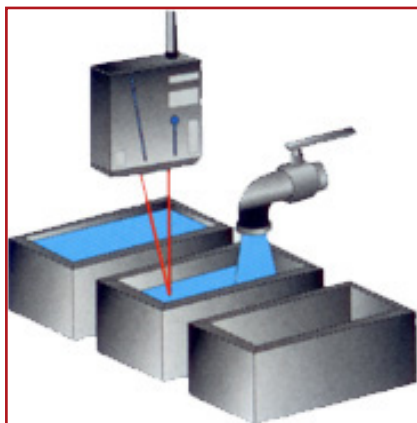
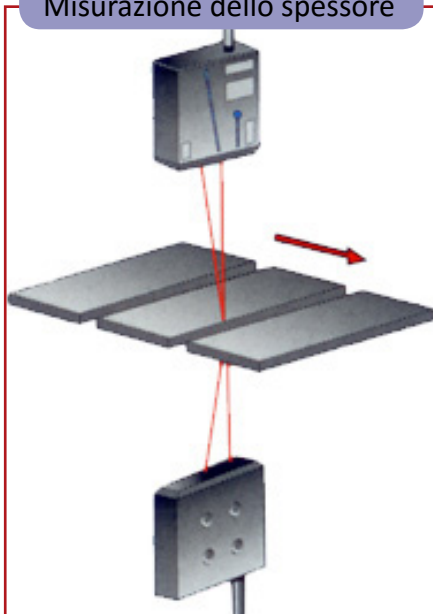


