



OC Sharp

CHROMATIC CONFOCAL MEASURING TECHNOLOGY
FOR MAXIMUM PRECISION

Short Range Distance Sensors (Displacement)

SICK
Sensor Intelligence.

PUTTING PRECISION INTO PERSPECTIVE



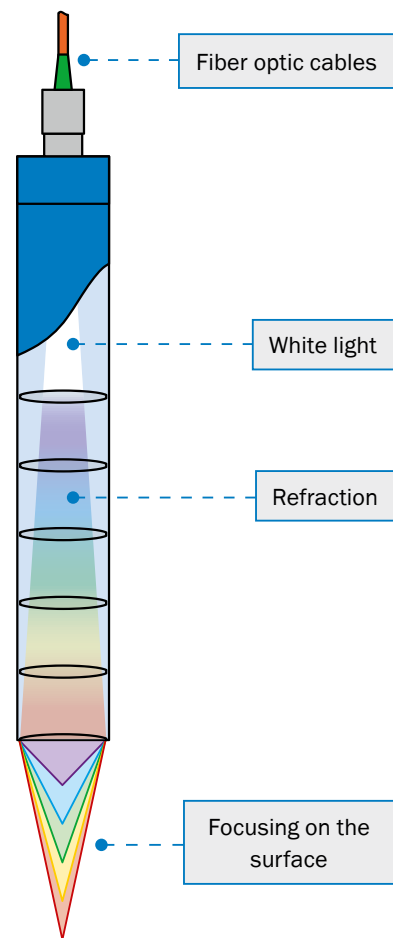
Distance and thickness measurement made easy: The OC Sharp short range distance sensor (displacement) provides high-precision measurements, right down to the last nanometer. It can detect object surfaces of all kinds with razor-sharp precision.

TECHNOLOGY AND PRINCIPLE OF OPERATION

The technology behind the OC Sharp short range distance sensor (displacement) is based on one simple physical principle: refraction.

The confocal system uses a white light LED, the light from which is directed from the controller to the measurement head through a fiber optic cable. The layout of the lenses causes wavelength-dependent refraction to occur (aberration). In this way, light with varying wavelengths is focused differently, reflected off the surface, and projected into a light-sensitive sensor element.

The sensor element determines the reflected wavelength, and uses this to calculate the distance to the object, based on calibration carried out by the manufacturer. Different sensor heads are available for a wide range of applications.



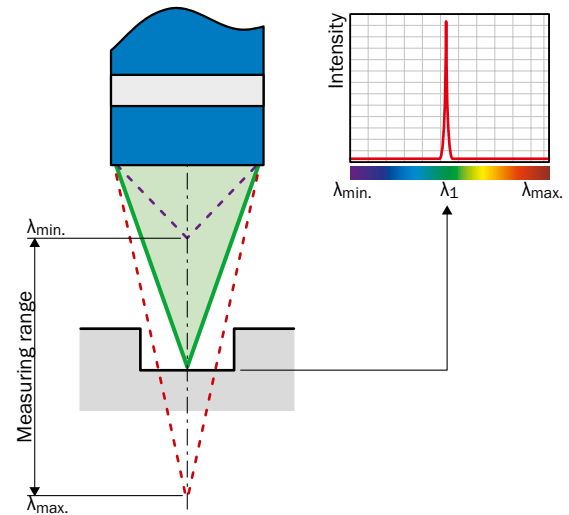
Your benefits

- Precise measurement results, even in the case of surfaces with varying reflective properties, as well as slanted and rough surfaces
- High resolutions in all directions thanks to the small light spot
- No precautionary measures required, due to the use of white light instead of lasers.

The OC Sharp short range distance sensor (displacement) has three operating modes. Combined with the different sensor head options, this opens up a whole range of potential applications.

