

# FOTEMP4 USER MANUAL



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## GENERAL

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The fiber optical thermometer described in the operating instructions has been designed and manufactured using state-of-the-art technology.

All components are subject to stringent quality and environmental criteria during production.

These operating instructions contain important information on handling the instrument. Working safely requires that all safety instructions and work instructions are observed.

Observe the relevant local accident prevention regulations and general safety regulations for the instrument's range of use.

The operating instructions are part of the product and must be kept in the immediate vicinity of the instrument and readily accessible to skilled personnel at any time.

Skilled personnel must have carefully read and understood the operating instructions prior to beginning any work.

The manufacturer's liability is void in the case of any damage caused by using the product contrary to its intended use, non-compliance with these operating instructions, assignment of insufficiently qualified skilled personnel or unauthorised modifications to the instrument.

The general terms and conditions contained in the sales documentation shall apply.

Subject to technical modifications.

Further information: Internet-address:  
[www.optocon.de](http://www.optocon.de)

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## SAFETY

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This manual contains important information to ensure personal safety and to prevent damage.

Explanation of symbols:

 **Information:** points out useful tips, recommendations and information for efficient and trouble-free operation.

 **Caution:** indicates a potentially dangerous situation that can result in light injuries or damage to equipment or the environment, if not avoided.

 **Warning:** indicates a potentially dangerous situation that can result in injury or death, if not avoided.

### Skilled personnel

Skilled personnel are understood to be personnel who, based on their technical training, knowledge of measurement and control technology and their experience and knowledge of country-specific regulations, current standards and directives, are capable of carrying out the work described and independently recognizing potential hazards.

### Intended use

The instrument has been designed and built solely for the intended use described here, and may only be used accordingly. The technical specifications contained in these operating instructions must be observed.

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## UNPACKING, INSPECTION, SERVICE

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When unpacking and inspecting your system components, you need to do the following:

1. Check all materials against the enclosed packing list.
2. Carefully unpack and inspect all components for visible damage.
3. Save all packing materials, until you have inspected all components and find that there is no obvious or hidden damage.
4. Before shipment, each instrument is assembled, calibrated, and tested. If you note any damage or suspect damage, immediately contact us.

Contact Optocon AG in case of a malfunction or service request.

Technical support can be contacted by telephone Monday-Friday between 8:30 to 17:00 o'clock: +49 (351) 3101957  
or email: [info@optocon.de](mailto:info@optocon.de)

Send RMA shipments to:

Optocon AG, Pohlandstraße 17, 01309 Dresden, Germany

Disposal

Inoperable instruments must be disposed of in compliance with local regulations for electronic materials.

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## INTRODUCTION

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The fiber optic thermometer FOTEMP4 is ideal for the use in EMI, RFI, microwave and high voltage environments. It combines innovative design with user-friendly functionality. The new fiber-optic thermometer FOTEMP4 combines innovative design with user-friendly functionality. The modern design makes the temperature measurement even easier and offers complete immunity to RFI, EMI, NMR and microwave radiation.

The FOTEMP4 has an innovative appearance: It has a larger screen and a modern keyboard which makes the data acquisition and control of the device even easier. The user-friendly display supports high-precision measurements, while the color LCD display offers excellent readout of the measurement values even in low light conditions. The menu supports two languages, German and English.

With its compact design, it fits perfectly into any environments. Various interfaces, analog and relay

outputs make the device very versatile. The extensive software „Fotemp Assistant“ allows a detailed evaluation via PC with direct export of data to an Excel spreadsheet.

The FOTEMP4 has a measuring range from -200°C to +300°C. It measures with the usual Optocon accuracy of  $\pm 0.2^\circ\text{C}$ . The fiber optic thermometer offers complete immunity to RFI, EMI and microwave radiation, making it ideal for environments where the use of conventional temperature measuring instruments is excluded due to extreme conditions.

