MICRO-EPSILON

Quick Manual

interferoMETER

IMS5400-DS19
IMS5400-TH45
IMS5400-TH70

IMS5400-DS19/MP
IMS5400-TH45/MP
IMS5400-TH70/MP

IMS5600-DS19
IMS5600-DS19/MP

Contents

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You can find further information about the measurement system in the operating instructions. They are available at:

www.micro-epsilon.com/download/manuals/man--interferoMETER-5x00--en.pdf

General

Symbols used

The following symbols are used in this document:

⚠ CAUTION	Indicates a hazardous situation which, if not avoided, may result in minor or moderate injury.
NOTICE	Indicates a situation that may result in property damage if not avoided.
➡	Indicates a user action.
i	Indicates a tip for users.
`Measure`	Indicates hardware or a software button/menu.

Warnings

⚠ CAUTION

Connect the power supply and the display/output device according to the safety regulations for electrical equipment.
> Risk of injury, damage to or destruction of the controller

NOTICE

The supply voltage must not exceed the specified limits.
> Damage to or destruction of the controller

Avoid shocks and impacts to the sensor and the controller.
> Damage to or destruction of the components

Never kink optical fibers or bend them in thight radii.
> Damage to or destruction of the optical fibers; failure of measurement device

Protect the ends of the optical fibers against contamination
> Failure of the measuring device

Protect the cable against damage.
> Failure of the measuring device

Intended Use

- The interferoMETER measuring system is designed for use in an industrial environments and domestic areas.
  It is used for
  - measuring displacement, distance, profile, thickness and surface inspection
  - monitoring quality and checking dimensions.
- The measuring system must only be operated within the limits specified in the technical data, see operating instructions chap. 3.
- The measuring system must be used in such a way that no persons are endangered or machines and other material goods are damaged in the event of malfunction or total failure of the controller.
- Take additional precautions for safety and damage prevention in case of safety-related applications.

Proper Environment

- Protection class
  - sensor: IP40 (with connected sensor cable only)
  - controller: IP40

Lenses are excluded from protection class. Contamination of the lenses causes impairment or failure of the function.

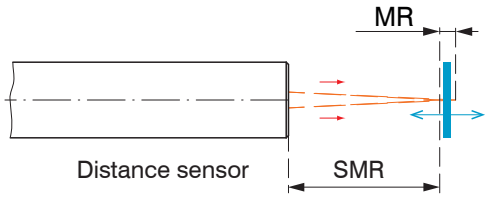
- Temperature range
  - operation
    - sensor: +5 ... +70 °C (+41 ... +158 °F)
    - controller: +15 ... +35 °C (+59 ... +95 °F)
  - storage: -20 ... +70 °C (-4 ... +158 °F)
- Humidity: 5 - 95 % (non-condensing)
- Ambient pressure: Atmospheric pressure
- EMC: According to EN 61000-6-3 / EN 61326-1 (Class B) and EN 61 000-6-2 / EN 61326-1

Glossary

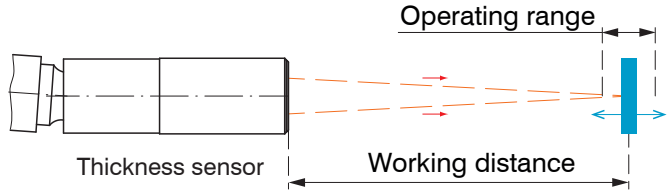
MR = Measuring range

SMR = Start of measuring range

MMR = Mid of measuring range (=SMR + 0.5MR)



Measurement object



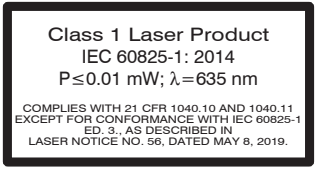
You can find further information about the sensors in the operating instructions, chapter Technical Data.

Laser Safety

The interferoMETER measuring system works with a pilot laser of a wavelength of 635 nm (visible / red) offering max. power of < 0.01 mW and a measuring laser of a wavelength of 840 nm with a max. power of < 0.2 mW.

The measuring system falls within laser class 1. The accessible radiation is harmless under predictable conditions.
For class 1 laser devices, impairment of color vision and disturbances, e.g., from a glare effect, cannot be excluded.

An LED signalizes by illumination that laser radiation emits from the optical opening of the light source (“Pilot on”).



Operating Modes

The interferoMETER measuring system provides highly accurate measurements of

- distances against visually dense materials with light-diffusing or reflective surfaces
- thicknesses for transparent layer materials.

By selecting the sensor, the distance or thickness measurement operating mode is selected.
Accordingly, the result of the measurement is a distance or thickness value.

	Distance measurements	Thickness measurements
Measuring range	2.1 mm	35 µm ... 1.4 mm [1]

Measuring ranges for distance and thickness measurements

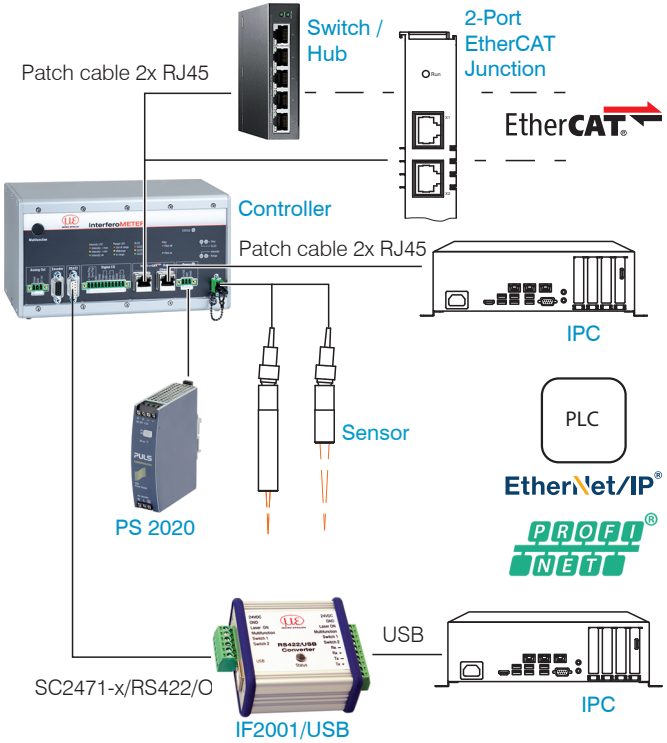
The possible resolution here is in the nanometer range.

For a quick start, we recommend to use presets defined for different target surfaces and applications, see operating instructions Chap. 6.6.

1) Measuring range with n=1.5; for air gap measurement between two glass plates (n~1) the measuring range is 0.05 ... 2.1 mm. The measurement object must be within the working distance.

Setup, Connection Options

Connect the components together and mount the sensors into the clamps.

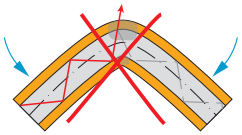


A more detailed description of the connection options is available in the operating instructions.

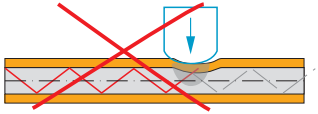
Sensor Cable

Sensor and controller are connected through an optical fiber.

