Introduction

Thank you for purchasing an AvaSpec Avantes Fiber Optic Spectrometer System.
You may find an electronic version of this manual as pdf file on your Avantes CD-rom that came with the system, the newest version of this manual can also be downloaded from our website www.avantes.com under the section downloads.
This manual provides users with directions on configuring your AvaSpec with your computer and operating the

- **AvaSpec-USB1 spectrometers** AvaSpec-128, AvaSpec-256, AvaSpec-1024, AvaSpec-2048
- **AvaSpec Starline** AvaSpec-128-USB2, AvaSpec-2048(L)-USB2, AvaSpec-3648-USB2, AvaSpec-FAST series
- **AvaSpec SensLine** AvaSpec-ULS2048x16/64, AvaSpec-HS1024x58/122TEC, AvaSpec-2048L/3648TEC
- **AvaSpec NIRLine** AvaSpec-NIR256-1.7, AvaSpec-NIR256/512-1.7TEC, AvaSpec-NIR256-2.0TEC, AvaSpec-NIR256/512-2.2TEC, AvaSpec-NIR256-2.5TEC

For abbreviated directions on setting up your system, turn to the instructions beginning in Chapter 1: Quick Start. In addition, this manual covers detailed information on AvaSoft-Basic.
This manual describes the installation and operation for both USB1 platform (USB1) and USB2 platform (USB2) spectrometers, the reference to the platform is designated between brackets.

Separate manuals are available and supplied with the lightsources, fiber optics and accessories.
There is a separate manual for AvaSoft full version Spectrometer Software as PDF on the CD.
A separate manual is available for OEM customers on the AvaBench and AS-161 or AS-5216 electronics board.

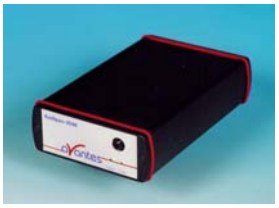
Contents of shipment

In your shipment box you will find following, please check carefully that all items are present:

- AvaSpec spectrometer
- PS-12V/1.0A power supply (not included for –USB2 or SPU1 self powered USB version)
- USB or RS-232 interface cable
- AvaSpec Product CD-rom
- Wavelength Calibration Data Sheet.

AvaSpec Spectrometer

The AvaSpec spectrometer comes in a black (StarLine) or silver (SensLine) enclosure for 1 and 2 channels. All electrical connectors are located on the backside; on the front side is the optical entrance connector. On the bottom a sticker is located with spectrometer type, serial nr, installed options date and customer name.
Please follow instructions in chapter 1 or 2 for installation.



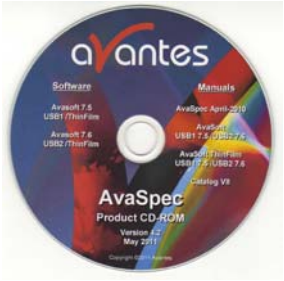
PS-12VDC/1.0A power supply (not included for –USB2 or –SPU self powered USB version)

The PS-12V/1.0A power supply is standard equipped with EUR connection and is suitable for 100-240 VAC. If you need different socket connection, please contact us for US, UK or Australian power supply. Please follow instructions in chapter 1 or 2 before connecting the power supply.

USB or RS-232 interface cable

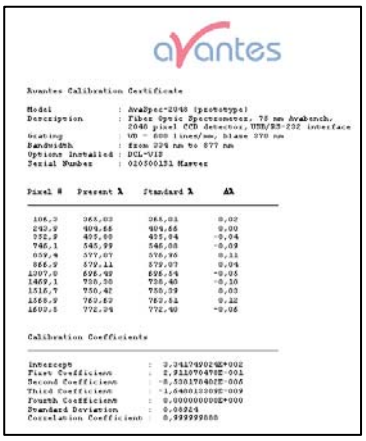
Standard a USB interface cable is included in the shipment. For connection under RS-232 a 9- pole IC-DB9-2 interface cable (for USB1 platform) or an IC-DB26/DB9-2 (for USB2 platform) should be separately ordered with the instrument.

AvaSpec Product CD-rom



The AvaSpec CD-ROM includes the installation software for the AvaSpec products, such as AvaSpec-USB1, AvaSpec SensLine, and AvaSpec NIRLine. It also includes a PDF version of this manual, a PDF version of the Avantes catalog and a PDF version of the AvaSoft-full manual.

Wavelength Calibration Data Sheet



This calibration sheet is unique to your spectrometer; it includes the wavelength calibration coefficients, installed grating, wavelength range and options as well as the spectrometer serial nr.
Please make sure to save this document in a secure place.

Upgrades

Customers sometimes find that they need Avantes to make a change to or to upgrade their system. In order for Avantes to make these changes, the customer must first contact us and obtain a Return For Upgrade (RFU) number. Please contact the Avantes Technical Services for specific instructions when returning a product.

If you still have problems with your installation, do not hesitate to contact us:

Avantes Technical Support

Soerense Zand Noord 26

NL-6961 RB Eerbeek

The Netherlands

Tel. +31-(0) 313-670170, Fax. +31-(0) 313-670179

www.avantes.com, info@avantes.com

1 Quick Start

The AvaSpec spectrometers are easy to set up, allowing the user to start collecting data within minutes. The pages in this section provide instructions on setting up your system, installing and configuring the software and connecting sampling optics.
AVASOFT version 7 is a 32-bit application and can be installed under the following operating systems:

- Windows 95/98/Me
- Windows NT/2000
- XP/Vista/Windows7 x32 (32-bit O/S)
- XP/Vista/Windows7 x64 (64-bit O/S)

1.1 Installing the AvaSpec

First install the AvaSoft software from the CD-rom, before you connect your AvaSpec spectrometer to your computer. If you connect the AvaSpec first, you will not be able to use your spectrometer. One of the options in the main menu which is shown after the CD-rom is inserted in the CD-rom drive, is to install AvaSoft software. After selecting this option, a submenu is displayed in which the spectrometer configuration can be selected. The AvaSpec-USB1 group of spectrometers should be selected to install AvaSoft for one of the following spectrometer types:

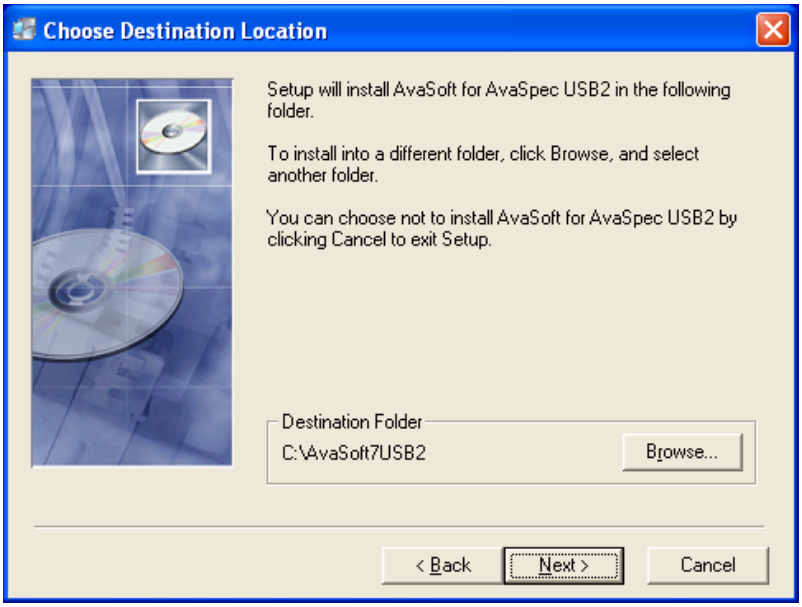
- AvaSpec-128 or AvaSpec128-y
- AvaSpec-256 or AvaSpec256-y
- AvaSpec-1024 or AvaSpec1024-y
- AvaSpec-2048 or AvaSpec2048-y

In which y represents the number of spectrometer channels.

The AvaSpec-USB2 group of spectrometers should be selected to install AvaSoft7 for one of the following spectrometer types:
AvaSpec-128/256/1024/2048/2048L/2048x14/2048x16/2048x64/3648/NIR256/NIR512-USB2.
Instructions below are for the AvaSpec-USB2 spectrometers, instructions for USB1 spectrometers are found after this section, AvaSpec-Bluetooth® instructions are found in section 1.1.1.

Installation Dialogs USB2

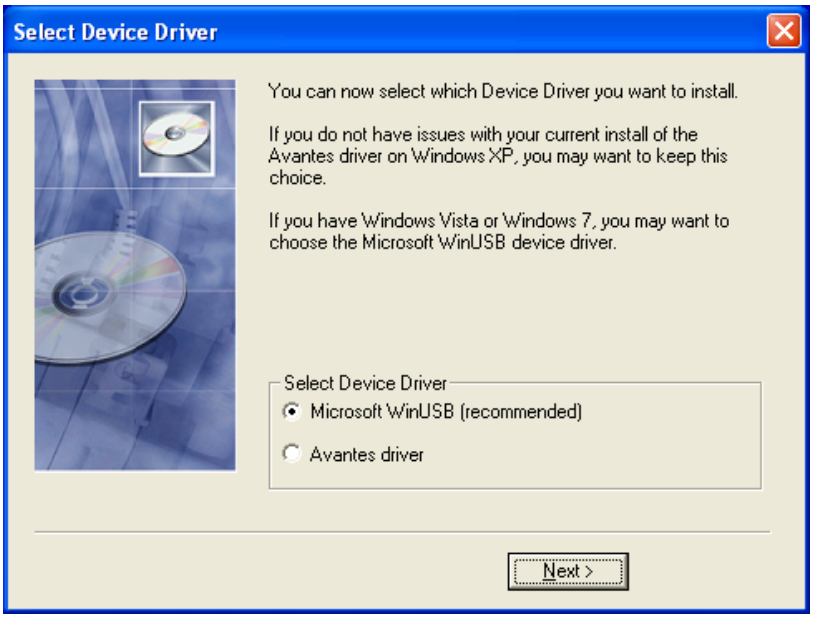
The setup program will check the system configuration of the computer. If no problems are detected, the first dialog is the "Welcome" dialog with some general information.
In the next dialog, the destination directory for the AvaSoft software can be changed. The default destination directory is C:\AVASOFT7USB2. If you want to install the software to a different directory, click the Browse button, select a new directory and click OK. If the specified directory does not exist, it will be created.



After this, the “Start Installation” dialog is shown. After clicking the “next” button, the installation program starts installing files.

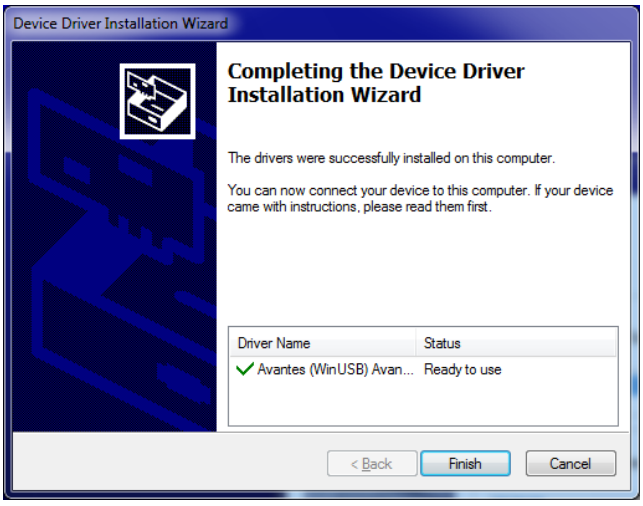
During this installation, the installation program will check if the most recent USB driver has been installed on the PC. In previous AvaSoft versions, the Avantes kernel USB driver was installed for the as5216 on all 32bit Windows O/S. On the 64bit Windows O/S, the winusb USB driver has been installed. AvaSoft now supports the winusb USB driver also on 32bit Windows O/S.

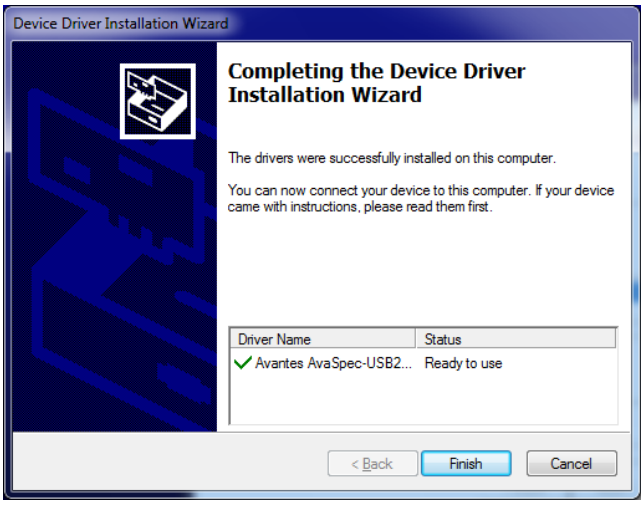
If the installation program detects that a USB driver has been installed before for the as5216, the dialog at the right will be displayed.



At modern PC’s, we have seen some communication problems under 32bit versions of Vista and Window7, which were solved by upgrading to the WinUSB driver. If the Avantes driver has been installed before, and no communication problems were noticed, you can also keep this driver by selecting the “Avantes driver” option. See Appendix A for more details about updating the USB driver.

The Device Driver Installation Wizard will be launched automatically. The last dialog in the Device Driver Installation Wizard displays the USB driver that has been installed. In the lower left figure, the WinUSB driver has been installed. The lower right figure is displayed after installing the Avantes kernel driver.

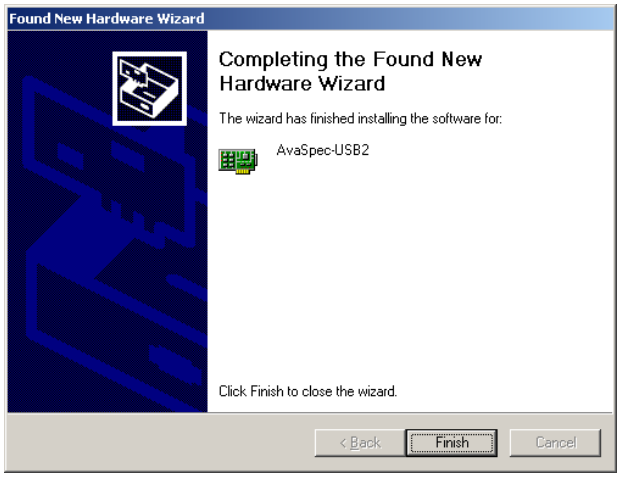




After all files have been installed, the “Installation Complete” dialog shows up. Click Finish.

Connecting the hardware

Connect the USB connector to a USB port on your computer with the supplied USB cable. Windows XP will display the “Found New Hardware” dialog. Select the (default) option to install the software automatically, and click next. After the Hardware Wizard has completed, the following dialog is displayed under Windows XP:



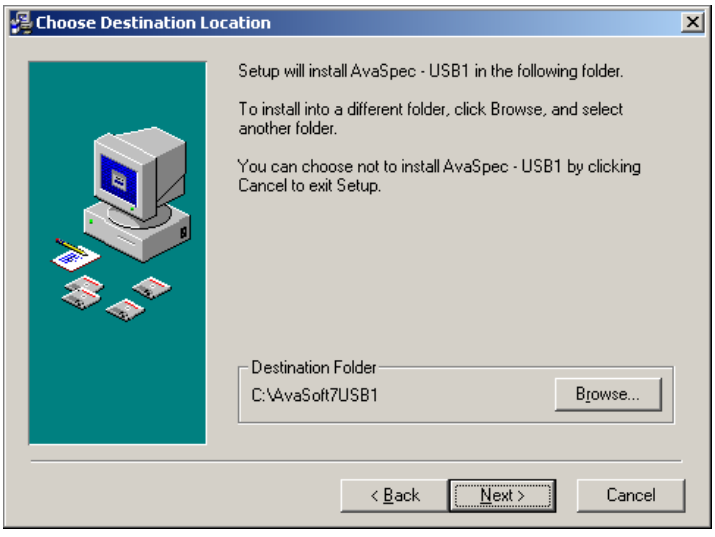
Click Finish to complete the installation.

Please note that if the spectrometer is Connected to another USB port to which it has not been connected before, the “Found New Hardware Wizard” will need to install the software for this port as well. For this reason, this Wizard will run “NrOfChannel” times for a multichannel AvaSpec-USB2 spectrometer system. This happens because inside the housing, the USB ports for each spectrometer channel are connected to a USB-Hub.

Windows Vista and Windows7 will install the driver silently, without displaying the “Found New Hardware Wizard” dialogs.

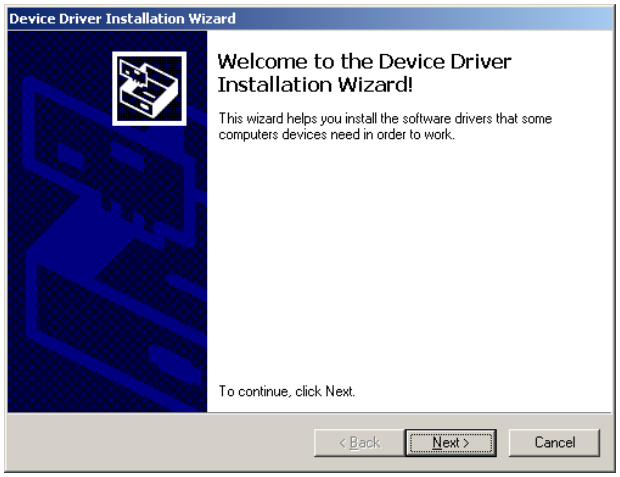
Installation Dialogs USB1

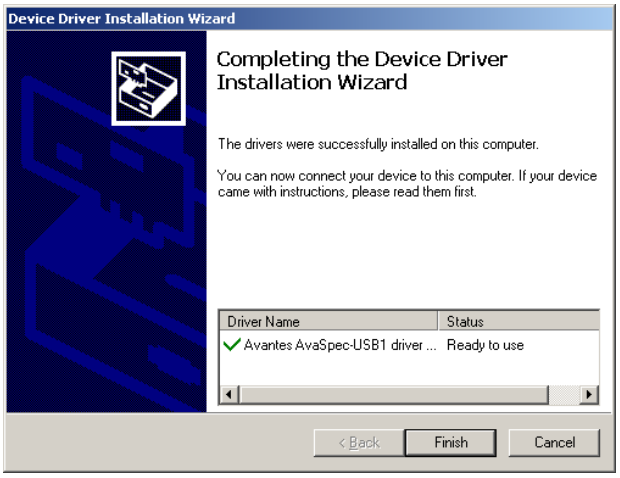
The setup program will check the system configuration of the computer. If no problems are detected, the first dialog is the “Welcome” dialog with some general information.
In the next dialog, the destination directory for the AvaSoft software can be changed. The default destination directory is C:\AVASOFT7USB1. If you want to install the software to a different directory, click the Browse button, select a new directory and click OK. If the specified directory does not exist, it will be created.



In the next dialog, the name for the program manager group can be changed. The default name for this is “AVANTES Software”.
After this, the “Start Installation” dialog is shown. After clicking the “next” button, the installation program starts installing files.

During this installation, the installation program will check if the most recent USB driver has been installed already at the PC. If no driver is found, or if the driver needs to be upgraded, the Device Driver Installation Wizard is launched automatically, click Next. If the Operating System is Windows Vista, it will display a message that it can’t verify the publisher of the driver software, select “Install this driver software anyway”.

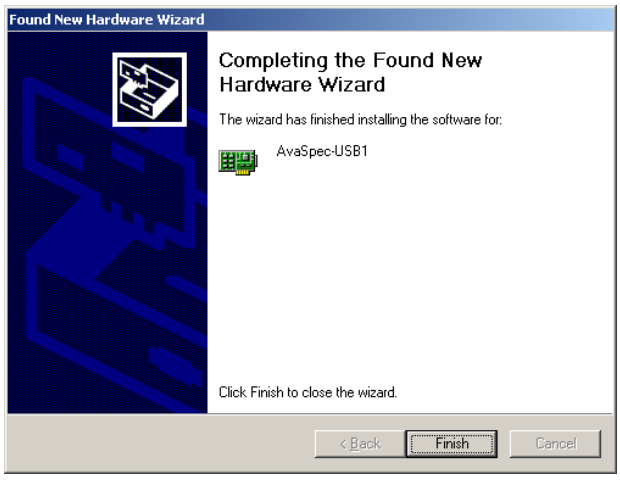




After the drivers have been installed successfully, the dialog at the right is displayed, click Finish. After all files have been installed, the “Installation Complete” dialog shows up. Click Finish.

