

# Sensor Unit

## CORONA REMOTE



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## Safety notes



### Warning: Bundled radiation!

Never look directly into the measuring beam. The bundled radiation can cause eye damage (e.g. conjunctivitis).

### Warning: Electric voltage!

Operate the system only on lines with earthing wire. Make sure the line voltage corresponds to the operating voltage specified on the rating plate on the rear of the device.

When you open covers or remove any parts, live components may become accessible. Disconnect the system from all sources of power before you open it for maintenance, repair or replacement of parts.



### Caution: Observe installation requirements!

Make sure the requirements specified in section --> *Installation requirements* are met. Otherwise, troubles or erroneous results will occur.

### Warning: Sensitive optical fibres!

handling optical fibres, observe the following instructions:

- Never fold optical fibres. The minimum permissible bending radius is 120 mm.
- Avoid excessive tensile stress and bending strain as well as torsion.
- Do not touch the polished end faces of the optical fibres with your fingers as even very thin traces of grease will severely impair measurements.
- these faces are dirty, clean them with a cotton swab soaked in alcohol.
- Always protect the end faces of unused optical fibres with the provided protective caps.

### Note for replaceable parts:

Use only spare parts listed along with their Catalogue Nos. in the --> *List of spare parts*.

### Caution: Selecting and recording operating parameters!

After every manipulation on the measuring system, such as changing optical fibres, measuring heads, etc., as well as after reinstallation, you should re-select and record the parameters.

## Enclosure Protection, radio interference suppression, class of protection

The sensor has been built and tested to comply with **DIN VDE 0411** and **IEC 1010-1**. It was shipped by the Manufacturer in a proper technical condition meeting all applicable safety standards. All instructions in this Manual must be duly followed in order to preserve this condition and ensure safe operation of the sensor.

The sensor meets the requirements in **EN 50081-2** (electromagnetic interference). It qualifies for **protection class II** and **internal protection standard IP65 (NEMA 4)**.

## Service and guarantee

You must not perform any maintenance or repair work on the instrument system. The system may otherwise be damaged.

Only persons authorized by the manufacturer may repair the system.

Please contact our service department if defects or faults should occur on the system or individual components.

In order to guarantee perfect and safe operation, have the measuring system inspected annually by our service.

You will find the address of the service department on the --> *Inside cover page*.

The Measuring System CORONA REMOTE with OMK 500-H measuring head consists of small, rugged modules in a protective rack and the OMK 500-H measuring head having a 0°/45° or 0°/45° circular measuring geometry.

A computer (IBM-compatible) can be connected via an RS-422 serial interface. The minimal system requirements depend on the software to be used.

The Measuring System with OMK 500-H measuring head serves for diffuse reflectance measurements, preferably in the NIR spectral range, in combination with the CORONA REMOTE NIR. The applications of the OMK 500-H include measurement of textured samples, such as textiles, paper, plastics, powders etc. It is specially suitable for the measurement of diffuse reflections of samples passing the OMK 500-H measuring head at varying distance, e.g. fluttering lengths of cloth or paper.

Various software packages are available for this measuring system. Please observe the appropriate notes contained in the documentation provided with the software. The purchased software must have been installed on the computer (PC) that is connected to the measuring system through a PC interface card and the RS 422 link cable. For any use of the system other than mentioned above, consult the manufacturer.

The Measuring System with OMK 500-H measuring head may be operated only by specially qualified or trained staff. Knowledge of this manual is indispensable and considered a prerequisite.

The modular construction of the measuring systems with their plug-in cassettes guarantees rapid and safe change of these units. Further tampering with the system by the operator is neither provided for nor allowed. The use of optical fibres makes it particularly easy to customize measuring set-ups and measuring heads to specific tasks. Thanks to the small entry slit and the large aperture angle, the spectrometer is particularly well suited to coupling the measuring and reference light into flexible optical fibres. This technique makes it possible to keep little the mechanical expenses of measuring optics/measuring heads and to set them up at a large distance from the measuring instrument.

Install the measuring systems in a safe and easily accessible location.

Mount the measuring head so that it is vibration-free.

The operating temperature range of the measuring systems is between +5 °C and +40 °C.

Mount the measuring system to preclude extreme contamination. Avoid direct exposure of the measuring head to extraneous light as far as possible.

