AVANTES

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AVASPEC OPERATING MANUAL

VERSION 5.3 AUG 2015

Introduction

Thank you for purchasing an AvaSpec Avantes Fiber Optic Spectrometer System.
The latest version of this manual can also be downloaded from our website www.avantes.com under the section downloads.
This manual provides users with directions for configuring your AvaSpec with your computer and operating the:

- **AvaSpec StarLine**
  AvaSpec-128-USB2, AvaSpec-2048(L)-USB2, AvaSpec-3648-USB2, AvaSpec-FAST series
- **AvaSpec SensLine**
  AvaSpec-ULS2048x16/64, AvaSpec-HS1024x58/122TEC, AvaSpec-ULS2048XL, AvaSpec HS2048XL, AvaSpec-2048L/3648/ULS2048x64TEC
- **AvaSpec NIRLine**
  AvaSpec-NIR256-1.7, AvaSpec-NIR256/512-1.7TEC, AvaSpec-NIR256-2.0TEC, AvaSpec-NIR256/512-2.2TEC, AvaSpec-NIR256-2.5TEC, AvaSpec-NIR256-2.5-HSC
- **AvaSpec EVO series**
  AvaSpec-2048L-EVO

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 USB2.0 and USB3.0 platform spectrometers.

If applicable, separate manuals are available and supplied with the light sources, fiber optics and accessories.
There is a separate manual for AvaSoft full version Spectrometer Software as a PDF document on the CD.
A separate manual is available for OEM customers.

Contents of shipment

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

- AvaSpec spectrometer
- AvaSpec Product CD-ROM
- Wavelength Calibration Data Sheet
- USB cable

AvaSpec Spectrometer

All electrical connectors are located on the backside; on the front side the optical entrance connector can be found. On the bottom a sticker is located with spectrometer type, serial nr, installation options, date and the customer's name.

Please follow instructions in chapter 1 or 2 for installation.

PS-12VDC/1.0A power supply (optional for SPU-2 version)

The PS-12V/1.0A power supply is standard equipped with a CEE 7/16 Europlug connector and is suitable for 100-240 VAC.
If you need different socket connection, please contact us for the US, UK or Australian power supply.

Please follow instructions in chapter 1 or 2 before connecting the power supply.

Interface Cables

The standard a USB interface cable is included in the shipment. USB3.0 systems are shipped with a USB3.0 cable.

For connection to an RS-232 interface, and an IC-DB26/DB9-2, the cable should be separately ordered with the instrument.

Ethernet cable is not included in standard delivery.

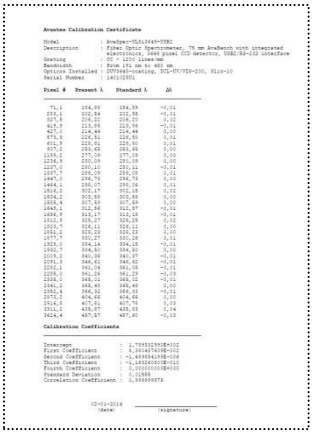
AvaSpec Product CD-ROM

The AvaSpec CD-ROM includes the installation software for the AvaSpec products, such as 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

Sometimes an upgrade or a change to your system is desired. In order for Avantes to make these changes, the customer should first contacts us and obtains a Return to Manufacturer Authorization (RMA) number.

Please contact Avantes Technical Services for specific instructions when returning a product. You can send an email to support@avantes.com

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

Avantes Technical Support

Oude Apeldoornseweg 28

NL-7333 NS Apeldoorn

The Netherlands

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

www.avantes.com, support@avantes.com

1. Quick Start

Before you connect the AvaSpec spectrometer to the USB port of your computer, you need to install the AvaSoft software first.
AVASOFT version 8 is a 32-bit application that can be installed under the following operating systems:

- 32 bit XP/Vista/Windows 7/Windows 8/Windows 10
- 64 bit XP/Vista/Windows 7/Windows 8/Windows 10

1.1 Installing the AvaSpec

With each new spectrometer system, an Avantes Product CD-ROM is included. 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.

AvaSoft 8 can be installed for:

AvaSpec-USB 2.0 group of spectrometers:

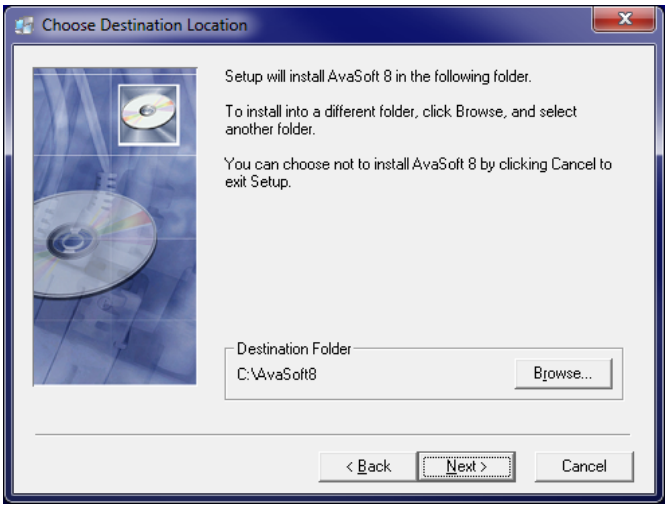
- AvaSpec-102/128/256
- AvaSpec-1024/HS1024x58/HS1024x122
- AvaSpec-2048/2048L/2048x14/2048x16/2048x64/2048XL
- AvaSpec-ULS2048L-EVO
- AvaSpec-3648
- AvaSpec-NIR256/NIR512

AvaSpec-USB 3.0 group of spectrometers:

- AvaSpec-ULS2048L-EVO

Installation Dialogs

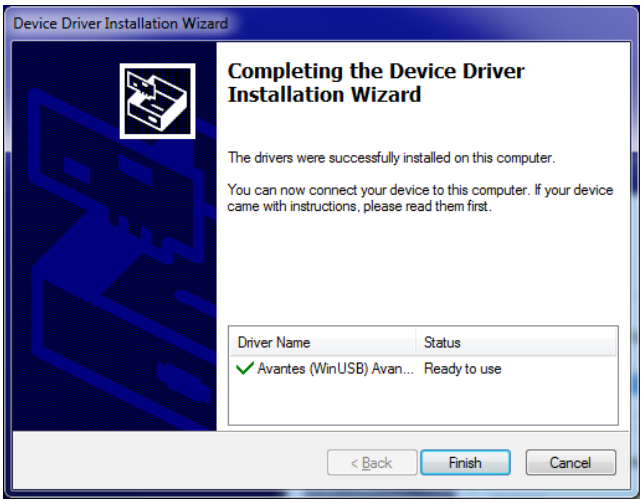
The setup program will check the system configuration of the computer. If no problems are detected, the first dialog is the “Welcome” dialog with some general information.
In the next dialog, the destination directory for the AvaSoft software can be changed. The default destination directory is C:\Program Files (x86)\AvaSoft8. 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.

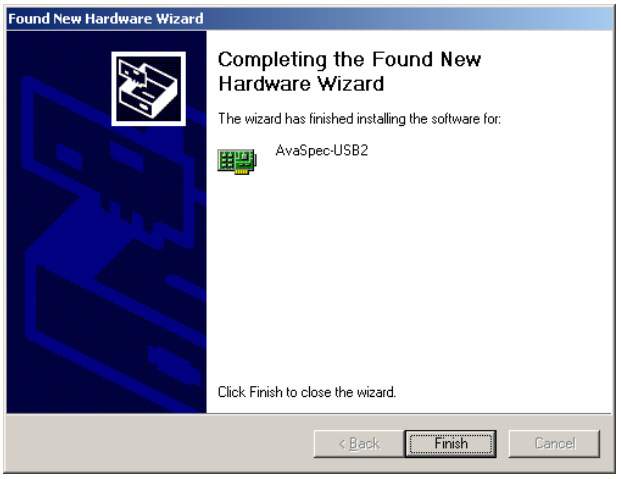
During the installation, the install program will check if the WinUSB driver has been installed on the PC. In some earlier AvaSoft versions, an Avantes kernel USB driver was installed for AS5216 spectrometers on 32bit versions of Windows.

The Device Driver Installation Wizard will be launched automatically. The last dialog in the Device Driver Installation Wizard displays whether the WinUSB driver has been installed correctly.
If you experience problems here, please refer to Appendix A, which describes some special cases.



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.

For Windows XP, 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, with a multichannel AvaSpec-USB2 spectrometer system this

Wizard will run as many times as the number of spectrometers attached. This happens because inside the housing, the USB ports for each spectrometer channel are connected to a USB-Hub.

Windows Vista and up will install the driver silently, without displaying the "Found New Hardware Wizard" dialogs.

1.2 Launching the Software

AvaSoft can be started in the Windows Start Menu. Under '**Start**', '**All Programs**', a group **"AVANTES Software"** has been added, which has an entry for the AvaSoft 8 program and an entry for the AvaSoft 8 help file.
There will also be an AvaSoft 8 icon on the desktop that you can click.
After starting the AvaSoft 8 software, a welcome window will be displayed that will show the spectrometers that are connected.
The AvaSoft 8 windows will be displayed next. Refer to section 3 for a description of the different windows. A "Quick Start" can be found in section 1, directly below, if you want to start measuring immediately. Depending on the AvaSoft version (Basic or Full) and the extra add-on modules that were ordered for your spectrometer, more applications are available in AvaSoft 8, which are described in section 3.5 to 3.9 of the AvaSoft 8 Manual.

Refer to section 3 for a description of the different windows. A "Quick Start" can be found in the section below, if you want to start measuring immediately. Detailed information about the menu options can be found in section 3. Depending on the AvaSoft version (Basic or Full) and the extra add-on modules that were ordered for your spectrometer, more applications are available in AvaSoft Full, which are described in the separate AvaSoft manual:

- Wavelength Calibration (needs AvaSoft Full)
- Time Series (works in AvaSoft Basic)
- Process Control (included in Time Series)
- Excel Output (works in AvaSoft Basic)
- Chemometry (needs AvaSoft Full & CHEM)
- Color Measurement (needs AvaSoft Full & COL))
- Irradiance Measurement (needs AvaSoft Full & IRRAD)
- Raman (needs extra hardware)
- Thin Film (needs AvaSoft Full)