Connecting the hardware

Connect the USB connector to a USB port on your computer with the supplied USB cable. Windows will display the “Found New Hardware” dialog. Select the (default) option to install the software automatically, and click next. After the Hardware Wizard has completed, the following dialog is displayed:



Click Finish to complete the installation.

Please note that if the spectrometer is Connected to another USB port to which it has not been connected before, the “Found New Hardware Wizard” will need to install the software for this port as well.

Windows Vista will install the driver automatically, without displaying the “Found New Hardware Wizard” dialogs

1.1.1 Bluetooth installation

The AvaSpec spectrometers with Bluetooth® wireless data transfer support are shipped with a Bluesoleil BS001 USB dongle. The Bluetooth® drivers can be installed from the Avantes product CD-ROM. This section describes how to setup Bluetooth® data communication with the AvaSpec-BT spectrometer.

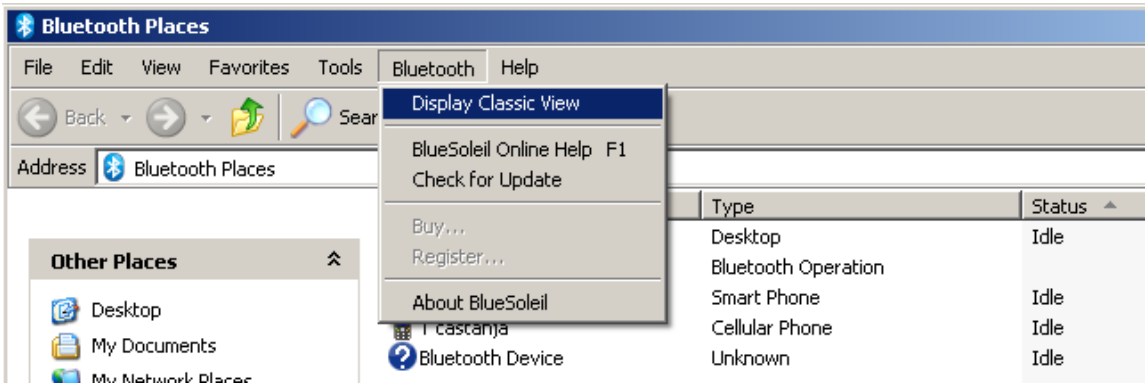
Install AvaSoft for USB2 spectrometers from the Avantes Product CD-ROM

Insert the Avantes Product CD-ROM in the CD drive of your PC, select "Software Installation" and install AvaSoft.

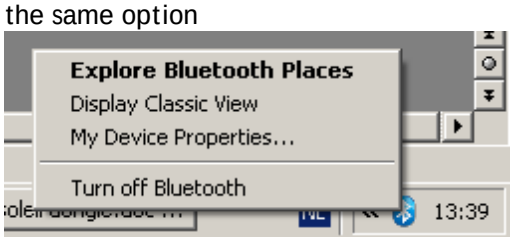
Install Bluetooth® drivers

The option to install the Bluesoleil Bluetooth Drivers can also be found in the "Software Installation" section of the Avantes Product CD-ROM. Click this option to install the Bluetooth drivers for the BS001 USB dongle. After the installation has been completed you will be asked to restart the computer. After the restart, insert the BS001 USB dongle.

The "Bluetooth Places" Window in the figure below can be opened by double clicking the bluetooth icon at the desktop. In this window, go to the Bluetooth menu and select "Display Classic View"

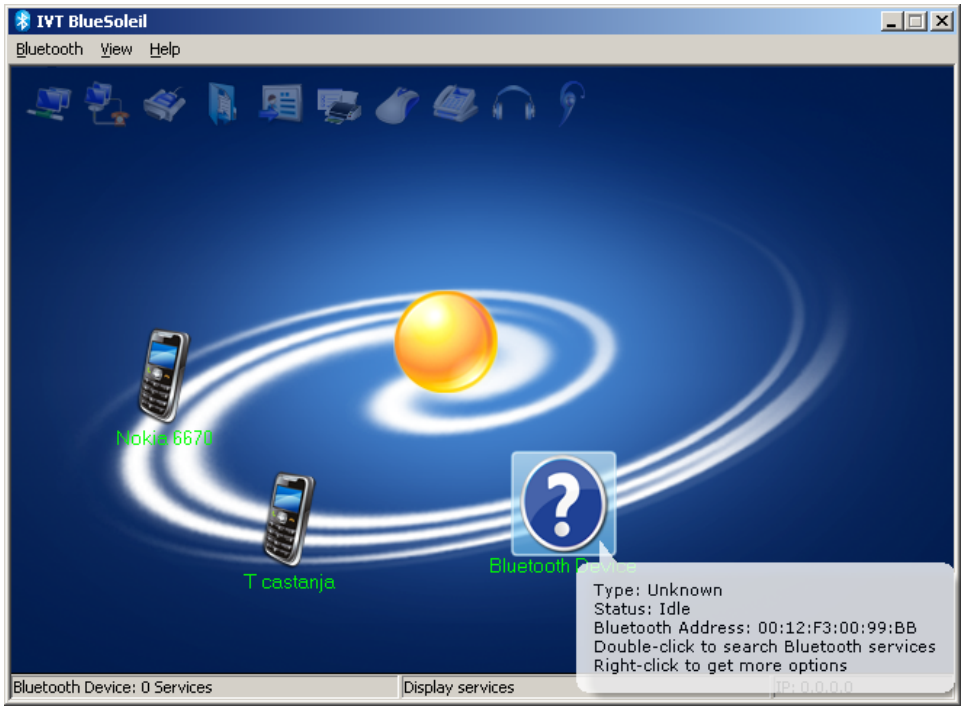


A shortcut to setup the Classic View is to right click the Bluetooth icon in the taskbar which shows the same option



Connect the 12 VDC external power supply or batterypack to the AvaSpecSpec

First make sure that the Batterypack is completely charged, if not connect the batterypack to the charger and let it charge until the LED on the charger starts to flicker (trickle-charge mode). Now connect the batterypack to the AvaSpec and switch on the batterypack (switch on the frontside) and switch on the AvaSpec to external power. In the Classic View, the AvaSpec will initially be displayed as a Bluetooth Device. The icon is a question mark.



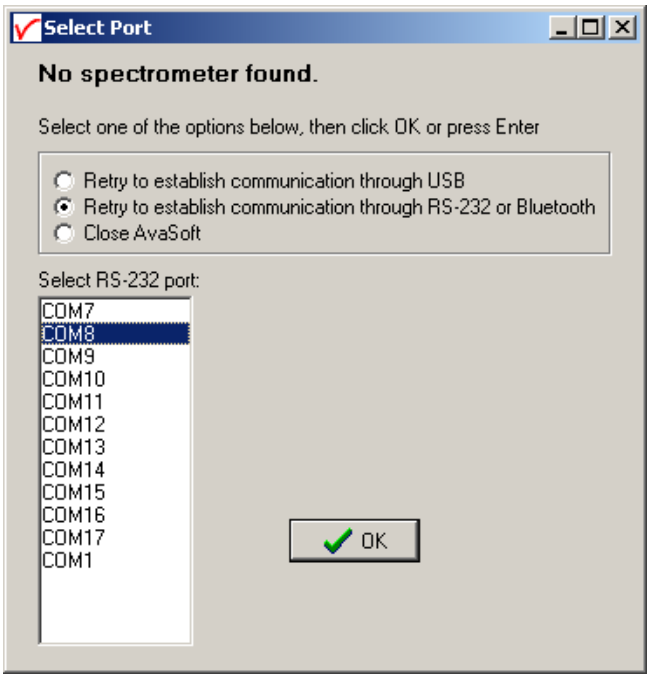
By double clicking the question mark icon, the serial port icon will be high lighted:

By double clicking the Serial Port icon, the connection will be established and a virtual serial port number will be assigned:

This serial port number (COM21 in this example) will be needed later on in AvaSoft. The color of the Bluetooth Device icon changes to green, and a dotted line with moving red dot between the PC (yellow bowl in the center) and the Bluetooth Device (AvaSpec) illustrates that the connection has been established successfully

Starting AvaSoft

AvaSoft can be started after data communication has been established. The first time that AvaSoft is started for the Bluetooth spectrometer, it will show the dialog at the right.
Click the option: “Retry to establish communication through RS-232 or Bluetooth”. A list with available comports will be displayed. In our example, COM8 has been selected for the Bluetooth® data communication. Select the right COM port from the list and click OK. AvaSoft will now read the configuration data from the spectrometer (this can take about 15 seconds), after which measurements can be started.

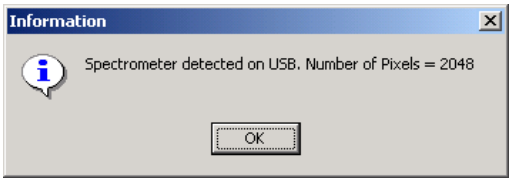


1.2 Launching the software

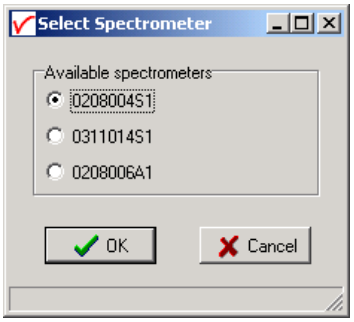
AvaSoft can be started from Windows Start Menu. Under Start-programs, the group “AVANTES Software” has been added. This group contains two icons. With the red “V” icon, AvaSoft is started. The AvaSoft Help icon can be used to activate the AvaSoft help files (these help files can also be activated from the Help menu after starting AvaSoft).

1.2.1 USB1 platform

After starting AvaSoft, the dialog at the right will be shown to indicate that the USB connection has been detected (a similar dialog will be shown if the serial RS-232 interface is used):



If more than one AvaSpec spectrometer is connected to your PC, the dialog at the right will be shown which allows you to select the spectrometer serial number for which you want to use AvaSoft. With USB1 platform spectrometers you can run multiple spectrometers simultaneously, just by restarting AvaSoft multiple times. After clicking the OK button, the main window is displayed.



1.2.2 USB2 platform

After starting the AvaSoft 7 software, all connected spectrometers will be recognized automatically and the serialnrs will appear as labels on the right hand of the screen. After clicking the start button all connected spectrometers will be displayed in the main window.

Refer to section 3 for a description about the main window components. A “Quick Start” can be found in section 1.3, if you want to start measuring immediately. Detailed information about the menu options are found in section 3. Depending on the AvaSoft version (Basic or Full) and the extra add-on modules that were ordered for your spectrometer, up to six applications are available in AvaSoft-full, which are described in the separate AvaSoft-full manual:

- History (standard in AvaSoft FULL)
- Wavelength Calibration (standard in AvaSoft FULL)
- Color Measurement (add-on module)
- Irradiance Measurement(add-on module)
- Process Control (add-on module)
- Excel Output (add-on module)
- Oxygen (add-on module)
- Chemometry (add-on module)

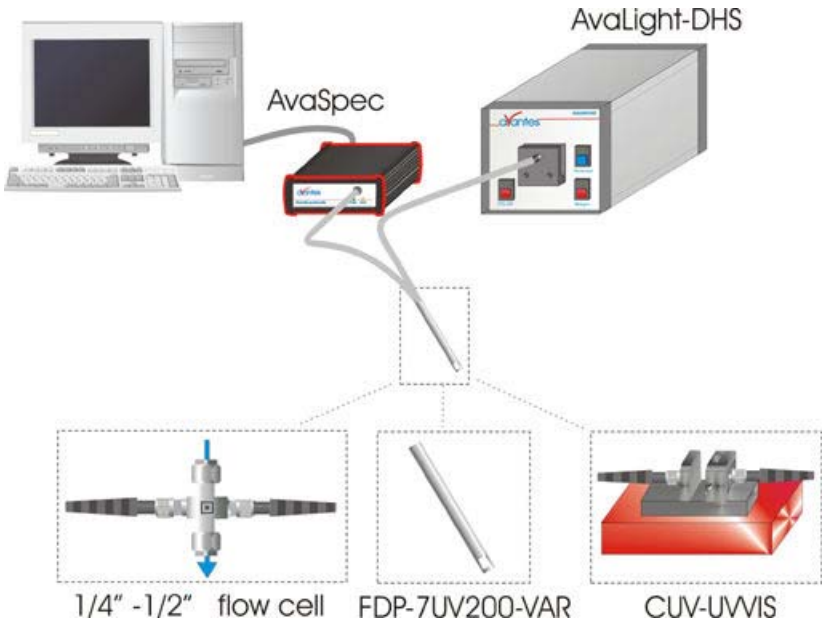
1.3 Measuring and saving a spectrum

1. After starting AvaSoft, the green Start button needs to be clicked to start measuring.
2. Connect a fiber or probe to the light source and to the spectrometer input port(s) and set up the experiment for taking a reference spectrum.
3. Adjust the Smoothing Parameters in the Setup menu (section 3.2.2) to optimize smoothing for the Fiber/Slit diameter that is used (for –USB2 platform AvaSpecs optimal smoothing is preset and stored on board in the EEPROM).
4. Now turn on the light source. Usually some sort of spectrum may be seen on the screen, but it is possible that too much or too little light reaches the spectrometer at the present data collection settings. Too much light means that, over a certain wavelength range, the signal is saturated shown as a straight line at the maximum counts and the appearance of the label "saturated" in the statusbar of the spectrometer channel. This can usually be solved by a shorter integration time. The integration time can be changed in the main window, in the white box below the start/stop button. If AvaSoft is collecting data, the start/stop button shows a red 'stop' and the integration time box is gray, indicating that it cannot be changed (USB1). After clicking the 'stop' button the data acquisition stops and the integration time can be changed. The result of the changed integration time can be viewed after clicking the green 'start' button. Try to adjust the integration time, such that the maximum count over the wavelength range is around 90% of the full ADC scale (14750 counts for the 14bit ADC, 59000 counts for the 16bit ADC). When at minimum integration the signal is still too high, an attenuator, a neutral density filter or fibers with a smaller diameter may be used. When not enough light reaches the spectrometer, likewise a longer integration time should be entered.
5. When a good spectrum is displayed, turn off the light source.
6. Now save the Dark data. This is be done by File-Save-Dark from the menu or by clicking the black square on the left top of the screen with the mouse. Always use Save Dark after the integration time has been changed.
7. Turn on the light source again. Save the present spectrum as a reference by choosing File Save-Reference from the menu or by clicking at the white square (next to the black one). Always use Save Reference after the integration time has been changed. Now the Transmittance/reflectance (T/R button) or Absorbance (A button) spectra can be obtained online. To have a better look at the amplitude versus wavelength, the cursor button can be clicked. A vertical line is displayed in the graph. If the mouse cursor is placed nearby this line, the shape of the mouse cursor changes from an arrow to a 'drag' shape. If this shape is displayed, the left mouse button can be used to drag (keep left mouse button down) the line with the mouse towards a new position. Moving this line shows the corresponding values of wavelength and amplitude in the main screen. By clicking the red stop button, the data acquisition is stopped and the last acquired spectrum is shown in static mode. The data acquisition can be started again by clicking the same button, which now shows a green 'Start'.
8. To save the spectrum (in the mode chosen before), choose File-Save-Experiment from the menu, or click the Save Experiment button from the button bar.
9. To improve the Signal/Noise ratio, a number of spectra may be averaged. To do this, the value in the white average box in the main window (next to integration time) can be increased. The value can only be changed in static mode. When AvaSoft is acquiring data, the average box becomes gray (USB1 platform).

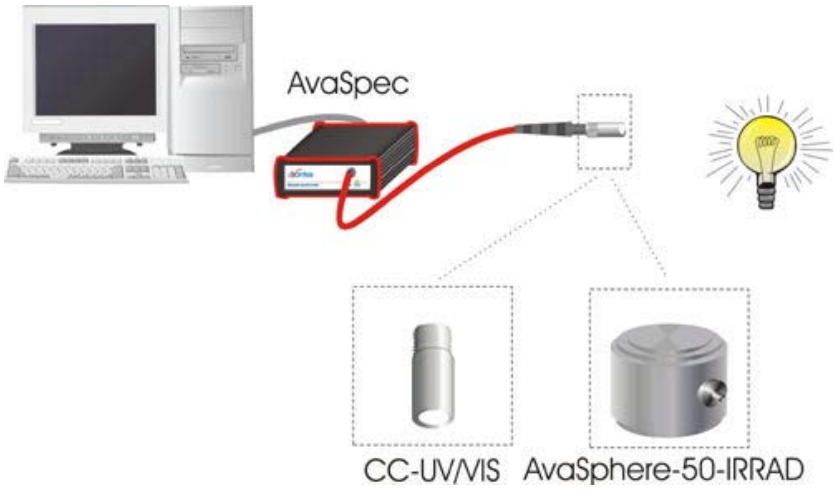
The following are typical configurations for absorbance, transmission, irradiance, and reflection experiments.

1.4 Measurement Setup

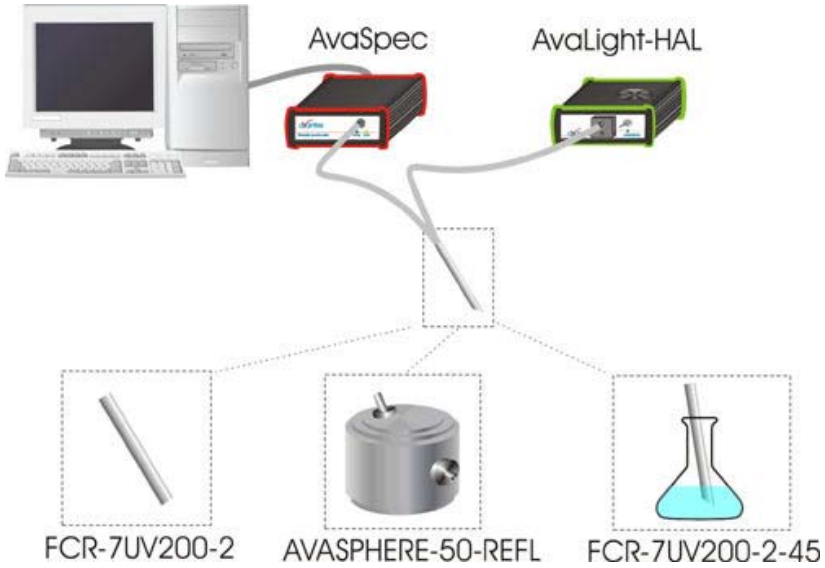
UV/VIS Absorbance/Transmission Setup



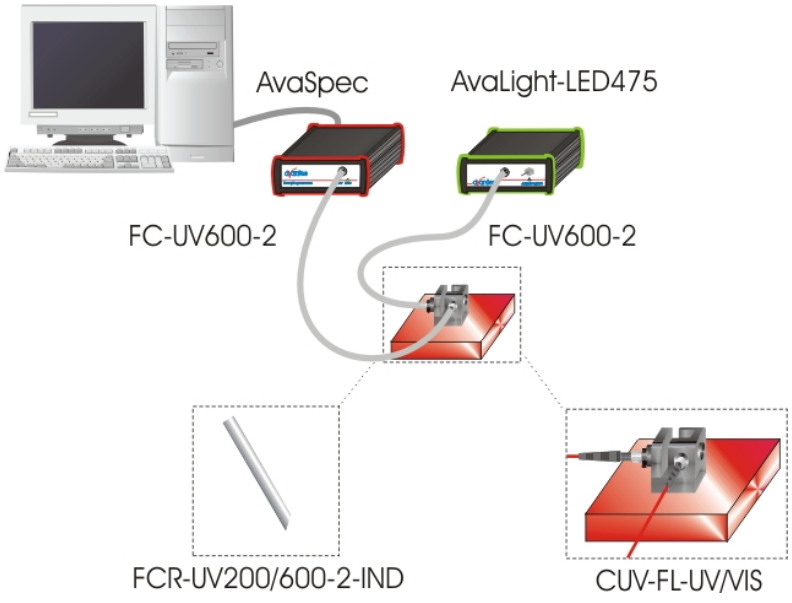
Irradiance Setup



Reflection Setup



Fluorescence Setup



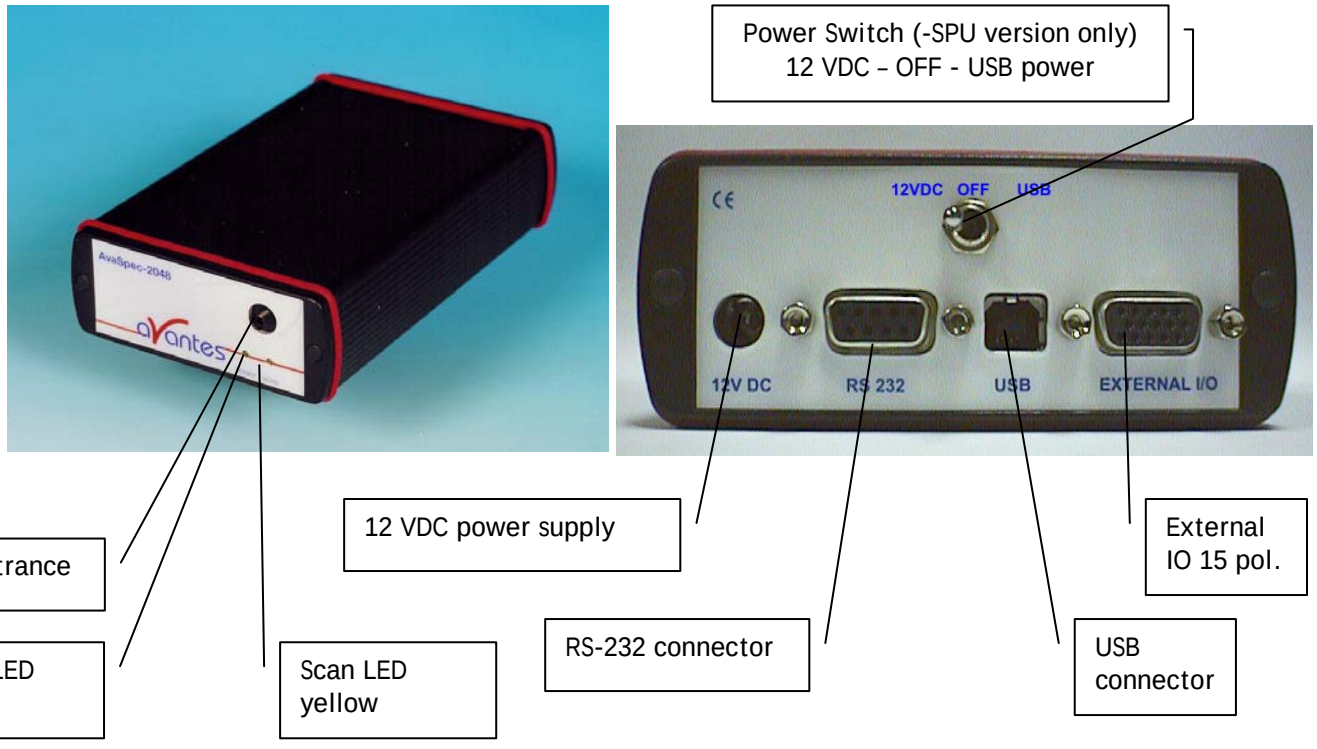
2 Miniature Fiber Optic Spectrometers

The technical specifications and product information on the separate spectrometer products can be found in the newest Avantes Catalog as well as on our website.
In the following paragraphs specific product information regarding interface signals, pinouts, ec is given for the different platforms.

