

Light Sources







Introduction

Illumination light sources are needed for transmission, absorption and reflection spectroscopic setups. For the convenient coupling of the light into our range of fiber optic cables, bundles and probes, it is necessary that the light is collected and can be coupled through SMA-905 connectors.

Avantes offers different light sources for the different applications and wavelength ranges, as can be seen in table 8. Tungsten Halogen light sources are mostly used for the visible range to do color measurements. The halogen light source provides a very stable output and has a lifetime, depending on the color temperature of the bulb. The high stability of the halogen light sources enables the use as color reflection illumination source or as irradiance calibration light source. The most important feature of the halogen light is that the spectral output is smooth and monotonic without spikes or dips.

Application	Wavelength Range	Туре	Principle	Product
Color / VIS / NIR	360-2500 nm	Tungsten Halogen	Continuous	AvaLight-HAL(-S)
DUV	190-400 nm	Deuterium	Continuous	AvaLight-D-S-DUV
UV	215-400 nm	Deuterium	Continuous	AvaLight-D-S
UV/VIS/NIR refl./abs.	215-2500 nm	Deuterium/Halogen	Continuous	AvaLight-DH-S-(BAL)
UV/VIS/NIR absorption	200-2500 nm	Deuterium/Halogen	Continuous	AvaLight-DHc
UV/VIS	200-1000 nm	Xenon	Pulsed	Avalight-XE
Fluorescence	Multiple possible	LED	Continuous	AvaLight-LED
Wavelength Calibration	253-1704 nm	Mercury-Argon / Neon / Argon	Continuous	AvaLight-CAL
Irradiance Calibration	360-2500nm	Tungsten Halogen	Continuous	AvaLight-HAL-CAL
Irradiance Calibration	200-1100nm	Deuterium/Halogen	Continuous	AvaLight-DH-(BAL)-CAL
Radiance Calibration	360-2500 nm	Tungsten Halogen	Continuous	AvaSphere-50-LS-HAL-CAL

Table 8 Light sources

Deuterium light sources provide a stable output and are mostly used for UV absorption- or reflection-measurements. Also, the deuterium's high stability enables the use as irradiance calibration source. The deuterium spectrum is not as smooth as the halogen spectrum and shows a high peak around 656 nm. The Standard AvaLight-DH-S light source focusing the halogen through the deuterium produces a wide range light source. The AvaLight-DHS-BAL has a dichroic beam splitter incorporated to eliminate the disturbing 656 nm peak, showing a smooth spectrum from 200-2500nm.

Pulsed xenon light sources are mostly used in applications that require a long lifetime and where a stable output is not the highest demand. Also the spectral output of a xenon light source is not as continuous as a halogen or deuterium light source, with some high peaks and valleys.

Whenever a high power small wavelength range illumination is needed an LED can efficiently be coupled into the fiber optics. A typical application is the use as an excitation light source for fluorescence applications. The long lifetime, short warm-up time and high stability are main features for LED light sources. The spectral distribution of the different light source is given in figure 7.

Avantes offers different sources for wavelength calibration with a combination of mercury and argon, neon or just argon spectral lines. All Avantes spectrometers are factory wavelength calibrated and do not need recalibration. The AvaLight-CAL can be used for recalibration purposes, AvaSoft-FULL offers an auto-calibration routine that supports the automatic recalculation of the wavelength calibration coefficients.

Figure 7 Spectral distribution of different light sources









AvaLight-DHc Compact Deuterium Halogen Light Source

The AvaLight-DHc is a combined deuterium-halogen light source, to be used for UV/VIS/NIR applications. The output energy of the AvaLight-DHc is relatively low. The use is therefore recommended in transmission setup with large diameter fibers. The light source emits light from 200 to 2500 nm and has an SMA connector to easily couple into our range of fiber optics. The AvaLight-DHc has an integrated TTL shutter, that can be used for auto-save dark/ lamp off in combination with AvaSoft (extra IC-DB15-2 or IC-DB26-2 needed).

Figure 8 Spectral output of AvaLight-DHc



AvaLight-DHc



Optionally, the AvaLight-DHc can be delivered in Rackmounted version, to be fully integrated in the 19" rackmount or 9.5" desktop housing.

A direct attach cuvette holder CUV-DHc/XE/LED (see section accessories) is available for fluorescence or absorbance measurements.

