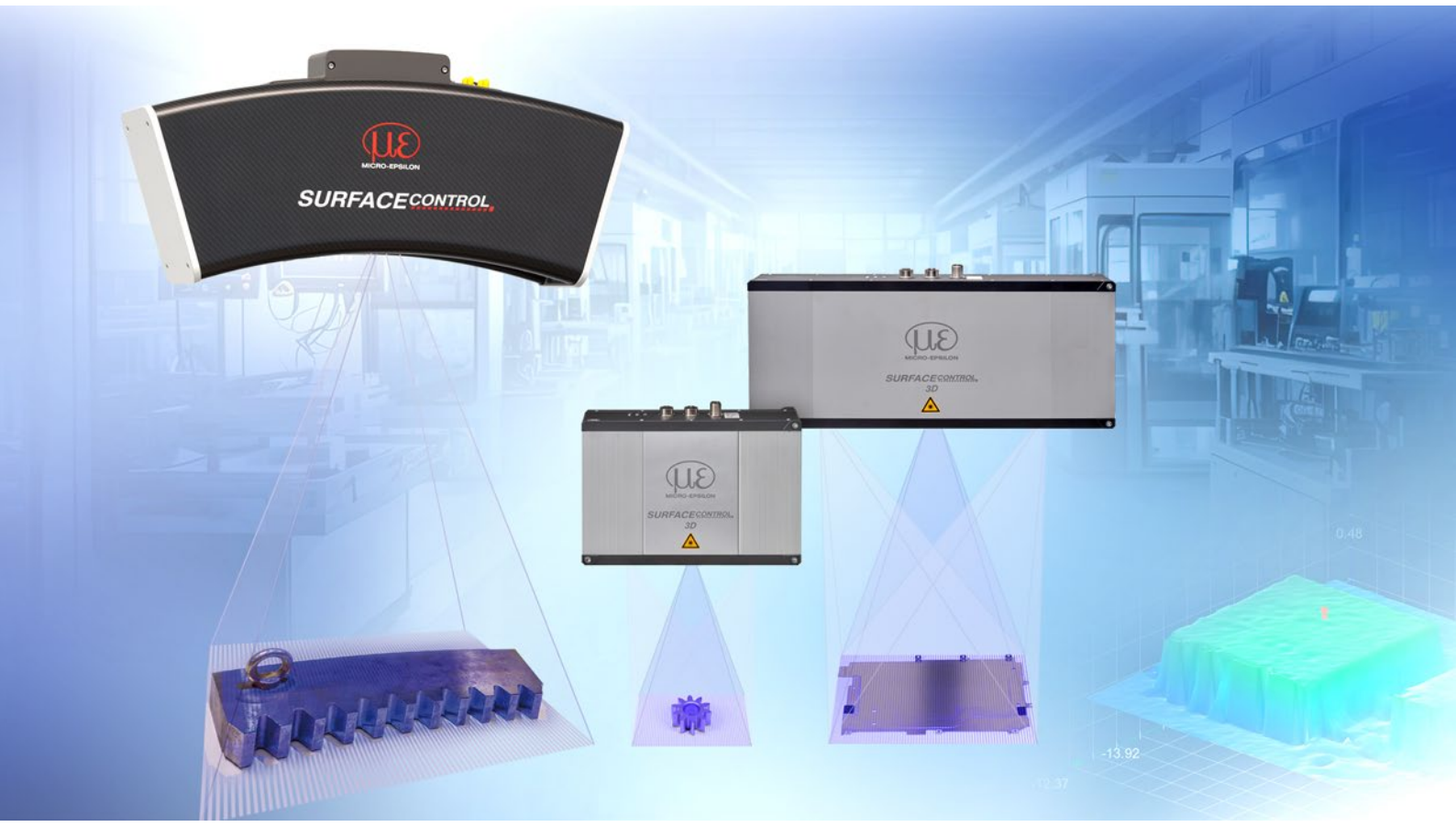
MICRO-EPSILON

More Precision.

surfaceCONTROL 3D // 3D snapshot sensors



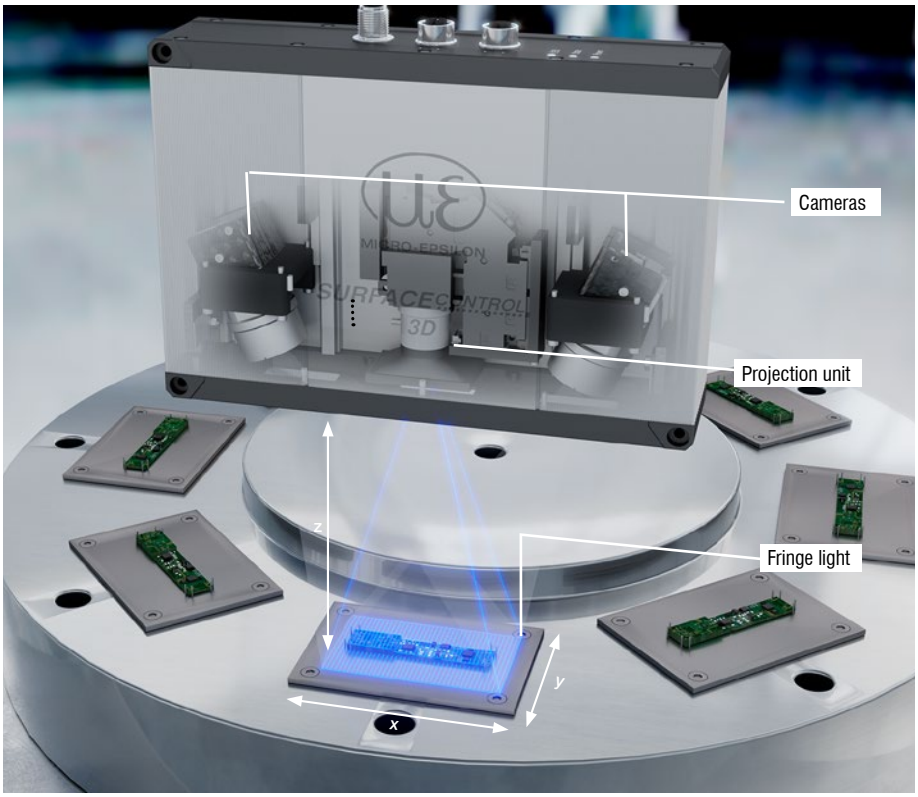
Precise sensors for 3D measurement and surface inspection
surfaceCONTROL 3D

3D snapshot sensors – your benefits

The surfaceCONTROL snapshot sensors enable fast, precise 3D acquisition of objects without contact and in a single measurement. The generated, calibrated 3D data are evaluated directly in the sensor or using external image processing software. This enables automated inspection tasks to be performed reliably, objectively and repeatably.

Measuring principle

The surfaceCONTROL 3D sensors operate on the principle of optical triangulation using fringe projection. Using a matrix projector, a sequence of patterns is projected onto the test object surface. The light of the patterns diffusely reflected by the test object surface is recorded by two cameras. The three-dimensional surface of the test object is then calculated from the captured image sequences and the relative arrangement of the two cameras.



More information
than 2D cameras

True height information
- 3D point cloud enables calculation of heights/z distances

Complete inspection
- Using the point cloud, virtually all inspection features can be evaluated from a single acquisition

Flexible positioning
- Changes in the orientation and position of the object can be optimally compensated

Increased safety
compared to tactile sensors

Non-contact
- No contact with the component and therefore no influence on or damage to the measuring object

Full-area measurement
- Not only individual measurement points but the entire component is inspected.

Easier handling
- Since no mechanical movement/ tracking is required, integration is significantly easier

More precision
than laser scanners

Higher z-axis accuracy
- Lower single-point deviation than with laser scanners, resulting in higher z-axis accuracy

Complete 3D data
- No encoders and no additional calculation of points/profiles required

Wear-free
- No moving parts in the sensor, unlike laser scanners with a pivoting laser

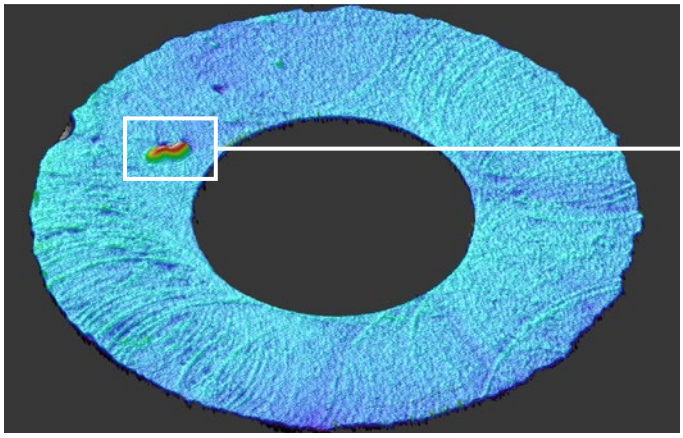
Overview

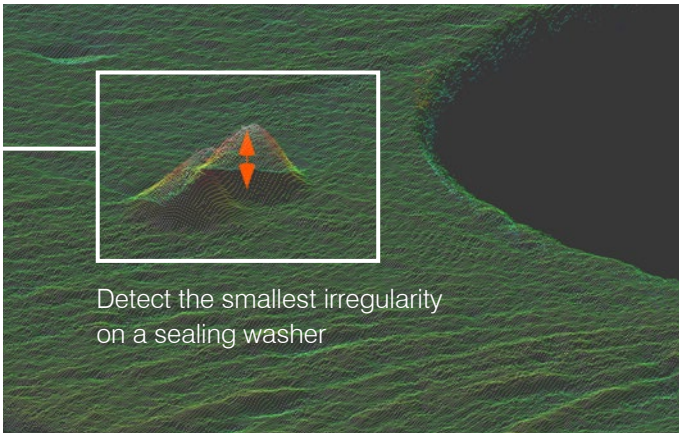
Highest precision in 3 dimensions
surfaceCONTROL 3D

The next generation of 3D snapshot sensors for automated inline measurement of form, geometry, position and surface.