In order to change a grating, wavelength range or any of the options, the unit (no older than 3 years) needs to be returned to Avantes manufacturing, please ask for an RFU number (see page 4 of this manual).
The cost for the so-called AvaSpec-Upgrade depends on the modification that needs to be done.

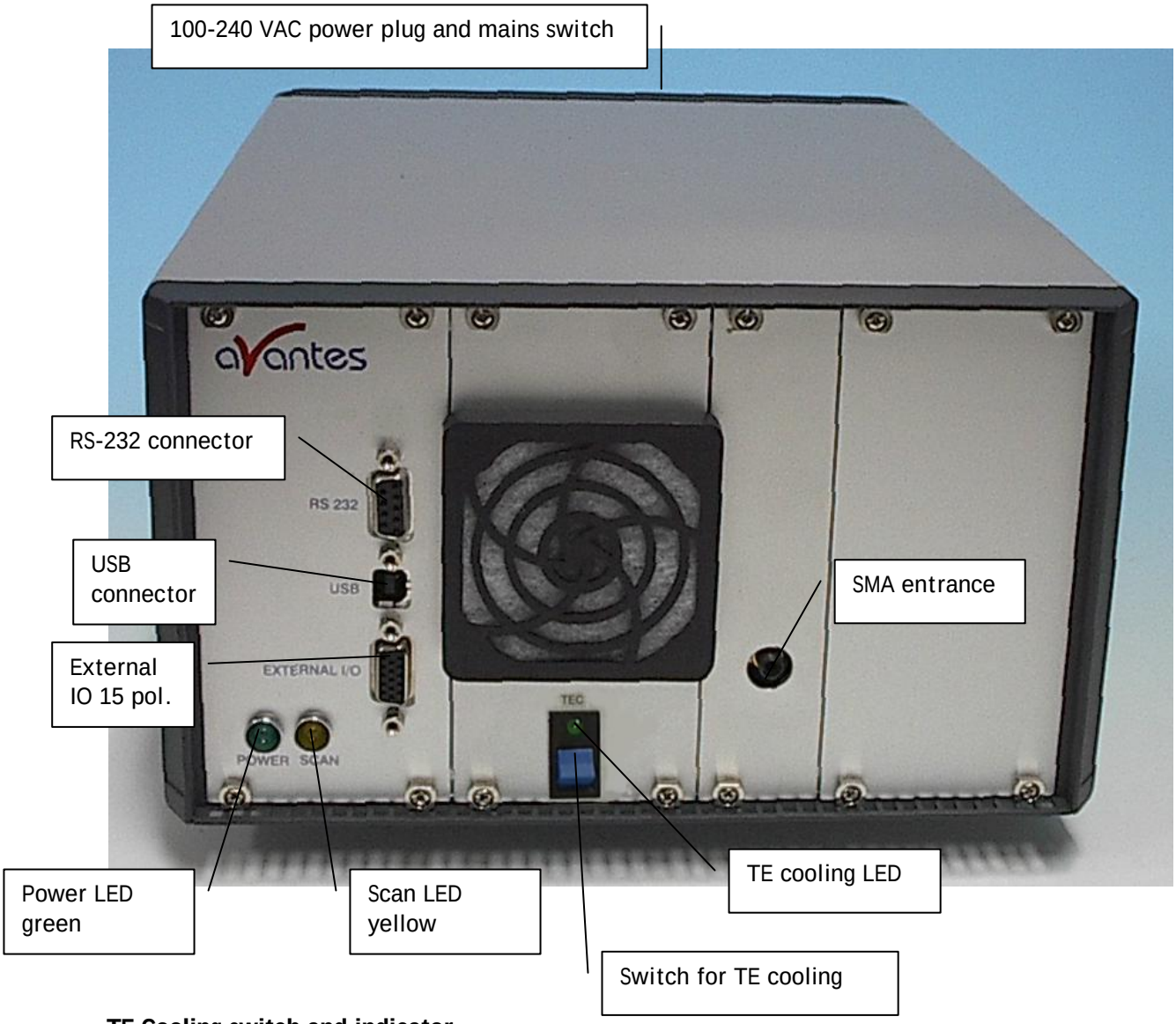
2.1 Spectrometer Connections USB1 Platform

2.1.1 AvaSpec-USB1 single channel connections



Pinout and specifications connectors, see 2.1.4

2.1.2 AvaSpec-2048TEC Connections



TE Cooling switch and indicator

The blue switch is used to switch on the CCD detector cooling, the green LED=on indicates that the CCD detector cooling is switched on.
Switch in down position Cooling is on
Switch in up position Cooling is off

Power connector with Fuse and switch (rear panel)

The power connector for 100-240 VAC is located on the rear of the AvaSpec-2048TEC. Be carefull to use for designated power range only, please use included power cord with the instrument. For UK, US and Australian power cords, contact Avantes Technical Support. The Fuse is a 2A slow blowing Fuse.

Disconnect power before opening housing or replace Fuse.
The installation category for this equipment is Class 2, it is not permitted to connect equipment to the AvaSpec-TEC with a power supply without SELV or class II qualification.

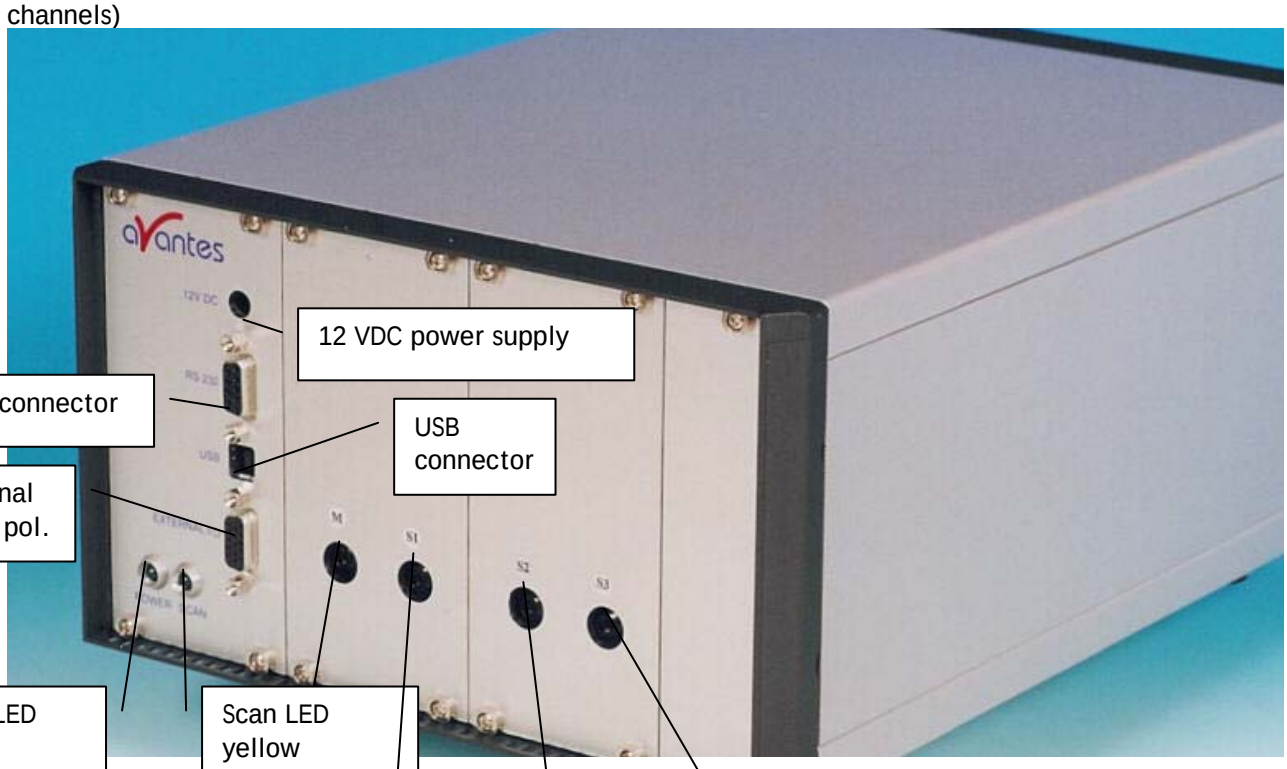
2.1.3 AvaSpec -USB1 multi-channel connections

AvaSpec-4 channel in desktop

The AvaSpec USB1.1 platform Fiber Optic Spectrometers can be configured as single, dual, triple, quadruple or multi-channel instrument with up to 8 different spectrometer channels, all read out simultaneously, controlled by a master´s board microprocessor.
The simultaneous data-sampling allows fast read-out and enables monitoring of pulsed light sources with different channels looking at the same pulse.

Multi-channel spectrometers all consist of the same detector type (128, 256 or 1024 or 2048 pixels), the spectrometer channels can of course cover different wavelength ranges or have different resolution specifications. For each channel grating, wavelength range and options need to be specified.

The multi-channel spectrometers all run with one USB interface and under AvaSoft software. Multi-channel housing can be in 9.5" desktop (for 1-4 channels) or 19" rack mount housing (1-8 channels)



2.1.4 nnections description

Power LED green and scan LED yellow

The green and yellow LED´s act as status LED´s for the micro controller with following meaning:
Green LED = off, power is not connected
Green LED = on, power is on, micro controller ready, no errors
Green LED = blinking, permanent error detected by micro controller
Yellow LED = on, when scan is transmitted to PC

Power connector

The power connector is a Low power DC connector with GND on outer contact and +12V on inner contact. The outside diameter is 5.5mm, the inside diameter 2.1mm.
The electrical circuit is protected against reverse polarity and accepts voltages between 8 and 15V.

Power switch (-SPU version only)

Manual switch for power selection for the AvaSpec-SPU
Left – external power 12VDC, connect external power supply PS-12V/1.0A
Middle - OFF
Right – Power taken from USB bus, no additional power supply required

RS-232 connector

The RS232 interface has the following physical characteristics:

- 1 start bit, 8 data bits, 1 stop bit
- baud rate 115200 bps
- flow control with RTS/CTS
- female 9 pole Sub-D connector

Pin	Dir	Description
1	out	Data Carrier Detect (DTD), not connected
2	out	Transmit data (TX)
3	in	Receive data (RX)
4	in	Data Terminal Ready (DTR), connected to 6
5		Common
6	out	Data Set Ready (DSR), connected to 4
7	in	Request To Send (RTS)
8	out	Clear To Send (CTS)
9	out	Ring Indicator, not connected

USB connector

The USB interface has the following physical characteristics:

- USB version 1.1
- high speed, 12Mbit
- endpoint node, no HUB function

Pin	Description
1	V+
2	D-
3	D+
4	Common

External I/O connector

The external I/O connector is a female high density 15 poles Sub-D connector. The connections are as follows:

Pin	Name	Connect to	Comment
1	DO1	AVALIGHT-XE	Output, one ore more TTL pulses per scan
2	DO2	AvaLight-LED	Output, fixed frequency of 1 kHz
3	DO3	IC-DB15-extrig	Output, + 5VDC
4	DI1	Ext. trigger	TTL Input, external hardware trigger, start scan at rising edge
5	DO4	reg. outp. of µC	general purpose output
6	DO5	reg. outp. of µC	general purpose output
7	DO6	reg. outp. of µC	general purpose output
8	DI2	Ext. trigger	TTL Input, external software trigger
9	DO7	reg. outp. of µC	general purpose output
10	GND	GND	
11	DO8	reg. outp. of µC	general purpose output
12	DO9	reg. outp. of µC	general purpose output
13	DO10	shutter	Output, used to close shutter for AvaLight-HAL-S, AvaLight-DHc and AvaLight-DHS
14	DO11	AvaLight-LED-p14	With AvaSoft 6.2-OXY turns on-and off AvaLight-LED-p14
15	DO12	reg. outp. of µC	general purpose output

Internal connections by backplane connector (multichannel only)

Please make sure that all connections to the 64-pole backplane connector is carried out by Avantes service personell only, otherwise the guarantee is not valid.
Only registed official Avantes rackmounted devices may be connected to the backplane.
A PS-12VDC/2.5A power supply unit may be required when lightsources and multiple channel spectrometers are included in one rackmount.

Pin description backplane connector (multichannel only)

Pin	signal name	description	pin	signal name	description
A1	DC-IN	9-15V DC input	B1	0	
A2	DC-IN	9-15V DC input	B2	0	
A3	0		B3	0	
A4	0		B4	LED-YELLOW-C	led-yellow-cathode
A5	0		B5	LED-YELLOW-A	led-yellow-anode
A6	0		B6	0	
A7	0		B7	0	
A8	0		B8	LED-GREEN-C	led-green-cathode
A9	CDSCLK1	adc sample clock 1	B9	LED-GREEN-A	led-green-anode
A10	CDSCLK2	adc sample clock 2	B10	0	
A11	ADCCLK	adc data clock	B11	START	sensor start
A12	B-SLK	adc bus serial clock	B12	CLK1	sensor clock 1
A13	B-MTSR	adc serial data	B13	CLK2	sensor clock 2
A14	SSEL1	adc select 1	B14	NOR	sensor nor
A15	SSEL2	adc select 2	B15	RESET	sensor reset
A16	SSEL3	adc select 3	B16	CLAMP	sensor clamp
A17	B-SHA-MD	adc offset mode	B17	B-GAIN-H	sensor gain select

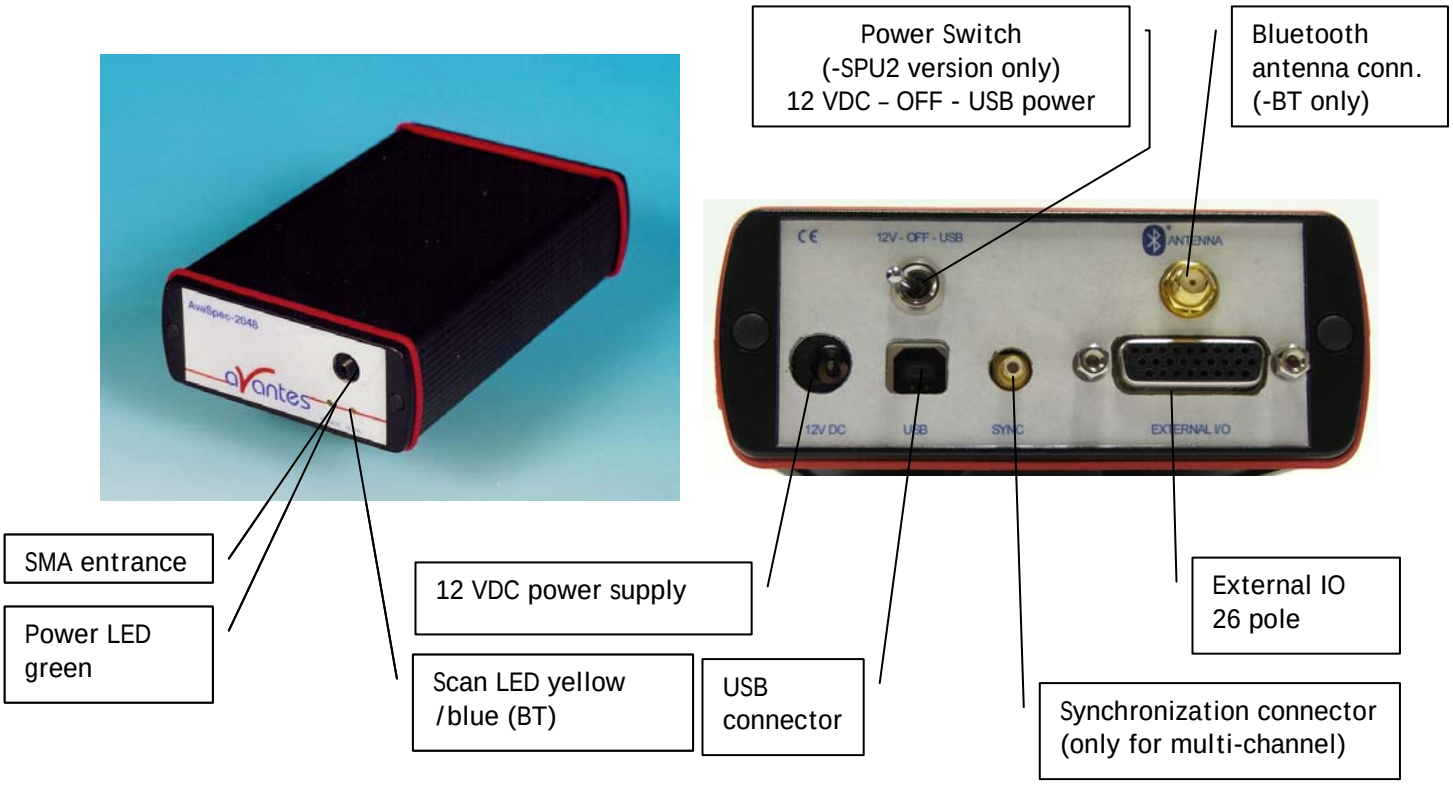
A18	0		B18	0	
A19	DO2	fixed frequency of 1 kHz	B19	0	
A20	DO1	one ore more TTL pulses per scan	B20	/WR-FIFO	write FIFO (all)
A21	DO6	external output 6	B21	/B-RS	FIFO reset (all)
A22	DO5	external output 5	B22	/RD-FIFO1	read select slave 1
A23	DO8	external output 8	B23	/RD-FIFO2	read select slave 2
A24	DO9	external output 9	B24	/RD-FIFO3	read select slave 3
A25	DO10	Output, used to close shutter	B25	Q0	FIFO data bit 0
A26	DO11	external output 11	B26	Q1	FIFO data bit 1
A27	DO12	external output 12	B27	Q2	FIFO data bit 2
A28	DO4	external output 4	B28	Q3	FIFO data bit 3
A29	DI1	TTL input, external hardware trigger, start scan at rising edge	B29	Q4	FIFO data bit 4
A30	DO7	external output 7	B30	Q5	FIFO data bit 5
A31	DO3	external output 3	B31	Q6	FIFO data bit 6
A32	DI2	external input 2	B32	Q7	FIFO data bit 7