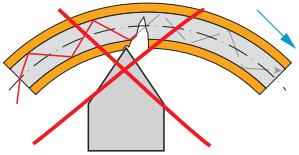
- Do not shorten or extend the optical fiber.
- Do not pull or hold the sensor on the optical fiber.



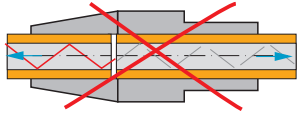
Do not kink the optical fiber.



Do not crush the optical fiber, do not fasten it using cable ties.



Please do not grind the optical fiber over sharp corners.



Do not pull the optical fiber.

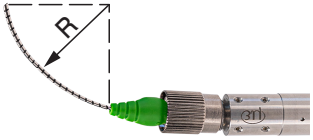
Cleaning of the connectors requires the corresponding know-how.

General Rules

As a matter of principle, avoid:

- any contamination of the connector, e.g., dust or finger prints
- unnecessary mating cycles.
- any mechanical stress of the optical fiber (bending, crushing, pulling, twisting, knotting etc.).
- tight curvature of the optical fiber because the glass fiber is damaged in the process and this causes permanent damage.

Never bend the cable more tightly than the permissible bending radius.



Fixed: R = 30 mm or more

Flexible: R = 40 mm or more

Mounting, Mounting Adapter

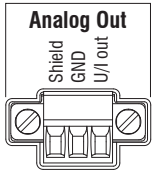
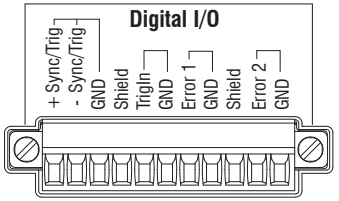
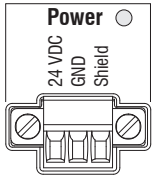
The sensors use an optical measuring principle that allows for measurements in the nm range.

i Ensure careful handling during installation and operation.

➡ Mount the sensors with an outer clamp. Use the MA5400-10 mounting adapter from the optional accessories.

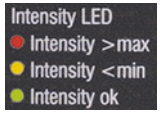
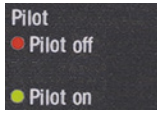
This type of sensor installation ensures the highest level of reliability because the sensor's cylindrical cover is clamped over a relatively large area.

Pluggable Screw Terminals

Pin	Description	Comments	
U/I out	Voltage output	0 ... 5 V; 0 ... 10 V; R_i appr. 50 Ohm 5.5 V / 10.9 V with error, outside measuring range	
	Current output	4 ... 20 mA; $R_L \leq$ 500 Ohm 23.7 mA with error, outside measuring range	
GND	Ground analog output	Galvanically connected with supply	
+Sync/Trig -Sync/Trig	Synchronization input/output, trigger input	RS422 level (EIA422)	
TrigIn	Trigger input	TTL or HTL level TTL: Low ≤ 0.8 V, High ≥ 2 V HTL: Low ≤ 3 V, High ≥ 8 V	
Error 1 / 2	Switch outputs	NPN, PNP or Push-Pull I_{max} = 100 mA, $U_{H\,max}$ = 30 V	
GND	Ground potentials	All GND conductors are interconnected with one another and to supply voltage ground.	
24 VDC	Supply voltage	± 15 %, I_{max} < 1 A	
GND	Supply voltage ground	GND is galvanically connected to GND of switching outputs, synchronization, analog and encoder input	
Shield	Shields to respective output/input, connector housing		

The plug-in screw terminals are designed for a conductor cross-section of 0.14 mm² up to 1.5 mm².

LEDs Controller

Power on	Green	Supply voltage available	The LED's Intensity and Range flashes with their current color during a synchronization error. 1) When measuring outside the optimum current value of the SLED, the controller will measure, but the measurement accuracy may not be as specified.
Status	Off	No error	
	If EtherCAT is active, meaning of the LED is conform with the Ether-CAT guidelines.		
	Red	Signal in saturation	
	Yellow	Signal too low	
	Green	Signal ok	
	Red	SLED of	
	Yellow	SLED warms up	
	Green	SLED ready for operation	
	Yellow flashing	SLED current outside the optimal value range [1]	
	Red	Pilot laser off	
	Green	Pilot laser on	
	Green	Pilot laser is alternately turned on and off, if no target object or outside the measuring range	

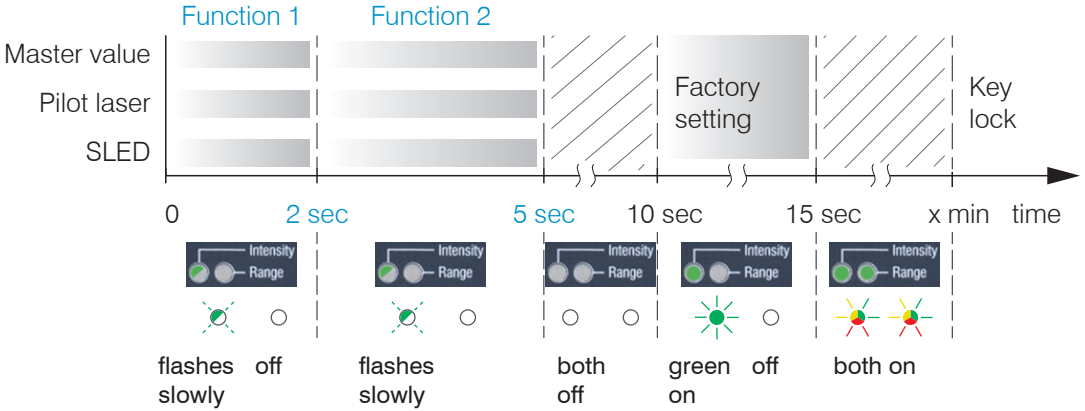
	IMS5400-DS19 IMS5400-TH45 IMS5400-TH70 IMS5600-DS19	IMS5400-DS19/MP IMS5400-TH45/MP IMS5400-TH70/MP IMS5600-DS19/MP	
	Distance and thickness measurment	Distance measurment	Thickness measurment
Red	No target object, or target object outside the measuring range	The expected number of peaks was not found or it was not possible to assign a distance.	The expected number of peaks was not found or it was not possible to assign a thickness.
Yellow	Target close to mid of measuring range	The expected number of peaks was found. A valid distance could be found for each peak. Center point of the target in the area surrounding the mid of the measuring range.	-
Green	Target within measuring range	The expected number of peaks was found. A valid distance could be found for each peak.	The expected number of peaks was found. A valid thickness could be found for each peak.

Button Multifunction

The `Multifunction` button of the controller has multiple functions. It enables, e.g., to operate the light source. The button is factory-set to the `Pilotlaser on/off` feature.

Key function 1 / 2	Set / reset master value	*Starts or stops the master measurement of the selected signals*
	Pilot laser	*Turns on/off the pilot laser*
	SLED	*Turns the light source on/off for the sensor*
	Inactive	*Key has no function*

There are two defined time intervals for pressing the button; each of these can be assigned a function. All time intervals are indicated by the LEDs flashing/lighting up.