It is compatible with all our fiber optic temperature sensors and is ideal for any applications in the laboratory and in industry.



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The outer jacket of the fiber optic temperature sensors is made out of teflon, at the sensor tip a GaAs crystal (gallium arsenide) is attached. The probe sensor is completely non-conductive.

Optocon's fiber optic sensors offer complete immunity to RF and microwave radiation with high temperature operating capability, intrinsic safety, and non-invasive use. The probes are also designed to withstand harsh and corrosive environments.

Starting at a light wave length of 850nm GaAs becomes optical translucent. Since the position of the band gap is temperature dependent, it shifts about 0.4nm/Kelvin.

The measurement device contains a light source and a device for the spectral detection of the band gap. This guarantees fast, repeatable and reproducible measurements.

Via the analog outputs and thanks to its accompanying software "FOTEMP-Assistant", measurement results can be easily controlled and monitored.

Over the entire life of the system calibration is not required to remain within the specifications.

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## PRODUCTS SPECIFICATIONS

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Number of channels	4
Power supply	100-240VAC / 50-60Hz
Power consumption	> 10VA
Measuring range	- 200°C to +300°C
Accuracy	+/- 0.2 °C
Resolution	0,1 °C
Sampling rate/Channel	250ms
Analog output	0-10V or 4-20mA
Interface	RS-232 or RS-485 or USB
Relay output	4
Data logging	Log sequenz via software
Display	7,1cm (2,8") LCD-TFT color display
Connector type	ST
Form factor	IP54
Storage temperature	-20°C to +70°C
Operating temperature	-20°C to +60°C
Weight	1,2 kg
Dimensions	205 x 267 x 81 mm
Material	ABS/PC in RAL9003
Software	FOTEMP-Assistent

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## PRODUCT SPECIFICATIONS

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Data export	Via interfaces
Warranty	2 years
Probes	All fiber optic temperature probes from Optocon AG can be connected

### Calibration

To ensure an accurate temperature measurement in critical areas, we offer a comprehensive calibration service for our fiber optic temperature measurement instruments. Through our modern labs and our qualified staff we can guarantee you a very accurate and fast calibration. Within a few days you get your unit back and can start your fiber optic measurement projects. For each calibrated measurement instrument by us, a full certificate of test results is supplied.

Your fiber optical thermometer Icomes factory calibrated. An annual re-calibration is not necessary, except for internal company regulations. All calibrations are performed at our factory. For each calibrated measurement instrument by us, a full certificate of test results is supplied.

Your account manager is available Monday to Friday 8:30 to 17:00 clock personally by phone +49 (351) 3101957. In addition, you are welcome to send an email message to tell us your concern. We will get in touch with you as soon as possible.

Our delivery address:

Optocon AG  
Pohlandstraße 17  
01309 Dresden, Germany

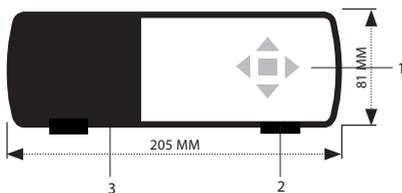
Telefon: +49 (0)351 310 1957  
Fax: +49 (0)351 311 1951  
E-mail: [info@optocon.de](mailto:info@optocon.de)

## QUICK START

This quick reference guide gives you an overview for quick usage. However, it can not replace extensive literature with important information and safety warnings.

### Front panel

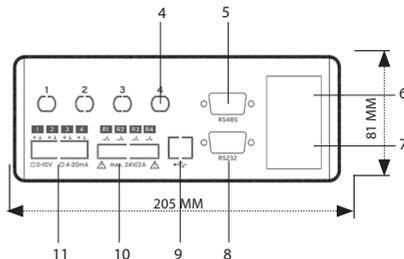
The following figure shows the thermometer front panel:



The following presents an easy overview and description of the user interfaces and instructions on how to use the thermometer.