	Deuterium Light Source	Halogen Light Source
Wavelength Range	200 - 400 nm	400 - 2500 nm
Stability	< 1 mAU	< 1 mAU
Warm-up time	8 min	1 min
Drift	< 0.25% / h	< 0.25% / h
Optical Power in 600 µm fiber	0.2 μWatt	7 μWatt
Lamp Lifetime	1000 hours	2000 hours
Temp. Range	5°C - 35°C	
Power Supply	12VDC / 450mA	
Dimensions	175 x 110 x 44 mm	

ORDERING INFORMATION		
AvaLight-DHc	Compact Deuterium Halogen Light Source with TTL Shutter	
IC-DB15-2	Interface cable AvaSpec-USB1 platform to AvaLight-DHc-TTL-shutter	
IC-DB26-2	Interface cable AvaSpec-USB2 platform to AvaLight-DHc-TTL-shutter	
AvaLight-DHc-RM	Rackmount Compact Deuterium Halogen Light Source with TTL Shutter	
AvaLight-DHc-B	Compact Deuterium Halogen Replacement Bulb	
CUV-DHc/XE/LED	Direct attach cuvette holder for AvaLight-DHc/XE/LED	
PS-12V/1.0A	Power supply 100-240VAC/12VDC, 1.0A for AvaLight-DHc	

Technical Data



AvaLight-HAL Tungsten Halogen Light Source

AvaLight-HAL



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The AvaLight-HAL is a compact stabilized halogen fan-cooled light source that can be used for the visible and the near infrared range. The AvaLight-HAL features adjustable focusing of the SMA connector to maximize light coupling into a fiber or fiber bundle with a diameter of up to $600 \ \mu\text{m}$. A filter slot accepts 1" round or 2" x 2" square filters up to 3 mm thick. The lamp stability is achieved by a current stabilization. A fan regulates the airflow around the heatsink to optimize the operation temperature. The AvaLight-HAL needs an extra PS-24V/1.25A 24 VDC power adapter.

The SMA-connector input into any fiber can be optimized by changing the focus. Bulb replacement is easy. With an internal jumper the optical output energy can be controlled. At "low" setting the source acts as a long life source with over 4000 hrs life time. At "medium" setting the color temperature goes up and the expected life time is about 2000 hrs. The "high" setting gives max output in the blue range, but reduces bulb life time to ca. 1000 hrs (see fig 9).

The Avalight-HAL-S has an internal TTL shutter, that can be controlled from the AvaSpec, so the auto-save dark option in the AvaSoft software can be used (extra IC-DB15-2 or IC-DB26-2 needed).

The filter holder can be easily replaced by a direct attach cuvette holder CUV-HAL (see section accessories) useful for fluorescence or absorbance measurements.

Optionally, the AvaLight-HAL(-S) can be delivered in Rackmounted version, to be fully integrated in the 19" rackmount or 9.5" desktop housing.

New is the AvaLight-HAL-S-IND halogen light source with a heavy duty industrial power connector and 24V power adapter included. We also offer to implement the new heavy duty industrial connector in your existing AvaLight-HAL-S and power supply as an upgrade.



Figure 9 Spectral output of AvaLight-HAL



Technical Data

	AvaLight-HAL	AvaLight-HAL	AvaLight-HAL
	(standard)	(long life)	(high power)
Wavelength Range		360-2500 nm	
Stability		± 0.1%	
Time to stabilize		Ca. 15 min.	
Output to bulb	12.7 VDC/ 0.9A	11.3 VDC/ 0.8A	14.1 VDC/ 1.0A
Bulb Life	2000 hrs	> 4000 hrs	< 1000 hrs
Optical power 200µm fiber	0.5 mWatt	0.35 mWatt	0.7 mWatt
Optical power 600µm fiber	4.5 mWatt	3.2 mWatt	6 mWatt
Optical power 1000µm fiber	10 mWatt	7 mWatt	14 mWatt
Bulb Color Temperature	2.850 K	2.700 K	3.000 K
Power requirement	24 VDC / 1.25A		
Temperature range	0-70 °C		
Dimensions, weight132 x 110 x 44 mm, 490 grams			S

Separate 50x50mm filters to install in AvaLight-HAL (-S)

