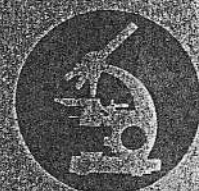


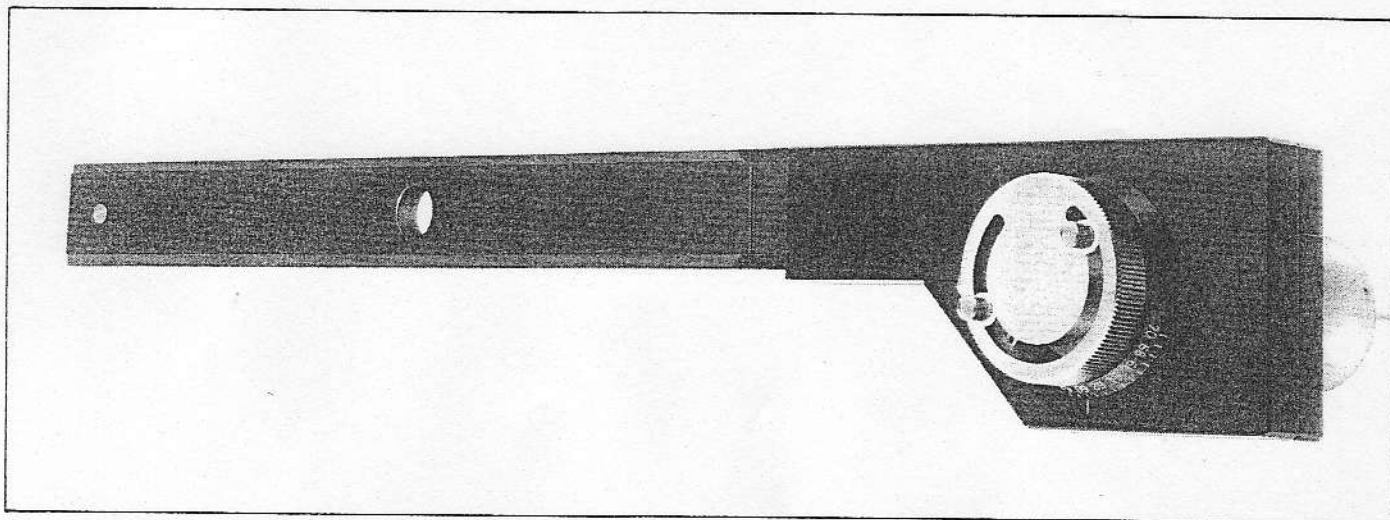
Continuous Filter Monochromator b

with Motor Drive



Mikro Bulletin No. 18

Fig. 1 Continuous filter monochromator b, front view



Application

Spectral photometry in the range from 400 nm to 700 nm with a microscope photometer, e.g. the CARL ZEISS MPM (or SMP) 01 or 03 model or AXIOMAT photometer.

Examples:

1. Biology

Determination of spectral absorbance or fluorescence curves of naturally or artificially stained specimens (specimen details, e.g. cells in thin sections).

2. Chemistry, physics, mineralogy, crystallography

Examination of the spectral absorption or reflection behavior of microcrystals (identification, examination of chemical bonds, i.e. atomic, molecular or submicroscopic structure).

3. Ore microscopy

Identification of minerals in ore deposits by means of reflectance spectra (at various vibration directions of linearly polarized light and with reflectance in air and immersion oil). Calculation of standard chromaticity values using the reflectance spectrum.

4. Coal petrology, oil petrology

Identification of organic, bituminous components in rocks using spectral fluorescence curves and/or reflectance curves (mainly with specular reflectance in immersion oil).

5. Industry

Checking the color or dyeing of finished products and production means using transmittance or reflectance spectra (including those with diffuse reflectance) or fluorescence spectra (e. g. paper surfaces, single particles or agglomerates of dyes, varnish chips).

6. Forensic science

Identification and differentiation of microscopic specimens of various kinds using absorbance, reflectance or fluorescence spectra (e. g. glass, fibers, varnish chips).

General characteristics of the monochromator

- The spectral bandwidth of the light produced by the continuous filter monochromator is

- a) independent of the size and shape of the measuring field in the image (measuring diaphragm) and the size of the effective numerical aperture of the optical system, i. e. the geometry of the photometric light beam is not influenced by openings in the monochromator such as slits;

- b) matched from the very start to the absorption or reflection properties of the microscopic specimens.

