



TM data II

Operating Instructions

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Technical specifications subject to changes without notice. Possible errors are unintentional. The actual product may differ from the illustration, but it will be similar to it.

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General Remarks

Congratulations on your decision for a high-quality product of the Helmut Hund GmbH, Wetzlar. Our name represents long-time experience and excellence in the development and production of dust monitors and their accessories.

Please compare the delivery carefully with the delivery note, the packing note or the invoice. Please keep a copy of these documents together with this manual for future reference regarding additional information, available accessories, or service works. This will give you quick access to the date and the extent of delivery.





Please make sure that no small parts remain in the packing material!

Please be informed that our systems are adjusted in the factory. They are ready for use immediately after installation.

Please read this manual carefully before you set the instrument in operation. We recommend that you keep this manual together with the instrument for quick reference.

Symbols used throughout this manual

Special remarks in this manual are indicated by one of the following symbols:

	Safety remark
	Caution! Faulty operation may lead to damage of the device and/or its accessories!
	Danger! Hazardous voltages!
	Explaining remark

1. Principle of Operation

The mobile fine-dust monitor TM data II works on the principle of scattered-light measurement. Here, the recorded intensity is a measure for the mass concentration of airborne dust in the measurement volume.

In the measuring chamber, a light source illuminates the measurement volume. Due to its arrangement, the photodetector can only receive scattered light, but no direct light from the light source. A low-reflectance coating of the measuring chamber, along with light traps adjacent to light source and detector, ensures efficient suppression of stray light that may be scattered back from the chamber walls (Fig. 1).

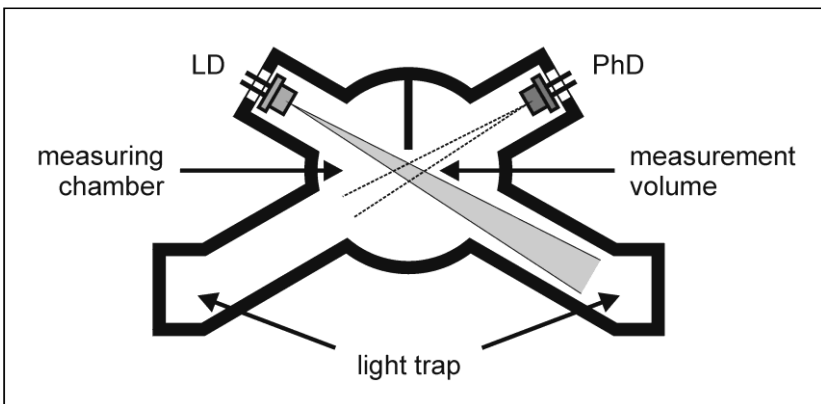


Fig. 1: TM data II measuring chamber (schematic). LD: light source (luminescent diode), PhD: photodetector.

The optical arrangement and the employed light wavelength result in high detection sensitivities for particles with aerodynamic diameters between about 1 μm and about 8 μm . Thus, it is not necessary to pre-separate coarse particles, and the detected dust fraction corresponds very well to the respirable dust fraction.

The scattered-light intensity is proportional to the mass concentration of the detected dust, but it is not independent of the kind of dust. As delivered, the displayed concentration values are only valid for the DEHS aerosol used for factory calibration.

The readings of the TM data II can be adjusted to any kind of dust by comparison with a gravimetric measurement in the respective environment. To this end, a calibration set is optionally available. After the determination of the collected dust mass, a calibration factor can be calculated and stored in the device and/or in the optional evaluation software. When the measurement is repeated at the same workplace and in the same dust atmosphere, this calibration factor may be selected from the list of stored factors.

The TM data II is equipped with a rechargeable battery for mobile operation. It comes with a USB charger with which it may also be operated from mains voltage.

2. Fine-dust monitor TM data II: Overview



- | | | | |
|---|-----------------------|---|---|
| 1 | Measuring chamber | 6 | Light-trap cover |
| 2 | Touchscreen display | 7 | Status LED |
| 3 | Charge-control LED | 8 | Connector USB/
charger (on the back) |
| 4 | 'On' switch | | |
| 5 | Carrying-belt eyelets | | |

3. Setup and installation

The TM data II is shipped in a secure packing. Please make sure that the delivery is complete and that no transport damage has occurred.