### Back panel

The following figure shows the thermometer back panel:



### 1) Keypad

For FOTEMP usage a 5 piece keypad is available. All functions, such as relay settings, one-point calibration can be performed both via the keypads and using the software „Fotemp-Assistent“.

The middle key gives access to the system menus. To navigate in the menu use the keys LI and RE

(left and right). Confirm your selection also by pressing the middle key. To change the values, use the up and down keys.

#### 2) Fold out stands

Integrated fold out stands; turn to individually adjust height of front panel.

#### 3) LCD-TFT display

The LCD display shows the temperature readings for the user selected channels. The temperature values are displayed either in Grad Celsius (°C) or Fahrenheit (F). Selections can be made in the menu via the keypad.

#### 4) Sensor connectors

These are ST type connectors, mating to each of the 4 optical temperature sensors. If you need to extend the fiber optic temperature sensor please use the extension cables also available from Optocon AG. For thermometers that have only 1 or two channel(s), only 1 or t2 sensor connectors are used.

#### 5) RS-485 interface

This interface is used to configure and extract information for the instrument.

#### 6) Power switch

Make sure the power supply is connected and powered.

#### 7) Power switch

Please use only the power supply provided.

#### 8) RS-232 interface

#### 9) USB interface

#### 10) Relay output

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### 11) Analog output

The device has an analog output for each temperature channel. Prior to shipment, the fiber optical thermometer is factory set to one of the following configurations: 4-20mA or 0-10V. The analog output is located on the back panel below the ST socket as BNC type. The limits are set to 0°C and 300°C. The temperatures correspond to values between 4-20mA or 0-10V. If no temperature sensor is connected, the maximum value is considered.

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## GETTING STARTED

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1. Plug the provided optical fiber temperature sensors to the ST-socket on the backside of the instrument. Please make sure that the sensor marked as K1 is connected to ST-socket number 1. Sensor marked with K2 must be connected to ST-socket number 2 etc.
2. Connect the provided RS-232 interface cable to the thermometer and a free serial port of the PC or Notebook.
3. To power the thermometer please use the provided power supply.
4. After powering and switching the thermometer on, our company logo and temperature values will be displayed for the different channels.
5. Now the thermometer is ready for measurement.

If no sensor is connected, the display will show „ Sensor?“.

 **Caution!** The fiber optical thermometers only function with Optocon fiber optic temperature sensors. Please do not use temperature sensors of other brands.

### General installation guidelines

Please read the instructions for installing the fiber optic instrument carefully. Please note especially the order of the instructions exactly.

### Sensor handling

The sensor consists of a ST-plug at the end and a gallium arsenide crystal at the tip of the sensor. The crystal is sensitive and should not be exposed to excessive mechanical stress. Please note the information about the bending radius of the sensor on page 17. A forcible bending of the sensor leads to breakage of the fiber. In this case the sensor is damaged and

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needs to be repaired / replaced.

#### Connection with PC:

Before establishing the first connection, please check whether the FOTEMP device is connected to the power supply and the PC via the RS-232 cable respectively.

#### Connection with sensors:

The temperature sensors are connected via the ST-plugs to the BNC sockets at the back panel. Please note to insert the plugs pushing slightly against the spring pressure and to turn with a clockwise rotation.

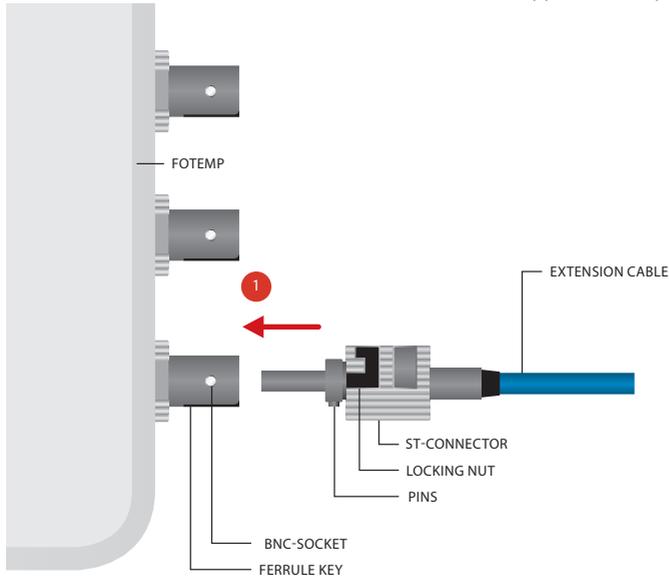
All fiber optical temperature sensors of Optocon AG can be connected.