Ordering Information Interface cables

IC-DB9-2	Interface cable AvaSpec-USB1 platform to RS-232, 9-pole
IC-DB15-2	Interface cable AvaSpec-USB1 platform to AvaLights-S and AvaLight-XE
IC-Extrig-2	Interface cable AvaSpec to External trigger pushbutton, 2m
IC-DB15-Extrig-2	Interface Y-cable AvaSpec to External trigger pushbutton and AvaLight-S with shutter, 2m
IC-DB15-FOS2-2	Interface Y-cable AvaSpec to FOS-2 and AvaLight-S with shutter, 2m
IC-USB-2	Interface cable AvaSpec to USB port on PC, 2m

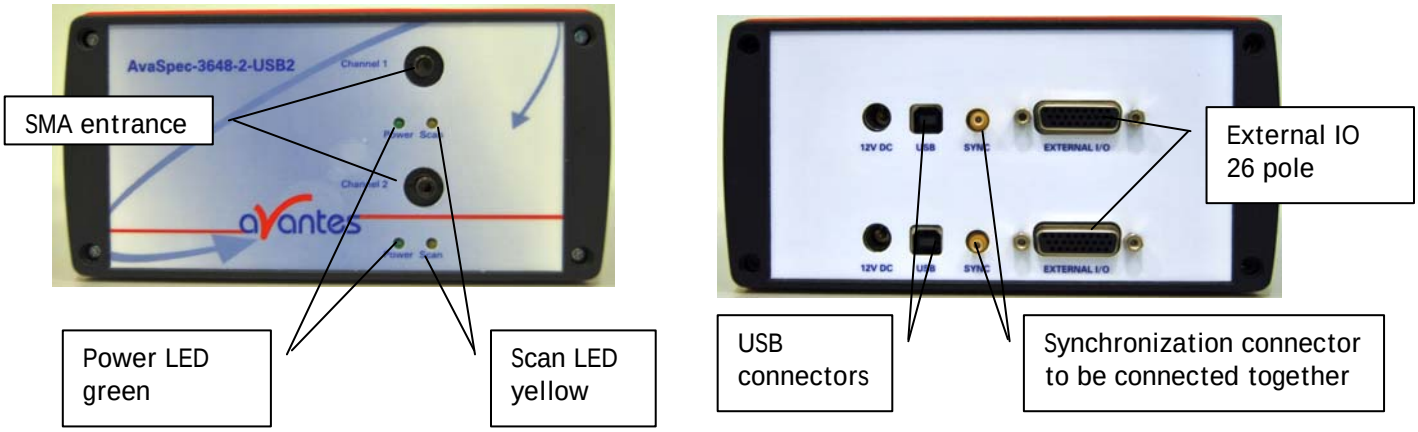
2.2. Spectrometer connections USB2 platform

2.2.1 StarLine AvaSpec-USB2



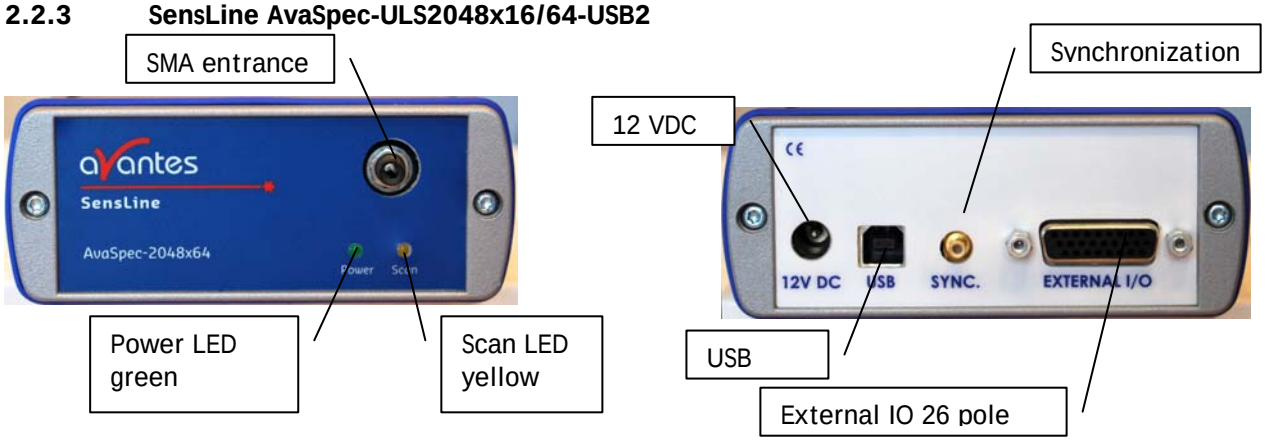
Specifications of connections under 2.2.3

2.2.2 Dual Channel AvaSpec-USB2



Specifications of connections under 2.2.3

2.2.3 SensLine AvaSpec-ULS2048x16/64-USB2



Power LED green and scan LED yellow
The green and yellow LED´s act as status LED´s for the micro controller with following meaning:
Green LED = off, power is not connected
Green LED = on, power is on, micro controller ready, no errors
Green LED = blinking, permanent error detected by micro controller
Yellow LED = on, when scan is transmitted to PC

USB connector

The USB interface has the following physical characteristics:

- USB version 2.0
- high speed, 480Mbitps
- endpoint node, no HUB function
- 5VDC power supply

Pin	Description
1	V+
2	D-
3	D+
4	Common

Synchronization connector

SMB miniature 50R coax synchronization connector to synchronize to other AvaSpec-USB2 spectrometers only, order code for SMA cables is IC-COAX-SMB-0,25 for 250mm coax cable (included in dual channel spectrometers)

Power connector (only needed for RS-232 functionality with SPU2)

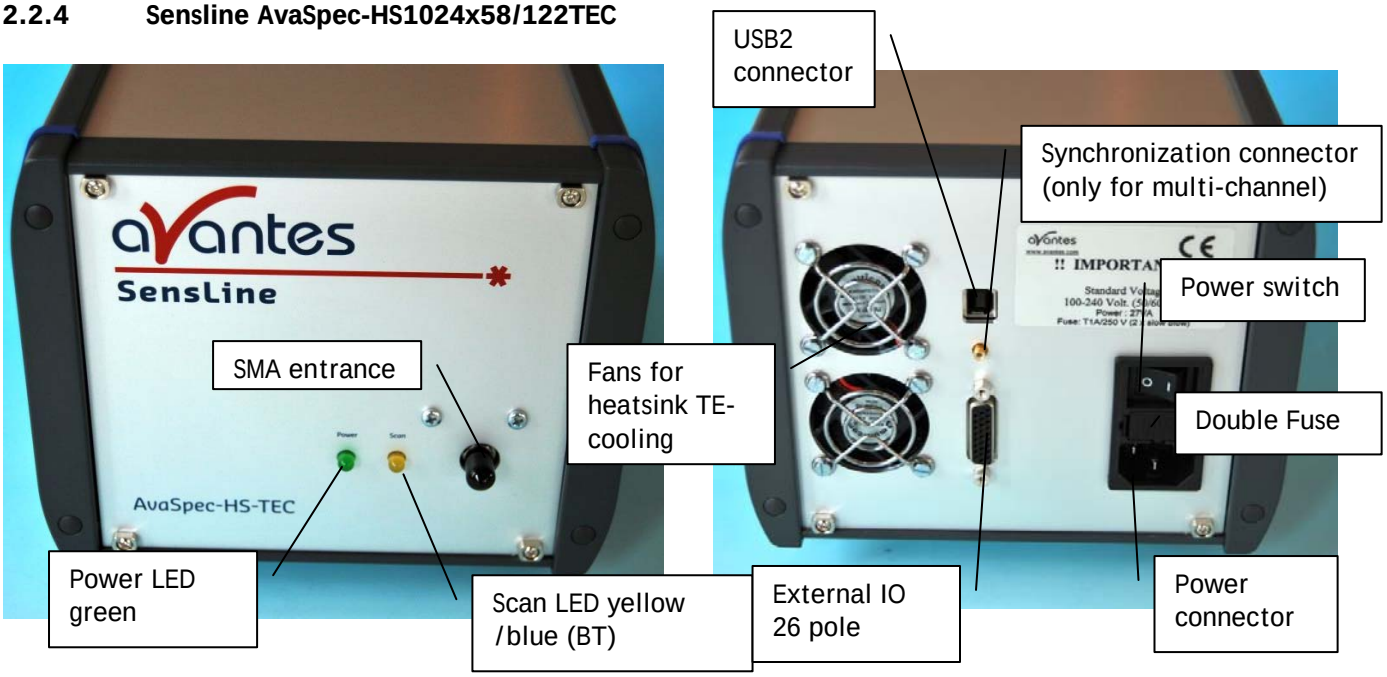
The power connector is a Low power DC connector with GND on outer contact and +12V on inner contact. The outside diameter is 5.5mm, the inside diameter 2.1mm.
The electrical circuit accepts voltages between 5 and 15V.
NOTE: Please use Avantes PS-12VDC/1.0A power supply or 12VDC batterypack only, serious damage to the electronics may occur, when other power supplies with different polarity and/or Voltage rating are used.

Power switch (-SPU2 version only)

Manual switch for power selection for the AvaSpec-SPU2
Left – external power 12VDC, connect external power supply PS-12V/1.0A or 12 VDC batterypack
Middle - OFF
Right – Power taken from USB bus, no additional power supply required

Bluetooth® antenna connector (only -BT models)
SMA coax 50R connection for minature dipole antenna for Bluetooth® interface.

2.2.4 Sensline AvaSpec-HS1024x58/122TEC



Power LED green and scan LED yellow

The green and yellow LED´s act as status LED´s for the micro controller with following meaning:
Green LED = off, power is not connected
Green LED = on, power is on, micro controller ready, no errors
Green LED = blinking, permanent error detected by micro controller
Yellow LED = on, when scan is transmitted to PC

USB connector

The USB interface has the following physical characteristics:

- USB version 2.0
- high speed, 480Mbitps
- endpoint node, no HUB function
- 5VDC power supply

Pin	Description
1	V+
2	D-
3	D+
4	Common

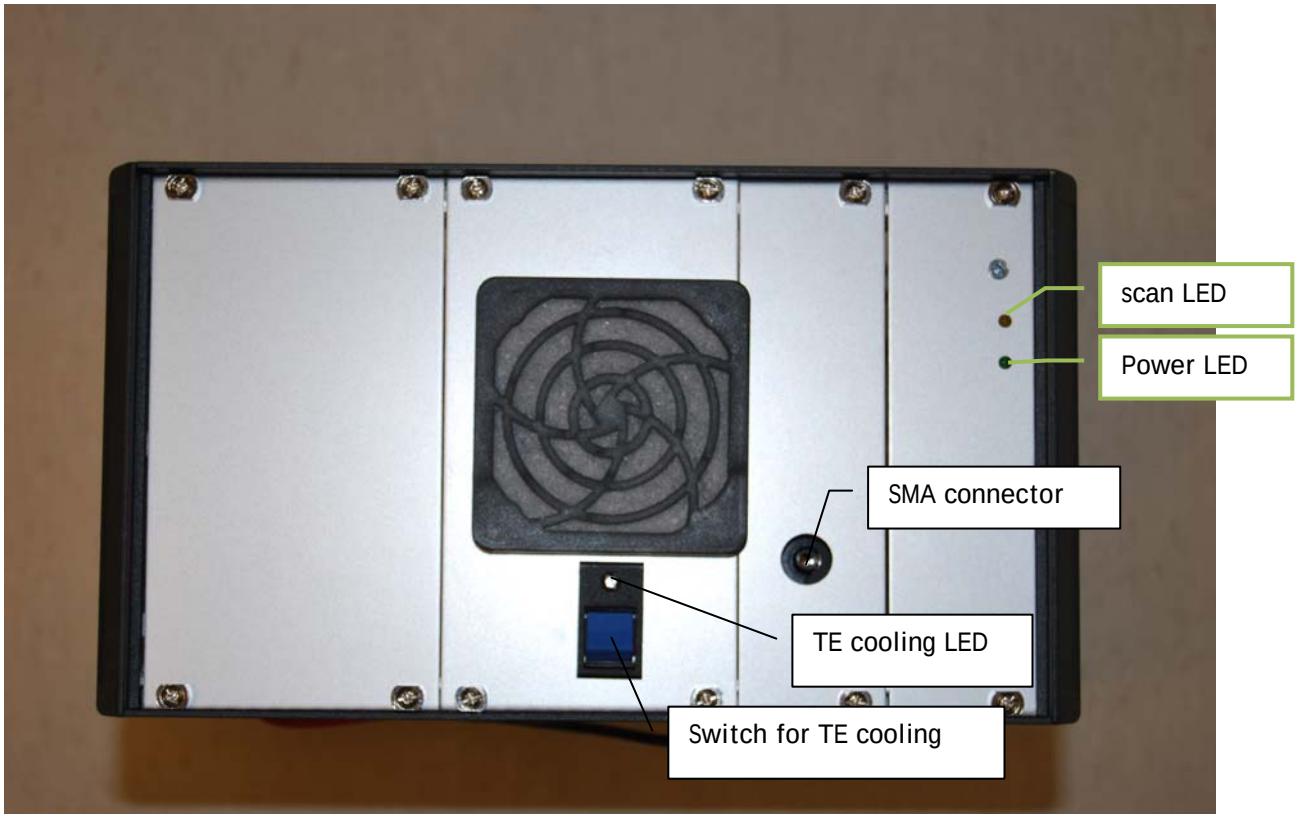
Synchronization connector

SMB miniature 50R coax synchronization connector to synchronize to other AvaSpec-USB2 spectrometers only, order code for SMA cables is IC-COAX-SMB-0,25 for 250mm coax cable.

Back side: Power connector with double Fuse and switch
The power connector for 100-240 VAC, 500 mA, is located on the rear of the Multichannel AvaSpec. Be carefull to use for designated power range only, please use included power cord with the instrument. For UK, US and Australian power cords, contact Avantes Technical Support.
The 2 Fuses are 2A slow blowing Fuse.

Disconnect power before opening housing or replace Fuse.
The installation category for this equipment is Class 2, it is not permitted to connect equipment to the AvaSpec mulichannel with a power supply without SELV or class II qualification.

2.2.5 AvaSpec-2048/3648TEC-USB2

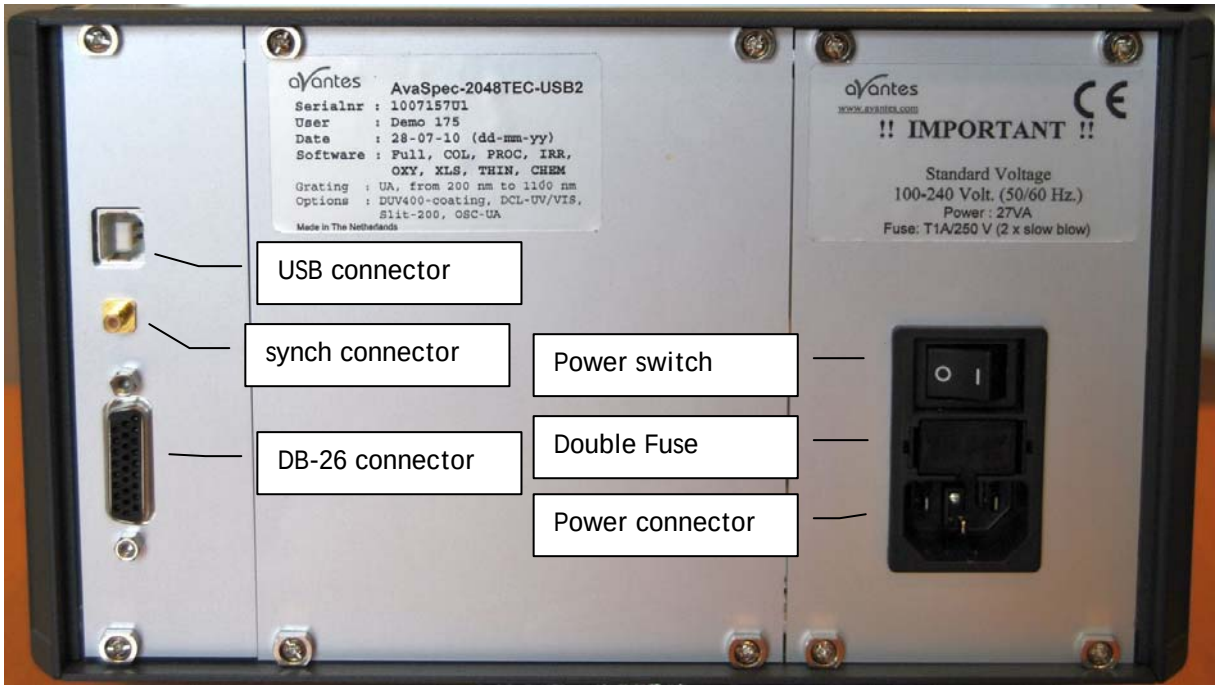


The AvaSpec-TEC-USB2 spectrometers are Temperature Regulated, the setpoint for TR is set in the AvaSoft software.

Front side: Power LED green and scan LED yellow

The green and yellow LED´s act as status LED´s for the micro controller with following meaning:
Green LED = off, power is not connected
Green LED = on, power is on, micro controller ready, no errors
Green LED = blinking, permanent error detected by micro controller
Yellow LED = on, when scan is transmitted to PC

TE Cooling switch and indicator
The blue switch is used to switch on the CCD detector cooling, the green LED=on indicates that the CCD detector cooling is switched on.
Switch in down position Cooling is on
Switch in up position Cooling is off



Back side: USB connector

The USB2 connector has the following physical characteristics:

- USB version 2.0
- high speed, 480Mbitps
- endpoint node, internal HUB function
- 5VDC power supply

Pin	Description
1	V+
2	D-
3	D+
4	Common

Synch Connector

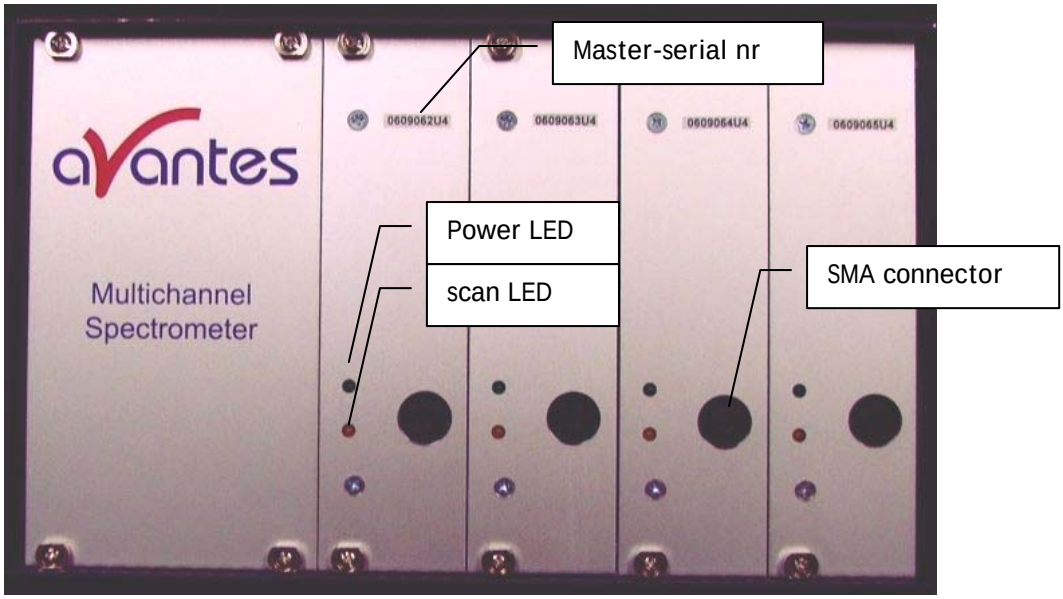
This connector is used to synchronize the spectrometer channel with other AvaSpec-USB2 spectrometers, using an IC-COAX-SMB interface cable.

Back side: Power connector with double Fuse and switch

The power connector for 100-240 VAC, 500 mA, is located on the rear of the AvaSpec-TEC. Be carefull to use for designated power range only, please use included power cord with the instrument. For UK, US and Australian power cords, contact Avantes Technical Support.
The 2 Fuses are 1A slow blowing Fuse.

Disconnect power before opening housing or replace Fuse.
The installation category for this equipment is Class 2, it is not permitted to connect equipment to the AvaSpec mulichannel with a power supply without SELV or class II qualification.

