



Quick Manual
confocalDT IFD2410/2415
PROFINET

IFD2410-1
IFD2410-3
IFD2410-6

IFD2415-1
IFD2415-3
IFD2415-10

Inhalt

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You can find more information about the measuring system in the operating instructions. They are available online at:

<https://www.micro-epsilon.com/fileadmin/download/manuals/man--confocalDT-2410-2411-2415-PROFINET-en.pdf>

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General

Symbols used

The following symbols are used in this document:



Indicates a hazardous situation which, if not avoided, may result in minor or moderate injury.



Indicates a situation that may result in property damage if not avoided.



Indicates a user action.



Indicates a tip for users.

Measurement

Indicates hardware or a software button/menu.

Warnings



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 sensor

When all interfaces are used, the sensor surface heats up to more than 50 °C.

> Risk of injury



Avoid shocks and impacts to the sensor.

> Damage to or destruction of the sensor

The supply voltage must not exceed the specified limits.

> Damage to or destruction of the sensor

Protect the cables against damage.

> Failure of the measuring device

Intended use

- The measuring system is designed for use in an industrial environment. It is used for
 - measuring displacement, distance and thickness
 - measuring the position of parts or machine components
- The measuring system must only be operated within the limits specified in the technical data.
- ➔ The measuring system must only be used in such a way that no persons are endangered or machines are damaged in the event of malfunction or total failure of the sensor.
- ➔ Take additional precautions for safety and damage prevention in case of safety-related applications.

Proper environment

- Sensor protection class: IP64, front side
- Temperature range (operation): +5 ... +50 °C
- Temperature range (storage): -20 ... +70 °C
- Humidity: 5 ... 95% (non-condensing)
- Ambient pressure: Atmospheric pressure
- Shock (DIN EN 60068-2-27): 15g / 6 ms in XY-axis, 1000 shocks each
- Vibration (DIN EN 60068-2-6): 2g / 20 ... 500 Hz in XY-axis, 10 cycles each

Glossary

SMR Start of measuring range

MMR Mid of measuring range

MR Measuring range

EMR End of measuring range

Minimum target thickness see Technical Data, Operating Instructions

Maximum target thickness Sensor measuring range x Refractive index of target

Mechanical fastening

Preliminary remarks

IFS241x optical sensors operate in the μm range. Observe the maximum tilt between sensor and target.

- Ensure careful handling during installation and operation!

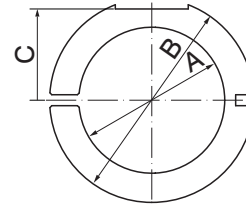
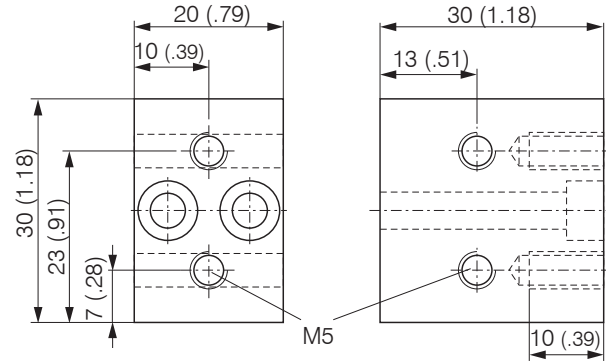
Circumferential clamp

➡ Use an adapter to mount the IFD241x sensors.



Circumferential clamp with MA240x mounting ring, consisting of mounting block and mounting ring

- Micro-Epsilon recommends using the circumferential clamp.

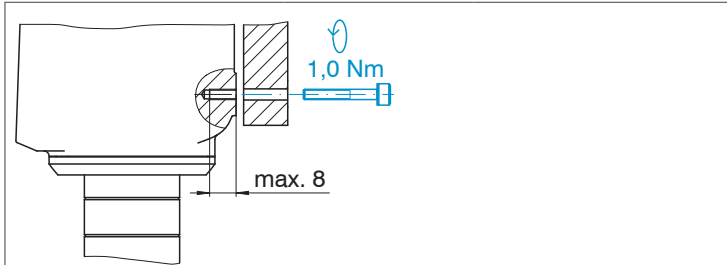


Mounting ring	Dimension A	Dimension B	Dimension C
MA2400-27	ø27	ø46	19.75
MA2405-34	ø34	ø50	22
MA2405-54	ø54	ø70	32

Mounting block and mounting ring MA240x

Direct fastening

➔ Mount the sensor via three M3 screws.



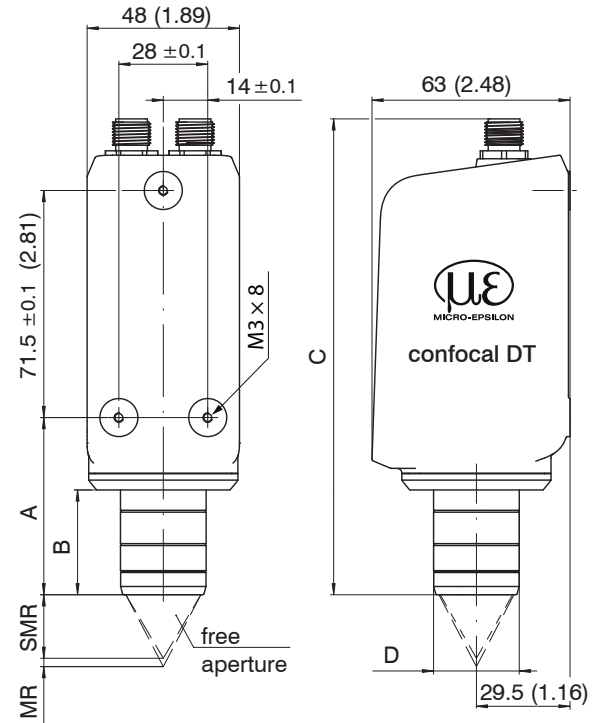
Screw-in depth		Screw	Tightening torque
Minimum	Maximum		
mm	mm	ISO 4762 3 pieces	Nm
6	8	M3	1.0