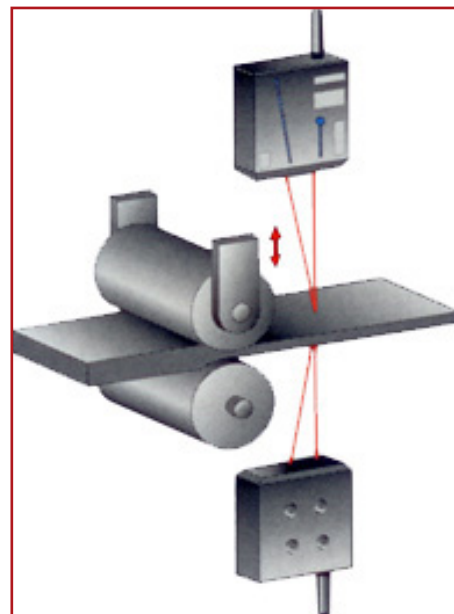
Misurazione del livello



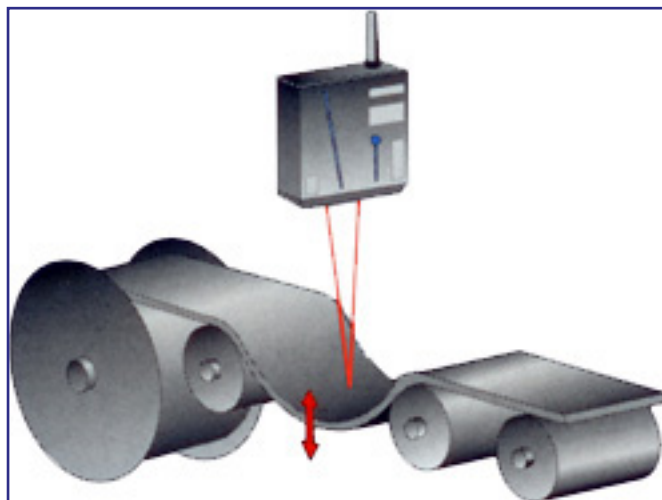
Misurazione dello spessore



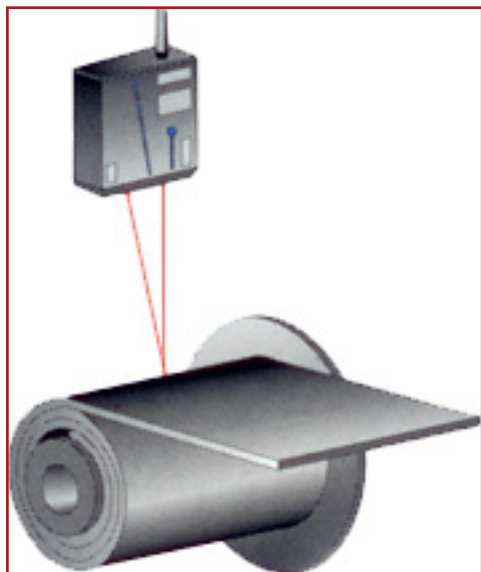
Misurazione dello spessore



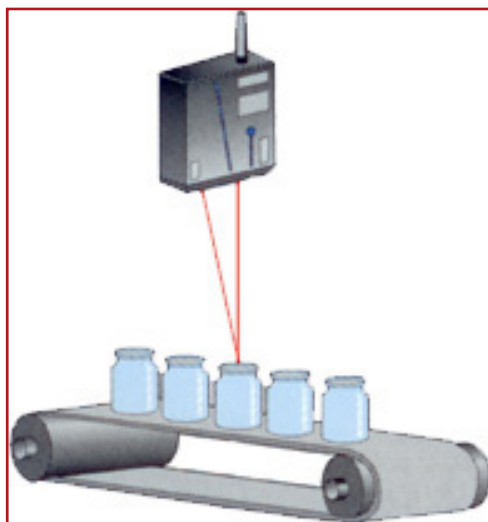
Misurazione della tensione o dell'allentamento



Misurazione dell'usura o della vibrazione



Misurazione del peso o del volume



Misurazione dell'altezza o della dimensione



Specifications

O^{2D}S Z-Line Scanner series



HT / High target temperature (1000°C) versions and VHT (1300°C) as well as VVHT (1500 up to 2200°C) are also available.

Models :	O ^{2D} S 250	O ^{2D} S 325	O ^{2D} S 500	O ^{2D} S 750	O ^{2D} S 505	O ^{2D} S 1155	O ^{2D} S 1350	O ^{2D} S 1950
Measurement data:								
Radial distance from mirror axis	200-300 mm	200-450 mm	250-750 mm	400-1100 mm	450-550 mm	1000-1300 mm	700-2000 mm	1500-2400 mm
Minimum 10° scan arch	± 5°	± 5°	± 5°	± 5°	± 5°	± 5°	± 5°	± 5°
Depth of Field (X)	98 mm	248 mm	497 mm	695 mm	98 mm	295 mm	1292 mm	890 mm
Field of View close end (Y)	35 mm	35 mm	43 mm	70 mm	79 mm	175 mm	123 mm	262 mm
Field of View far end (Y)	52 mm	78 mm	130 mm	191 mm	95 mm	226 mm	348 mm	418 mm
Maximum 50° scan arch	± 25°	± 25°	± 25°	± 25°	± 25°	± 25°	± 25°	± 25°
Depth of Field (X)	72 mm	207 mm	429 mm	597 mm	48 mm	178 mm	1113 mm	675 mm
Field of View close end (Y)	186 mm	186 mm	232 mm	372 mm	419 mm	932 mm	652 mm	1398 mm
Field of View far end (Y)	253 mm	379 mm	633 mm	928 mm	464 mm	1098 mm	1688 mm	2028 mm
Radial / Polar Resolution	0.03 mm	0.05 mm	0.2 mm	0.3 mm	0.05 mm	0.2 mm	0.8 mm	0.7 mm
Radial / Polar Reproducibility	± 0.03 mm	± 0.05 mm	± 0.2 mm	± 0.3 mm	± 0.05 mm	± 0.2 mm	± 0.8 mm	± 0.7 mm
Radial / Polar Linearity	± 0.10 mm	± 0.20 mm	± 0.4 mm	± 0.5 mm	± 0.10 mm	± 0.5 mm	± 1.6 mm	± 1.4 mm
Size of spot	Ø 0.5 mm	Ø 0.5 mm	Ø 1 mm	Ø 1.5 mm	Ø 1 mm	Ø 1 mm	Ø 1.5 mm	Ø 1.5 mm
Laser protection class: 2 kHz / 6 kHz	IEC 2 / IEC 2	IEC 2 / IEC 3R	IEC 2 / IEC 3R	IEC 2 / IEC 3R	IEC 2 / IEC 3R	IEC 3R / IEC 3B	IEC 3R / IEC 3B	IEC 3R / IEC 3B

*) Static measurement on white paper without any averaging of the output signals, sampling and output frequency being equal.