GL-WG305-3	Separate 50 x 50 x 3 mm long-pass filter > 305 nm
GL-KG3-3	Separate 50 x 50 x 3 mm bandpass filter, transparent $>$ 325 nm and $<$ 700 nm
GL-BG28-3	Separate 50 x 50 x 3 mm bandpass filter, transparent $>$ 360 nm and $<$ 500 nm
GL-GG385-3	Separate 50 x 50 x 3 mm long-pass filter > 385 nm
GL-GG475-3	Separate 50 x 50 x 3 mm long-pass filter > 475 nm
GL-0G515-3	Separate 50 x 50 x 3 mm long-pass filter > 515 nm
GL-0G550-3	Separate 50 x 50 x 3 mm long-pass filter > 550 nm
GL-0G590-3	Separate 50 x 50 x 3 mm long-pass filter > 590 nm
GL-NG9-1	Separate 50 x 50 x 1 mm Neutral Density filter (transmission ca. 10% 400-1100nm)
GL-NG9-2	Separate 50 x 50 x 2 mm Neutral Density filter (transmission ca. 1% 400-1100nm)
GL-NG9-3	Separate 50 x 50 x 3 mm Neutral Density filter (transmission ca. 0.1% 400-1100nm)

More filter types available, please contact us for ordering information

ORDERING INFORMATION

AvaLight-HAL	10W Tungsten Halogen Lamp, fan-cooled, needs extra PS-24V/1.25A power supply
AvaLight-HAL-S	10W Tungsten Halogen Lamp, fan-cooled, incl. TTL shutter, needs extra PS-24V/1.25A power supply
AvaLight-HAL-S-IND	10W Tungsten Halogen Lamp, fan-cooled, incl. TTL shutter, including industrial connector and
	PS-24V/1.25A power supply
AvaLight-HAL-S-RM	Rack mounted version of the 10W Tungsten Halogen Lamp, fan-cooled, incl. TTL shutter
IC-DB15-2	Interface cable AvaSpec-USB1 platform to AvaLight-HAL-S
IC-DB26-2	Interface cable AvaSpec-USB2 platform to AvaLight-HAL-S
AvaLight-HAL-B	10W Tungsten Halogen Replacement bulb for AvaLight-HAL, AvaLight-HAL-S
HAL-S-IND-UPGRADE	Upgrade from HAL-S to HAL-S-IND, incl. industrial connector please return with PS-24V/1.25A
CUV-HAL	Direct attach cuvette holder for AvaLight-HAL(-S)
PS-24V/1.25A	Power supply 100-240VAC/24VDC, 1.25A, necessary for AvaLight-HAL





AvaLight-D(H)-S Deuterium-Halogen Light Sources

AvaLight-DH-S



The AvaLight-DH-S is a combined Deuterium and Halogen light source, which can be used for UV/VIS/NIR applications. The AvaLight-DH-S has an SMA905 connector to be used with fiber optic cables and bundles. For optimal coupling an adjustable focus lens assembly is included. The light source supplies a continuous spectrum with high efficiency and highest stability in the UV, visible and near-infrared range from 215-2500 nm.

The Avalight-DH-S was developed based on the shine-through principle, in which the halogen light is focused through a small diameter aperture in the deuterium bulb. The AvaLight-DH-S-BAL has a dichroic beam splitter to give a much more balanced spectrum from 200-2500nm.

For UV only applications the AvaLight-D-S (only Deuterium) source is available.

The standard AvaLight-D(H)-S light sources have a special UV longpass filter (>220nm) implemented to protect the fibers from solarizing. For applications that require a spectral range below 220 nm a Deep UV bulb is available, in which no UV longpass filter is included. For these Deep-UV measurements (from 190nm) the AvaLight-D(H)-S-DUV may be ordered. New is a long-life and more stable version of the Deuterium lamp (AvaLight-D-B-DUV-LL).

For all Deuterium Light Sources solarization resistant fibers (-SR) are recommended, for the DUV lamp special solarization resistant fibers (-SR) are required (see the fiber optic section).

The output of the AvaLight-DH-S is optimized for fibers (bundles) with a diameter up to 600 μ m, for larger diameter fiber bundles the AvaLight-DH-S SMA connector focal point can be manually adapted to uniformly fill a larger core diameter fiber cable or bundels.

In all AvaLight-Deuterium sources an integrated TTL-shutter and filter holder for filters of up to 50x50x6.5 mm are implemented.

The Avalight-DH-S internal TTL shutter can be controlled from the AvaSpec, so the auto-save dark option in the AvaSoft-FULL software can be used (extra IC-DB15-2 or IC-DB26-2 needed).