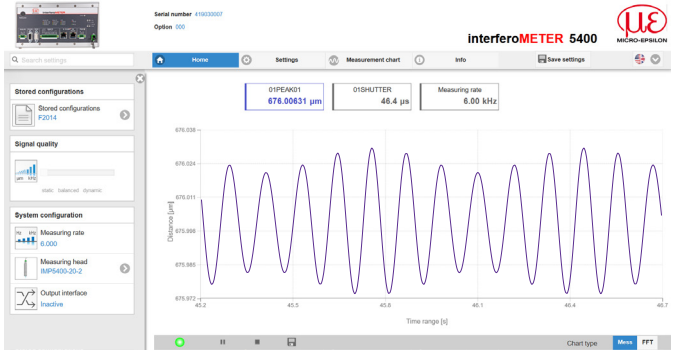
The Intensity and Range LEDs indicate the currently selected function.

Multifunction Button Actuation Time

Initial Operation

Initializing starts after the voltage supply has been switched on. The measuring system is ready for use after approx. 10 seconds. To ensure precise measurements, let the measuring system warm up for approx. 60 minutes.

The controller is factory set to the static IP address 169.254.168.150. Use this address for a direct connection with a browser.



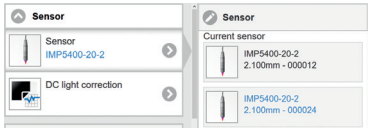
The start screen of the controller software is displayed in the web browser now.

You can check the IP address of the controller, that are connected to a PC / network, with the sensorTOOL.exe program. This program is available online at https://www.micro-epsilon.com/download/software/sensorTOOL.exe.

- Start the program sensorTOOL and click the button Sensor.
- Click the `Open Website` button to connect the controller to your default browser.

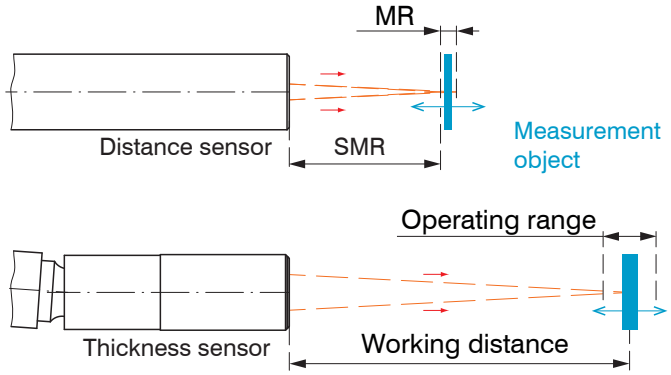
Select a Sensor

- Change to the `Settings` > `Sensor` menu.
- Select a sensor from the list.



Start of Measuring Range, Working Distance

A offset distance (SMR) or working distance between each sensor and the target must be kept.

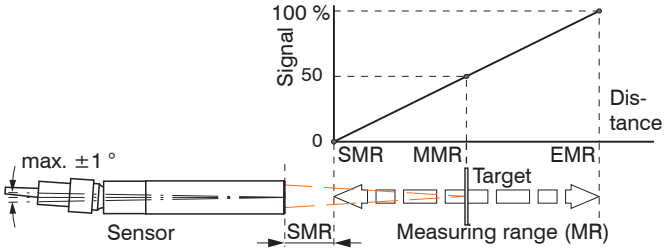


Positioning the Target, Distance Measurement

The red-light pilot laser supports you in aligning the sensor to the target during commissioning.

Turn on or off the pilot laser in the menu `Settings` > `System settings`.

➡ Position the target (measurement object) as much as possible in the mid of the measuring range.



The LED `Range` on the controller front indicates the position of the target in relation to the sensor.

Green	Pilot laser is turned on and off alternately, if no target or outside the measuring range

You can also position the sensor using the FFT signal [1]. The interferometric measuring principle provides measurement values in front of and behind the actual measuring range. An incorrect measuring range distance can be recognized by the running direction of the peak in the FFT signal. Inverse direction of FFT signal, if the target is outside measuring range.

Using the FFT signal for sensor positioning

Red	No target or target outside the measuring range
Yellow	Target close to mid of measuring range
Green	Target within measuring range

1) FFT = Fast Fourier Transformation, frequency signal

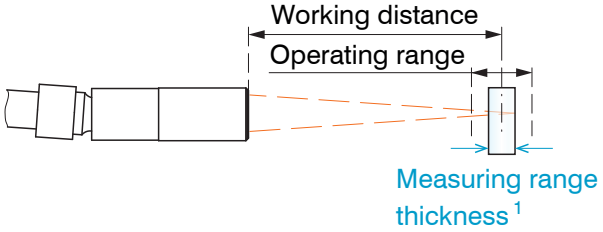
Positioning the Target, Thickness Measurement

The red-light pilot laser supports you in aligning the sensor to the target during commissioning.

Turn on or off the pilot laser in the menu `Settings` > `System settings`.

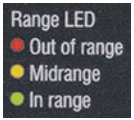
➡ Position the target (measurement object) as much as possible in the mid of the operating range.

The peak positions remains stable in the FFT signal, even though the measurement target moves. The peak position depends on the target thickness.



Basics thickness measurement

The LED `Range` on the controller front indicates the position of the target in relation to the sensor.



Red	No target or target outside the measuring range
Yellow	Target close to mid of measuring range
Green	Target within measuring range

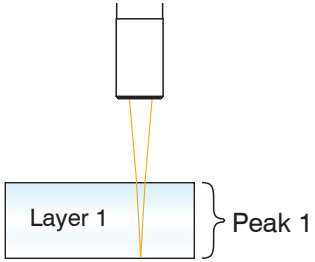
Green	Pilot laser is turned on and off alternately, if no target or outside the measuring range

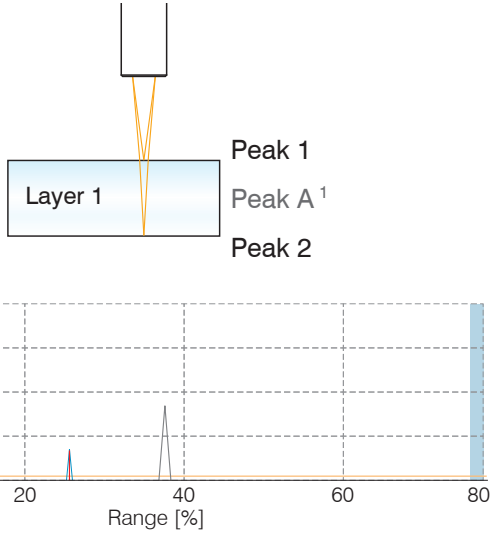
1) The maximum thickness for a air gap is 2.1 mm. The thickness for glass (n = 1.5) is 35 μm as a minimum and 1.4 mm as a maximum.

Measpeak Sorting

The selection of peak/peaks dictates which region in the signal is used for the distance or thickness measurement.

- Switch to material selection by going to `Settings` > `Data recording`.
- Switch to the chart type `FFT`.
- Choose between `First peak` and `Highest peak`.