Common Measurement data:

Updating frequency	2000 Hz or 6000 Hz
Scan rate (from one side to the other for 2 kHz model)	600 or 300 scans/min.
Angular resolution at Minimum 10° scan arch (2 kHz)	< 0.08° or < 0.04°
Angular resolution at Maximum 50° scan arch (2 kHz)	< 0.4° or < 0.2°
Scan rate (from one side to the other for 6 kHz model)	1800, 900 or 450 scans/min.
Angular resolution at Minimum 10° scan arch (6 kHz)	< 0.08° < 0.04° or < 0.02°
Angular resolution at Maximum 50° scan arch (6 kHz)	< 0.4° < 0.2° or < 0.1°
Temperature deviation	± 0.03% FS/C°
Light source red or blue diode (nm)	Laser (650 or 405)

Electrical data:

Serial output : 2 kHz / 6 kHz	RS232 or RS422 or Ethernet
Baud rate : 2 kHz / 6 kHz	115200 / 230400
Supply voltage	22 - 28 VDC
Power consumption	max 12 W

Environment data:

Operating temperature	0 - +45 C°
Storage temperature	-20 - +70 C°
Humidity non condensing	Max 90 % RH
Degree of protection	IEC IP65
Operating temperature	0 - +45 C°

Physical data:

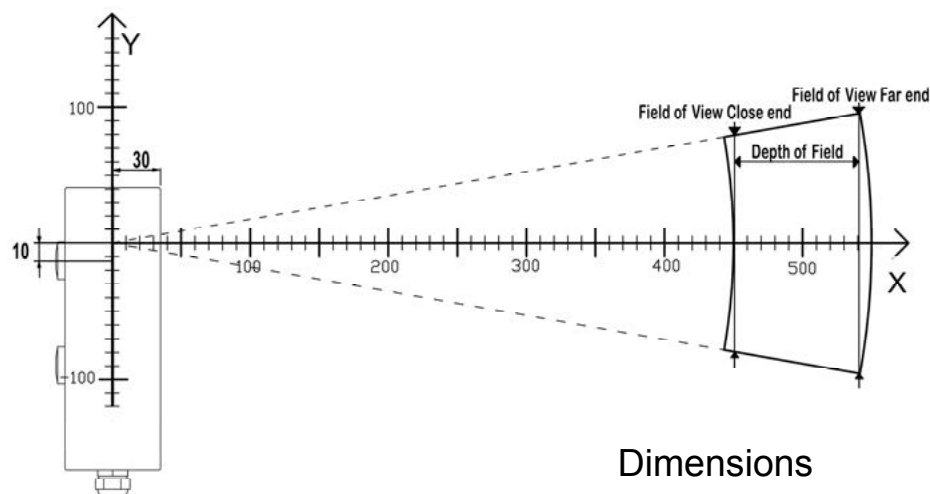
Dimensions	310 x 190 x 64 mm
Weight excl. Cable	4.5 kg
Cable length	2.5 m
Housing	Aluminum & Glass windows

General Description

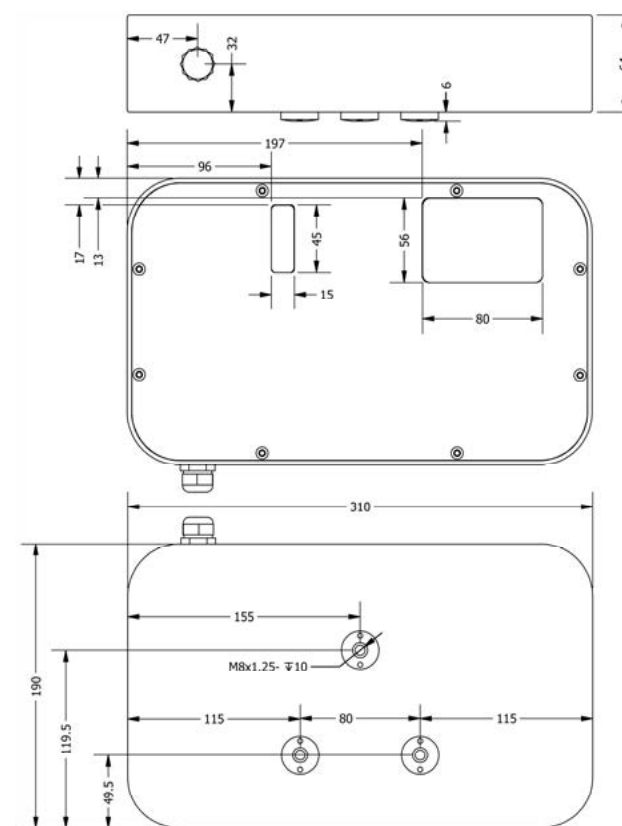
The O^{2D}S Z scanner is an optical measuring device for non-contact precision measurement in two dimensions. The measurement is performed by oscillating the triangulation plane over X° up to 50°. A fine collimated or focused laser beam is diffusely reflected from the surface of almost any kind of material or fluid, and a CCD-camera records the image through an objective. This makes it possible for a Digital Signal Processor to calculate the (radial) distance from the centre of the mirror axis to the object surface, as well as keeping track of the angular reference position.