In case of complaints, please contact Helmut Hund GmbH, Wetzlar, Germany, or the supplier immediately.

!	The TM data II is shipped with a fully charged battery .
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!	During shipment, the display of the TM data II is protected with an adhesive foil. Please remove this foil before you set the device in operation.
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!	Please do not connect the data logger with your PC yet! Please note that the device can only be operated in a Microsoft Windows™ environment. We do not guarantee operation with other operating systems or in virtual machines!
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- Insert the software CD into the CD/DVD drive of your PC. Start the Windows Explorer, switch to the CD/DVD drive and start the installation of the transfer and evaluation software by clicking 'setup.exe'. Simply follow the on-screen instructions, all drivers and software components are installed automatically.

!	You need administrator rights on your PC to install the software drivers!
---	--

- Now, connect the backside connector of the TM data II via the supplied USB cable with your PC (Fig. 2). Please make sure that the cable is firmly screwed into the connector.

	Do not cant the USB cable in the connector! This may result in damage to both cable and connector threads !
---	--

!	The TM data II comes with a USB power and charging unit , with which the battery can be charged without a PC.
---	--



Fig. 2: Connector USB/charger of the TM data II.

- The TM data II does not automatically switch on after it has been connected to the PC. However, the charging LED on the front panel lights up.

!	The charging LED glows green as long as the battery is being charged. It goes out when the battery is fully charged.
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- Switch the TM data II on by pressing the 'On' switch.
- During initialization, the status LED lights up in orange while the PC automatically connects to the TM data II via USB. When the connection has been established, the status LED will switch to green.

!

In case your PC is not connected to the Internet, the drivers for the setup of the virtual COM ports can also be installed from the included software CD.

- In your Windows environment, open the control panel and click 'Device Manager'. Select 'Ports (COM & LPT)'. This will display a list which contains the entry „USB Serial Port (COM XX)“ with XX as a one- or two-digit number. Please write this number down. Figure 3 shows an example in which the TM data II was found on COM3, this number can be different for your system!



Fig. 3: Example: entry of the virtual COM port (in this example COM3) in the Windows Device Manager of a PC named 'orifice'.

- Launch the transfer and evaluation software 'TM data II Dust Analysis Software'.
- In the menu bar, click 'Device – Settings' or the symbol 'Settings' in the tool bar. The 'Settings' window opens (Fig. 4).

- In the dropdown menu 'Port name', select – unless not already set automatically – the TM data II COM port as found above. If it is not listed yet, click 'Update' first.

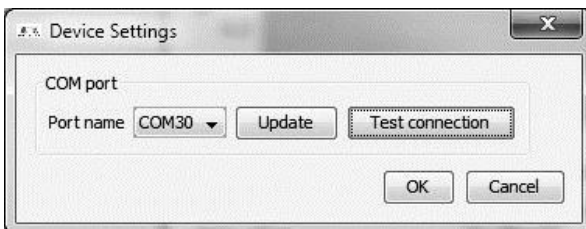


Fig. 4: Window „Settings“.

- Click 'Test connection'. If operational, the system responds as in Fig. 5. Confirm by clicking 'OK'.

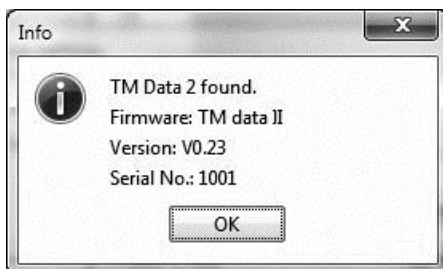


Fig. 5: Software response after positive test connection to the TM data II, in the example with serial number 1001 and for firmware version 0.23.

The transfer and evaluation software is now installed and operational.

!	The connection to the PC only serves to transfer the measurement results from the TM data II.
---	--

4. Using the TM data II

After the short boot sequence is finished, the screen shows the main menu (Fig. 6). From here, the operator can parametrize the TM data II or start and stop measurements.



Fig. 6: Main menu TM data II.