<table>
<tr><th colspan="2">Controller IMC5400, IMC5600</th></tr>
<tr><th>Thickness</th><th>Distance</th></tr>
<tr>
<td>


The IMS5400-THxx evaluates one layer. The peak in the FFT signal already corresponds to the thickness. It is not necessary to decide between the first and highest peak.
</td>
<td>


The first peak is evaluated
</td>
</tr>
</table>

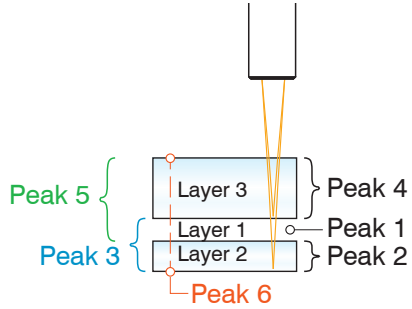
1) During a distance measurement on transparent objects, thickness peaks are displayed in addition to the distance peaks, but the controller does not evaluate them. For the sake of clarity, thickness peaks are marked with letters.

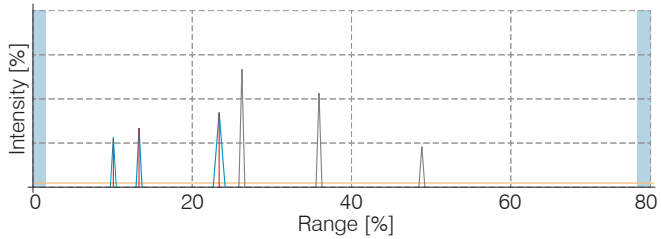
Controller IMC5400/MP, IMC5600/MP

Thickness

Each peak represents a thickness value. The peaks are counted starting at the start of the measuring range (for the thinnest layer) toward the end of the measuring range (for the thickest layer). Combined thicknesses of adjacent layers are also evaluated.

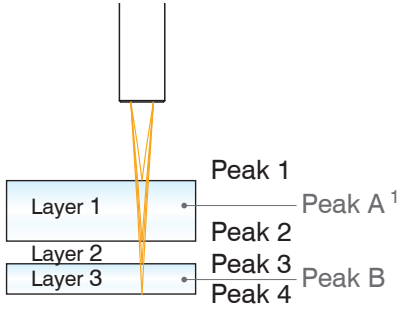
The material selection for a thickness measurement starts with the thinnest layer (layer 1) independent of the physical arrangement in the measuring object, see Chap. Material Selection.

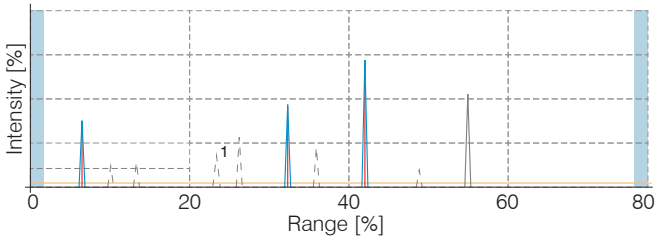




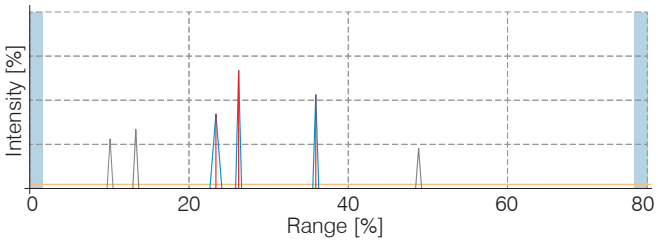
Distance

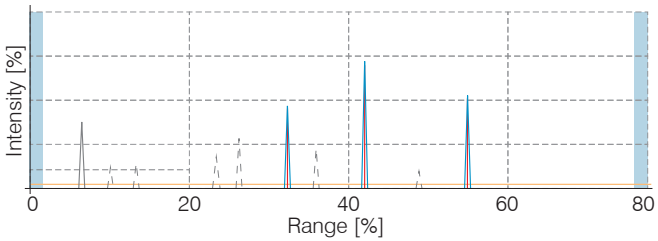
Each detected peak represents a distance value. The peaks are counted starting at the start of the measuring range (short distance between sensor and target) in the direction of the end of the measuring range (long distance between sensor and target).





Evaluation starts with the first peak, e.g. 3 out of 4 peaks





Evaluation starts with the highest peak, e.g. 3 out of 4 peaks

The number of peaks of the FFT signal that are used for evaluation in distance and thickness measurement are to be determined separately, see Chap. Number of Peaks.

In the case of a target consisting of several transparent layers, the material must be assigned for each layer, see Chap. Material Selection.

With distance measurements, the coating thickness can be calculated via signal processing, see operating instructions Chap. 7.3.

1) During a distance measurement on transparent objects, thickness peaks are displayed in addition to the distance peaks, but the controller does not evaluate them.

i This function is used if, before or between the useful peaks, a material has even smaller interfering peaks caused by thin layers on the target. This function should be used with caution and should only be used by product specialists.

Number of Peaks

Number of peaks of the FFT signal used for evaluation in distance and thickness measurement. The number of peaks can be selected in the `Settings` > `Data recording` > `Number of peaks`.

This function is possible for the following systems:

- IMS5400-DS19/MP: max. 13 layers or 14 distance peaks
- IMS5400-TH45/MP: max. 5 layers
- IMS5400-TH70/MP: max. 5 layers
- IMS5600-DS19/MP: max. 13 layers or 14 distance peaks

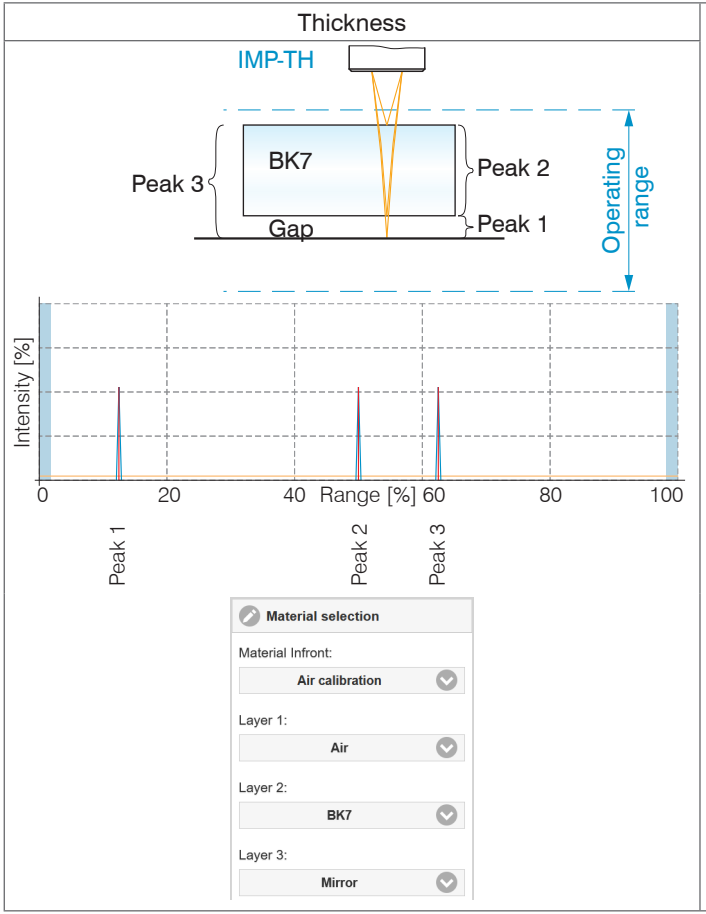
Make sure to count the peaks in the correct manner, see Chap. Measpeak Sorting.

