

AVASPEC SPECTROMETERS

SPECTROMETERS

Operation manual



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1 Introduction

Thank you for choosing Avantes. This operating manual has been crafted to assist you in effectively utilizing the capabilities of your new spectrometer. Whether you are a seasoned researcher or a novice user, this manual is designed to provide comprehensive guidance for the optimal operation of our product. This manual provides users with directions for configuring your AvaSpec with your computer and operating of the AvaSpec:

AvaSpec StarLine	AvaSpec SensLine	AvaSpec NIRLine
VARIUS series: AvaSpec-VRS2048CL-EVO AvaSpec-VRS4096CL-EVO ULS series: AvaSpec-ULS2048CL-EVO AvaSpec-ULS4096CL-EVO	AvaSpec-ULS2048XL-EVO AvaSpec-ULS2048XL+-EVO AvaSpec-ULS2048x64-EVO AvaSpec-HS2048XL-EVO AvaSpec-HS2048XL+-EVO AvaSpec-ULS2048x64TEC-EVO AvaSpec-HSC1024x58TEC-EVO	AvaSpec-NIR256/512-1.7-EVO AvaSpec-NIR256/512-1.7 HSC-EVO AvaSpec-NIR256/512-2.5-HSC-EVO

For abbreviated directions on setting up your system, turn to the instructions beginning in chapter 2: Quick Start. This manual describes the installation and operation for USB2.0 and USB3.0/Ethernet 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 version Spectrometer Software as a PDF document which can be downloaded from the Avantes website.

Separate manuals are 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
- 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 or back is a label with specific spectrometer information.

Please follow instructions in chapter 2 installation.



Power Supply

PS-12VDC/2.08A - optional for StarLine/SensLine EVO

The PS-12V/2.08A power supply is standard equipped with an IEC 60320 C14 inlet and is suitable for 100-240 VAC. Standard it will be supplied with a cord with a CEE 7/7 (EUR) plug. If you need a different plug, please contact us for the power supply with a US, UK or Australian power cord. Please follow instructions in chapter 3 before connecting the power supply.



PS-12VDC/5.0A for HSC NIRLine and SensLine TEC-EVO

The PS-12V/5.0A power supply is standard equipped with a IEC 60320 C14 inlet and is suitable for 100-240 VAC. Standard it will be supplied with a cord with a CEE 7/7 (EUR) plug. If you need a different plug, please contact us for the power supply with a US, UK or Australian power cord.

Please follow instructions in chapter 3 before connecting the power supply.

Interface Cables

The standard USB interface cable is included. EVO systems come with a USB3.0 cable. To connect other devices to the spectrometer a variety of cables are available (to be ordered separately). Ethernet cable is not supplied as standard.

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 number. Please make sure to save this document in a secure place.

Wavelength	Standard 1	Standard 2	Standard 3	Δλ
400.0	400.00	400.00	400.00	0.00
400.1	400.10	400.10	400.10	0.00
400.2	400.20	400.20	400.20	0.00
400.3	400.30	400.30	400.30	0.00
400.4	400.40	400.40	400.40	0.00
400.5	400.50	400.50	400.50	0.00
400.6	400.60	400.60	400.60	0.00
400.7	400.70	400.70	400.70	0.00
400.8	400.80	400.80	400.80	0.00
400.9	400.90	400.90	400.90	0.00
401.0	401.00	401.00	401.00	0.00
401.1	401.10	401.10	401.10	0.00
401.2	401.20	401.20	401.20	0.00
401.3	401.30	401.30	401.30	0.00
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401.8	401.80	401.80	401.80	0.00
401.9	401.90	401.90	401.90	0.00
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415.2	415.20	415.20	415.20	0.00
415.3	415.30	415.30	415.30	0.00
415.4	415.40	415.40	415.40	0.00
415.5	415.50	415.50	415.50	0.00
415.6	415.60	415.60	415.60	0.00
415.7	415.70	415.70	415.70	0.00
415.8	415.80	415.80	415.80	0.00
415.9	415.90	415.90	415.90	0.00
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416.1	416.10	416.10	416.10	0.00
416.2	416.20	416.20	416.20	0.00
416.3	416.30	416.30	416.30	0.00
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416.5	416.50	416.50	416.50	0.00
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416.7	416.70	416.70	416.70	0.00
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417.7	417.70	417.70	417.70	0.00
417.8	417.80	417.80	417.80	0.00
417.9	417.90	417.90	417.90	0.00
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418.1	418.10	418.10	418.10	0.00
418.2	418.20	418.20	418.20	0.00
418.3	418.30	418.30	418.30	0.00
418.4	418.40	418.40	418.40	0.00
418.5	418.50	418.50	418.50	0.00
418.6	418.60	418.60	418.60	0.00
418.7	418.70	418.70	418.70	0.00
418.8	418.80	418.80	418.80	0.00
418.9	418.90	418.90	418.90	0.00
419.0	419.00	419.00	419.00	0.00
419.1	419.10	419.10	419.10	0.00
419.2	419.20	419.20	419.20	0.00
419.3	419.30	419.30	419.30	0.00
419.4	419.40	419.40	419.40	0.00
419.5	419.50	419.50	419.50	0.00
419.6	419.60	419.60	419.60	0.00
419.7	419.70	419.70	419.70	0.00
419.8	419.80	419.80	419.80	0.00
419.9	419.90	419.90	419.90	0.00
420.0	420.00	420.00	420.00	0.00
420.1	420.10	420.10	420.10	0.00
420.2	420.20	420.20	420.20	0.00
420.3	420.30	420.30	420.30	0.00
420.4	420.40	420.40	420.40	0.00
420.5	420.50	420.50	420.50	0.00
420.6	420.60	420.60	420.60	0.00
420.7	420.70	420.70	420.70	0.00
420.8	420.80	420.80	420.80	0.00
420.9	420.90	420.90	420.90	0.00
421.0	421.00	421.00	421.00	0.00
421.1	421.10	421.10	421.10	

2 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 Windows 7, 8, 10 and 11
- 64 bit Windows 7, 8, 10 and 11

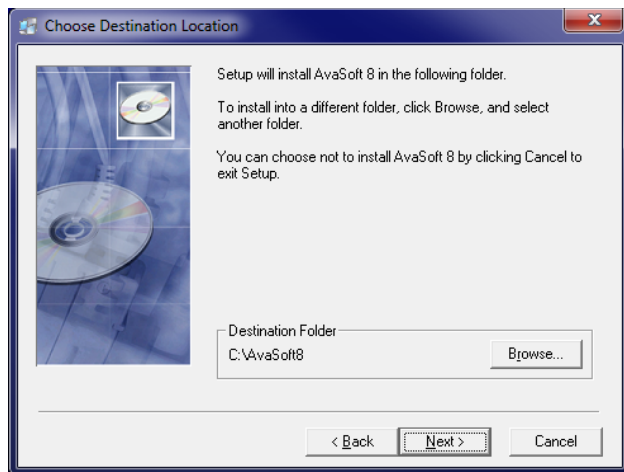
2.1 Installing the AvaSpec Software

Browse to www.avantes.com/gettingstarted for the latest files and software to get started. Free registration is required.