The upper section of the display shows the current date and time and also a battery symbol for the charging state of the battery. In case the TM data II is powered via a USB cable, the battery symbol will contain a jagged line. The following section gives the number of stored measurements and the remaining memory in the format [days].[hours]:[minutes]:[seconds] for a measurement period of 1 s. For technical reasons, this display value is limited to a maximum value of 9.23:59:59 (almost 10 days).

4.1 Submenu ‘Start measurement‘

Selection of “Start measurement‘ switches to a submenu where a ‘Start’ button starts the measurement. “Main menu” returns back to the start screen.

4.1.1 ‘Start measurement’-‘Start now‘

After an initialization phase of about 2 s (display: ‘Init‘) this screen shows the selected measurement period and the remaining storage capacity. The header indicates whether the measurement is active or finished (Fig. 7).



Fig. 7: Menu „Start measurement“–„Start now“.

‘Stop measurement‘ finishes the measurement immediately, ‘Show data‘ displays the measurement values. When a measurement is finished before the first measurement period has passed, an empty file will be displayed in the download dialog of the evaluation software.

4.1.1.1 'Start measurement'-'Start now'-'Show data'

On the 'Show data' screen, the TM data II shows the current dust concentration ('Act. ') and its moving average ('AVG', Fig. 8). When the user has selected a 'Standard' calibration factor of 1 in the 'Extras'-'Config 1' menu, asterisks behind the numerical value indicate that the measurement is carried out with the factory calibration. If some other calibration factor is selected (see below) or in case this Standard calibration factor differs from 1, no asterisks will be displayed. By selecting 'Curves', the device can also display a time-resolved, rolling diagramme of the measurement values, e. g., in order to find dust emission sources (Fig. 9). The current value is always represented as a green curve, the moving average as a yellow one.



Fig. 8: Submenu 'Show data': numerical values.

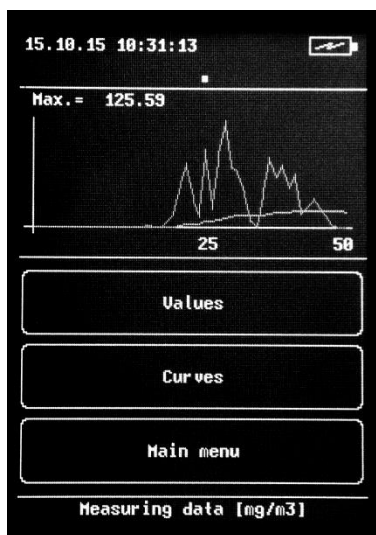


Fig. 9: Submenu 'Show data': curves.

!	The curve display has an autoscale function that shows the values with optimal scale. As the curve represents only 50 s of measurement time, the scale may change when peak values leave the display range!
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!	After the measurement is finished, the display stops at the last measured value. From here, you can only return to the Main menu.
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!	Touching the 'Curves' button during a measurement will stop the display, but not the measurement itself. Typing 'Curves' again will continue the curve.
---	---

4.2 Menu 'Show data'

Selecting this option jumps to the same screen as described in Section. 4.1.1.1. The on-screen values, however, will not be stored, but only displayed.

4.3 Menu 'Extras'

!	<p>The TM data II is switched off via the menu entry 'Shut down', NOT by pressing the 'On' switch! This prevents the TM data II from being unintentionally switched off during a measurement.</p> <p>However, it is possible to restart the TM data II in case of a system crash by keeping the 'On' switch pressed for about 15 s.</p>
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The submenu 'Extras' branches out into three submenus that allow different configuration settings.

4.4.1 Submenu ‘Config 1‘

Bluetooth:

- Activate Bluetooth
- Deactivate Bluetooth

!	In order to transfer the measurement results via Bluetooth, a desktop PC requires an external USB Bluetooth adapter while notebook PCs usually come with an internal Bluetooth adapter. Install the external adapter (not part of the scope of delivery) according to the manufacturer’s instructions. When this installation is accomplished, you will find the Bluetooth symbol in the Windows system tray (on the bottom right of the Windows task bar). Activate Bluetooth in the TM data II menu and click on the Bluetooth symbol in the system tray. Select “Add Bluetooth Device” and subsequently, the displayed TM data II. Connect the device by typing the pairing code “1234”. Then, start the PC software and proceed as with a USB cable connection, i.e., by choosing a valid COM port.
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Brightness:

Sets the display brightness to a value between 10 % and 100 %. The numerical value must be confirmed with ‘OK’.