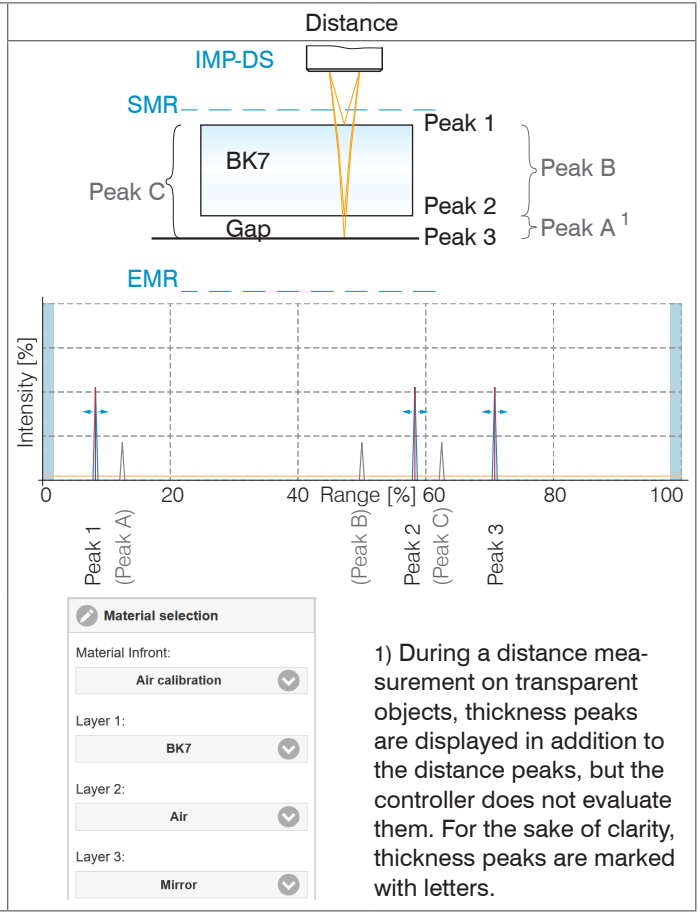
The standard systems IMS5400-DSxx, IMS5400-THxx and IMS5600-DSxx evaluate one layer.

i If no distances need to be determined for a measurement, Micro-Epsilon recommends using an IMS5400MP-THxx.

The material selection for a thickness measurement starts with the thinnest layer (layer 1) independent of the physical arrangement in the measuring object. The material selection for a distance measurement corresponds to the actual physical arrangement in the measuring object.

Example of a layer of glass and gap, measpeak sorting: First, corresponding material selection

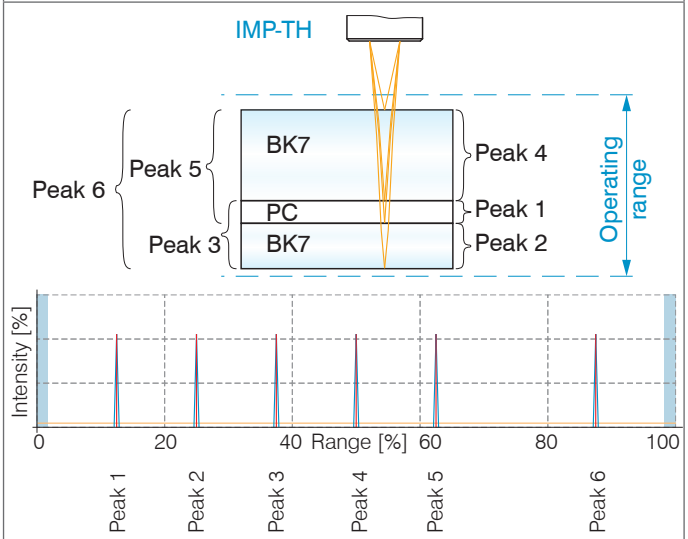




1) During a distance measurement on transparent objects, thickness peaks are displayed in addition to the distance peaks, but the controller does not evaluate them. For the sake of clarity, thickness peaks are marked with letters.

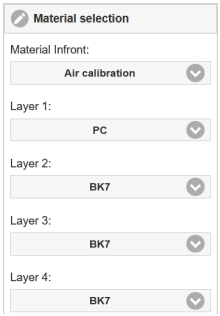
Example of laminated glass from three layers, measpeak sorting: First, corresponding material selection

Thickness

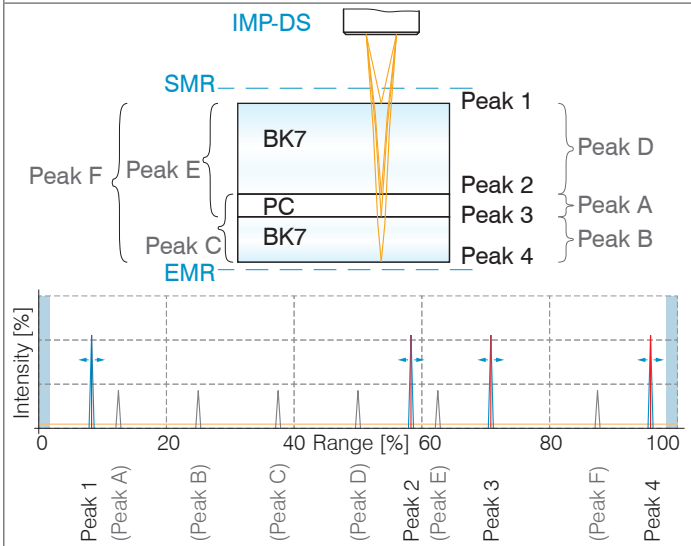


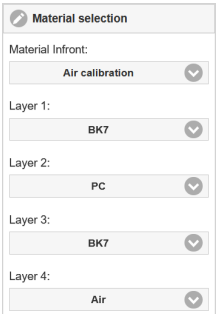
Layer 3 is the material selection for the combined layer [2] of peak 3.

2) The IMS5400-TH45/MP and IMS5400-TH70/MP controllers also evaluate combined thicknesses of the different layers.