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## SENSOR CONNECTION

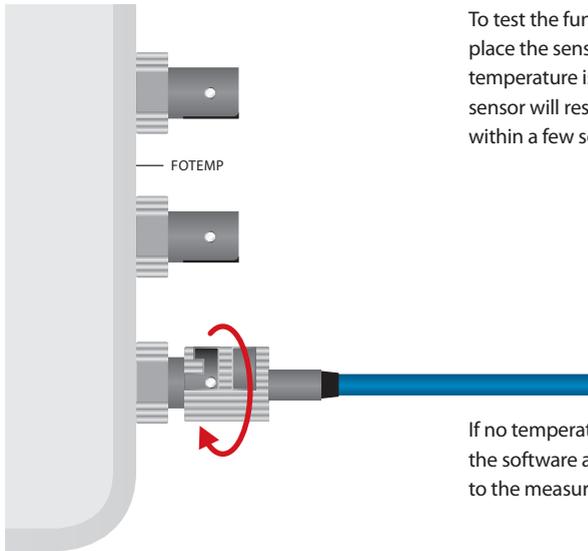
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💡 Any channels not in use must be protected with supplied dust caps.



To ensure accurate measurements and long life of the fiber optic sensors and instruments, it is necessary to clean them regularly.

More information about cleaning can be found on page 19.



#### Test of sensor functionality

To test the functionality of the sensor, you can place the sensor into a test liquid, of which the temperature is known (eg boiling water). The sensor will respond with the given temperature within a few seconds.

If no temperature is displayed please re-install the software and check if the sensor has contact to the measuring object.

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## SENSOR HANDLING

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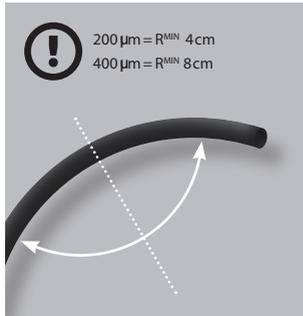
### General advise

#### Bending radius:

For fibers with a core diameter of  $200\mu\text{m}$  have a maximum short time bending radius of 4cm applies; long term usage of 8cm. Fibers with a core diameter of  $400\mu\text{m}$  have a maximum short term bending radius of 8cm; long term of.



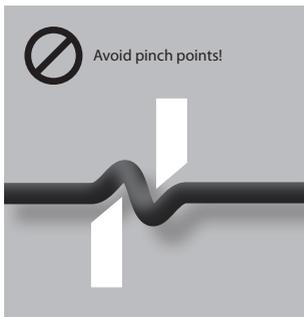
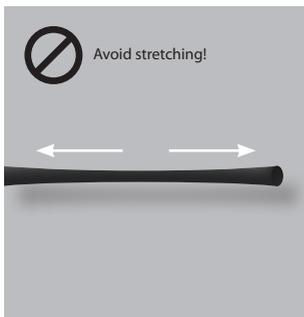
#### ↓ Bending radius



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## ↓ Mechanical load



### Storage

The sensor should be in its delivery box.

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## CLEANING OF SENSOR CONNECTORS AND PLUGS

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### ↓ Step 1



### ↓ Step 2



### ↓ Step 3



#### Instructions

Clean the ST connector of the sensor with the connector cleaner. Softly press the connector on the cloth tape and rotate across the tape while rotating the connector.