- The combined effect of matched bandwidth, the relatively high transmittance, well-nigh uniform over the entire spectral working range, and the high throughput of the continuous filter monochromator results in an extraordinary high yield of light.

- The continuous filter monochromator does not affect the geometry of the photometric light bundle; it can be combined with different photometer systems on the microscope and inserted into the light path of both the illuminating system and the imaging system without noticeable change of length and/or adjustment of the light paths.

- In contrast to the prism or grating monochromator the continuous filter is neutral towards polarized light.

- The monochromator incorporates a continuous filter recently developed, which is characterized by an extremely low portion of false light* (undesirable spectral range blocked almost completely).

- Glare effects resulting from reflections on the filter surfaces are eliminated by the tilted position of the filter in the housing.

- The filter housing is dust-tight.

- The wavelength scale around the base of an easily accessible rotary knob is matched individually to the linear dispersion of the filter. The rotary knob has stops and micro switches for the demarcation of certain spectral working ranges.

- The monochromator can be retrofitted with a DC motor for the motorized drive.

The filter housing incorporates a photoelectric wavelength scanning system which designates the adjusted wavelengths within the set range by producing electrical signals.

- The electrical energy for the motor drive is supplied by a control box with keys for the following operations:

- a) Selection of continuous or stepwise filter movement; steps in intervals of 10 nm, continuous control of speed of filter

*) False light is heterochromatic light which is superimposed on the monochromatic light and comes from the monochromator. It occurs with all types of monochromators to a lesser or greater extent and consists of scattered light (reflected light), fluorescent light and "harmonic" spectral components.

movement. (Duration of continuous motion from 400 nm to 700 nm: about 10 sec minimum, about 7 min maximum; speed continuously variable. With the stepping mode 1 step takes about 1/2 sec for a 10 nm interval.

- b) Stopping of the filter motion at any wavelength and/or return of the filter to the set starting position.

- The control box can be connected to:

- a) a potentiometric recorder (e.g. SERVOGOR S type) for recording measuring values and wavelengths with synchronized movement of the recorder and the monochromator;

- b) a desk or process calculator. If such a calculator is connected to the photometer system (e.g. via interface) the wavelengths can be selected automatically with simultaneous processing of the measured values. Interface for WANG 720 C and HP 9825 desk calculators and complete automatic program for WANG 720 C (LAMBDA-SCAN Program, Cat. No. 48 00 32-9001) are available. Interface for calculators of a different type on request.

