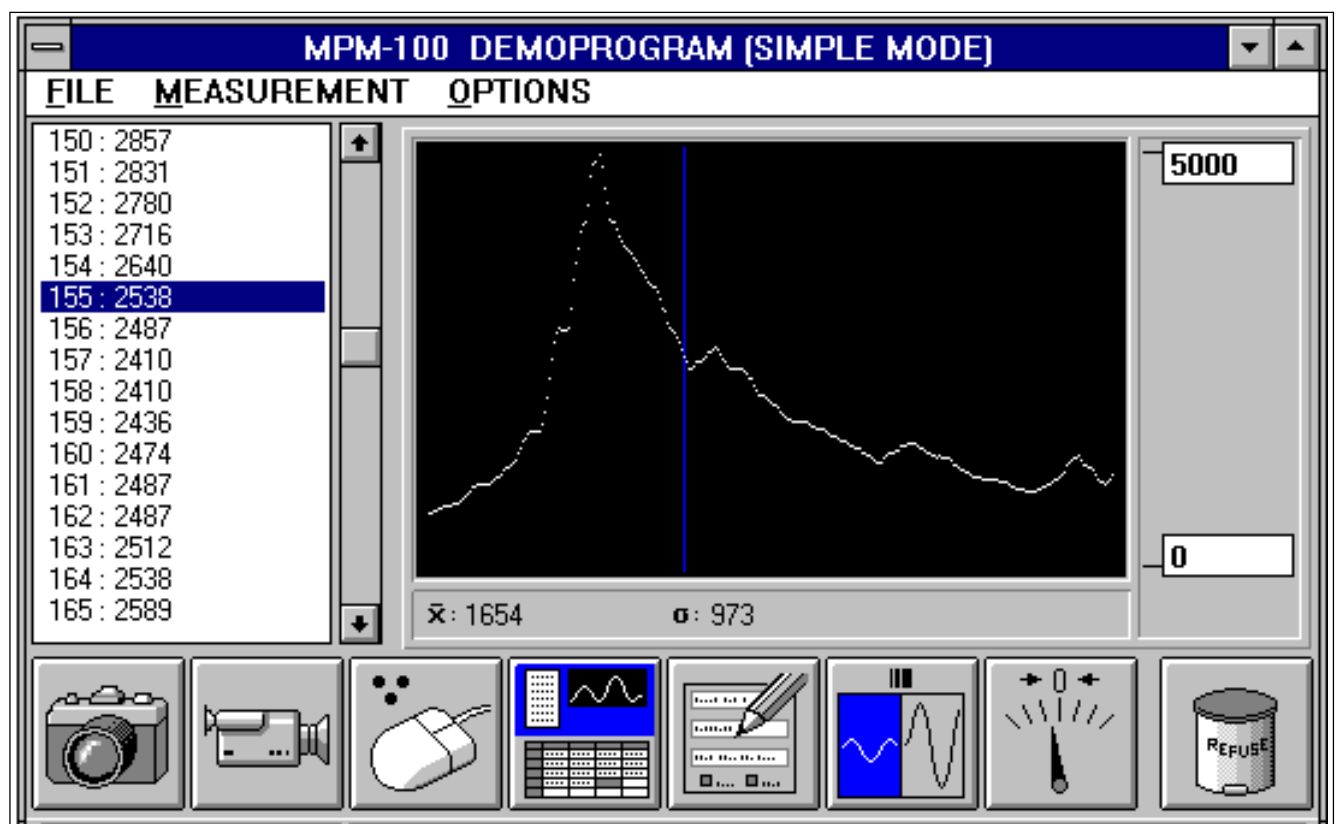


MPM 100

Microscope-Photometer



Operating manual





Knowledge of this manual is required for the operation of the instrument. Would you therefore please make yourself familiar with the contents of this manual and pay special attention to hints concerning the safe operation of the instrument.

The specifications are subject to change; the manual is not covered by an update service.

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1 NOTES ON DEVICE SAFETY

1.1 General

Subject to change.

The 6- or 10-digit numbers, e.g. 45 19 45, are ordering numbers of instruments or instrument components.

In-depth knowledge of the instrument is **absolutely vital** for safe operation. Please read this operating manual carefully before you put the instrument in operation. Additional information is available from our maintenance service or from authorized agencies.

Changes and repairs of the instruments may only be performed by the manufacturer or authorized agencies.

1.2 Hints on installation and use of the microscope system

To avoid vibrations, the system should be installed on a sturdy base.

Static electrification of the electronics unit must be avoided.

Use only power cables and plugs which are earthed in accordance with the regulations and which are in a perfect condition.

The tube apertures should be equipped with eyepieces and other open mounts should be covered with caps to protect them from dust and humidity.

Do **not** cover the ventilation apertures of the instrument system in order to avoid overheating. The instrument must not be installed near heat sources (radiator, sunshine) either. After use, the microscope system should be covered to protect it from dust.

The microscope system must be operated by trained personnel only.

Always use the main power switch to switch off the instrument.

The microscope system may be connected only to a correctly installed safety plug. Any extension cables used must not affect the grounded conductor cables.

1.3 Hints on installation and use of the computer system

Please also see the computer manual.

Do not perform any maintenance work exceeding the extent described in the computer manual.

Computer, monitor and all connected instruments **must** be disconnected from the line before the computer housing is opened.

Before you touch anything inside the computer, touch an earthed metal surface or the PC housing first.

Handle the components and extension cards carefully and hold the cards only by the edges or by the mounting brackets. Do not touch electrical contacts or components on PC boards.

If the computer is damaged, phone the manufacturer directly.

Lay the cables in such a way that nothing is positioned upon them and nobody can trip over them. Do not cover the ventilation apertures. Protect the computer from heat, sunshine, etc. Do not insert anything into the apertures of the computer housing because of the risk of causing a short circuit. The instrument system must not come in contact with liquids. If the computer has become wet, pull out the power cables and phone the manufacturer. Handle the disks carefully, do not bend them and protect them from heat. Do not touch the data carriers with your fingers. Store data sets on disks in due time and make backup copies to avoid the loss of data. The computer system may be connected only to a correctly installed safety plug. Any extension cables used must not affect the grounded conductor cables.

1.4 Regulations

The instrument user must observe the legal regulations for accident prevention. The instrument is radio-screened, short-circuit-proof and complies with the applicable VDE, IEC, CSA and UL provisions.

1.5 Maintenance

We would recommend you to conclude a maintenance contract with your nearest Zeiss agency in order to guarantee the perfect function of the instrument system. Changes and repairs of the instruments may only be performed by the manufacturer or authorized agencies.



Pull out the power plug before each lamp and fuse exchange or voltage change!