Set cal. value:

The TM data II can store six calibration factors. They may result from earlier calibration measurements and can manually be typed into the instrument after the number of the storage position and a name for the factor has been selected. On the other hand, the calibration factor can be evaluated with the optional calibration set. The respective calibration menu allows the user to calculate and store the factor (see below).

!	With a calibration factor ‘Standard’ of 1, the displayed measurement values are followed by an asterisk.
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4.4.2 Submenu ‘Config 2‘

Date:

Sets the date in the format dd:mm:yy. Must be confirmed with ‘Ok‘.

Time:

Sets the time in the 24-hour format hh:mm:ss. Must be confirmed with ‘Ok‘.

Auto off:

Sets the time (in minutes) after which the TM data II switches off when idle. A value of ‘0‘ deactivates this function. Must be confirmed with ‘Ok‘.

Backlight off:

Sets the time (in seconds) after which the TM data II switches the display off when idle. A value of ‘0‘ deactivates this function. Must be confirmed with ‘Ok‘.

!	When the backlight is switched off, the touchscreen is locked. In order to avoid unintentional inputs during a measurement, the time should be set to a very short interval. The touchscreen can be reactivated by pressing the ‘On‘ switch.
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Language:

Switches the display language from German to English or vice versa.

!	In case of an input error, the status LED blinks red.
---	--

4.4.3 Submenu ‘Config 3‘

Clear flash:

Deletes all measurement values.

Zero value:

Before the TM data II can display correct measurement values, its zero value has to be corrected for prior to every measurement. For that purpose, a zero-point adjustment device is available with which filtered air can be blown into the measuring chamber. Please proceed as follows:

- If necessary, clean the measuring chamber (see below).

- Unlock the fixing screws of the mounting bracket of the zero-point adjustment device and pull both halves of the bracket apart. Insert the measuring chamber into the bracket, push both halves together and lock them again with the fixing screws.
- Insert a glass-fibre filter into the filter capsule. Connect one nozzle of the filter capsule with the bellows, the other with the connector of the mounting bracket (Fig. 10).
- In the 'Zero value' menu, type 'Start now'. The following screen ('Clean chamber') now shows the current concentration value.
- With the bellows, pump clean air via the filter capsule into the measuring chamber until the display value remains as constant as possible. Finish the pumping operation and type 'Continue'.
- Now, the zero-point measurement begins ('Zeroing'). The remaining zero concentration value is registered over a one-minute measurement interval, then stored and subsequently subtracted from all measurement values. Then, the zero-point adjustment is complete and can be repeated whenever necessary.
- Remove the zero-point adjustment device from the TM data II.



Fig. 10: TM data II with zero-point adjustment device.

Int. cal:

This menu item leads to the internal electronic calibration of the TM data II. This calibration should be carried out every three months. Please proceed as follows:

- If necessary, clean the measuring chamber (see below).
- The procedure shall be carried out at an ambient temperature of between +15 °C und +25 °C.
- Perform a zero-point adjustment (see above). Do not remove the zero-point adjustment device yet.
- With a coin, turn the switch on top of the TM data II (Fig. 11) counter-clockwise until its slit points into the direction of the separating line between the two halves of the housing.



Fig. 11: Internal calibration switch in 'measurement' position.

- With the bellows, pump clean air via the filter capsule into the measuring chamber until the display value remains as constant as possible. Finish the pumping operation and type 'Continue'.
- Now, the calibration measurement starts. The remaining electronic zero value is registered over a one-minute measurement interval, then stored and subsequently subtracted from all measurement values. Then, the internal calibration is complete and can be repeated whenever necessary.

- Turn the switch on top of the TM data II back into the 'measurement' position (as depicted in Fig. 11) and type 'Continue'.
- Remove the zero-point adjustment device from the TM data II.