Mounting conditions

IFD2410-	1	3	6
MR	1	3	6
SMR	15	25	35
A	56		
B	33		
C	150		
D	27		

IFD2415-	1	3	10
MR	1	3	10
SMR	10	20	50
A	82	85	118
B	59	62	---
C	176	179	212
D	27	34	54

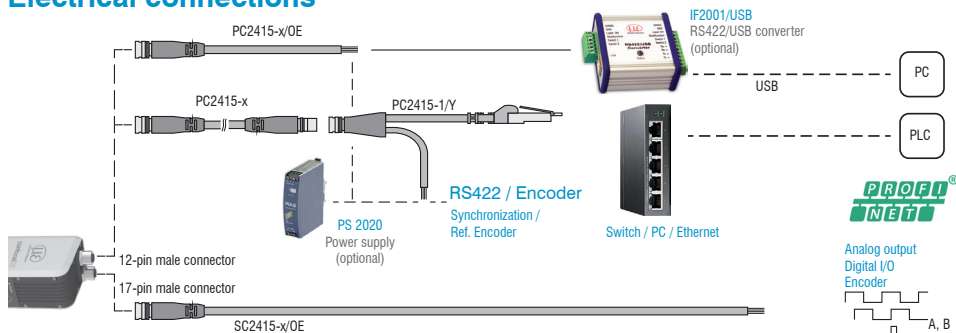
Dimension in millimeters



Dimensional drawing IFD2410 / IFD2415, dimensions in mm

The support surfaces around the fastening holes are slightly raised.

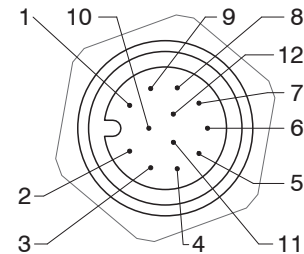
Electrical connections



The PC2415-1/Y cable is included in the scope of delivery. Characteristics PC2415-1/Y:

- Power supply
- Ethernet
- RS422 and synchronization or encoder

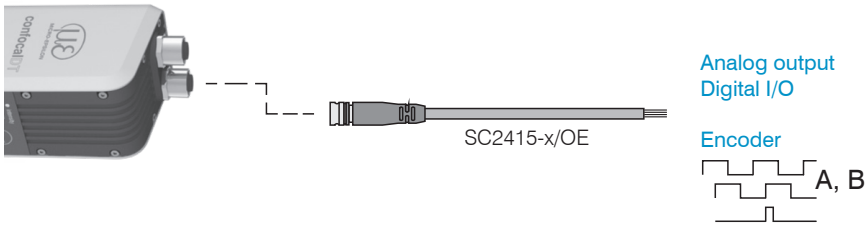
Other cables are available as optional accessory.



12-pin sensor connector, pin side

- 1) You can use the pins for
- serial communication (TIA/EIA-422-B) and synchronization or
 - encoder signals.

IFD2410/2415, 12-pin connector		PC2415-x/OE	PC2415-1/Y	IF2001	
Signal	Pin	Wire color	Wire color	RJ45, pin	Signal
V ₊	1	Red	Red	---	24V DC
Supply GND	2	Blue	Blue	---	GND
Data Rx+	Encoder 2A+ ¹	3	Brown	---	Tx+
Data Rx-	Encoder 2A-	4	White	---	Tx-
Data Tx+	Encoder 2B+	5	Green	---	Rx+
Data Tx-	Encoder 2B-	6	Yellow	---	Rx-
SYNC+	Encoder 2Ref+	7	Gray	---	---
SYNC-	Encoder 2Ref-	8	Pink	---	---
Shield	Housing	Black	Black	---	---
Industrial Ethernet	9	White/green	---	3	---
	10	Green	---	6	---
	11	White/orange	---	1	---
	12	Orange	---	2	---



IFD2410/2415, 17-pin connector		SC2415-x/OE	
Signal	Pin	Wire color	
Analog output	1	White, inside	
Analog GND	2	Black ¹	
Switching output 2 GND	3	Black	
Switching output 2	13	Violet	
Multifunction input 1	5	Red	
Multifunction input 2	14	Blue	
Encoder 1B+	8	Gray	
Encoder 1B-	15	Pink	
Encoder 1Ref+	9	Green	
Encoder 1Ref-	16	Yellow	
Switching output 1 GND	10	Brown	
Switching output 1	11	White	
Encoder 1A-	12	Red/ blue	
Encoder 1A+	17	Gray/pink	

1) Analog output in shielded cable area

Characteristics SC2415-x/OE:

- Analog output
- Switching outputs
- Encoder

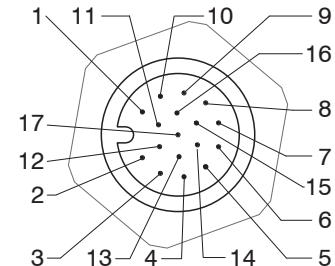
The SC2415-x/OE cable is available as an optional accessory.

