

# H20-UVL

## Monochromator for Far Ultraviolet

The next stage  
of the vacuum spectroscopy

**Compact**

**Controller- less**

Low stray light

**Robust**

**Fast  
scanning**

**Vacuum Far  
Ultra Violet**



# A monochromator for 100 – 600 nm

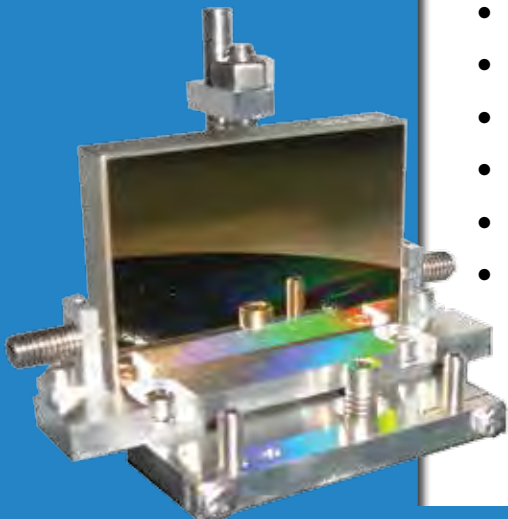
## Aberration-corrected grating

Type IV aberration-corrected gratings are concave gratings. They disperse, collimate and refocus the light from the entrance slit onto the exit slit of the monochromator.

The wavelength selection and the scanning are obtained through a simple rotation of the grating.

The groove spacing of these gratings is computer-optimized to produce high quality images with a minimum of astigmatism and coma over a large spectral range and even at high numerical aperture.

Type IV aberration-corrected gratings are typically recorded using two point sources. As a consequence, the grating grooves are no longer straight and parallel, but instead correspond to confocal hyperboloids or ellipsoids. Optimizing the position, angles and arm lengths of the two sources provides the optical designer with the degrees of freedom necessary to minimize aberrations.



The H20-UVL is a monochromator especially designed for analyzing 100-600 nm (2 to 12.4 eV) far UV (FUV) range when using under vacuum, or 190-600 nm at atmospheric pressure. Its micrometric slits and its worm drive make its scans precise and fast. This short focal length vacuum monochromator is ideal for sample illumination if equipped with a VUV light source, or for FUV low resolution analysis with a single PMT or silicon detector. A spectrograph version for one inch CCD detector or MCP (Micro Channel Plate) is available on request.

Based on HORIBA Jobin Yvon's patented technology, the H20-UVL series is built around a single concave holographic grating aberration corrected type IV. Its 64° deviation angle makes this monochromator perfectly optimized in FUV range. The positions of its entrance and exit slit port work in fixed location and do not need to rotate following the Rowland circle of a classical spherical grating setup.

This simple optical design dramatically reduces astigmatism and results in excellent throughput and spectral purity, even below 140 nm, where other instruments based on Czerny Turner design lose their efficiency because of the number of internal reflections and the working angles of their optics.

## Applications

- **Transmission-Reflection measurements**
- **UV tunable filter/Light source**
- **Fluorescence**
- **Photoluminescence**

## Features

- Single Grating design
- Type IV Grating
- MgF<sub>2</sub> coating UV optimized
- Dedicated baffling
- High Vacuum compatible
- Automate drive
- Built-in USB2 interfaces
- HORIBA Scientific slit attachment

## Benefits

- Optimized for throughput
- Minimized aberrations
- Better efficiency in FUV range
- Low stray light
- 10<sup>-6</sup> mbar
- Fast and Easy to operate
- No additional controller. Easily programmable with SDK
- Compatible with all HORIBA Scientific accessories

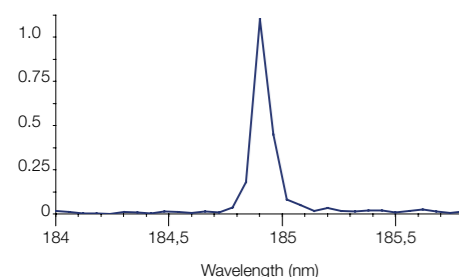
## The best specifications for your analyses

### Efficiency of the H20-UVL

Our H20-UVL standard package includes Magnesium Fluoride (MgF<sub>2</sub>) coating. Other coatings such as Platinum (Pt), which improve the efficiency below 115 nm, are offered as an option.