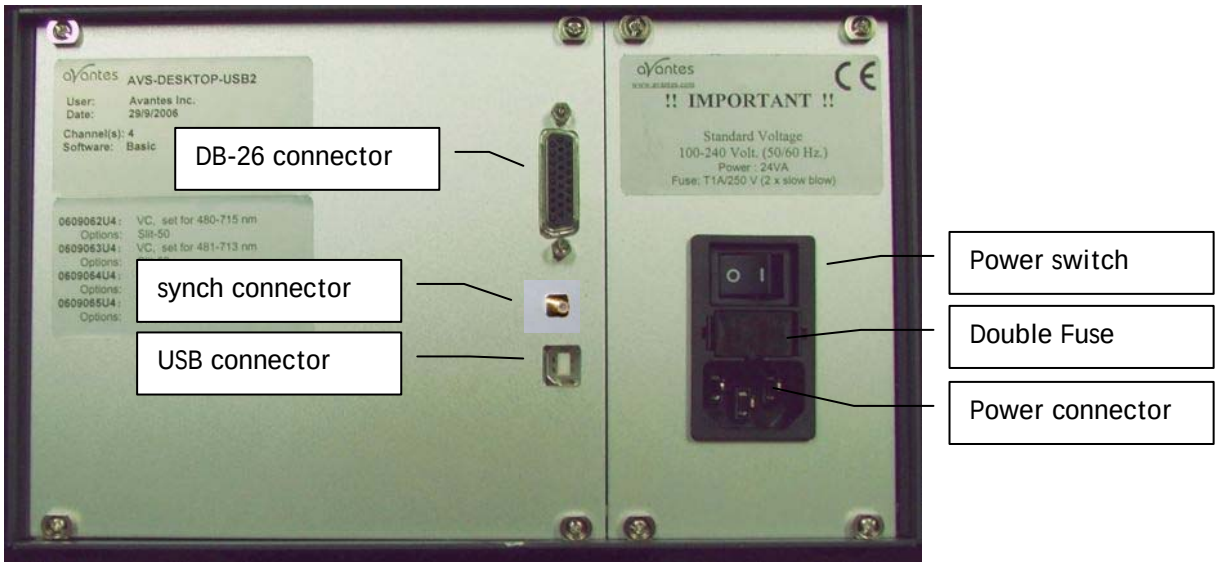
2.2.6 Multichannel connections USB2 platform



All spectrometer channels in the Multichannel instrument are internally synchronized.
The most left spectrometer, as seen from the front, is the master spectrometer, that provides the synchronization signal. This master spectrometer is connected to the HD-26 connector on the backside of the spectrometer.

Front side: Power LED green and scan LED yellow per channel

The green and yellow LED´s act as status LED´s for the micro controller with following meaning:
Green LED = off, power is not connected
Green LED = on, power is on, micro controller ready, no errors
Green LED = blinking, permanent error detected by micro controller
Yellow LED = on, when scan is transmitted to PC



Back side: USB connector

The USB interface is an internal 4- or 7-hub, depending on the amount of spectrometer channels, built into the multichannel instrument.
The USB2 connector has the following physical characteristics:

- USB version 2.0
- high speed, 480Mbitps
- endpoint node, internal HUB function
- 5VDC power supply

Pin	Description
1	V+
2	D-
3	D+
4	Common

Synch Connector

This connector is used to synchronize the spectrometer channel with other AvaSpec-USB2 spectrometers, using an IC-COAX-SMB interface cable.

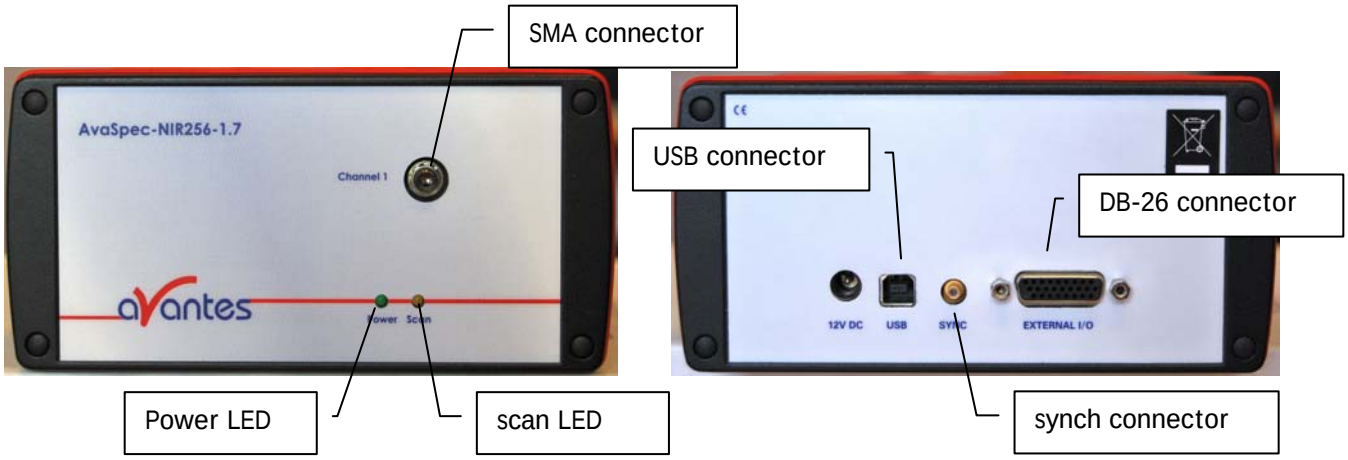
Back side: Power connector with double Fuse and switch

The power connector for 100-240 VAC, 500 mA, is located on the rear of the Multichannel AvaSpec. Be carefull to use for designated power range only, please use included power cord with the instrument. For UK, US and Australian power cords, contact Avantes Technical Support.
The 2 Fuses are 2A slow blowing Fuse.

Disconnect power before opening housing or replace Fuse.
The installation category for this equipment is Class 2, it is not permitted to connect equipment to the AvaSpec mulichannel with a power supply without SELV or class II qualification.

2.2.7 AvaSpec- NIRLine

2.2.7.1 AvaSpec-NIR256-1.7



Power LED green and scan LED yellow

The green and yellow LED´s act as status LED´s for the micro controller with following meaning:
Green LED = off, power is not connected
Green LED = on, power is on, micro controller ready, no errors
Green LED = blinking, permanent error detected by micro controller
Yellow LED = on, when scan is transmitted to PC

USB connector

The USB interface has the following physical characteristics:

- USB version 2.0
- high speed, 480Mbitps
- endpoint node, no HUB function
- 5VDC power supply

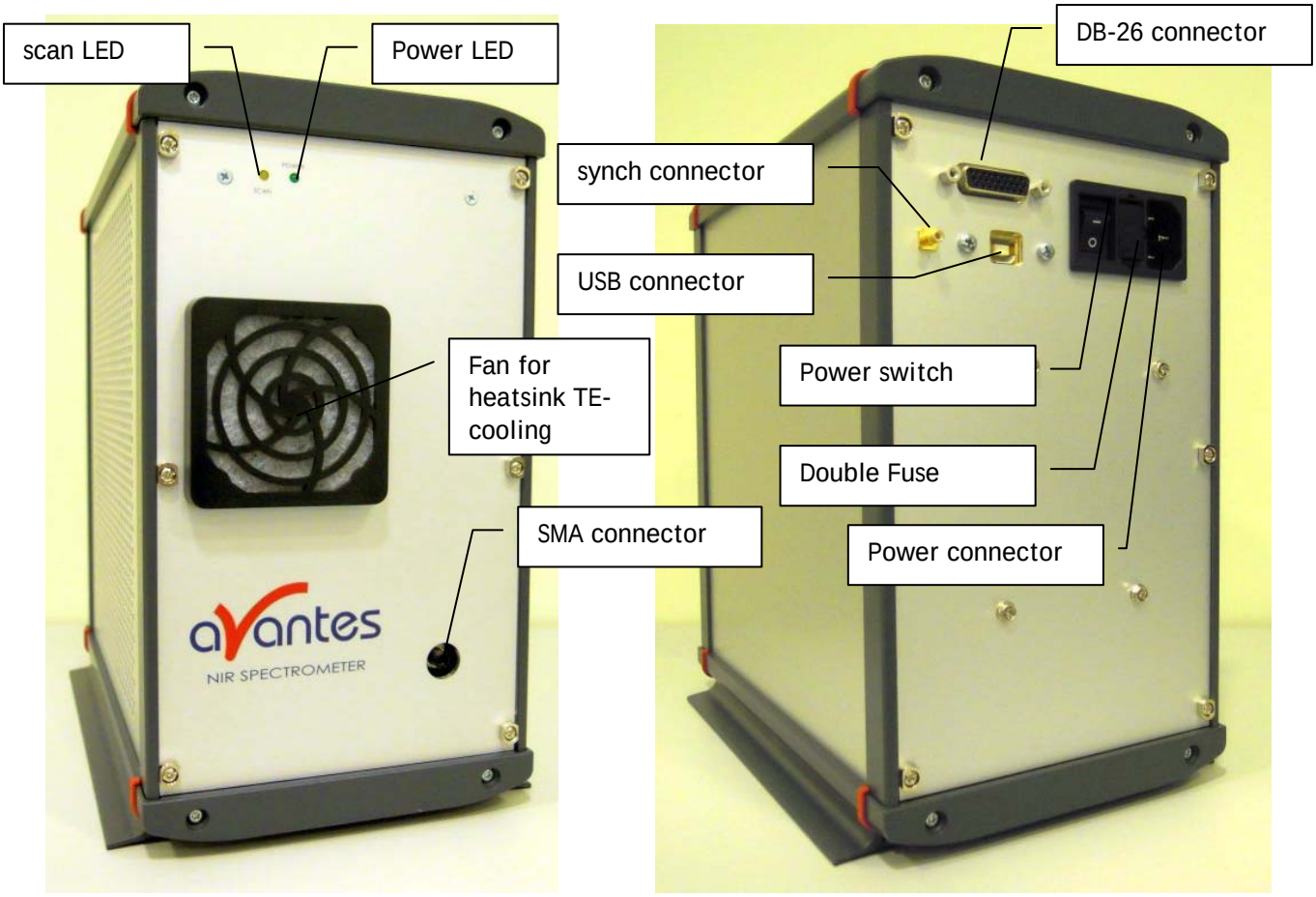
Pin	Description
1	V+
2	D-
3	D+
4	Common

Synchronization connector

SMB miniature 50R coax synchronization connector to synchronize to other AvaSpec-USB2 spectrometers only, order code for SMA cables is IC-COAX-SMB-0,25 for 250mm coax cable.

Pinout DB-26 External IO connector see 2.2.8

2.2.7.2 AvaSpec-NIR256/512 TEC connections



Back side: Synch Connector

This connector is used to synchronize the spectrometer channel with other AvaSpec-USB2 spectrometers, using an IC-COAX-SMB interface cable.

Back side: Power connector with double Fuse and switch

The power connector for 100-240 VAC, 500 mA, is located on the rear of the Multichannel AvaSpec. Be carefull to use for designated power range only, please use included power cord with the instrument. For UK, US and Australian power cords, contact Avantes Technical Support.
The 2 Fuses are 2A slow blowing Fuse.

Disconnect power before opening housing or replace Fuse.
The installation category for this equipment is Class 2, it is not permitted to connect equipment to the AvaSpec mulichannel with a power supply without SELV or class II qualification.

2.2.8 AvaSpec-USB2 External I/O connector

The external I/O connector is a female high density 26 poles Sub-D connector.

Pin	Name	Connect to	Comment
1	GND	GND(DB26/DB15-p10)	
2	DO2		general purpose TTL output, PWM, max 25 mA*
3	DO5		general purpose TTL output, PWM, max 25 mA*
4	DO8	FOS (DB26/DB15-p15)	general purpose TTL output, max 25 mA*, AvSoft FOS control
5	STROBE	AVALIGHT-XE (DB26/DB15-p1)	Output, one ore more TTL pulses per scan, max 50 mA*
6	Trig In	Ext. trigger	TTL Input, external hardware trigger
7	DI2		TTL input, AvaSoft-Save spectrum
8	GND	GND	
9	AI1		Analog input, 0-5VDC
10	RX	RS-232-RX (DB26/DB9-p3)	RS-232-RX
11	DO1	AvaLight-LED (DB26/DB15-p14)	general purpose TTL output, PWM, AvaSoft-PWM, max 25 mA*
12	DO4	shutter(DB26/DB15-p13)	Output, used to close shutter for AvaLight-HAL-S, AvaLight-DHc and AvaLight-DHS, max 25 mA*
13	DO7		general purpose TTL output, PWM, max 25 mA*
14	GND	GND	
15	5VDC	DB26/DB15-p3	5VDC output, max 25 mA*
16	DI3		TTL input, AvaSoft-Save reference
17	AO1		Analog output, 0-5VDC
18	AI2		Analog input, 0-5VDC
19	TX	RS-232-TX (DB26/DB9-p2)	RS-232-TX
20	DO3		general purpose TTL output, PWM, max 25 mA*
21	DO6		general purpose TTL output, PWM, max 25 mA*
22	DO9		general purpose TTL output, PWM, max 25 mA*
23	LASER OUT	LASER TTL for LIBS	TTL output, AvaSoft programmable delay and duration, max 50 mA*
24	DI1		TTL input, AvaSoft-Save dark
25	DO10		general purpose TTL output, max 25 mA*
26	AO2		Analog output, 0-5VDC

* All DO combined cannot supply more than 150 mA

Ordering Information Interface cables

IC-DB26-2	Interface cable AvaSpec-USB2 platform to DB15 for AvaLight-S with shutter for auto save dark/ lamp off, AvaLight-XE control
IC-DB26/DB9-2	Interface cable AvaSpec-USB2 platform to RS232 DB9 cable
IC-DB26/DB9/DB15-2	Interface Y cable AvaSpec-USB2 platform to RS-232 (DB9) and AvaLight-S (DB15) with shutter for auto save dark/ lamp off, AvaLight-XE control
IC-DB26-FOS2-2	Interface Y-cable AvaSpec-USB2 platform to FOS-2 and AvaLight-S with shutter, 2m
IC-USB2-2	Interface cable AvaSpec-USB2 to USB port on PC, 2m
IC-Extrig-USB2	Interface cable AvaSpec-USB2 to External trigger pushbutton, 2m
IC-DB26-Extrig-USB2	Interface Y-cable AvaSpec-USB2 to External trigger pushbutton and AvaLight-S with shutter, 2m
IC-DB26-EXTRIG-BNC-2	Interface cable AvaSpec-USB2 platform to BNC plug External trigger, 2 m
IC-COAX-SMB-0.25	Synchronization coax cable with 2 SMB connectors 0.25m for Avaspec USB2 platform

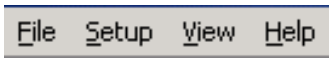
3 AvaSoft-Basic manual

The AvaSoft-Basic software is delivered with every Avantes spectrometer. The AvaSoft full version software contains many additional features and applications. The full version comes with a separate manual. Please refer to the software section in the Avantes Fiber optic Spectroscopy Catalogue for an overview of the extra functionality in AvaSoft-Full. A detailed description about all features in the full version can be found in the help files, or in PDF format on the AvaSpec product CD-ROM that came with your spectrometer system.
AvaSoft-Basic 7 is available for both -USB1 and –USB2 platforms, you will find the relevant instructions for the –USB2 platform spectrometers marked with USB2.

AvaSoft-Basic features user friendly, mouse oriented pull down menus. The mouse controls movements of a data cursor for instantaneous readout of wavelength, pixel and y-axis magnitude. Mouse dragging is a fast and elegant way to zoom in both x and y direction at the same time. Buttons in the main window are available for on-line/off-line spectral analyses (start/stop), for easy saving of reference, dark and experiment spectra, printing, changing the view to absorbance, transmittance, irradiance or raw scope data, rescaling the y-axis and set scale for x- and y-axis. Spectra that were saved before can be displayed graphically and compared to other saved spectra, or to the online measured spectra. The user sets the data collection parameters, such as CCD detector integration time, auto-dark correction, signal averaging and spectral smoothing in common dialog boxes.

3.1 Main Window

Menu bar



The menus and submenus are described in section 3.2

Button bar

-USB1 platform

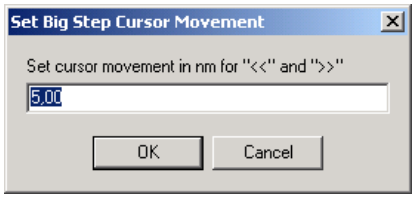
-USB2 platform

Start/Stop button

The Start/Stop button can be used to display data real-time or to take a snapshot

Cursor button

After clicking the cursor button, a vertical line is displayed in the graph. If the mouse cursor is placed nearby this line, the shape of the mouse cursor changes from an arrow to a 'drag' shape. If this shape is displayed, the left mouse button can be used to drag (keep left mouse button down) the line with the mouse towards a new position. Moving this line shows the corresponding values of wavelength and amplitude in the main screen. As an alternative for dragging the line, the small step and big step arrow buttons may be used, or the left and right arrow keys on the keyboard. The step size for the arrow buttons can be changed by holding down the CTRL-key while clicking at a (single or double) arrow button.



Save reference and dark buttons

The reference button is the white button at the left top of the screen. It needs to be clicked to save the reference data. The same result can be achieved with the option File-Save Reference. The dark button is the black button at the left top of the screen. It needs to be clicked to save the dark data. The same result can be achieved with the option File-Save Dark.

Save experiment button

By clicking the Save Experiment button an experiment is saved. The same result can be achieved with the option File-Save Experiment.

Print button

By clicking the Print button a graph that is displayed on the monitor will be printed. The same result can be achieved with the option File-Print.

Channel button (USB1 platform only)

After clicking the Channel button, a dialog is shown in which the spectrometer channels can be selected, for which data will be acquired and displayed. The same result can be achieved with the option View-Channel.

Scope button

By clicking the S button, the data will be presented in Scope Mode. The same result can be achieved with the option View-Scope Mode.

Absorbance button

By clicking the A button, the data will be presented in Absorbance Mode. The same result can be achieved with the option View-Absorbance Mode.

Transmission button

By clicking the T button, the data will be presented in Transmittance Mode. The same result can be achieved with the option View-Transmittance Mode.

Irradiance button

By clicking the I button, the data will be presented in Irradiance Mode. The same result can be achieved with the option View-Irradiance Mode.

Auto scale Y-axis button

By clicking this button, the graph will be rescaled on-line. A maximum signal will be shown at about 75% of the vertical scale. The same result can be achieved with the option View-Auto scale Y-axis

Change Graph Scale button

By clicking this button, a dialog will be shown in which the range can be changed for both X- and Y-axis. This range can be saved as well and restored any time by clicking the Goto Preset Scale button (see below). The menu option with the same functionality is View-Change Graph Scale.

Goto Preset Scale button

By clicking this button, the scale for X- and Y-axis will be set to a range that has been set before. The same result can be achieved with the menu option View-Goto Preset Scale

Graphic Reset button

By clicking this button, the X- and Y-axis will be reset to their default values. The same result can be achieved with the option View-Graphic Reset

Edit bar

-USB1 platform

-USB2 platform multichannel

For USB1 when AvaSoft is acquiring data, the edit fields are gray and non-editable. By clicking the red STOP button, data acquisition is stopped and the edit fields become white and editable. The edit bar shows the following parameters:

Integration time[ms]
This option changes the CCD readout frequency and therefore the exposure- or integration time of the CCD detector. The longer the integration time, the more light is exposed to the detector during a single scan, so the higher the signal. If the integration time is set too long, too much light reaches the detector. The result is that, over some wavelength range, the signal extends the maximum counts or in extreme case shows as a straight line at any arbitrary height, even near zero. Entering a shorter integration time can usually solve this. Try to adjust the integration time, such that the maximum count over the wavelength range is around 90% of the full ADC scale (14750 counts for the 14bit ADC, 59000 counts for the 16bit ADC).. When at minimum integration the signal is still too high, an attenuator (FOA-INLINE), a neutral density filter or fibers with a smaller diameter may be used. When not enough light reaches the spectrometer, likewise a longer integration time should be entered.

If measurements are done in a mode in which reference and dark data are required (all modes except Scope mode), then new reference and dark spectra need to be saved after the integration time has been changed.

Average

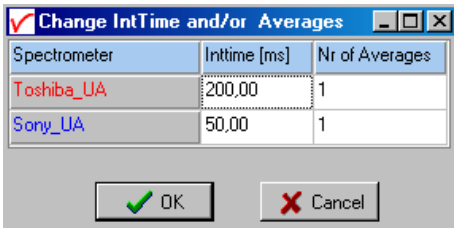
With this option, the number of scans to average can be set. A spectrum will be displayed after every # scans. This spectrum is the average of the # scans.