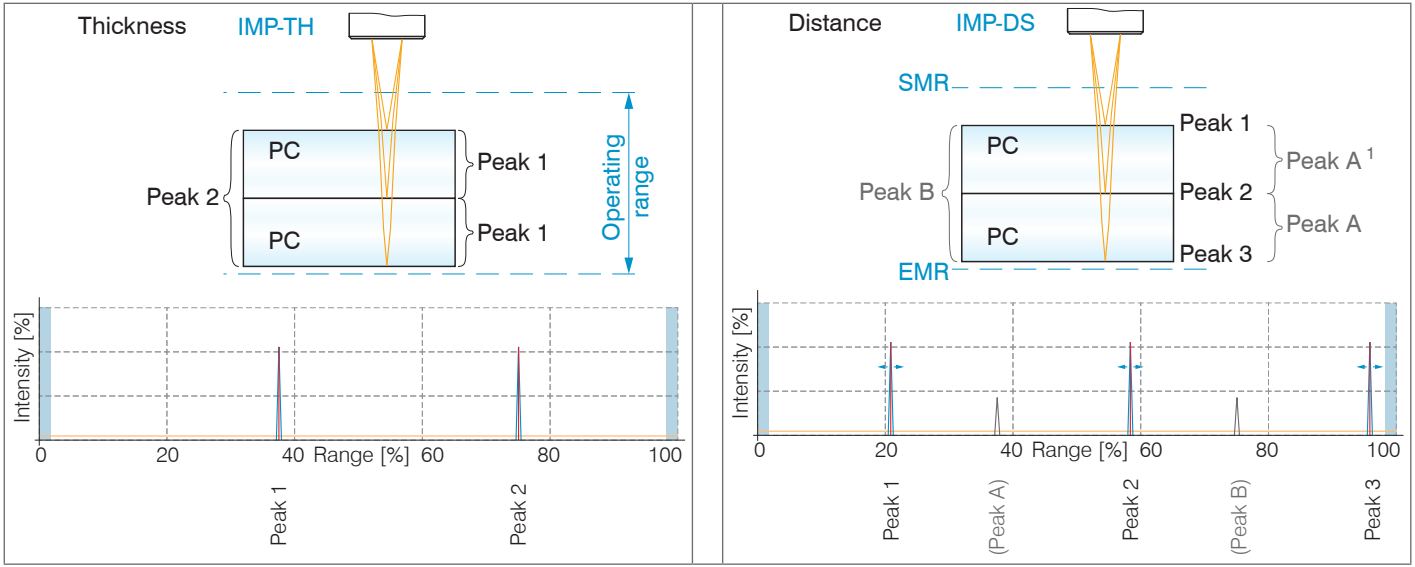
Distance





Thicknesses of combined layers with the same material can be measured using the IMS5400-THxx/MP controllers. If the layers cannot be separated or consist of different materials, the thickness can be determined using the IMS5400-TH/MP controllers and the signal processing (calculation programs).

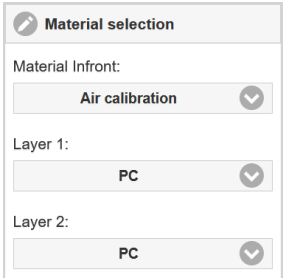
Example of two layers of the same thickness; measpeak sorting: First, corresponding material selection



Peak 1 is duplicated because the two layers of equal thickness are imaged in one peak.

Layer 2 is the material selection for the combined layer [2] of peak 2.

2) The IMS5400-TH45/MP and IMS5400-TH70/MP controllers also evaluate combined thicknesses of the different layers.

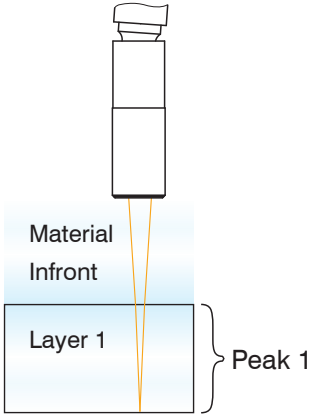
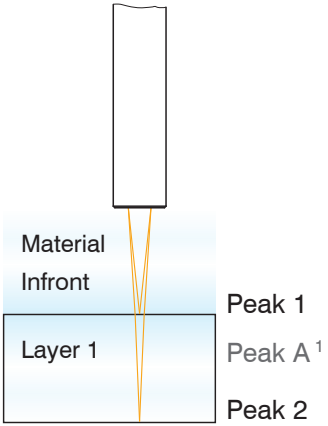


The thickness can also be determined from the distances using the calculation functions Thickness and Calculation, see operating instructions Chap. 7.3.

1) During a distance measurement on transparent objects, thickness peaks are displayed in addition to the distance peaks, but the controller does not evaluate them. For the sake of clarity, thickness peaks are marked with letters.

Material Selection

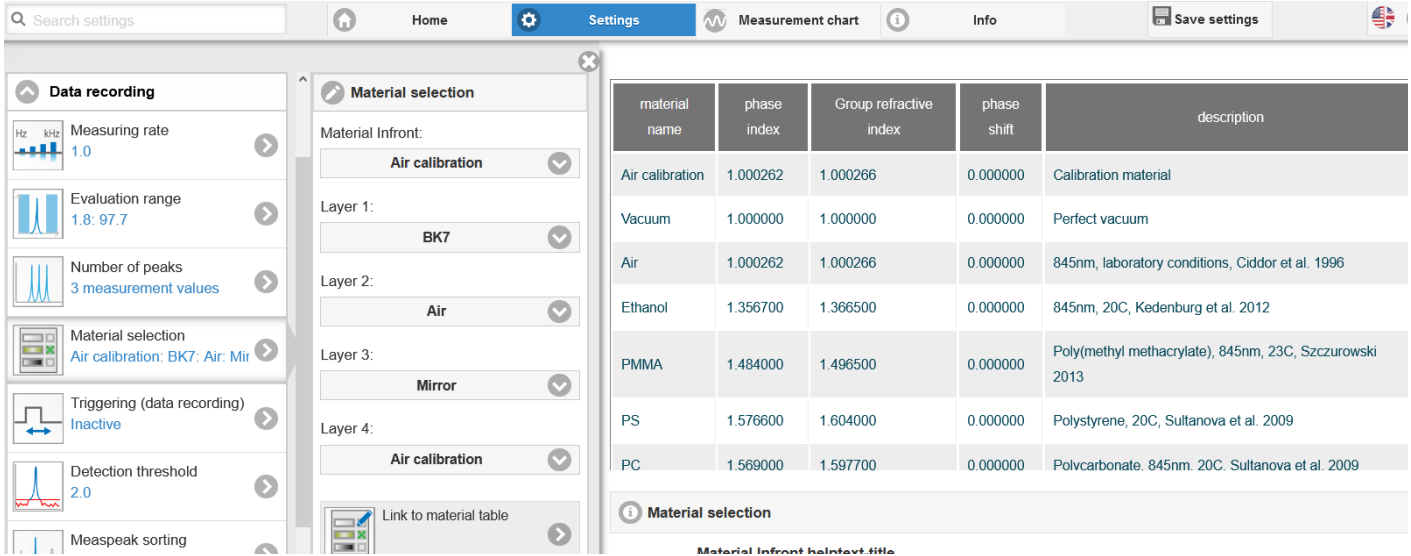
The refractive index needs to be corrected in the controller for an exact distance or thickness measurement. Only air may be present between the sensor face and the measuring object (`Material Infront`); other media such as water or alcohol are not permissible.

Thickness	Controller IMC5400, IMC5600	Distance
	➡ Switch to material selection by going to `Settings` > `Data recording`. ➡ Assign the material according to the target used.	

You can edit or add to the material table. For a new material, a phase index and group refractive index is required.

➡ Switch to the `Settings` > `Data recording` > `Link to material table` menu.

1) During a distance measurement on transparent objects, thickness peaks are displayed in addition to the distance peaks, but the controller does not evaluate them. For the sake of clarity, thickness peaks are marked with letters.



The surface area of the following material is also required for calculating the distances and thicknesses.

