

OPTICAL PROBES

The optical probes for non-contact distance and thickness measurements have a wide measuring range: from a few microns to several millimeters.

All probes are available in a vacuum version.

In addition there are angled, space saving, and flat probes obtainable.

That means:

For every application the perfect probe!

They have the following advantages:

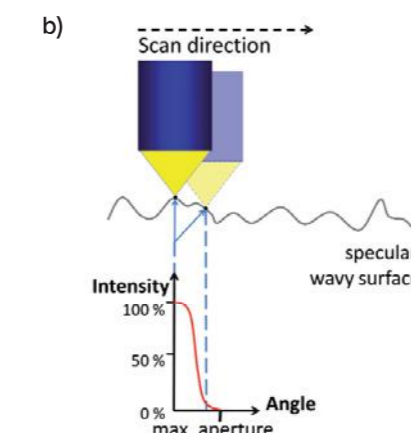
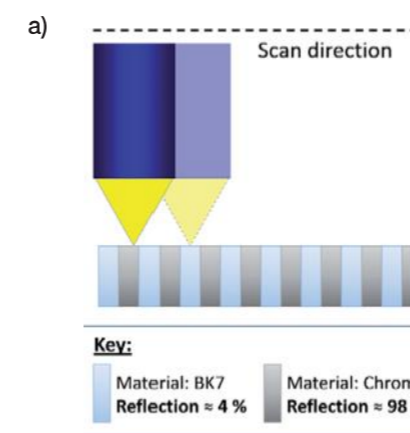
- precise measurements independent of the surface type
- high axial resolution for the measurement of intricate structures
- measurements also on highly tilted, reflective and dispersive surfaces
- small spot diameter
- robust and compact design

RELIABLY FAST MEASUREMENTS ON CHALLENGING SAMPLES

The superior dynamic range and excellent signal-to-noise ratio of the detectors used in the CHRocodile sensors offer excellent measuring results even on variably reflective surfaces.

Examples:

- sample with differing reflective properties (auto-adjustment enables continuous measurement)
- sample with reflective, wavy surface (high aperture captures sufficient light even at large angles)



| | | | | | | | | | | | |
|--|---|-------------------------|---------------------------|---------------------------|-------------------------|---------------------------|---------------------------|---------------------------|------------------------------|-------------------------|-------------------------|
| | | | | | | | | | | | |
| Sensor | CHRocodile S, CHRocodile E, CHRocodile X, CHRocodile M4, CHRocodile M10 | | | | | | | | | | |
| Application | distance and thickness | | | | | | | | | | |
| Measuring principle | chromatic confocal | | | | | | | | | | |
| Order number | RB 200 232 | RB 200 031 | RB 200 136 | RB 200 241 | RB 200 003 | RB 200 225 | RB 200 137 | RB 200 050 | RB 200 074 | RB 200 071 | RB 200 076 |
| Measuring range | 100 µm | 300 µm | 350 µm | 400 µm | 600 µm | 1 mm | 2 mm | 3 mm | 6 mm | 10 mm | 25 mm |
| Working distance ¹⁾ | 1.85 mm | 4.5 mm | 8.4 mm | 15.3 mm | 6.5 mm | 20.8 mm | 61 mm | 22.5 mm | 35 mm | 70 mm | 76.5 mm |
| Resolution in z | 3 nm | 10 nm | 12 nm | 14 nm | 20 nm | 35 nm | 70 nm | 100 nm | 200 nm | 300 nm | 800 nm |
| Spot diameter | 3,5 µm | 5 µm | 5 µm | 4 µm | 4 µm | 3,5 µm | 12,5 µm | 12 µm | 16 µm | 24 µm | 25 µm |
| Lateral resolution | 1,8 µm | 2,5 µm | 2,5 µm | 2 µm | 2 µm | 1,8 µm | 6 µm | 6 µm | 8 µm | 12 µm | 12,5 µm |
| Numerical aperture | 0,7 | 0,5 | 0,33 | 0,7 | 0,5 | 0,7 | 0,26 | 0,5 | 0,43 | 0,33 | 0,26 |
| Measurement angle to surface ²⁾ | 90° +/- 45° | 90° +/- 30° | 90° +/- 20° | 90° +/- 45° | 90° +/- 30° | 90° +/- 45° | 90° +/- 15° | 90° +/- 30° | 90° +/- 25° | 90° +/- 20° | 90° +/- 15° |
| Thickness measuring range ³⁾ | up to 150 µm | up to 450 µm | up to 525 µm | up to 600 µm | up to 900 µm | up to 1,5 mm | up to 3 mm | up to 4,5 mm | up to 9 mm | up to 15 mm | up to 37,5 mm |
| Dimensions | l = 67,9 mm d = 8 mm | l = 111 mm d = 15 mm | l = 105,8 mm d = 15 mm | l = 148,5 mm d = 50 mm | l = 125 mm d = 19 mm | l = 163,6 mm d = 55 mm | l = 108,7 mm d = 45 mm | l = 105,8 mm d = 49 mm | l = 197 mm d = 52 / 70 mm | l = 146 mm d = 65 mm | l = 243 mm d = 76 mm |
| Weight | 36 g | 38 g | 36 g | 1250 g | 71 g | 1118 g | 315 g | 501 g | 1244 g | 721 g | 1637 g |
| Note | high numerical aperture | | | high numerical aperture | | high numerical aperture | extra bright | extra bright | extra bright | extra bright | extra bright |