Defective instruments or components may only be repaired and maintained by our maintenance service. The instrument manufacturer is not liable for damage caused by faulty operation, negligence or unauthorized meddling with the instrument, especially the removing or exchanging of instrument components or the use of accessories from other manufacturers. Furthermore, this forfeits all the claims against warranty.

Use a clean cloth, soaked in a mixture of water and washing-up liquid, to clean dirty painted surfaces and dry them using a lint-free cloth. Do not use any solvents.

Remove dirt, e.g. finger prints, from glass surfaces by breathing on them immediately and carefully rubbing them with a clean cloth especially intended for cleaning optics.

Use an optics-cleaning cloth to moisten stubborn dirt, e.g. mascara, with a mixture of water and washing-up liquid and remove the dirt. Then lightly breathe on the glass surface and rub it with a clean cloth. Finally, remove lint and dust using a clean brush.



MPM 100

1.6 Requesting service

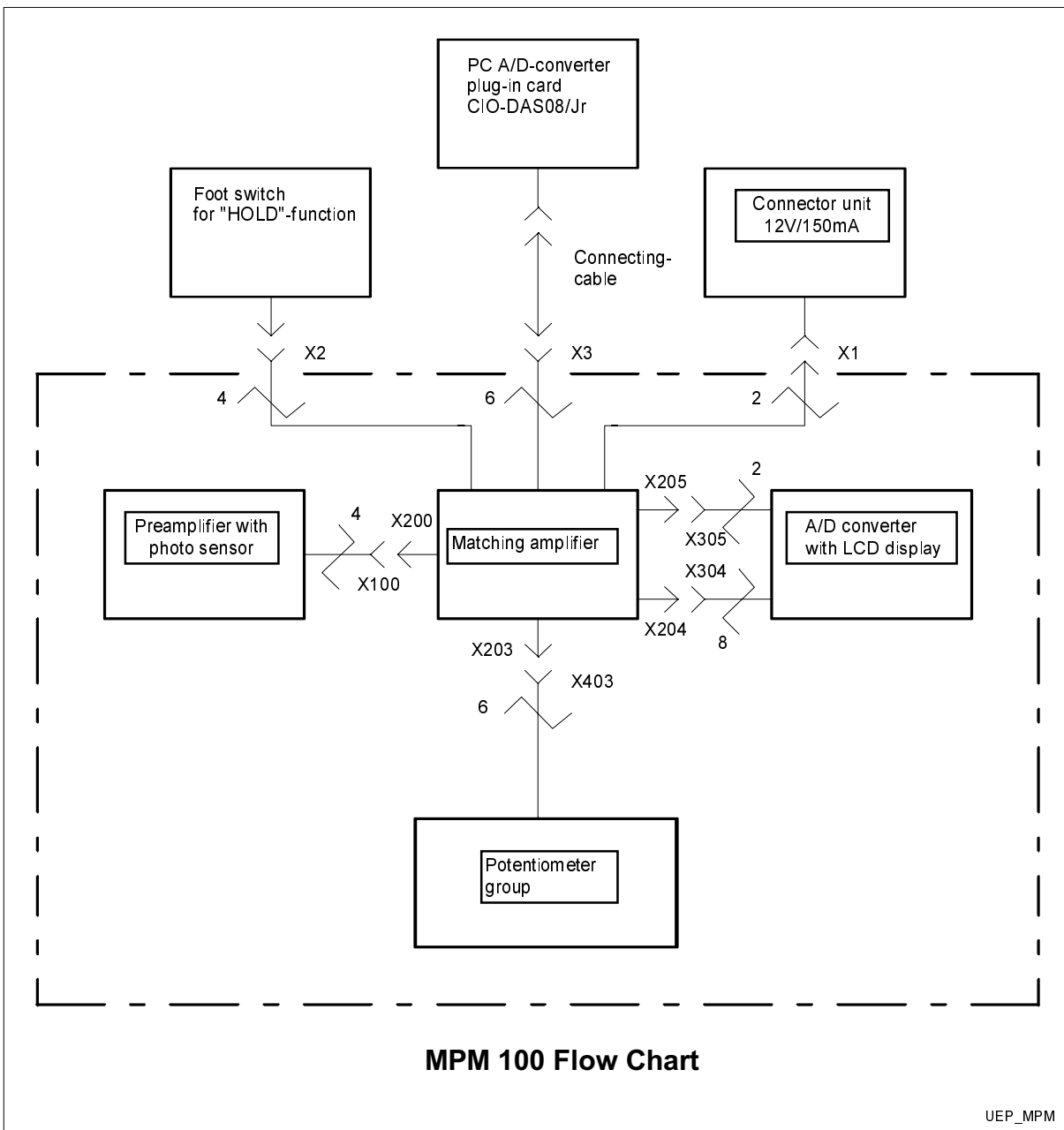
All repairs of mechanical, optical or electronic components inside the instrument and of the electrical components may only be performed by Carl Zeiss service staff or specially **authorized** personnel.

To ensure the optimum setting and trouble-free function of your microscope even for a longer period of time, we would recommend you to conclude a service/maintenance contract with Carl Zeiss.

In the case of subsequent orders or when service is required, please get in touch with your local Zeiss agency.

2 GENERAL INFORMATION ON THE MPM 100

2.1 Brief description





MPM 100

The MPM 100 photometer attachment has been intended for photometric measurements using microscopes with 20, 40 and 60 mm distance of the intermediate image above the photo port and configured for the medium light sensitivity range. The measured data are recorded using a Si photodiode. Two models are available :

- **MPM 100** **Cat. No.: 45 73 25**
- **PC-accessory MPM 100** **Cat. No.: 45 73 26**

With the MPM 100, the results obtained are shown as numerical data on the illuminated LCD display. Activation of the "Display Hold" function via a foot switch permits more convenient reading of the measured data. Power is supplied via a plug-in power unit which is available in three versions (European, US and GB version).