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.

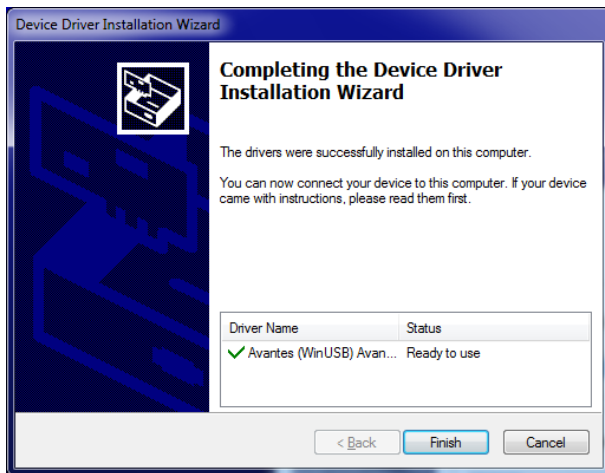
In the next dialog, the destination directory for the AvaSoft software can be changed. The default destination directory is C:\Program Files (x86)\AvaSoft8. If you want to install the software to a different directory, click the Browse button, select a new directory and click OK. If the specified directory 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 Avantes 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.



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 (this can be USB2.0 or USB3.0), wait until the Power LED is ON before you start AvaSoft.

USB with external power supply

Connect the power supply to the spectrometer, then connect the USB cable between the spectrometer and computer, wait until the power 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 (only applicable for EVO spectrometers)

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.

The power LED is blinking during request of the IP address, when the power LED remains ON, the spectrometer is ready for use.

2.2 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. 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 the separate AvaSoft manual.

Depending on the AvaSoft version (Basic, Full and All) different functionality is offered for details please refer to the software page on Avantes.com/products/software

- 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 All)
- Color Measurement (needs AvaSoft All)
- Irradiance Measurement (needs AvaSoft All)
- Raman (needs additional hardware)
- Thin Film (needs AvaSoft Full)

Start AvaSoft with Ethernet spectrometers.

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.

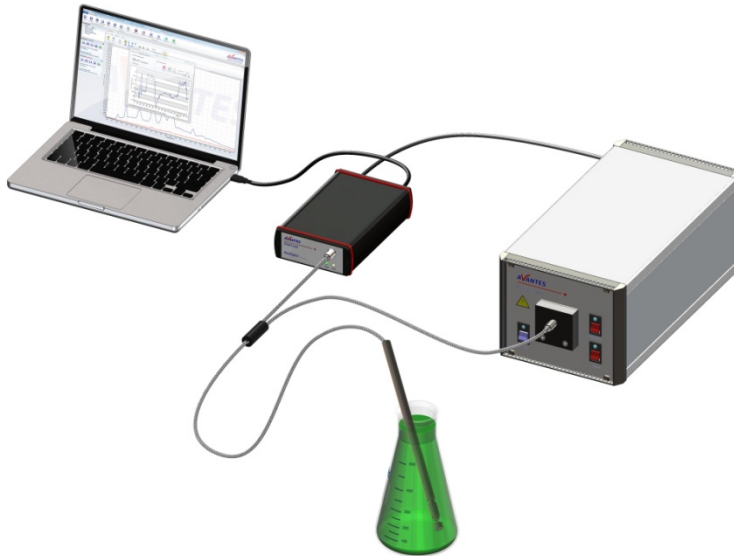
2.3 Quick Start: Measuring and saving a spectrum

1. After starting AvaSoft, the Start button in the upper left corner of the screen 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. 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 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.
5. 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.

