

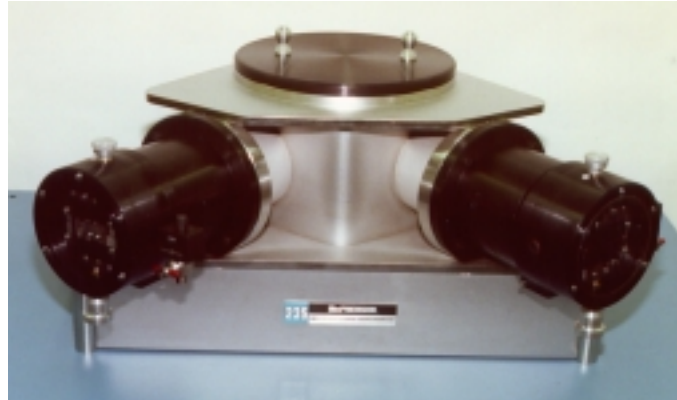
Increased work space

Internally welded Stainless steel construction

Toroidal imaging gratings available

Spectrometer & Spectrograph operation

The 0.5 meter focal length Seya-Namioka uses simple grating rotation to scan wavelengths. An angle of $70^{\circ} 15'$ subtends the entrance and exit slit arms. The focal length provides increased resolution and work space. Stainless steel construction makes this proven design suitable for use with high vacuum and contaminant free experimental chambers or microchannel plate intensified detectors.



Seya-Namioka mounting maintains all components (slits and gratings) on the Rowland circle. While resolution is maintained over a broad spectral region, astigmatism should be considered depending on the application.

The image height at the exit of this instrument is equal to the height of the entrance image

plus $2/3$ grating ruled height. Exit images on the order of 25 mm high are not uncommon. When using a photomultiplier (with a large photocathode area) to scan a source or samples emission, or when using the instrument as a filter for selecting plasma lines from a emission source the astigmatism presents no problem.

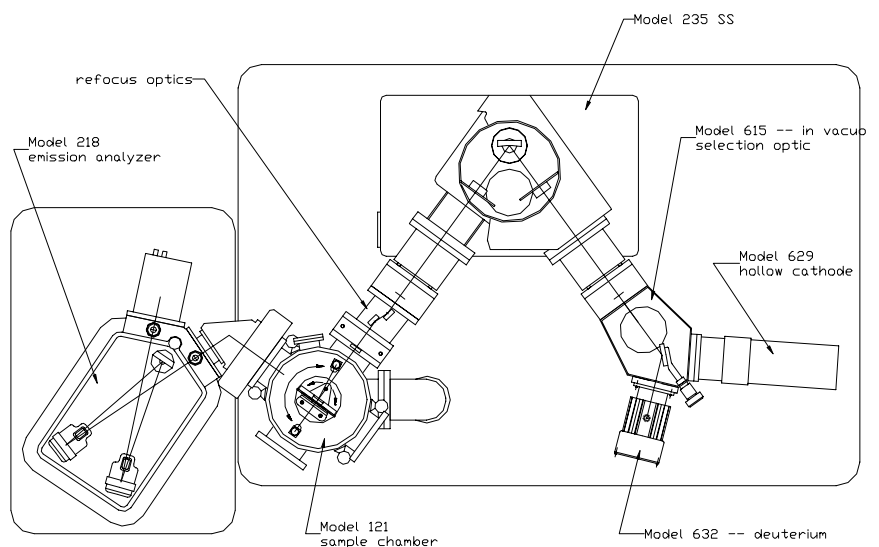
Model 235SS
part #: 8183-0235-0

Focal length: 500 mm
Included angle: $70^{\circ} 15'$
f/number: 11.4
Resolution: ** 0.05 nm*
Dispersion: 1.66 nm/mm**
Accuracy: 0.1 nm
Reproducibility: 0.005
Base vacuum: 10^{-7} torr

* with 1200 G/mm, measured with 10 μ m slits x 4 mm high.