Starting at **0.25 µm** repeat-ability

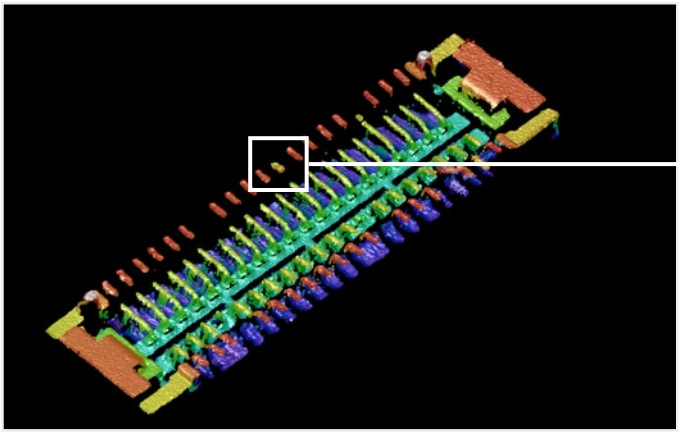
Measurement of the smallest height differences – extremely reliable

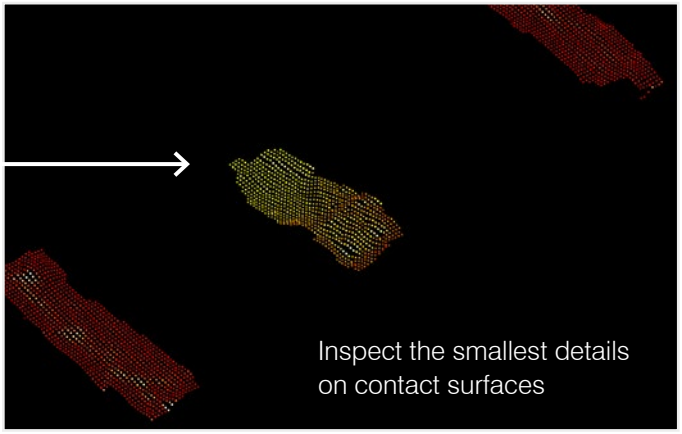




Starting at **8 µm** X/Y resolution

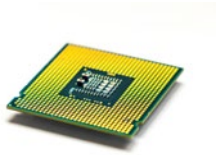
Measurement of the smallest structures & details with the highest precision





More than
10 million
3D points per measurement

Complete imaging of diffusely reflective objects



Extremely small objects

&

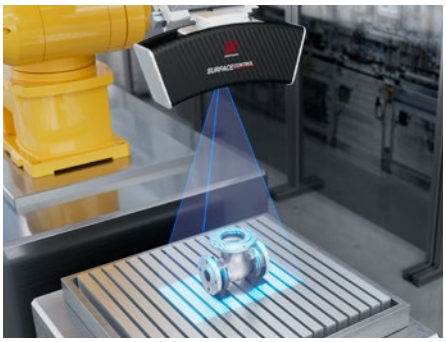
Very large objects

Starting at
0.2 s
acquisition time

Shortest cycle times at-line, in-line & on the robot

At-line measurement

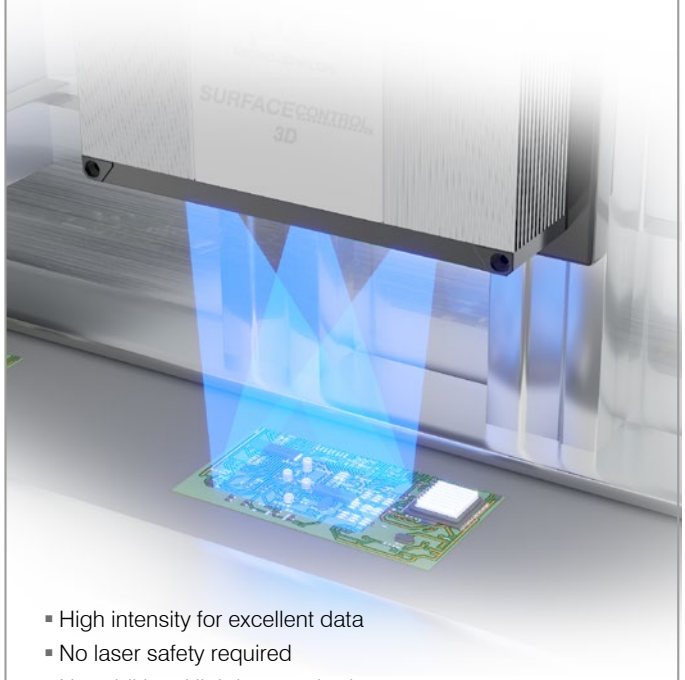
In-line measurement



Robot measurement

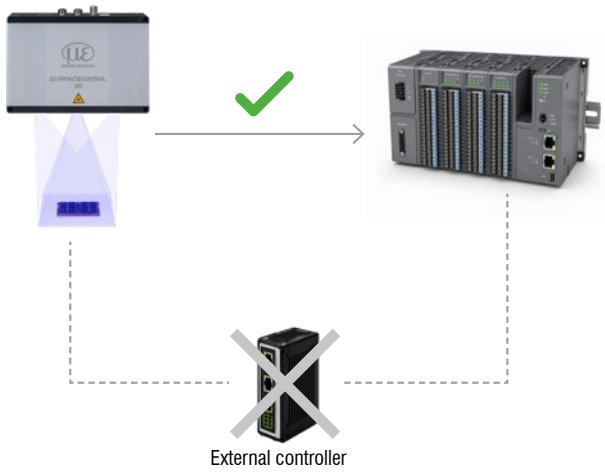
High-performance 3D snapshot sensors
surfaceCONTROL 3D

LED light source



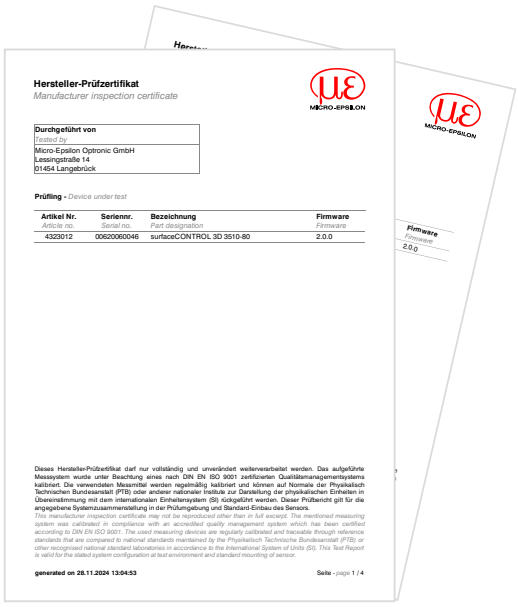
- High intensity for excellent data
- No laser safety required
- No additional lighting required

Fully integrated sensors



- Direct output of measurement values reduces data volume and relieves end systems
- Space-saving: no additional external evaluation units
- Simple system architecture due to fewer components

Verified precision



Hersteller-Prüfzertifikat
Manufacturer inspection certificate

Durchgeführt von
Tested by
Micro-Epsilon Optronic GmbH
Lessingstraße 14
01454 Langebrück

Prüfling - *Device under test*

Artikel Nr. *Article no.*	Seriennr. *Serial no.*	Bezeichnung *Part designation*	Firmware *Firmware*
4323012	00620060046	surfaceCONTROL 3D 3510-80	2.0.0

Dieses Hersteller-Prüfzertifikat darf nur vollständig und unverändert weiterverarbeitet werden. Das aufgeführte Messsystem wurde unter Beachtung eines nach DIN EN ISO 9001 zertifizierten Qualitätsmanagementsystems kalibriert. Die verwendeten Messmittel werden regelmäßig kalibriert und können auf Normale der Physikalisch Technischen Bundesanstalt (PTB) oder anderer nationaler Institute zur Darstellung der physikalischen Einheiten in Übereinstimmung mit dem internationalen Einheitensystem (SI) rückgeführt werden. Dieser Prüfbericht gilt für die angegebene Systemzusammenstellung in der Prüfumgebung und Standard-Einbau des Sensors.
This manufacturer inspection certificate may not be reproduced other than in full except. The mentioned measuring system was calibrated in compliance with an accredited quality management system which has been certified according to DIN EN ISO 9001. The used measuring devices are regularly calibrated and traceable through reference standards that are compared to national standards maintained by the Physikalisch Technische Bundesanstalt (PTB) or other recognised national standard laboratories in accordance to the International System of Units (SI). This Test Report is valid for the stated system configuration at test environment and standard mounting of sensor.

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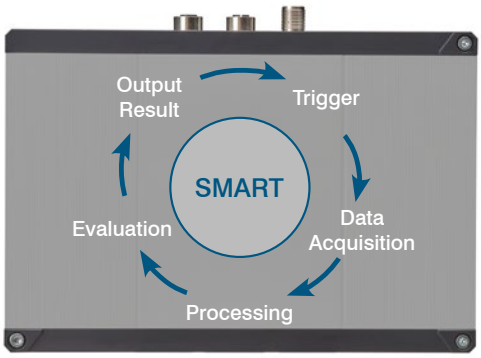
- Factory-calibrated and ready for immediate use
- Inspection certificate included

Designed for industry

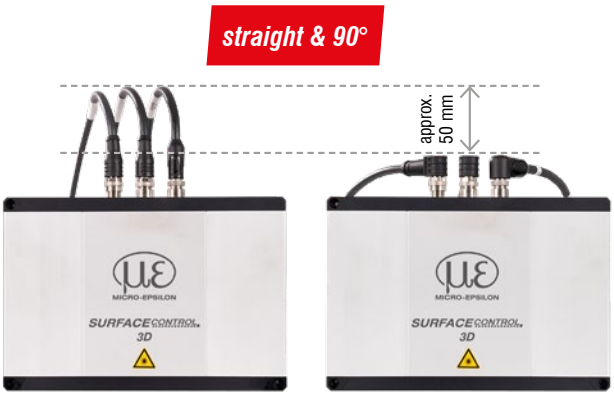
- Reliable in industrial environments due to a robust aluminum housing and excellent ambient light resistance
- Optional cooling housings for demanding environments

All-in-one solution



- Complete acquisition of the measuring object at the push of a button or via trigger signal
- Calibrated 3D data without linear motion and without an encoder

Easiest integration



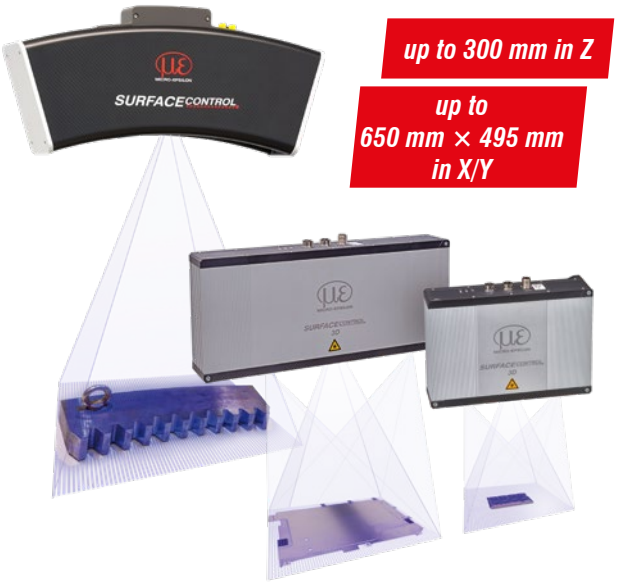
EtherCAT® PROFINET® EtherNet/IP

- Minimal wiring effort thanks to integrated controllers & flexible connection cables
- Multiple interfaces and comprehensive SDK for time-saving integration

Fast commissioning

- Fast and convenient alignment and positioning using auxiliary patterns
- Integrated measurement assistant for quick setup

Wide range of models

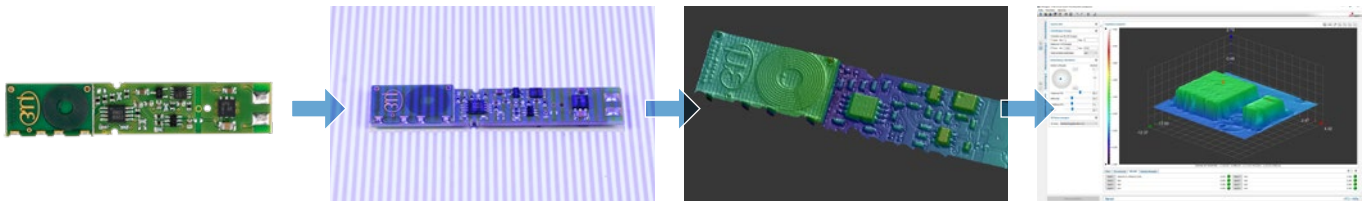


- A wide variety of measuring fields for almost any application
- Accuracy down to the submicrometer range

Precise 3D data – measuring instead of just detecting
surfaceCONTROL 3D

Whether in factory automation, autonomous assembly systems or process monitoring, surfaceCONTROL 3D sensors provide high-precision 3D data in real time. With a single acquisition, they capture more than 10 million measurement points with exact x, y and z coordinates. This produces a detailed representation of the measuring object that can be comprehensively analyzed and objectively evaluated.

