

# AUTOMATED MONOCHROMATOR/SPECTROGRAPH M266

The M266 is a 284mm focal length modified Czerny-Turner monochromator, with a 30x10mm flat field output for spectrograph use. It is a compact versatile fully automated high-aperture instrument with high line quality and low stray light performance.



## FEATURES

**High-aperture optics, perfect line quality and low stray light** allow using the M266 for a widest range of applications.

**Two output ports** allow connecting to the M266 two exit slits, exit slit/detector or two detectors simultaneously.

**The M266i version (Imaging)** ensures use of the M266 equipped with two-dimensional array detectors not only in the binning mode, but also in the mode of obtaining a two-dimensional Image. Both output ports can be equipped with the astigmatism compensated optics.

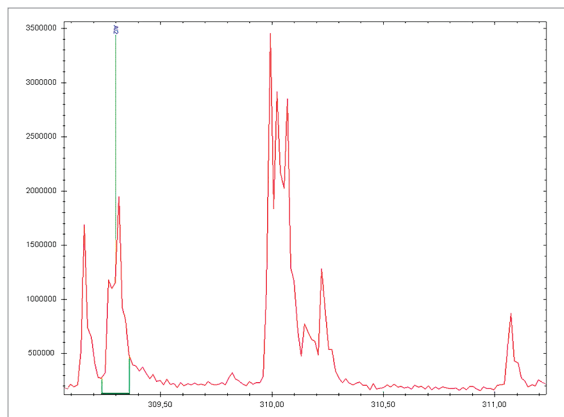
**Automated shutter** allows dark signal measuring and subtracting.

Both exit slits of the M266 are equipped with precise mechanisms for **slit focusing**. **Precise and easy detector** focusing is provided by detector adapters.

**The SolarLS.LAB software** provides automated control over the M266 and its detector. It allows to stitch spectra obtained by several diffraction grating scans in order to get a panoramic spectrum. A lot of possibilities of spectra processing and analysis are provided as well.

**DLLs and LabVIEW drivers** can be supplied at your request, allowing to control the instrument via individually designed software.

**High optical quality.**



*Fe quadruplet, spectral lines 309.9897nm, 309.9971nm, 310.0304nm and 310.0666nm. The spectrum was acquired with spark excitation using the M266 with 1800 lines/mm grating. The possibility of resolving at least 3 peaks demonstrates high optical quality of the instrument.*

## APPLICATIONS

- Emission, fluorescent and Raman spectroscopy
- Analytical tasks and researches demanding high resolution in the spectral range from UV to IR
- Multi-channel spectroscopy
- Measuring absorption, reflection and transmission

## M266 ADVANTAGES

The standard optics comprises spherical and flat mirrors with Al+MgF<sub>2</sub> coating optimized for high UV efficiency. Optionally the device may contain optics with Al+SiO<sub>2</sub> or gold coating for high efficiency in the infrared spectral range.

The M266 comprises one input port and two output ports. The input port may hold either a standard entrance slit, or a crossed entrance slit (optionally). All the spectral slits are automated; their width is adjusted by the instrument software. The slit design also contains a micro-screw that provides the possibility of the opening width of the blades.

The M266 output ports may hold either two exit slits, or one exit slit and detector, or two detectors concurrently.

Direct (axial) and lateral (radial) output ports operate alternately. Switching between the output ports is effected by the software with the use of the swinging mirror, which in its operating position directs light to the lateral (radial) output port. The instrument is also available with one output (axial) port. If the radial output port is not used, it is plugged

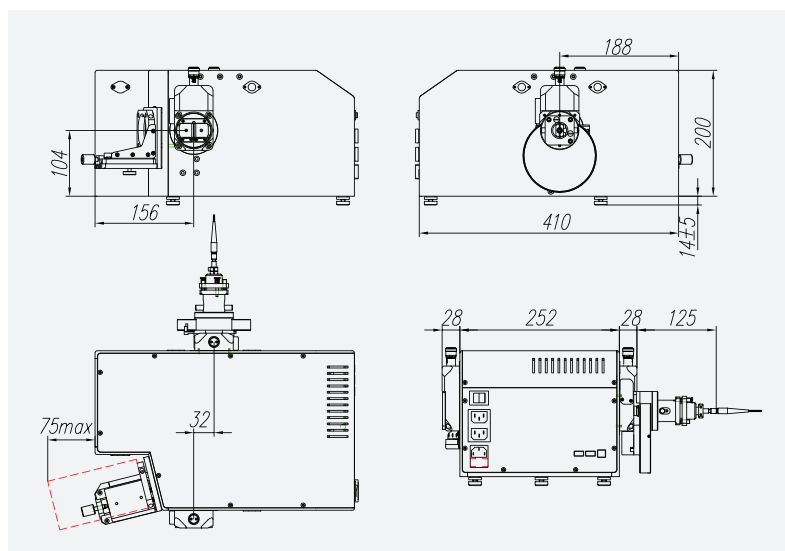
The M266 astigmatic segment is 2.4mm in the center of its output flat field, and respectively 2.1mm and 2.8mm at the edges of the field. Astigmatism does not

usually impair resolution of the instrument, but, depending on the height of the detector used, can affect the overall sensitivity of the system.