1.3 Quick Start: Measuring and saving a spectrum

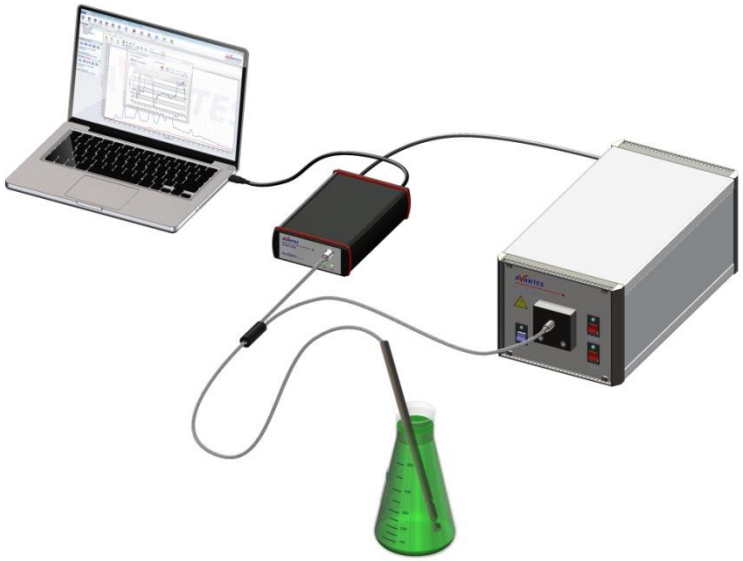
2. After starting AvaSoft, the Start button in the upper left corner of the screen needs to be clicked to start measuring.
3. Connect a fiber or probe to the light source and to the spectrometer input port(s) and set up the experiment for taking a reference spectrum.
4. Optimal smoothing is preset and stored on board in the EEPROM.
5. 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 with the present data collection settings. Too much light means that, over a certain wavelength range, the signal is saturated, this is shown as a straight line at the maximum counts and the appearance of the label "saturated" in the spectrometer window of the channel. This can usually be solved by a shorter integration time. The integration time can be changed in the spectrometer window (by pressing the cogwheel icon, by directly changing the ms value, or by pressing the Auto-configure Integration time button. Try to adjust the integration time, such that the maximum count over the wavelength range is around 90% of the full ADC scale (59000 counts for a 16bit ADC). When at minimum integration time 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.
6. When a good spectrum is displayed, turn off the light source.

6. Now save the Dark data. This can be done by clicking the dark bulb icon in the spectrometer window, or the one 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 clicking the bright bulb icon (next to the dark one). Always use Save Reference after the integration time has been changed. Now the measure mode can be changed to e.g. Absorbance (A button) or Transmittance (T button). To have a better look at the amplitude versus wavelength, the Assign Cursor button can be clicked in the Tools menu. A vertical line is then 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 'splitter' 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 status line of the screen. By clicking the 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 displays 'Start'.
8. To save the spectrum (in the mode chosen before), choose 'File'-'Save' from the menu.
9. To improve the Signal/Noise ratio, a number of spectra may be averaged. To do this, the value in the spectrometer window (below the integration time) can be increased. The new value will take effect when you press the 'Set' button.

1.4 Measurement Setups

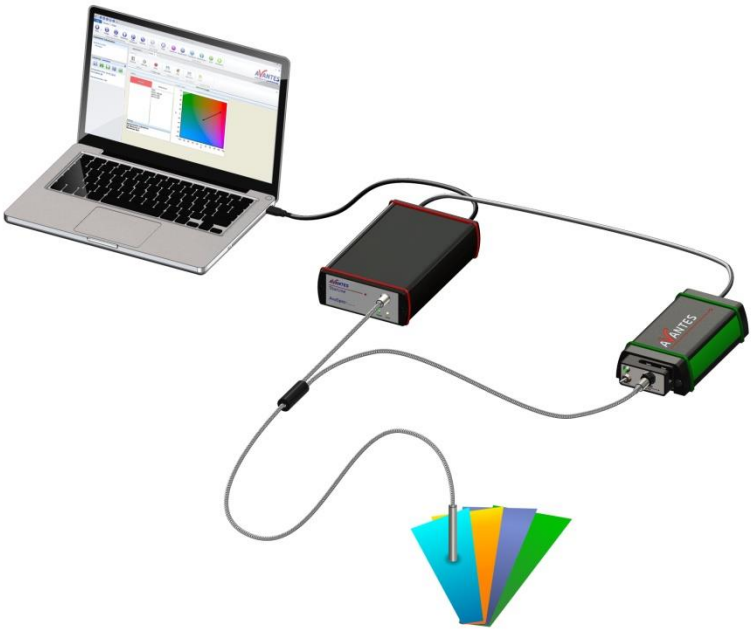
On the following pages the typical configurations for absorbance, transmission, irradiance, and reflection experiments can be found.