The GND connections of the switching outputs are separated from the supply GND by filters.

The GND connections of the switching outputs are separated from analog GND by filters.

The GND connections are not electrically separated.

I For reasons of interference immunity, use the associated GND connection for the analog output and the two switching outputs.

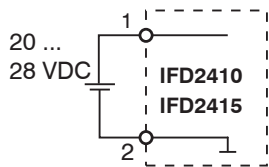


17-pin sensor connector, pin side

Supply voltage

Nominal value: 24 V DC (20 ... 28 V, $P < 7$ W).

The sensor is supplied via cable PC2415-1/Y or PC2415-x/OE.



Sensor 12-pin connector	Power supply	PC2415-1/Y PC2415-x/OE
1	V_+	Red
2	GND	Blue

Voltage supply only for measuring devices, not to be used for drives or similar sources of impulse interference at the same time. MICRO-EPSILON recommends using the optionally available PS2020 power supply unit for the sensor.

- ➡ Only turn on the power supply after wiring has been completed.
- ➡ Connect the inputs Pin 1 and Pin 2 at the sensor with a 24V power supply.

RS422 connection with USB converter IF2001/USB

In addition to Industrial Ethernet, the sensor also supports serial communication via RS422. The PC2415-1/Y or PC2415-x/OE cables enable serial communication. The IF2001/USB RS422-to-USB converter is available as an optional accessory.

Characteristics: Differential signals according to EIA-422, galvanically connected to the supply voltage.

- ➡ Use a shielded cable with twisted wires.
Cable length must be less than 30 m.
- ➡ Connect the ground connections.

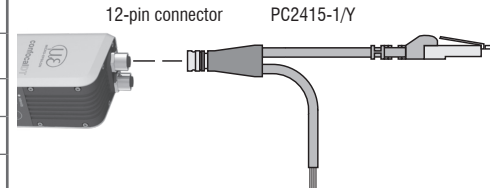
Sensor 12-pin connector	Signal	PC2415-1/Y PC2415-x/OE	IF2001/USB
3	RX +	Brown	TX +
4	RX -	White	TX -
2	Supply GND (blue)		GND
5	TX +	Green	RX +
6	TX -	Yellow	RX -
Housing	Shield	Cable shield	---

Ethernet, PROFINET

Connection

- to an Ethernet network (PC) or
- to the PROFINET bus system (IN port).

IFD2410/2415, 12-pin connector		PC2415-x/OE	PC2415-1/Y
Signal	Pin	Wire color	RJ45, pin
Industrial Ethernet	9	White/green	3
	10	Green	6
	11	White/orange	1
	12	Orange	2



➡ Connect the IFD2410/2415 and network with a shielded Ethernet cable (Cat5E, patch cable 2 m from the scope of delivery, total cable length less than 100 m).

The two LEDs S_F and B_F indicate that the connection was successful and is active.

The measuring device can be configured via Records (PROFINET, the web interface or by ASCII commands at command level (e.g. Telnet).

Sensor LEDs

LED	Color	Status	Meaning
Intensity	Red	flashes	Dark signal acquisition in progress
	Red	illuminated	Signal saturated
	Yellow	illuminated	Signal too low
	Green	illuminated	Signal OK
Range	Red	flashes	Dark signal acquisition in progress
	Red	illuminated	No target present, outside of measuring range
	Yellow	illuminated	Target close to mid of measuring range
	Green	illuminated	Target within the measuring range
SF		off	No error
	Red	flashing, approx. 1 Hz	DCP signal service is triggered by the bus
	Red	illuminated	Watchdog time-out; channel, generic or extended diagnosis exist; system error
BF		off	No error
	Red	flashing, approx. 2 Hz	No data exchange
	Red	illuminated	No configuration; or slow physical connection or no physical connection at all



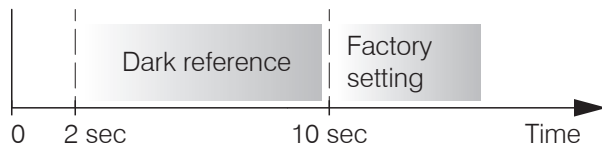
Correct button

The **Correct** button is assigned multiple functions. The button is assigned the Dark correction function at the factory.



Function	Dark correction	<i>Starts dark referencing</i>
	Factory settings	Resets the device and measurement settings to factory settings.

The selected function is indicated by the flashing/illuminated Range and Intensity LEDs.



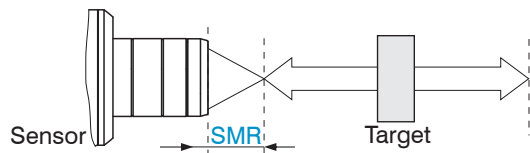
Actuation time of **Correct** button

The **Correct** button is not assigned a keylock in the factory. You can optionally deactivate or lock the key to prevent incorrect operation.

Set to factory setting: Hold the button for longer than 10 s.

Resetting to factory settings does not change the IP address or the PROFINET name.

Start of measuring range



An offset distance (SMR) between the sensor and the target must be kept.