The filter holder can be easily replaced by a direct attach cuvette holder CUV-DHS (see section accessories) useful for fluorescence or absorbance measurements.

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Figure 10 Spectral output AvaLight-D-S



Figure 11 Spectral output AvaLight-DH-S





Technical Data

	Deep UV Deuterium	Deuterium (Standard)	Deuterium	Halogen Lamp
			(long-life DUV)	
Wavelength Range	190-400nm	215-400nm	185-400nm	360-2500nm
Warm-up Time	30 min.	30 min.	30 min.	20 min.
Lamp Power	78W / 0.75A	78W / 0.75A	78W / 0.75A	5W /0.5A
Lamp Lifetime	1000 hrs	1000 hrs	2000 hrs	1000 hrs
Noise (AU)	2x 10 ⁻⁴	2x 10 ⁻⁴	2x 10 ⁻⁵	10 ⁻⁴
Max. drift	± 0.5%/hrs	± 0.5%/hrs	± 0.5%/hrs	±0.1%/hrs
Color Temperature	-	-	-	3000 K
Optical Power in 200µm fiber	11 µW	7 μW	11 µW	43 µW
Optical Power in 600µm fiber	72 µW	61 µW	72 μW	239 µW
Optical Power in 1000µm fiber	206 µW	166 µW	206 µW	354 µW
Power consumption	90 Watt (190Watt for heating D-Lamp 4-5 sec.)			
Power Requirements	100-240VAC 50/60 Hz			
Dimensions / Weight	315 x 165 x 140 mm / ca 5 kg.			

For a table of separate 50x50mm filters to install in AvaLight-D(H)-S see AvaLight-HAL.

ORDERING INFORMATION		
AvaLight-D-S	Deuterium light source, 215-400 nm, incl. TTL shutter, -SR fibers recommended	
AvaLight-DH-S	Deuterium-Halogen light source, 215-2500 nm, incl. TTL shutter, -SR fibers recommended	
AvaLight-D-S-DUV	Deep UV deuterium light source, 190-400 nm, incl. TTL shutter, -SR fibers needed	
AvaLight-DH-S-DUV	Deep UV deuterium-halogen light source, 190-2500 nm, incl. TTL shutter, -SR fibers needed	
AvaLight-DH-S-DUV-LL	Deep UV deuterium-halogen light source, long-life 2000 hrs, 190-2500 nm, incl. TTL shutter,	
	-SR fibers needed!	
IC-DB15-2	Interface cable AvaSpec-USB1 platform to AvaLight-D(H)S	
IC-DB26-2	Interface cable AvaSpec-USB2 platform to AvaLight-D(H)S	
AvaLight-D-B	Replacement deuterium bulb for AvaLight-D/AvaLight DH light source	
AvaLight-D-B-DUV	Replacement deep UV deuterium bulb for AvaLight-D(H)-S-DUV light source	
AvaLight-D-B-DUV-LL	Long-life 2000 hrs. Replacement deep UV deuterium bulb for AvaLight-D/AvaLight DH light source	
AvaLight-DH-B	Replacement halogen bulb for AvaLight-DH light source	
CUV-DHS	Direct attach cuvette holder for AvaLight-D(H)S	





AvaLight-DH-S-BAL Balanced Deuterium-Halogen Light Source

AvaLight-DH-S-BAL



The AvaLight-DH-S-BAL is an improved version of the AvaLight-DH-S combined Deuterium and halogen light source, which can be used for UV/VIS/NIR applications. The AvaLight-DH-S-BAL has an innovative optical design, in which a dichroic beam splitter is integrated to give a much more balanced spectrum from 200-2500nm. The advantage of this design is that the disturbing alfa peak at 656 nm is filtered out and therefore a smooth, balanced spectrum is obtained. The optical output power of the BAL version is a factor 5 lower than for the standard version, but the dynamic range has increased by a factor 20, thanks to the filtering of the 656 nm peak.

A comparison spectrum as taken with a standard AvaSpec-2048UA is depicted in figure 12. An upgrade of existing AvaLight-DH-S to the balanced version is available. The AvaLight-DH-S-BAL has an SMA905 connector to be used with fiber optic cables and bundles. For optimal coupling an adjustable focus lens assembly is included. The light source supplies a continuous spectrum with high efficiency and highest stability in the UV, visible and near-infrared range from 200-2500 nm. For UV only applications the AvaLight-D-S-BAL (only Deuterium) source is available.