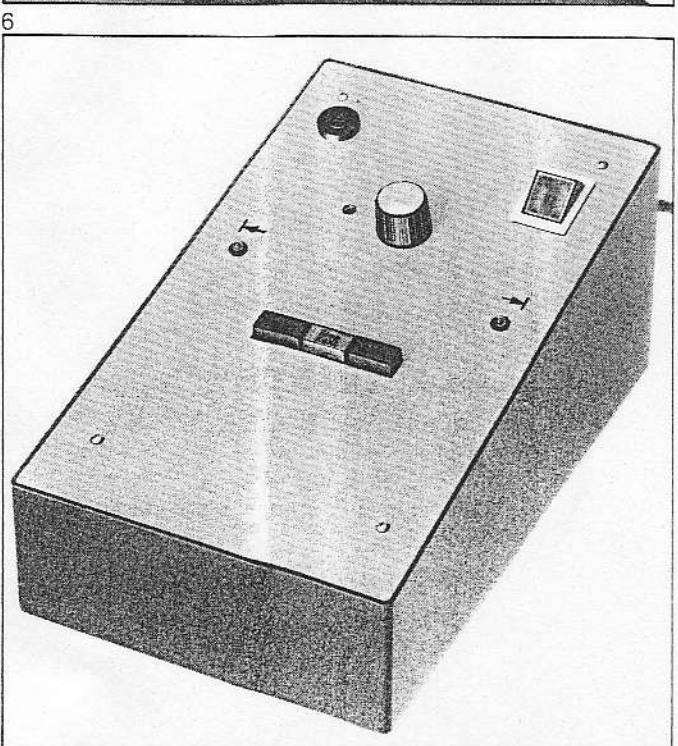
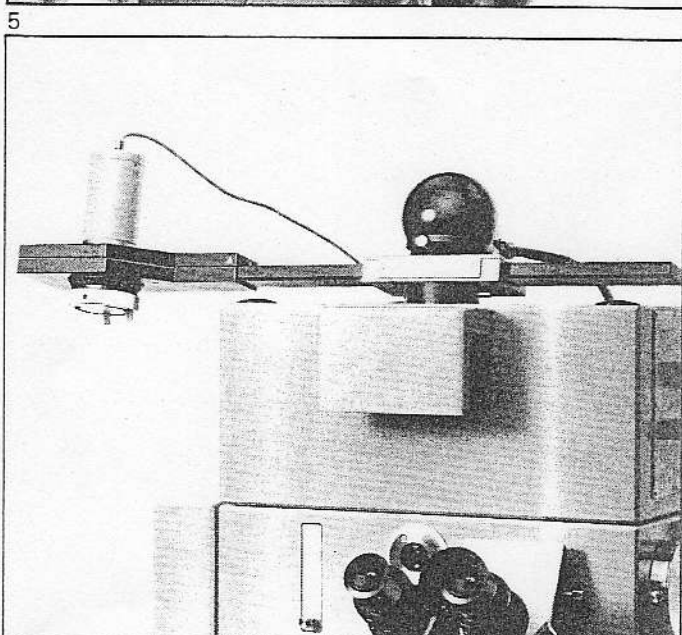
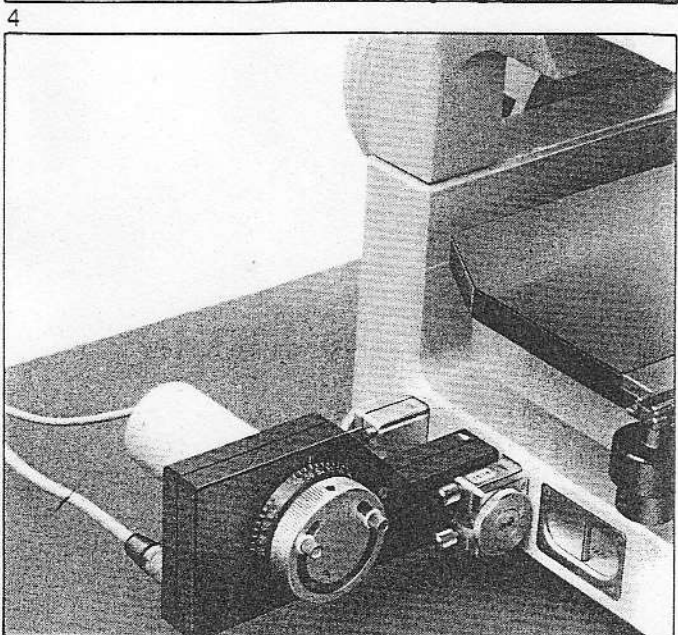
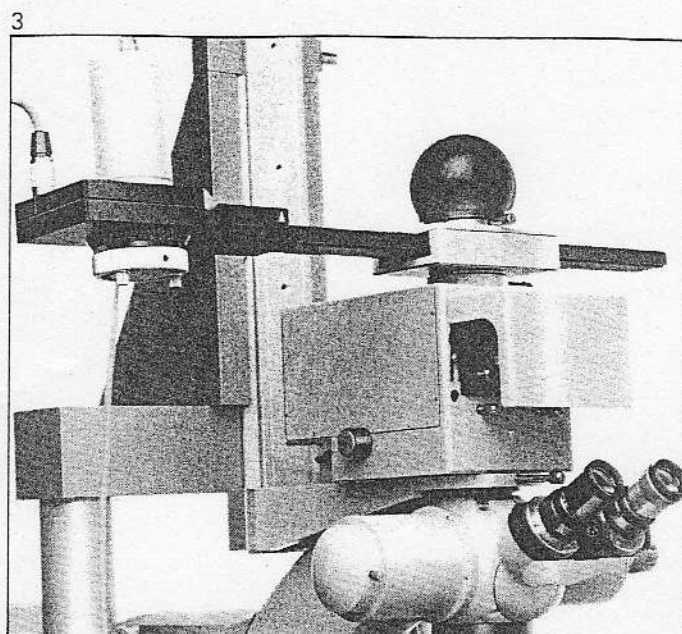
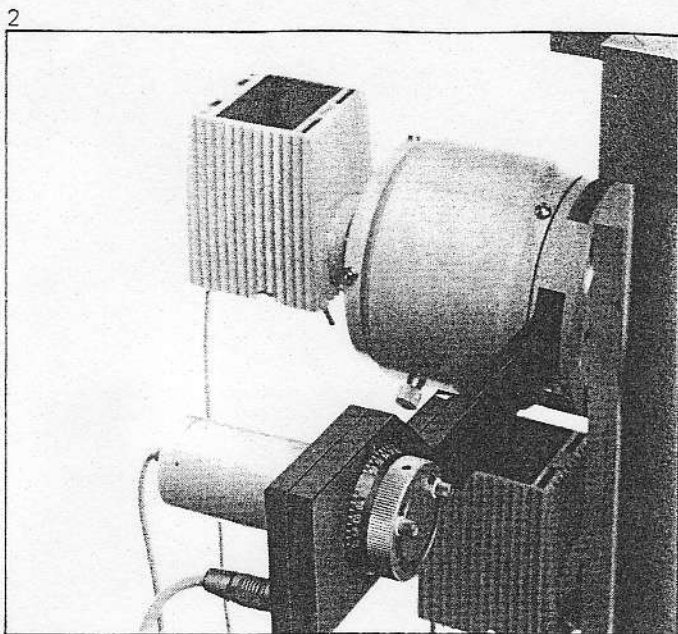