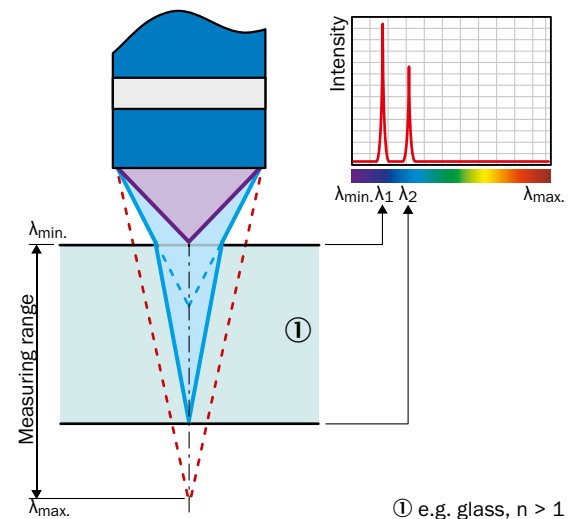
Chromatic distance measurement

Chromatic distance measurement can be used for measuring topography, profile and roughness. White light is focused on the surface of the object to be measured using a lens which causes distinctive chromatic aberration. The reflected light is at maximum strength for the wavelength at which the surface is in focus, causing a clear peak in its spectrum. The distance to the object surface is determined by observing the spectral position of this peak.



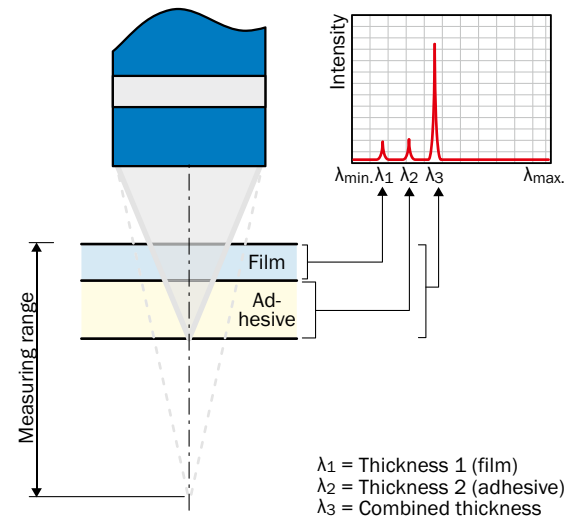
Chromatic thickness measurement

This operating mode is used to measure the thickness of transparent objects. If a transparent object is present within the measuring range, two peaks appear in the spectrum of the reflected light. Each of these peaks represents reflection from one of the optical interfaces of the object. The layer thickness is determined based on the spectral distance between the two peaks and the refraction index ($n > 1$) of the material to be measured.

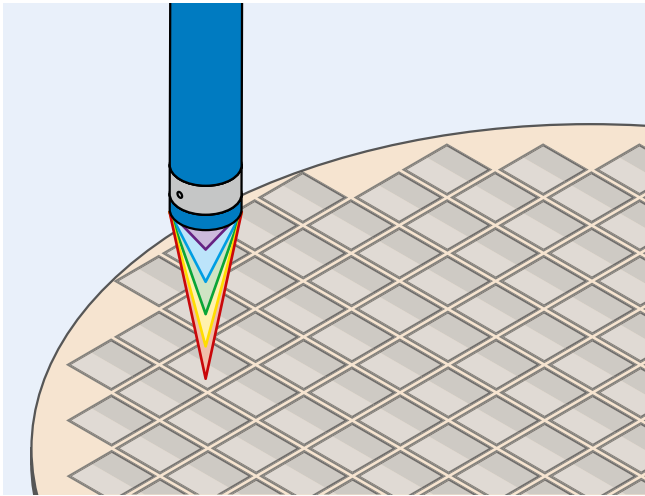


Interferometric layer thickness measurement

Interferometric layer thickness measurement is recommended for measuring multiple ultra-thin layers. Using an achromatic measuring head, small optical thicknesses of between 3 and 180 μm can be precisely measured. Interferometric layer thickness measurement works via the superimposition of the light reflected off the optical interfaces. The transitions between the individual layers can be clearly seen in the form of individual peaks. If the refraction index of the material is known, then the spectrum can be used to determine the thickness of each layer.