The O^{2D}S measuring system is a compact unit where optics, CCD-camera, and digital signal processing electronics all are integrated in the sensor housing. The schematic drawing to the right shows the scanner seen from the side. It is here indicated, with this orientation of the scanner, how the triangulation plane can sweep from minus 25° below the horizontal plane to plus 25° above the horizontal plane. The measured distance data is available with a measuring frequency of 2 or 6 kHz as a digital signal for an application running under Windows and using the O^{2D}S driver DLL.

The scanner is delivered with CD's containing the mentioned DLL and a Windows test/demo program. The PC application program receives output data from the scanner over the RS422/RS232 serial interface via a DLL. The software either converts polar coordinates of a measurement point to orthogonal X, Y-coordinates or presents a profile (table of X, Y-values) for each sweep from one side to the other. Within the application program the user can specify the seize of the Y-increment and thus the length of the output table containing the profile data. Standard Models of the O^{2D}S scanner can be delivered in 8 different measuring ranges, and each in two versions with different measuring angles, either 10°, 20° or 50° and then in 2 or



Dimensions



3 scan rates giving high or low angular resolution, and can furthermore be customized to other than standard scan angles and measuring ranges.

Multi O2DS applications

The O^{2D}S scanners are also available in a synchronized version, where the units are programmed to operate as either a SLAVE unit or as a MASTER unit controlling one or more SLAVE units.

High Target Temperature

The O^{2D}S scanners are also available in high target temperature and high Laser light intensity versions named HT, VHT and VVHT. The HT version is made for surface temperatures up to 1000°C. The VHT can handle surface temperatures up to 1300°C. The VVHT, using a **BLUE** laser diode, brings target temperature up to as high as 2.200°C.

December 2015 Subject to change without notice.



Specifications ODS *Black-Line* Select - 2 & Select - 10:



HT / High target temperature (1000°C) versions and VHT (1300°C) as well as VVHT (1500 up to 2200°C) are also available.

Short Stand-off Models

Long Stand-off Models

	ODS 205	ODS 230	ODS 280	ODS 330	ODS 445	ODS 455	ODS 510	ODS 550	ODS 650	ODS 775
Measuring range (~Full Scale)	50 mm	100 mm	200 mm	300 mm	500 mm	100 mm	200 mm	300 mm	500 mm	750 mm
Measuring range	180-230 mm	180-280 mm	180-380 mm	180-480 mm	200-700 mm	400-500 mm	400-600 mm	400-700 mm	400-900 mm	400-1150 mm
Center distance	205 mm	230 mm	280 mm	330 mm	450 mm	450 mm	500 mm	550 mm	650 mm	775 mm
Nomimnal digital resolution	0.001	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Resolution: Minnimum range *)	0.003 mm	0.01 mm	0.01 mm	0.01 mm	0.01mm	0.01 mm	0.01 mm	0.01 mm	0.01mm	0.01
Resolution: Maximum range *)	0.006 mm	0.01 mm	0.03 mm	0.04 mm	0.08mm	0.02 mm	0.02 mm	0.03 mm	0.04 mm	0.10
Measurement Linearity *)	± 0.010 mm	± 0.02 mm	± 0.04 mm	± 0.12 mm	± 0.20 mm	± 0.02 mm	± 0.04 mm	± 0.06 mm	± 0.10 mm	± 0.30
Updating frequency *)	2 kHz/10 kHz	2 kHz/10 kHz	2 kHz/10 kHz	2 kHz/10 kHz	2 kHz/10 kHz	2 kHz/10 kHz	2 kHz/10 kHz	2 kHz/10 kHz	2 kHz/10 kHz	2 kHz/10 kHz
Temperature deviation	± 0.03% FS/C°	± 0.03%FS/C°	± 0.03% FS/C°	± 0.03%FS/C°	± 0.03%FS/C°	± 0.03%FS/C°	± 0.03%FS/C°	± 0.03%FS/C°	± 0.03%FS/C°	± 0.03%FS/C°
Light source / wave length	LASER 650 nm	LASER 650nm	LASER 650 nm	LASER 650nm	LASER 650nm	LASER 650nm	LASER 650nm	LASER 650nm	LASER 650nm	LASER 650nm
Size of spot	Ø 0.5 mm	Ø 0.6 mm	Ø 0.7 mm	Ø 0.8 mm	Ø 0.5 mm	Ø 0.6 mm	Ø 0.7 mm	Ø 1.0 mm	Ø 1.5 mm	Ø 2 mm
Laser protection class *****)	IEC 2	IEC 2	IEC 2	IEC 2	IEC 2	IEC 2	IEC 2	IEC 2	IEC 2	IEC 2