For all Deuterium Light Sources solarization resistant fibers (-SR) are recommended (see the fiber optic section of this catalog). The output of the AvaLight-DH-S-BAL is optimized for fibers (bundles) with a diameter up to $1500 \,\mu$ m. In all AvaLight-Deuterium sources an integrated TTL-shutter and filter holder for filters of up to $50x50x6.5 \,\mu$ m are implemented.

The Avalight-DH-S internal TTL shutter can be controlled from the AvaSpec, so the auto-save dark option in the AvaSoft software can be used (extra IC-DB15-2 or IC-DB26-2 needed).

The filter holder can be easily replaced by a direct attach cuvette holder CUV-DHS (see section accessories) useful for fluorescence or absorbance measurements.

Figure 12 Spectral Output AvaLight-DH-S-BAL(red) vs. AvaLight-DH-S (blue)



Technical Data

	Balanced Deuterium (Standard)	Balanced Halogen Lamp
Wavelength Range	215-500nm	500-2500nm
Warm-up Time	30 min.	20 min.
Lamp Power	78W / 0.75A	5W /0.5A
Lamp Lifetime	1000 hrs	1000 hrs
Noise (AU)	2x 10 ⁻⁴	10 ⁻⁴
Max. drift	± 0.5%/hrs	±0.1%/hrs
Color Temperature	-	3000 K
Optical Power in 200µm fiber	17 μW	60 μW
Optical Power in 600µm fiber	120 μW	500 μW
Optical Power in 1000µm fiber	300µW	700 μW
Power consumption	90 Watt (190Watt for heating D-Lamp 4-5 sec.)	
Power Requirements	100-240VAC 50/60 Hz	
Dimensions / Weight	315 x 165 x 140 mm / ca 5 kg.	

ORDERING INFORMATION

AvaLight-D-S-BALBalanced Deuterium light source, 200-400 nm, incl. TTL shutter, -SR fibers neededAvaLight-DH-S-BALBalanced Deuterium-Halogen light source, 200-2500 nm, incl. TTL shutter, -SR fibers neededDH-S-BAL upgradeUpgrade existing AvaLight-DH-S to an AvaLight-DH-S-BAL Balanced Deuterium-Halogen light source, 200-2500 nm





AvaLight-XE Xenon Pulsed Light Source

The AvaLight-XE is a xenon pulsed light source, used for UV-applications, such as fluorescence measurements. The AvaLight-XE needs an additional cable to be connected with the AvaSpec spectrometer (IC-DB15-2 for AvaSpec-USB1/IC-DB26-2 for AvaSpec-USB2) to synchronize the flashes with the data taken by the spectrometer. In the AvaSoft software you can select one or multiple flashes per scan.

The AvaLight-XE has no internal flash generator and therefore needs to be connected to an external pulse generator, as

Figure 13 Spectral output of the AvaLight-XE

Technical Data



AvaLight-XE



included in the AvaSpec spectrometers. The AvaLight-XE is also available for deep UV applications (below 200nm) with a special DUV bulb. A special CUV-DHc/XE/LED direct attach cuvette holder is available for fluorescence applications.

The lamp needs an extra PS12-1.0A 12VDC power converter.

Spectral Output	200 nm to 1000 nm
Total optical power output	39 μJ per pulse (average 3.9 mW)
Optical power in 600 µm fiber	1.8 μJ per pulse (average 180 μW)
Synchronization Input	15 pin sub D connector, TTL level
Pulse Duration	5 µs (at 1/3 height)
Pulse delay	6 µs
Pulse rate (max.)	100 Hz
Bulb Life	min. 10 ⁹ pulses

Turse acray	0 μ3
Pulse rate (max.)	100 Hz
Bulb Life	min. 10 ⁹ pulses
Connector	SMA-905 connector
Power requirement	12 VDC/550 mA
Dimensions, weight	175 x 110 x 44 mm, 540 grams

