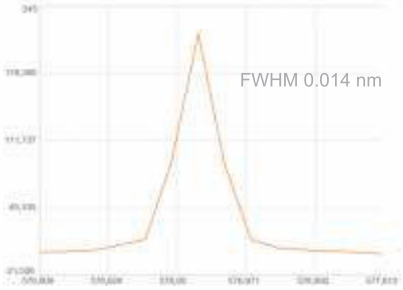
SOL instruments

MONOCHROMATORS & SPECTROGRAPHS

MS SERIES



Imaging

* PRECISION OPTICS WITH ASTIGMATISM CORRECTION
* HIGH SPECTRAL RESOLUTION
* HIGH-ACCURACY WAVELENGTHS CALIBRATION
* FOUR-GRATING AUTOMATED TURRET
* MOTORIZED SLITS
* AUTOMATED FLIP MIRRORS
* PRECISION MECHANISMS FOR SPECTRUM SCANNING
* HIGH PRECISION OF ALL MECHANISMS
* WIDE RANGE OF ACCESSORIES AVAILABLE

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Cherny- Turner Monochromator/Spectrographs
MS series

A series of instruments for spectroscopy "Monochromators/spectrographs" comprises two groups: middle focus, high-aperture, compact devices and long-focus (more than half a meter) high resolution devices with a large flat focal plane. All instruments are fully automated. The choice of an instrument will depend on the purpose of the measurement.

Middle focal devices have been designed especially for operation with very low levels of light signals, they are most applicable for measurements at different wavelengths in wide spectral range at once. This group includes MS200 and MS350 instruments, which are ideally suitable for majority of applications.

If high resolution, accuracy, reproducibility, size of a scanning step are of principal demand any long-focus device is that one you need. Thus, a choice should be made among the devices in another group of instruments: MS520, MS750, MSDD1000.

FEATURES & BENEFITS

1. Precise optics, perfect optical implementation

All MS series instruments are imaging. The high quality stigmatic image is reached by aspherical correction. The astigmatism is corrected in a large focal plane. The correct position and exact radius of curvature of a focusing mirror provide flat focal plane of a large size.

Another benefit is a small angle at a grating (minimum possible for Cherny – Turner layout). It is an angle between the beams going to and from a grating. The smaller this angle the better nature of a wave front change, thus aberrations value is smaller

The astigmatism compensated optics in the monochromators/spectrographs allows to obtain almost ideal spectral image in a large flat focal plane.

2. High reproducibility and accuracy of the mechanisms

The *worm mechanism* is known for its construction simplicity and hereof, for high reproducibility. However the angular oscillations, inducing the equivalent oscillations of wavelengths values, are inherent in the worm mechanism. It is impossible to achieve the required wavelength accuracy by applying simple theoretical models. The upgraded software in concordance with the technique that compensates consequences of angular oscillations has allowed to achieve the best results in accuracy in comparison with similar devices of other manufacturers. Thus, in addition to high reproducibility MS200 and MS350 series monochromator-spectrographs are characterized by wavelength high accuracy.

In long-focus instruments a *sine mechanism* is used as a scanning one. Sine mechanism is notable for a higher level of reproducibility, accuracy, a very small step of scanning . It provides the linear ratio between number of steps of the mechanism and wavelength at the output of a spectral instrument. For MS520 and MS750 series a new sine mechanism of improved linearity for operation in the broader spectral range has been developed. Use of this new mechanism makes possible to install echelle grating which operates in high diffraction orders and provides the greatest possible spectral resolution. As for other gratings, the spectral range has increased considerably, for example, the wavelength range for the grating with 600G/mm grove density can be than 3000 nm.

Besides, use of the new sine mechanism allows to improve linearity and accuracy on a wavelength. What is more, our spectral instruments with the sine mechanism exceed in accuracy over all available spectral instruments with similar focal length.