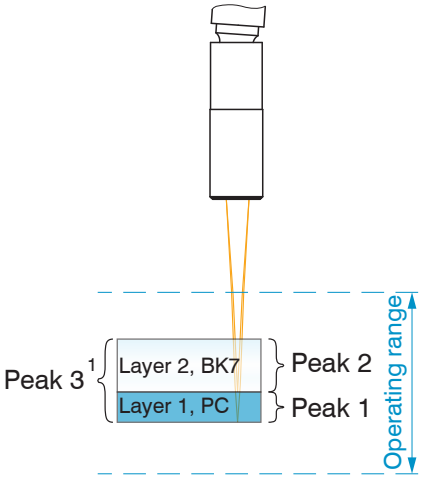
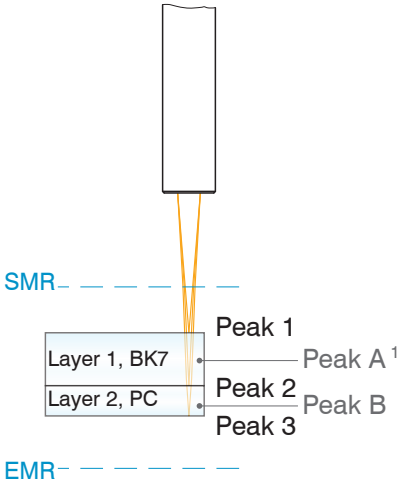
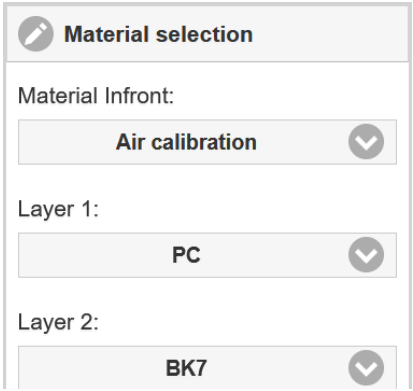
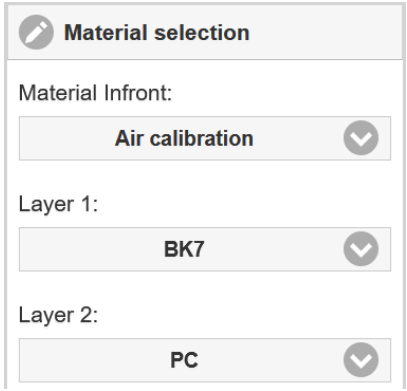
Click the icon to change an existing entry.

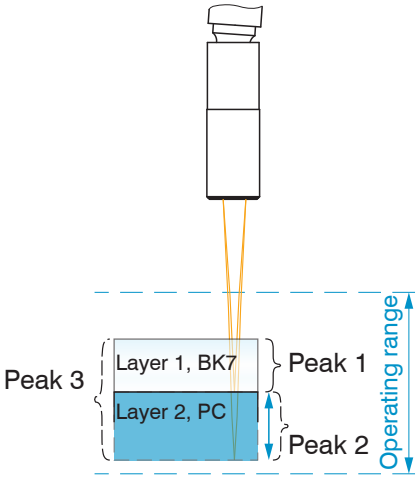
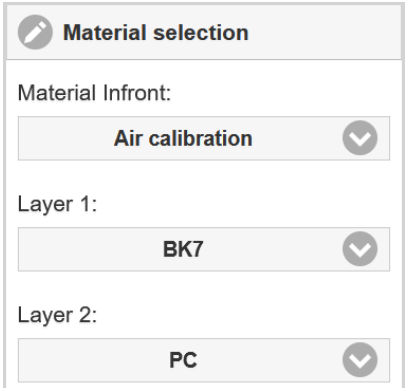
Click the icon to add another material.

Click the icon to save another or changed material.

Click the icon to cancel the operation without saving.

Click the icon to delete the entry.

Thickness	Controller IMC5400MP, IMC5600MP	Distance
	➡ Switch to material selection by going to `Settings` > `Data recording`.	
	➡ Assign the materials to the individual layers according to the target used.	
	The IMS5400-THxx and IMS5400-THxx/MP thickness systems output the coating thickness(es) directly. The IMS5x00-DSxx and IMS5x00-DSxx/MP distance systems calculate the layer thickness(es) from the distance values.	
	The material selection for a thickness measurement starts with the thinnest layer (layer 1) independent of the physical arrangement in the measuring object.	
	The material selection for a distance measurement corresponds to the actual physical arrangement in the measuring object.	

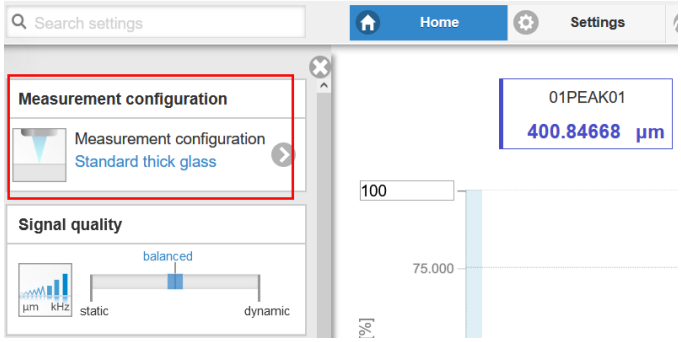
Thickness	Controller IMC5400MP, IMC5600MP	Distance
 	Compared to the example above, the thickness of the lower layer (blue) has increased and is larger than the upper layer. For this case, the material selection must be adjusted. In the FFT signal, peak 1 and peak 2 change places, see Chap. Measpeak Sorting. 1) The IMS5400-TH45/MP and IMS5400-TH70/MP controllers also evaluate combined thicknesses of the different layers. For peak 3, a corresponding material for layer 3 (= layer 1 + layer 2) is to be selected.	

Measurement Configuration

Common measurement configurations (presets) for various target surfaces are stored on the controller. This allows you to quickly start with your individual measurement task. In a preset the basic features like peak or material selection and calculation functions are already set.

Serial number 420120025

Option 000



The signal quality is set to `Balanced` at the factory.

➡ Go to the `Home` > `Measurement configuration` menu and start the `Measurement configuration`.
Select a configuration.

Then, you can apply your own settings (setups). When saving a modified preset, the web interface displays a dialog for entering a setup name. This prevents presets from being overwritten by accident.

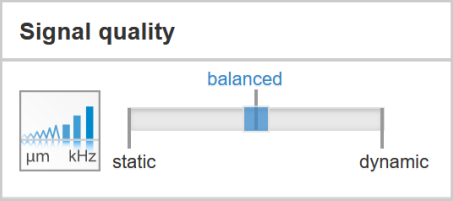
Data output only starts when the associated interface is activated.

Signal Quality

Using the `Signal quality` function, you can influence the measuring rate and the respective averaging.

Averaging with the `Median` function is specified by the preset.

The subsequent moving averaging is specified by the `Signal quality` function.