Reference measurements should be regularly recorded and their results compared with one another.

Carry out a reference measurement after every cleaning of the measuring optics, after replacing parts of the measuring system and after every new installation. Record the results in a protocol.

A reduction in intensity may have various causes:

- Faulty optical fibres
- Defective spectrometer module
- Dirty protective window on measuring head
- Aged halogen lamps
- Regularly check all electric connections on the measuring system.

## Intended use

## Installation requirements

## Reference measurement

- Regularly check whether optical fibres are folded or no longer give full performance due to a rupture of fibres. You can easily test individual optical fibres by replacing them with spare fibres. Subsequently, run a reference measurement and compare the results.
- The mean lifetime of the halogen lamp is about 1,500 hours. Therefore, replace the halogen lamp of the measuring head regularly with new ones (depending on its service life).

### Changing replaceable parts

Use only the parts listed in the --> *List of spare parts*.

You can obtain these parts from our service department by specifying the corresponding order number.

All components of the system (including optical fibres, measuring heads, etc.) are geared to one another. It is therefore not possible to tell anything about the effect of parts of other make on the measuring system. The use of spare parts made by other manufacturers is therefore solely at the responsibility of the operator.

### Storage and transport

When storing the components and all spare parts, observe the storage temperature and air humidity specified in the Section --> *Installation requirements*.

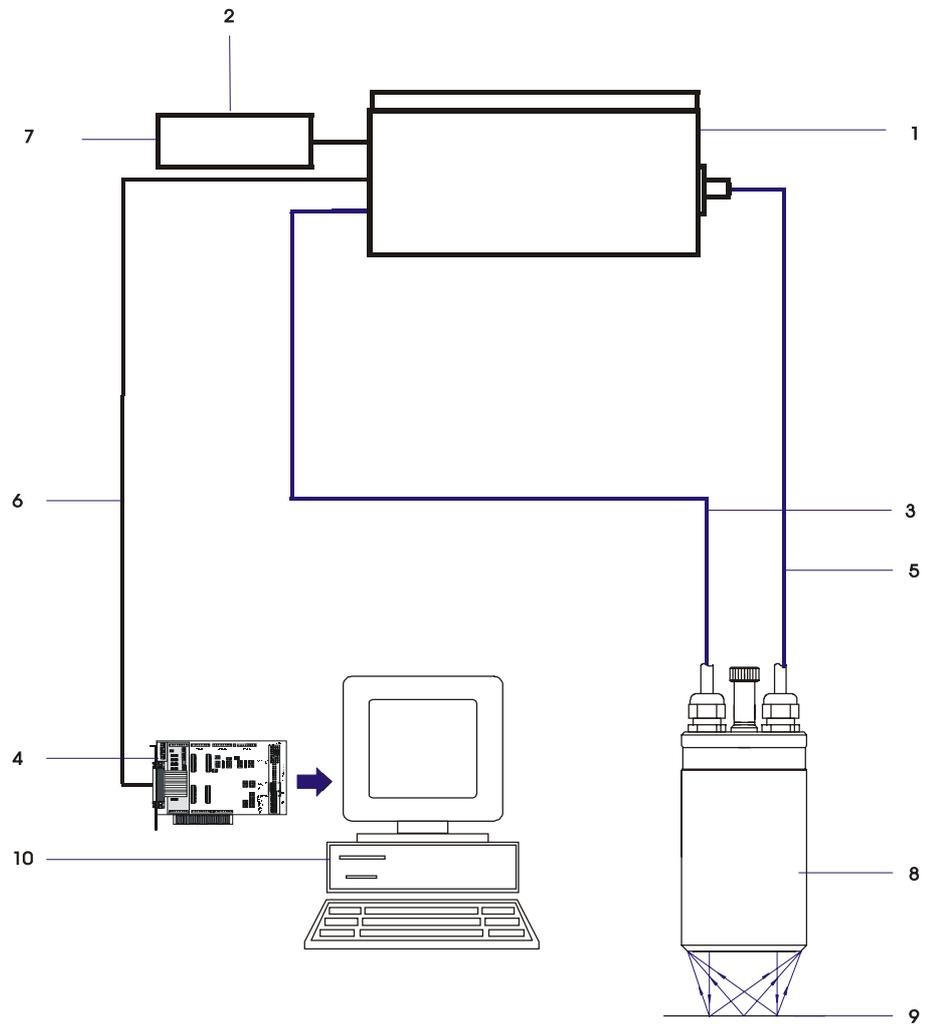
Although the components are very rugged, avoid violent shocks. The system is packed to commercial standards and delivered without any special transportation fixtures or locks. It is recommended to keep transport cases and packing for possible longer storage or return to the manufacturer.