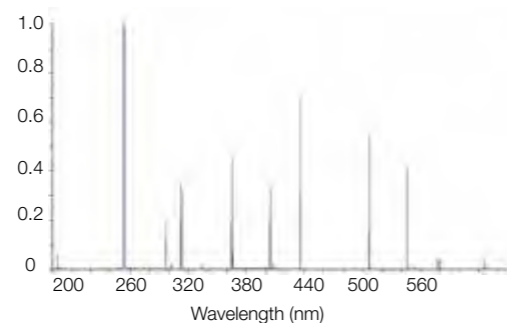
### Resolution of single emission lines

Thanks to our spherical holographic grating aberration correction, the symmetry of a single emission line is dramatically improved compared to other design.

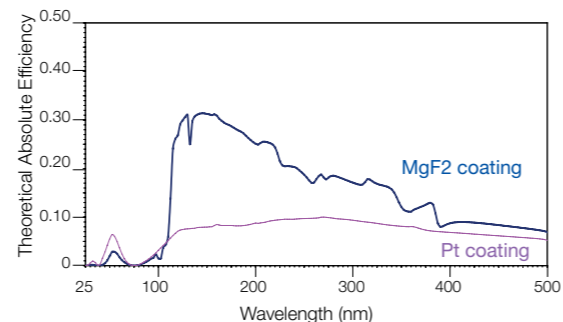


185 nm Hg line acquired with PMT detector, using 0.01 x 2 mm slit

Resolution better than 0.1 nm.



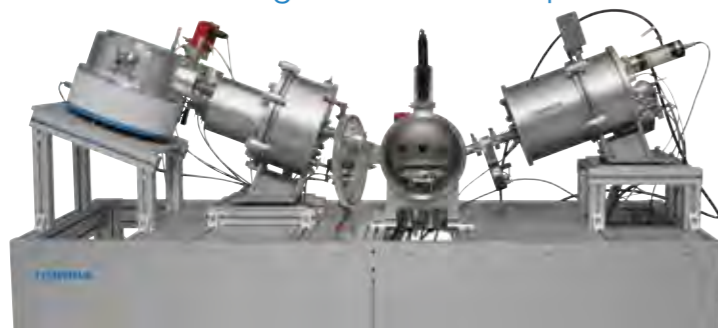
Hg Spectrum



H20-UVL grating coating efficiencies



### H20-UVL used as a tunable light source for ellipsometer



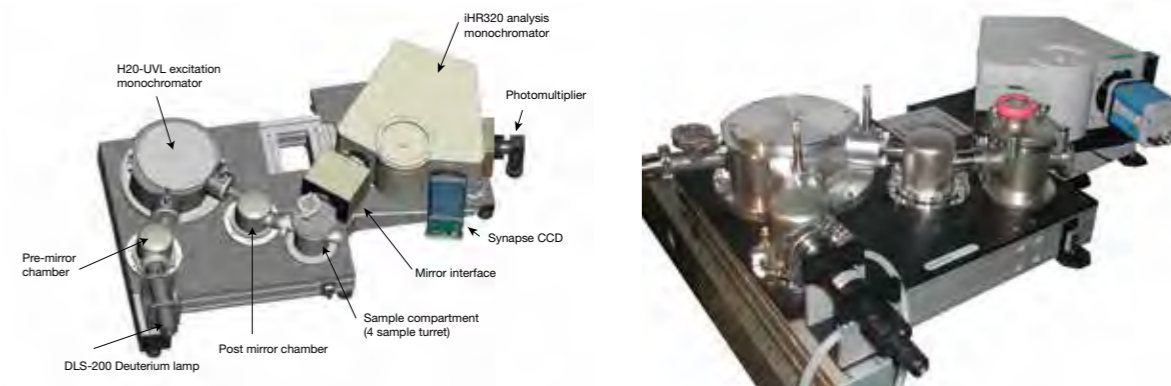
VUV spectroscopic ellipsometry is ideal for the investigation of optical properties. For such applications, the H20-UVL with a Deuterium or Xenon source is assembled with Rochon prisms for exciting samples at dedicated polarization and reflective angles. Thicknesses and optical constants are extracted for semiconductors, dielectrics, polymers and thin films on the extended spectral range from VUV.