Output data:		Electrical data:		Environment data:		Physical data:	
Analog output:	***) 4-20 mA or 1-9 V	Supply voltage:	22 - 36 VDC	Operating temperature:	0 - +45 °C	Dimensions:	120*95*31.5 mm
Digital output:	***)) RS232 or RS422	Power consumption:	max 4.5 W	Storage temperature:	-20 - +70 °C	Weight:	390 g
	115200 baud rate for 2 kHz outputfrequency			Humidity non condensing:	: Max 90 % RH	M12 Connector:	12 pin male code A
	460800 baud rate for10 kHz outputfrequency			Degree. of protection:	IEC IP65	Housing:	Aluminium/Glass Windows

*) Static measurement on white paper at measuring/sampling frequency, without any averaging of the serial output signal: $2 \cdot \sigma \gg 2$ times the standard deviation.

**)) Analog output Resolution: 14 Bit DAC's are used for the conversion of the 18 bit digital distance result, an integer value with a nominal resolution of 0.01 mm.

***)) Serial/Digital and Analog output are updated at the measuring frequency of 2 kHz/10 kHz except if the Simple Average Filter is activated.

****)) 10kHz measuring frequency requires RS422, Ethernet is a Serial Interface option for distance measurement.

*****)) Laser class IEC 3R may be needed for some HT and VHT sensor versions.

More information on back page >

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Specifications ODS Select - 2 & - 10 *Grey-Line* :



0.5 and 1 kHz versions are also available in all models of the ODS Grey-Line sensor family.

HT / High target temperature (1000°C) versions and VHT (1300°C) as well as VVHT (1500 up to 2200°C) are available additionally.

Models Select-2:	ODS 72.5	ODS 75	ODS 82.5	ODS 95	ODS 120	
Measurement data:						
Measuring range (FS)	5 mm	10 mm	25 mm	50 mm	100 mm	
Measuring range	70-75 mm	70-80 mm	70-95 mm	70-120 mm	70-170 mm	
Center distance	72.5 mm	75 mm	82.5 mm	95 mm	120 mm	
Resolution at short range *)	0.001 mm	0.001 mm	0.001 mm	0.001 mm	0.001mm	
Resolution at long range *)	0.001 mm	0.001 mm	0.002 mm	0.002 mm	0.005 mm	
Measurement Linearity *)	± 0.003 mm	± 0.004 mm	± 0.008 mm	± 0.013 mm	± 0.025 mm	
Updating frequency *)	2 kHz	2 kHz	2 kHz	2 kHz	2 kHz	
Temperature deviation	± 0.03% FS/C°	± 0.03% FS/C°	± 0.03% FS/C°	± 0.03% FS/C°	± 0.03% FS/C°	
Light source / wave length	LASER / 650 nm	LASER / 650 nm	LASER / 650 nm	LASER / 650 nm	LASER / 650 nm	
Size of spot	Ø 0.2 mm	Ø 0.3 mm	Ø 0.3 mm	Ø 0.4 mm	Ø 0.4 mm	
Laser protection class ****)	IEC 2	IEC 2	IEC 2	IEC 2	IEC 2	
Output data:		Electrical data:		Environment data:		
Analog output **):	4-20 mA or 1-9 V	Supply voltage:	22 - 36 VDC	Operating temperature::	0 - +45 C°	
Digital output ***):	RS232 or RS422	Power consumption:	max 4.5 W	Storage temperature::	-20 - +70 C°	
Baud rate:	115200 for:2 kHz output frequency			Humidity non condensing:	Max 90 % RH	
Baud rate:	38400 for:1 kHz output frequency			Degree of protection::	IEC IP65	
					Physical data:	
					Dimensions:	120*95*31.5 mm
					Weight excl. Cable:	370 g
					M12 Connector:	12 pin male code A
					Housing:	Aluminum/Glass Windows

- *) Static measurement on white paper at measuring/sampling frequency, without any averaging of the serial output signal: 2·6 » 2 times the standard deviation.
- **) Analog output Resolution: 14 Bit DAC's are used for the conversion of the 18 bit digital distance result, an integer value with a nominal resolution of 0.001 mm.
- ***) Serial/Digital and Analog output are updated at the measuring frequency of 2 kHz & 10 kHz except if the Simple Average Filter is activated.
- ****) Ethernet is a Serial Interface option for distance measurement.
- *****) Laser class IEC 3R may be needed for some HT and VHT sensors versions.