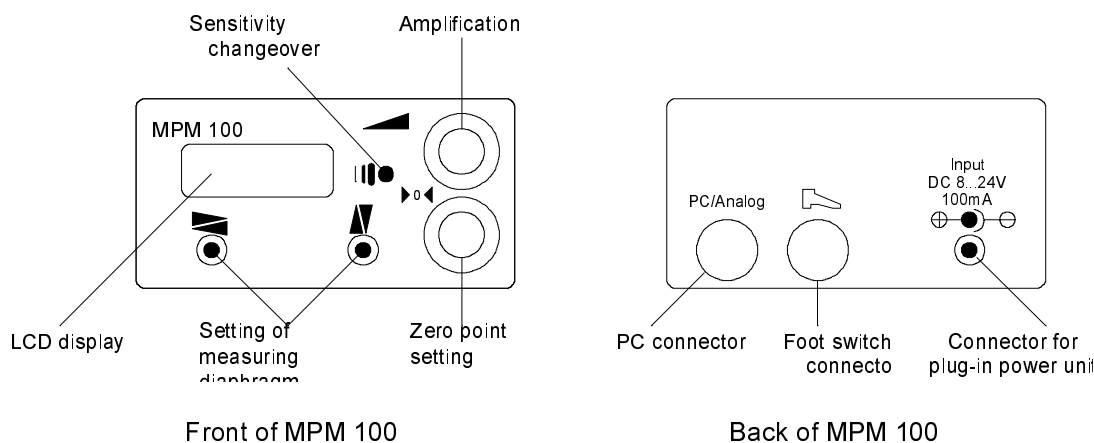
The PC accessories also permit processing of the analog measuring data in a PC using an A/D converter card. The required operating voltage for the photometer is supplied by the PC via the connecting cable.

2.2 Technical data

Outer dimensions w x h x d	130 x 65 x 105 mm
Weight	1.2 kg
Power consumption	approx. 1.5 VA
Power supply	+8...+24 VDC via plug-in power unit (MPM 100) : US mod: Prim.:120 V/60 Hz/1.8 VA Sec.:12 V=/150 mA Euro mod:Prim.:220 V/50 Hz/1.8 VA Sec.:12 V=/150 mA GB mod: Prim.:240 V/50 Hz/1.8 VA Sec.:12 V=/150 mA +5 VDC from PC (PC accessory MPM 100)
Photometer sensitivity (with 0.4 mm measuring diaphragm)	0.5 mlx*...4 lx in the LOW sensitivity range 0.15 mlx*...0.4lx in the HIGH sensitivity range (* reproducibility <2% (RMS)
Amplification variants	1:10 via sensitivity changeover 1:10 continuous via helical potentiometer
Zero point correction	continuous via helical potentiometer
Data output	3½-digit illuminated LCD-Display (MPM 100) analog data for PC A/D converter card (PC accessory MPM 100)

3 MPM 100 START-UP

3.1 Position and description of the display and control components



Sensitivity changeover

Sensitivity range selector. Pressing the selector changes from one range to the other (1:10 change of amplification).

The PC accessory MPM 100 permits this function also to be controlled via the software.

Amplification

Using a helical potentiometer, the amplification factor can be set continuously in the range between 1:1 (left stop) and 1:10 (right stop).

LCD display

Illuminated 3½ digit display unit for the photometer data output. Furthermore, the set sensitivity range is displayed:

- decimal points visible = LOW sensitivity range
- decimal points not visible = HIGH sensitivity range

Adjustment of measuring diaphragm

A SW 3 Allan key allows the xy-adjustment of the measuring diaphragm to the optical axis of the camera port.

Zero point setting

Like amplification, zero point setting is performed via a helical potentiometer which allows, for example, the compensation of the effect of extraneous light.



MPM 100

PC connector

Via a connecting cable and an A/D converter card, the PC connector permits the exchange of data and control signals with an IBM-compatible PC and also allows the supply of the operating voltage.

Foot switch connector

The display can be "frozen" via the connected foot switch, which enables easier reading of the measured data, particularly if a low integration constant is used.

Connector for power unit

The power unit installed here supplies the voltage for the MPM 100 when no PC is used.

3.2 Adaptability of the MPM 100 to various microscope stands

The MPM 100 microscope photometer can be easily attached to all Carl Zeiss microscope stands with a camera/TV port, the intermediate image position of which is 20, 40 or 60 mm above the camera port. Suitable adapters, listed in the following tables, are available :

1. with adapter 44 - 20 of the MPM 100 equipment		
microscope	equipped with	Cat.No.
Axioskop, Axioskop 20	phototube 30°, 50/50	45 29 12
	phototube 30°, 100:100	45 29 14
	phototube 30°, 100:30/70	45 29 10
	phototube pol 30°, 100:100	45 29 11
Axioplan, Axiophot and Axiotron S	phototube 30°, 100:20/80	45 29 20
	phototube 30°, 100:100	45 29 23
	phototube pol 30°, 100:100	45 29 21
	phototube 100:100:100	45 29 25
	photo/TV tube (variable beam splitting ratio)	45 29 26
	"Axiophot" camera system	45 19 37
	"Axiophot pol" camera system	45 19 36
Axiovert 10, Axiovert 35 and Axiovert 405	phototube 30° / 25 P	45 29 22
	phototube 30°, 100:30/70	45 17 22
	phototube 30°, 100:100	45 17 21

**2. with adapter 44 - 20 of the MPM 100 equipment plus adapter 60 - 44 (Cat.No. 45 61 40) from the line of accessories**

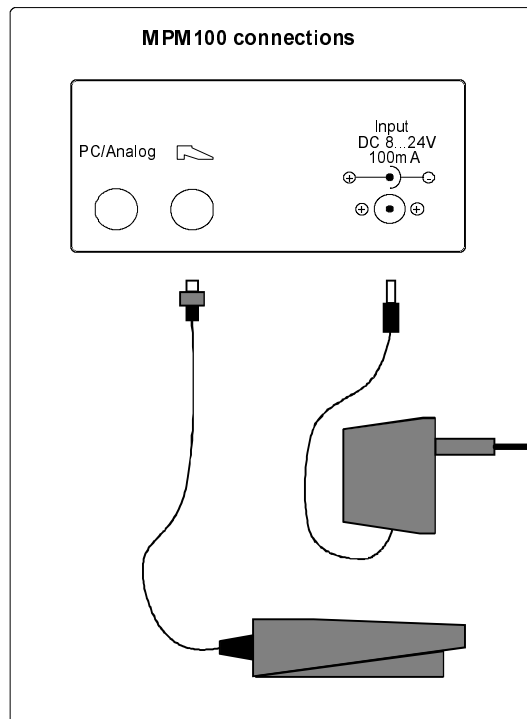
microscope	equipped with	Cat. No.
Stemi 2000-C	Stemi 2000-C microscope body	45 50 53
SV 6	SV 6 stereo microscope body	45 50 54
SV 11	SV 11 stereo microscope body	45 50 56
Axiolab	phototube 35°/20, 100:100	45 29 09
Axiolab A	reflected-light tube H 30°/20, 100:100	45 09 62
Axiolab FL	fluorescence tube 30°/20, 100:100	45 09 60
Axiolab Pol	phototube Pol D 30°/20, 100:100	45 09 64
	phototube Pol D/A 30°/20, 100:100	45 09 63
Axiotech, Axiotech ^{vario}	phototube 30°, 100:100	45 09 60
	phototube 20°, 100:100 (image-erecting)	45 29 34
Axiovert 100, Axiovert 135 and Axiovert A	phototube 45°, 100:100	45 13 21
	phototube 45°, 100:30/70	45 13 22
	photo/TV tube 45°, 30/70	45 13 25

In the case of the JENAPOL (26 30 04 - 3311 124), coupling is performed directly at the camera port.
Further adaptation possibilities for instruments of the JENAVAL series on request.