Applications include:

- Optical characterization at lithography lines
- Transmitted intensity of optical elements
- Electronic transitions of semiconductor and dielectric films
- Ultra thin film characterization such as high k gate dielectrics

## A key component for your application

### Fluorescence instrument based on H20-UVL and iHR320

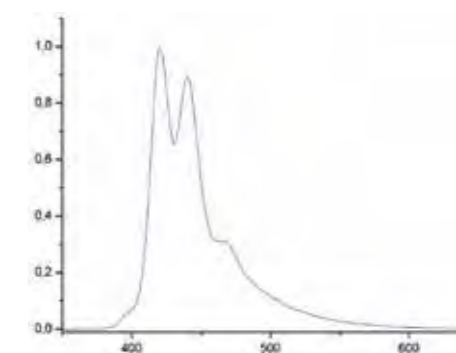


The H20-UVL/Deuterium tunable light source can operate in a fluorimeter setup when the sample compartment is equipped with an additional lateral port at 90° from the excitation. An iHR/CCD spectrometer, made by HORIBA Scientific<sup>1</sup>, is attached onto this port, analyzing the fluorescence emission of the sample.

<sup>1</sup> contact us for the iHR series brochure

C<sub>14</sub>H<sub>10</sub> Fluorescence spectrum obtained with the H20-UVL set at 160 nm as excitation. Emission was collected using iHR320 spectrograph equipped with an air cooled Synapse CCD detector (400-600 nm).

This last emission spectrometer may operate in atmospheric pressure or under Nitrogen depending on the fluorescence spectral range of the analysis.



### H20-UVL used as a tunable light source for a VUV transmission setup



For transmission measurements, a 200 w Deuterium light source is mounted on the entrance slit of the H20-UVL (on left) lighting samples in the sample chamber (on right). A Far-UV photomultiplier acquires the transmission signal of the sample. Sample turret cut-off filters, filter wheel, reference detector or customized chamber are available. Contact us for more information.

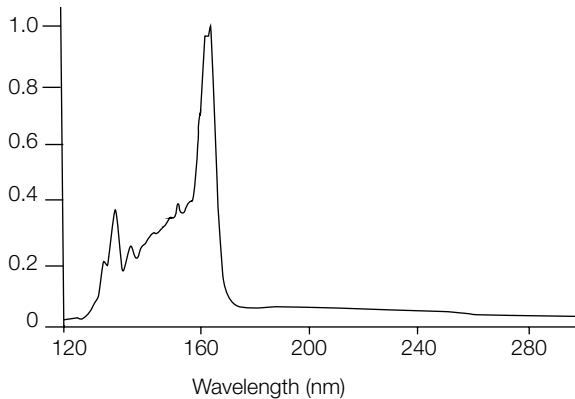
# Turn your H2O-UVL into a tunable light source

## VUV Deuterium light source

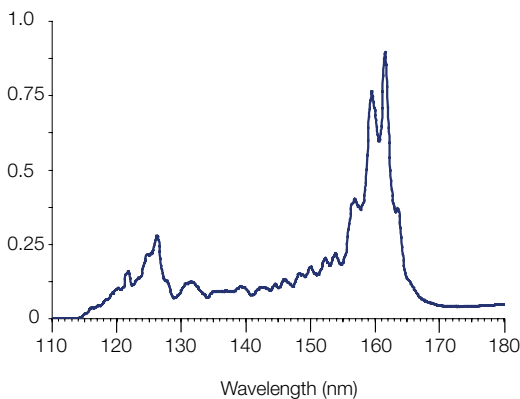
The DLS-200 Vacuum UltraViolet (VUV) lamp is a Deuterium lamp especially designed to supply deep UV light down to 115 nm. Its spectral emissions spreads from 115 nm to 350 nm with especially high intensity between 120 nm and 160 nm.

The DLS-200 VUV light source has been developed and deeply tested in collaboration with our partners.

When coupling with our VUV grazing angle pre mirror chamber, the DLS-200 can be used with monochromators as a monochromatic tunable light source.



Relative emission of the DLS-200 VUV source



High resolution spectrum of DLS-200 acquired with Photomultiplier detector.