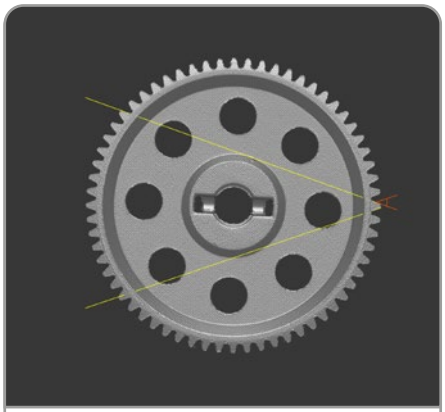
Defects, height differences, positional deviations and other inspection features are reliably detected and precisely quantified – enabling efficient, automated inspection and measurement processes and consistently high product quality in demanding modern industrial applications and production environments.



Measuring object | Measuring object with fringe light | Point cloud processing | Evaluation with 3DInspect and automated output

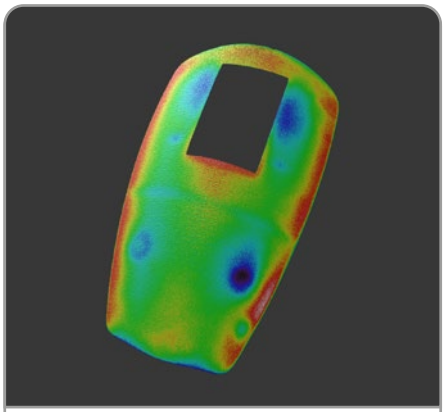
Wide variety of applications

surfaceCONTROL application areas



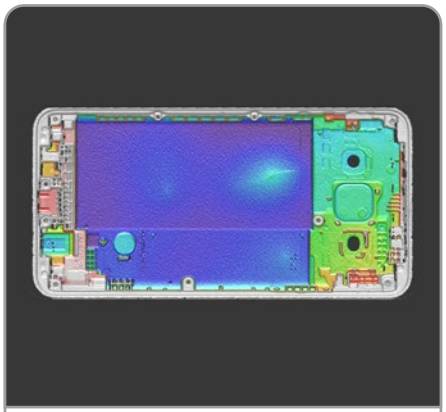
Form & geometry inspection

e.g., angle, diameter, length, distance, height, roundness, straightness, flatness, volume, etc.



Defect detection & assembly inspection

e.g., cracks, chips, dents, scratches, particles, burrs, presence, completeness, etc.



Alignment & position

e.g., location, position, orientation in space, etc.

Maximum solution flexibility
surfaceCONTROL 3D

SMART

Fast, intuitive path to a high-precision 3D solution

3D DATA

Highest precision with maximum integration flexibility

Direct output of measurement values = Evaluation in the sensor

For PLCs and automation

- Transfer measurement values directly to the PLC
- Sensor control via standard protocols
- OK/NOK result evaluation and output via digital outputs or fieldbus

Available interfaces:

EtherCAT
EtherNet/IP
PROFINET
Modbus
UDP

Integration into image processing = external evaluation

For vision systems and software

- Standardized interfaces: GenICam / GigE Vision
- Direct connection to compatible vision software
- Output of profile or 3D data depending on the sensor series

Compatible interfaces & software:

COGNEX VisionPro
HALCON a product of MVTec
GENICAM
GIGE VISION

Integration into customer software = external evaluation

For developers and OEMs

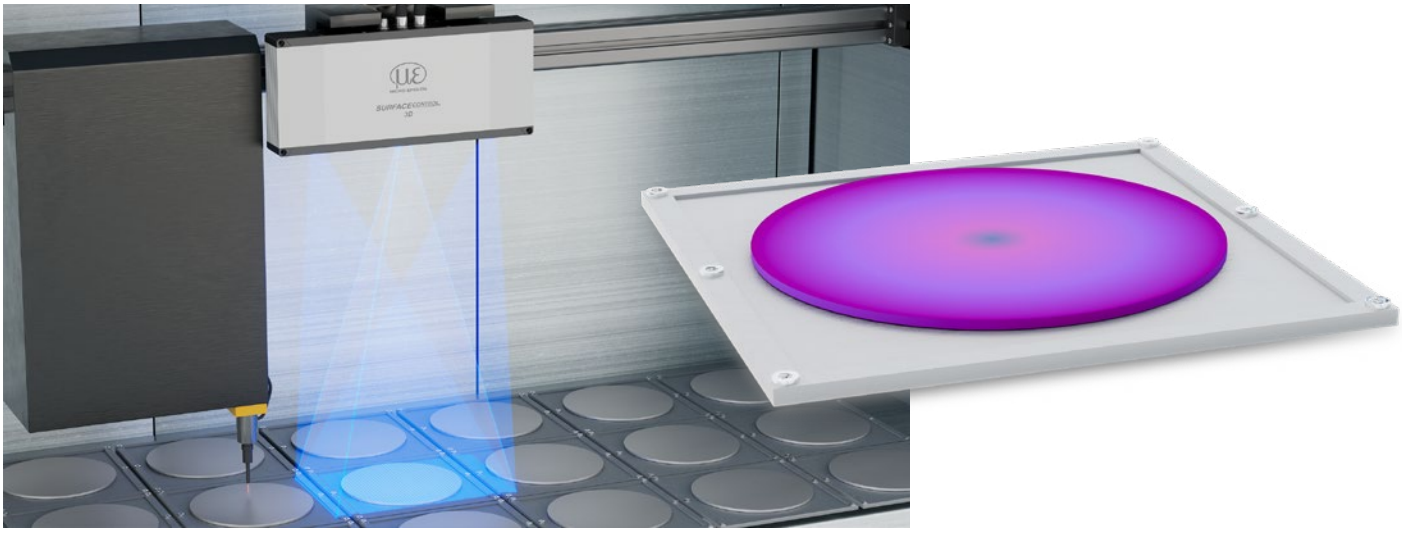
- SDKs and LLT.DLL for C/C++ or C#/.NET
- LabVIEW drivers and example programs
- Developer Tool with sample code
- Documentation and support

Supported environments:

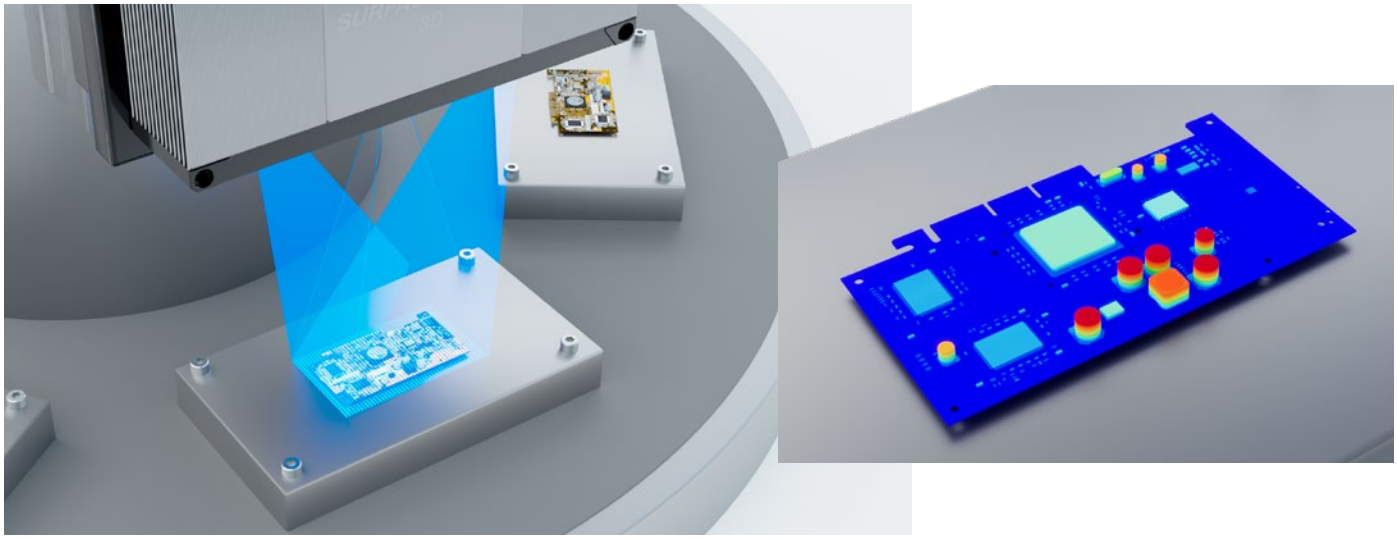
C/C++ C#/.NET
Linux LabVIEW
python

For custom workflows, advanced integrations or special requirements, we will be happy to help you select the right solution.