UV/VIS Absorbance/Transmission Setup

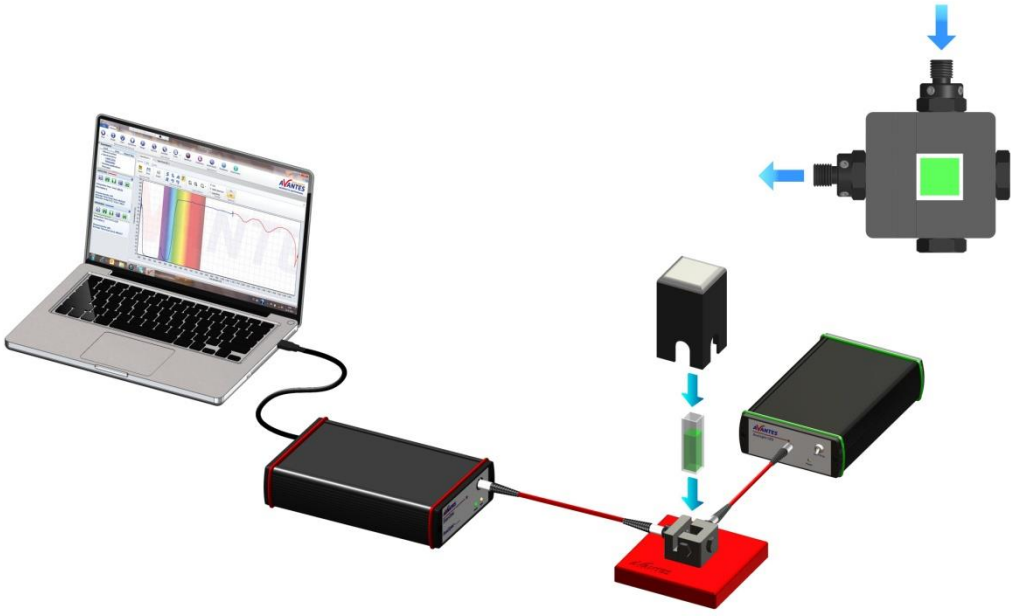


Irradiance Setup

Reflection Setup



Fluorescence Setup

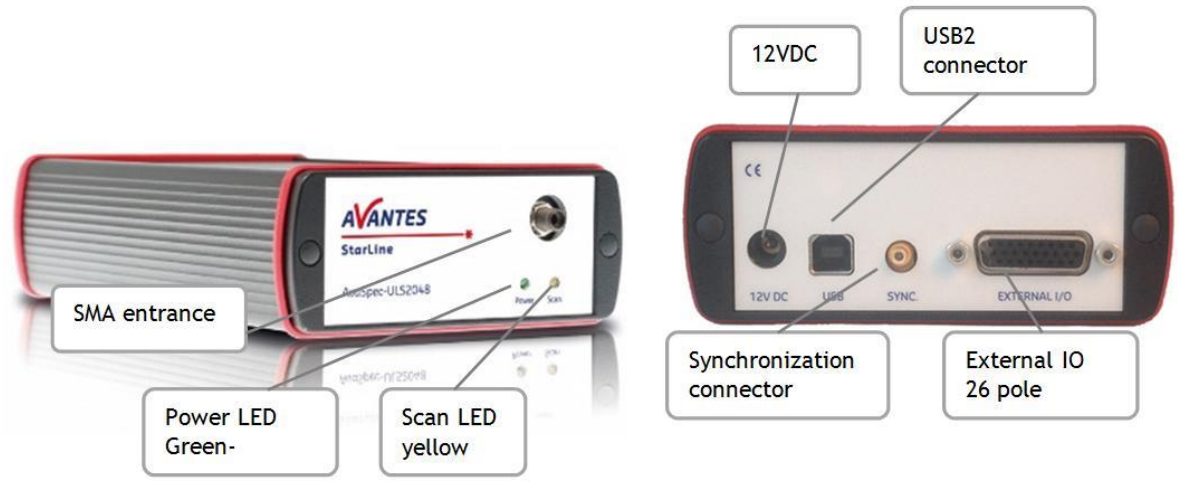


2. Miniature Fiber Optic Spectrometers

The technical specifications and product information, on the separate spectrometer products, can be found in the latest Avantes Catalog as well as on our website.
In the following paragraphs specific product information regarding interface signals, pin-outs, etc. 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 RMA number (see page 6 of this manual). The costs for the AvaSpec-Upgrade depend on the modification that needs to happen.

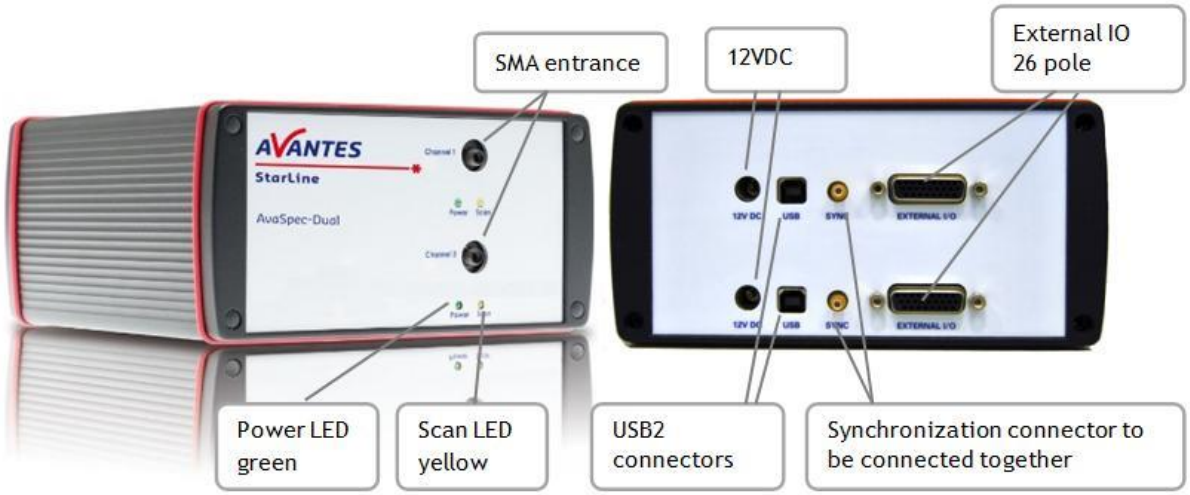
2.1 Spectrometer connections USB2 platform

2.1.1 StarLine AvaSpec-USB2



Specifications of connections see SensLine AvaSpec-ULS2048x16/64-USB2

2.1.2 Dual Channel AvaSpec-USB2



Specifications of connections see SensLine AvaSpec-ULS2048x16/64-USB2

2.1.3 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 the following is meant:

connection	USB
Green LED = off	No power
Green LED = on	Power is on, spectrometer ready
Green LED = blinking	Error detected by spectrometer
Yellow LED = on	scanning in progress

Specifications of connections see section AvaSpec connectors for External I/O, USB and Synchronization