### PC

The configuration requirements of the PC used depend on the software obtained. Please observe the notes given in the provided software manuals.

| Mechanical Specifications                           |   |
|---|---|
| Range of operating temperatures                     | 0 °C ... + 35 °C  |
| Storage temperatures                                | - 10 °C ... + 65 °C   |
| Power consumption                                   | < 30 VA   |
| Power supply  | 12 V, 2.2 A   |
| Spectrometer-PC communication interface             | RS 422<br>RS 232 *  |
| Spectrometer-to-PC distance                         | < 10 m (RS 422)<br>< 80 m (RS 232/RS)   |
| Digital inputs/outputs                              | 4 inputs (0 ... 24 V external voltage)<br>4 outputs (0 ... 24 V external voltage) |
| Dimensions (W x H x D) in mm                        | About 324 x 168 x 246   |
| Weight  | About 7 kg  |
| Protection grade                                    | IP 65 (NEMA 4)  |
| *) optional item, not included in standard delivery |   |

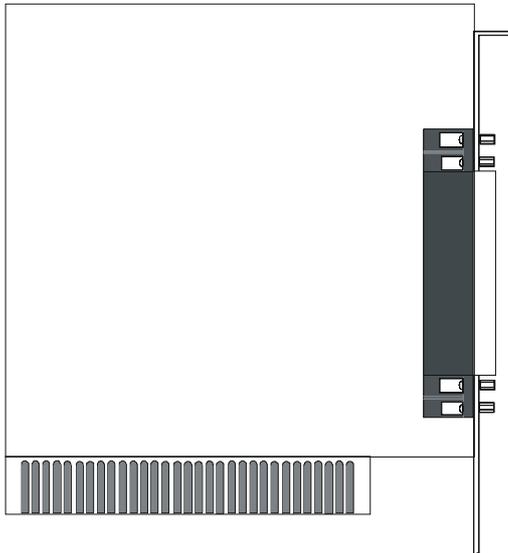
| Optical Specifications  |  |
|-------------------------|--|
| Spectrometer            | Single-beam diode array  |
| Polychromator           | MMS NIR 1.7  |
| Sensor array            | InGaAs array, peltier cooling  |
| Number of diodes        | 128  |
| Wavelength range        | 950 ... 1680 nm  |
| Spectral resolution     | 6 nm/diode (18 nm/Rayleigh)  |
| Wavelength accuracy     | < 0.6 nm   |
| Amplitude resolution    | 16 bits  |
| Lightsource             | Halogen lamp 5V, 9 W, stabilized   |
| Lifetime of lightsource | About 3000 h   |
| Sensor geometry         | 0°/45° circular-shaped   |
| Fibre connector         | SMA  |
| Working distance        | About 13 mm ( for 0°/45° )   |
| Measuring spot          | About 15 mm &  |
| Max. measuring rate     | 100 measurements/second (with RS 422 interface)<br>5 measurements/second (with RS 232 interface) |
| 100 % calibration       | On external white standard   |



- |  |                                   |                    |
|--|-----------------------------------|--------------------|
| <b>1</b> Corona Remote                           | <b>5</b> Optical fibre            | <b>10</b> PC       |
| <b>2</b> Power supply unit                       | <b>6</b> RS 422 link cable        | <b>Power cable</b> |
| <b>3</b> Electric cable for halogen lamp         | <b>7</b>                          |                    |
| <b>4</b> PCI interface card<br>(installed in PC) | <b>8</b> OMK 500-H measuring head |                    |
|  | <b>9</b> Sample plane             |                    |

Fig. 1 System overview

PC-CORONA REMOTE communication is equally possible via **PCI interface card** and **RS422 link cable**.



Turn PC off and disconnect from electrical power supply.  
Open PC case in accordance with manufacturer specifications.  
Insert interface card into vacant 16-bit slot position and fasten card.  
Close PC case.  
Restore power supply connection and turn PC on.