**Other gratings available, multiply resolution and dispersion values by the difference in groove densities.

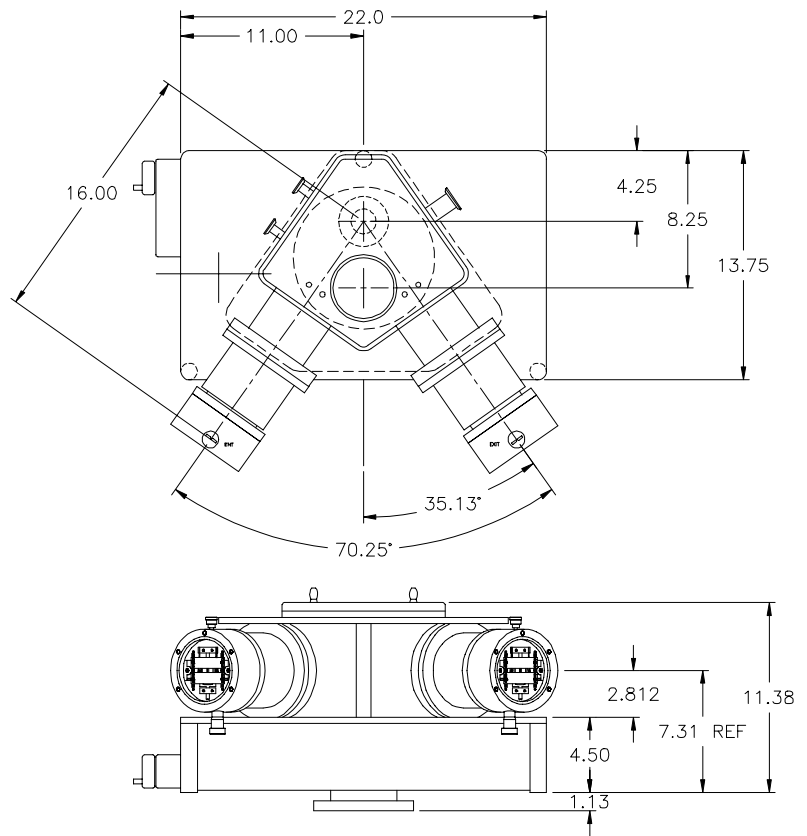
The **Model 235 SS** depicted in the diagram below has been integrated into a system utilizing two sources for excitation of samples in the model 121 sample chamber. Samples under test were excited with selected vacuum UV energy in the 300 - 1600 Å region. The **variable angle test reflectance and absorbance capability of the Model 121 was complemented by the addition of an emission wavelength analyzer, a Model 218**, 0.3 meter focal length spectrometer with a low energy detector.



Imaging gratings

In source filtering or laser harmonic separation applications the Model 235 SS has proven desirable. Its working distance and resolution offer the experimenter flexibility.

In cases where source energy must be maintained toroidal gratings are offered. These optics are helpful when working with extended sources as capillary or hollow cathode types. Providing 1:1 imaging at wavelengths as energetic as 300 Å the instruments are ideal for a variety of experimental situations.



Model 235 SS -- All dimensions in inches and for reference only. Approximate weight 80 pounds.

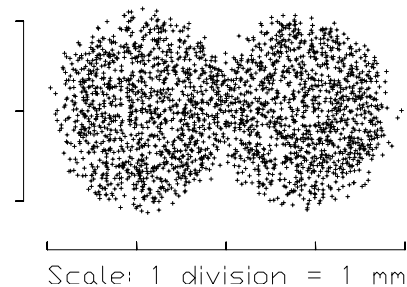


Figure 1. The 235 with toroid provides the highest energy throughput with good resolution. An extended 2 mm image at the entrance slit position yielded this spot separation at 300 and 320 Å, at full aperture spot size is maintained.