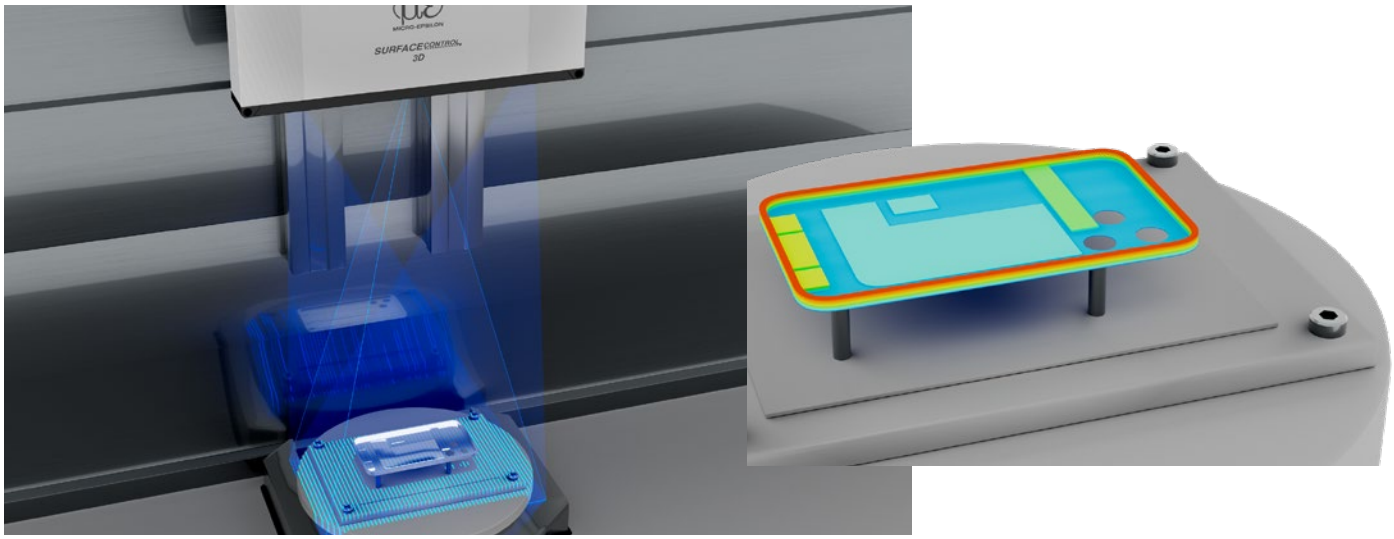
Applications
surfaceCONTROL 3D



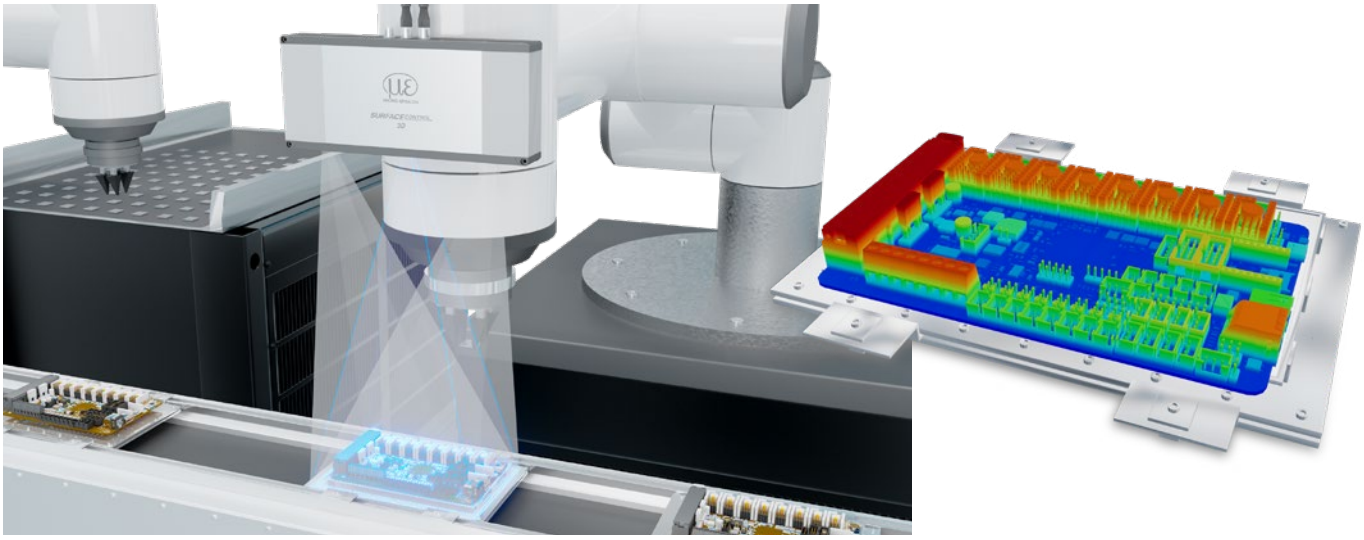
Height measurement for high-precision flatness inspection during laser ablation



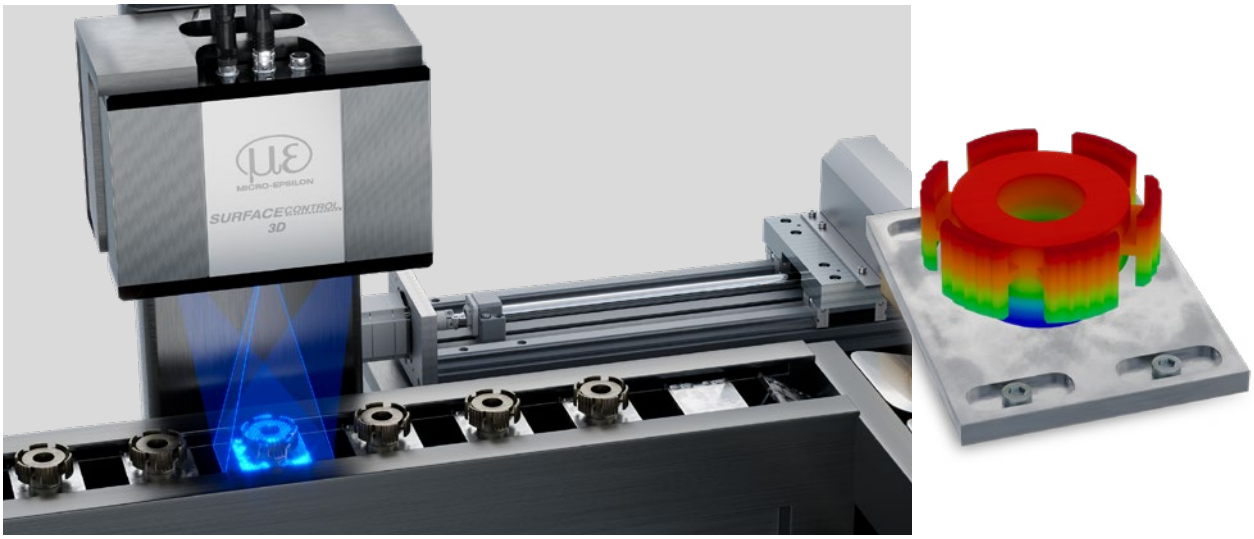
Measurement of PCB warpage and tilt of mounted components



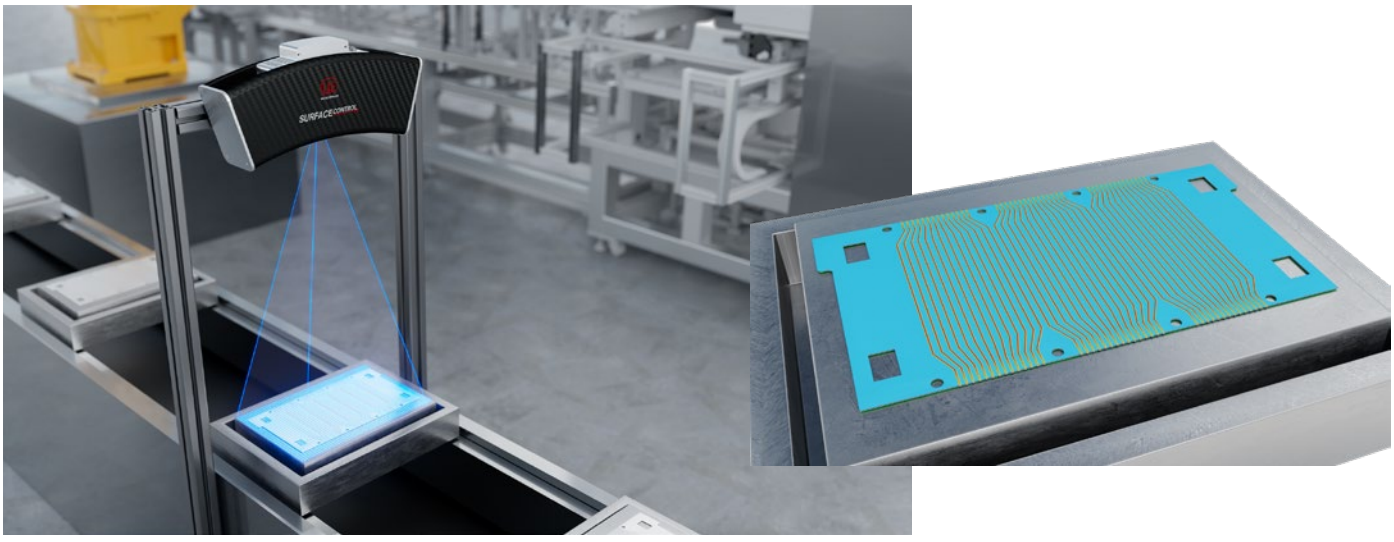
Measurement of the dimensional accuracy of smartphone housings
(height differences, lengths, widths, hole positions)



Height and distance measurements on electronic assemblies to verify correct mounting and completeness



Defect detection and dimensional accuracy measurement for precision parts



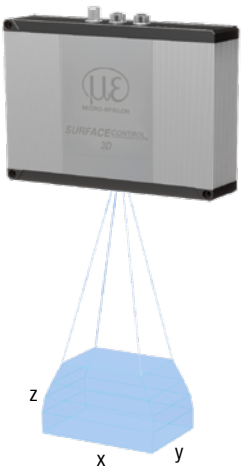
Precise flatness measurement of large objects, e.g., bipolar plates

Measuring fields for all applications
surfaceCONTROL 3D

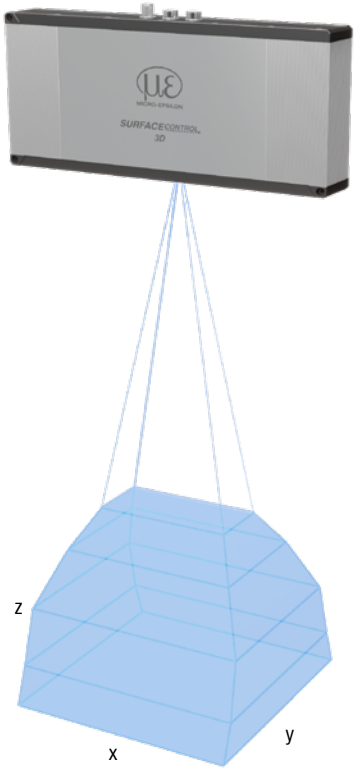
Highest z-axis repeatability & high XY resolution

Measuring field x y	max. 30.5 x 19.0 mm
Measuring field height z	max. 12 mm

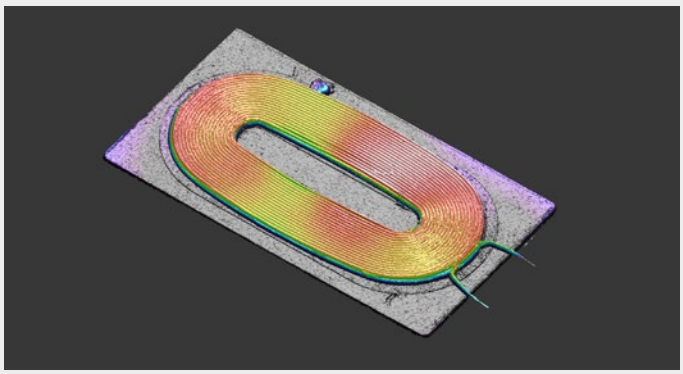
Measuring field x y	max. 77.5 x 52 mm
Measuring field height z	max. 40 mm



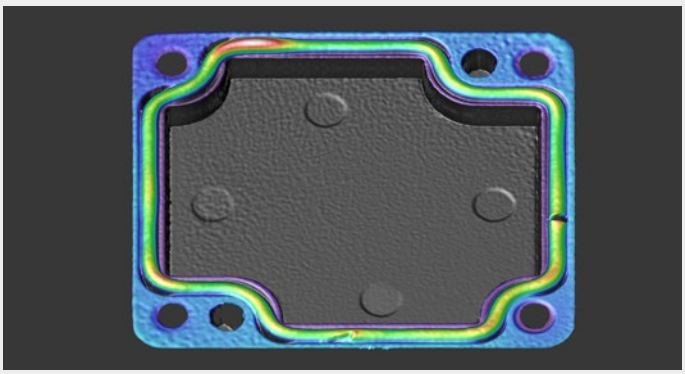
Measuring field x y	max. 123.5 x 80 mm
Measuring field height z	max. 70 mm