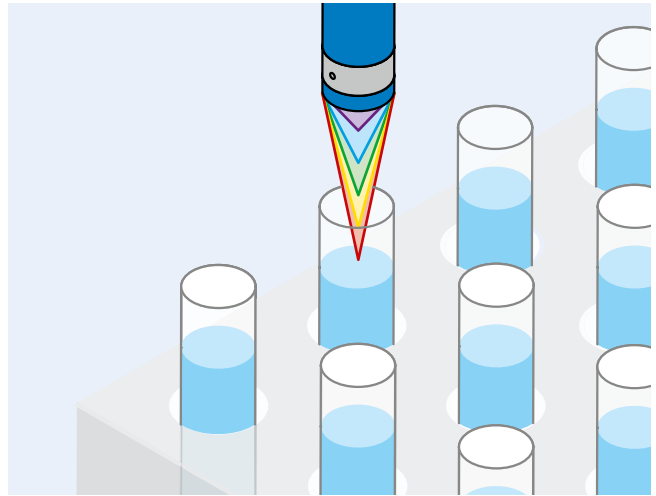


Electronics and solar industry – production of surface topographies for solar wafers



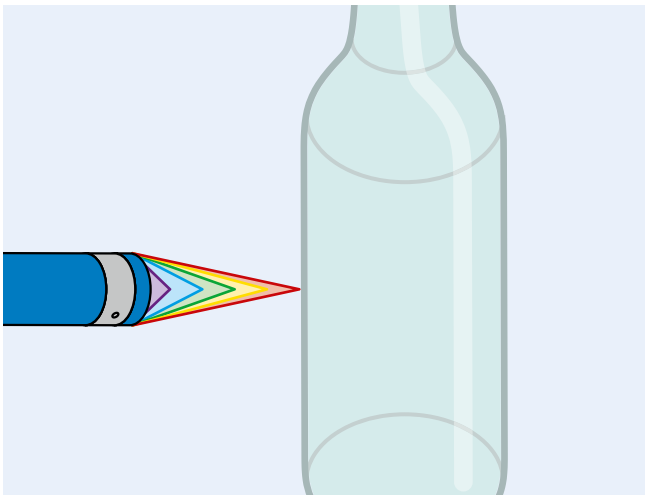
Chromatic distance measurement is suitable for use with nearly all surfaces and component geometries. As it is also high resolution and resistant to ambient conditions, it is the ideal technology for producing topographies such as those for solar cells and wafers.

Pharmaceutical industry – test tube level measurement



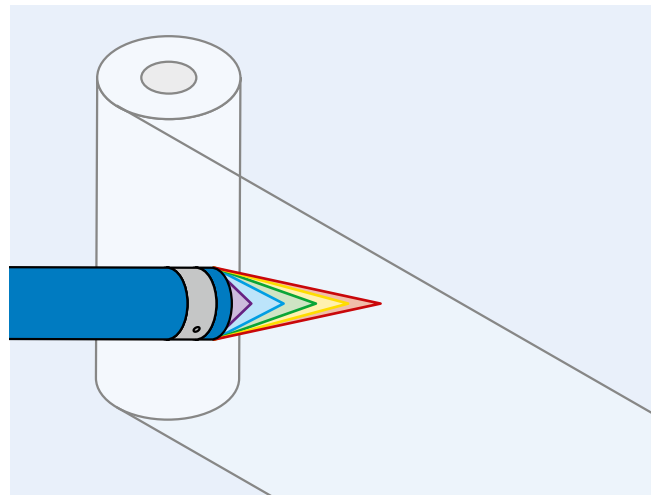
By measuring spectral position, chromatic distance measurement can determine fill levels based on the reflection of the light hitting the surface of the liquid.

Glass industry – measuring glass thickness



Speed is of the essence when it comes to non-contact measurement of wall thickness and roundness of glass containers – an ideal application for chromatic thickness measurement.

Packaging industry – measuring film thickness



In the interferometric layer thickness measurement mode, the sensors can measure the thickness of thin, transparent films. The simultaneous thickness measurement of several transparent layers is possible at a high resolution and speed, and independently of temperature and air humidity, with no contact required.

CHROMATIC CONFOCAL MEASURING TECHNOLOGY OFFERS MAXIMUM PRECISION



Product description

The OC Sharp is a highly precise optical distance sensor based on chromatic confocal measuring technology. This measuring technology allows for precise measurements to the nearest nanometer on a wide range of materials, from pitch black to transparent materials.

