

VUV5k

Retractable VUV5k-package

The retractable VUV5k-package is the combination of the VUV5000 UV-source and the VUV5047 UV-monochromator. These components form a unique light source.

The VUV5000 is the most intense He-light source on the market and has the narrowest line width. The unique feature of the VUV5047 UV monochromator is that it can utilise the full output of the VUV5000 giving extremely high intensity at the sample even after monochromatisation.

Another feature of the VUV5047 has a 60 mm exit capillary retraction further described below. The retractable VUV5k-package also includes the VUV5051 differential pumping stage and the VUV5045 monochromator entrance valve. The retractable VUV5k-package allows a working pressure in the 10^{-11} mbar range during lamp operation.

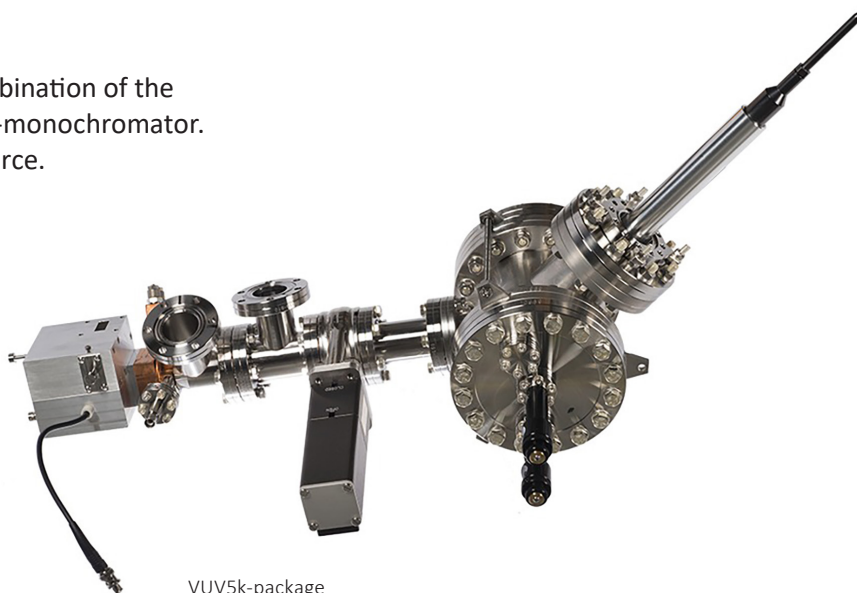
VUV5000 Photon source

The Scienta Omicron VUV5000 photon source is based on a He plasma, generated with the ECR (Electron Cyclotron Resonance) technique. A microwave generator is coupled to a small discharge cavity in a magnetic field tuned to the microwave frequency to meet the ECR condition. The photon flux emitted through a 2 mm VUV5k-package Retractable VUV5k-package VUV5k aperture is about 500 times higher than that from conventional discharge VUV sources. Still, Scienta Omicron VUV 5000 operates at 1 meV resolution since the ion temperature is low due to the small microwave energy coupling to the ions and the low discharge pressure.

The excellent stability of the Scienta Omicron VUV 5000 makes it ideal for measurements such as studies of ultra-thin films and nanomaterials, requiring extremely high intensity and long measurement series. In addition, the ~ 1 meV bandwidth allows high resolution gas phase and cluster measurements.

VUV5047 UV-monochromator

The Scienta Omicron VUV5047 is a compact monochromator optimised for high efficiency at both He I and He II. Complete separation of He I α and He I β



VUV5k-package

Technical Highlights:

- Extremely high photon flux
- Unchallenged stability and uptime
- Very low maintenance requirements
- Small spot option (with ARPES Capillary Upgrade)
- Very high resolution

is achieved while maintaining a 1 meV bandwidth. The VUV5047 also includes a retractable exit stage with inter-changeable capillaries and port aligner. 60 mm linear travel ensures compatibility with the Scienta Omicron Cryo manipulator models. The in-vacuum capillary-retraction is done by a turn on an easily accessible knob. Three capillaries are included and delivered with the set-up.

VUV5045 Monochromator Entrance Valve

The VUV5045 is a manual shut-off valve placed between the UV-source lamp head and the UV-monochromator to enable easy servicing of the UV-source without venting the experimental set-up. VUV5051 Differential pumping addition VUV5050 UV-source head differential pumping addition. The VUV5051 includes both an entrance and an exit capillary in order to maximise the differential pumping efficiency.