2.4 Measurement Setups

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

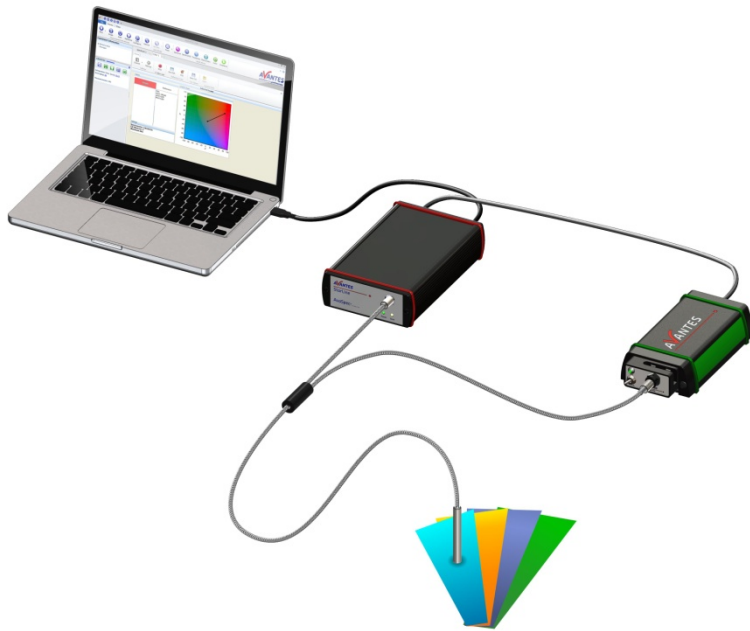
UV/VIS Absorbance/Transmission Setup



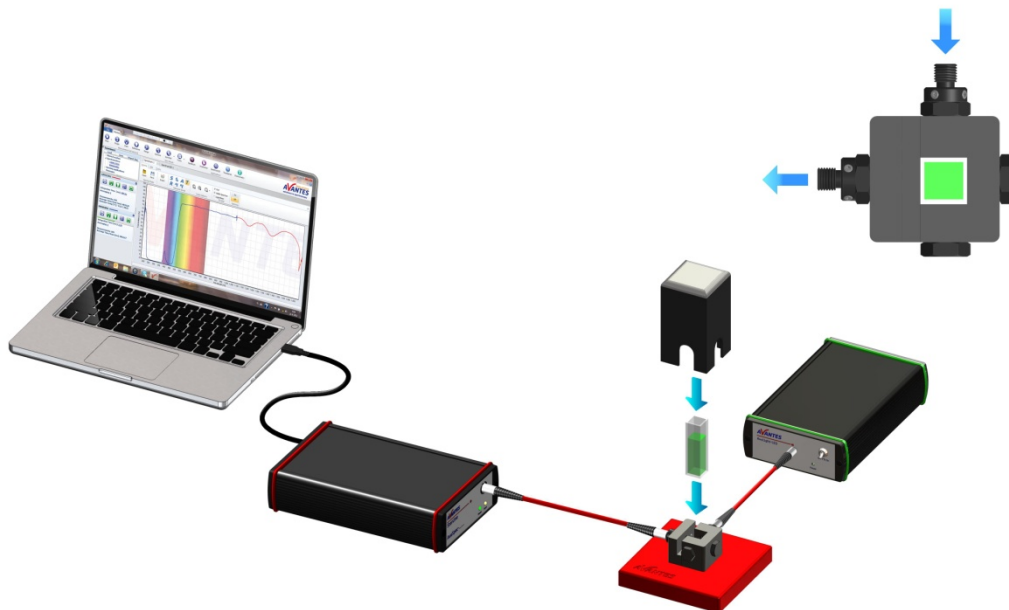
Irradiance Setup



Reflection Setup



Fluorescence Setup



3 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.

3.1 AvaSpec-RS (Replaceable-Slit)



For most customers the choice between throughput and resolution is not an easy one. Avantes offers the possibility for end-users to easily replace a slit through the introduction of our replaceable-slit feature. Replaceable slit and slit kit are available for the following spectrometers:

AvaSpec StarLine	AvaSpec SensLine	AvaSpec NIRLine
AvaSpec-ULS2048CL-EVO-RS AvaSpec-ULS4096CL-EVO-RS	AvaSpec-ULS2048XL-EVO-RS AvaSpec-ULS2048XL+-EVO-RS AvaSpec-ULS2048x64-EVO-RS AvaSpec-ULS2048x64TEC-EVO AvaSpec-HSC1024x58TEC-EVO	AvaSpec-NIR256/512-1.7-EVO AvaSpec-NIR256/512-1.7-HSC-EVO AvaSpec-NIR256/512-2.5-HSC-EVO

Slit Kit

The slit kit features a complete set with four slits in the range of 25, 50, 100, 200 and 500 μm . The Slit Kit is available in SMA, FC/PC and combined (two SMA and two FC/PC replaceable slits) versions. All three slit kit options can be used on any spectrometer mentioned above with the replaceable slit option installed. The kit also includes tools to easily replace the slit in the spectrometer.



Slit Exchange

Exchanging slits requires re-positioning of the new slit and is crucial to the functionality of the spectrometer. The mechanical precision of the slit in the spectrometer typically provides wavelength accuracy within 17 μm or 1.2 pixel (2048 pixel detector). Depending on the configuration and purpose, an exchange of slits should be completed by a wavelength recalibration. AvaSoft 8 provides a "Load or Save Calibration Sets" (settings-Wavelength coefficients) function that can be used to save and load, e.g., slit specific wavelength calibration coefficient sets. To perform a new calibration, you will need a fiber and calibration light source.

How to replace a slit.

Replacing your slit is easy. The proper procedure to change a slit is as follows:

- Use the Torx wrench provided to completely loosen the RS-SLIT connector mounting screws.
- Gently pull the RS-SLIT connector in a straight line out of the spectrometer, you could use the SLIT-TOOL or a SMA (FC/PC) cap for extra grip.
- Carefully insert the new RS-SLIT connector into the spectrometer in a straight line, making sure that the housing of the RS-SLIT connector sits correctly in the recess of the spectrometer's SMA (FC/PC) connector.
- Replace the RS-SLIT mounting screws and tighten them by hand.

Remark:

Never insert the RS-SLIT connector by tightening the RS-SLIT mounting screws.

Use only a hand screwdriver to tighten the RS-SLIT mounting screws to prevent damage to the spectrometer.

Keep in mind that swapping a slit may cause small changes in spectral positioning.

3.2 AvaSpec-Varius™-RS (Replaceable Slit)

Avantes offers the possibility for end-users to easily replace a slit on the AvaSpec-Varius™ and AvaSpec-NEXOS™ spectrometers. This replaceable slit option is available on all non-OEM spectrometers.

Measurement flexibility

To fully utilize your Varius™ series spectrometer with replaceable slit, a variety of slit sizes (10, 25, 50, 100, 200, 500 μm) are available.



Slit Exchange

Exchanging slits requires re-positioning of the new slit and is crucial to the functionality of the spectrometer. The mechanical precision of the slit in the spectrometer typically provides wavelength accuracy within $17\mu\text{m}$ or 1.2 pixel (2048 pixel detector). Depending on the configuration and purpose, an exchange of slits should be completed by a wavelength recalibration. AvaSoft 8 provides a "Load or Save Calibration Sets" (settings-Wavelength coefficients) function that can be used to save and load, e.g., slit specific wavelength calibration coefficient sets. To perform a new calibration, you will need a fiber and calibration light source.

How to replace your slit.

Replacing your slit is easy. The proper procedure to exchange a slit is as follows:

- Remove the connector cover. The connector cover is magnetically attached.
- Use the Torx wrench provided to completely loosen the RS-SLIT connector mounting screw.
- Gently pull the RS-SLIT connector in a straight line out of the spectrometer, you could use a SMA (FC/PC) cap for extra grip.
- Carefully insert the new RS-SLIT connector into the spectrometer in a straight line, making sure that the housing of the RS-SLIT connector sits correctly in the recess of the spectrometer's SMA (FC/PC) connector.
- Replace the RS-SLIT mounting screws and tighten them by hand.

Remark:

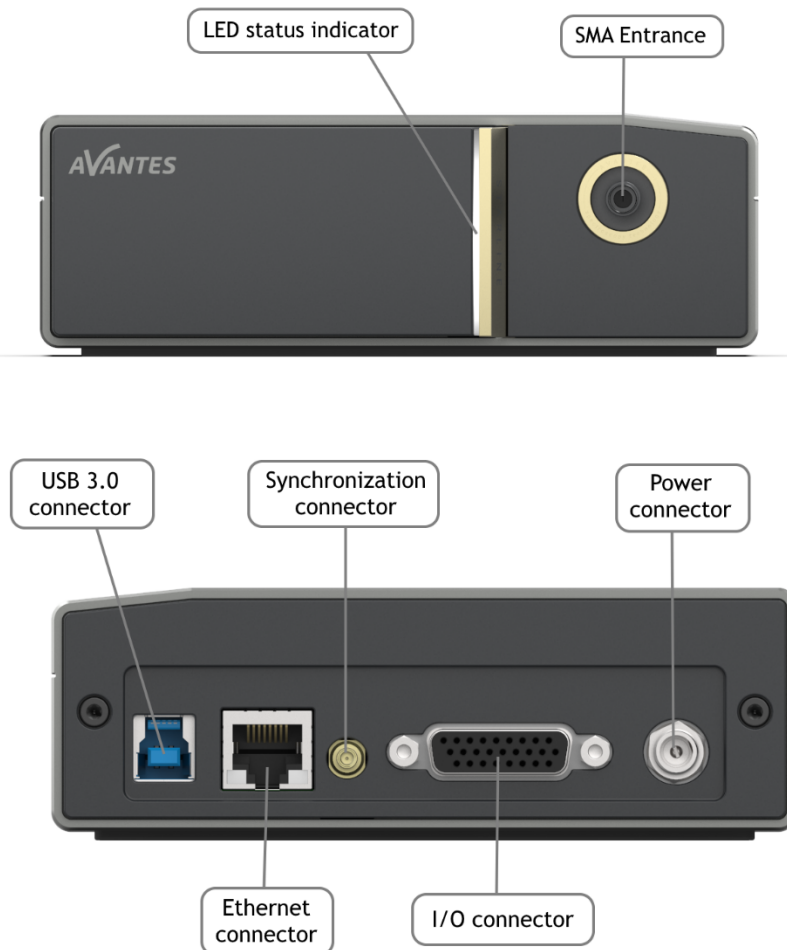
Never insert the RS-SLIT connector by tightening the RS-SLIT mounting screws.

Use only a hand screwdriver to tighten the RS-SLIT mounting screws to prevent damage to the spectrometer.

Keep in mind that swapping a slit may cause small changes in spectral positioning.

3.3 Spectrometer connections USB3.0/Ethernet platform

3.3.1 StarLine AvaSpec-Varius™



Specifications of connections: see section 3.3.11 AvaSpec I/O connectors.

Specification of LED strip: see section 3.3.9 LED indicator StarLine AvaSpec-Varius™.

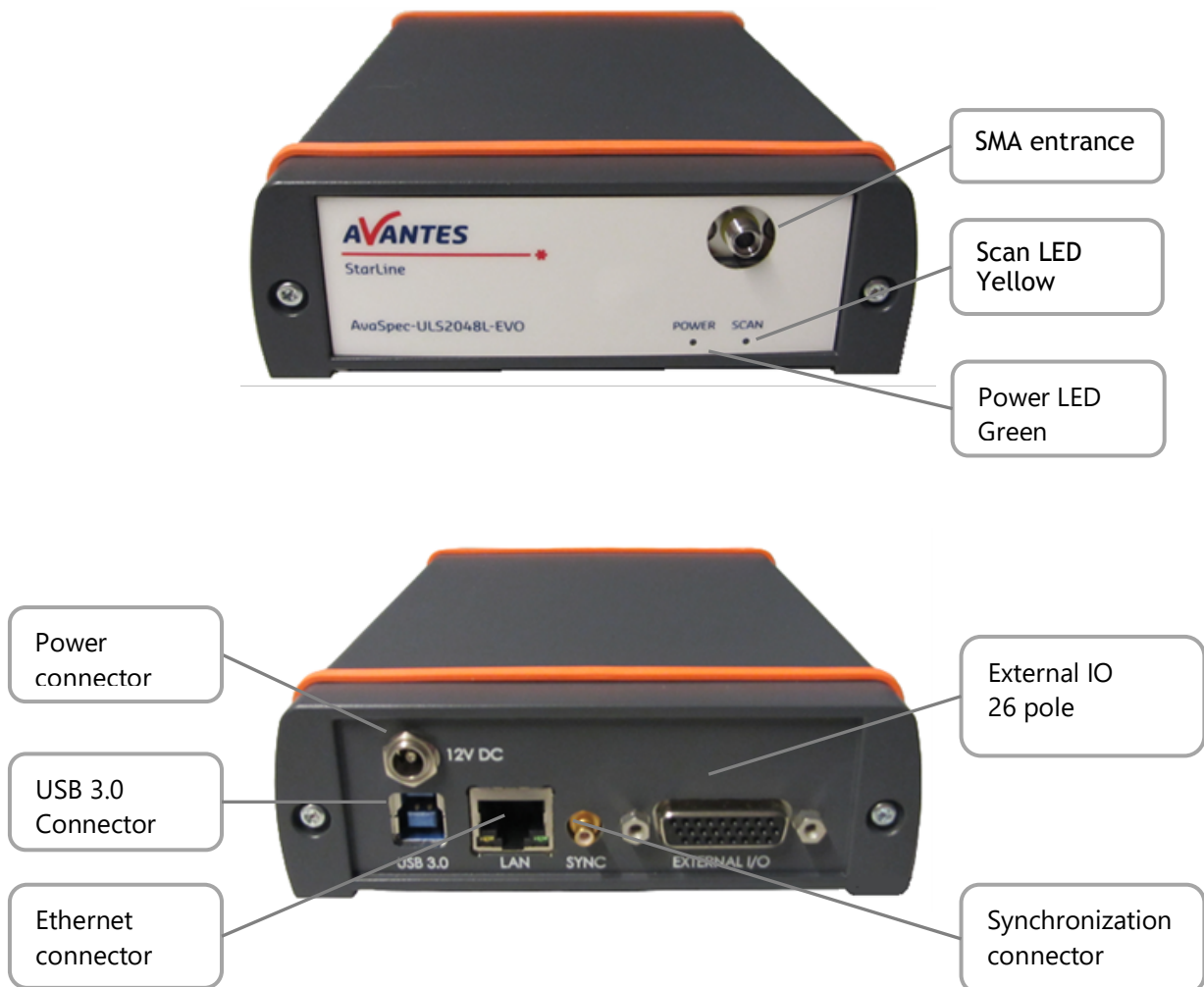
Power connector (only needed if not USB-powered or Ethernet operation)

The power connector is a Low power DC connector with GND on outer contact and +12VDC typical 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/2.08A power supply only. Serious damage to the electronics may occur, when other power supplies with different polarity and/or voltage ratings are used.

3.3.2 StarLine AvaSpec-ULS.....-EVO



Specifications of connections: see section 3.3.11 AvaSpec I/O connectors.

Specification of LEDs: see section 3.3.9 LED indicators StartLine/SensLine/NIRLine/VARIUS OEM.