Measuring field x y	max. 245 x 170 mm
Measuring field height z	max. 200 mm

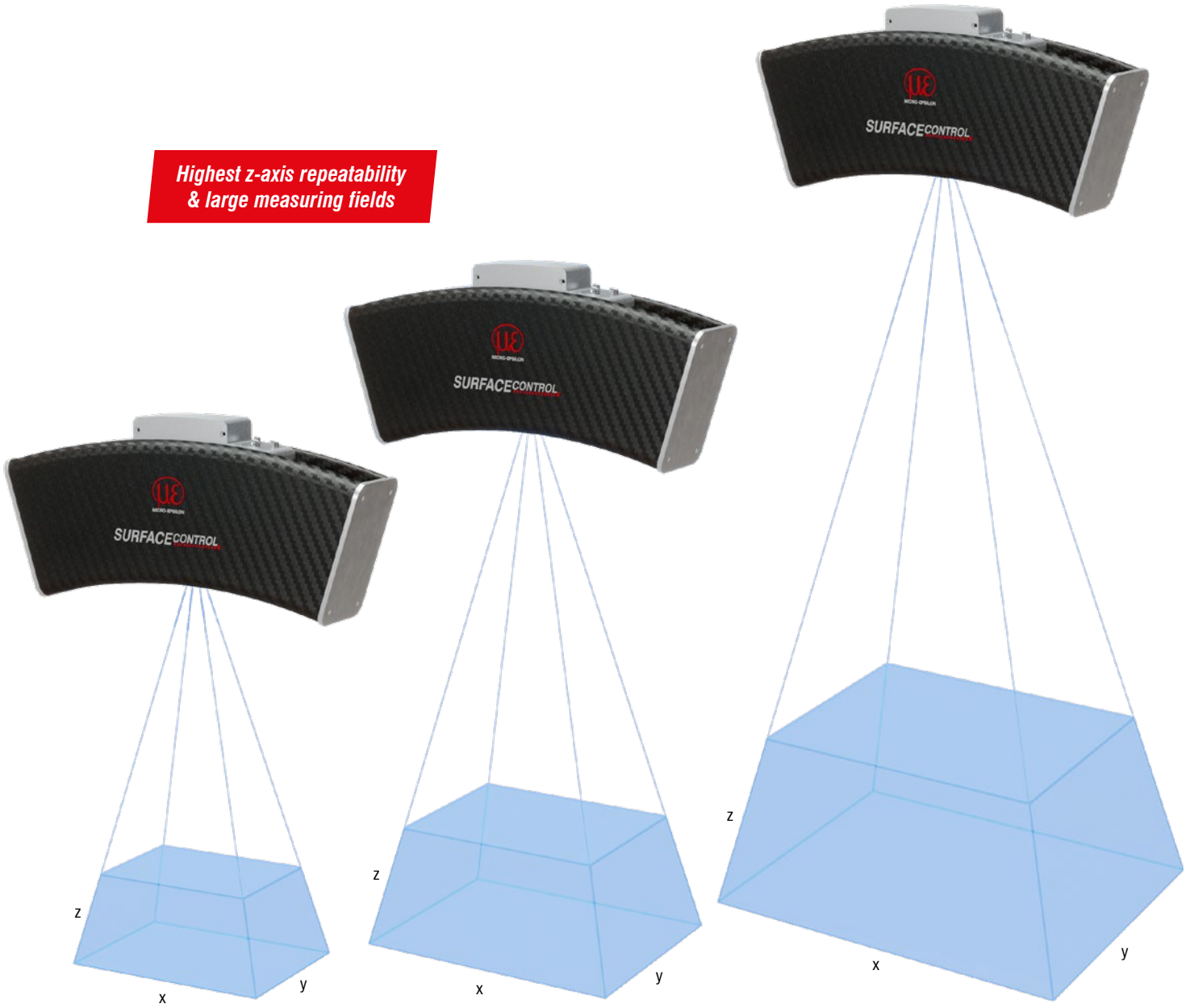


Smallest electronic components,
e.g., inspection of the winding of charging coils



Medium-sized industrial assemblies
e.g., presence and defect inspection of seals

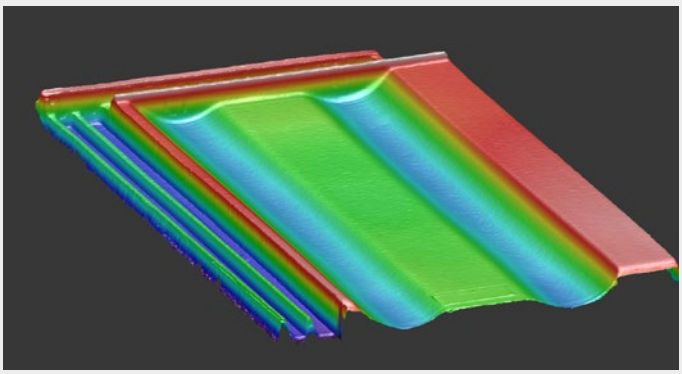
Highest z-axis repeatability & large measuring fields



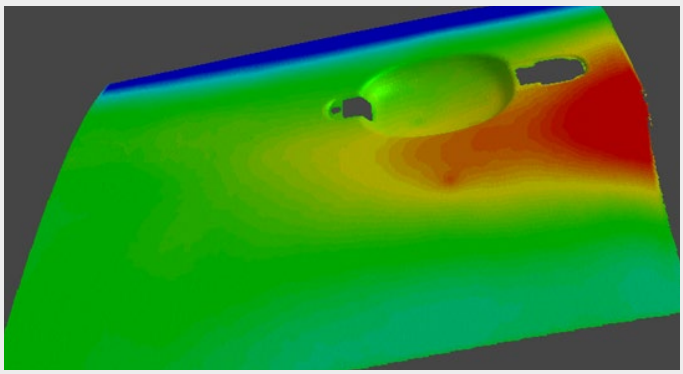
Measuring field x y	max. 340 x 250 mm
Measuring field height z	max. 150 mm

Measuring field x y	max. 450 x 340 mm
Measuring field height z	max. 200 mm

Measuring field x y	max. 650 x 495 mm
Measuring field height z	max. 300 mm



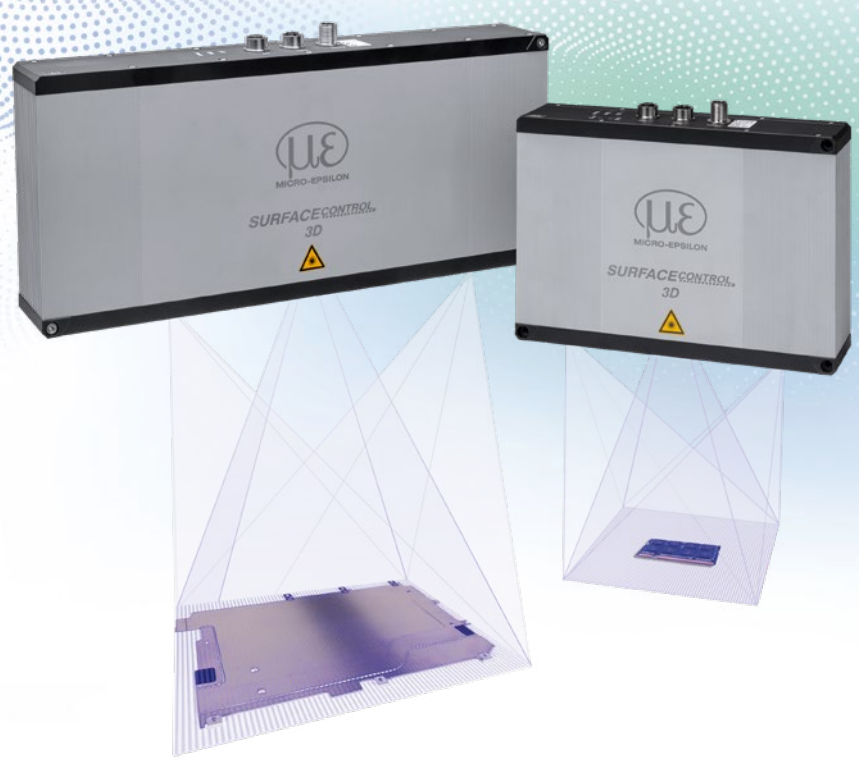
Larger products and objects
e.g., form and surface inspection of roof tiles



Very large automotive components
e.g., surface inspection and defect detection of car doors

Next Level: Fully integrated 3D snapshot sensors
surfaceCONTROL 3D 3560

- Highest XY resolution starting at 8 µm for measuring the smallest details
- Best in class: Z-axis repeatability starting at 0.25 µm
- Short acquisition and evaluation times for high-speed processes
- All-in-one: Data acquisition, processing and evaluation in the sensor
- Easy integration thanks to integrated Industrial Ethernet
- Sensor with IP67 and passive cooling



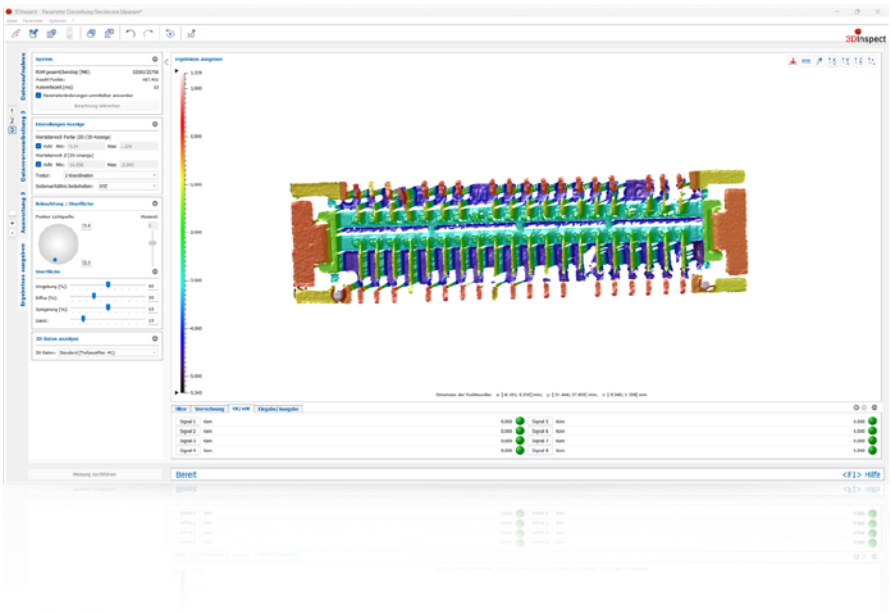
Fast. Precise. Smart.

The surfaceCONTROL 3D 3560 is a smart 3D sensor for high-precision measurements. The 3D data sets are captured in a very short time and processed directly on the integrated high-performance platform – no additional PC required.

Measurement results for form, geometry, surface, or quality are available in the shortest possible time. This enables reliable inspections even in high-speed or cycle-based processes without slowing the process flow. With z-axis repeatability up to 0.25 µm and a lateral resolution of 8 µm, the smallest details are reliably captured in both XY and Z directions.

The 3D sensor for integrators, image processing specialists and end users

Depending on requirements, 3D data can be transmitted in accordance with the GigE Vision and GenICam standards, while end users receive directly calculated measurement values. For integration, digital switching signals and the fieldbus interfaces PROFINET, EtherNet/IP, EtherCAT and Modbus are available.