It is also possible to measure the thickness of materials and films. The measuring technology features a passive sensor head without electronic components. This ensures measurements are not affected by interference (e.g., EMC).

At a glance

- Many measuring lengths from 600 μm up to 12 mm
- Chromatic confocal sensor technology for the highest reliability and precision
- High measuring frequency of up to 4,000 Hz
- Reliably measures a wide range of materials and colors
- Measures the thickness of transparent materials using just one sensor head chromatic confocal for thicknesses from 30 μm and interferometric for thicknesses from 3 μm).
- Very small light spot is able to measure minuscule objects
- Easy-to-use programming with OC Sharp software

Your benefits

- Thanks to its non-contact operation and measuring speeds of up to 4,000 Hz, this sensor optimizes the production process and ensures top quality
- Precise measurements, regardless of object material and brightness, ensures maximum reliability
- Cost-effective solution for measuring the thickness of transparent materials by using just one sensor head
- Thanks to its small light spot, this sensor can deliver precise measurements of very small objects and holes (e.g., VIA) which are currently not possible with laser triangulation sensors or tactile systems
- Non-contact, wear-free and calibration-free measuring technology means low maintenance costs
- Easy-to-use OC Sharp Software saves time and money

Additional information

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For more information, just enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples and much more.



Detailed technical data

Performance

	Evaluation unit
Light source	LED, white
Response time	550 µs
Measuring frequency	32 Hz ... 4,000 Hz
Additional functions	Averaging, distance measurement (DtO), thickness measurement, automatic configuration of light intensity

Interfaces

Analog output	2 x 0 V ... 10 V
Resolution, analog output	16 bit
Serial (RS-232, RS-422)	1
Resolution, serial output	15 bit
USB	1 (921600 Baud)

Mechanics/electronics

Connection type	Connection terminal for supply voltage (2-pin), connection terminal for inputs/outputs (12-pin), 9-pin Sub-D RS-232/422, USB 2.0 connection, connection for fiber optic male connector for E2000 type (push-pull with automatic safeguard mechanism)
Supply voltage U_v	15 ... 30 V DC
Weight	1,100 g
Housing material	Polystyrene (front plate: Aluminum)
Display	Dot matrix display

Ambient data

Enclosure rating	IP 20
Ambient temperature	Operation: +5 °C ... +50 °C / Storage: -25 °C ... +55 °C
Max relative air humidity (non-condensing)	5 % ... 80 %
Protection class	III

Performance

	Sensor head 600 µm	Sensor head 3 mm	Sensor head 12 mm	Sensor head Interf. 27 mm
Measurement principle	Chromatic confocal			Interferometric
Measuring range	6.2 mm ... 6.8 mm (600 µm) ¹⁾	21 mm ... 24 mm (3 mm)	48 mm ... 60 mm (12 mm)	24 mm ... 30 mm ²⁾ (6 mm) ³⁾
Thickness measurement at transparent material	30 µm ... 900 µm ⁴⁾	100 µm ... 4.5 mm ⁴⁾	1 mm ... 18 mm ⁴⁾	3 µm ... 180 µm
Middle of the measuring range	6.5 mm	22.5 mm	54 mm	27 mm
Resolution	18 nm (15 bit)	92 nm (15 bit)	366 nm (15 bit)	5.5 nm
Linearity ⁵⁾	< 200 nm	< 1 µm	< 4 µm	60 nm
Typical light beam diameter	Ø 4 µm	Ø 12 µm	Ø 30 µm	Ø 40 µm
Maximum tilt angle ^{6), 7)}	90° ± 30°		90° ± 15°	90° ± 5°

¹⁾ Suitable for roughness measurement.

²⁾ Typical values, material and surface-dependent.

³⁾ Maximum measurable layer thickness (with refraction index n = 1): 3 µm–180 µm.

⁴⁾ Refraction index n = 1.5.

⁵⁾ Calibration protocols available upon request.

⁶⁾ In the case of reflective surfaces.