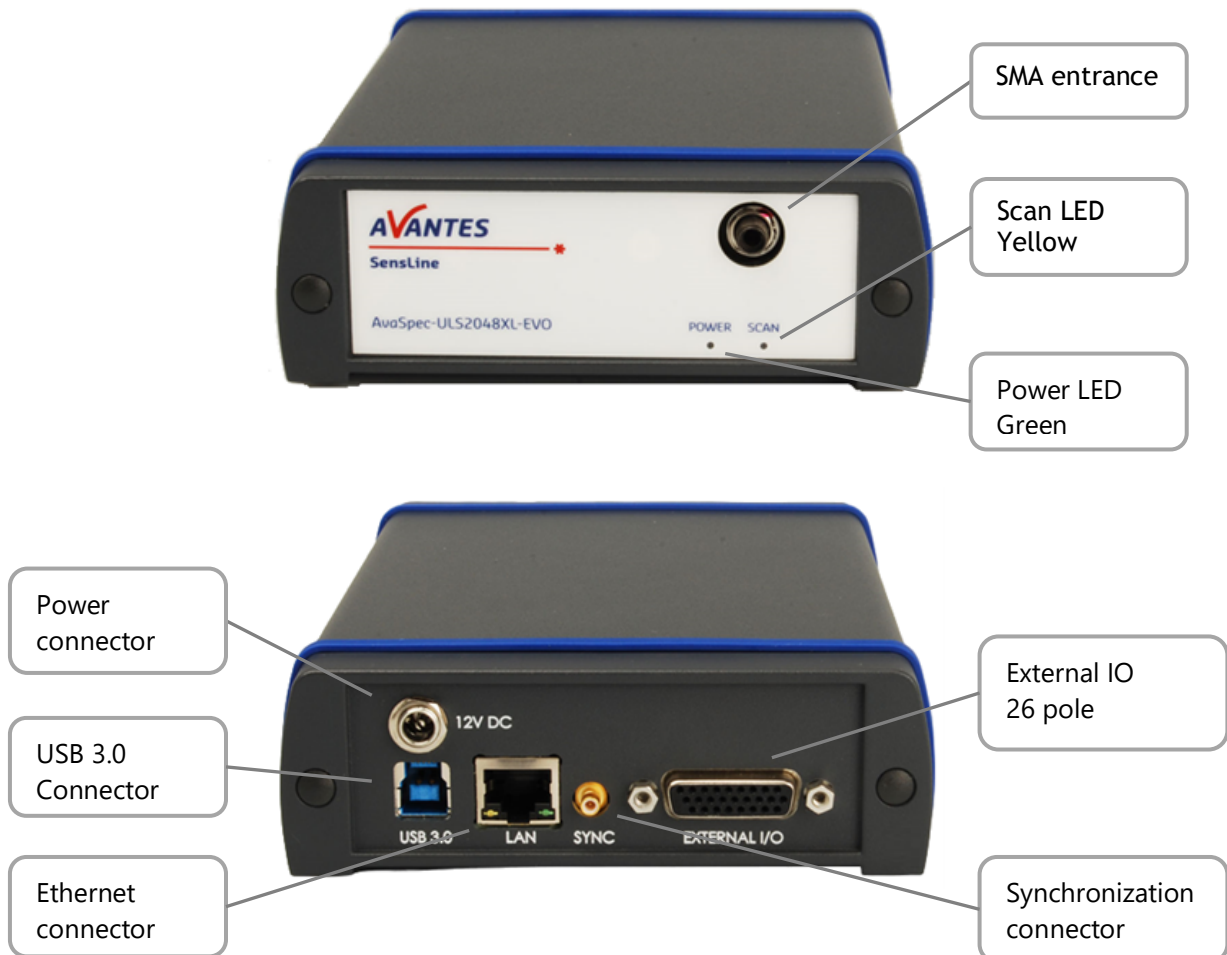
Power connector (only needed if not USB-powered or Ethernet operation)

The power connector is a Low power DC connector with GND on outer contact and +12VDC typical 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/2.08A power supply only. Serious damage to the electronics may occur, when other power supplies with different polarity and/or voltage ratings are used.

3.3.3 SensLine AvaSpec-ULS.....-EVO



Specifications of connections: see section 3.3.11 AvaSpec I/O connectors.

Specification of LEDs: see section 3.3.9 LED indicators StartLine/SensLine/NIRLine/VARIUS OEM.

USB-powered

When the AvaSpec-ULS2048XL-EVO or AvaSpec-ULS2048XL+-EVO gets USB-powered it will only start-up when connected to an USB3.0 port. When powered from an USB2.0 port the spectrometer will **not** start-up due to the lower available current with USB2.0.

Note: Please use Avantes IC-USB3-2 cables, to guarantee the working at USB power.
When other USB cables are used the working is not guaranteed.

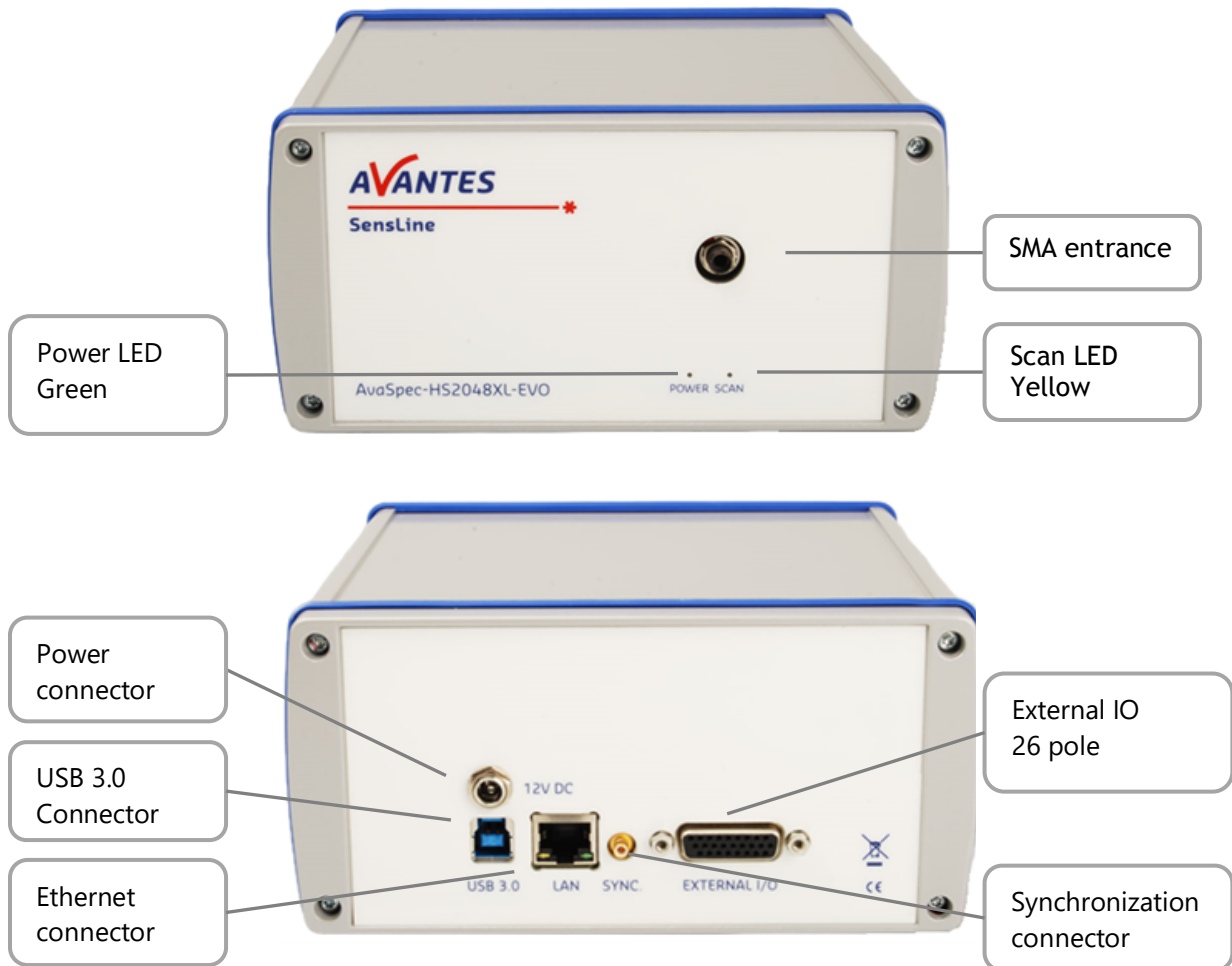
Power connector (only needed if not USB-powered or Ethernet operation)