Model		SC3560-30-IE	SC3560-80-IE	SC3560-120-IE	SC3560-240-IE
Measuring range length (x) x width (y)	Start of measuring range	29.5 mm x 18.0 mm	67.5 mm x 46 mm	107.5 mm x 70 mm	190 mm x 130 mm
	Mid of measuring range	30 mm x 18.5 mm	80 mm x 50 mm	120 mm x 75 mm	240 mm x 150 mm
	End of measuring range	30.5 mm x 19.0 mm	77.5 mm x 52 mm	123.5 mm x 80 mm	245 mm x 170 mm
Working distance	z	130 ±3 mm	130 ±10 mm	206 ±15 mm	440 ±60 mm
	Extended z	130 ±6 mm	130 ±20 mm	206 ±35 mm	440 ±100 mm
Resolution	x, y	8 µm	20 µm	30 µm	60 µm
	z [1]	0.7 µm	1 µm	2 µm	4 µm
Repeatability	z [1]	< 0.25 µm	< 0.4 µm	< 0.8 µm	< 1.4 µm
Acquisition time [2]		from 0.2 s			
Light source		LED			
Supply voltage		24 V DC ±20%			
Max. current consumption		0.5 … 2.5 A			
Digital interface		Gigabit Ethernet (GigE Vision / GenICam); PROFINET; EtherCAT; EtherNet/IP			
Digital I/Os		4 digital I/Os for which parameters can be set (for external trigger, sensor control, output of sensor states)			
Connection		8-pin M12 socket for Gigabit Ethernet, 12-pin M12 socket for fieldbus or digital I/Os, 4-pin M12 plug for power supply			
Mounting		3 mounting holes (repeatable mounting with centering sleeves)			
Temperature range	Storage	-20 °C ... +70 °C			
	Operation [3]	0 °C … +45 °C			
Permissible extraneous light		10,000 lx			
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			
Protection class (DIN EN 60529)		IP67 (when connected)			
Material		Aluminum housing			
Weight		1.9 kg			2.3 kg
Control and indicator elements		3x color LEDs for power, state and LED; 2x LEDs for fieldbus			
Software	3D evaluation software	Micro-Epsilon 3DInspect for integrated processing, evaluation, and output of measurement values			
	3D sensor SDK	Micro-Epsilon 3D Sensor SDK for custom integration into third-party software			

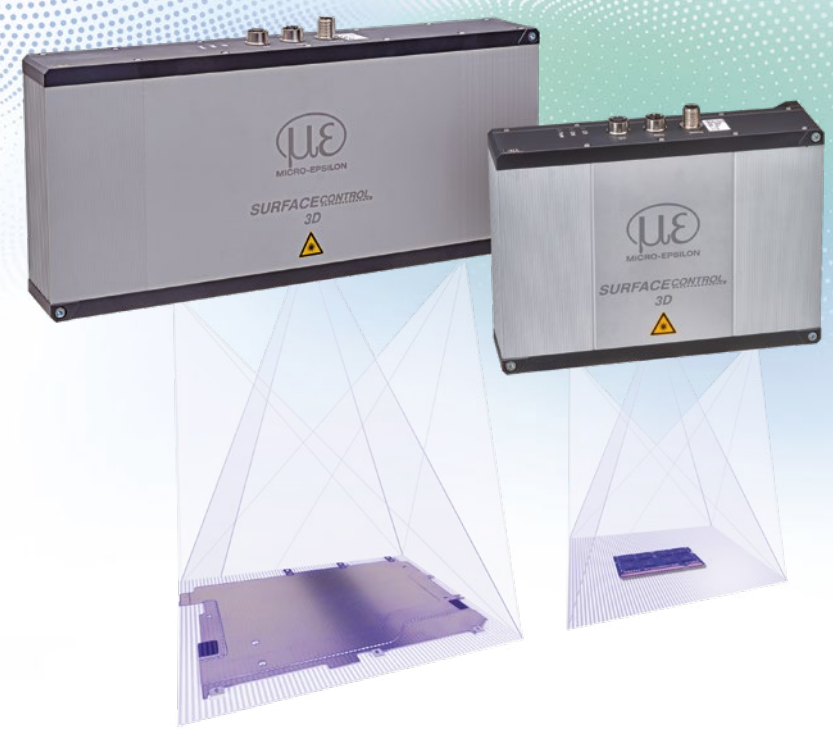
[1] Measured on measuring object with cooperative surface in the center of the measurement area while the EnhancedSNR parameter is enabled and a 3x3 mean value filter is used once at a room temperature between 20 °C and 25 °C.

[2] Duration that the sensor requires for the image acquisition of the pattern projections (without processing and evaluation time). Applies to exposure times < 6,800 µs.

[3] Max. permissible operating temperature depends on installation scenario, connection and operating mode. In combination with a ventilation unit (art. no. 2105079), continuous measurement operation is possible at ambient temperatures of up to 45 °C (valid for measuring ranges 30, 80 and 120 mm).

High-performance 3D sensors for highest precision
surfaceCONTROL 3D 3500

- Highest XY resolution starting at 8 µm for measuring the smallest details
- Best in class: Z-axis repeatability starting at 0.25 µm
- Short acquisition time starting at 0.2 s for high-speed processes
- GigE Vision & GenICam for standardized 3D image processing
- Sensor with IP67 and passive cooling



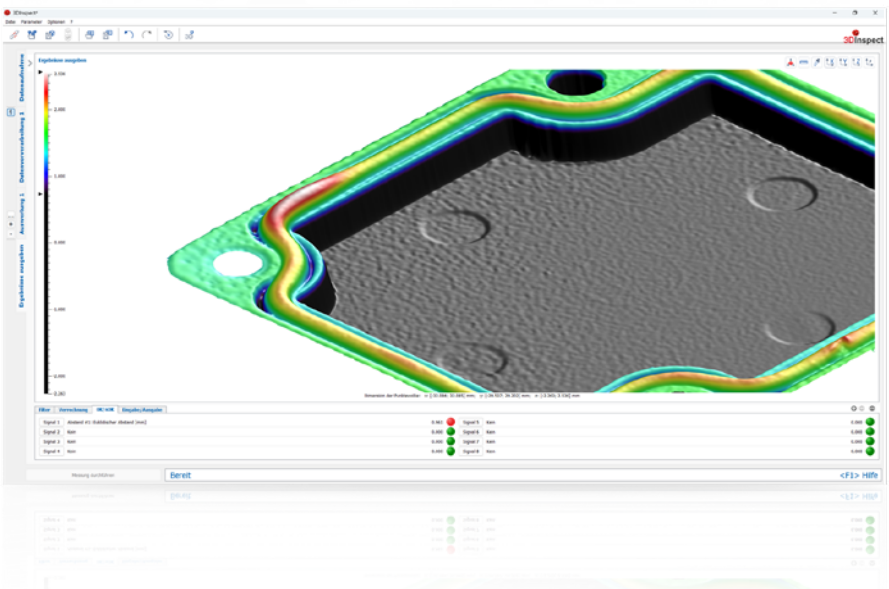
High-precision 3D measurements

surfaceCONTROL 3D 3500 series sensors are used for automated, high-precision inline inspection of geometry, form and surfaces. The 3D snapshot sensors are characterized by a compact design and high measurement accuracy, combined with high-speed data processing.

With z-axis repeatability of up to 0.25 µm, the smallest flatness deviations and height differences are reliably detected. Four measuring ranges cover different application areas.

Ideal for integrators and image processing specialists

The surfaceCONTROL 3D sensors of the SC3500 series capture complete images of a measuring object and process them into high-precision 3D data. These are output over Gigabit Ethernet in accordance with the GenICam standard and can be processed or evaluated in any image processing software.



Model		SC3500-30	SC3500-80	SC3500-120	SC3500-240
Measuring range length (x) x width (y)	Start of measuring range	29.5 mm x 18.0 mm	67.5 mm x 46 mm	107.5 mm x 70 mm	190 mm x 130 mm
	Mid of measuring range	30 mm x 18.5 mm	80 mm x 50 mm	120 mm x 75 mm	240 mm x 150 mm
	End of measuring range	30.5 mm x 19.0 mm	77.5 mm x 52 mm	123.5 mm x 80 mm	245 mm x 170 mm
Working distance	z	130 ±3 mm	130 ±10 mm	206 ±15 mm	440 ±60 mm
	Extended z	130 ±6 mm	130 ±20 mm	206 ±35 mm	440 ±100 mm
Resolution	x, y	8 µm	20 µm	30 µm	60 µm
	z [1]	0.7 µm	1 µm	2 µm	4 µm
Repeatability	z [1]	< 0.25 µm	< 0.4 µm	< 0.8 µm	< 1.4 µm
Acquisition time [2]		from 0.2 s			
Light source		LED			
Supply voltage		24 VDC ±20%			
Max. current consumption		0.5 … 2.5 A			
Digital interface		Gigabit Ethernet (GigE Vision / GenICam)			
Digital I/Os		4 digital I/Os for which parameters can be set (for external trigger, sensor control, output of sensor states)			
Connection		8-pin M12 socket for Gigabit Ethernet, 12-pin M12 socket for digital I/Os, 4-pin M12 plug for power supply			
Mounting		3 mounting holes (installation can be reproduced with centering sleeves)			
Temperature range	Storage	-20 °C ... +70 °C			
	Operation [3]	0 °C … +45 °C			0 °C … 40 °C
Permissible extraneous light		10,000 lx			
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			
Protection class (DIN EN 60529)		IP67 (when connected)			
Material		Aluminum housing			
Weight		1.9 kg			2.3 kg
Control and indicator elements		3x color LEDs for power, state and LED			
Software	3D evaluation software	Micro-Epsilon 3DInspect for visualization of 3D data			
	3D sensor SDK	Micro-Epsilon 3D Sensor SDK for custom integration into third-party software			

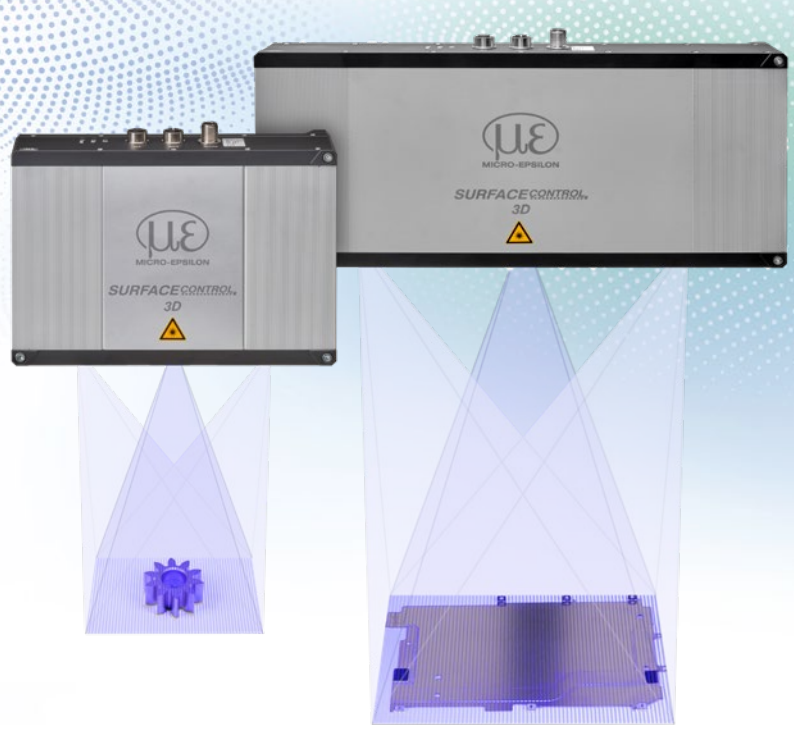
[1] Measured on measuring object with cooperative surface in the center of the measurement area while the EnhancedSNR parameter is enabled and a 3x3 mean value filter is used once at a room temperature between 20 °C and 25 °C.

[2] Duration that the sensor requires for the image acquisition of the pattern projections (without processing and evaluation time). Applies to exposure times < 6,800 µs.

[3] Max. permissible operating temperature depends on installation scenario, connection and operating mode. In combination with a ventilation unit (art. no. 2105079), continuous measurement operation is possible at ambient temperatures of up to 45 °C (valid for measuring ranges 30, 80 and 120 mm).