Dust type:

As the readings of the TM data II depend on the kind of dust under investigation, a calibration factor has to be determined and stored. With this factor, the instrument reading must be multiplied. For this purpose, an optional calibration set is available (Fig. 12). Its mounting bracket is the same as for the zero-point adjustment device. Additionally, this set contains a total-dust collection system with filter, a rotameter to measure the flow rate and a sampling pump. Please proceed as follows:

- Unlock the fixing screws of the mounting bracket of the zero-point adjustment device and pull both halves of the bracket apart. Insert the measuring chamber into the bracket, push both halves together and lock them again with the fixing screws.
- Determine the mass of a blank glass-fibre filter and put it into the total-dust collection system.
- Connect one nozzle of the mounting bracket with one connector of the total-dust collection system.
- Connect the second connector of the total-dust collection system with the high-pressure nozzle of the rotameter.
- Connect the low-pressure connector of the rotameter with the pump intake (Fig. 12).
- Type 'Start now' and immediately activate the pump.
- The TM data II will now show the current, factory-calibrated measurement value along with the elapsed time in the screen header.
- Write down the flow rate as indicated by the rotameter.
- After sufficient time has passed, terminate the measurement by typing 'Continue'. The TM data II displays the mean mass concentration under factory calibration and the length of the measurement interval over which it was acquired.
- Switch off the pump.

- Determine the filter mass and – by subtracting the mass of the blank filter – the collected dust mass. Type 'Continue'.
- Type the dust mass (in mg) into the instrument and confirm it by typing 'OK'.
- Type the flow rate (in l/min.) into the instrument and confirm it by typing 'OK'.

!	<p>As the calibration is based on a gravimetric measurement, the 'sufficient' time interval can easily be determined: If you multiply the displayed concentration value with the flow rate as indicated by the rotameter and with the elapsed time interval, you will get an estimate for the collected dust mass for the standard calibration factor of 1. This estimate is the mass that the employed balance should be able to determine.</p>
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- The calculated calibration factor is now displayed in the screen header. Underneath this value, the screen shows the calibration factors that are already stored in the TM data II.
- If you would like to store the calculated calibration factor on one of the six storage positions, type the corresponding number and a corresponding identifier into the instrument.
- Remove the calibration set.

!	<p>On principle, a plausible calibration factor equals a value of between 1 and 20. If the calculated calibration factor is not within this interval, the result is displayed in red and cannot be stored!</p>
---	---



Fig. 12: TM data II calibration set. From left to right: pump, rotameter with total-dust collector (in front of it), TM data II with mounting bracket.

4.5 Menu „Settings“

Sampling time:

Sets the sampling time in the format d.hh:mm:ss. Must be confirmed with 'Ok'.

Period:

Sets the measuring period (in seconds). Must be confirmed with 'Ok'.

User:

Input of the name of the user/measurement technician. As the screen does not display a complete keyboard, the input ranges must be switched with the 'Right Arrow' button.

Location:

Input of the measurement location. As the screen does not display a complete keyboard, the input ranges must be switched with the 'Right Arrow' button.

Remark:

Input of a remark. As the screen does not display a complete keyboard, the input ranges must be switched with the 'Right Arrow' button.

Cal.value:

Display of the stored calibration values. Selecting one of these values will carry out all subsequent measurements with this calibration factor.

Limit:

TM data II can relate the concentration measurements to given concentration limits:

None: No limit.

TRGS900: In the display of the measurement curves, a horizontal line is displayed for a respirable dust limit of 1.25 mg/m^3 . If the current concentration value exceeds this limit, it will momentarily be displayed in red (either numerically or as a curve), later in orange. This indicates an at least momentary concentration value above the TRGS900 limit, even if the corresponding peak has already travelled out of the screen.

5. Transfer and evaluation software

After the installation of the software, the main window opens (Fig. 13).

