

## M300 Monochromator

*The M300 is a high quality general purpose grating monochromator designed for use in the UV, visible and infra-red spectral regions.*

*The instrument is easily purged for use down to 175nm while a range of easily interchangeable gratings allows operation to 30mm.*

*All the gratings are kinematically mounted so that calibration is not lost when gratings are changed.*



A built-in stepping motor and sine drive allow wavelength scanning to be completely controlled from a remote stepping motor drive unit PMC3B.

The PMC3B can be controlled from any PC or computer via its IEEE-488 bus interface.



PMC3B

Alternative entrance and exit configurations ensure maximum flexibility of position in integrating spectroscopic systems. The unit is manufactured using a single main casting with rebated lid for optimum light-tightness and stability.

The use of an 1800 l/mm grating in the visible region results in a higher resolution and light gathering power than is normally associated with an instrument of this size, while novel and effective internal baffling leads to a particularly low level of scattered light, which is further reduced in the visible region by the use of a holographic grating. The position of the collimating mirrors reduces rediffracted light.

A range of accessories including programmable order sorting filter wheels, detection systems, light sources, integrating spheres, telescopes, reflection/transmission measurement stations, fibre optic probes and specialised software is available.

# M300

## M300 Specification

### Optical Configuration

Symmetrical Czerny-Turner with alternative slit positions (see diagram).

Focal Length : 300mm  
Aperture Ratio : f/4.2

### Stray Light

1.5 bandwidths from laser line 0.18%  
3.0 bandwidths from laser line 0.025%  
10.0 bandwidths from laser line 0.004%

Measurements were made with an 1800l/mm holographic grating at FULL APERTURE with 1nm bandwidth.

### Gratings

69mm x 69mm plane diffraction gratings

Each grating is mounted on a quick-change kinematic mount allowing grating changeover without loss of calibration. Gratings ordered at the same time as the monochromator will be delivered pre-aligned and calibrated. For gratings ordered at a later date, the customer must perform a simple, once only, setting-up procedure.

### Slits

The instrument can be supplied with three different types of slits:-

**Fixed slits:** Slits are supplied on interchangeable carriers. Three pairs of slits are included in price of M300 with fixed slits. Additional pairs of slits can be ordered separately.

**Variable slits:** Continuously variable, bilateral straight slits variable between 10mm and 8mm by a direct reading micrometer screw gauge.

**Motorised slits:** As variable slit except micrometer is motor driven. Can be controlled by PMC3B/IEEE or MSC1 units. Slit height is 20mm in all cases. A slit height adjuster is available for variable slits.

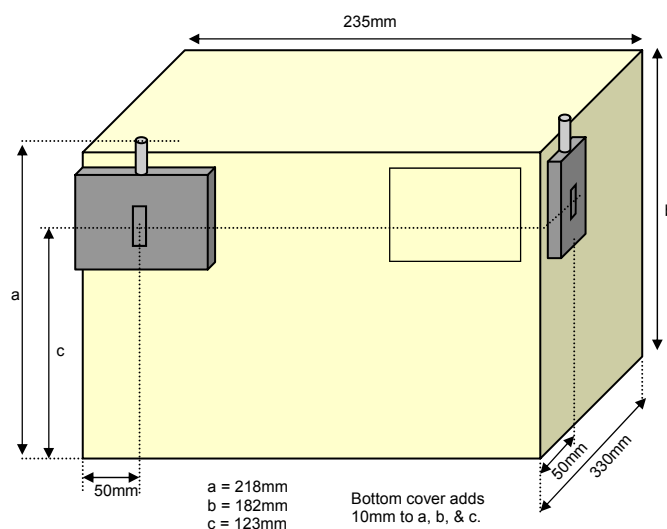
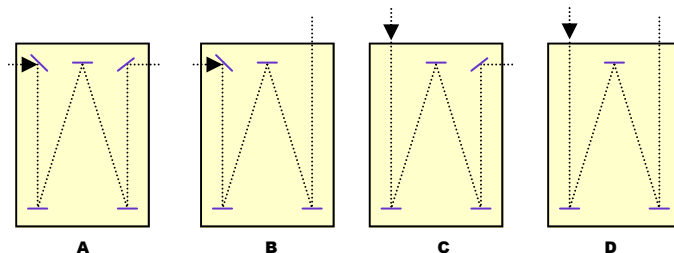
### Wavelength Scanning

All models are fitted with a stepping motor for wavelength scanning. The stepping motor is fitted below the floor in the monochromator and does not protrude from the box. The motor is linked directly to the lead screw in the E version and via 5:1 reduction gearbox in the HR version. Limit switches at both ends of the lead screw prevent overscanning. Connection to the stepping motor is made via a multi-way connector mounted on the inside of the monochromator.

### Wavelength Range

Grooves/mm	Wavelength Range
1800	Zero order to 900nm
1200	Zero order to 1.35 $\mu$
900	Zero order to 1.9 $\mu$
600	Zero order to 2.7 $\mu$
300	Zero order to 5.4 $\mu$
150	Zero order to 10.8 $\mu$
60	Zero order to 27 $\mu$

The above figures refer to the theoretical range of the instrument with each grating. In practice the usable range will depend on the blaze or peak efficiency wavelength of the grating. As a general guide the useful range of a blazed grating is .6 to 1.5 times the blaze wavelength. For more details of the effect of blaze and a comparison of blazed and holographic gratings, refer to our gratings brochure.