Start of measuring range (SMR), the shortest distance between the front surface of the sensor and the target

Commissioning

A web server is implemented in the measuring system; the web interface displays, among other things, the current settings of the sensor. Operation is only possible while there is an Ethernet connection to the sensor.

- The measuring system is ready for operation approx. 3 s after applying the supply voltage.
- ℓ To ensure precise measurements, let the measuring system warm up for approx. 50 minutes.

The sensors start with the last stored operating mode. PROFINET is set by default.

- The measuring system has no IP address by default. The IP address and the device name are assigned via the PROFINET Discovery Protocol. The IP address and the device name can be assigned, e.g., via the TIA Portal software.

➡ Choose between the two following operation modes.

PROFINET operation (standard)

➡ Assign an IP address to the sensor/controller.

You can find an example of this in the operating instructions, Chap. A5.

➡ Start your web browser and type the IP address of the sensor/controller into the address bar.

Firmware update is possible with PROFINET operation.

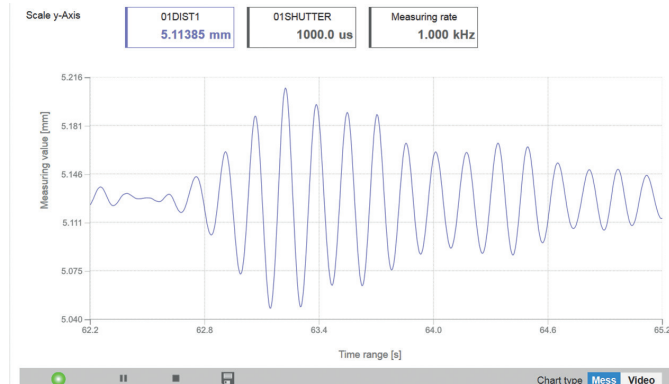
Communication via RS422

- Programming via web interface
 - Programming on command level, e.g., with Telnet
 - Data output via RS422
- ➡ Connect the sensor, e.g. via an IF2001/USB RS422 converter from Micro-Epsilon via USB to a PC.

Access via web interface

➡ Launch the web interface of the measuring system.

Interactive web pages for configuring the measuring system now appear in the web browser. The measuring system is active and provides measured values. Real-time measurement with the web interface is not guaranteed. The currently running measurement can be controlled using the function buttons in the `Chart` type section.



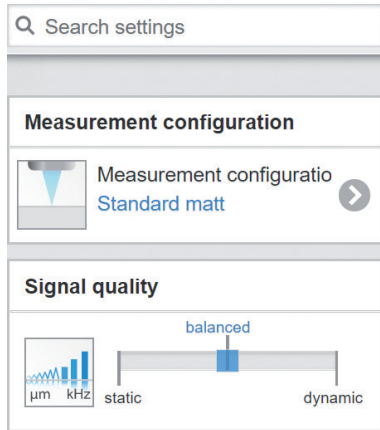
First page after web interface has been accessed in Ethernet mode

You can switch between the video signal and a display of the measured values over time for configuration. The appearance of the web sites can change depending on the functions. Dynamic help texts with excerpts from the operating instructions assist you in configuring the measuring system.

• Depending on the selected measuring rate and the PC used, measured values may be reduced in the display. This means that not all measured values are sent to the web interface for display and saving.

The horizontal navigation contains the following functions:

- Home. The web interface automatically starts in this view with Measurement Chart, Measurement configuration and Signal quality.
- Settings. Configuration parameters, including triggering, measuring rate and zeroing/mastering.
- Measurement chart. Measurement chart or show video signal.
- Info. Contains information on the sensor, including measuring range, serial number and software version.
- Web interface language selection

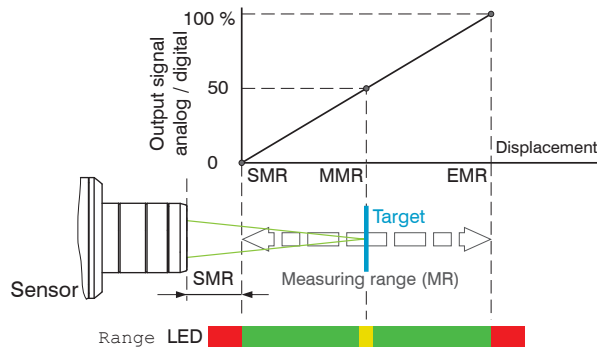


The vertical navigation is contextual to the selection in the horizontal navigation and contains the following functions for the Home menu:

- The `Search settings` function permits time-saving access to functions and parameters.
- `Measurement configuration`. Enables selection of predefined measurement settings.
- `Signal quality`. By mouse click it is possible to switch between three predefined basic settings for the measuring rate and the averaging.

Positioning the target

➡ Position the target as centrally as possible within the measuring range.