3.3 Assembly of the MPM 100 to the microscope

Attach MPM 100 microscope photometer to the respective camera/TV port of the microscope tube either directly or via the above adapters and clamp it.

Please make electrical connections of the power unit and the foot switch in accordance with the following illustration.



Before plugging in the power cable, make sure that the primary operating voltage of the power unit complies with the available line voltage!

3.4 Use of eyepiece and eyepiece reticles

For the MPM 100 photometer attachment on the Axiotech, we would recommend the use of the photometer eyepiece E-PL 10x/20 P Br. foc., 44 40 92 - 9901, paired with an eyepiece E-PL 10x/20 Br. foc., 44 42 32 - 9902. The photometer eyepiece features an integrated, factory-aligned eyepiece reticle P 45 40 34, $d = 21$ mm, and guarantees always exact lateral alignment of the planes of the measuring diaphragm and the eyepiece reticle, even in the case of large interpupillary distances and the involved turning of the inclined tube.

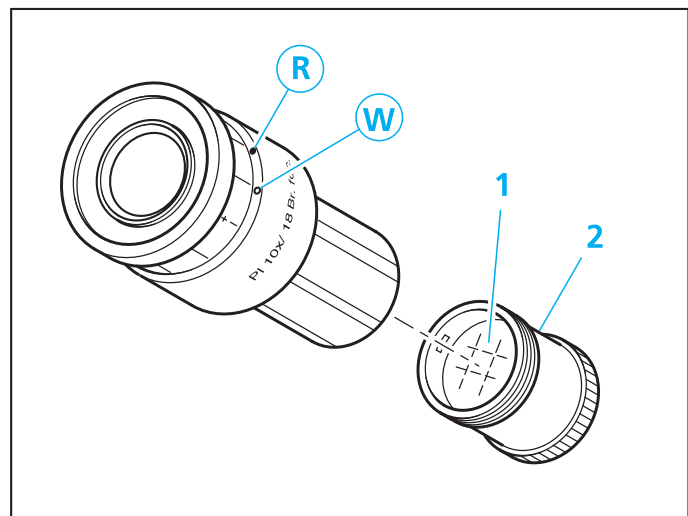
Insert an eyepiece reticle;

The standard eyepieces E-PL 10x/20 Br. foc. 44 42 32 - 9902 and PL 10x/25 Br. foc. 44 40 34 of the Axio line of microscopes have been designed for the use of eyepiece reticles with a diameter of 26 mm.

The slight image shift caused by the additional path through the glass is taken into account on the diopter scale by the fact that the zero point position is indicated not by the white dot **W** but by the red dot **R**.

The eyepiece reticles **1** have been adhered to screw-in mounts **2** to allow easy replacement.

- To replace a reticle, unscrew the screw-on mount or the part containing the eyepiece reticle and replace it with the required one.



If eyepiece reticles are inserted into the unscrewed mount by the customer, attention must be paid to the labelling being visible the right way up after insertion.

In the case of loosely supplied eyepiece reticles, e.g. for the old eyepiece GF-P 10x/18 for the JENAPOL, the eyepiece reticle must be inserted into the lower part of the eyepiece in such a way that the inscription of the circle diameter of the plate is easy to read. Please also make sure that there are no fingerprints or dirt on the plate when it is inserted.



To maintain the precise assignment of measuring diaphragm and eyepiece reticle, it is important to make sure that the eyepiece is not turned any more after adjustment of the measuring diaphragm.

When the interpupillary distance has been changed considerably on the binocular tube, the adjustment of the measuring diaphragm should be rechecked.

4 CHANGE AND ADJUSTMENT OF PINHOLE DIAPHRAGMS AND MEASURING DIAPHRAGMS

4.1 Assignment of pinhole diaphragms and measuring diaphragms in reflected-light illumination

The line of accessories of the MPM 100 includes a set of diaphragms with dia. 0.05, 0.1, 0.16, 0.25, 0.4, 0.63, 1.0, 1.6 und 2.5 mm. The diaphragms are suitable as measuring or pinhole versions.

The **maximum measuring diaphragm size** has been determined at **1 mm** for use with the MPM 100.

The use of pinhole diaphragms for the elimination of undesired light in the illumination beam path is particularly important in reflected-light photometry. The Axiotech, Axiotech vario and Axiolab Pol reflected-light microscopes therefore feature an exchangeable luminous-field diaphragm slider which is exchanged for the slider A for fixed diaphragms (457378) to accept pinhole diaphragms. The following is recommended for the assignment of pinhole diaphragm and measuring diaphragm:

For Axiotech and Axiotech vario :

Use the first pinhole diaphragm which is larger than the measuring diaphragm.

The pinhole diaphragm then produces a luminous field which is 3.5 times as large as the diameter of the measuring diaphragm.

If a luminous field of 2.5x the diameter of the measuring diaphragm is required, the diameter of the pinhole diaphragm must be identical with that of the measuring diaphragm. This requires the purchase of a second set of diaphragms.

For Axiolab Pol, JENAPOL and instruments in the JENAVAL line :

Use the first pinhole diaphragm which is smaller than the measuring diaphragm.

The pinhole diaphragm then produces a luminous field which is 2...2.3 times as large as that of the measuring diaphragm.

For all microscopes in the Axio and Stemi lines in reflected and transmitted light :

Where available, the luminous-field diaphragm should be used as pinhole diaphragm and closed according to the requirements.

4.2 Change of the measuring diaphragm

To change the measuring diaphragm, the measuring diaphragm insert at the bottom of the basic instrument must be screwed out, for example by using a coin. The measuring diaphragm is pressed out of its holder using the pestle supplied. The new measuring diaphragm is placed on the pestle and slid into the holder until stop. The holder is then screwed into the basic instrument again. The measuring diaphragm has been inserted correctly if the inscription is still legible when the holder is screwed in.

4.3 Change of pinhole diaphragms (slider A for fixed diaphragms 45 73 78)

Pinhole diaphragms are changed in the same way as the measuring diaphragm.

The pestle is used to press the pinhole diaphragm out of the slider. The new pinhole diaphragm is placed on the pestle and pressed into the mount provided. The pinhole diaphragm has been inserted correctly if its inscription is legible when the pushrod points to the right and the stops point upwards.