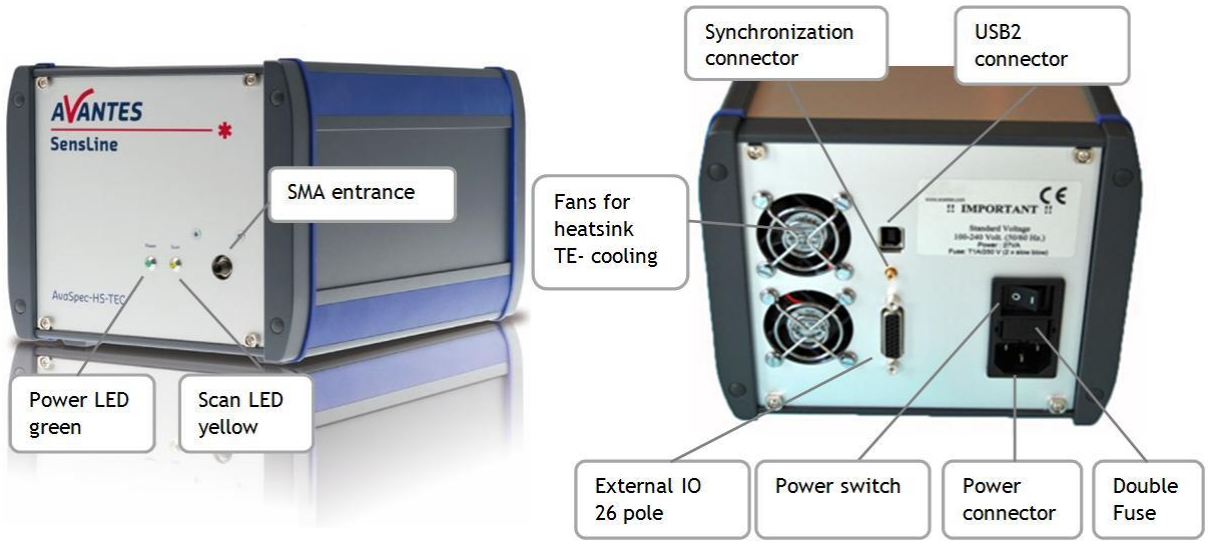
12VDC Power connector (only needed if not USB-powered)
The power connector is a Low power DC connector with GND on outer contact and +12V on inner contact. The outside diameter is 5.5mm, the inside diameter is 2.1mm.
The electrical circuit accepts voltages between 5 and 15V.

> **NOTE**: Please use Avantes PS-12VDC/1.0A power supply or 12VDC battery pack only. Serious damage to the electronics may occur, when other power supplies with different polarity and/or Voltage ratings 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 Battery pack
Middle : OFF
Right : USB powered, no additional power supply required

2.1.4 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 the following is meant:

Connection	USB
Green LED = off	No power
Green LED = on	Power is on, spectrometer ready
Green LED = blinking	Error detected by spectrometer
Yellow LED = on	scanning in progress

Specifications of connections see section AvaSpec connectors for External I/O, USB and Synchronization

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

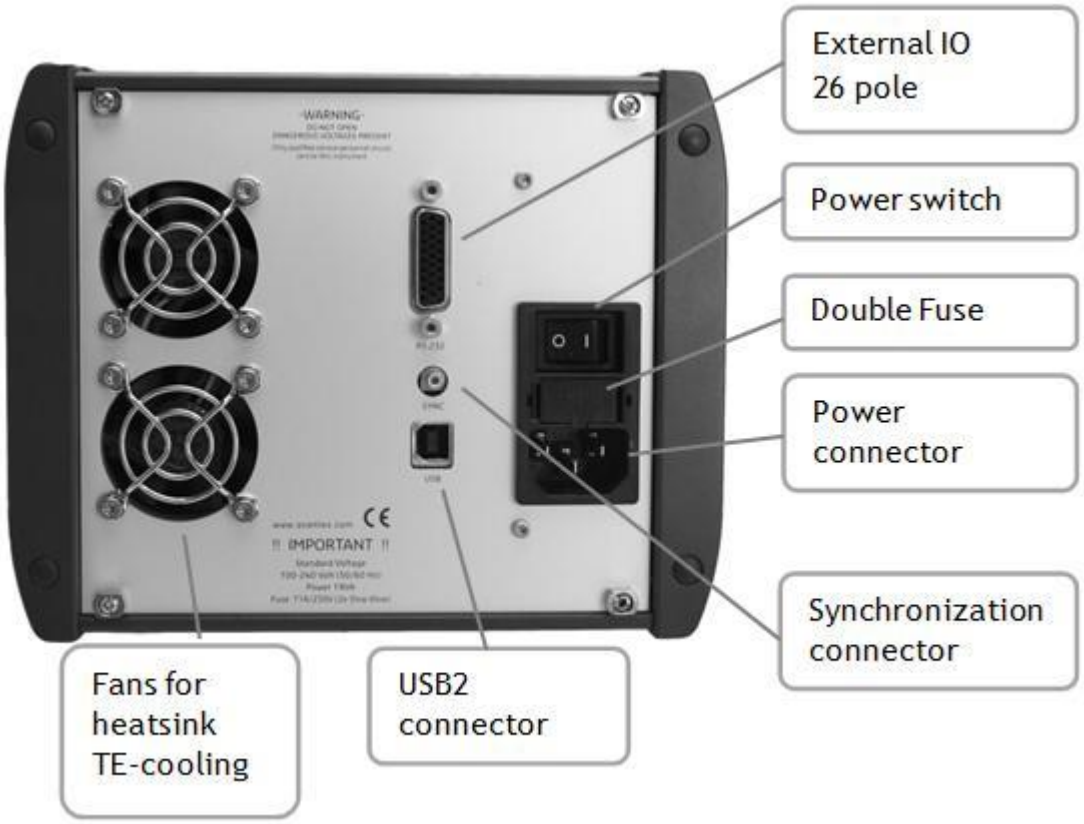
Disconnect power before opening housing or replace Fuse.
The installation category for this equipment is Class 2, it is not permitted to connect equipment to the AvaSpec multichannel with a power supply without SELV or class II qualification.