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| CHRocodile LR |
| distance and thickness |
| chromatic confocal |
| RB 200 135 |
| 100 µm |
| 6,5 mm |
| 10 nm |
| 1,4 µm |
| 0,7 µm |
| 0,66 |
| 90° +/- 40° |
| up to 150 µm |
| l = 158 mm d = 30 mm |
| 323 g |
| high numerical aperture |

| | | | | |
|---|--------------------------|---------------------------|--|--------------------------|
| | | | | |
| CHRocodile S, CHRocodile E, CHRocodile X, CHRocodile M4, CHRocodile M10 | | | CHRocodile IT, CHRocodile MI5 | |
| thickness | | | thickness | |
| interferometric | | | interferometric | |
| RB 200 006 | RB 200 061 | RB 200 085 | RB 200 307 | RB 200 307 |
| The measuring range depends on the used CHRocodile sensor. | | | | |
| 27 mm | 27 mm | 101 mm | 39,7 mm | 39,7 mm |
| 10 nm | 10 nm | 10 nm | IT 250: 75 nm IT 500: 100 nm IT 1000: 200 nm | 100 nm |
| 40 µm | 10 µm | 50 µm | 13 µm | 9 µm |
| 20 µm | 5 µm | 25 µm | 6,5 µm | 4,5 µm |
| 0,09 | 0,17 | 0,1 | 0,1 | 0,1 |
| 90° +/- 5° | 90° +/- 10° | 90° +/- 5° | 90° +/- 5° | 90° +/- 5° |
| The measuring range depends on the used CHRocodile sensor. | | | | |
| l = 53,6 mm d = 15 mm | l = 53,6 mm d = 15 mm | l = 129,2 mm d = 28 mm | l = 58,3 mm d = 15 mm | l = 58,3 mm d = 15 mm |
| 21 g | 21 g | 278 g | 53 g | 53 g |

Regarding interferometric measurements the working distance can vary several millimeters.
By using an LED sensor the measuring range of the chromatic probes decreases up to 10 %.

¹⁾ bottom of probe to middle of measuring range

²⁾ decreasing accuracy on the limits

³⁾ refractive index n = 1.5

OPTICAL SENSORS

CHRocodile sensors feature high measuring rates. They allow precision measurements and are able to be used as stand-alone sensors or integrated into production machines for inline measurements.

CHRocodile sensors work with the chromatic confocal and interferometric measuring principles using light in the visible and the infrared spectral range. They are proven in the glass, plastic and semiconductor industries and are implemented in measuring systems and inspection machines for numerous types of quality control.

CHRocodile E, CHRocodile X

These well established, high-end sensors are designed for the most precise non-contact topography and thickness measurements. The Xenon-technology of CHRocodile X allows the measurement on dark surfaces at a very high measuring rate.

CHRocodile S

Alternative sensor for demanding measuring tasks with an excellent price-performance ratio.

CHRocodile M4

Modular sensor designed specifically for inline applications with up to 4 channels integrated into a 19 inch slot. Two different types available:
High Sensitivity - very bright
High Resolution - high dynamic

CHRocodile M10

Synchronized measurements with up to 10 channels.

CHRocodile LR

Sensor with higher lateral resolution for ambitious topography measurements.


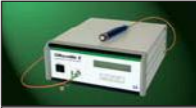




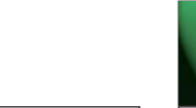
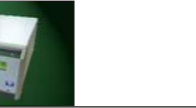
CHRocodile IT

Sensor optimized for thickness and distance measurements of silicon wafers and multilayers with transmitted infrared light.

CHRocodile MI5

Modular, multi-channel sensor (up to 5 channels) based on CHRocodile IT for inline applications in the wafer and solar cell industry.