### Construction & Weight

Single aluminium casting with rebated lid.  
Weight, complete with gratings: 12.3kg

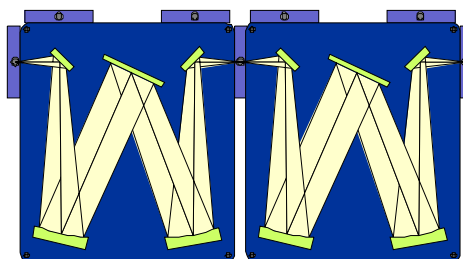
# M300

The following specifications refer to the instrument fitted with 1800 lines/mm grating and used in first order. With the exception of light gathering capability all should be multiplied by 1800/ (ruling density) for other gratings. For light gathering capability divide by the above factor.

Specification	
<b>Dispersion:</b>	1.8nm/mm
<b>Resolution:</b>	M300HR: 0.15nm    M300E: 0.5nm
	The maximum obtainable resolution in a monochromator of this type is limited by misfocus in the collimating system. In the HR version, one of the collimating mirrors is mounted on a translation stage allowing fine positioning. All instruments are set up to achieve the specified resolution before delivery
<b>Light gathering capability:</b>	$0.63 = \text{slit height}/(\text{f number}^2 \times \text{dispersion nm/mm})$
<b>Wavelength readout:</b>	4 digit display reading directly in nm with readability of .02nm
<b>Wavelength step:</b>	Each step of the stepping motor results in a wavelength change of .01nm for the HR version and .05nm for the E version.
<b>Maximum scan speed:</b>	M300HR: 4nm/s    M300E: 20nm/s
<b>Wavelength accuracy:</b>	$\pm 0.2\text{nm}$ of the true throughput range

## Double Monochromator

A rigid, factory set, pre-drilled base plate allows two M300's to be positioned to give additive or subtractive dispersion. The aperture ratio of f/4.2 is retained. Specifications for the double monochromator (additive dispersion) are as for the single except as follows:-



Specification	
<b>Stray Light:</b>	For measurement of the notch filter in visible with quartz halogen light source and photomultiplier stray light is less than $10^{-8}$
<b>Dispersion:</b>	0.9nm/mm
<b>Resolution</b>	M300HR: 0.075nm M300E: 0.25nm
<b>Light gathering capacity:</b>	1.3

## Order Sorting

An optional filter wheel, Model 252 can be fitted inside the M300 accommodating up to 6 filters for automatic higher order removal from 200nm to beyond 20mm using filters from our OS range. It is also fitted with a shutter for automated dark current measurements.

Model No.	Insertion Wavelength	Order Sort up to
OS400	400	720nm
OS700	700	1300nm
OS1250	1250	2 $\mu\text{m}$
OS2000	2 $\mu\text{m}$	3.6 $\mu\text{m}$
OS3600	3.6 $\mu\text{m}$	6.4 $\mu\text{m}$
OS6000	6.0 $\mu\text{m}$	11 $\mu\text{m}$
OS10500	10.5 $\mu\text{m}$	20 $\mu\text{m}$

# M300

## Swing Away Mirrors

Programmable Swing Away Mirrors (SAMs) can be fitted at the exit for use with a second detector or at the entrance if no 252 filter wheel is fitted.

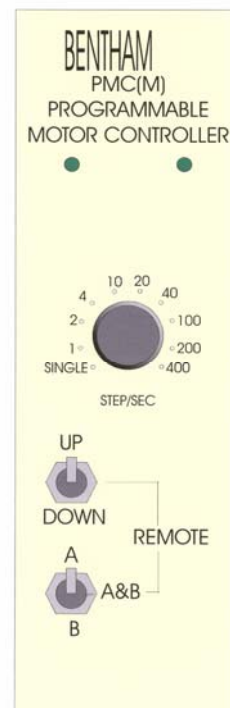
## Programmable Stepping Motor Drive

The Programmable Stepping Motor Drive is available in two units:-

The **PMC3B/IEEE** is a stand alone unit with its own mains power supply.

The **PMC(M)** is a modular unit compatible with the 200 Series detection electronics and has a programmable stepping motor drive for use with M300 Monochromators. Both units allow wavelength scanning and order sorting filter insertion to be completely controlled from the IEEE 488 bus or from front panel controls. For non-programmable applications the units are provided with manual start/stop, forward/reverse and stepping rate controls .

Dimensions: 315 x 275 x 155mm/Weight 3kg



**PMC3B/IEEE Stand Alone Unit & PMC(M) Modular Unit**

## Specification

### Direction and Stop/Start

Increasing or decreasing wavelength and stop/start are controlled from IEEE bus or from front panel switches.

### Scan Rate

Selected by front panel switch between 0.5 and 400 steps per second.

The PMC3B/IEEE and PMC(M) contain an interface unit and connector allowing direct connection to the IEEE 488 bus.

The interface is a listener-only device whose bus address may be set to any even number between 16 and 30 using an internal switch. The unit may be instructed to execute between 1 and 9999 steps of the stepping motor in either direction. Simple variations in the instruction allow the stepping motor in the monochromator or the order sorting filter changer to be operated e.g.-

**I0010 cr If** = increment stepping motor in Monochromator by 10 steps.

The interface accepts the **If** character immediately and therefore frees the computer and interface for other purposes.