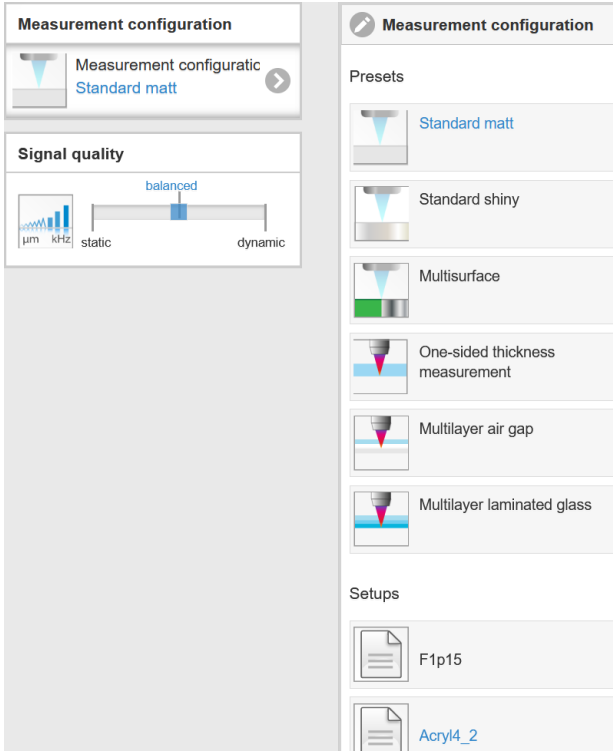
- intensity
- range

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

The `Range LED` on the front of the sensor indicates the position of the target relative to the sensor.

Presets, setups, measurement configuration selection, signal quality

- Preset: Manufacturer-specific program with settings for frequent measurement tasks; cannot be overwritten
- Setup: User-specific program with relevant settings for a measurement task
- Initial setup at boot (sensor start): a favorite can be selected from the setups, is automatically activated at sensor start. If no favorite is selected, the sensor activates the `Standard` preset at startup.



Upon delivery of the measuring system from the factory:

- the presets `Standard matt`, `Standard shiny`, `Multisurface` and `One-sided thickness measurement` are available
- for the IFD2415 sensor, the presets `Multilayer air gap` and `Multilayer laminated glass` are also available,
- no setup is available.

You can select a preset in the tab

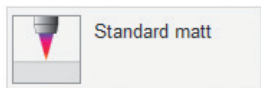
Home > Measurement configuration

You can select a setup in the tab

Home > Measurement configuration or
Settings in the menu System settings >
Load & Save

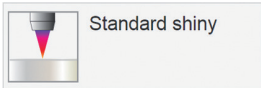
A setup can be permanently saved in the measuring system.

These presets enable quick startup of the respective measurement task. Basic features to suit the target surface, such as peak and material selection and the calculation functions are already set in the preset.



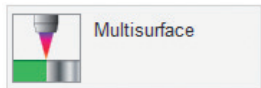
Standard matt

Distance measurement e.g. for ceramic material, non-transparent plastics. Highest peak, averaging, distance calculation.



Standard shiny

Distance measurement e.g. for metal, polished surfaces. Highest peak, median over 5 values, distance calculation.



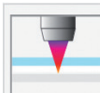
Multisurface

Distance measurement e.g. for PCBs, hybrid materials. Highest peak, median over 9 values, distance calculation.



One-sided thickness measurement

One-sided thickness measurement, e.g., for glass, BK7 material. First and second peak, averaging, thickness calculation.



Multilayer air gap

One-sided thickness measurement 2 against glass, 1st layer BK7, 2nd layer vacuum, first and second peak, 3 measured values, median over 5 values, thickness calculation.



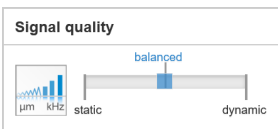
Multilayer laminated glass

Layer thickness measurement 2 against laminated glass, e.g. windshield, 1st layer BK7, 2nd layer PC, 3rd layer BK7, 1st and 2nd peak, 4 measured values, thickness calculation.

1) Values apply to the presets `Standard matt` and `One-sided thickness measurement` presets

2) Possible only with IFD2415

For all presets, the measurement task can be individually adapted via the `Signal quality` slider. Reducing the measuring rate increases the exposure time for the line and thus improves the measurement quality.

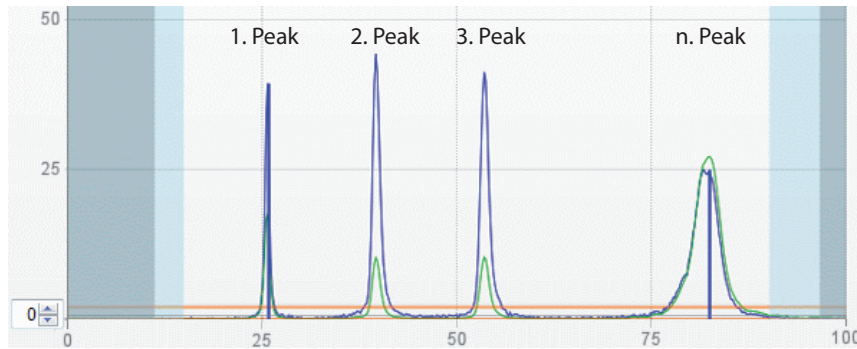


Measuring rate ¹	Averaging ¹	Description
0.2 kHz	Static Moving, 128 values	Three predefined basic settings (Static, Balanced and Dynamic); a change via mouse click is immediately visible in the diagram and the system configuration. 1 If the sensor starts up with a user-defined measurement setting (setup), the signal quality cannot be changed.
1 kHz	Balanced Moving, 16 values	
5 kHz	Dynamic Moving, 4 values	

Checking the video signal, peak selection

The video signal shows the determined reflections at the measuring object as a raw signal. The peaks are counted starting at the start of the measuring range toward the end of the measuring range. The corresponding measured value is marked by a vertical line (peak marking).