The OMK 500-H measuring head is designed for measurement of textured samples, such as textiles, paper, plastics, etc. It is specially suitable for on-line measurement of diffuse reflections of samples with continuously varying distance between measuring head and sample surface.

The OMK 500-H measuring head contains a 5V 9W halogen lamp (1) powered by the Corona Remote through an electric cable. An optical system provides sample illumination at 0° (normal to the sample) in a quasi-parallel beam. In the measuring head, 15 individual optical fibres (2) are uniformly arranged in a ring for sample observation at 45°.

The fibres are bundled to a light guide that is connected to the spectrometer.

With double-beam setup (reference beam), part of the light is directly transmitted to the spectrometer (not via the sample) through an additional light guide

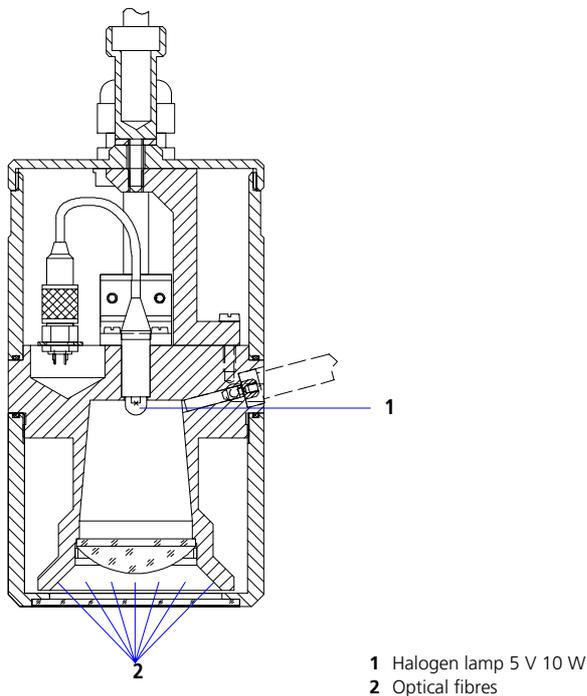


Fig. 3 OMK 500-H measuring head

The diameter of the fibres must be 1 mm. The length can vary between 1.0 and 10.0 m.

The fibres are screwed to so-called SMA connectors.

Such connectors are arranged on the Corona Remote for the OMK 500-H measuring head.



**Warning: Sensitive optical fibres!**

In handling optical fibres, observe the following instructions:

- Never fold optical fibres. The minimum permissible bending radius is 120 mm.
- Avoid excessive tensile stress and bending strain as well as torsion.
- Do not touch the polished end faces of the optical fibres with your fingers as even very thin traces of grease will severely impair measurements.
- If these faces are dirty, clean them with a cotton swab soaked in alcohol.
- Always protect the end faces of unused optical fibres with the provided protective caps.

# Mounting the OMK 500-H measuring head

Loosen conduit gland nut (4) of the power supply cable on the OMK 500-H measuring head.  
 Loosen plug screw (2) and carefully take off casing cover (5) upward.  
 Loosen (about half a turn) conduit gland nut (3) and hexagon socket screw (6).  
 Thread optical fibre through conduit gland nut (3), push it into receptacle (7) as far as it will go, and lock it by means of hexagon socket screw (6).  
 Carefully reattach casing cover and clamp it by means of plug screw (2).  
 Screw down both conduit gland nuts.

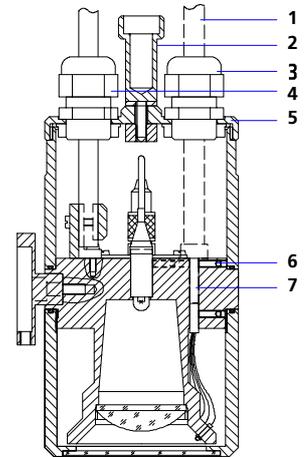
**Important note:**

In the bottom section of the OMK 500-H measuring head, highly sensitive fibres are arranged. Therefore, the measuring head must not be opened by the user.  
 Unauthorized opening of the measuring results in forfeiture of the right to claim under warranty.

Connect light guide (1) to SMA connector on front side.  
 Connect the halogen lamp supply cable to the appropriate connector on the front panel of the CORONA REMOTE.