2.1.5 AvaSpec-ULS2048L/3648/ULS2048x64TEC-USB2

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

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:

Connection	USB
Green LED = off	No power
Green LED = on	Power is on, spectrometer ready
Green LED = blinking	Error detected by spectrometer
Yellow LED = on	scanning in progress



Specifications of connections see section AvaSpec connectors for External I/O, USB and Synchronization

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 careful 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.

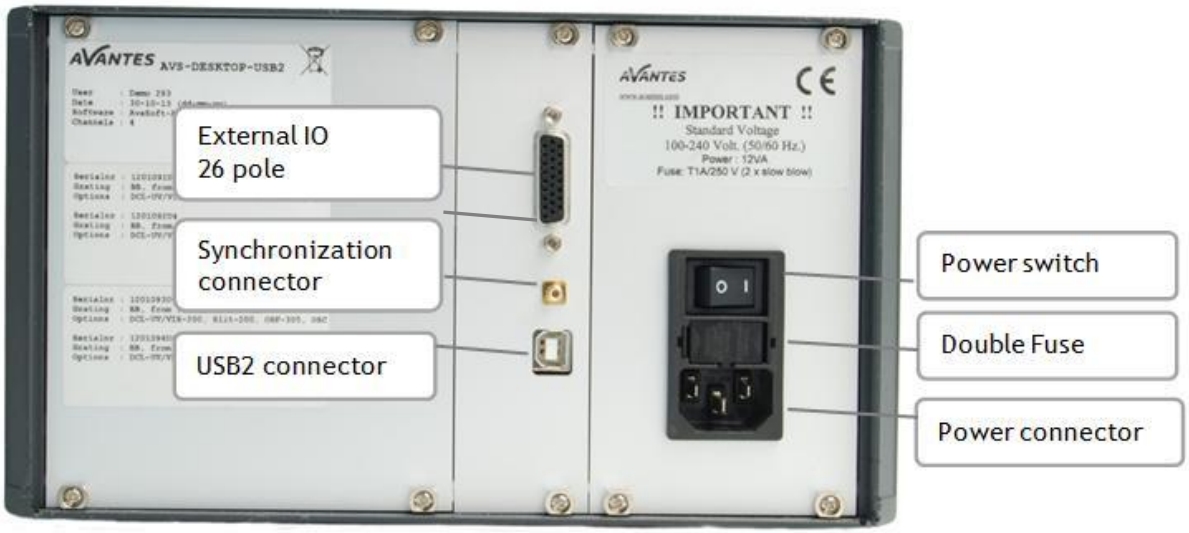
Disconnect power before opening housing or replacing the Fuse.
The installation category for this equipment is Class 2, it is not permitted to connect equipment to the AvaSpec multichannel with a power supply without SELV or class II qualification.

2.1.6 Multichannel connections USB2 platform

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

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:

Connection	USB
Green LED = off	No power
Green LED = on	Power is on, spectrometer ready
Green LED = blinking	Error detected by spectrometer
Yellow LED = on	scanning in progress



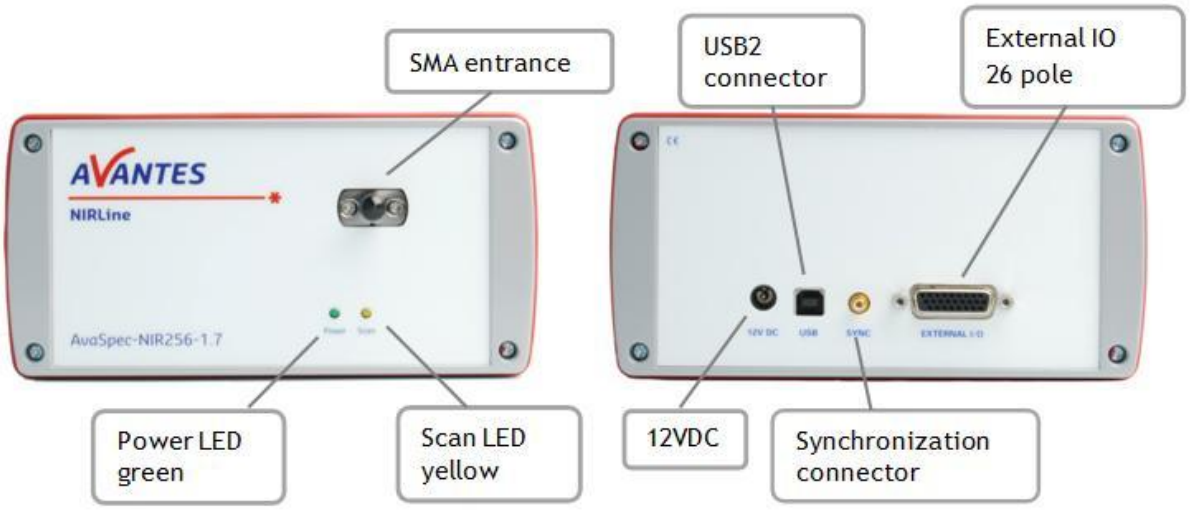
Specifications of connections see section AvaSpec connectors for External I/O, USB and Synchronization

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 careful to use with designated power range only, please use the 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 the housing or replacing Fuses.
The installation category for this equipment is Class 2, it is not permitted to connect equipment to the AvaSpec multichannel with a power supply without SELV or class II qualification.