➔ Go to the `Measurement chart` menu. Display the video signal with `Video`. Adjust the settings for the exposure mode and measuring rate parameters.



The selection of peak/peaks dictates which regions in the signal are used for the distance or thickness measurement. For a measuring object consisting of several transparent layers, use the refractive index correction to compensate for the distance measurement errors caused by optical factors, see operating instructions.

Video signal with four peaks in the measuring range

1 measurement value	First peak / highest peak / last peak
2 measurement values	First and second peak / first and last peak / second to last and last peak / highest and second highest peak
3 measurement values	All peaks above the intensity threshold are evaluated in ascending distance order.
4 measurement values	
5 measurement values	

Options for peak selection

The `Standard`, `Standard shiny` and `Multisurface` presets use the highest peak.

The preset `One-sided thickness measurement` uses the 1. and 2. peak for the calculation of the measured value.

➔ Go to the `Data Recording > Settings > Peak selection` menu to select a different peak.

Distance measurement with website display

- ➡ Align the sensor perpendicularly to the object to be measured.
- ➡ Then gradually move the sensor (or the measuring object) closer from a distant position until the sensor's start of the measuring range is approximately reached.

As soon as the object is within the measuring field of the sensor, the sensor's Range LED lights up (green or yellow). Alternatively, you can watch the video signal.



Measurement (*distance measurement*) web page

1 The LED visualizes the state of measured value transmission.


- green: measured value transmission in progress
- yellow: waiting for data in trigger state
- gray: measured value transmission paused

The data query is controlled with the `Play/Pause/Stop/Save` buttons of the measured values that were transmitted. `Stop` stops the diagram; you can still continue to use the data selection and zoom functions.

`Pause` pauses the recording. `Save` opens a Windows selection dialog for the file name and storage location to save the last 10,000 values in a CSV file (separation using semicolon).

 Click on the  button (Start) to display the measurement results.

2 In the left-hand window, the signals of channel 1/2 to be displayed can be switched on or off during or after the measurement. Inactive curves are grayed out and can be added by clicking on the check mark. The changes become effective when you save the settings.

You can show or hide the individual signals using the eye symbols . The calculation continues in the background.

- `0xSHUTTER`: Exposure time
- `0xINTENSITY`: Signal quality of the underlying peak in the video signal
- `0xDIST`: Distance signal curve over time

3 To scale the measurement value axis of the graph (y-axis), you can use `Auto` (= automatic scaling) or `Manual` (= manual scaling).

4 All changes only become effective when you click on the `Save settings` button.

5 Current values for distance, exposure time, current measuring rate and time stamp are shown in the text boxes above the graph. Errors are also displayed.

6 Mouseover function. When the chart has been stopped and you move the mouse over the graph, points on the curve are marked with a circle and the associated values are displayed in the text boxes above the graph. The intensity bars are also updated.

7 Peak intensity is displayed as a bar chart.

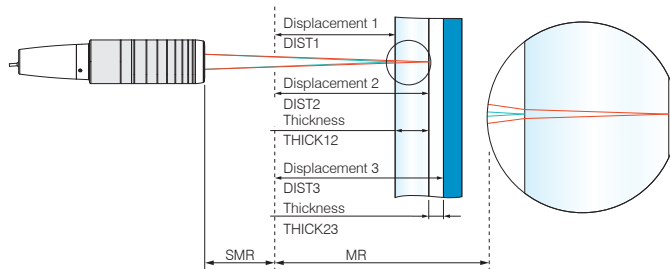
8 Scaling the x-axis: During an ongoing measurement, you can use the left-hand slider to enlarge the entire signal (zoom). The time range can also be defined using an input field under the time axis. When the chart has been stopped, the right-hand slider can also be used. You can also move the zoom window with the mouse in the center of the zoom window (four-sided arrow).

One-sided thickness measurement, transparent target

To measure the thickness of a transparent object on one side, the controller evaluates two signals reflected from the surfaces. Based on these two signals, the controller calculates the distances from the surfaces and, from this, derives the thickness.

➤ Align the sensor perpendicularly to the object to be measured. Make sure that the target is approximately in the mid of the measuring range ($SMR + 0.5 \times MR$).

i The light beam must strike the surface of the object at a perpendicular angle. Otherwise, measurements might be inaccurate.



One-sided thickness measurement of transparent measuring object

Select preset

confocalDT IFD2410

➤ Choose `One-sided thickness measurement` in the configuration selection.

confocalDT IFD2415

➤ Switch to the `Home` menu.

➤ Choose `Multilayer airgap` in the configuration selection.

This presetting prompts the sensor to use the first and second peak in the video signal for the thickness calculation.

Material selection

Specifying the material is essential for calculating a correct thickness value. To compensate for the spectral change of the index of refraction, at least three refractive indices at different wavelengths or a refractive index and the Abbe number must be known.

➤ Switch to the `Settings > Data recording > Material selection` menu.

➤ Select the material of the measuring object for `Layer 1` and possibly `Layer 2`.

Video signal

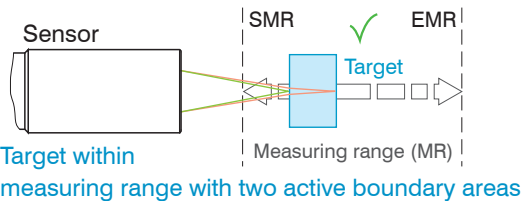
If a surface of the target lies outside the measuring range, the controller will send only one signal for the distance, intensity and center of gravity. This may also occur if a signal is below the detection threshold.