Precise 3D sensors for industrial measurement tasks
surfaceCONTROL 3D 3200

- High XY resolution starting at 12 µm for measuring the smallest details
- z-axis repeatability starting at 0.4 µm for the smallest height differences
- Short acquisition time starting at 0.3 s for high-speed processes
- GigE Vision & GenICam for standardized 3D image processing
- Excellent price-performance ratio

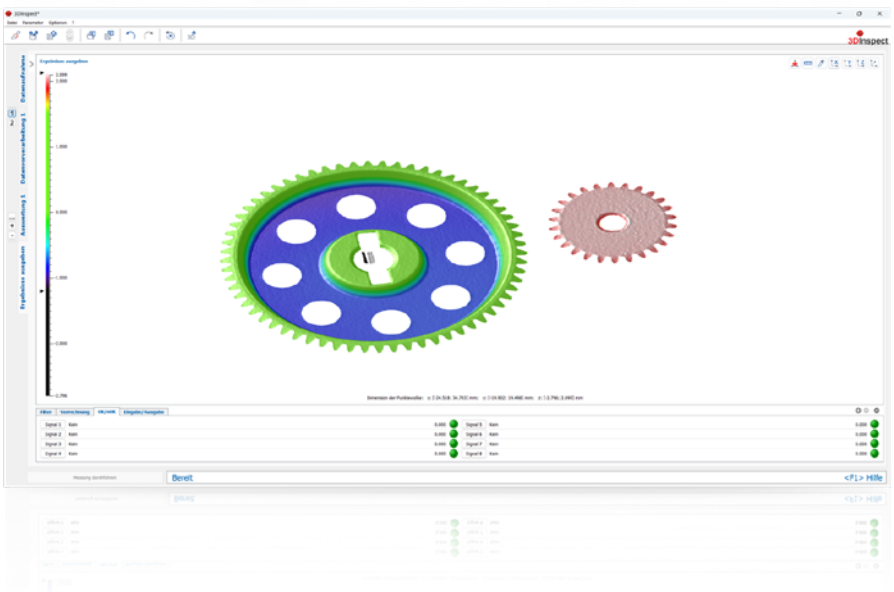


High precision with an excellent price-performance ratio

surfaceCONTROL 3D 3200 series sensors are ideally suited for automated, high-precision inline inspection of geometry, form and surfaces on diffusely reflecting surfaces. The 3D snapshot sensors are characterized by their robustness, compact design, high measurement accuracy, and an excellent price-performance ratio. With XY resolution up to 12 µm and z-axis repeatability up to 0.4 µm, they detect the smallest flatness deviations and height differences reliably.

Ideal for integrators and image processing specialists

The surfaceCONTROL 3D sensors in the SC3200 series capture complete images of a component and process them into precise 3D data. These are output over Gigabit Ethernet in accordance with the GenICam standard and can be processed or evaluated in any image processing software.



Model		SC3200-30	SC3200-80	SC3200-120	SC3200-240
Measuring range length (x) x width (y)	Start of measuring range	29.5 mm x 18 mm	65 mm x 47 mm	100 mm x 70 mm	180 mm x 130 mm
	Mid of measuring range	30 mm x 18.5 mm	75 mm x 50 mm	115 mm x 75 mm	235 mm x 150 mm
	End of measuring range	30.5 mm x 19 mm	74 mm x 53 mm	115 mm x 79 mm	235 mm x 170 mm
Working distance	z	130 ±3 mm	130 ±10 mm	206 ±15 mm	440 ±60 mm
	Extended z	130 ±6 mm	130 ±20 mm	206 ±35 mm	440 ±100 mm
Resolution	x, y	12 µm	30 µm	45 µm	90 µm
	z [1]	1 µm	1.5 µm	3.4 µm	5 µm
Repeatability	z [1]	< 0.4 µm	< 0.6 µm	< 1.2 µm	< 1.8 µm
Acquisition time [2]		from 0.3 s			
Light source		LED			
Supply voltage		24 VDC ±20%			
Max. current consumption		0.5 … 1.5 A			
Digital interface		Gigabit Ethernet (GigE Vision / GenICam)			
Digital I/Os		4 digital I/Os for which parameters can be set (for external trigger, sensor control, output of sensor states)			
Connection		8-pin M12 socket for Gigabit Ethernet, 12-pin M12 socket for digital I/Os, 4-pin M12 plug for power supply			
Mounting		3 mounting holes (installation can be reproduced with centering sleeves)			
Temperature range	Storage	-20 °C ... +70 °C			
	Operation [3]	0 °C … +45 °C			0 °C … +40 °C
Permissible extraneous light		10,000 lx			
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			
Protection class (DIN EN 60529)		IP67 (when connected)			
Material		Aluminum housing			
Weight		1.9 kg			2.3 kg
Control and indicator elements		3x color LEDs for power, state and LED			
Software	3D evaluation software	Micro-Epsilon 3DInspect for visualization of 3D data			
	3D sensor SDK	Micro-Epsilon 3D Sensor SDK for custom integration into third-party software			

[1] Measured on measuring object with cooperative surface in the center of the measurement area while the EnhancedSNR parameter is enabled and a 3x3 mean value filter is used once at a room temperature between 20 °C and 25 °C.

[2] Duration that the sensor requires for the image acquisition of the pattern projections (without processing and evaluation time). Applies to exposure times < 6,800 µs.

[3] Max. permissible operating temperature depends on installation scenario, connection and operating mode. In combination with a ventilation unit (art. no. 2105079), continuous measurement operation is possible at ambient temperatures of up to 45 °C (valid for measuring ranges 30, 80 and 120 mm).

High-precision 3D sensors for large measuring objects
surfaceCONTROL 3D 2600

- Extra-large measuring field (XY) up to 650 × 495 mm
- Short acquisition time starting at 0.25 s Ideal for high-speed processes
- Excellent z-axis repeatability of up to 0.5 µm with a large measurement depth
- Flexible integration: with evaluation or 3D data only

Large measuring fields with high z-axis precision
Ideal for flatness measurements on large objects

surfaceCONTROL 3D 2600 series sensors are particularly suitable for precise measurement of large objects up to 650 mm × 495 mm. They achieve an impressive z-axis precision of up to 0.5 µm, enabling reliable detection and extremely precise determination of the smallest details and height differences. This makes them particularly well suited for flatness measurements.

Thanks to the integrated controller, precise 3D data are generated directly on the sensor and, depending on the model, either output via GigE Vision (SC2600) or evaluated via the optionally available Industrial Performance Unit using the powerful 3DInspect software (SC2610).

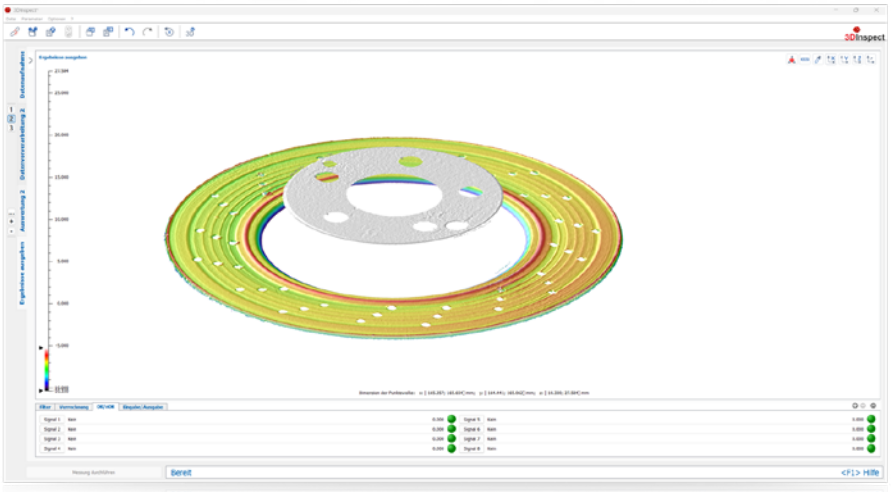
Article designation

SC	26	00	-300

Measuring range
300 mm
400 mm
575 mm

Class
00 = standard
10 = functional extension

Model series
SC26x0



Model		SC2600-300	SC2610-300	SC2600-400	SC2610-400	SC2600-575	SC2610-575
Measuring range length (x) x width (y)	Start of measuring range	260 mm x 190 mm		350 mm x 260 mm		500 mm x 375 mm	
	Mid of measuring range	300 mm x 220 mm		400 mm x 300 mm		575 mm x 435 mm	
	End of measuring range	340 mm x 250 mm		450 mm x 340 mm		650 mm x 495 mm	
Working distance	z	550 ±75 mm		760 ±100 mm		1100 ±150 mm	
Resolution	x, y	125 µm		150 µm		250 µm	
	z [1]	1.2 µm		3.4 µm		8.5 µm	
Repeatability	z [1]	< 0.5 µm		< 1.2 µm		< 3.0 µm	
Acquisition time [2]		from 0.25 s					
Light source		LED					
Supply voltage		18 ... 24 V DC					
Max. current consumption		8 A (at 24 V)					
Digital interface [3]		Gigabit Ethernet (GigE Vision / GenICam) PROFINET; EtherCAT; EtherNet/IP					
Digital I/Os		2 digital I/Os for which parameters can be set (for external trigger, sensor control, output of sensor states)					
Connection		8-pin M12 socket (X-coded) for Gigabit Ethernet; 12-pin M12 socket (D-coded) for digital I/Os; 4-pin M12 plug (T-coded) for power supply					
Mounting		Mounting via flange adapter					
Temperature range	Storage	-10 °C ... +50 °C					
	Operation	+5 °C ... +40 °C					
Permissible extraneous light		10,000 lx					
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					
Protection class (DIN EN 60529)		IP40					
Material		Carbon, aluminum, plastics					
Weight		8 kg					
Control and indicator elements		3x LEDs for device status, power, projection					
Software	3D evaluation software	Micro-Epsilon 3DInspect for integrated processing, evaluation, and output of measurement values					
	3D sensor SDK	Micro-Epsilon 3D Sensor SDK for custom integration into third-party software					
Output of measurement values	3D data	yes	yes	yes	yes	yes	yes
	Measurement values	-	yes	-	yes	-	yes

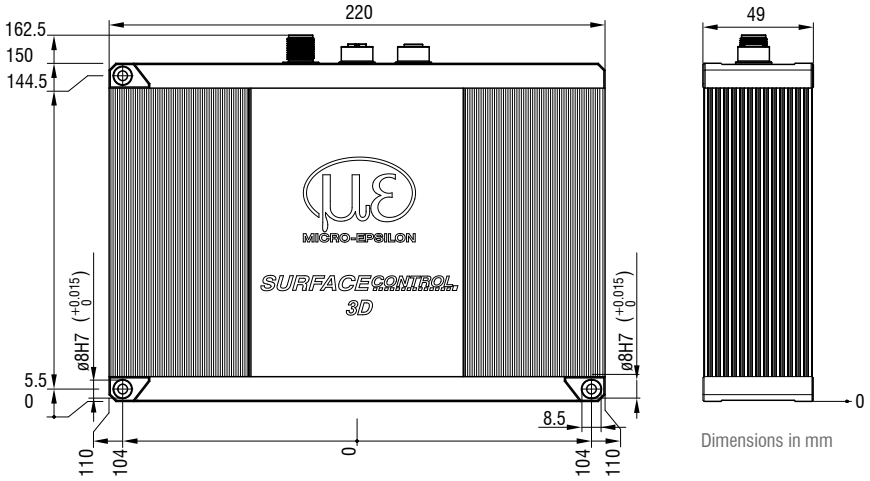
[1] Measured on measuring object with cooperative surface in the center of the measurement area while the EnhancedSNR parameter is enabled and a 3x3 mean value filter is used once at a room temperature between 20 °C and 25 °C.

[2] Duration that the sensor requires for the image acquisition of the pattern projections (without processing and evaluation time). Applies to exposure times < 6,800 µs.

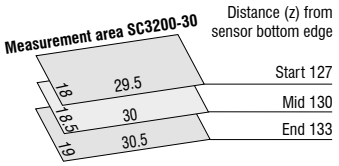
[3] For EtherCAT, PROFINET, and EtherNet/IP the connection via an Industrial Performance Unit (IPU) is required.