4.4 Adjustment of the pinhole diaphragm (slider A for fixed diaphragms 45 73 78)

Axial adjustment :

The pinhole diaphragm is seated in a threaded ring which can be adjusted axially using the key supplied to enable the setting of a sharp image of the pinhole diaphragm in the object plane. The key must be used on the slider side showing the catalogue number. Once the focal plane has been set, it remains even when the pinhole diaphragm is changed.

Lateral adjustment:

Lateral adjustment of the pinhole diaphragm is performed using the ball-headed screwdriver which is applied above or below the pushrod of the slider. The pinhole diaphragm is adjusted concentrically to the rings of the eyepiece reticle.

The pinhole diaphragm slider has two stop positions. If the slider is inserted deep into the inside of the microscope, it will stop in the position which allows photometry using the pinhole diaphragm in reflected light. If about half the slider is pulled out, it will rest in the position in which the entire luminous field can be viewed.

4.5 Adjustment of the measuring diaphragm

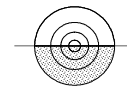
The measuring diaphragm of the MPM 100 cannot be seen through the eyepiece. Its lateral adjustment, i.e. the conjugation with the marking rings of the eyepiece reticle, must therefore be made indirectly. Centering is then possible at utmost accuracy if the geometric image of the centration object has approximately the same diameter as the centration object itself. Three diameters are available on the centration object for selection. The optimum diameter can be selected in accordance with Table 1. For centering, the measuring diaphragm should not be larger than 0.4 mm (unshaded area).


Table 1

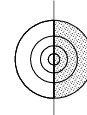
Ø of Centration object- [µm]	Size in the plane of the measuring diaphragm (tube factor 1) [mm] with different objective magnifications						
	50x	25x	20x	12,5x	10x	6,3x	3,2x
8	0.4	0.2	0.16	0.1	0.08	0.05	0.025
20	1	0.5	0.4	0.25	0.2	0.125	0.063
50	2.5	1.25	1	0.6	0.5	0.32	0.16


Centering is performed in the following steps :

- Select objective, e.g. 20x, and insert measuring diaphragm, e.g. 0.4 mm
- Focus on centration object and position it in such a way that the field is illuminated
- Attach photometer with measuring diaphragm. Set LOW sensitivity range and regulate light in such a way that the photometer display shows > 1000.
- Position centration object in such a way that a horizontal object edge runs through the field center and intersects the center of the eyepiece marking rings:



- Use a hexagon socket wrench to move the measuring diaphragm at the adjustment position marked on the basic instrument with the  symbol until about half the set value is displayed.
- Position the centration object in such a way that a vertical object edge runs through the field center.



- Move the measuring diaphragm at the adjustment position marked with the  symbol until half the value set at first is displayed again.
- Position central centration object, e.g. transparent chromium circle with dia 20 µm, concentrically to the marking rings of the eyepiece reticle and use objective 20x. The object will fill the second marking circle (counted from the inside).



transmitted light



reflected light

If the first two adjustment steps were successful, a value considerably larger than 0 should be displayed in transmitted light, and a value considerably smaller than the one initially set in reflected light. If this is not the case, the adjustment steps must be repeated.



If possible, adjustment should be made in transmitted light, since then the following adjustment step can be more easily controlled.

- The measuring diaphragm is carefully moved alternately in both adjustment positions (▲ and ▼) until the displayed value no longer increases in transmitted light and no longer decreases in reflected light. In reflected light, the adjustment sensitivity can be improved by using the pinhole diaphragm.

After adjustment, the measuring diaphragm is conjugated to the marking rings of the eyepiece reticle and measuring objects can be set in compliance with the eyepiece reticle.

The innermost ring of the measuring diaphragm corresponds to 0.16 mm, the second ring to 0.4 mm and the third ring to 1 mm.

When the MPM 100 is attached to the same microscope again, adjustment of the measuring diaphragm is retained.

If an objective change has been provided, the new objectives only need to be aligned with the "centration objective" (in our example the 20x objective) which was used for the preceding centering of the measuring diaphragm.

After a change of measuring diaphragms, the new diaphragm may be decentered by up to 0.1 mm. Optimum centering is achieved by repeating the last adjustment step

Axial adjustment of the measuring diaphragm is ensured by the design of the interface between microscope and MPM 100. This exactly applies to the visible wavelength range if a 2 mm glass component is inserted between the microscope input and the photometer output, e.g. the IR barrier filter 263047-7903 900. The glass filter can be inserted in the adapter used between microscope and photometer.

5 SETTING A HIGHER INTEGRATION TIME CONSTANT

The MPM 100 can be operated using two different integration time constants:

- | | | |
|----|-----------------|-------------------|
| 1. | LOW range 35 ms | HIGH range 50 ms |
| 2. | LOW range 50 ms | HIGH range 300 ms |

The MPM is normally delivered with the lower of the two possible integration time constants. However, it may be advantageous to use the higher integration time constant (steadier display). For this, the following steps must be performed:

- Disconnect power unit from the line or switch off the PC.
- Loosen the clamping screws on top of the housing and remove the cover.
- The now accessible PCB board contains two slide switches in a joint housing which are both in the "OFF" position. Both switches must be set in the opposite position.
- Mount the cover again and secure it in position using the locking screws.



The heat reflection filter d = 32 x 2 (467832) from the line of accessories is absolutely necessary for setting the photometer sensitivity for the **visual spectral range**.

For the Axio line of microscopes, the filter must be inserted in the filter mount of the adapter 44 - 20 of the MPM 100.

For the JENAPOL and the instruments in the JENAVAL line, the above filter is arranged in the respective filter turret.

6 START-UP OF THE MPM 100 WITH PC ACCESSORIES

6.1 Integration and interconnection of the additional components

These are the additional components of the MPM 100 with PC accessories :

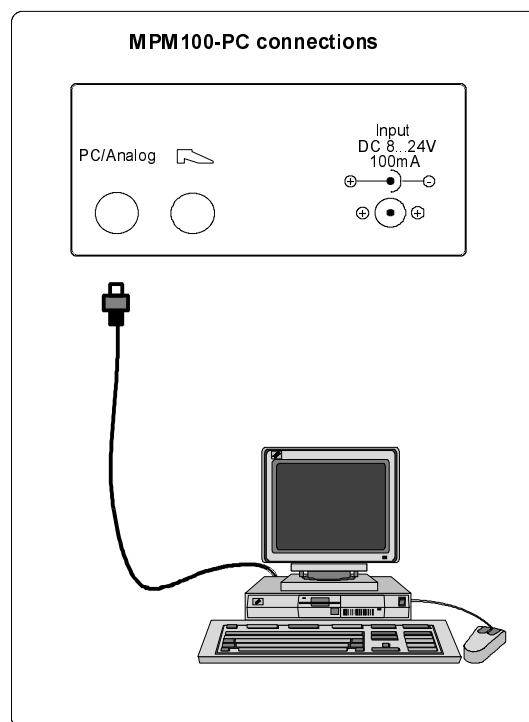
- A/D converter interface CIO-DAS08/Jr
- MPM 100 software package
- MPM 100 connecting cable

Any IBM-compatible PC featuring at least a 386-processor can be used. The user interface is WINDOWS 3.1.