The Model 235 SS - MX (version number X), depicted at top left, reveals a minimalist design. It offers the features of our standard instrument while the housing design offers some unique capabilities.

This instrument is fully UHV compatible, has a gate valve on the exit arm, an X-Y-Z adjustable source mount (for optimizing alignment and throughput under vacuum). Not visible in this photo is the reduced diameter slit assembly – provided to extend deep into the experimental chamber from its 2 ¾ cf mounting point. It provides high resolution energy focused at a point close to the sample under test.

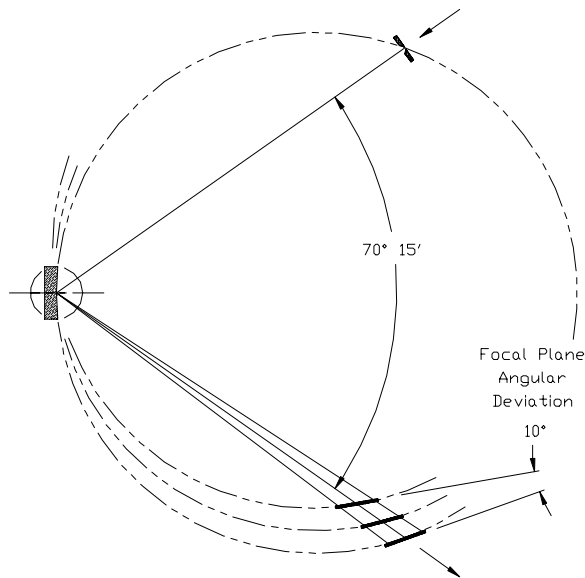


Figure 3 An illustration of the changing focal plane condition on the Seya-Namioka Rowland circle spectrograph as the grating is scanned to 1000 Å. In the auto focusing Model 225 the position at the center of the detector does not change but the angle does.

Rowland Circle Spectrometer Operation

Focus Condition

The Rowland circle mount produces a focal plane which is curved (true with the spherical or toroidal gratings). Fortunately, with a 500 mm or 1,000 mm diameter circle of in focus spectra, and a 25 or 40 mm array detector – placed

on tangent -- well focused, high resolution spectra can be intercepted across the array.

Detectors are positioned to intercept the focused spectra in 2 places, optimizing focus across an array.

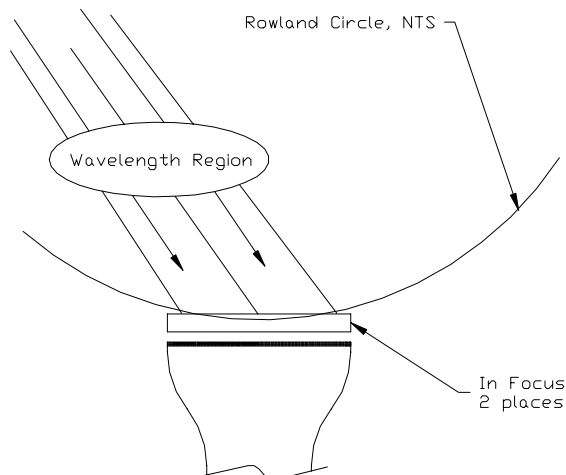


Figure 2 The Rowland circle is not to scale. The figure clarifies the method of achieving best focus across a planar detector.

Best Interception

Since simple grating rotation is responsible for changing the output wavelength in the Models 235 and 231 the Rowland circle rolls away from the detector as the grating is scanned.



Figure 4 This ultra high vacuum compatible accessory permits to adjust a planar detector at the focal plane with respect to depth of focus and angular position.

This requires positioning the planar detector at a unique location to best intercept spectra at each central wavelength.

The Model 225 maintains an in focus point at the center of the detector as wavelength is changed but angular adjustments need to be made for best interception.

When using a model 225, 235 or 231 as a spectrograph the exit (slit) arm is removed and replaced by the variable angle focal plane adapter.