More information on back page >

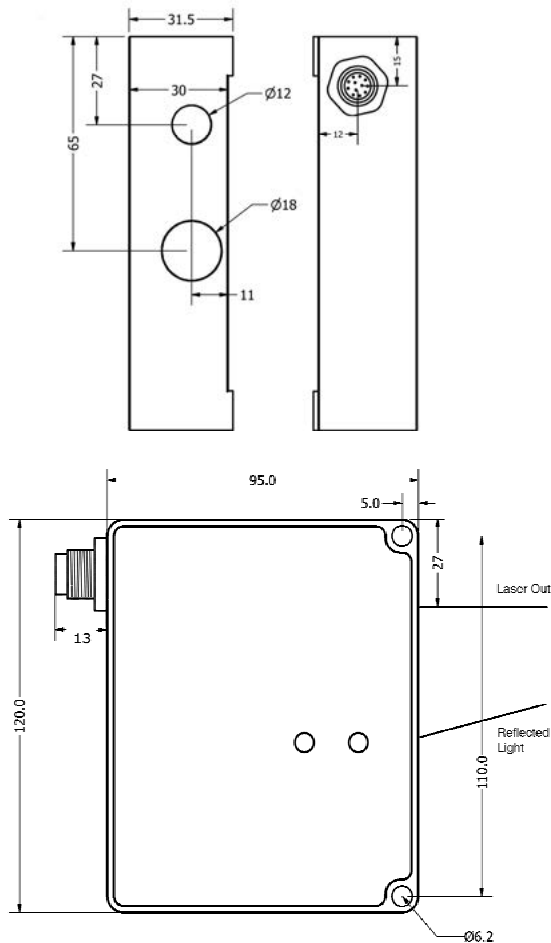
December 2015; Subject to change without notice.

Measuring frequency 2 or 10 kHz

Output rates are user specified, as the sensor can be programmed to make an average of up to 200 measurements (disregarding all zero/missing values) and output it as a single point. In this way the output rate can be lowered from 2000/10000 Hz in steps down to 10/50 Hz. This is done with the Simple Average Filter.

The baud rate can also be changed. An output frequency of 2 kHz requires a baud rate of 115200 whereas 10 kHz requires 460800. 38400 baud will reduce serial output rate to 1 kHz.

Dimensions



Filter & User Settings available

All ODS Grey-Line sensors have a programming / Select functionality.

There are 3 kinds of averaging filters, Median Filter, Simple Average and Running Average Filter. These filter settings can be set individually and operate simultaneously (and additive), as can most other user settings.

In Group Mode a running average is calculated over a user specified number of measuring points (group). The user also programs the sensor to disregard a number of bad (zero) / missing measuring points before calculating the average value. It is recommended to suppress the maximum number of "0" values. The running average value is calculated at full measuring frequency and is also used for converting the analog signal, either 4-20 mA or 1-9 V.

The Simple Average Filter compresses a number of measuring points, from 1 to 200, into one single output value by making an average disregarding any "0"/missing values present.

Several Median filters, actually from 3 to 31 is available, as well as Sample Hold Mode, where the last valid measurement value is kept as the output value in case of missing "0" measuring points.

Level Mode inverts the measuring values, in this setting the closer distances will be output as high values whereas distances far away will be output as low values.

ODS High Temperature models

ODS Grey-Line sensors can be specified to measure up to 1000°HT or 1300°C/VHT with a **Red Diode**. When VVHT is specified a **Blue Diode** is used and the target temperature can reach far above 1500°C.

It is important to stress, that the HT specification only concerns the target temperature. Maximum sensor environment temperature is 45 °C. The HT specification can also be necessary when there is a risk of harmful false light as is the case with bright sunlight, both direct and reflected.