Wavelength[nm]
The wavelength shows the position of the cursor, which becomes visible if the cursor button is down. The amplitude of the signal, which is given in the status bar at the bottom of the main window, is the amplitude at the wavelength shown in this field.

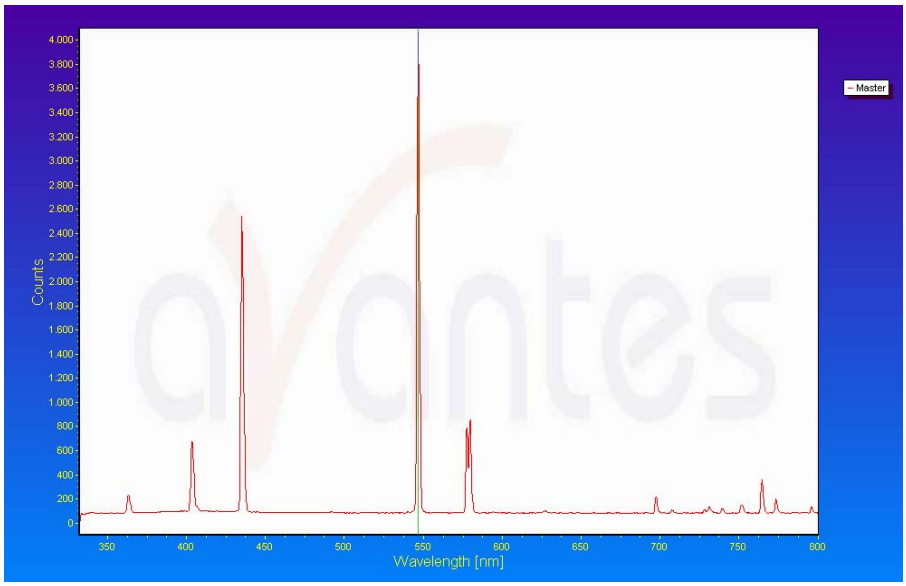
Multichannel USB2 only

For multichannel USB2 spectrometers the integration time and averaging can be set for all channels at the same value by clicking to All.

If the dashed box is clicked, different integration time and averaging can be set per channel .

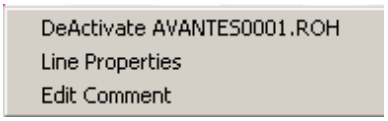


Graphical region
The graphical region displays the data in an XY-diagram, with at the X-axis the wavelength in nanometer, and at the Y-axis the detector counts. After loading or saving a reference and dark spectrum, other units can be selected at the Y-axis: Absorbance Units, Percentage Transmittance, or Relative Irradiance.



Display saved Graph and Line style editor

By clicking on the legenda with the right mouse button, multiple spectra, that were saved earlier can be displayed.
New in AvaSoft 7 is that displayed graphs can be deleted or properties of the displayed graphs, such as line style or color or comments can be changed. This is done by clicking with the right mouse button on the line in the graphical display. A small line edit box will occur.



Now the line can be deactivated or the line properties can be changed as depicted in the border editor or the comments can be edited.

Zoom features

Zoom in: select a region to be expanded to the full graph. To select this region, click the left mouse button in the white graphical region and drag it downwards and to the right. After releasing the left mouse button within the graphic display, both the X- and Y-axis will be rescaled to the new values of the selected region.

Zoom out: drag with the left mouse button within the white rectangle, but in stead of dragging the mouse downwards and to the right, drag it into another direction. After releasing the mouse button, both the X- and Y-axis will be reset to their default values.

Move X-Y: dragging with the right mouse button results in moving the complete spectrum up or down and to the left or right.

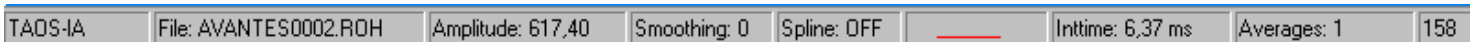
Move-Y: if a mouse-wheel is available on the mouse being used, then the spectrum can be moved up or down by moving the mouse wheel.

Status bar

USB1

For each selected spectrometer channel, a statusbar at the bottom of the main window shows information about the file to which the data will be saved, amplitude at current wavelength, and the current settings for the smoothing and spline parameters. The field at the right of the Spline setting is used to indicate that the spectrometer is receiving too much light at a certain wavelength range (=16383 counts before correcting for dynamic dark, smoothing or averaging), in which case the label “saturated” will become visible.

USB2



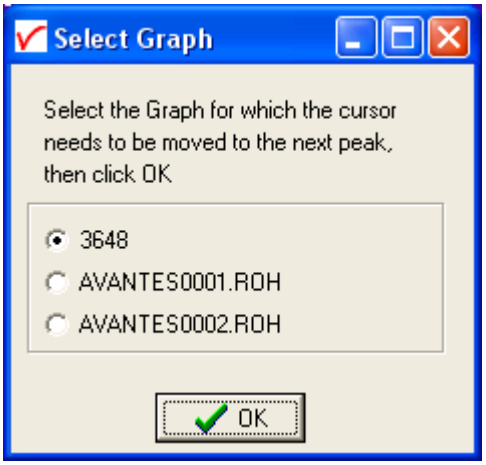
For each selected spectrometer channel, a statusbar at the bottom of the main window shows the name label of the connected spectrometer channel, the file to which the data will be saved, amplitude at current wavelength, the current settings for the smoothing and spline parameters, the line color and style in the graphical display, the real integration time and averages per channel and final the number of scans taken since the start button was clicked. The field at the right is used to indicate that the spectrometer is receiving too much light at a certain wavelength range (=16383 counts for 14bit ADC, 65535 counts for 16bit ADC, before correcting for dynamic dark, smoothing or averaging), in which case the label “saturated” will become visible.

Find peaks or valleys by CTRL or SHIFT + left mouse button click
This option can be used in all modes (Scope, Absorbance, Transmittance or Irradiance) and for all displayed graphics. When the left mouse button is clicked in the graphical region, while the CTRL key is down, AvaSoft will follow the following procedure to run to the closest peak:

1) The wavelength is determined from the position the mouse click occurred.
2) The data from closest pixel is retrieved
3) The direction to search for the peak is determined from the neighbor pixels. If both neighbor pixels have a lower value at the Y-axis than the current pixel, the current pixel is already a peak. If only one of the neighbor pixel values is higher then the current pixel value, the peak will be searched in the direction of this higher pixel. If both neighbor pixels have a higher value at the Y-axis than the current pixel, the current pixel is in a valley. The peak will in this case be searched in the direction of this neighbor pixel with the highest value.
4) The cursor starts moving in the direction, as determined under 3), until it reaches a pixel of which the value is not higher than the last one evaluated. At this pixel the cursor stops.

By holding down the SHIFT key instead of the CTRL key, the same procedure will be used to move to the closest valley.

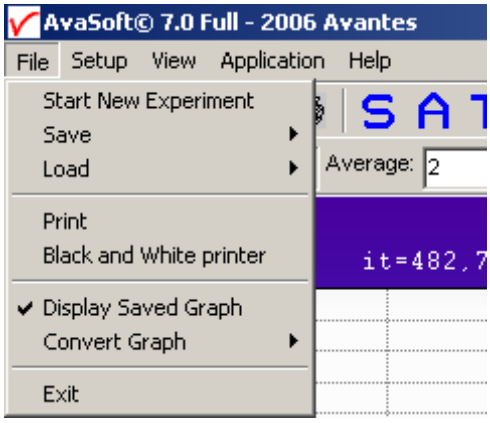
If more than one spectrum is being displayed, a dialog, as shown at the right, pops up in which the spectrum for which the peak finder needs to be activated can be selected out of all displayed spectra.



3.2 Menu Options

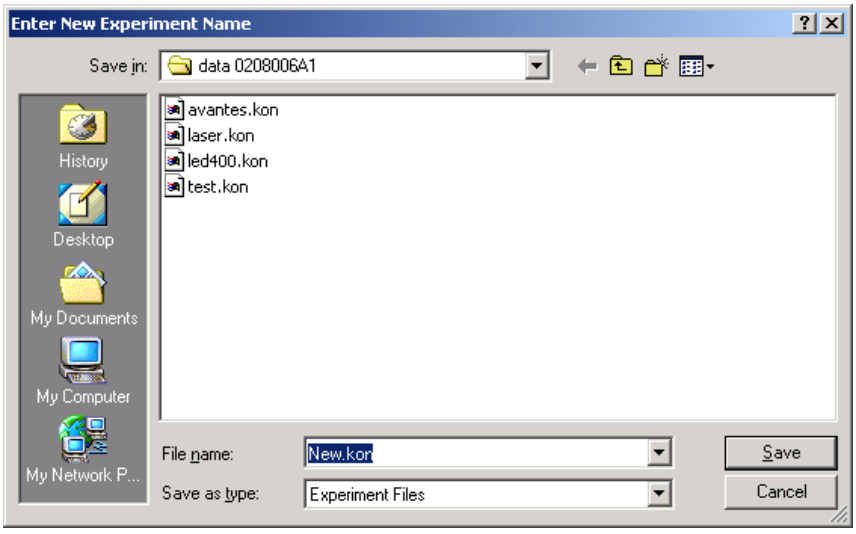
In sections 3.2.1 to 3.2.4 the four main menu options (File, Setup, View and Help) and their submenus are described in detail.

3.2.1 File Menu



File Menu: Start New Experiment

After selecting this option, a dialog box appears in which a new experiment name can be entered. The experiment name will be saved as a filename with the extension *.kon. This extension does not need to be entered.



After clicking the save button, the current filename will be built up from the experiment name that has been entered, and a sequence number, starting at 0001.
Example: if the experiment name is “test”, the first graphic file that will be saved in scope mode, will be called test0001.ROH, the sequence number will be automatically incremented, so the next file that will be saved in scope mode will be called test0002.ROH etc. For detailed information on graphic filenames, see File-Save Experiment. Note that the dialog allows you to select different folders or drives to save the experiments to, as well as creating a new folder name for the new experiment. For USB1 platform the default folder in which data is saved is called “data <serialnumber>”, in which <serialnumber> refers to the serial number of the AvaSpec spectrometer that is being used (0208006A1 in the figure above), for USB2 platform the default directory is “data”.
After closing the dialog box by clicking the save button, the new experiment name, followed by its sequence number, is displayed in the lower left of the status bar. By clicking the cancel button, the old experiment name will be restored.

File Menu: Load Dark

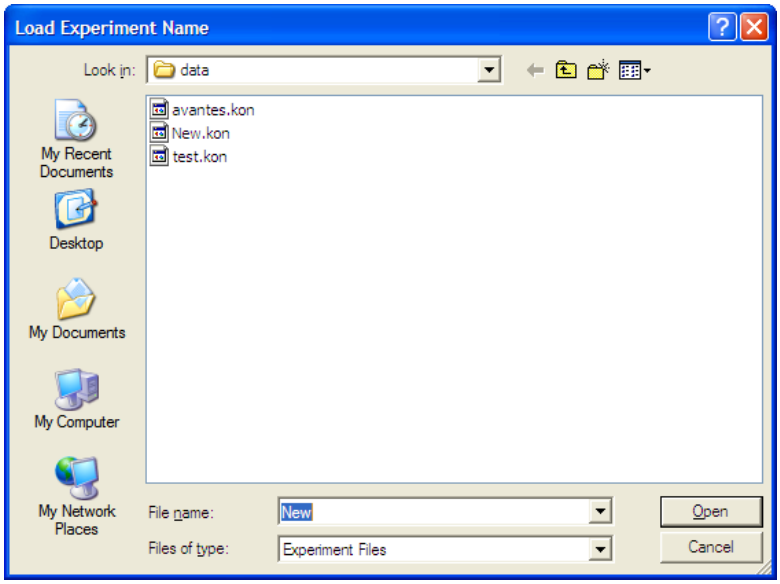
With this option, dark data can be loaded, that have been saved before. If AvaSoft is in static mode, the dark data that will be loaded are shown on the screen first.

File Menu: Load Reference

With this option, reference data can be loaded, that have been saved before. If AvaSoft is in static mode, the reference data that will be loaded are shown on the screen first.

File Menu: Load Experiment

With this option, an experiment name can be loaded, that has been used before. This experiment name has the file extension "*.kon". After choosing this option, a dialog box shows all experiments that were saved earlier in the current experiment directory. If the experiment name that needs to be loaded is in this directory, select it and click the save button. If the experiment name that needs to be loaded is in another drive and/or directory, move to this directory by clicking the behind the current folder name.



File Menu: Save Dark

With this option, dark data are saved. For USB1 platform the name of the dark data file is "dark*.dat", where * represents the number of the slave channel for which the dark data has been saved (*=0 represents the master channel). For USB2 platform the name of the dark data file is "serialnr.drk". The dark data files will be saved in the experiment directory that has been picked by the option File-Load-Experiment or File-Start New-Experiment.

File Menu: Save Reference

With this option, reference data are saved. For USB1 platform the name of the reference data file is "ref*.dat", where * represents the number of the slave channel for which the reference data has been saved (*=0 represents the master channel). For USB2 platform the name of the reference data file is "serialnr.ref".

The reference data files will be saved in the experiment directory that has been picked by the option File-Load-Experiment or File-Start New-Experiment.

File Menu: Save Experiment

With this option, graphic files are saved. All graphic files will be saved in the experiment directory that has been picked by the option File-Load-Experiment or File-Start New-Experiment.

Saving graphic files if one spectrometer channel is enabled
First, a window appears in which a line of comments can be entered to the saved graph. Next two files will be saved: the first file contains the saved spectrum data. The name of this first file starts with the experiment name, directly followed by the sequence number of the saved spectrum. The extension of this first file depends on the current measuring mode, as shown below:

Extension	Mode
ROH	Scope Mode
ABS	Absorbance
TRM	Transmittance/Reflectance
IRR	Irradiance

The second file contains the line of comments, which may have been added to this graph. The name of this second file is, except for the extension, the same as the name of the first file (experiment name and sequence number). The extension of this second file also depends on the measuring mode, as shown below:

Extension	Mode
RCM	Scope Mode
ACM	Absorbance
TCM	Transmittance/Reflectance
ICM	Irradiance

Example: suppose the name of our experiment is "avantes". Then, saving one spectrum in scope mode, one in absorbance mode and two in transmittance mode results in the following files:

avantes0001.roh:	spectrum data in scope mode
avantes0001.rcm:	comments for the spectrum saved in avantes0001.roh
avantes0001.abs:	spectrum data in absorbance mode
avantes0001.acm:	comments for the spectrum saved in avantes0001.abs
avantes0001.trm:	spectrum transmittance mode
avantes0001.tcm:	comments for the spectrum saved in avantes0001.trm
avantes0002.trm:	spectrum data in transmittance mode
avantes0002.tcm:	comments for the spectrum saved in avantes0002.trm

After leaving the application and opening AvaSoft the next time, saving graphics in scope, absorbance and transmittance mode, will then result in respectively the data-files avantes0002.roh, avantes0002.abs and avantes0003.trm, as well as the comment files avantes0002.rcm, avantes0002.acm and avantes0003.tcm.

Before saving, the name of the graphic file is displayed in the status bar at the bottom of the screen. After saving, the sequence number is automatically incremented by one.

Saving graphic files if multiple spectrometer channels have been enabled

If graphic files are saved while more than one channel is enabled at the same time (see option View-Channel), then the graphic filename for each channel that is displayed gets a different sequence number. For example, the result of saving one experiment in triple view mode is three graphic data files and three comment files, for instance:

avantes0002.roh: spectrum data in scope mode (e.g. spectrometer 1 or Master)

avantes0003.roh: spectrum data in scope mode (e.g. spectrometer 2 or Slave1)

avantes0004.roh: spectrum data in scope mode (e.g. spectrometer 3 or Slave 2)

avantes0002.rcm: comments for the spectrum saved in avantes0002.roh

avantes0003.rcm: comments for the spectrum saved in avantes0003.roh

avantes0004.rcm: comments for the spectrum saved in avantes0004.roh

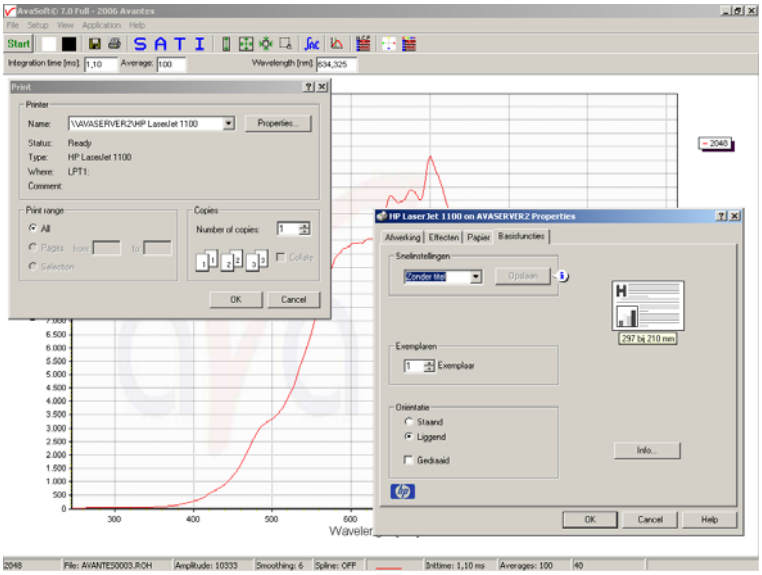
For each channel a different comment line can be entered.

To make it easier to select the graphic files later on with the option File-Display Saved Graph, all comment lines start with a short name for the channel at which the graph has been saved: M for Master, S1 for Slave1 and so on.

After saving, the sequence numbers in this example (triple view mode) will automatically have been increased to 0005, 0006 and 0007, for resp. Master, Slave1 and Slave2.

File Menu: Print

After selecting the print menu option, the background colors in the graphical region will become white. If the menu option “Black and White printer” (see next section) has been marked, the line style for the spectra will also change from colored to black. A dialog will be shown in which the title for the printout can be entered. In the next window, the printer settings can be changed (e.g. portrait or landscape printing, printing quality etc.). After clicking OK in the printer settings dialog, the graph will be printed, and the original graph colors will be restored on the monitor.

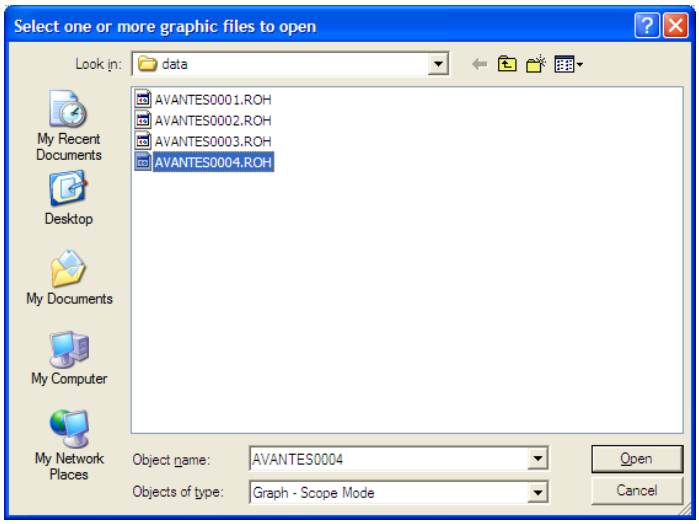


File Menu: Black and White printer

The default setting in AvaSoft is to print the spectra in the same color as they appear on the monitor. However, if a color printer is not available, the menu option “Black and White printer” can be enabled. If this option is enabled, different line styles will be printed if more than one spectrum is displayed, e.g. dash-dash, dot-dot, dash-dot. To enable this option, click the menu option and a checkmark appears in front of it.

File Menu: Display Saved Graph

This option requires that graphic files were saved earlier by using the option File-Save Experiment. After choosing this option or clicking with the right mouse button on the legenda in the display window, a window shows all files in the current measure mode. In the example at the right, the measure mode is “scope”, so the extension of the earlier saved spectra is *.roh.