Two boundary surfaces are active when the thickness of a transparent material is measured. As a result, two peaks are visible in the video signal.

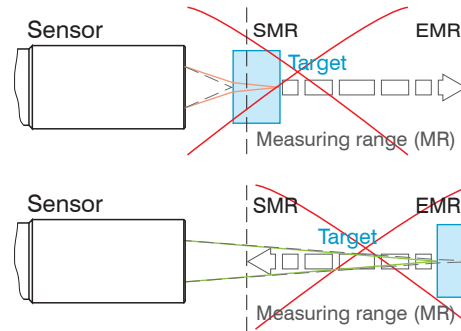
Even if the detection threshold is below the saddle between the two peaks, the controller can determine both distances and calculate the thickness from them.



Video signal (*thickness measurement*)
web page



Measurement arrangement for thickness measurement No thickness measurement possible

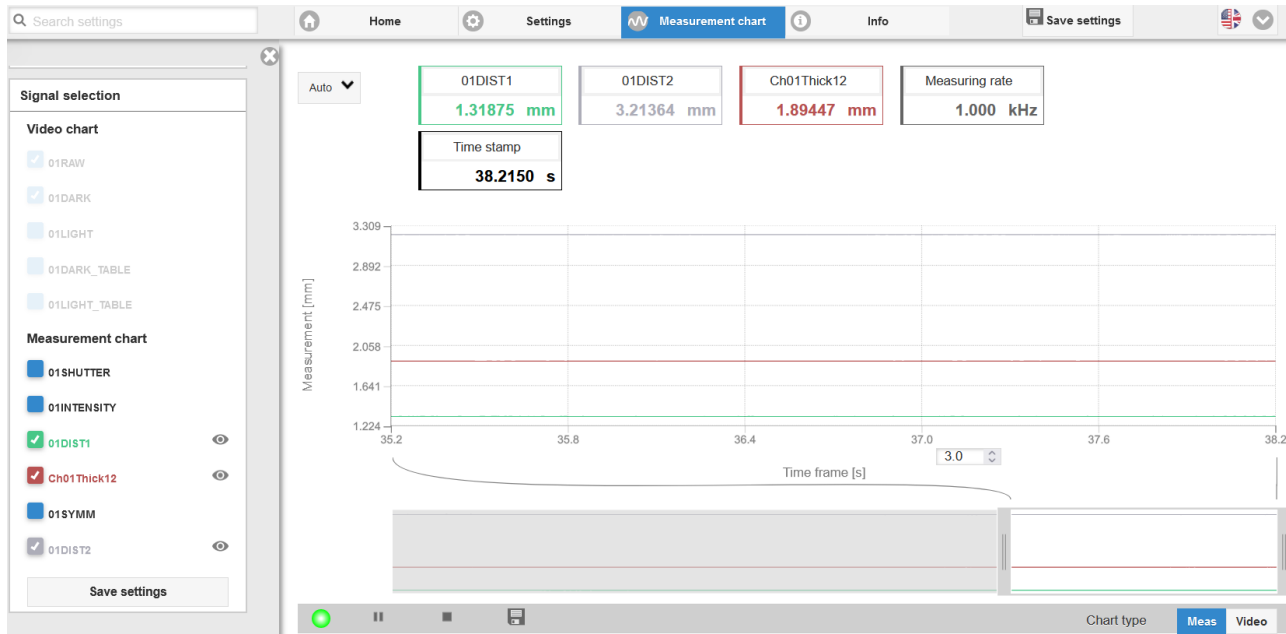


Measuring object only partially in the measuring range

Measurement chart for thickness measurement

➡ Switch to the **Measurement chart** tab and select **Meas** as the chart type.

The web page shows the two distances and the thickness **Ch01Thick12** (difference between **01DIST2** and **01DIST1**) graphically and numerically. Optionally, the intensities of both peaks (**Peak 1 = near**, **Peak 2 = far**) can also be displayed.



Saving the settings

➔ Go to the **SETTINGS** menu.

This menu enables you to save current device settings in the controller or activate saved settings. You can permanently save eight different parameter sets in the controller.

Unsaved settings will be lost when the device is switched off. Save your settings in Setups.

The screenshot displays the 'Settings' menu of a device. The top navigation bar includes a search field, 'Home', 'Settings' (active), 'Measurement...', 'Info', and 'Save settings'. The left sidebar lists various settings categories: Sensor, Inputs, Data acquisition, Signal processing, Postprocessing, Outputs, and System settings. The 'Load & Save' panel is open, showing 'Measurement settings' with a 'New setup' button (labeled 'A') and 'Saved measurement settings' with 'F1p15' (labeled 'B') and 'Acryl4_2'. Below this is the 'Device settings' section with a 'Manage setup' button. Two panels are also visible: 'Measurement Settings' for 'F1p15' with 'Load', 'Save', 'Favorite', and 'Delete' buttons, and 'Device Settings' with 'Load' and 'Save' buttons. Both panels include 'Import/Export' sections with search and action buttons, and an 'Info' button at the bottom.

PROFINET documentation

The sensor starts with the last stored operating mode. PROFINET is set by default.