For convenience of choice of a grating and its fast change the spectral instruments are equipped with *four-grating turret* with automated switch of gratings. All spectral devices of MS series are imaging monochromator-spectrographs. The most important parameter for such spectral devices, and mostly for long-focus devices, is accuracy of a grating positioning in vertical direction. A new precise automated four-grating turret has been specially developed for long-focus instruments capable of accurate positioning of a grating. Typical mistake is equal to zero, maximum possible – only one step that doesn't affect the results in view of such a small value.

3. Excellent accuracy. Real automatic wavelength calibration

Manufacturers of spectral instruments offer automatic wavelength calibration. By this use of a reference light source and minimum involvement of a user is supposed. You must admit that such calibration isn't automatic one. There isn't always an opportunity to use a reference source and a user should spend time for calibration. Sometimes the conditions of experiment cannot allow to fulfill this procedure or there is no reference line for high resolution devices in the narrow simultaneously registered spectrum section.

In an arsenal of potentialities of MS series devices there is a real automatic calibration which is executed automatically every time in case of a wavelength change. This calibration process doesn't require involvement of an operator or a reference light source. Your spectra are always calibrated with the accuracy within the spectral pixel size of the used CCD detector. Such excellent accuracy without involvement of a reference light source has became possible thanks to the technique of calibration, developed by the engineers at SOL instruments, as well as high reproducibility of mechanisms of scanning and wavelength setting.

When using a reference light source superb calibration of spectra is reached. The error on wavelength doesn't exceed ¼ of CCD detector spectral pixel size.

4. High energy efficiency

A spectral range cannot be a criterion for choosing necessary instrument because all MS series devices have mirror optics and can be used in the greatest possible spectral range. When a choice of a spectral device is already made, it is important to reach the maximum energy efficiency in the spectral intervals.

We offer different types of coatings for mirrors and gratings and extensive list of gratings with different wavelengths of blaze whose power efficiency region covers the whole of possible spectral range.

Right choice of gratings and coating of mirrors and gratings enables to reach high energy efficiency of a device.

FEATURES

MS200

- fully automated imaging monochromator- spectrograph with focal length of 200 mm which has the highest F/number 3.6. among other MS series devices.
Thanks to excellent performance parameters and small dimensions, MS200 devices can be used both as an autonomous spectral devices and as a part of spectroscopic systems. They are ideal for measurements at different wavelengths in the spectral range at once.

MS350

- fully automated imaging monochromator- spectrograph with focal length of 350 mm and a high F/number 1/3.8.
Excellent performance parameters, high aperture, reliability, a flexibility in selection of a device configurations, middle size - all these features make MS350 device a multi-purpose instrument for high quality measurements.

MS520

- fully automated imaging monochromator- spectrograph with focal length of 520 mm. It has a high F/number 1/5.4 for a long-focus device.
The unique combination of a high aperture, reproducibility, accuracy and high spectral resolution make this spectral device a multi-purpose one. A large rotation angle of a grating allows to use echelle grating, providing extremely high spectral resolution by this.

MS750

- fully automated imaging monochromator- spectrograph with focal length of 750 mm and F/Number 1/8.9.
Newly developed scanning mechanism makes possible to use echelle grating that provides the best spectral resolution among MS series devices. Thanks to an ideal contour of spectral lines, extremely high spatial resolution, wide flat focal field, high spectral resolution MS750 meets the high standard requirements.
For all of these advantages MS750 can be widely used in all fields of spectroscopy, including high resolution spectroscopy.

MSDD1000

- fully automated imaging monochromator- spectrograph with effective focal length of 1000 mm and high F/number 1/5.9.
Optical layout of double dispersion is a distinctive feature of the instrument. Doubling of dispersion is equivalent to doubling of effective focal length only from a point of view of improvement of spectral resolution. Besides, this optical layout provides reduction of stray light and retention of a high N/A which is inherent to devices without doubling of focal length.
Unlike double monochromator-spectrographs MSDD1000 overall dimensions are not doubled. MSDD1000 is comparable to MS350 in dimensions. Thus, the advantages of MS1000 are very high spectral resolution, low level stray light, a high N/A by its compactness.

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