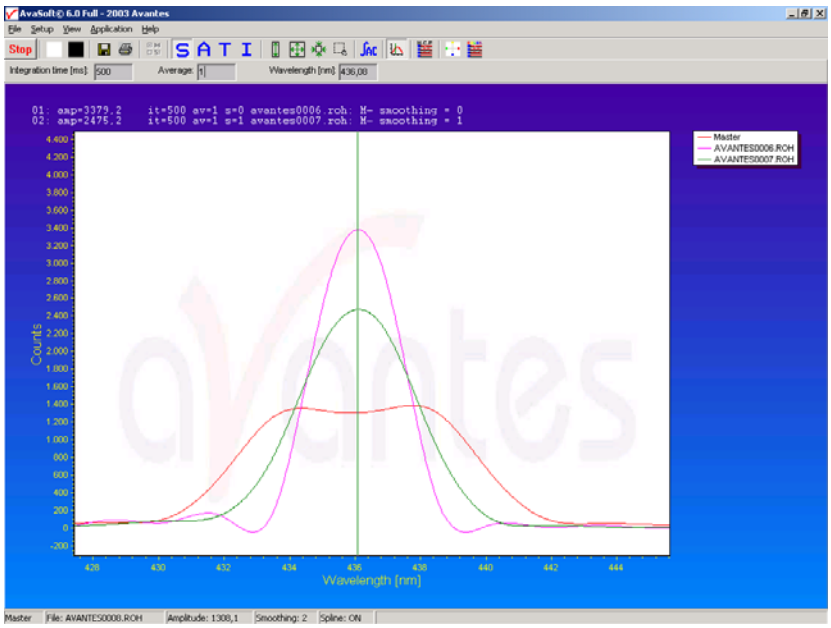


To select graphic files that were saved in another measure mode, e.g. absorbance, click  behind the Graph - ...Mode, and pick the desired measure mode.

To select graphic files from another folder or drive, click  behind the current folder name.

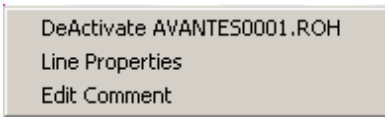
If a graphic file is marked by a (single) mouse click on the filename, the comment line for this file appears at the top of the graphical region in the main window. Selecting multiple filenames can be realized by using the CTRL or SHIFT key in combination with the mouse. If the CTRL key is pressed, all the files that are clicked by the mouse will be selected for displaying. If the SHIFT key is pressed, all the files in between two clicked files will be selected for displaying.

Select the name of the file(s) to be displayed and click the Open button. To leave this dialog without displaying graphic files, click the CANCEL button.



In the figure at the right, two graphic files were selected in scope mode. The comments that were saved with these graphs are displayed at the top of the graphical region, together with information about amplitude at current wavelength (amp), integration time (it) and smoothing (s) settings at the moment that the file was saved and the name of the graphic file. If the active spectrometer channels (e.g. Master) have not been unselected with the View Channel option, the actual data for the activated channel(s) will be displayed in the same graph as the selected graphic files. By

clicking the green start button, the online measurements can be compared directly to the graphics that were saved before.

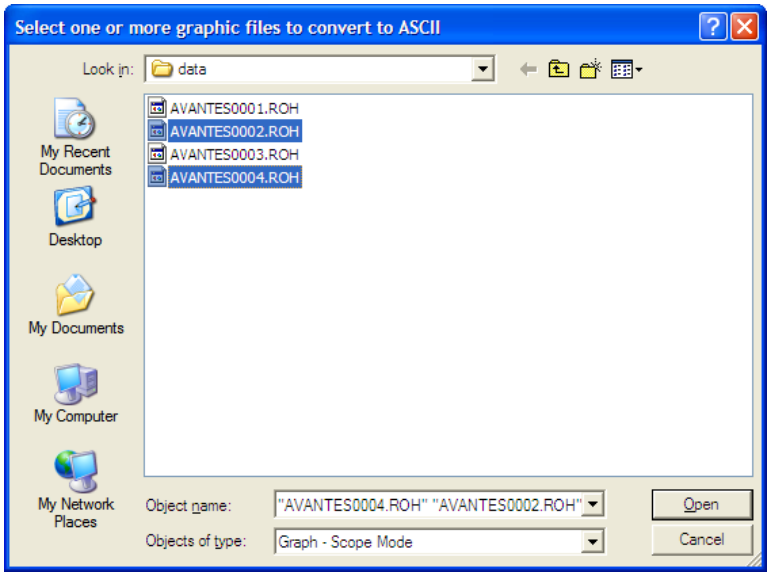


New in AvaSoft 7 is that displayed graphs can be deleted or properties of the displayed graphs, such as line style or color or comments can be changed. This is done by clicking with the right mouse button on the line in the graphical display. A small line edit box will occur.

Now the line can be deactivated or the line properties can be changed as depicted in the border editor or the comments can be edited.

The menu option File-Display Saved Graph is preceded by a checkmark as long as the earlier saved graphics are displayed. To clear all earlier saved graphics at once, select again the menu option File-Display Saved Graph, after which the checkmark disappears, and only the spectra for the active spectrometer channel(s) will be displayed.

File Menu: Convert Graph - to ASCII



This option requires that graphic files were saved earlier by using the option File-Save Experiment. After choosing this option, a window shows all files in the current measure mode. In the example at the right, the measure mode is “scope”, so the extension of the earlier saved spectra is *.roh.

To select graphic files that were saved in another measure mode, e.g. absorbance, click  behind the Graph - …Mode, and pick the desired measure mode.

To select graphic files from another folder or drive, click  behind the current folder name.

If a graphic file is marked by a (single) mouse click on the filename, the comment line for this file appears at the top of the graphical region in the main window. Selecting multiple filenames can be realized by using the CTRL or SHIFT key in combination with the mouse. If the CTRL key is pressed, all the files that are clicked by the mouse will be selected for conversion. If the SHIFT key is pressed, all the files in between two clicked files will be selected for conversion.

Select the name of the file(s) to be converted to ASCII and click the Open button. To leave this dialog without converting files, click the CANCEL button.

The extension of the text files depends on the extension of the binary graphic file as shown below:

Extension binary file	Extension text-file
ROH	TRT
ABS	TAT
TRM	TTT
IRR	TIT

All text files start with a header with information for the graphic file that has been converted. The header shows:

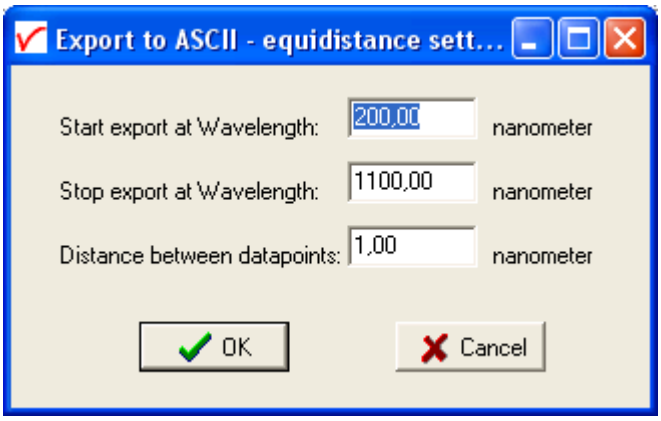
- the comment line
- the integration time
- the number of scans that has been averaged
- the number of pixels used for smoothing
- the serial number of the spectrometer that was used to save the data

The data in a *.TRT file is given in two columns. The first column gives the wavelength in nanometers, the second one the scope data.

The data in the *.TAT, *.TTT and *.TIT files is presented in five columns. The first column gives the wavelength in nanometers. The second to fourth column give respectively the dark, reference and scope data. The fifth column shows the calculated value for absorbance (in a *.TAT file), transmittance (in a *.TTT file) or irradiance (in a *.TIT file).

File Menu: Convert Graph - to ASCII Equi distance

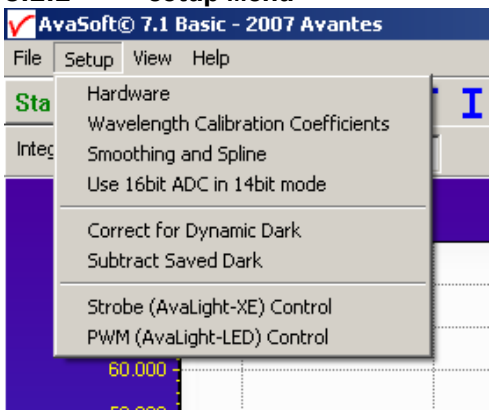
This option requires that graphic files were saved earlier by using the option File-Save Experiment. After selecting the option “File/ Convert Graph/To ASCII – Equi distance”, the wavelength range for which thedata should be converted, and the distance between two successive data points can be entered in the dialog as shown at the right. After clicking the OK button, you can select the files which need to be converted. Selecting these files is the same as for converting to ASCII without the equi distance feature, as described above.



Also the information in the header file is the same as for converting to ASCII without the equi distance feature. The data in the *.TRT, *.TAT, *.TTT and *.TIT files is presented in two columns. The first column gives the equally spaced wavelength in nanometers. The second column shows the interpolated value for scopedata (in a *.TRT file), absorbance (in a *.TAT file), transmittance (in a *.TTT file) or irradiance (in a *.TIT file).

File Menu: Exit
Closes AvaSoft.

3.2.2 Setup Menu

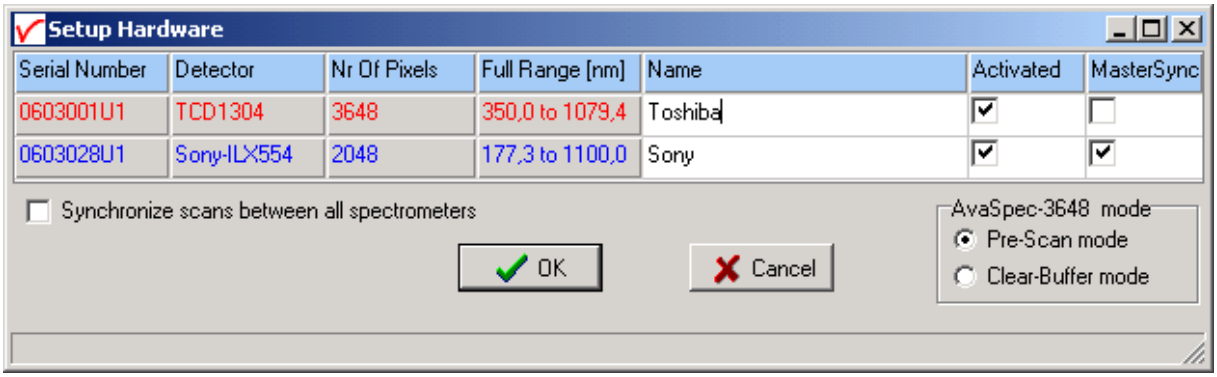


Setup Menu: Hardware

USB1 platform

This menu option displays a list of AvaSpec serial numbers that are connected to the PC's USB port(s) and COM port(s) and which are not used by another (instance of the) application. This option can be used to allocate a spectrometer to an application (for example if one spectrometer is running with AvaSoft-Basic and another spectrometer needs to run with AvaSoft-Raman software). But it can also be used to run multiple spectrometers simultaneously, just by restarting AvaSoft multiple times.
After clicking the OK button, AvaSoft will communicate with the spectrometer serial number that has been activated in the dialog.

USB2 platform



This option shows all connected spectrometers and allows you to change the name of the channel and to deactivate and activate spectrometers. For synchronization of scans a master sync spectrometer needs to be dedicated, in Multichannel platforms usually the spectrometer from the left as seen from the front is prededicated as master sync by Avantes.

AvaSpec-3648-USB only

The Toshiba detector, as implemented in the AvaSpec-3648, can be used in 2 different control modes:

1. The Prescan mode (default mode).

In this mode the Toshiba detector will generate automatically an additional prescan for every request from the PC, the first scan contains non-linear data and will be rejected, the 2nd scan contains linear data and will be showed on the screen and/or saved. This prescan mode is default and should be used in most applications, like with averaging (only one prescan is generated for a nr of averages), with the use of an AvaLight-XE (one or more flashes per scan) and with multichannel spectrometers. The advantage of this mode is a very stable and linear spectrum. The disadvantage of this mode is that a minor (<5%) image of the previous scan (ghostspectrum) is included in the signal.
This mode cannot be used for fast external trigger and accurate timing, since the start of the scan is always delayed with the integration time (min. 3.7 ms).

2. The Clear-Buffer mode.
In this mode the Toshiba detector buffer will be cleared, before a scan is taken. This clear-buffer mode should be used when timing is important, like with fast external triggering. The advantage of this mode is that a scan will start at the time of an external trigger, the disadvantage of this mode is that after clearing the buffer, the dector will have a minor threshold, in which small signals (<500 counts) will not appear and with different integration times the detector is not linear.

Setup Menu: Wavelength Calibration Coefficients
After clicking this option, a dialog is shown in which the wavelength calibration coefficients can be changed manually and start/stoppixels can be set to speed up datatransfer.

Background

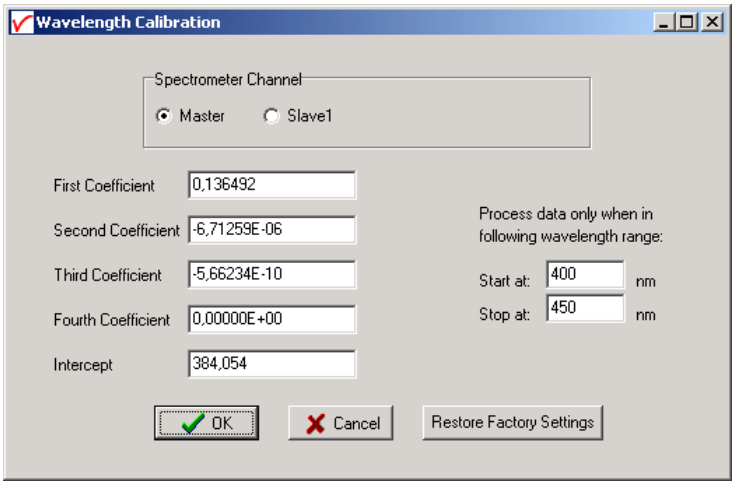
The wavelength λ that corresponds to a pixel number (pixnr) in the detector in the spectrometer can be calculated by the following equation:

$\lambda = Intercept + X1*pixnr + X2*pixnr^2 + X3*pixnr^3 + X4*pixnr^4$

in which Intercept and X1 to X4 correspond to Intercept and First to Fourth Coefficient in the figure below.

For example, if we want to calculate the wavelength at pixel number 1000, using the numbers in the figure at the right, the wavelength becomes:

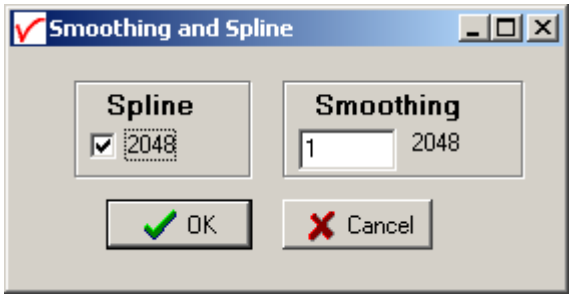
λ = 384,054 + 0,136492*1000 +
-6,71259E-6*1E6 +
-5,66234E-10*1E9
= 513,267 nm.



The 'Restore Factory Settings' button restores for all spectrometer channels the original wavelength calibration coefficients that were saved to the EEPROM during factory calibration.

The "Process data only when in following wavelength range" option can be used to transfer only a limited number of pixels from the spectrometer to the PC. This can significantly speed up the transfer time (e.g. for the AvaSpec-2048 from 30 ms at full wavelength down to 14 ms for a small selection of 10 pixels). A second advantage is data reduction, because only the spectral data will be saved at the pixels for which the wavelength is in the specified wavelength range.

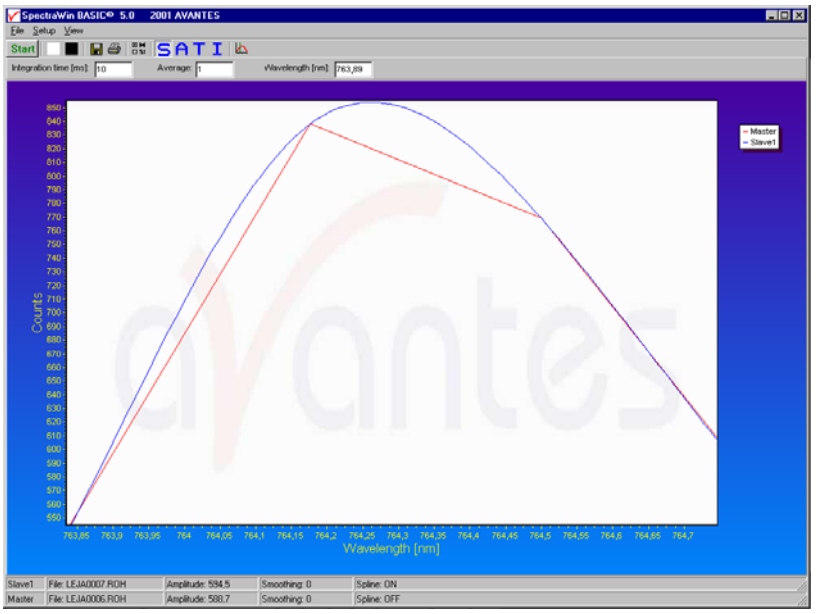
Setup Menu: Smoothing and Spline



The Cubic Spline Interpolation Algorithm can be applied to get a better estimation for the spectral data between the pixels on the detector array.

Smoothing is a procedure, which averages the spectral data over a number of pixels on the detector array. For example, if the smoothing parameter is set to 2, the spectral data for all pixels x_n on the detector array will be averaged with their neighbor pixels x_{n-2}, x_{n-1}, x_{n+1} and x_{n+2}.

Cubic Spline Interpolation



In the figure at the right, the effect of spline interpolation is illustrated. The Master data shows the AD counts for 4 pixels, connected by a straight line (linear interpolation). The Slave1 data is for these 4 pixels exactly the same as for the Master data, but this time the cubic spline interpolation algorithm has been applied, resulting in data which is smooth in the first derivative and continuous in the second derivative.

The spline interpolation can be useful for applications in which the output of line sources, like laser diodes is displayed, or for other applications, which require a high resolution. Note that for the AvaSpec-2048 with 2048 pixels, the effect of spline interpolation is not visible if the data is shown at full scale. The monitor resolution is much less than 2048 pixels. The effect of spline interpolation can only be visualized if the number of detector pixels that are displayed is smaller than the number of monitor pixels at the x-axis.

Smoothing

To get a smoother spectrum without losing information it is important to set in the software the right smoothing parameter. The optimal smoothing parameter depends on the distance between the pixels at the detector array and the light beam that enters the spectrometer. For the AvaSpec-2048, the distance between the pixels on the CCD-array is 14 micron.

With a 200 micron fiber (no slit installed) connected, the optical pixel resolution is about 14.3 CCD-pixels. With a smoothing parameter set to 7, each pixel will be averaged with 7 left and 7 right neighbor pixels. Averaging over 15 pixels with a pitch distance between the CCD pixels of 14 micron will cover 15*14 = 210 micron at the CCD array. Using a fiber diameter of 200 micron means that we will lose resolution when setting the smoothing parameter to 7. Theoretically the optimal smoothing parameter is therefore 6.
The formula is ((slit size/pixel size) – 1)/2
In the table below, the recommended smoothing values for the AvaSpecs spectrometer are listed as function of the light beam that enters the spectrometer. This light beam is the fiber core diameter, or if a smaller slit has been installed in the spectrometer, the slit width. Note that this table shows

the optimal smoothing without losing resolution. If resolution is not an important issue, a higher smoothing parameter can be set to decrease noise against the price of less resolution.

Slit or Fiber	**AvaSpec-102** **Pixel 77 µm**	**AvaSpec-128** **Pixel 63.5 µm**	**AvaSpec-256** **AvaSpec-1024** **Pixel 25 µm**	**AvaSpec-2048** **AvaSpec-2048x14** **Pixel 14 µm**	**AvaSpec-3648** **Pixel 8 µm**	**AvaSpec-NIR256** **Pixel 50 µm**
10µm	n.a.	n.a.	n.a.	0	0	n.a.
25µm	n.a.	n.a.	0	0-1	1	n.a.
50µm	0	0	0-1	1-2	2-3	0
100µm	0-1	0-1	1-2	3	5-6	0-1
200µm	1	1	3-4	6-7	12	1-2
400µm	2	2-3	7-8	13-14	24-25	3-4
500µm	3	3-4	9-10	17	31	4-5
600µm	3-4	4	11-12	21	37	5-6

Setup Menu: Use 16bit ADC in 14bit mode (only USB2 platform, HW rev 1D and later)

The 14bit AD Converter used with the as5216 boards revision 1B and 1C inside the AvaSpec-USB2 has been replaced by a 16bit ADC since the release of the as5216 board revision 1D. Therefore, the default range in Scope Mode for an AvaSpec-USB2 has changed from a 14bit range (0..16383) to 16bit (0..65535).
If the menu option "Use 16bit ADC in 14bit mode" is enabled (preceded by a checkmark), the 16bit range AD Counts will be converted to a 14bit range by the as5216.dll (divide by 4.0). This option has been added for customers who have been already working with earlier versions of the AvaSpec-USB2 with 14bit ADC, and want to be able to compare the data in scope mode between both spectrometers. Note that by setting the 16bit ADC into 14bit mode, you will not loose resolution because the numbers are not truncated or rounded to integer numbers, e.g. 5 counts in 16bit mode will become 1.25 counts in 14-bit mode.
If multiple AvaSpec-USB2 spectrometers are connected simultaneously and one or more devices don't support the 16bit ADC (rev 1B or rev 1C as5216 board), all spectrometers will be set automatically into 14bit mode (range 0..16383 AD counts).