Proceed as follows to build in the A/D converter card :

- Switch off PC and disconnect it from the line.
- Loosen the locking screws of the PC housing and remove it.
- Insert the A/D converter card into an empty card slot and tighten clamping piece firmly using screws.
- Attach housing again and tighten firmly using locking screws.

Then connect the MPM 100 with the A/D converter card via the cable in compliance with the following illustration:



6.2 System requirements

Microscope Photometer 100 with connecting cable
IBM-compatible PC (at least 386 processor)
WINDOWS 3.1
AD converter card CIO-DAS08/Jr

6.3 Program files

MPM.EXE	program file
MPMBASE.INI	initialization file
LOGODLL.DLL	
PICT.WMF	
README.TXT	
VIR_SCAN	

6.4 Program initialization

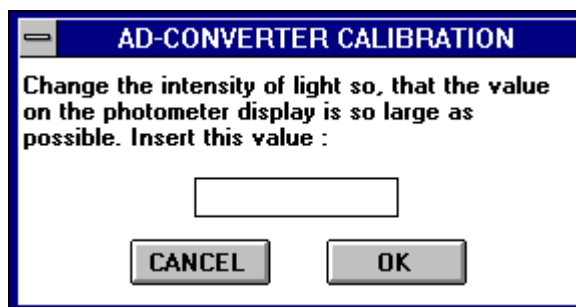
This program features no special initialization program. The files listed above must all be copied into a joint directory. When the icon is installed on the WINDOWS program manager, this joint directory must be specified as the work directory.



Further information to the program initialization you can get in the readme.txt file.

6.5 Calibrating the A/D converter card

After insertion of the A/D converter card and after program installation, the software must be calibrated via the program. For this, select the item "AD Converter Calibration" from the program menu. The following dialog box appears :





The light intensity must be regulated in such a way that the value displayed on the photometer is as high as possible. The photometer must be set to high sensitivity. The value displayed must be entered in the input window and acknowledged. The calculated data is stored in the MPM.INI file when the program is ended, i.e. it will be available again when the program is restarted.



7 GENERAL INFORMATION ON THE PROGRAM

When the program is started, the MPM.INI file is loaded and stored at the end of the program, i.e. newly set parameters are retained. The active buttons and dialog components are briefly explained in the status line of the program if the mouse is pointed on the relevant control element. Menu items are also briefly described when they are activated. The program features two different operating modes; the SIMPLE MODE and the SPREAD SHEET MODE. All operations, such as measurements, data deletion, parameter setting or adjustment always have influence only on the currently active mode.

7.1 Program menu

The program menu consists of the following items :

FILE	MEASUREMENT	OPTIONS
DATA-EXPORT	SINGLE MEASUREMENT	SIMPLE MODE
ERASE	PERMANENT MEASUREMENT	SPREAD SHEET
QUIT	BLIND MEASUREMENT	PARAMETERS
	ADJUST	HIGH SENSITIVITY
	AD-CONVERTER CALIBRATION	LOW SENSITIVITY

The meaning of the various menu items is described in the following sections.

8 FILE MENU ITEM

8.1 Finish program

The program can be finished via the *QUIT* menu item or in the way usually performed under Windows.

8.2 Data export

Measured data can be stored. To enable use of these data in Excel, two data export possibilities have been defined: one as a pure ASCII file and one as an Excel file. The difference between the two files is that the decimal places are separated by a comma in the Excel file and by a point in the ASCII file. The normally used fileheader is not available here. When the *DATA EXPORT* menu item is selected, only the measured data of the active operating mode are stored, while the measured data of the other operating mode are not recorded.

8.3 Erase data

Data can be erased by selecting the *ERASE* menu item, by pressing the key or the *Refuse* key shown below.



Only the data in the currently set operating mode are deleted. In the simple mode, all data are erased, while only the just marked data (highlighted in blue) are erased in the spread sheet mode.

9 OPTIONS MENU ITEM

9.1 Operating mode of the program

The program features two different operating modes: the SIMPLE MODE and the SPREAD SHEET MODE. Switchover is made via the appropriate submenu items or by pressing the following key



in the tool bar. In the simple mode, individual measuring results are listed and displayed graphically. Permanent measurement is also possible here. In the spread sheet mode, the measuring results are entered into a table. Different adjustments can be allocated to the columns of this table.

9.2 Setting the parameters

Every operating mode contains parameters which are entered into a dialog box. This dialog box is opened and closed via the *PARAMETER* menu item or the following key :



9.3 Setting the photometer sensitivity

The MPM 100 features two different sensitivity ranges. One possibility of setting the sensitivity is via the photometer directly; the program automatically recognizes the setting in the next measurement.

Alternatively, the measuring sensitivity can be set via the *HIGH SENSIVITY* and *LOW SENSIVITY* menu items or via the following key :



One measuring range is allocated to each of the different sensitivities.



The following table shows the parameters:

Sensitivity	Time constant	Illuminance with 0.4mm measuring diaphragm
LOW	35 ms	0.0005 *) 4 lux
HIGH	50 ms	0.00015 *) 0.4 lux

*) reproducibility < 2% (rms)

10 MEASUREMENT MENU ITEM

10.1 Single measurements

The set adjustment is taken into consideration in each measurement. In the simple mode, only one measurement is performed, while in the spread sheet mode the average of a series of measurements is determined in accordance with the setting. A single measurement is released via the *SINGLE MEASUREMENT* menu item or the following key :



The spread sheet mode also offers the possibility of releasing the measurement by double-clicking on the required table cell with the left mouse button.

10.2 Permanent measurements

This option is active only in the simple mode. Measurements are performed permanently and displayed both graphically and numerically. The measuring frequency depends on the speed of the computer and its graphic board. These measurements are started and stopped via the *PERMANENT MEASUREMENT* menu item or the following key :

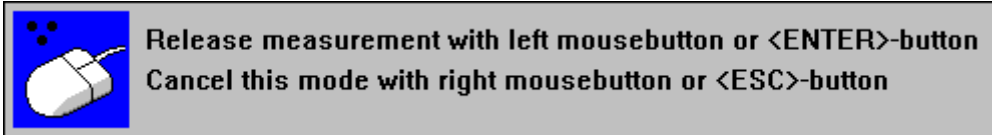


10.3 "Blind" measurements

If you want to make measurements without having to look up from the microscope, select the *BLIND MEASUREMENT* menu item or press the following key :



The following box will appear instead of the tool bar :



The mouse becomes invisible. The left mouse button, the <ENTER> key or the space bar now permit the release of single measurements. No other actions can be released and no other programs operated until this mode is finished via the <ESC> key or the right mouse button.