PROFINET operation enables easy parameter setting of a sensor via web interface and Records.

The FD241x is a PROFINET IO device that can exchange data cyclically and acyclically with a PROFINET IO controller.

The IFD241x sensor supports PROFINET with RT (Real-Time Communication).

PROFINET IRT (Isochronous Real-Time Communication) is currently not supported.

	IFD2410-x, IFD2411-x	IFD2415-x
Maximum measurement frequency (RT)	8 kHz (via oversampling)	25 kHz (via oversampling)
Minimum bus cycle period (RT)	1 ms	
Supported I&M records	0 to 3	
Minimum cyclic process data size	4 bytes	
Maximum cyclic process data size	704 bytes (max. 22 submodules * oversampling 8 * 4 bytes)	2700 bytes (max. 27 submodules * oversampling 25 * 4 bytes) 1440 bytes are transmitted
Number of input modules	8	25
Number of input submodules	176 (max. 22 submodules * oversampling 8)	675 (max. 27 submodules * oversampling 25)

In the delivery state, the IFD241x has no IP address and also no device name. These settings must be made once.

The IP address and the device name are assigned via the PROFINET Discovery Protocol. The IP address and the device name can be assigned, e.g., via the [TIA Portal](#) software.

- 1 To use the IFD241x, you need the corresponding GSDML file. This is an XML file that you must include in your PLC environment
- 1 Define the modules in the device overview. Note the instructions and examples for acyclic reading and writing of records, see operating instructions, Chap. 8.5.

Data format, little-endian

The IFD241x sends the cyclic process data in little-endian format. The acyclic demand data is also in little-endian format; records are read as little-endian and must also be written as little-endian. If the PLC uses the big-endian format, the byte order must be swapped.

AllenBradley	Big-endian
BECKHOFF	Big-endian
Festo	Little-endian

Omron	Big-endian
SIEMENS S7-300	Big-endian
SIEMENS S7-1200/150	Little-endian

- No further communication via the fieldbus is required. Each measurement value has a DWORD.
- 1 DWORD = 2 WORD = 4 BYTES = 32 bits.

Output value	PROFINET, min	PROFINET, max	Scaling	Unit	IFD2410	IFD2415
0xRAW (512 x 16 bits)	0	4095	value / 4096 * 100	%	X	X
0xSHUTTER	0	UINT32_MAX	Value / 36	μs	X	X
0xENCODER1	0	UINT32_MAX	Value	Encoder ticks	X	X
0xENCODER2	0	UINT32_MAX	Value	Encoder ticks	X	X
0xENCODER3	0	UINT32_MAX	Value	Encoder ticks	X	X
0xINTENSITY[1..6]	0	0x3ffffff	(value & 0x7ff) / 1024 * 100	%	X	X
0xDIST[1..6]	INT32_MIN	0x7ffffeff	Value / 1000000	mm	X	X
MEASRATE	4500	360000	36000 / value	kHz	X	-
MEASRATE	1440	360000	36000 / value	kHz	-	X
TIMESTAMP	0	UINT32_MAX	Value	μs	X	X
COUNTER	0	UINT32_MAX	Value		X	X
_MIN	INT32_MIN	0x7ffffeff	identical 0xDIST*	mm	X	X
_PEAK	INT32_MIN	0x7ffffeff	identical 0xDIST*	mm	X	X
_MAX	INT32_MIN	0x7ffffeff	identical 0xDIST*	mm	X	X

Extract of output values with PROFINET

Service, repair

If the sensor or sensor cable is defective:

- If possible, save the current sensor settings in a parameter set to reload them into the sensor 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:

MICRO-EPSILON MESSTECHNIK
GmbH & Co. KG
Königbacher Straße 15
94496 Ortenburg / Germany
Tel. +49 (0) 8542 / 168-0
Fax +49 (0) 8542 / 168-90
info@micro-epsilon.com
www.micro-epsilon.com

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 or the firmware.


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/legal-details>.

Decommissioning, disposal

In order to avoid the release of environmentally harmful substances and to ensure the reuse of valuable raw materials, we draw your attention to the following regulations and obligations:

- Remove all cables from the sensor and/or controller.
- Dispose of the sensor and/or the controller, its components and accessories, as well as the packaging materials in compliance with the applicable country-specific waste treatment and disposal regulations of the region of use.
- You are obliged to comply with all relevant national laws and regulations.

For Germany / the EU, the following (disposal) instructions apply in particular:

- Waste equipment marked with a crossed garbage can must not be disposed of with normal industrial waste (e.g. residual waste can or the yellow recycling bin) and must be disposed of separately. This avoids hazards to the environment due to incorrect disposal and ensures proper recycling of the old appliances. 
- A list of national laws and contacts in the EU member states can be found at https://ec.europa.eu/environment/topics/waste-and-recycling/waste-electrical-and-electronic-equipment-weee_en. Here you can inform yourself about the respective national collection and return points.
- Old devices can also be returned for disposal to Micro-Epsilon at the address given in the legal details at <https://www.micro-epsilon.com/legal-details/>.
- We would like to point out that you are responsible for deleting the measurement-specific and personal data on the old devices to be disposed of.
- Under the registration number WEEE Registration No. DE28605721, we are registered at the foundation Elektro-Altgeräte Register, Nordostpark 72, 90411 Nuremberg, as a manufacturer of electrical and/or electronic equipment.



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