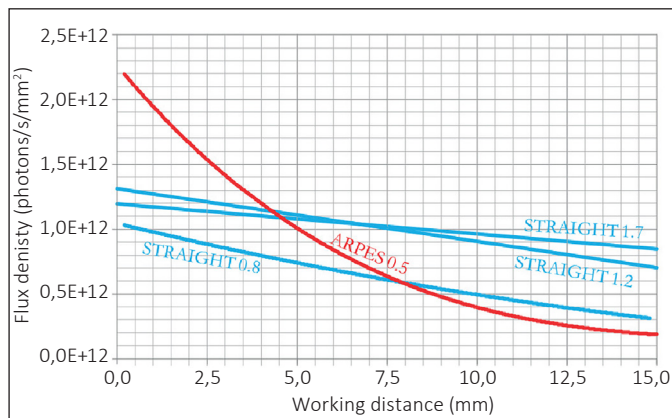


Figure 2: ARPES Capillary Upgrade

The retractable VUV5k-package can be equipped with a newly developed exit stage. This exit stage contains a capillary custom made from glass with an exit inner diameter of 0.5 mm. This option offers the highest flux density in a very small spot. The figure to the right shows the flux density for the different capillaries available with the Scienta Retractable VUV5k package.

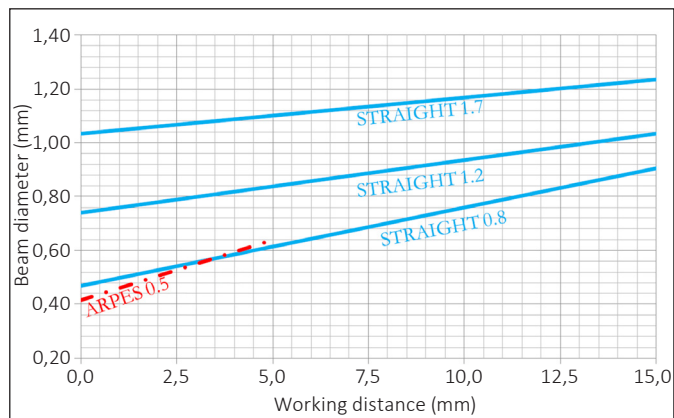


Figure 3: UV spot sizes

The spot size of the retractable VUV5k package depend on the mounted exit capillary. Generally, the spot size decreases with capillary inner diameter. For optimum performance, we recommend the ARPES capillary upgrade.

Note, however, that in order to benefit from the increased performance of the ARPES capillaries, the working distance need to be 5 mm. Obtainable spot sizes (Gaussian FWHM) are shown above.

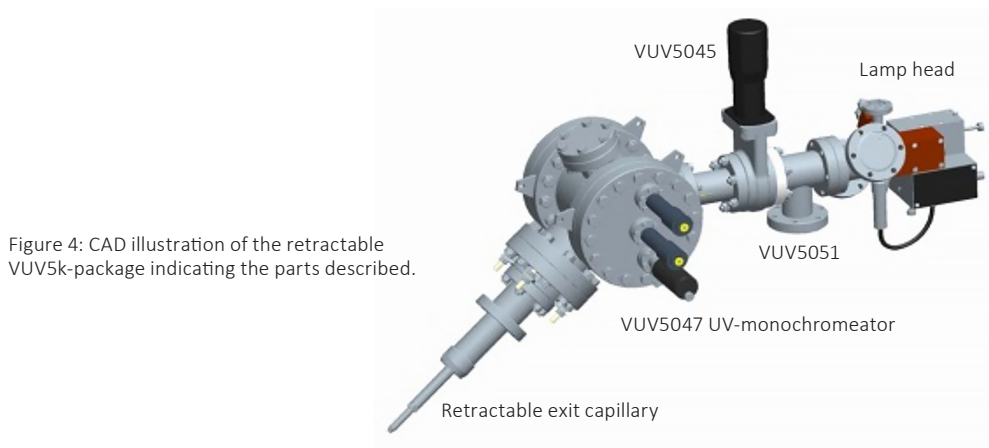


Figure 4: CAD illustration of the retractable VUV5k-package indicating the parts described.

Technical data

Photon generation:	Electron Cyclotron Resonance (ECR)	Working distance	
Emitted radiation using Helium gas with > 99.999 % purity:		ARPES capillaries:	5 mm
He I α , 21.2 eV (584 Å):	FWHM 1.2 meV (~ 82 %)	Straight capillaries:	10 mm
He I β , 23.1 eV (537 Å):	FWHM 1.2 meV (~ 8 %)	Operating pressure	
He II α , 40.8 eV (304 Å):	FWHM 2 meV (> 10 %)	Typical:	< 3.0E-10 mbar
Total VUV flux:		Optimal pumping:	10 ⁻¹¹ mbar range
Capillary	Flux (photons/s)	Port length:	200 or 280 mm
ARPES 0.5 mm	3.2E11	ARPES capillary retraction:	60 mm
STRAIGHT 0.8 mm	2.1E11	Mounting flange:	DN40CF (2.75" OD)
STRAIGHT 1.2 mm	6.0E11	Bake-out temperature:	< 120 °C / 390 K
UV spot size (ARPES capillary):	< 0.7 mm		
Monochromator gratings			
Efficiency He I, 1st order:	10 %		
Efficiency He II, 1st order:	20%		
Efficiency He II, 2nd order:	< 0.25 %		