2.1.7 AvaSpec- NIRLine

2.1.7.1 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:

Connection	USB
Green LED = off	No power
Green LED = on	Power is on, spectrometer ready
Green LED = blinking	Error detected by spectrometer
Yellow LED = on	scanning in progress

Specifications of connections see section AvaSpec connectors for External I/O, USB and Synchronization

12VDC Power connector (only needed if not USB-powered)
The power connector is a Low power DC connector with GND on the outer contact and +12V on the 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 battery pack only. Serious damage to the electronics may occur, when other power supplies with different polarity and/or Voltage ratings are used.

2.1.7.2 AvaSpec-NIR256/512 TEC connections

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:

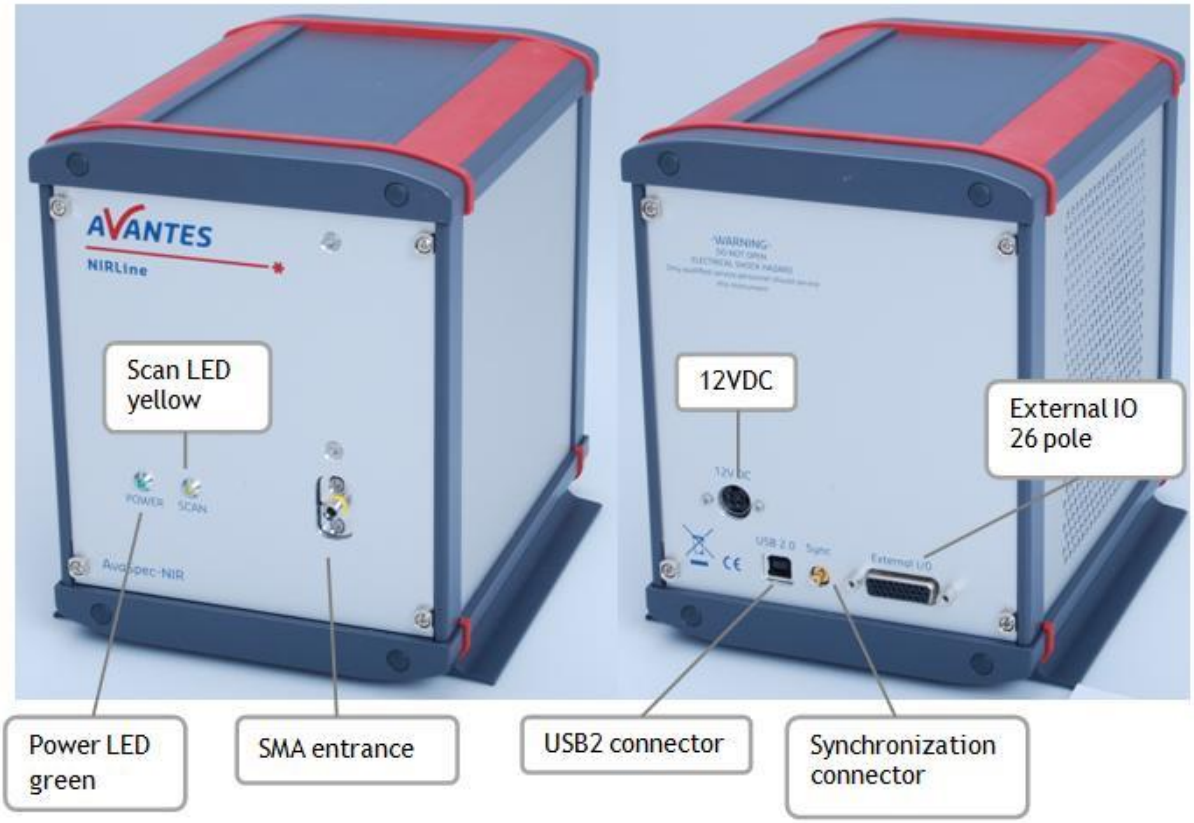
Connection	USB
Green LED = off	No power
Green LED = on	Power is on, spectrometer ready
Green LED = blinking	Error detected by spectrometer
Yellow LED = on	scanning in progress

Specifications of connections see section AvaSpec connectors for External I/O, USB and Synchronization

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 careful to use with 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 replacing Fuses.
The installation category for this equipment is Class 2, it is not permitted to connect equipment to the AvaSpec multichannel with a power supply without SELV or class II qualification.

2.1.7.3 AvaSpec-NIR256-2.5-HSC connections



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:

connection	USB
Green LED = off	No power
Green LED = on	Power is on, spectrometer ready
Green LED = blinking	Error detected by spectrometer
Yellow LED = on	scanning in progress

12VDC Power connector
The power connector is a 4pins power DC connector with GND and +12V contacts.

> **NOTE**: Please use Avantes PS-12VDC/3.3A power supply only. Serious damage to the electronics may occur, when other power supplies with different polarity and/or Voltage ratings are used.

AvaSpec USB and synchronization connectors AvaSpec connectors for External I/O, USB and Synchronization