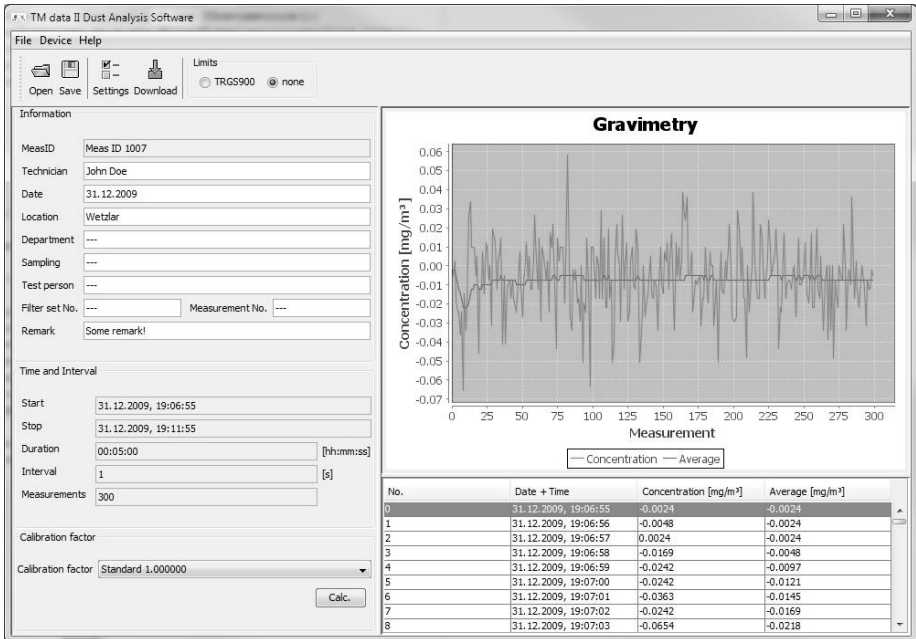


Fig. 13: Main window of the transfer and evaluation software.

The software transfers and stores measurements as TMD files. This file format contains both factory-calibrated and user-calibrated measurement values (after a gravimetric evaluation). The file format is an ASCII format and may also be imported into Microsoft Excel [TM].

5.1 Menu bar

File – Open...:

Opens a TMD file.

File – Save...:

Saves a TMD file.

File - Exit:

Terminates the software.

Device - Settings:

Sets the correct COM port (Fig. 3).

Device - Download:

Downloads measurement files stored on the TM data II. This option opens a dialogue to select the relevant files (Fig. 14). To select a file, click on the respective line in the table and confirm it with 'OK'.

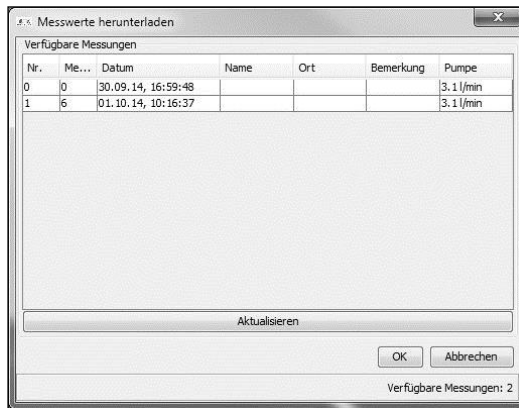


Fig. 14: Dialogue 'Device– Download'.

Help - Help:

Displays this manual in PDF format.

Help - About:

Shows Copyright information.

Help - Language:

Selects menu language (German or English).

!	A change in the menu language requires a restart of the software to become effective!
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5.2 Toolbar

File – Open...:

Opens a TMD file.

File – Save...:

Saves a TMD file.

Settings:

As in Device – Settings in the menu bar.

Download:

As in Device – Download in the menu bar.

Limits:

Display of the mass concentration limit according to TRGS900 in the diagramme, can be switched on and off.

5.3 Box ‘Information‘

After a download, the „Information“ box displays all information that was typed into the respective fields of the TM data II input masks. These data can be edited and/or modified. There are also additional data fields to be freely used for documentation purposes.

5.4 Box ‘Time and Interval‘

The contents of these fields are taken from the data downloaded from the TM data II. They cannot be edited or modified.

5.5 Box ‘Calibration factor‘

Clicking the arrow opens a list containing the calibration factor with which the current measurement was carried out, the six calibration factors stored in the TM data II and a list of known calibration factors from previous measurements. As soon as a certain factor is selected, the measurement values are corrected for correspondingly (see below). The button ‘Calc.’ opens a dialogue that allows the calculation of a calibration factor from the parameters taken from a calibration measurement. This calculated factor may then replace the first factor in the list – the one that belongs to the current measurement. It is also possible to define and store a calibration factor manually.

