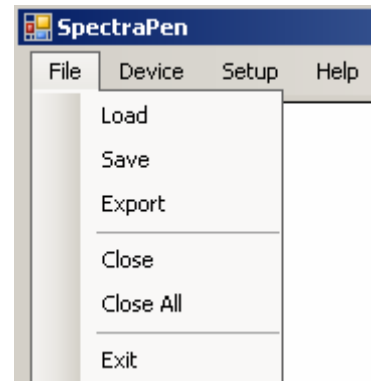


If properly connected, the message "Device: SpectraPen" appears in the bottom part of the screen and a small USB icon will appear in the top right hand corner of the SpectraPen display.

7.A. Menu and Icon Explanation

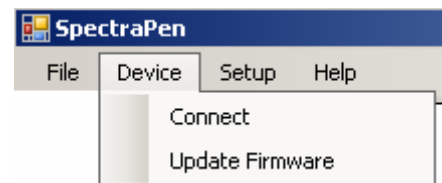
Menu: File

- Load** Loads previously saved data files.
- Save** Saves data to hard disc.
- Export** Exports data in .txt format.
- Close** Closes the current experiment.
- Close All** Closes all running experiments.
- Exit** Exits the program.



Menu: Device

- Connect** Detects and connects the device
- Update Firmware** Used for firmware updates.*



* For more information on software updating, see Chapter 7.C. of this Operation Manual.

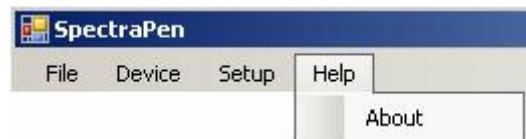
Menu: Setup

- Update Software** Used for software updates.



Menu: Help

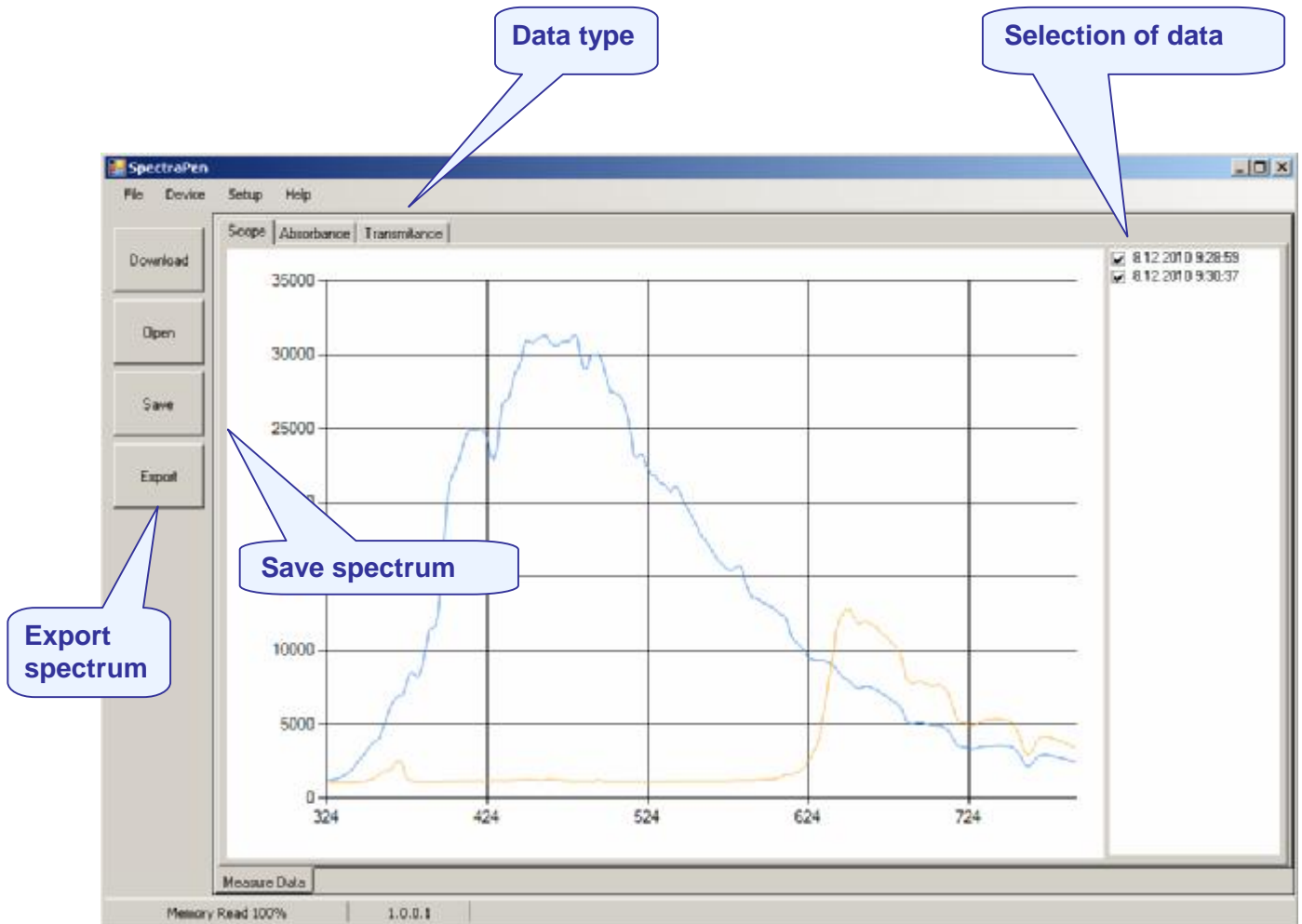
- About** Offers basic information about the program.