ORDERING INFORMATION		
AvaLight-XE	Xenon Light Source (200-1000nm), needs interface cable and power supply	
AvaLight-XE-DUV	Xenon Light Source for DUV (160-1000nm), needs interface cable and power supply	
AvaLight-XE-B	Spare bulb for the AvaLight-XE (200-1000nm)	
AvaLight-XE-B-DUV	Spare bulb for the AvaLight-XE-DUV (160-1000nm)	
IC-DB15-2	Interface cable AvaSpec-USB1 platform to AvaLight-XE	
IC-DB26-2	Interface cable AvaSpec-USB2 platform to AvaLight-XE	
CUV-DHc/XE/LED	Direct attach cuvette holder for AvaLight-DHc/XE/LED	
PS-12V/1.0A	Power supply 100-240VAC/12VDC, 1.0A for AvaLight-XE	

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AvaLight-HAL-CAL and AvaLight-DH-CAL Calibrated Light Sources

AvaLight-HAL-CAL



The AvaLight-HAL-CAL is a compact, low-cost light source, calibrated for the VIS (350-1095nm). Optionally an extended calibration for the NIR spectral range (1100-2500 nm) can

AvaSphere-50-LS-HAL-CAL

Specially for radiance calibrations in the VIS (360-1100nm) spectral range the AvaSphere-50-LS-HAL-CAL has been developed. Radiance calibrated systems normally include a spectrometer and a bare fiber with SMA connector and look at homogeneous illuminated areas. The Avasphere-50 LS-HAL-CAL comes with a power supply and a CDRom with the calibration file in ASCII format.

be ordered. This NIST traceable calibrated light source is developed for use with all AvaSpec spectrometers, to measure absolute spectral intensity.

The AvaLight-HAL-CAL comes with a built-in diffuser, a cosine corrector CC-VIS/NIR with SMA adapter and a CDROM with the calibration file in ASCII format. The AvaLight-HAL-CAL calibration file can be read by AvaSoft-IRRAD, a software package developed to turn your spectrometer system into a spectroradiometer.

A special version of the calibrated light source, the AvaLight-HAL-CAL-ISPXX, is available to couple the AvaSphere-XX-IRRAD integrating spheres to the light source (XX=30,50,80). This version comes with a special bottomplate to stabilize the AvaSpheres.

The AvaLight-HAL-CAL cannot be used as an illumination source for spectral absorbance, transmission and reflection measurements. The AvaLight-HAL-CAL is calibrated together with the included PS-24V/1.25A power supply.



AvaLight-DH-CAL



The AvaLight-DH-CAL is a calibrated light source for the UV/ VIS/NIR spectral range (200-1099 nm). This NIST-traceable calibrated light source is developed for use with all AvaSpec spectrometers to measure absolute spectral intensity. The AvaLight-DH-CAL comes with a built-in diffuser, a cosine corrector CC-UV/VIS with SMA adapter and a CDROM with the calibration file in ASCII format. The software includes two calibration files, both valid for calibration with the cosine corrector. One calibration file can be used for irradiance calibration over the full range (200-1099 nm). In that case both the Deuterium and Halogen light need to be switched on during the calibration.

The other calibration file can be used for irradiance calibration over the VIS/NIR range (350-1099 nm). In that case only the Halogen light needs to be switched on which gives a more smooth and stable output around 656 nm and at the higher wavelengths. Optionally the AvaLight-DH-BAL-CAL can be ordered to have a more balanced spectrum in the 200-1100nm range. Also new is the AvaLight-D-CAL for UV range calibrations only (200-400nm).

The calibration files can be imported in the AvaSoft-IRRAD application software, developed to turn your spectrometer system into a spectroradiometer.

A special version of the calibrated light source, the AvaLight-DH-CAL-ISPXX, is available to couple the AvaSphere-XX-IRRAD integrating sphere to the light source. (XX=30,50,80)

The AvaLight-DH-CAL cannot be used as an illumination source for spectral absorbance, transmittance and reflectance.