Mechanics/electronics

Connection type	Connection for fiber optic cables			
Weight	71 g	501 g	281 g	21 g
Housing material	Aluminum with glass lens			

Ambient data

Ambient temperature	Operation: +5 °C ... +50 °C / Storage: -25 °C ... +55 °C
Max relative air humidity (non-condensing)	5 % ... 80 %

Ordering information

The OC Sharp short range distance sensor (displacement) always comes as a set. This set contains the following components: one or two sensor heads, one evaluation unit, and one three-meter fiber optic cable. Also included with the delivery: one plug-in power supply unit, one USB cable, one set of cleaning swabs, CD with operating instructions, driver and software for the OC Sharp. Other combinations available upon request.



Sets with one sensor head

Description		Model name	Part no.
Set 1	Evaluation unit, fiber optic cable, 600 µm sensor head	SOC-1A100103K	6054506
Set 2	Evaluation unit, fiber optic cable, 3 mm sensor head	SOC-1A100203K	6054507
Set 3	Evaluation unit, fiber optic cable, 12 mm sensor head	SOC-1A100303K	6054508
Set 4	Evaluation unit, fiber optic cable, sensor head interf. 27 mm	SOC-1A100403K	6054509

Sets with two sensor heads

Description		Model name	Part no.
Set 5	Evaluation unit, fiber optic cable, 600 µm sensor head, 3 mm sensor head	SOC-1A200103K	6054510
Set 6	Evaluation unit, fiber optic cable, 600 µm sensor head, 12 mm sensor head	SOC-1A200203K	6054511
Set 7	Evaluation unit, fiber optic cable, 600 µm sensor head, sensor head interf. 27 mm	SOC-1A200303K	6054512
Set 8	Evaluation unit, fiber optic cable, 3 mm sensor head, 12 mm sensor head	SOC-1A200403K	6054513
Set 9	Evaluation unit, fiber optic cable, 3 mm sensor head, sensor head interf. 27 mm	SOC-1A200503K	6054514
Set 10	Evaluation unit, fiber optic cable, 12 mm sensor head, sensor head interf. 27 mm	SOC-1A200603K	6054515

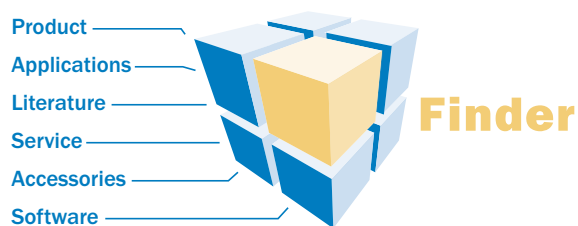
Individual fiber optic cables

Description	Model name	Part no.
3-meter fiber optic cable ¹⁾	FOC03-AM1K	5328669
5-meter fiber optic cable ¹⁾	FOC05-AM1K	5328670
10-meter fiber optic cable ¹⁾	FOC10-AM1K	5328671
3-meter fiber optic cable with metal sheath ¹⁾	FOC03-AM1M	5328672
5-meter fiber optic cable with metal sheath ¹⁾	FOC05-AM1M	5328673

¹⁾ Bend radius of max. 30 mm.

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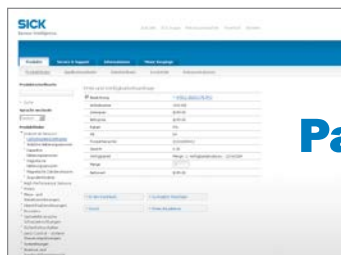
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SICK AT A GLANCE

SICK is a leading manufacturer of intelligent sensors and sensor solutions for industrial applications. With more than 6,500 employees and over 50 subsidiaries and equity investments as well as numerous representative offices worldwide, we are always close to our customers. A unique range of products and services creates the perfect basis for controlling processes securely and efficiently, protecting individuals from accidents and preventing damage to the environment.

We have extensive experience in various industries and understand their processes and requirements. With intelligent sensors, we can deliver exactly what our customers need. In application centers in Europe, Asia and North America, system solutions are tested and optimized in accordance with customer specifications. All this makes us a reliable supplier and development partner.

Comprehensive services round out our offering: SICK LifeTime Services provide support throughout the machine life cycle and ensure safety and productivity.

For us, that is “Sensor Intelligence.”

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Detailed addresses and additional representatives → www.sick.com