10.4 Adjust

By "adjust", the measuring results are put in relation to reference measuring data, with the dark current being taken in consideration, if applicable (see *ADJUST* dialog box). Adjust measurements are performed in the *ADJUST* dialog box which can be called from the *ADJUST* menu item or from the parameter box by pressing the following key :



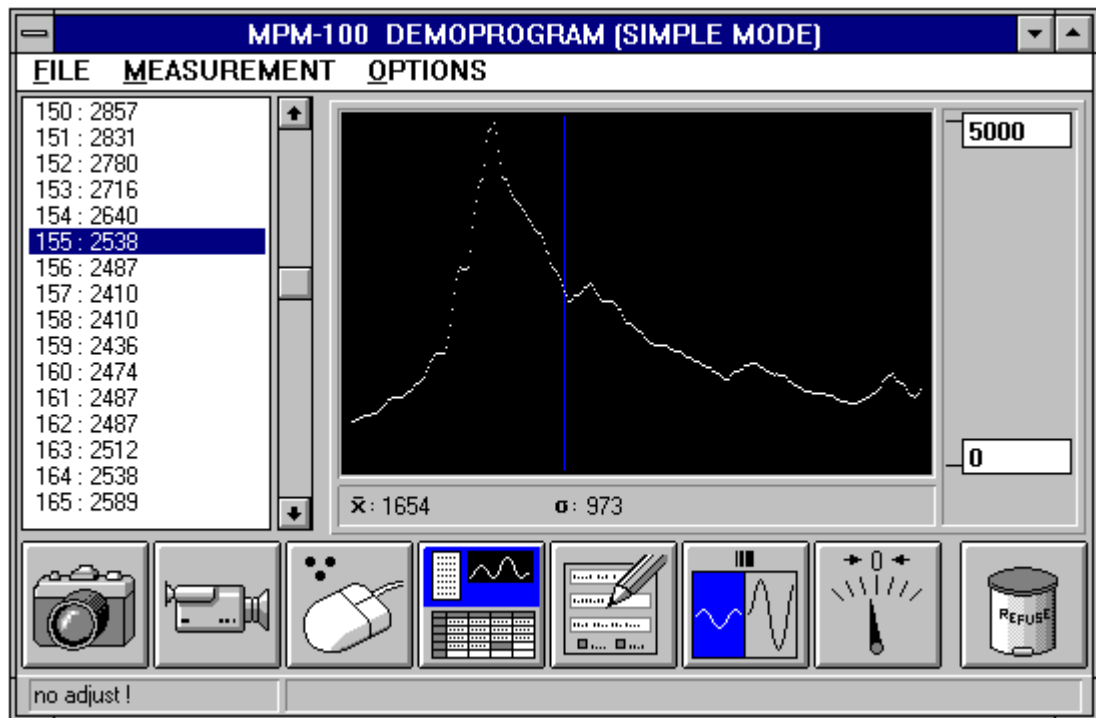
If *ADJUST* is not active in Simple Mode, *adjust only for spread sheet* must be deactivated in the parameter box (see "parameters in simple mode")

For *AD-CONVERTER CALIBRATION* please see the section "Calibration of the A/D converter card".

11 SIMPLE MODE

11.1 Program interface

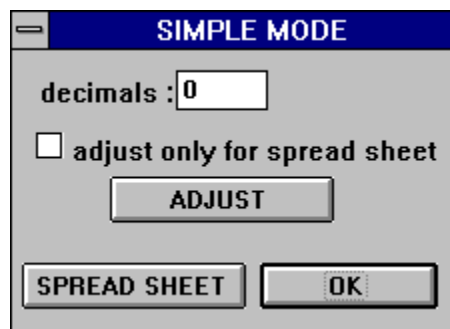
The program looks as follows in Simple Mode :



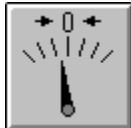
In "Simple Mode", single measuring results are listed and graphically displayed. Permanent measurement is also possible in this mode. The list on the left side shows the measured data with their current number. The scroll bar or the cursor keys allow the measured data to be viewed again. Since a cyclic buffer is used, it is not possible to view more than the last 1000 values. The value highlighted in blue corresponds to the one highlighted in blue in the graphic display. The minimum and maximum values of the graphic display are not determined automatically, but must be entered in the input window to the right of the graphic display. The average value and the standard deviation of all the measured data is shown below the graphic display.

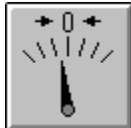
11.2 Parameters

The parameter box in Simple Mode looks as follows :



- The number of decimal places (0 to 3) of the measuring results can be entered.
- Activation of *adjust only for spread sheet* ensures that only the adjustment which is valid for the marked table cell is activated when switchover to Simple Mode is made. In that case, adjustment in Simple Mode is not possible.



- *ADJUST* or the  key opens and closes the adjust box (see the section *ADJUST* dialog box).



- *SPREAD SHEET* or the  key changes to the spread sheet mode.

- The <ESC> key closes the parameter box without taking over any amendments (including the adjust values).