Astigmatism correction is imperative in a multichannel spectroscopy, in case you need to adequately transfer the light distribution along the slit, as well as for the use of spectrographs with two-dimensional detectors in the Imaging mode.

Introducing the astigmatism compensator in the M266 optical scheme allows correcting astigmatism in the exit slit plane to the value of about 50 micrometers. This fact must be considered when estimating the expected optical resolution of an instrument with a specific grating. Astigmatism compensation also affects the vertical magnification of the spectrograph:

M266 magnification	Horizontal	Vertical
Without astigmatism compensation	1.19	1.32
With astigmatism compensation	1.19	1.55



M266 dimensions.

## OPTICS & ACCESSORIES

The M266 monochromator-spectrograph has a wide range of options and accessories that provide efficient light collection from the sample located at a finite distance and at infinity, delivering light to the monochromator with and without an optical fiber, effective aperture matching of the optical fiber and monochromator.

- Order Separating Filters Wheels
- Aperture Matching Adapters
- Condensers for collecting light into the fiber
- Condensers for collecting light into the monochromator
- Crossed Entrance Slit (optionally installed instead of the Standard Entrance Slit)
- Optical Fibers
- Adapters for attaching CCD detectors
- CCD detectors
- Cassegrain lenses

Possible types of detectors and PMT for monochromator-spectrograph M266 are listed on the page 53.

## M266 SPECIFICATIONS

Optical scheme	Optimized Czerny-Turner with one optical input and two outputs								
Spectral range	Typical 190 – 3600 nm Extended up to 40 $\mu$ m at your request								
F/Number	1 : 3,8								
Focal length, mm	284								
Flat field, mm	30 x 10								
Imaging	Optional; Available on both output ports								
Diffraction gratings	50x50x10 mm, one grating or turret with 4 gratings from the list below <sup>1)</sup>								
Grooves/mm <sup>1)</sup>	2400	1800	1200	600	400	300			
Reciprocal linear dispersion (average) nm/mm	1.58	2.12	3.18	6.37	6.32	9.6	9.41	12.75	12.64
Blaze wavelength	225	270	400	750	1000	800	1700	1500	2000
Spectral range <sup>3)</sup> , nm	190-450	190-540	265-800	500-1500	660-800	530-1600	1130-2600	1000-3000	1330-3600
Multichannel array bandpass (average), nm	38 <sup>4)</sup>	51 <sup>4)</sup>	76 <sup>4)</sup>	150 <sup>4)</sup>	80 <sup>5)</sup>	230 <sup>4)</sup>	120 <sup>5)</sup>	160 <sup>5)</sup>	160 <sup>5)</sup>
Spectral range, nm	<0.1 <sup>4)</sup>	<0.15 <sup>4)</sup>	<0.22 <sup>4)</sup>	<0.45 <sup>4)</sup>	<0.45 <sup>5)</sup>	<0.7 <sup>4)</sup>	<0.7 <sup>5)</sup>	<0.94 <sup>5)</sup>	<0.94 <sup>5)</sup>
Wavelength accuracy, nm	$\pm$ 0.05	$\pm$ 0.067	$\pm$ 0.1	$\pm$ 0.2	$\pm$ 0.3		$\pm$ 0.4		
Wavelength reproducibility, nm	$\pm$ 0.013	$\pm$ 0.017	$\pm$ 0.025	$\pm$ 0.05	$\pm$ 0.075		$\pm$ 0.1		
Step of grating rotation, nm	0.007	0.009	0.013	0.026	0.04		0.05		
Scanning rate, nm/s	12.5	16.7	25	50	75		100		
Entrance/Exit slits	Automatic and manual adjustment								
Slit width, mm	0 - 2								
Slit height, mm	12								
Parallelism, $\mu$ m	+/- 1								
Micrometer reading accuracy, $\mu$ m	+/- 1								
Step size, $\mu$ m	0.5								
Precision, $\mu$ m	+/- 10								
Filter Wheel	Automatic switching								
Max number of filters	6								
Standard number of filters	5								
Filter size, mm	20								
Light aperture, mm	18								
Integrated shutter	Software-controlled, serves for dark signal measuring								
Computer interface	High-Speed USB								
Dimensions and Weight	410 x 252 x 213 mm, 23.5 kg								

1) Upon your request diffraction gratings differing from the above can be used.

2) Reciprocal linear dispersion is indicated for blazing wavelength.

3) Wavelength range for which diffraction efficiency exceeds 40%.

4) For detector with 24  $\mu$ m pixel size and 24.5 mm length of active area.

5) For detector with 25  $\mu$ m pixel size and 12.8 mm length of active area.

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