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|---|---|---|---|--|---|---|--|--|
| Order number | CHRocodile S RB 200 253 | CHRocodile E RB 200 110 RB 200 188 (LED) | CHRocodile X RB 200 120 | CHRocodile M4 RB 200 114 (high resolution) RB 200 112 (high sensitivity) | CHRocodile M10 RB 200 221 | CHRocodile LR RB 200 140 | CHRocodile IT RB 200 223 (CHRocodile IT 250) RB 200 117 (CHRocodile IT 500) RB 200 113 (CHRocodile IT 1000) | CHRocodile MI5 RB 200 270 (CHRocodile MI5 250) RB 200 264 (CHRocodile MI5 500) RB 200 259 (CHRocodile MI5 1000) |
| Application | distance, thickness | distance, thickness | distance, thickness | distance, thickness | distance, thickness | distance, thickness | distance, thickness | distance, thickness |
| Measurements / second | 2000 (chromatic) 2000 (interferometric) | 4000 (chromatic) 4000 (interferometric) | 14000 (chromatic) ¹⁾ 40000 (interferometric) | 4000 (chromatic) 4000 (interferometric, high resolution module) | 15000 / number of active channels | 4000 (chromatic) 4000 (interferometric) | 4000 (interferometric) | 4000 (interferometric) |
| Interferometric measuring range ²⁾ | 3 - 180 µm | 2 - 250 µm | 3 - 250 µm | 2 - 250 µm (high resolution module) | - | 30 - 1200 µm | IT 250: 28 - 1100 µm IT 500: 34 - 1900 µm IT 1000: 60 - 3500 µm | MI5 250: 28 - 1100 µm MI5 500: 34 - 1900 µm MI5 1000: 60 - 3500 µm |
| Chromatic measuring range | The measuring range depends on the used probe. | | | | | | | |
| Pitch error ³⁾ | < +/- 0.001 | | | | | | | |
| Linearity error ³⁾ | 0.033 % of measuring range | | | | | | | |
| Resolution | 0.003 % of measuring range (15 bit); optionally 0.00001 % (23 bit) | | | | | | 0.007 % of measuring range; optionally 0.00002 % | |
| Reproducibility (in % of measuring range) | < 0.009 | < 0.009 | < 0.009 | 0.012 (high sensitivity) 0.009 (high resolution) | < 0.009 | < 0.02 | < 0.02 | < 0.02 |
| Synchronization with external devices | trigger input, synchronizing output, 3 encoder inputs | trigger input, synchronizing output, 3 encoder inputs | trigger input, synchronizing output, 3 encoder inputs (optional 5) | trigger input, synchronizing output, 3 encoder inputs / channels | trigger input, synchronizing output, 3 encoder inputs (optional 5) | trigger input, synchronizing output, 3 encoder inputs | trigger input, synchronizing output, 3 encoder inputs | trigger input, synchronizing output, 3 encoder inputs / channels |
| Interfaces ⁴⁾ | USB, RS 232, RS 422, 2 x analog (0 - 10 V) | USB, RS 232, 2 x analog (0 - 10 V) | Ethernet, USB, RS 232, 2 x analog (0 - 10 V) | RS 232, RS 422, USB, 2 x analog (0 - 10 V) | Ethernet, USB, 2 x analog (0 - 10 V) | USB, RS 232, 2 x analog (0 - 10 V) | USB, RS 232, 2 x analog (0 - 10 V) | USB, RS 232, 2 x analog (0 - 10 V) |
| Transfer rate | RS 232 (9600 - 921600 Baud); RS 422 (9600 - 921600 Baud); USB: virtual comport (921600 Baud); Ethernet (100 Mbit) | | | | | | | |
| Light source | LED / ext. light source | Halogen lamp / LED | Xenon - short arc lamp | Halogen lamp | Halogen lamp | NIR SLD | NIR SLD | NIR SLD |
| Operating temperature | + 5° C up to + 50° C | | | | | | | |
| Dimensions W x H x D | 200 mm x 100 mm x 93 mm | 260 mm x 115 mm x 310 mm | 360 mm x 160 mm x 400 mm | 19" x 3 HE x 306 mm | 360 mm x 160 mm x 400 mm | 260 mm x 115 mm x 310 mm | 260 mm x 115 mm x 310 mm | 19" x 3 HE x 306 mm |
| Weight | 1.1 kg | 4.5 kg | 11 kg | 10 kg | 11 kg | 5 kg | 5 kg | 13 kg |
| Length optical fibre ⁵⁾ | 2 - 50 m | | | | | | | |
| System voltage | 15 - 36 V DC with separate power supply (90 - 264 V AC) | 90 - 264 V AC / 47 - 63 Hz | 100 - 240 V AC / 47 - 63 Hz | 85 - 264 V AC / 47 - 63 Hz | 90 - 264 V AC / 47 - 63 Hz | 85 - 264 V AC / 47 - 63 Hz | 85 - 264 V AC / 47 - 63 Hz | 85 - 264 V AC / 47 - 63 Hz |
| Rated power | 10 W | 140 W (LED 20 W) | 110 W | 135 W (+5 W per add. channel) | 150 W | 15 W | 15 W | 16 W (+8 W per add. channel) |
| No. of measuring channels | 1 | 1 | 1 | 1 - 4 | 10 | 1 | 1 | 1 - 5 |
| Calibr. tables / channels | 16 | 16 | 10 | 16 | 16 | 16 | - | - |
| Note | tabletop unit or top hat rail mounting; automatic light control | LED version with automatic light control | fast measurements also on dark surfaces | module available as high resolution or high sensitivity version | multi-channel sensor | automatic light control | 3 measuring ranges available; special version for rough wafer (IT RW); automatic light control | 3 measuring ranges available; special version for rough wafer (IT RW); automatic light control |

¹⁾ also on dark surfaces

²⁾ optical length

³⁾ measuring accuracy = linearity error + pitch error x used measuring range

⁴⁾ optionally with RS 422, LVDT for emulation of roughness probes additionally

⁵⁾ metal covered also available

OPTICAL PROBES AND SENSORS



Stand: 10.04.2009; subject to change without prior notice

CHRocodile

If time matters...