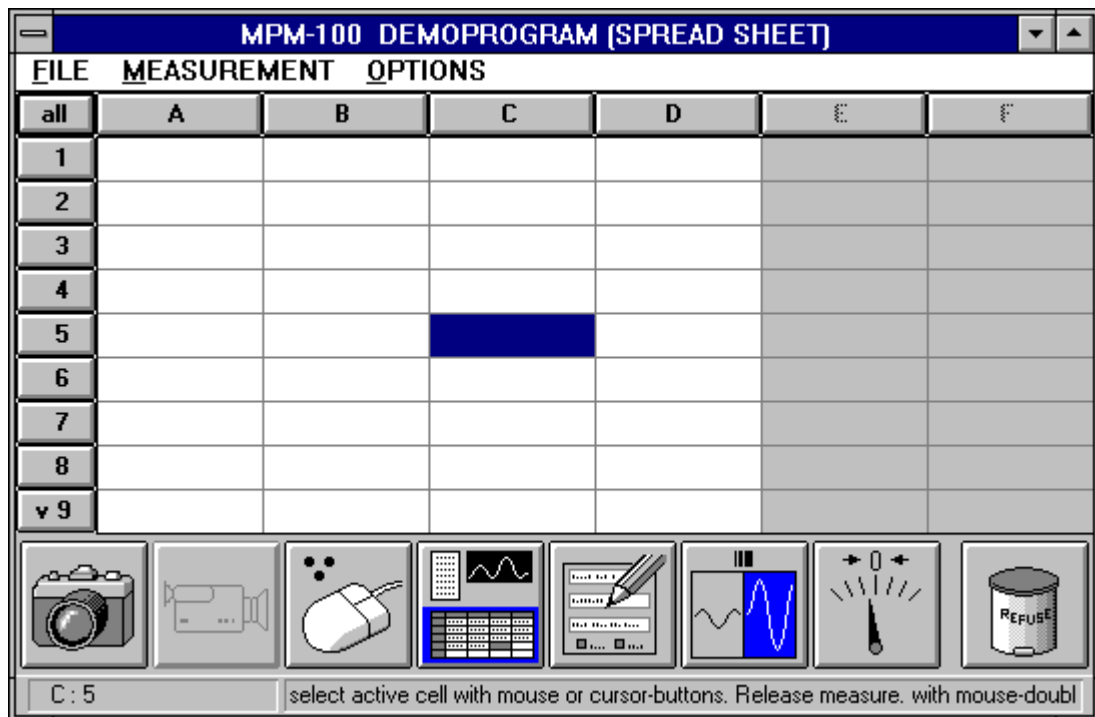


- *OK* or the  key takes over the values and closes the box.

12 SPREAD SHEET MODE

12.1 Program interface

In this mode, the program looks as follows :



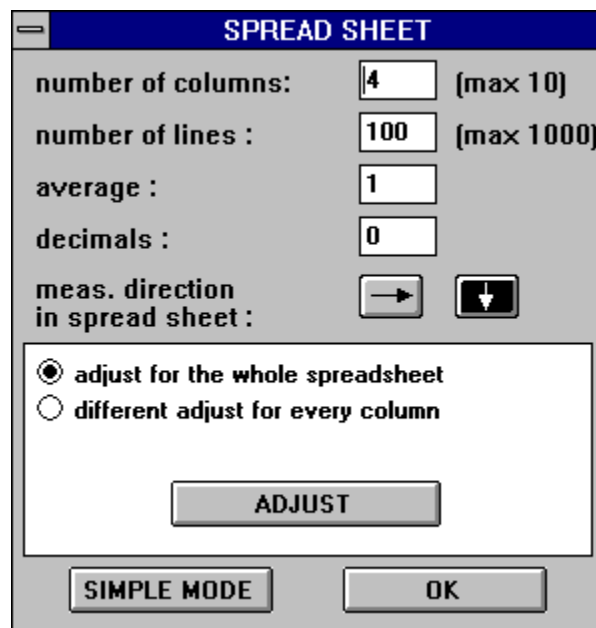
In the spread sheet mode, the measuring results are entered into a table. Here, different adjustments can be entered into the columns. A cell, into which the next measurement is entered, can be marked using the cursor keys or <PGDOWN> and <PGUP> or by a click of the left mouse button. The current adjust values for this cell are used. Measurement can be released with a doubleclick of the left mouse button on the relevant cell, the *SINGLE MEASUREMENT* menu item or the following key:



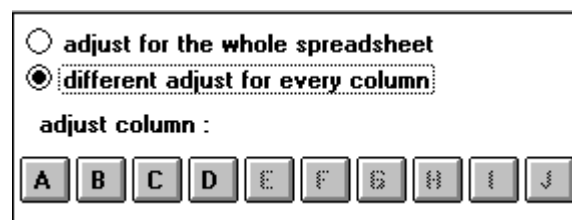
The buttons "A", "B", "C"... and "1", "2", "3"... or "all" enable columns, cells or the entire table to be marked so that the values they contain can be deleted.

12.2 Parameters

The parameter box in the Spread Sheet mode looks as follows :



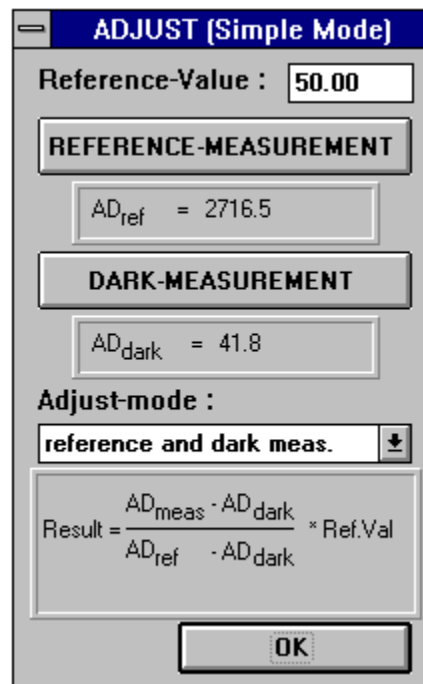
- The number of columns (1 to 10) and the number of lines (1 to 1000) of the table can be entered.
- Under "average", the number of measuring values to be included in each single measurement can be determined. The average is entered into the table.
- The number of decimal places of the measuring results (0 to 3) can be entered.
- After a measurement, the marking moves on automatically. The item "meas. direction in spread sheet" determines whether the marking moves on to the right or downwards.
- It is possible to determine whether adjustment shall apply to the entire table or only to individual columns. In the latter case, only the appropriate keys are active (in the illustration below, these are the keys A, B, C and D).



- Program end - including the takeover of values - interrupt, adjust and change of mode is made in the same way as in the Simple mode parameter box.

12.3 ADJUST dialog box

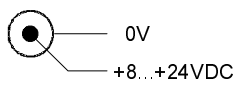
Here, "adjust" refers to dark and reference measurements. They are performed using the following *ADJUST* dialog box :



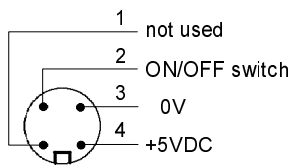
- First of all, the *ADJUST* mode - reference or dark measurements - must be determined. The field below shows the formula for the results to be entered in the spread sheet or the list in Simple Mode. Depending on the mode selected, the elements "Reference Value", "REFERENCE MEASUREMENT" and "DARK MEASUREMENT" are inactive.
- Reference measurement is performed using an object the transmission or reflexion of which is known. The known percentage value of the transmission or reflexion must be entered as the reference value and measurement must be released by clicking on the REFERENCE MEASUREMENT field.
- In dark measurement, it is important to make sure that no light reaches the photometer. Clicking on the DARK MEASUREMENT field releases the measurement.
- Adjustment can be interrupted using the <ESC> key without the adjust mode or values being taken over.

12.4 Connector pin assignment

Power unit socket



Foot switch socket



PC connector