Figure 14 Spectral output Avalight-HAL-CAL and Avalight-DH-CAL



Technical Data

	AvaLight-HAL-CAL	AVASPHERE-50-LS-HAL-CAL	AvaLight-DH-(BAL-)CAL
Calibration use	Irradiance µWcm ⁻² nm ⁻¹	Radiance µWsr ⁻¹ cm ⁻² nm ⁻¹	Irradiance µWcm ⁻² nm ⁻¹
Calibrated surface	CC-VIS/NIR or AvaSphere	Bare fiber	CC-UV/VIS or AvaSphere
Wavelength Range	350-1095 nm / 1100-2500 nm*	350-1095 nm / 1100-2500 nm*	200-1099 nm
Calibration Accuracy Repeatability	± 0.5 %	± 0.5 %	± 1.0%
Calibration	±9.5% (350-1100nm)	±9.5% (350-1100nm)	±10% (200-240)
Relative Uncertainty to	±6.5% (1100-1950nm)		±9% (240-350)
NIST standard	±9.5% (1950-2500nm)		±10% (350-400)
			±9.5% (400-1100nm)
Calibration valid for	60 hrs	60 hrs	60 hrs
Warm-up Time	15 Min.	15 Min.	30 min.
Bulb Output	170µWcm ⁻² nm ⁻¹ (@800nm)	100µWsr ⁻¹ cm ⁻² nm ⁻¹ (@800nm)	80µWcm ⁻² nm ⁻¹ (@215nm)
			5µWcm ⁻² nm ⁻¹ (@800nm)
Power requirement	24 VDC / 1.2A	24 VDC / 0.3A	100-240 VAC
Dimensions (mm)	132 x 110 x 44	70 round x 75 height	315 x 165 x 140

* optional extended range NIR calibration

	ORDERING INFORMATION
AvaLight-HAL-CAL	NIST traceable Halogen Lamp with CC- VIS/NIR diffuser, incl. PS-24V/1.25A
AvaLight-HAL-CAL-ISP30	NIST traceable Halogen Lamp for use with AvaSphere-30-IRRAD, incl. PS-24V/1.25A and special
	sphere holder bottomplate BOTTOM PLATE-30-CAL
AvaLight-HAL-CAL-ISP50	NIST traceable Halogen Lamp for use with AvaSphere-50-IRRAD, incl. PS-24V/1.25A and special
	sphere holder bottomplate BOTTOM PLATE-50-CAL
AvaLight-HAL-CAL-ISP80	NIST traceable Halogen Lamp for use with AvaSphere-80-IRRAD, incl. PS-24V/1.25A and special
	sphere holder bottomplate BOTTOM PLATE-80-CAL
AvaSphere-50-LS-HAL-CAL	NIST traceable radiance calibration source, 10mm and SMA adapter calibrated, incl PS-24V/1.25A
HL-Recal	AvaLight-HAL-CAL recalibration service 350-1095nm
HL-Recal-NIR	AvaLight-HAL-CAL extended or recalibration service 1100-2500nm
AvaLight-D-CAL	NIST traceable UV Deuterium Lamp with CC-UV/VIS diffuser, -SR fibers recommended
AvaLight-DH-CAL	NIST traceable UV/VIS Deuterium/Halogen Lamp with CC-UV/VIS diffuser, -SR fibers recommended
AvaLight-DH-BAL-CAL	NIST traceable balanced UV/VIS Deuterium/Halogen Lamp with CC-UV/VIS diffuser, -SR fibers recommended
AvaLight-DH-CAL-ISP30	NIST traceable UV/VIS Deuterium/Halogen Lamp for use with AvaSphere-30-IRRAD,
	incl. special sphere holder bottomplate, -SR fibers recommended
AvaLight-DH-CAL-ISP50	NIST traceable UV/VIS Deuterium/Halogen Lamp for use with AvaSphere-50-IRRAD,
	incl. special sphere holder bottomplate, -SR fibers recommended
AvaLight-DH-CAL-ISP80	NIST traceable UV/VIS Deuterium/Halogen Lamp for use with AvaSphere-80-IRRAD,
	incl. special sphere holder bottomplate, -SR fibers recommended
DH-Recal	AvaLight-DH-CAL recalibration service 200-1099nm
AvaSoft-IRRAD	Irradiance add-on software, to be ordered with AvaSoft-full

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AvaLight-CAL Spectral Calibration Source

AvaLight-CAL



Figure 15 Spectral lines Avalight-CAL



Technical Data

The AvaLight-CAL is a spectral calibration lamp. It is available with different gasses, the standard is HgAr, that emits all mercury and argon lines from 254 to well over 922 nm. The major lines and structures are shown on the bottom surface including their relative intensity.

With the standard SMA 905 connector the lamp can quickly be attached to optical fibers, and therefore lends itself to an easy wavelength calibration of fiber optic spectrometer systems.

In the AvaSoft-Full software an automatic recalibration option is included.