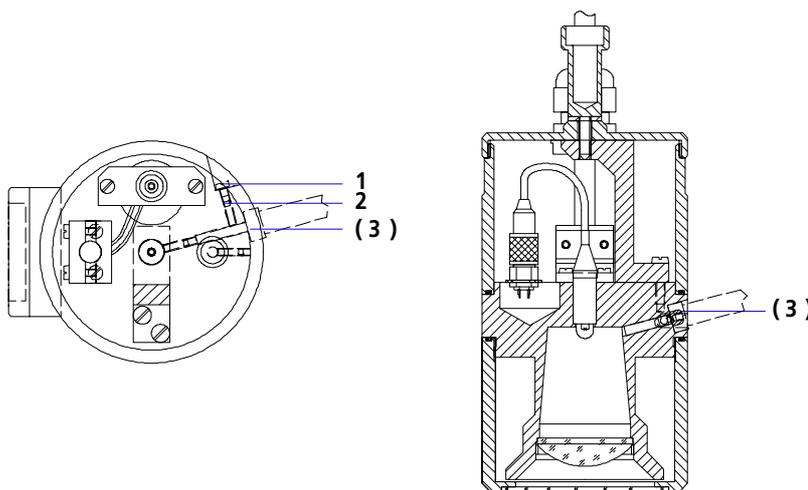
**Note:**

If the system is accommodated in a protective casing or protective cabinet, you have to remove the connector from the supply cable. Then thread the cable through the provided conduit. Reconnect the connector to the supply cable and connect it to the CORONA REMOTE. Subsequently, screw in the conduit gland nut of the cable conduit tightly.



- 1 Optical fibre
- 2 Plug screw
- 3 Conduit gland nut (fibre)
- 4 Conduit gland nut (power)
- 5 Casing cover
- 6 Clamp screw
- 7 Fibre receptacle

Fig. 4 Connecting optical fibre to OMK 500-H



- Subsequently, screw in plug screw (1) with plastic washer and connect light guide to spectrometer.

- 1 Plug screw
- 2 Grub screw
- 3 Closing plug

Fig. 5 Mounting the reference light guide

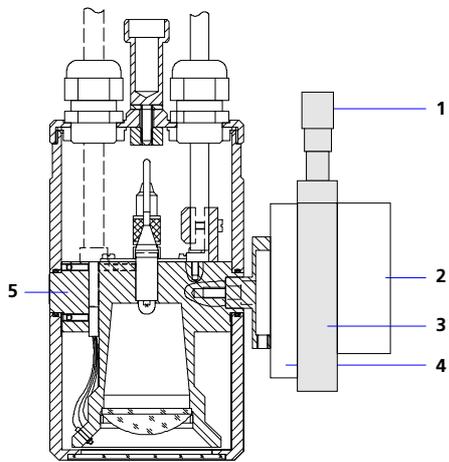
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You can mount the OMK 500-H measuring head by means of four screws (M5) to any support having the drilling hole configuration illustrated in Fig. 12. The thread depth on the measuring head is 8 mm.

If the sample thickness is always the same, you can mount the measuring head at a fixed, defined clearance to the sample surface.

The optimum clearance between OMK 500-H measuring head and sample surface is achieved when the detected energy is maximum. The optimum clearance is about 13 mm ... 15 mm.

If, however, you want to measure vertically fluttering samples or samples having varying thickness, we recommend the use of a vertically adjustable measuring table. This table is to be mounted between measuring head and holder.



- 1 Vertical control
- 2 Holder
- 3 Measuring table
- 4 Adapter plate
- 5 OMK 500-H measuring head

Fig. 7 Mounting measuring head with measuring table

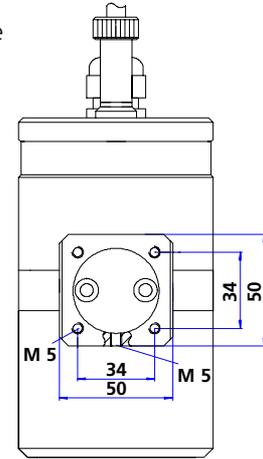


Fig. 6 Mounting surface on measuring head

# Mounting the OMK 500-H measuring head

## Start up

- Turn on the PC and start the appropriate software. Observe the instructions given in the software manual.
- Turn on the system by turning the key switch clockwise. The green LED on the CORONA REMOTE lights up.