You can clean up to 6 connectors before advancing the tape. Tear off excess tape as required.

Take a swab and wet it with the isopropanol wipes. In rotating motion smoothly insert swab into the internal connector of the conditioner. Avoid using cotton swabs.

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## SOFTWARE

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### Installation

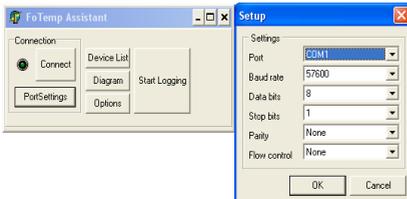
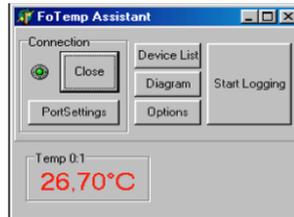
The accompanying software “FoTempMKT” establishes the connection to the FOTEMP device, displays the measured temperatures graphically and saves the temperature data into a log file, if needed.

For installation simply copy the file „FOTEM-PMKT.EXE“ to a local hard disk folder and start the program.

### Set up

Before establishing the first connection, please check whether the FOTEMP device is connected to the power supply and the PC via the RS232 cable respectively. Furthermore the COM port and connection settings should be set correctly (button “PortSettings”), see page 22.

Press the “Connect” button : the connected device should display a temperature value shortly. If an error occurs during the measurement (e.g. no sensor connected) the display will show “Sensor?” and the LED will flash red light.



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## ONE POINT CALIBRATION

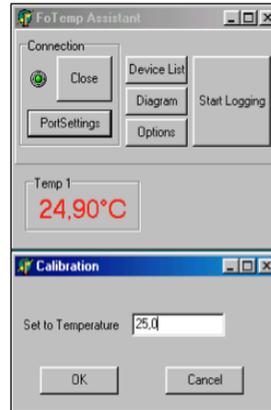
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If a slight deviation between real and displayed temperature is encountered, it is possible to eliminate the temperature difference by doing a one point calibration at a well known temperature.

For doing so please click the right mouse button on the temperature panel which shall be adjusted. A context menu will appear. Please select "one point calibration" and enter the real temperature value and click "OK".

The device should now display the correct temperature.

One point calibration can be made undone at any time selecting „reset calibration“ from the content menu.



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## CONNECTING FOTEMP DEVICE WITH PC VIA USB - RS232 CABLE

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The driver for the converter must be properly installed according to request. Use the included CD:

- 1) Insert converter in the USB port
- 2) Windows 7 and 8 most of converters used their own drivers
- 3) For Windows XP on request insert the CD and select the source „CD“ in the driver manager
- 4) The driver installation must end with the message that the installation was successful and the new hardware is ready to use
- 5) For control you can look up in Settings / Control Panel / System / Hardware / Device Manager / Ports (COM & LPT).

There the converter must be as „USB Serial Port“, „USB Serial Converter“ etc. registered and do not equipped with error marker (yellow question mark).

6) Here you can also read the „COM Number“, which is necessary for future communication with the software.

Manual parameter settings for serial interfaces  
The serial port parameters must be set manually if you use some special converter types. In that case you have to open the Device Manager under Ports (COM & LPT) for seeing the characteristics of the converter display (double-click the converter-entry). In the „Port Settings“ must be set for communication with FOTEMP devices following values:

Baud rate: 57600  
Data bits: 8  
Parity: None  
Stop bits: 1  
Flow control: None

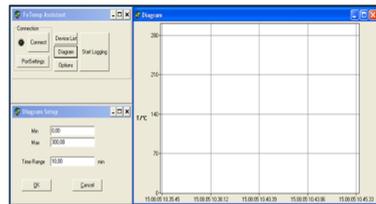
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## VIEWING TEMPERATURE DATA

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The temperatures can be displayed graphically as a time course. The diagram window with the temperature plot(s) may be hidden/displayed by clicking the “Diagram” button.