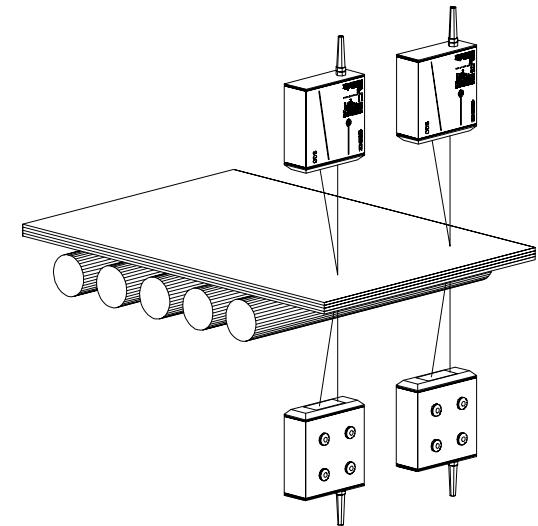
ODS Thickness Measurement

ODS Grey-Line sensors are calibrated for measuring thickness when paired.

An ODS Grey-Line sensor will automatically turn itself into being either the Master or the Slave half part of a thickness measuring system when connected to an identical ODS sensor model.

The Master sensor reads the digital distance data as send from the Slave sensor over their RS232 or RS422 serial interfaces, and after taking its own distance information into account, it will output the change in thickness in its calculated digital form as well as a converted analog signal. The sensors must always be synchronized.

A couple of ODS sensors will thus measure thickness or width without any control box or special calibration from the factory. ODS sensors can also be programmed to operate in Difference Mode instead of measuring thickness. This unique characteristic of the ODS sensors is also available in models of the Black-Line and Red-line families.





Specifications: ODS Red-Line 1 kHz series

2, 5 & 10 kHz versions of all ODS Red-Line models are available.



Select Models :	ODS 505	ODS 500-1100	ODS 925	ODS 1150	ODS 1950	ODS 1400	ODS 3000
High & Very High Target Temperature	+	+	+	+	+	+	+
Measurement data:							
Measuring range	100 mm	200 mm	650 mm	900 mm	900 mm	1400 mm	2000 mm
Measuring range	450–550 mm	Center ± 100 mm	600–1250 mm	700–1600 mm	1500-2400 mm	700-2100 mm	2000-4000 mm
Center distance (mm)	500 mm	500, 700, 950 & 1100	925 mm	1150 mm	1950 mm	1400 mm	3000 mm
Resolution *)	0.01 mm	0.05 mm	0.1 mm	0.1 mm	0.2 mm	0.3 mm	0.5 mm
Reproducibility*)	±Resolution	±Resolution	±Resolution	±Resolution	±Resolution	±Resolution	±Resolution
Linearity *)	±0.05 mm	±0.10 mm	±0,3 mm	±0.4 mm	±0.5 mm	±0.7 mm	±1.0 mm
Updating frequency	1 kHz	1 kHz	1 kHz	1 kHz	1 kHz	1 kHz	1 kHz
Temperature deviation	±0.03% FS/C°	±0.03% FS/C°	±0.03% FS/C°	±0.03% FS/C°	±0.03% FS/C°	±0.03% FS/C°	±0.03% FS/C°
Light source (nm)	LASER (655)	LASER (655)	LASER (655)	LASER (655)	LASER (655)	LASER (655)	LASER (655)
Size of spot	App. Ø 1 mm	Ø 2-3 mm	Ø 4 mm	Ø 4 mm	Ø 5 mm	Ø 5 mm	Ø 5 mm
Laser protection class	IEC 2	IEC 2	IEC 2	IEC 2	IEC 2	IEC 2	IEC 2
Output data:		Electrical data:		Environment data:		Physical data:	
Analog output **):	4-20 mA or 1-9 V DC	Supply voltage	22 - 36 VDC	Operating temperature	0 - +45 C°	Dimensions	255*70*205 mm
Digital output **):	RS232 or RS422	Power consumption	max 4.5 W	Storage temperature	-20 - +70 C°	Weight excl. Cable	4.5 Kg
Ethernet output †):	Alternative to RS output			Humidity non condensing	Max 90 % RH	Cable length	2.5 m
Baud rate: 38400:	1 kHz output frequency			Degree of protection	IEC IP65	Housing	Aluminum / Glass

*) Static measurement on white paper at measuring frequency of 1 kHz, without any averaging of the output signals. Sampling and output frequency being equal.

*) Data are for digital as well as analog outputs, because 14 Bit DAC's are used for the conversion.

***) The serial/digital and analog outputs are updated at the measuring frequency of 1 kHz except if the Simple Average Filter is set to be active.

†) The Ethernet interface can be used for distance measurement only, i.e. connection for sensor internal thickness or difference measurement is not available.

USB 150

Optical Displacement Sensor using advanced laser technique, a line scan camera and digital signal processing algorithms.