Other lamps are available for wavelength calibration in other regions, such as Neon (340-1100nm) and Argon (600-1704nm) The AvaLight-CAL can also be delivered in a rack mounted version, to be fully integrated in the 19" rack mount or 9.5" desktop housing. A PS-12V/1.0A 12VDC power adapter should be ordered with the unit.

Figure 16 Spectral lines Avalight-CAL Neon



Lamp	HgAr	Neon	Ar
Output	254 - 922 nm	340-1100nm	696-1704 nm
Optical power in 600µm fiber	1.6 mW		
Connector	SMA 905 connector		
Internal Voltage	1200 Volts AC at 30 kHz, 10 mA		
Warm up	1 minute for vapor stabilization		
Lamp lifetime	5000 hrs.		
Power requirement	12VDC supply, 240 mA		
Dimensions, weight	175 x 110 x 44 mm, 480 grams		

ORDERING INFORMATION

AvaLight-CAL	Mercury Argon Calibration source needs extra PS-12V/1.0A power supply, SMA
AvaLight-CAL-NEON	Neon Calibration source needs extra PS-12V/1.0A power supply, SMA
AvaLight-CAL-AR	Argon Calibration source needs extra PS-12V/1.0A power supply, SMA
AvaLight-CAL-RM	Rack mounted version of Mercury-Argon Spectral Calibration Source
AvaLight-CAL-B	Replacement bulb, Mercury-Argon
AvaLight-CAL-NEON-B	Replacement bulb, Neon
AvaLight-CAL-AR-B	Replacement bulb, Argon
PS-12V/1.0A	Power supply 100-240VAC/12VDC, 1.0A for AvaLight-CAL





AvaLight-LED Light sources for fluorescence applications

The AvaLight-LED light sources are compact, low-cost Light Emitting Diodes that produce continuous or pulsed spectral output at different wavelengths for high sensitivity fluorescence measurements.

All AvaLight-LED light sources are recommended for fluorescence applications, where the excitation wavelength can be chosen from the following table.

New is the CUV-LED, where the LED is built into an adapter that fits in a standard cuvette holder and is connected to the lamp electronics (AvaLight-LED-CON) by an electrical cable. This setup is ideal for fluorescence applications.

Other fluorescence accessories and probes, such as the CUV-DA, CUV-FL/ CUV-ALL cuvette holders and the FCR-UV200/ 600 fluorescence probe can be found elsewhere in this catalog. A typical application setup for fluorescence is depicted at the end of this catalog, in the applications section.

The AvaLight-LED has an SMA 905 connector for coupling to fiber optics, a PS-12V/1.0A power supply should be ordered with the unit.

The AvaLight-LED can be used as a DC source or pulsed with a programmable Pulse Width Modulation (PWM), supplied by the AvaSpec-USB2 spectrometers output (IC-DB26-2 needed).

AvaLight-LED



Figure 17 Spectral output different AvaLight-LED's



Technical Data

	AvaLight-LED255	AvaLight-LED340/	AvaLight-LED400/	AvaLight-LED450/	AvaLight-LED530/
		360/380	410/430	470/490	590/780
Spectral Range*	255 nm	340/360/380 nm	400/410/430 nm	450/470/490 nm	530/590/780 nm
FWHM (nm)	20 nm	15 nm	11 nm	30 nm	30 nm
LED Output	5 µW	10 µW	25 µW	25 µW	25 µW
Connector	SMA 905				
Power Supply	12 VDC, 40 mA				
Dimensions, weigth	175 x 110 x 44 mm, 480 grams				

* other wavelengths available on request.

ORDERING INFORMATION		
AvaLight-LED-XXX	Light Emitting Diode Lightsource, specify wavelength XXX	
AvaLight-LED-XXX-RM	Rackmount version of the Light Emitting Diode Lightsource, specify wavelength XXX	
AvaLight-LED-CON	LED lightsource control unit with electrical connector to LED, needs extra PS-12V/1.0A and interface cable	
CUV-LED-XXX	LED holder for Cuvette, specify LED wavelength XXX	
CUV-DHc/XE/LED	Direct attach cuvette holder for AvaLight-DHc/XE/LED	
IC-DB15-2	Interface cable AvaSpec-USB1 platfrorm to AvaLight-LED	
IC-DB26-2	Interface cable AvaSpec-USB2 platfom to AvaLight-LED for PWM	
PS-12V/1.0A	Power supply 100-240 VAC/12VDC, 1.0 A necessary for AvaLight-LED	

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