2.1.8 AvaSpec connectors for External I/O, USB and Synchronization

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

Pin	Name	Connect to	Comment
1	GND	GND (DB15-p10 or DB9-p1)	
2	DO2	Disable (DB15-p11)	general purpose TTL output, max 25 mA*, or used to disable the AvaLight-HAL-(S)-Mini
3	DO5	BSC-DA (Binder768-p1)	general purpose TTL output, PWM, max 25 mA*, or used to control the BSC-DA
4	DO8	FOS (DB15-p15) BSC-DA (Binder768-p3)	general purpose TTL output, max 25 mA*, or used to control the FOS or BSC-DA
5	STROBE	AVALIGHT-XE (DB15-p1)	Output, one or more TTL pulses per scan, max 50 mA*
6	Trig In	External 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-TX (DB9-p3)	Connect RX to TX of computer
11	DO1	AvaLight-LED (DB15-p2)	general purpose TTL output, PWM, AvaSoft-PWM, max 25 mA*
12	DO4	Shutter(DB15-p13)	general purpose TTL output , max 25 mA*, or used to close shutter for AvaLight-HAL-S-Mini, AvaLight-DHc and AvaLight-DHS
13	DO7		general purpose TTL output, PWM, max 25 mA*
14	GND	GND	
15	5VDC	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-RX (DB9-p2)	Connect TX to RX of computer
20	DO3		general purpose TTL output, PWM, max 25 mA*
21	DO6	Long life	general purpose TTL output , max 25 mA*, or used for long life mode of the AvaLight-HAL-(S)-Mini
22	DO9	High power	general purpose TTL output , max 25 mA*, or used for high power mode of the AvaLight-HAL-(S)-Mini
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

USB connector

The USB interface has the following physical characteristics:

- USB version 2.0
- high speed, 480 Mbit/s
- endpoint node, no HUB function

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.

Ordering Information Interface cables

IC-DB26-2	Interface cable AvaSpec-USB2 platform for all Avantes light sources with a DB15 connector
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 all Avantes light sources with a DB15 connector
IC-DB26-FOS2-2	Interface Y-cable AvaSpec-USB2 platform to FOS-2 and all Avantes light sources with a DB15 connector
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 all Avantes light sources with a DB15 connector
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
IC-DB26-BEAM-2	Interface cable AvaSpec-USB2 to BSC-DA, 2m

2.2 Spectrometer connections USB3.0 platform

2.2.1 StarLine AvaSpec-ULS2048L-EVO

FIGURE 1: FRONT

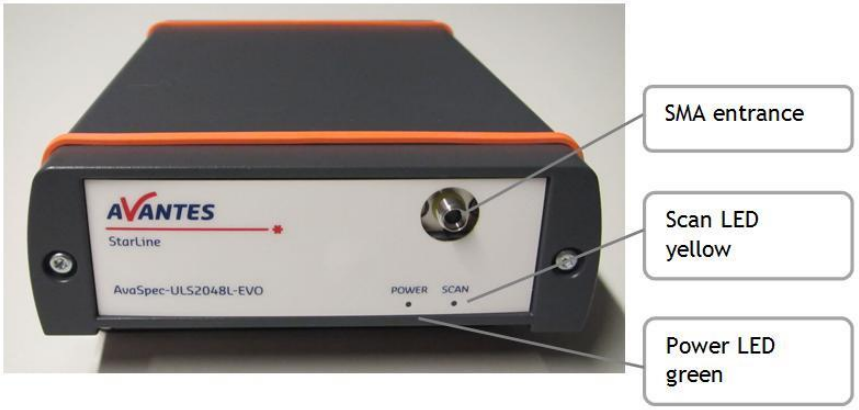


FIGURE 2: REAR

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:

Connection	USB	Ethernet DHCP	Ethernet Fixed IP
Green LED = off	No power	No power	No power
Green LED = on	Power is on, spectrometer ready	Power is on spectrometer ready	Power is on spectrometer ready
Green LED = blinking fast	Error detected by spectrometer	Error detected by spectrometer	Error detected by spectrometer
Green LED = blinking Slow (1Hz)		Requesting IP address	
Yellow LED = on	scanning in progress	scanning in progress	scanning in progress

USB 3.0 connector
The USB interface has the following physical characteristics:

- USB version 3.0
- Super Speed, 4.8Gbitps
- endpoint node, no HUB function
- 5VDC power supply

NOTE: Please use USB 3.0 cable as supplied with your AvaSpec.

Ethernet Connector RJ45
The RJ45 connector has following physical characteristics:

- Gigabit Ethernet
- 1 Gbitps
- TCP/IP protocol

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)

DB-26 Connector External IO connector see section 2.1.8

12VDC Power connector (only needed if not USB-powered)
External power has priority over USB power.
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 battery pack only Serious damage to the electronics may occur, when other power supplies with different Voltage ratings are used.

2.2.2 Connect spectrometer:

USB
Connect USB cable between spectrometer and computer, wait until the green LED is ON, then start AvaSoft.

USB with external power supply
Connect power supply to spectrometer, then connect the USB cable between the spectrometer and computer, wait until the green LED is ON, then start AvaSoft.

> **NOTE**: USB3.0 speed requires USB3.0 cable and USB3.0 port on the computer.

Ethernet with external power supply.
Connect the power supply to the spectrometer and connect the Ethernet cable between the spectrometer and LAN.
Default a new spectrometer, is delivered with DHCP enabled.
LED is blinking during request of IP address, when LED remains ON, the spectrometer is ready.

Start AvaSoft.
At the startup, AvaSoft searches only for USB devices by default.
To use Ethernet, settings in 'options' menu of AvaSoft have to be changed, see AvaSoft manual.

If no DHCP server is available in your network, you can change the IP settings of spectrometer to fixed IP. Please use the IP_Settings_AS7010 utility. This utility can be found in the Avantes software folder in the Windows start menu.

3. AvaSoft manual

The AvaSoft-Basic software is delivered with every Avantes spectrometer. The AvaSoft-Full version software contains many additional features and applications. Please see the software section in the Avantes 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 menu, or in the PDF file on the AvaSpec product CD-ROM which came with your spectrometer system.

AvaSoft-Basic features are user friendly, it works through 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 was saved before, can be displayed graphically and compared to other saved spectra, or to the online measured spectra. The user can set the data collection parameters, such as CCD detector integration time, auto-dark correction, signal averaging and spectral smoothing in common dialog boxes.