Fig. 2:
Continuous filter monochromator inserted into illuminating light train with lamp carrier (47 56 44-9902)

Fig. 3:
Continuous filter monochromator inserted into imaging light train (in front of detector housing) with holder (47 58 06)

Fig. 4:
Continuous filter monochromator on AXIOMAT, upright transmitted light microscope

Fig. 5:
AXIOMAT photometer with continuous filter monochromator b mounted in front of detector

Fig. 6:
Control box for continuous filter monochromator (front view)

Filter specifications

Type VERIL Z 160	at 450 nm	at 550 nm	at 650 nm
Transmittance at spot of transmission (T_{\max}) at least	20 %	25 %	20 %
Half band width at spot of transmission (HW) not exceeding	18 nm	15 nm	18 nm

Steepness of the flanks of the pass-band profile characterized by the ratio of one tenth band width to half band width; over entire range (400-700 nm): ca. 2:1.

The false light portion transmitted by the filter outside the characteristic pass band is:

T 0.01 % extending to 1000 nm,

T 0.1 % extending to 1100 nm.

Increasing the widths of the effective light beam on the filter in dispersion direction results in reduced maximum transmittance and increased half band width as compared to the values for a very narrow beam. For instance, the following approximate values apply to a parallel beam:

Widening the light beam from 0.1 mm to	Relative reduction of T_{\max}	Relative increase of HW by ca.
2 mm	1.5 %	10 %
4 mm	6 %	25 %

Note: In the microscope photometer system the width of the effective light beam is usually smaller than 2 mm.

Detailed technical description and directions for use of the continuous filter monochromator b are given in Operating Instructions GV 41.828-e.

Measuring methods

1. Determination of the spectral distribution of the measured values of the optical parameter of the reference standard used with continuous variation of wavelength.

2. Determination of the spectral distribution of measured values on the actual specimen (with fixed setting of entire measuring equipment).

3. Calculation of the spectral distribution of the quotients from measured values 2 and 1 results in relative spectral curves (standardized to the parameters of the standard used).

4. Multiplication of the quotients by the true spectral values of the parameters of the standard used results in the spectral distribution of the absolute values of the specimen.

Ordering information

Cat. No.

Continuous filter monochromator b 47 58 08

To attach filter in illumination light train to the special illuminator (47 20 15/10):

Illuminator carrier with filter protection 47 56 44-9902

Between photometer attachment and detector housing:

Holder for continuous filter monochromator 47 58 06

For the AXIOMAT microscope no special holder is required; the monochromator is inserted into one of the slits provided for light filters.

Motor drive 47 58 09

Control box for connection to 100-110-115-127-220-240 V, 50...60 Hz

with mains cable with earth-contact plug 38 00 71-2810

Cable to connect control box to peripherals:

Cable for connection to SERVOGOR S

potentiometric recorder 47 91 99-9011

Cable for connection to interface of

WANG 700, 720 desk computers 47 91 99-9901