7.B. Example of Data Transfer and Visualization

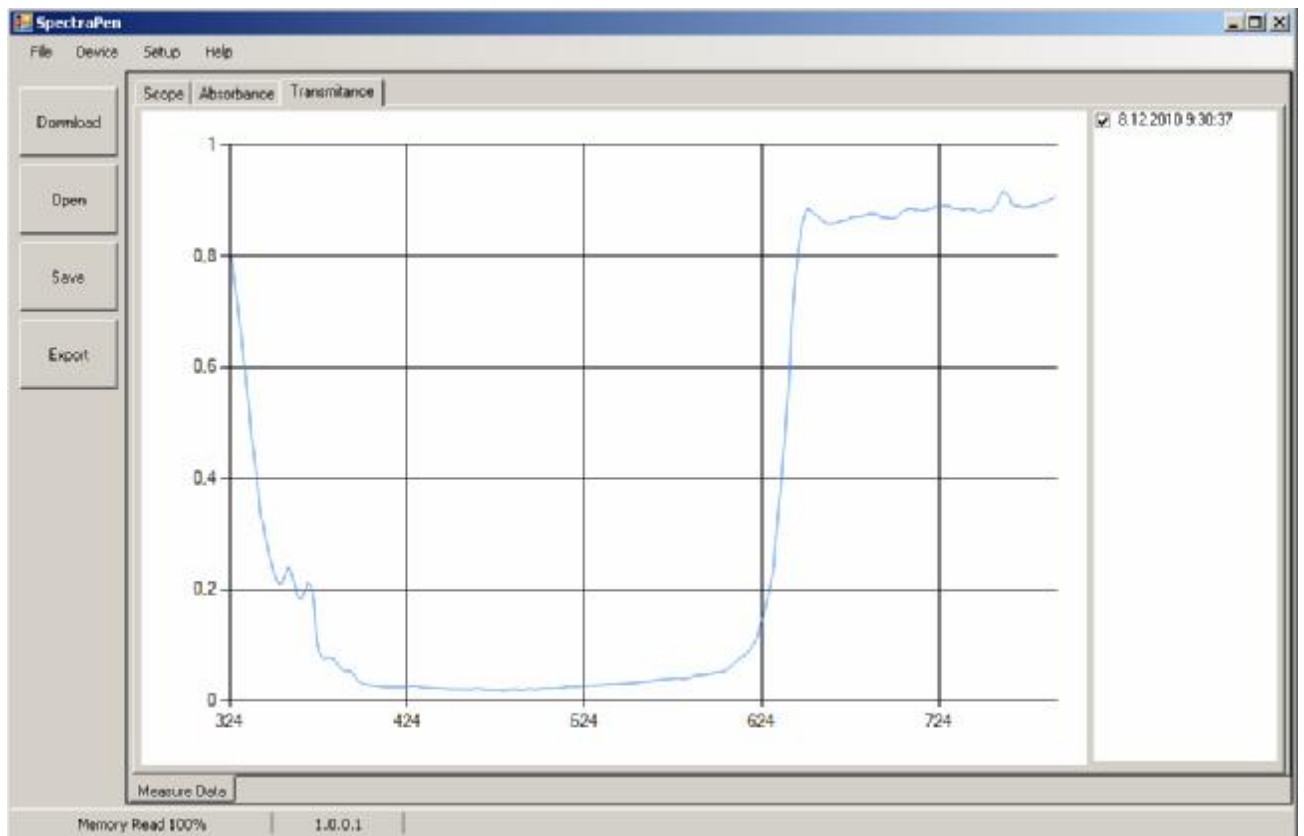
Step 1: Perform measurement with your SpectraPen