The power connector is a Low power DC connector with GND on outer contact and +12VDC typical 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/2.08A power supply only. Serious damage to the electronics may occur, when other power supplies with different polarity and/or voltage ratings are used.

3.3.4 SensLine AvaSpec-HS2048XL-EVO



Specifications of connections: see section 3.3.11 AvaSpec I/O connectors.

Specification of LEDs: see section 3.3.9 LED indicators StartLine/SensLine/NIRLine/VARIUS OEM.

USB-powered

When the AvaSpec-HS2048XL-EVO gets USB-powered it will only start-up when connected to an USB3.0 port. When powered from an USB2.0 port the spectrometer will **not** start-up due to the lower available current with USB2.0.

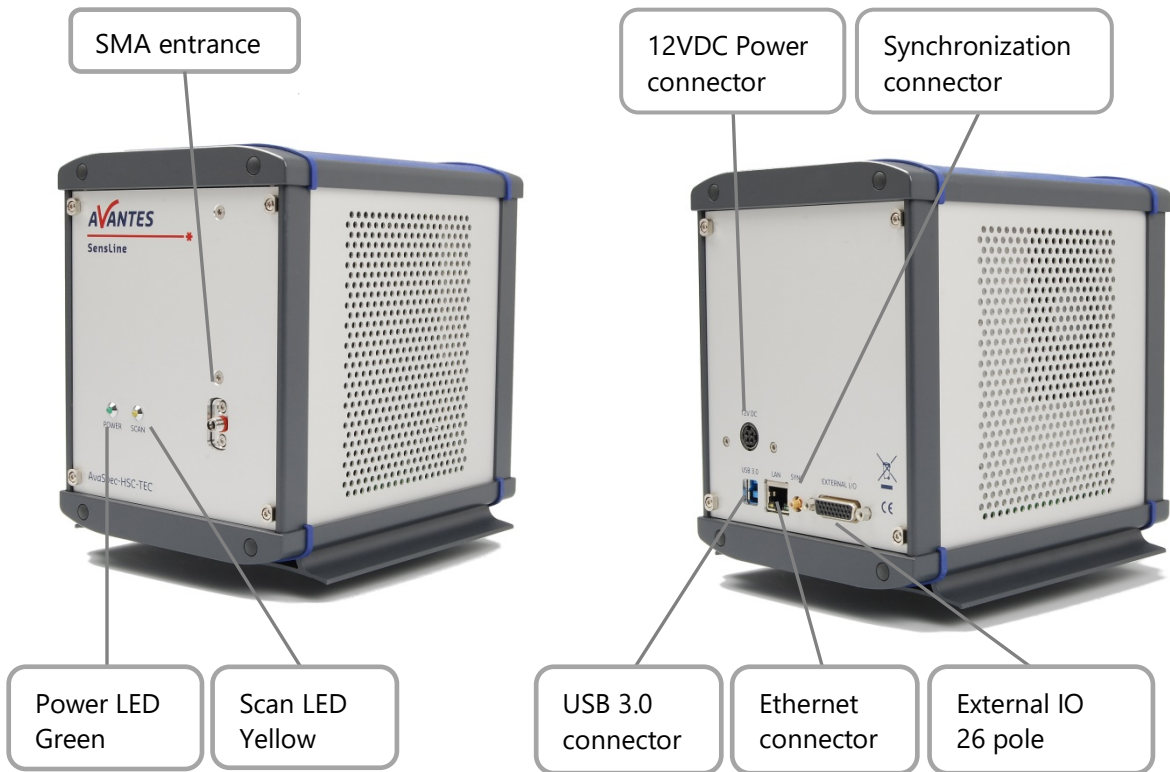
Note: Please use Avantes IC-USB3-2 cables, to guarantee the working at USB power.
When other USB cables are used the working is not guaranteed.

Power connector (only needed if not USB-powered or Ethernet operation)

The power connector is a Low power DC connector with GND on outer contact and +12VDC typical 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/2.08A power supply only. Serious damage to the electronics may occur, when other power supplies with different polarity and/or voltage ratings are used.

3.3.5 SensLine AvaSpec-ULS2048x64TEC-EVO



Specifications of connections: see section 3.3.11 AvaSpec I/O connectors.