## Adjusting optimum clearance between OMK 500-H measuring head and sample

This adjustment serves to find the clearance ensuring least sensitivity to distance variations.

This point is identical with that point at which maximum intensity will be transferred.

Adjustment is as follows:

- Put a diffuse white standard underneath the OMK 500-H measuring head.
- Activate an operating mode providing simultaneous energy display. Observe the instructions given in the software description.
- Vary the clearance between measuring head and sample surface until the energy display is maximum.

### **Note:**

Set an integration time that yields a display sufficiently high for visual evaluation. During vertical adjustment you must keep constant the integration time.

## Final adjustment of integration time

- Put the diffuse white standard underneath the OMK 500-H measuring head.
- Switch to monitor mode and, with the found optimum clearance between measuring head and sample surface, select the definite integration time.
- The set integration time shall allow the signal level to be set to about 60 ... 80% of the possible control range using the white standard.

## Selecting further parameters

- For this, observe --> *appropriate software descriptions*.

### **Note:**

It is absolutely necessary that you select a spectral range 380 nm ... 780 nm and Reflection ordinate mode.  
Do not activate Automatic dark current measurement.

## Dark current measurement

- Put the diffuse black standard underneath the OMK 500-H measuring head.

## Reference measurement

- Put the diffuse white standard underneath the OMK 500-H measuring head.

## Sample measurement

- Put the sample underneath the OMK 500-H measuring head at the optimum clearance.
- Save measured data and evaluate them using the software.

See also --> *Program description of software*.

## Notes on measurement

### Maintenance

To prevent damage of the system, do not perform care, maintenance and repair work on the instrument beyond that described in this section. Except for the complete exchange of plug-in modules, the system may only be repaired by technicians authorized by the manufacturer.

### Changing replaceable parts

Use only the parts listed in the --> *List of spare parts*. You can obtain these parts from our service department by specifying the corresponding order number. All components of the system (including lamps, optical fibres, measuring heads, etc.) are geared to one another. It is therefore not possible to tell anything about the effect of parts of other make on the measuring system. The use of spare parts made by other manufacturers is therefore solely at the responsibility of the operator.

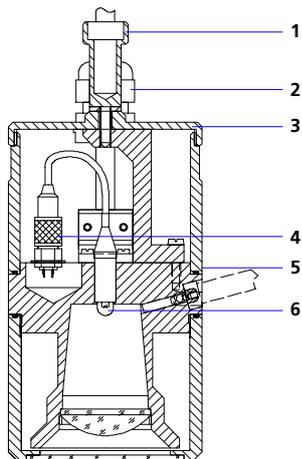
Observe the instructions given in your PC manual regarding the installation of PC cards.

- Switch off the PC and disconnect it from mains.
- Open PC casing following the instructions of the PC manufacturer.
- Remove PC interface card from 16 bit slot and insert the new card. Fix it.
- Close PC casing and switch on the PC.

### Changing the PCI interface card

- Switch off instrument and disconnect power cable.
- On OMK 500-H measuring head, loosen both conduit gland nuts (2) by about half a turn.
- Loosen plug screw (1) with plastic washer. Take off casing cover (3) carefully.
- Loosen sleeve nut (4) and pull out the connector.
- Loosen the right-hand hexagon socket screw (5) using the long leg of the Allen key.
- Pull out the defective halogen lamp (6). Push in a new lamp into the receptacle as far as it will go. Clamp it, reconnect the connector and lock it by screwing in sleeve nut (4).
- Carefully reattach casing cover (3). Fasten it by means of plug screw (1).
- Screw down both conduit gland nuts (2).

### Changing the halogen lamp



- 1 Plug screw
- 2 Conduit gland nut
- 3 Casing cover
- 4 Sleeve nut
- 5 Hexagon socket screw (not shown)
- 6 Halogen lamp

Fig. 8 Changing the halogen lamp

## Care

- ❑ The housing may be cleaned externally with a commercial (non-aggressive) cleaning agent.

## Handling optical fibres

In handling optical fibres, observe the following instructions:

- ❑ Never fold optical fibres. The minimum permissible bending radius is 120 mm.
- ❑ Avoid excessive tensile stress and bending strain as well as torsion.
- ❑ Do not touch the polished end faces of the optical fibres with your fingers as even very thin traces of grease will severely impair measurements.
- ❑ If these faces are dirty, clean them with a cotton swab soaked in alcohol.
- ❑ Always protect the end faces of unused optical fibres with the provided protective caps.