Step 2: Click the "Download" icon or select Device>Download.



blue curve - spectrum of sun light

yellow curve - spectrum of sun light passed HP650 filter



blue curve – absorbance of filter HP650, (reference needs to be obtained before measuring absorbance or transmittance)

7.C. Software Update

Very important!

All data in the SpectraPen memory are erased during the software update!

Before starting any software update, export all your data from the SpectraPen memory into your computer!

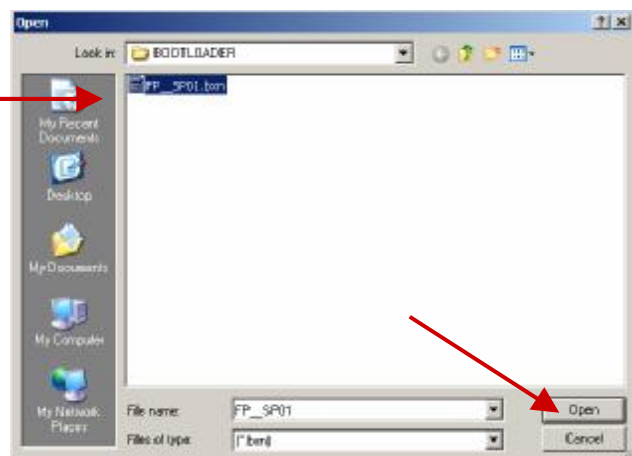
Step 1: Starting Update

Select: Device>Update Firmware

Step 2: Selecting .bxn File

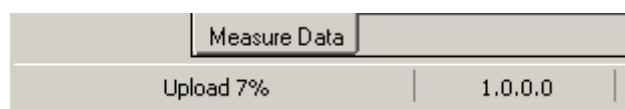
Find: Binary file (with the extension .bxn)

Select: Open



Step 3: Finishing Upload

Select: "OK" to start uploading of the update.



Upload progress is indicated in the status bar.

8. Statement of Limited Warranty

- This Limited Warranty applies only to the SpectraPen and its accessories (excluding any batteries). It is valid one year from the date of shipment.
- If at any time within this warranty period the instrument does not function as warranted, return it and the manufacturer will repair or replace it at no charge. The customer is responsible for shipping and insurance charges (for the full product value) to PSI. The manufacturer is responsible for shipping and insurance on return of the instrument to the customer.
- No warranty will apply to any instrument that has been (i) modified, altered, or repaired by persons unauthorized by the manufacturer; (ii) subjected to misuse, negligence, or accident; (iii) connected, installed, adjusted, or used otherwise than in accordance with the instructions supplied by the manufacturer.
- The warranty is return-to-base only, and does not include on-site repair charges such as labor, travel, or other expenses associated with the repair or installation of replacement parts at the customer's site.
- The manufacturer repairs or replaces faulty instruments as quickly as possible; the maximum time is one month.
- The manufacturer will keep spare parts or their adequate substitutes for a period of at least five years.
- Returned instruments must be packaged sufficiently so as not to assume any transit damage. If damage is caused due to insufficient packaging, the instrument will be treated as an out-of-warranty repair and charged as such.
- PSI also offers out-of-warranty repairs. These are usually returned to the customer on a cash-on-delivery basis.
- *Wear & Tear Items* (such as sealing, tubing, padding, etc.) are excluded from this warranty. The term *Wear & Tear* denotes the damage that naturally and inevitably occurs as a result of normal use or aging even when an item is used competently and with care and proper maintenance.

For customer support, please write to: support@psi.cz

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