By double clicking on the diagram button a window appears showing a dialog by which the featured window can be adjusted (min/max temperature, time range in minutes).



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## ANALOG OUTPUT / LED

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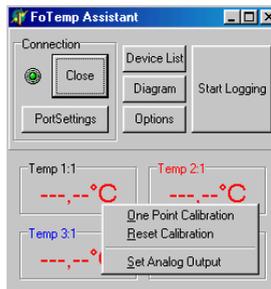
The device has an analog output corresponding to each temperature channel. They are located beneath each ST socket as BNC socket.

The limits are set to 0°C and 300°C.

For temperatures outside of this range analog output is set to the maximum value.

The temperatures are mapped to values between 0-10V or 4-20mA. If no temperature sensor is connected, the maximum value is applied.

The maximum values for the analog output can be also set via the accompanying software „FOTEMP-MKT“. For doing so, please make a right mouse click and choose „Set Analog Out“, for each channel.



### LED

The LED indicates the status of each channel. In case of damage, sensor either defective or non-existence, the LED flashes red.

In normal operation, sensor is available, measurements are carried out, it flashes green.

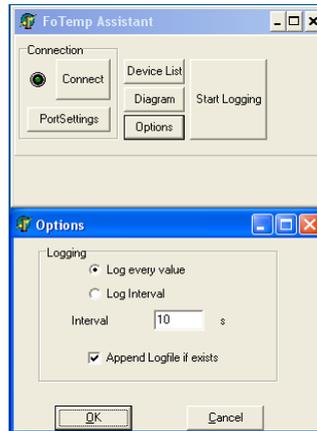
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## LOGGING

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Clicking “Start Logging” activates the logging of the measured data. These are logged and saved to a file that has to be specified in the appearing dialog. The log file holds the data formatted in columns for date/time and temperature values of all channels (one for FOTEMP1) respectively.

By clicking “Options” the log interval can be selected.

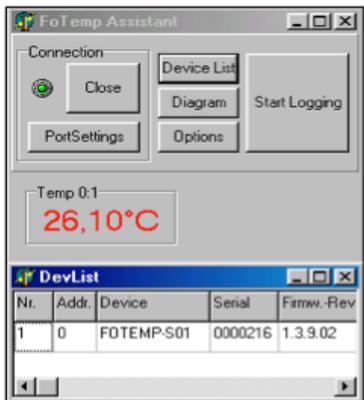


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## DEVICE LIST

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Device List: After clicking on this button a list of all detected devices appears. There, among other things, information on serial number and firmware version will be displayed.



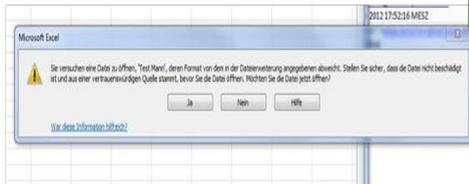
## SPEICHERN / DRUCKEN DER TEMPERATURDATEN

Under the menu item „Window“ of the graph window, there is a choice to save the temperature profile shown as a bitmap, print the active window contents using „Save as Bitmap“, or just „Print“.

„Copy to clipboard“ copies the temperature profile in the clipboard.

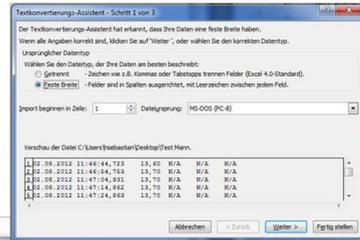
### Export into a Windows Excel File

The log file is automatically saved and can be imported into Microsoft Excel 2010. This. Open Excel, click on „File“, „Open“, select your log file, the following message box appears:



Please press yes to open the file menu conversion. Please tick „Fixed width“. Then press „Finish“.

Now you can see your results in separate fields of an Excel table.





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