5.6 Diagramme measurement curves

The diagramme shows the time-domain curves of the measurement results. The abscissa, however, is not scaled in time units, but in the sequence of the measurement values. The ordinate shows the mass concentrations for the current and average values, its scaling corresponds to the selected calibration factor.

Clicking with the right mouse button into the diagramme area opens the context menu. The menu items are:

Properties:

Customization of diagramme properties like title, axes and outline. Also, a smoothing option for the measurement curves can be activated/deactivated.

Copy:

Copies the diagramme to the clipboard.

Save as:

Saves the diagramme as PNG, SVG or PDF file.

Print:

Prints the diagramme.

Zoom In/Zoom Out:

Customizes the display detail manually, either for both axes or for domain and range axis (Fig. 15).

Auto Range:

Automatically sets the display range, either for both or for single axes (domain/range axis).

5.8 Table measurement values

The table contains the current measurement values and the moving average values.

When the user clicks one particular point in the diagramme with the left mouse button, the corresponding line in the table is highlighted.

6. Maintenance, cleaning and care

**Danger! Hazardous voltages!**

The TM data II does not contain user-serviceable parts. In case of damages or technical problems, please contact our **Technical Service!**

**Do not use any liquid cleaning agents!**

You can clean the TM data II externally with oil-free pressurized air and/or with a clean cloth. Then, blow the measuring chamber with oil-free pressurized air or – if possible – clean it with a soft and dry brush. When using a brush, please make sure that no hairs remain in the measuring chamber.



NEVER clean the measuring chamber with a cloth! The induced mechanical friction will destroy the reflective properties of the painted surfaces!

The light-trap covers (Fig. p. 7, No. 6) can be screwed out of the housing so that dust particles may be blown out of the light traps with oil-free pressurized air. The lenses in front of the emitting and receiving diodes can be cleaned with a Q-tip wetted in some alcohol.

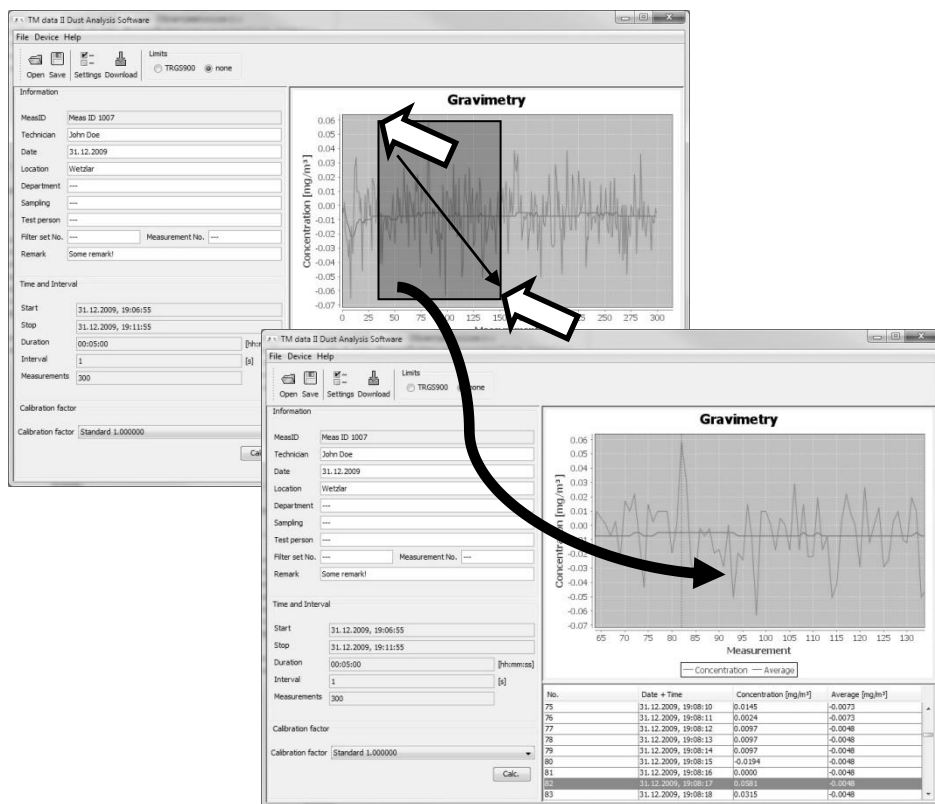


Fig. 15: Zooming into the diagramme by drawing a frame.