## Applications

- **Fluorescence excitation**
- **Transmission/Absorption spectroscopy**
- **Monochromatic Semiconductor exposure**
- **Lithography**
- **Photo-chemical processes with high photon energy**



Water cooled DLS-200 light source

## Specifications

Type	Deuterium
Emission range	115 – 350 nm
Power	200 W
Window material	MgF <sub>2</sub>
Vacuum flange	DN50KF
Cooling	Water cooled
Arc diameter	1 mm
Operating Emission angle	14°
Noise	Better than 0.1 % @ 215 nm
Drift	Better than 0.5 % @ 250 nm
Ignition voltage	500 V
Life time	300 hours at 1.8 Amp
Heating up time	30 s
Housing Diameter	54 mm at cooling jacket with 8 mm cooling connectors
Overall length	225 mm
Weight	0.9 kg (without power supply)
Power supply	Included in the package
Additional bulb	Part number: 43321317

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# H2O-UVL Specifications

## Standard Configuration

Optical design	Spherical Type IV (single optic)
Focal length	200 mm
Aperture	f/4.2
Grating density	1200 gr/mm
Optic coating	MgF <sub>2</sub> optimized at 121 nm (Pt option)
Deviation angle	64°
Dispersion	3.6 nm/mm at 120 nm
Drive	Fast worm drive
Minimum step	0.06 nm
Speed	400 nm/s
Accuracy	+/- 0.1 nm
Repeatability	+/- 0.06 nm
Resolution	Better than 0.1 nm (*)
High Vacuum	10 <sup>-6</sup> mbar (**)
Pumping flange	DN40 KF
Entrance/exit port	Micrometric slits (10 µm to 3 mm)
Entrance/exit flange	DN25 KF
PC interface	Built-in USB2- No additional controller

(\*) using 10 micron slit and 2 mm slit height on 121 nm line  
 (\*\*) H2O-UVL requires pump and gauge not included in these packages

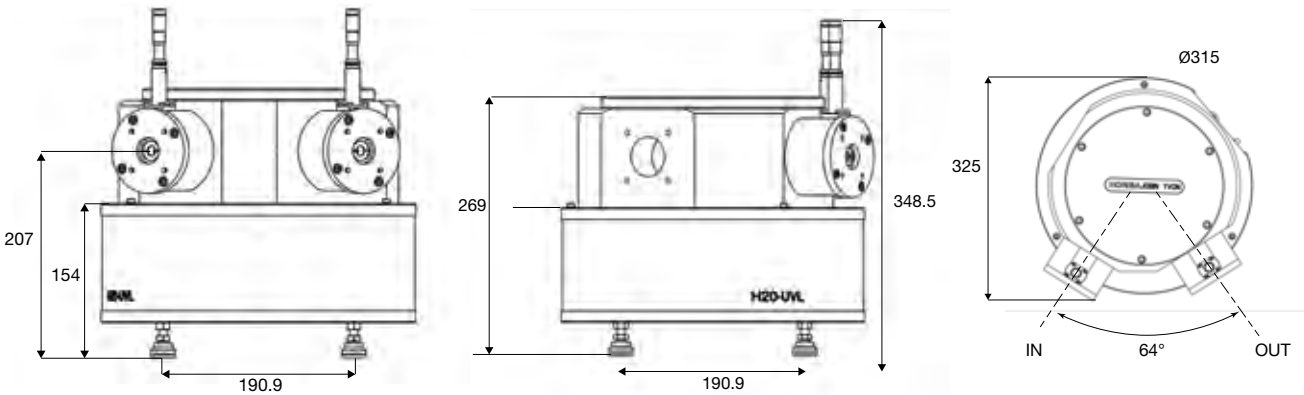
## Variation of the dispersion with wavelengths

As the spectral dispersion at the exit of a monochromator varies with the wavelength selection, the maximum spectral resolution of the monochromator depends on wavelength changes.

Wavelength (nm)	Dispersion (nm/mm)
120	3.6
300	3.2
550	2.6

## Spectral ranges according to the coating and vacuum specifications

100 - 500 nm	Pt coating	from 10 <sup>-5</sup> mbar
120 - 600 nm	MgF <sub>2</sub> coating	from 10 <sup>-5</sup> mbar
140 - 600 nm	MgF <sub>2</sub> coating	Nitrogen (optional)
190 - 600 nm	MgF <sub>2</sub> coating	Air



Weight: 27 kg

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