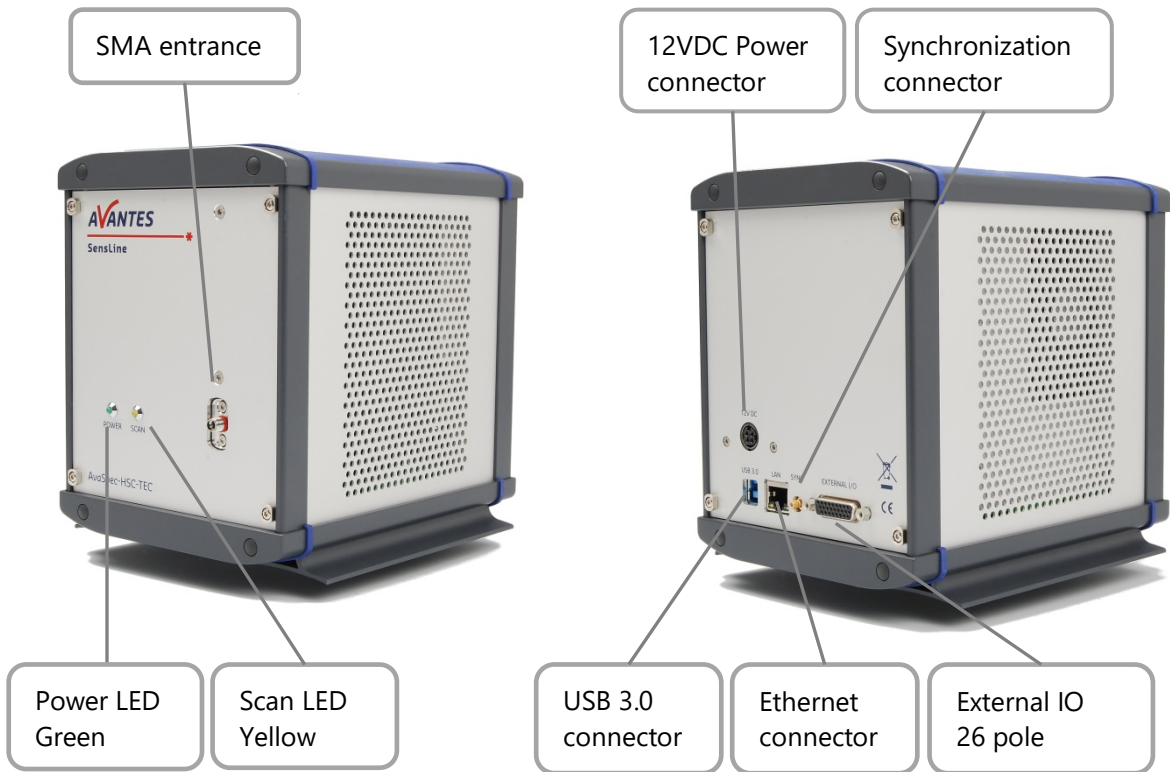
Specification of LEDs: see section 3.3.9 LED indicators StartLine/SensLine/NIRLine/VARIUS OEM.

12VDC Power connector

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

Note: Please use Avantes **PS-12VDC/5.0A** power supply only.
 The power supply is supplied as standard with the AvaSpec NIRLine.
 Serious damage to the electronics may occur, when other power supplies with different polarity and/or voltage ratings are used.

3.3.6 SensLine AvaSpec-HSC1024x58TEC-EVO



Specifications of connections: see section 3.3.11 AvaSpec I/O connectors.

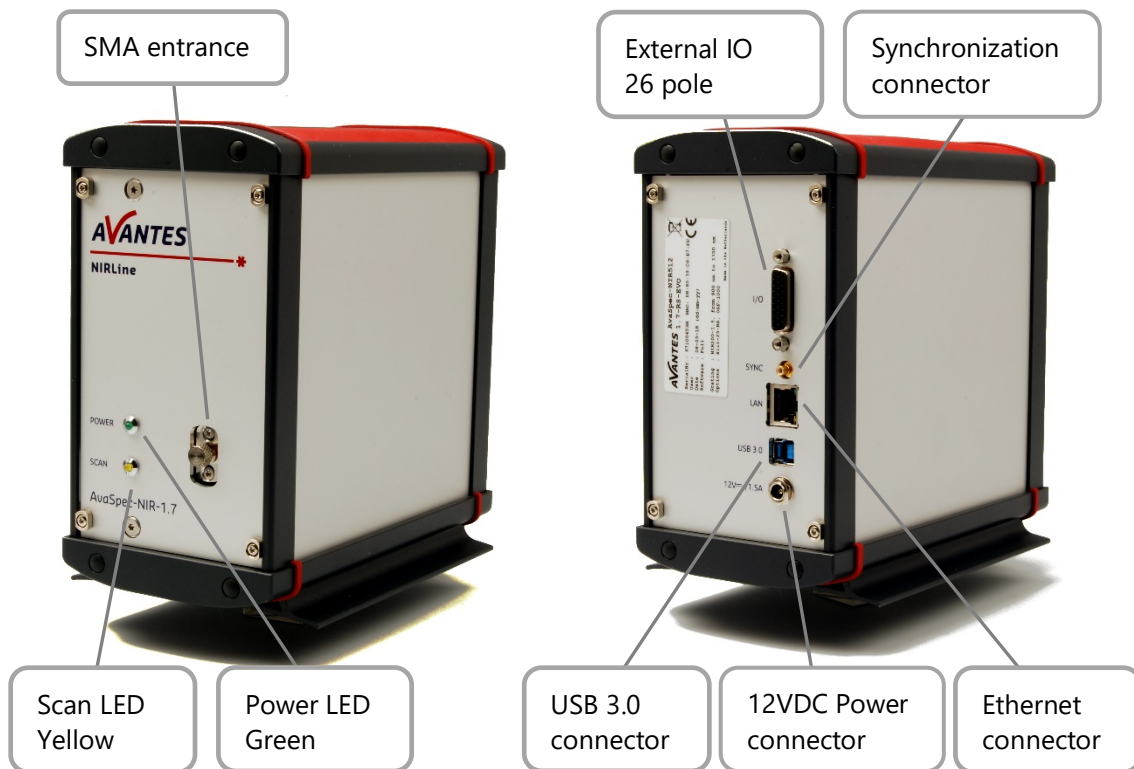
Specification of LEDs: see section 3.3.9 LED indicators StartLine/SensLine/NIRLine/VARIUS OEM.

12VDC Power connector

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

Note: Please use Avantes **PS-12VDC/5.0A** power supply only.
 The power supply is supplied as standard with the AvaSpec NIRLine.
 Serious damage to the electronics may occur, when other power supplies with different polarity and/or voltage ratings are used.

3.3.7 NIRLine AvaSpec-NIR256/512-1.7-EVO



Specifications of connections: see section 3.3.11 AvaSpec I/O connectors.

Specification of LEDs: see section 3.3.9 LED indicators StartLine/SensLine/NIRLine/VARIUS OEM.

USB-powered

When the AvaSpec-NIR256/512-1.7-EVO gets USB-powered it will only start-up when connected to an USB3.0 port. When powered from an USB2.0 port the spectrometer will **not** start-up due to the lower available current with USB2.0.

Note: Please use Avantes IC-USB3-2 cables, to guarantee the working at USB power. When other USB cables are used the working is not guaranteed.