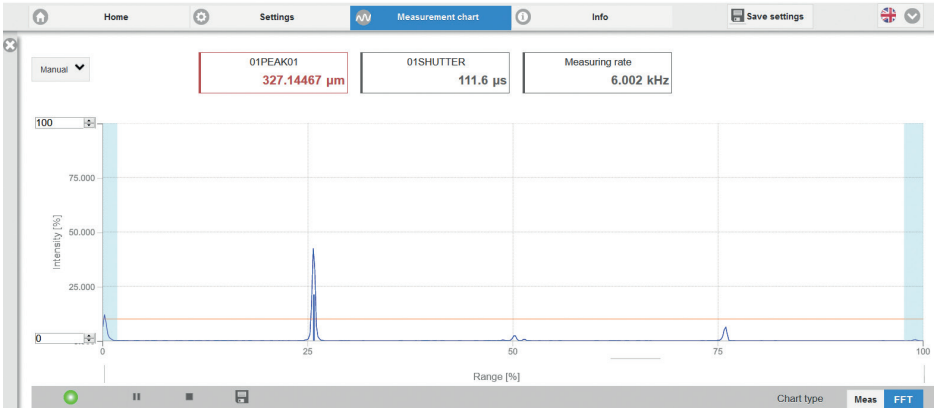


Averaging	Description
Static Moving with 128 values Measuring rate 0.2 kHz	In the signal quality section, you can switch between three basic settings (static, balanced and dynamic). The reaction in the chart and system configuration is immediately visible. i If the controller starts up with a user-defined measurement setting (setup), see Chap. 6.10, the signal quality cannot be changed.
Balanced Moving with 16 values Measuring rate 1 kHz	
Dynamic Moving with 4 values Measuring rate 6 kHz	

Individual material selection is possible in the `Settings` > `Data recording` > `Material selection` menu.

FFT Signal Check

Go to the `Measurement chart` menu. Show FFT signal display with `FFT`. The signal in the chart window shows the distance between sensor and target or the target thickness. Left 0 % (small distance) and right 100 % (large distance). The corresponding measured value is marked by a vertical line (peak marking). The diagram starts automatically when the website is called.



Distance and Thickness Measurement, Web Page Display

- Align the sensor vertically to the target object.
- Then, move the sensor (or the target) closer, until you more or less reach the start of measuring range for your sensor.

Once the object is within the sensor's measuring range, the `Range` LED (green or yellow) on the front of the controller will light up. Or, observe the FFT signal.

`Measurement` *web page (distance measurement)*

1 The LED visualizes the status of the transmission of measured values:
- green: transmission of measured values is running.
- yellow: waiting for data in trigger mode
- gray: transmission of measured values stopped

Data queries are controlled by using the `Play/Pause/Stop/Save` buttons of the measured values that were transmitted. `Stop` stops the diagram; data selection and zoom function are still possible. `Pause` interrupts recording. `Save` opens the Windows selection dialog for file name and storage location to save the FFT signals resp. measurement values in a CSV file (separation with semicolon).

➪ Click the button ▶ (Start), for starting the display of the measurement results.

2 Changes only take effect after clicking the `Save settings` button.

3 In the window on the left, the signals can be enabled or disabled both during and after the measurement. Inactive graphs are gray. Click on the check mark to add them. The changes take effect when saving the settings. Use the eye symbols to show and hide the single signals. The calculation continues in the background.
- 01PEAK01: Chronological sequence of displacement signal

4 `Auto` (= automatic scaling) or `Manual` (= manual setting) allow for scaling the measurement axis (Y axis) of the graphic.

5 The current values for distance, exposure time, current measuring rate and time stamp are displayed in the text boxes above the graphic. Errors are displayed as well.

6 Mouseover feature. When moving the mouse over the graph, curve points are highlighted with a circle symbol while the corresponding values are displayed in the text boxes above the graph.

7 X axis scaling: The total signal is zoomable with the slider on the left side during running measurement. The time range can be defined in the input field below the time axis. If the diagram is stopped, you can also use the right slider. The zoom window can also be moved with the mouse in the center of the zoom window (arrow cross).

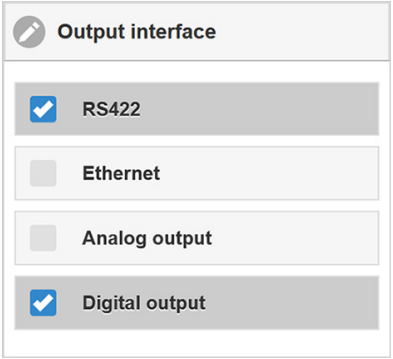
8 The two buttons allow to switch between FFT signal and measurement representation.

Data Output, Interface Selection

The controller supports

- three digital interfaces that can be used in parallel for data output,
  - Ethernet: enables fast data transfer, but provides no real-time capabilities (packet-based data transfer). Both measurement and FFT data can be transferred. For measurement value detection without direct process control, for subsequent analysis. Parameterization is provided through the web interface or ASCII commands.
  - RS422: provides an interface capable of real-time output at a lower data rate.
  - Switching/limit value output
- Analog output: outputs either voltage or current values.

➡ Switch to the `Settings` > `Outputs` > `Output interface` menu and select the desired output channels.



Selecting the required interfaces for data output

Ethernet

The controller transmits TCP/IP or UDP/IP packages with an Ethernet transfer rate of 10 Mbit/s or 100 Mbit/s. The transfer rate is selected automatically depending on the connected network or PC.

When transmitting measurement data to a measurement server, following successful connection (TCP or UDP), the sensor sends each measurement to the measurement server or to the connected client. No explicit request is necessary for this.

Distance and thickness values are transmitted as 32 bit signed integer value with 10 pm resolution.

Set IP Address

- Change to the menu `Settings > Outputs > Ethernet Settings` and enter the new IP address.
- Click on `Apply settings` to confirm.
- Start the web interface with the new IP address.
- Save the new device settings. Click on `Save settings`.

Disclaimer

All components of the device have been checked and tested for functionality in the factory. However, should any defects occur despite careful quality control, these shall be reported immediately to MICRO-EPSILON or to your distributor / retailer.

MICRO-EPSILON undertakes no liability whatsoever for damage, loss or costs caused by or related in any way to the product, in particular consequential damage, e.g., due to

- non-observance of these instructions/this manual,
- improper use or improper handling (in particular due to improper installation, commissioning, operation and maintenance) of the product,
- repairs or modifications by third parties,
- the use of force or other handling by unqualified persons.

This limitation of liability also applies to defects resulting from normal wear and tear (e.g., to wearing parts) and in the event of non-compliance with the specified maintenance intervals (if applicable).

MICRO-EPSILON is exclusively responsible for repairs. It is not permitted to make unauthorized structural and / or technical modifications or alterations to the product. In the interest of further development, MICRO-EPSILON reserves the right to modify the design.

In addition, the General Terms of Business of MICRO-EPSILON shall apply, which can be accessed under Legal details | Micro-Epsilon https://www.micro-epsilon.com/impressum/.

For translations into other languages, the German version shall prevail.

Service, Repair

If the sensor, controller or sensor cable is defective:

- If possible, save the current sensor settings in a parameter set to reload them into the controller after the repair.
- Please send us the affected parts for repair or exchange.

If the cause of a fault cannot be clearly identified, please send the entire measuring system to:

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info@micro-epsilon.com · www.micro-epsilon.com
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X9691389-B012102MSC