Specifications

Measurement data

Measuring range	50 --- 250 mm
Centre distance	150 mm
Resolution	0.01 --- 0.03 mm
Linearity	± 0.05 mm
Reproducibility	± Resolution
Updating frequency	1000 Hz
Temperature deviation app.	± 0.03% of FS/°C
Light source	visible laser (655 nm)
Size of light spot	app. Ø 2 mm
Laser protection class	IEC 2

Output data

Digital output as Binary or ASCII USB 2.0
 ASCII protocol see backside of Data sheet.

Environment data

Operating temperature	0 - +50 °C
Storage temperature	-20 - +70 °C
Humidity (non condensing)	Max 90 % RH
Degree of protection	IEC IP65

Physical data

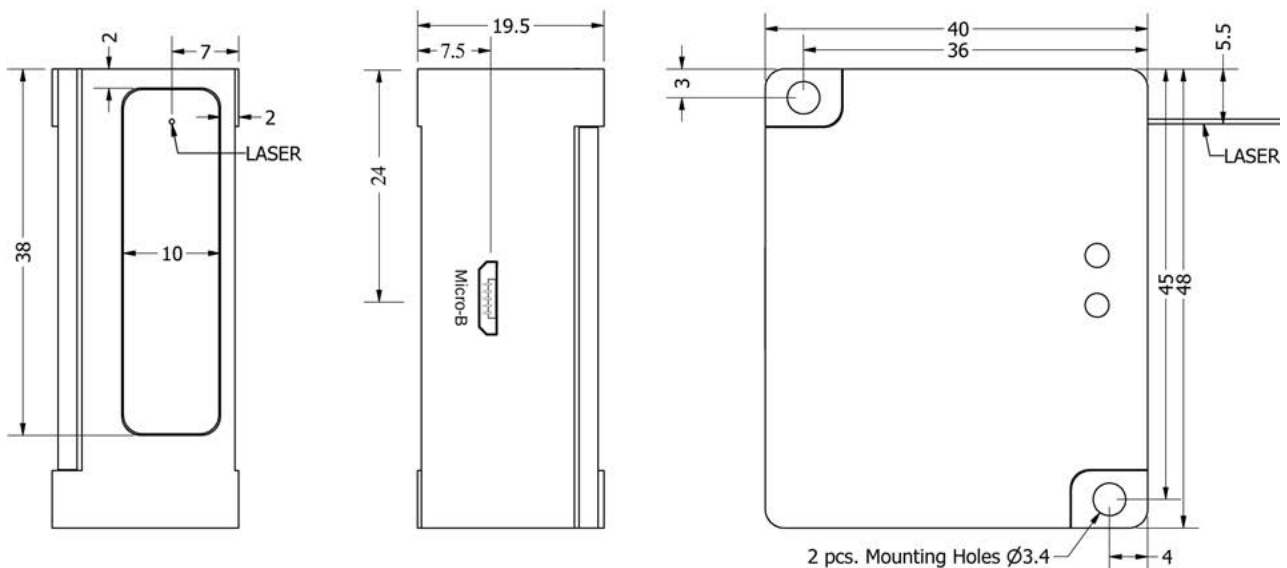
Dimensions WxHxD	48x40x19.5 mm
Weight exc. Cable	55 g
Connector	USB micro-B
Housing	aluminium/glass

Electrical data

Supply voltage	5 V via USB connector
Power consumption, max	0.75 W

Specifications subject to change without notice

Dimensions



USB 150



New SMALL USB 150 sensor with no need for a power supply.

A new innovative and very compact sensor called USB 150 is introduced with a 200 mm measuring range (50-250 mm). The sensor use a standard USB interface for Windows as well as Unix environments. Cables are fitted with a micro-B connector at the sensor end and a USB-A connector at the other end.

As a novelty the sensor also work in ASCII Mode.



The measuring frequency is 1 kHz and the sensor operates either in BINARY MODE (The normal ODS sensor fashion with 3 byte telegrams, and a nominal resolution of the converted integer number of 0,01 mm, this makes it compatible with all ODS sensors, including Select programming) or in ASCII MODE, where a baud rate of 115200 baud is needed for operating at the full measuring frequency of 1 kHz. A special feature of ASCII MODE is that by sending a capital "Q" a single measuring value is presented. See

backside of the attached Data Sheet for further details about specifications and this protocol.

The format/size of this new sensor is 48 x 40 x 19,5 mm, and a weight of 55 g without cable attached.