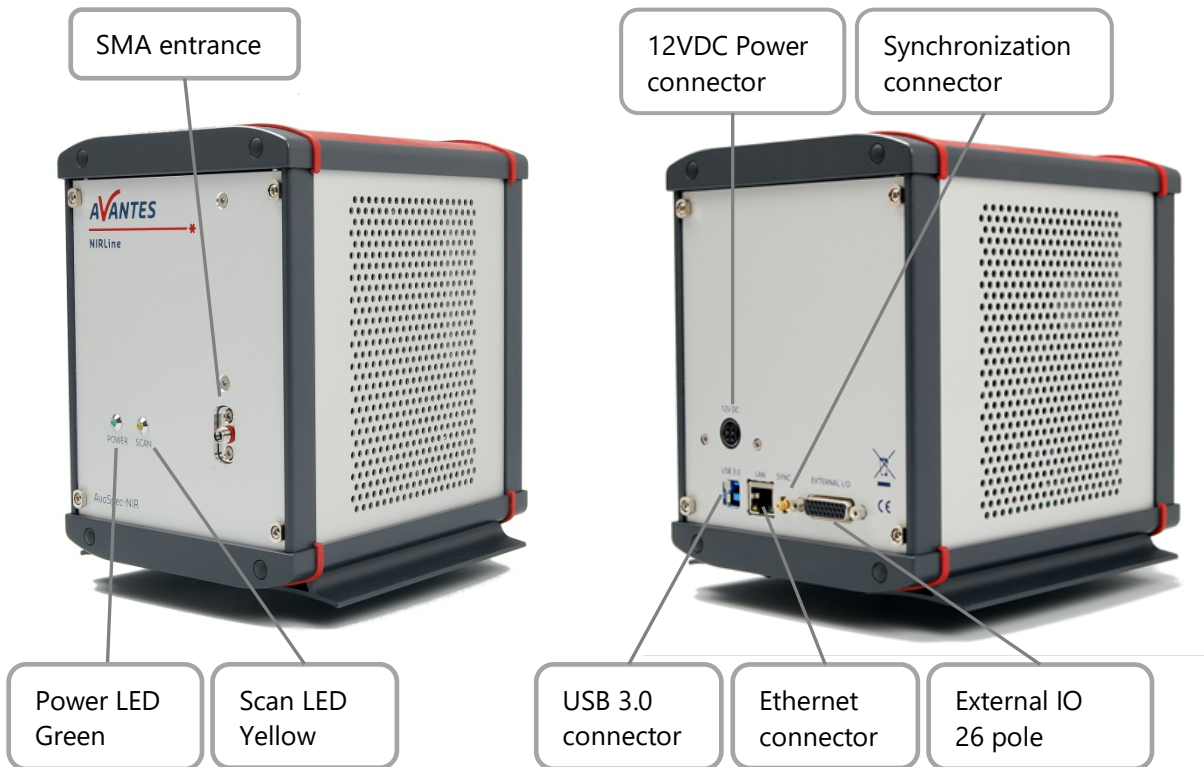
Power connector (only needed if not USB-powered or Ethernet operation)

The power connector is a Low power DC connector with GND on outer contact and +12VDC typical 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/2.08A power supply only. Serious damage to the electronics may occur, when other power supplies with different polarity and/or voltage ratings are used.

3.3.8 NIRLine AvaSpec-NIR256/512-.....-HSC-EVO



Specifications of connections: see section 3.3.11 AvaSpec I/O connectors.

Specification of LEDs: see section 3.3.9 LED indicators StartLine/SensLine/NIRLine/VARIUS OEM.

12VDC Power connector

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

Note: Please use Avantes **PS-12VDC/5.0A** power supply only.
 The power supply is supplied as standard with the AvaSpec NIRLine.
 Serious damage to the electronics may occur, when other power supplies with different polarity and/or voltage ratings are used.

3.3.9 LED indicator StarLine AvaSpec-Varius™

The Varius™ spectrometer has a single white LED-strip to indicate the status of the spectrometer:

LED	Status
ON	Power is on, spectrometer is ready
Breathing pattern	Scanning in progress
Blinking (slow)	Requesting IP address when Ethernet with DHCP is used
Blinking (fast)	Error detected by spectrometer / spectrometer is about to restart

3.3.10 LED indicators StartLine/SensLine/NIRLine/VARIUS OEM

Power LED green and scan LED yellow

The green and yellow LEDs act as status LEDs for the spectrometer 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)	N/A	Requesting IP address	N/A
Yellow LED = on	scanning in progress	scanning in progress	scanning in progress

3.3.11 AvaSpec I/O connectors

USB 3.0 connector

The USB interface has the following physical characteristics:

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

Note: Please use Avantes IC-USB3-2 cables, to guarantee the working at USB power.
When other USB cables are used the working is not guaranteed.

Ethernet Connector RJ45

The RJ45 connector has the following physical characteristics:

- Gigabit Ethernet
- 1 Gbit/s
- TCP/IP protocol

Synchronization connector

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

External IO 26 pole

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		Reserved	
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		Reserved	
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's combined cannot supply more than 150 mA

Ordering Information Interface cables

IC-DB26-2	Interface cable AvaSpec for all Avantes light sources with a DB15 connector
IC-DB26-FOS2-2	Interface Y-cable AvaSpec to FOS-2 and all Avantes light sources with a DB15 connector
IC-USB3-2	Interface cable AvaSpec to USB3.0 port on PC, 2m
IC-Extrig-USB2	Interface cable AvaSpec to External trigger pushbutton, 2m
IC-DB26-Extrig-USB2	Interface Y-cable AvaSpec to External trigger pushbutton and all Avantes light sources with a DB15 connector
IC-DB26-EXTRIG-BNC-2	Interface cable AvaSpec platform to BNC plug External trigger, 2 m
IC-COAX-SMB-0.25	Synchronization coax cable with 2 SMB connectors 0.25m for AvaSpec
IC-DB26-BEAM-2	Interface cable AvaSpec to BSC-DA, 2m

4 AvaSoft manual

The AvaSoft-Basic software is available for 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.

AvaSoft-Basic features are user-friendly; it works through mouse-oriented pull-down menus. The mouse controls the 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 the x and y directions 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. A spectrum that was saved before can be displayed graphically and compared to other saved spectra, or the online measured spectra. The user can set the data collection parameters, such as spectrometer integration time, auto-dark correction, signal averaging, and spectral smoothing in common dialog boxes.

For your AvaSoft manual please refer to:

- Avantes website at the download section www.avantes.com/gettingstarted
- the "help" menu in AvaSoft software
- Scan the QR code below to visit the Getting Started page