Please make sure that you NEVER damage the special paint of the inner surfaces of the measuring chamber! New paint can only be applied in the factory!

Internal calibration and zero-point adjustments should be carried out in regular intervals – depending on the frequency of the measurements. The internal calibration may be carried out in larger intervals. On delivery, both values have been set in the factory so that the TM data II is ready for operation when you receive it.



To ensure flawless operation of the TM data II, we recommend annual maintenance and calibration in our factory.

Technical data, environmental conditions

USB power supply:	100 V ... 240 V AC (1 A max.), 50 ... 60 Hz, Output: 5 V / 2,1 A (10,5 W max.), Adaptersatz für Netzanschlüsse EU/GB/ US/CN
Measurement values:	Momentary mass concentration, moving average
Interfaces:	USB, Bluetooth
Display:	Touchscreen 8.1 cm (3.2"), resistive
Storage capacity:	about 6 days (meas. period 1 s), max. 9 days (for longer periods)
Charging time:	about 6 h
Operating time (fully charged):	about 8 h
Min. system requirements:	PC with Windows 7, dual-core processor, 2 GB RAM, hard drive with 200 MB free memory 1 free USB or Bluetooth interface
Dimensions (L x W x H):	52 mm x 101 mm x 222 mm
Accessories:	Carrying belt, transport case
Temperature range:	5 °C ... 40 °C
Rel. humidity:	max. 80 % up to 31 °C, lin. decreasing, max. 50 % at 40°C
Rechargeable battery:	Lithium-ion battery, 11 Wh

Safety remarks

The fine-dust monitor TM data II including its power supply conforms with the safety regulations for electrical measurement devices and was supplied to the customer in technically flawless condition.

To assure proper function of the device, the user is obliged to follow the instructions and recommendations contained in this manual.

The TM data II must only be employed according to the determination as given in this manual.

All maintenance and repair must only be carried out by qualified personnel authorized by the Helmut Hund GmbH or by the manufacturer's Technical Service Department.

All spare parts delivered for and accessories to be employed with the device must be approved by the Helmut Hund GmbH.

Prior to every use of the TM data II, check the power supply cable for possible damages. In case of any obvious defect to the cable, it must be replaced immediately.

In case of doubt, please contact our nearest representative or the Helmut Hund GmbH directly.



In case of disregard of the safety remarks, proper function and device safety can not be guaranteed any more.

Should such disregard lead to any damage of the device and its accessories and/or to further damage to property or persons, the Helmut Hund GmbH **cannot be held liable. This will also void all warranty claims against the Helmut Hund GmbH, Wetzlar, Germany!**

Device tests

The TM data II is tested according to DIN EN 55022.

Declaration of Conformity/CE sign

The CE sign confirms that this instrument complies with the standard DIN EN 55022.

This statement becomes void if the device is modified by unauthorized personnel.

Warranty

The warranty period for HUND dust measuring instruments shall be 12 months from passing of risk.

Parts proven as defective shall be repaired (HUND has three attempts) or replaced by HUND at his discretion and at its own expense. HUND shall not be liable for consequential, indirect or incidental damages, including without limitation loss of profit and production.

The Buyer shall notify HUND in writing immediately on occurrence of a defect informing HUND in detail of the nature and the probable cause of the defect.

Parts subjected to wear and tear, improper use and external factors are excluded.

The warranty period for goods not produced by HUND (goods of trade) will be the period provided by the original manufacturer of these goods.

Waste Disposal Remark



European Union (EU) Waste of Electrical and Electronic Equipment (WEEE) directive

The European Union's WEEE directive requires that products sold into EU countries must have the crossed-out trashbin label on the product (or the package in some cases). As defined by the WEEE directive, this crossed-out trashbin label means that customers and end-users in EU countries should not dispose of electronic and electrical equipment or accessories in household waste. Customers or end-users in EU countries should contact their local equipment supplier representative or service center for information about the waste collection system in their country.

Notes