Setup Menu: Correct for Dynamic Dark (AvaSpec-2048/3648 only)

The pixels of the CCD detector (AvaSpec-2048/3648/2048x14) are thermally sensitive, which causes a small dark current, even without light exposure. To get an approximation of this dark current, the signal of the first 14 optical black pixels of the CCD-detector can be taken and subtracted from the raw scope data. This will happen if the correct for dynamic dark option is enabled. As these 14 pixels have the same thermal behavior as the active pixels, the correction is dynamic.
Note that this option is different from the dark current that needs to be saved before any transmittance or absorbance measurements can be taken (File-Save Dark). If the correct for

dynamic dark option has been changed, it will be necessary to save a new dark and reference spectrum because the raw data has been changed.

If this menu option is preceded by a checkmark, the scope data is corrected with the dynamic dark algorithm. It is recommended to leave this setting checked, which is the default state.

Setup Menu: Subtract Saved Dark

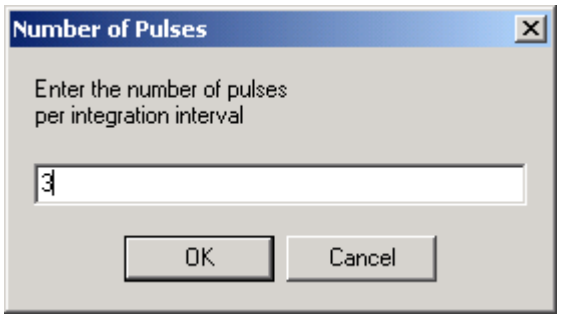
This option is used to subtract the dark spectrum that has been saved (File-Save Dark) from the raw scope data. After starting up AvaSoft, this menu option is always unselected, because a dark spectrum needs to be saved or loaded before it can be subtracted.
If this menu option is preceded by a checkmark, the scope data is corrected with the saved dark.

Setup Menu: Strobe Enable

This option can be used to enable or disable an external strobe (e.g. the AvaLight-XE) attached to an AvaSpec spectrometer. The measured light intensity of the AVALIGHT-XE is independent of the integration time in AvaSoft. To increase light intensity, the number of pulses per integration interval should be increased. The maximum frequency at which the AVALIGHT-XE operates is 100 Hz. This means that the minimum integration time for 1 pulse per scan is 10 ms. When setting the number of pulses e.g. to 3, the minimum integration time becomes 30 ms. It is recommended to keep the integration time as low as possible to avoid unnecessary increase of noise.

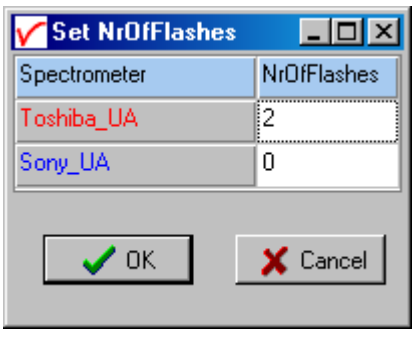
USB1 platform

The AvaLight-XE needs to be attached to the AvaSpec by connecting an IC-DB15-2 interface cable to the high density 15 pole Sub-D connectors at the AvaSpec and AvaLight -XE. If used with an old XE-2000, the XE-2000 has the possibility to switch between Single Flash and Multi Flash (in that case there will be a switch at the backside of the XE-2000), make sure that the switch is always in the Single Flash position, when using the XE-2000 with an AvaSpec spectrometer (in Single Flash mode the XE-2000 is triggered at pin 1, in Multi Flash mode at pin 2). When clicking the "Strobe Enable" menu option, a dialog is shown in which this number of pulses can be set.If this menu option is preceded by a checkmark, the strobe control function has been enabled. To disable the strobe, simply click the menu option when preceded by a checkmark.



Strobe (AvaLight-XE) Control USB2 platform

The AvaLight-XE needs to be attached to AvaSpec-USB2 by connecting an IC-DB26-2 interface cable between the high density 26 pole Sub-D connectors at the AvaSpec-USB2 and the 15-pole DB connector of the AvaLight -XE. If used with a multichannel system, make sure that the AvaLight-XE is connected to the master sync spectrometer, only the number of flashes per scan set for the master synch spectrometer will determine flash rate. To disable the strobe, simply enter 0 under the NrOfFlashes.



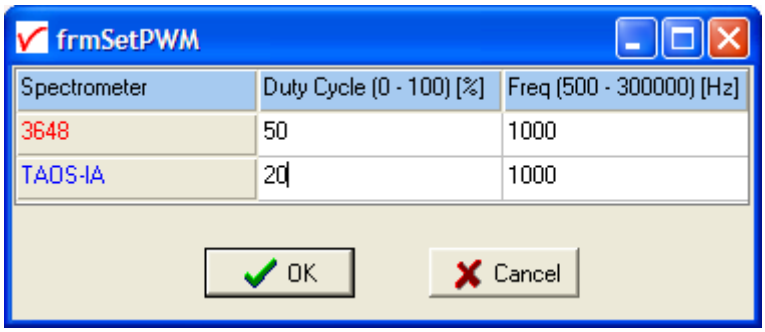
Setup Menu: 1 kHz Enable (DO2) for USB1 platform

Pin 2 of the high density 15 pole Sub-D connector at the AvaSpec can be used to generate an 1 kHz signal. This signal can be used to control an AvaLight-LED light source in pulsed mode.

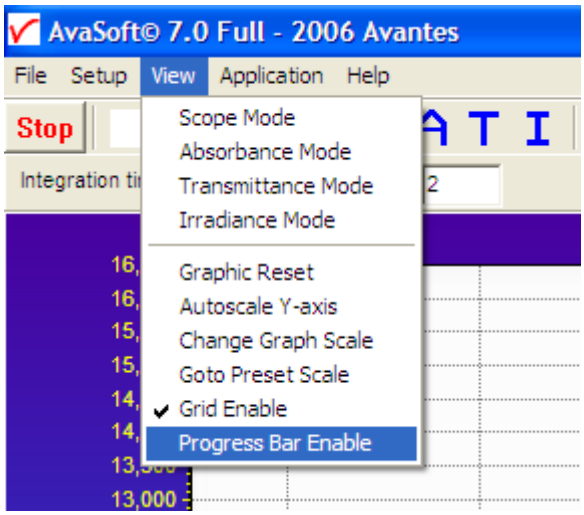
Setup Menu: PWM (AvaLight-LED) control for USB2 platform

The AvaLight-LED needs to be attached to AvaSpec-USB2 by connecting an IC-DB26-2 interface cable between the high density 26 pole Sub-D connectors at the AvaSpec-USB2 and the 15-pole DB connector of the AvaLight –LED (DO1 – pin11).

The frequency can be set between 500 Hz and 300 kHz, the duty cycle between 0 and 100%.
If used with a multichannel system, all channels can have their own independent PWM setting for both frequency and duty cycle.
To disable the PWM output, simply enter 0 under the Duty Cycle.



3.2.3 View Menu



View Menu: Scope Mode
The display is set to Scope Mode, showing a real-time raw data signal, with on the Y-axis the readout of the AD-converter and on the X-axis the calculated wavelength.

View Menu: Absorbance Mode
In Absorbance Mode, the absorbance at pixel n is calculated using the current sample, reference and dark data sets in the following equation:

$$A_n = -\log\left(\frac{sample_n - dark_n}{ref_n - dark_n}\right)$$

View Menu: Transmittance Mode
In Transmittance Mode, the transmittance at pixel n is calculated using the current sample, reference and dark data sets in the following equation:

$$T_n = 100 * \left(\frac{sample_n - dark_n}{ref_n - dark_n}\right)$$

The percentage of transmittance is mathematically equivalent to the percentage of reflectance and can also be used for reflectance experiments.

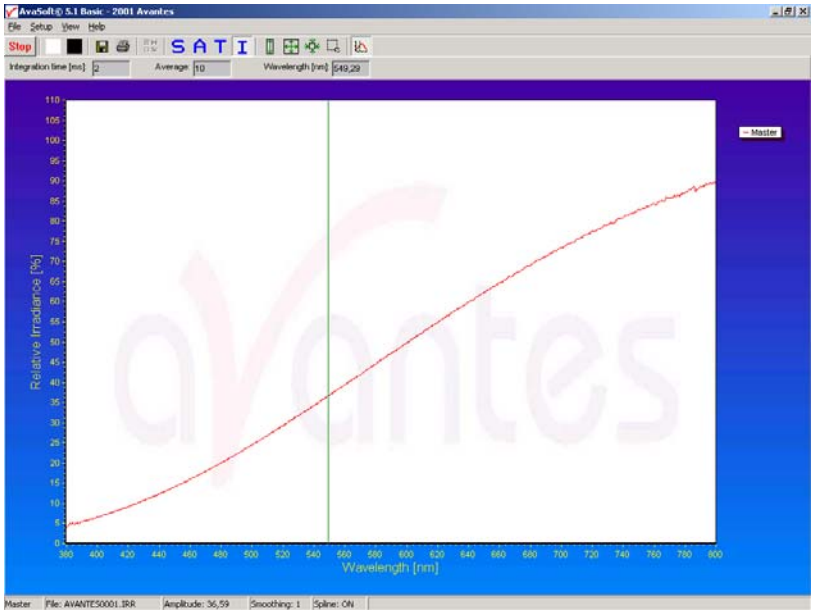
View Menu: Irradiance Mode
For relative irradiance measurements, a light source of known color temperature is needed as a reference, for example the AvaLight-HAL with color temperature of 2900K. The **relative** radiance energy at wavelength λ is then calculated using the current sample, the reference and the dark data sets:

$$S_\lambda = B_\lambda * (sample_\lambda - dark_\lambda)$$

Where B_λ is the computed component of the spectral distribution of the blackbody radiant emittance (at user selected temperature in degrees Kelvin), divided by the current reference data at wavelength λ

How to take relative irradiance measurements with AvaSoft

1. Start the AvaSoft software, and click the Start button in the main window.
2. Connect a fiber to the Spectrometer input port.
3. Adjust the Smoothing Parameters in the Setup menu to optimize smoothing for the Fiber/Slit diameter that is used.
4. Set up the experiment such that the other end of the fiber points at the sample of light to be determined (use a fixture for the best results). Usually some sort of spectrum may be seen on the screen, but it is possible that too much or too little light reaches the spectrometer at the present data collection settings. Too much light means that, over a certain wavelength range, the signal is overloaded shown as a straight line at any arbitrary height, even near zero. This can usually be solved by a shorter integration time. The integration time can be changed in the main window, in the white box below the start/stop button. If AvaSoft is collecting data, the start/stop button shows a red 'stop' and the integration time box is gray, indicating that it cannot be changed. After clicking the 'stop' button the data acquisition stops and the integration time can be changed. The result of the changed integration time can be viewed after clicking the green 'start' button. Try to adjust the integration time, such that the maximum count over the wavelength range is around 90% of the full ADC scale (14750 counts for the 14bit ADC, 59000 counts for the 16bit ADC). When at minimum integration the signal is still too high, fibers with a smaller diameter can be used. When not enough light reaches the spectrometer, likewise a longer integration time should be entered.
5. When a good spectrum is displayed, turn off the light source.
6. Now save the Dark data. This is done by File-Save Dark from the menu or by clicking the black square on the left top of the screen with the mouse.
7. Turn on the **reference light source of known color temperature** (2850K for AvaLight-HAL with default jumper setting) and set up the fiber end that is not connected to the spectrometer, so that a good spectrum is displayed on the screen. Note that the integration time or fiber type may not be changed while measuring the reference data. If there is too much light, adjust the focusing of the light source, so less light is coupled into the fiber. As long as only light from the reference light source and no ambient light is coupled into the fiber, this will not influence the spectral distribution, only its height. Try to set up the fiber such that the maximum count over the wavelength range is around 90% of the full ADC scale (14750 counts for the 14bit ADC, 59000 counts for the 16bit ADC).
8. Save the Reference data. This is done by File-Save Reference from the menu or by clicking the white square on the left top of the screen with the mouse.
9. Note that the whole operation of saving a reference file does not need to be carried out each time a new experiment is started. The reference data are saved in a file called ref*.dat and can be loaded next time by choosing the option File-Load Reference. After saving or loading reference and dark the irradiance mode can be chosen by clicking the 'I' button or by the menu option View-Irradiance mode. First a message box appears in which the value of the color temperature in Kelvin of the light source that has been used as a reference can be entered. If light from the reference light source is viewed, the Planck-curve for the color temperature of the reference light source is displayed, as shown in the figure on the next page. The maximum of the reference Planck-curve has been set to 100.

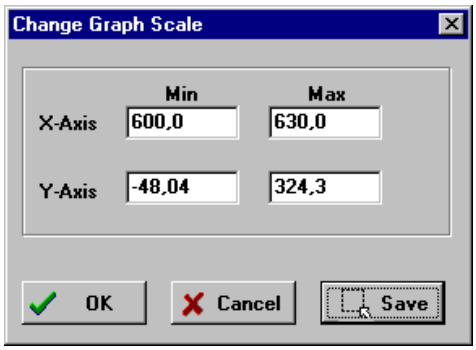


View Menu: Channel (only for USB1 platform)

After selecting this option, a dialog is shown in which the channels to be displayed can be selected. Depending on the number of available channels in the spectrometer system that is used, up to 8 spectrometer channels can be selected. If displaying graphs that were saved before (File-Display Saved Graph), the active channels also remain visible, to be able to measure online against a saved graph background. To view only the saved graphs, all active channels need to be unselected.

View Menu: Change Graph Scale

After selecting this option, a dialog is shown in which the range for both X- and Y-axis can be changed. To switch to the full scale, the View-Graphic Reset option, or the mouse zoom-out feature can be used. By clicking the Save button in this dialog, the settings for X-axis and Y-Axis will be saved to a file and can be restored in the future by selecting the menu option "View-Goto Preset Scale" or by clicking the corresponding button in the button bar.



View Menu: Graphic Reset

When selecting this option, the graph will be reset for all available channels in the spectrometer. This means that both the default X- and Y-axes will be shown.

View Menu: Auto scale Y-axis

By using this option, the graph will be rescaled on-line. A maximum signal will be shown at about 75% of the vertical scale. This will be realized for all channels in the current view mode.

View Menu: Goto Preset Scale

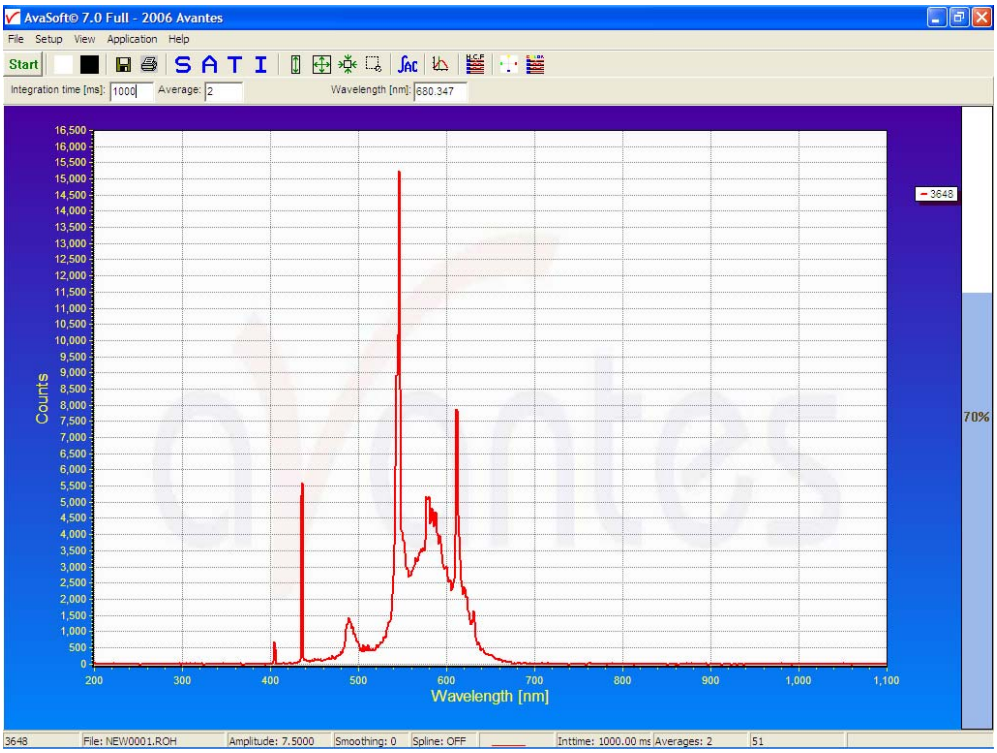
By clicking this menu option, the scale for X- and Y-axis will be set to a range that has been set before . The same result can be achieved by clicking the Goto Preset Scale Button in the button bar.

View Menu: Grid Enable

With the Grid Enable option activated, a grid will be displayed in the graph as shown in the figure below.

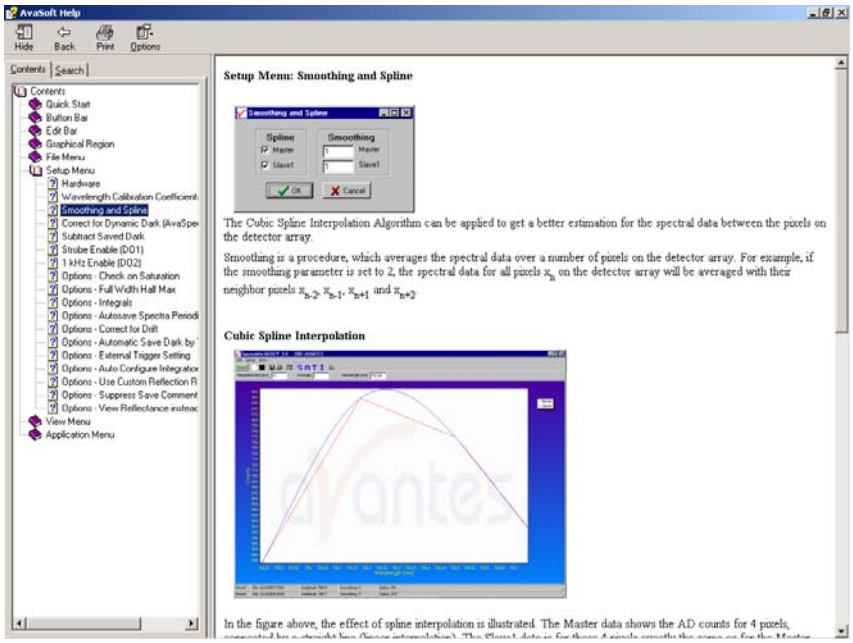
View Menu: Progress Bar Enable

If using long integration times or a high number of averages, it can take a few or more seconds before a new scan is received by the application. To get an indication about how much time it will take until the next scan arrives, a progress bar can be displayed. After enabling the progress bar by clicking the menu option, it will be displayed after the next scan has arrived. The progress bar will be shown only if the time between scans is more than one second. The time between scans is roughly the integration time, multiplied with the number of averages. However, if the number of averages is high, the time between scans can get longer because of the overhead time that is spent on transmitting the high number of average spectra to the PC.



3.2.4 Help Menu

The information in this manual can also be found in the help menu. Further, a lot of additional features that are standard in the FULL version of AvaSoft are described in this help file, as well as the add-ons that are available with this FULL version, like color, process control, absolute irradiance and AvaSoft-XLS. After clicking the Help-Contents menu option, the AvaSoft FULL manual will be displayed in HTML format. At the left side the Help Contents displays all sections to which the user can browse to a specific topic.



Instead of browsing through the contents to a specific topic, the search TAB can be selected. After typing in a keyword (e.g. smoothing), and clicking the List Topics button, a list of all topics containing this keyword is shown. By selecting a topic at the left (double click), the information is displayed at the right, in which the keyword is marked in the text.

3.3 Troubleshooting

If there are any failures, please don't hesitate to contact us:

Avantes Technical Support
Soerense Zand Noord 26
NL-6961 RB Eerbeek
The Netherlands

Tel.: +31-(0)313-670170
Fax.: +31-(0)313-670179

E-mail: info@avantes.com
Web: www.avantes.com

Index