## Handling the OMK 500H measurement

Avoid violent shocks to the support of the measuring heads so as not to spoil their adjustment.

If the measuring head was unscrewed, it must always be readjusted.

The protective window of the measuring head is very sensitive. Avoid shocks to and scratches on the surface of the protective window.

Never remove the lower part of the measuring head. Non-observance of this instruction will result in forfeiture of the right to claim under warranty.

If the measuring head is defective, consult the service department. You will find the address of the service department on --> *Inside cover page* of this manual.

### Cleaning measuring heads

A dirty protective window may lead to incorrect measurements. Therefore, clean it regularly. The cleaning intervals depends on the degree of contamination at the site of use. It should, however, be done at least once a week.

Clean the dirty protective window of the measuring head with a soft, lint-free cloth that has been moistened with distilled water or a special optical cleaning agent.

## Referenemeasurements

Reference measurements should be regularly recorded and their results compared with one another. A reduction in intensity in reference measurements may indicate heavy contamination.

Carry out a reference measurement after every cleaning of the protective window, after replacing parts of the measuring system and after every new installation. Record the results in a protocol.

A reduction in intensity may have various causes:

- ❑ Faulty optical fibres
- ❑ Defective spectrometer module
- ❑ Dirty measuring optics
- ❑ Aged halogen lamps
- Regularly check all electrical connections on the measuring system.
- Regularly check whether optical fibres are folded or no longer give full performance due to a rupture of fibres. You can easily test individual optical fibres by replacing them with spare fibres. Subsequently, run a reference measurement and compare the results.
- Replace the halogen lamp of the measuring head regularly with new ones. We recommend to do this after every three months each.

| Error                                      | Causes  | Remedy   |
|--|---|--|
| No signal intensity available              | <ul style="list-style-type: none"> <li>• Halogen lamp does not light</li> </ul>   | <ul style="list-style-type: none"> <li>• Make sure that cable is properly connected to power supply module..</li> <li>• Halogen lamp defective, change it.</li> </ul>  |
| Intensity too low                          | <ul style="list-style-type: none"> <li>• Faulty light guide connection</li> <li>• Measuring head/sample clearance is not optimum</li> </ul>   | <ul style="list-style-type: none"> <li>• Check fibre connections in measuring head and on spectrometer.</li> <li>• If necessary, maximize intensity by slightly twisting fibre about its axis at connectors on spectrometer and measuring head.</li> <li>• See section --&gt; <i>Connecting optical fibres and electric cables.</i></li> </ul> |
| Integration time too low                   |   | <ul style="list-style-type: none"> <li>• See section --&gt; <i>Notes on measurement.</i></li> </ul>  |
| No communication between PC and instrument | <ul style="list-style-type: none"> <li>• System not switched on or power supply disconnected</li> <li>• RS 422 cable not connected or screwed down</li> </ul>                             | <ul style="list-style-type: none"> <li>• Connect to mains.</li> <li>• Switch on system (green LED at key switch must light).</li> <li>• Check fuses.</li> <li>• Check RS 422 cable connection.</li> </ul>  |
| Measured data is drifting                  | <ul style="list-style-type: none"> <li>• Reference data must be updated every 30 ... 60 min depending on ambient conditions and accuracy requirements.</li> </ul>                         | <ul style="list-style-type: none"> <li>• Update reference data (white standard and darkcurrent measurement)</li> </ul>   |
| Poor reproducibility                       | <ul style="list-style-type: none"> <li>• Integration time and accumulation too low</li> <li>• Intensity too low</li> <li>• Sample/measuring head clearance varies too strongly</li> </ul> | <ul style="list-style-type: none"> <li>• Increase measuring time.</li> <li>• See this table --&gt; <i>Intensity too low</i></li> <li>• Optimize clearance. See section --&gt; <i>Notes on measurement.</i></li> </ul>  |

| <b>Designation</b> | <b>Type</b>     | <b>Catalogue No.</b> |
|--------------------|-----------------|----------------------|
| Light guide        | Variable length | on request           |
| PC interface card  | PCI RS422 Card  | 407.910              |
| Halogen lamp       | 5 V, 9 W        | 226030-8001.000      |

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