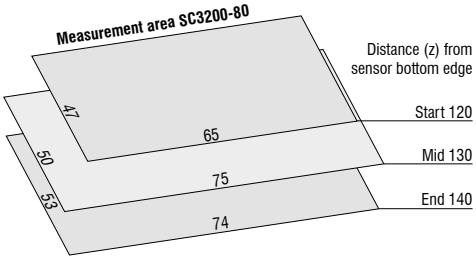
Dimensions and measuring ranges
surfaceCONTROL 3D 3560, 3500 & 3200

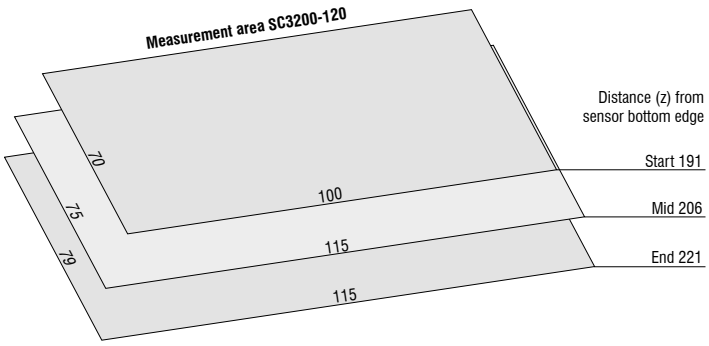
Measuring ranges -30, -80 and -120



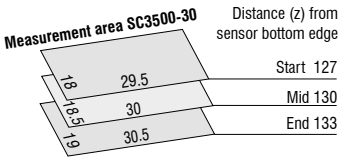
surfaceCONTROL 3D 3200

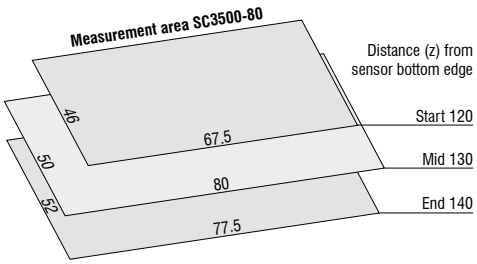


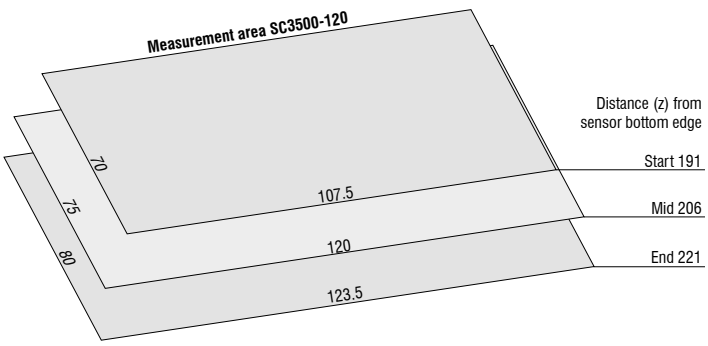




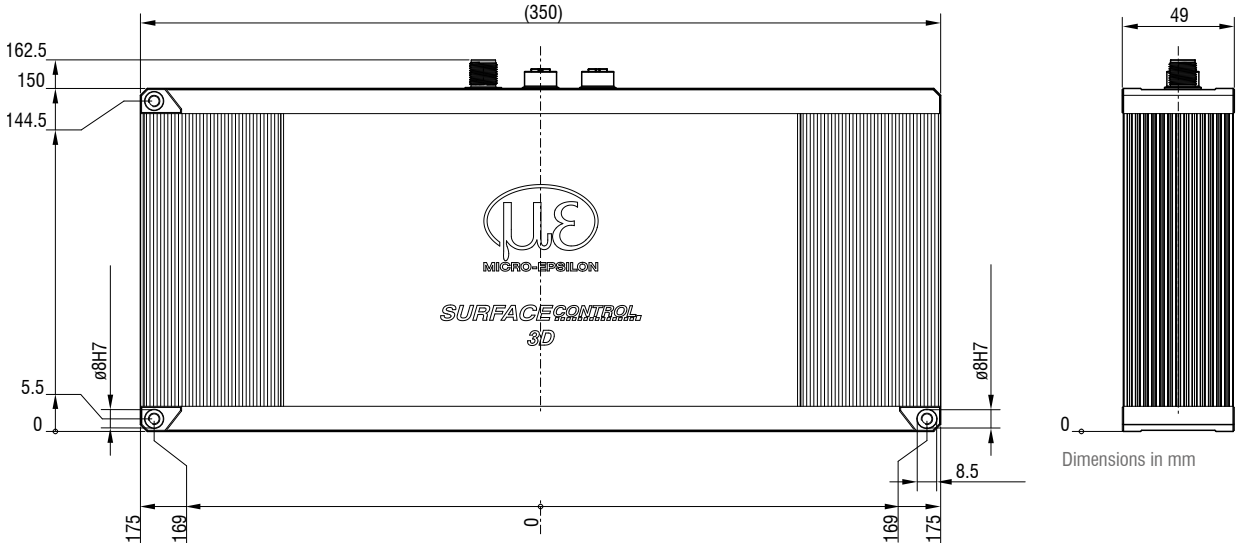
surfaceCONTROL 3D 3560 /3500



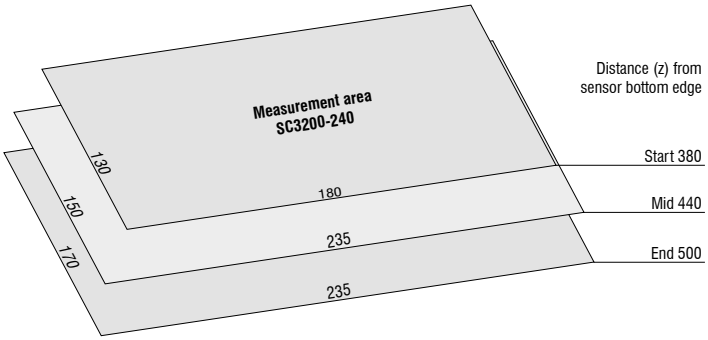




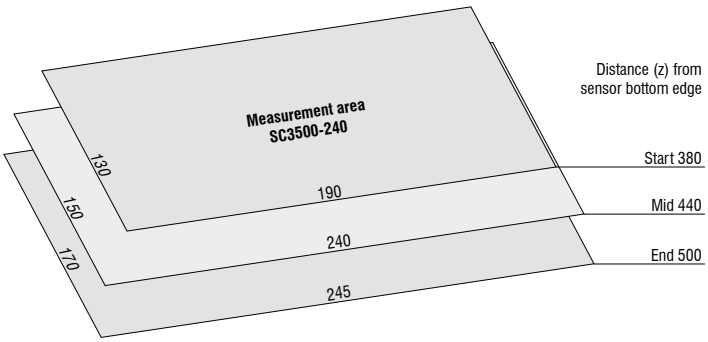
Measuring range -240



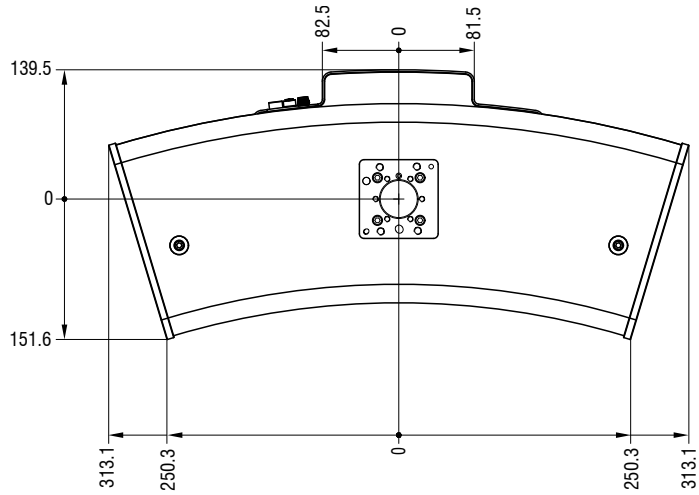
surfaceCONTROL 3D 3200

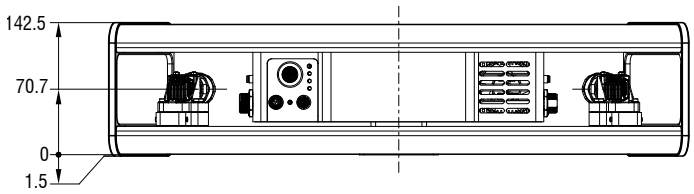


surfaceCONTROL 3D 3560 /3500

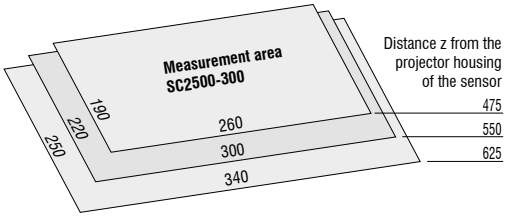


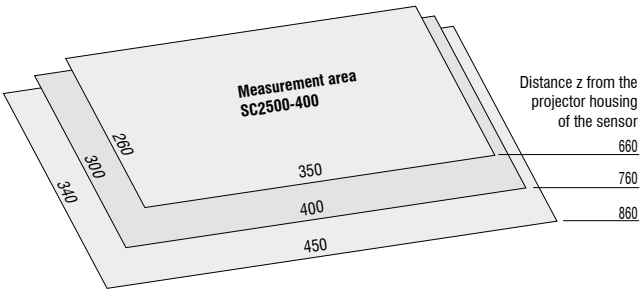
Dimensions and measuring ranges
surfaceCONTROL 3D 26x0

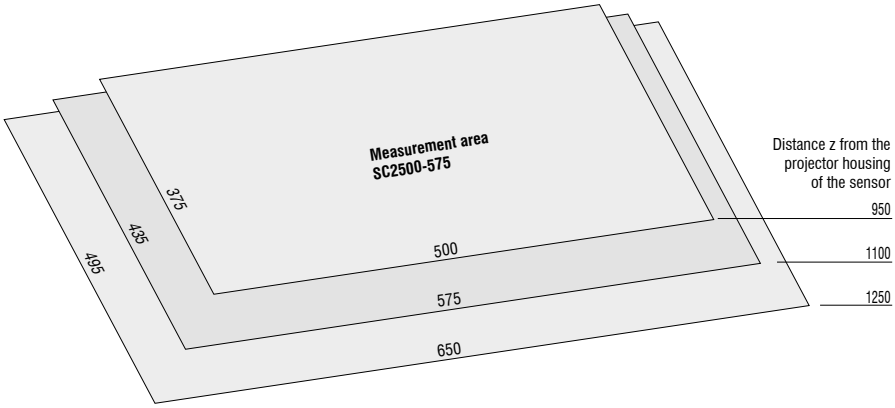




Dimensions in mm







Connection options
surfaceCONTROL 3D

SC3560

SMART

PROFINET, EtherCAT, EtherNet/IP, Modbus TCP, UDP

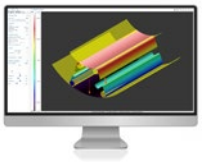
Interface cable PC3000-IE-x/RJ45 (see accessories)

PLC

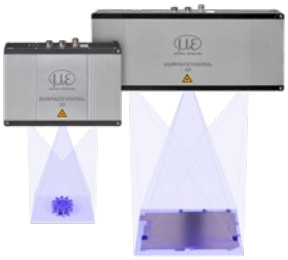
3D DATA

GigE Vision

Ethernet connection cable SCR3000X-x (see accessories)



Third-party software

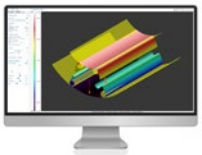


SC3200/3500

3D DATA

GigE Vision

Ethernet connection cable SCR3000X-x (see accessories)



Third-party software

3DInspect

SC26x0

3DInspect

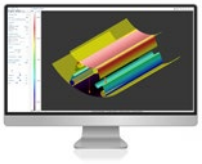
GigE Vision

PROFINET, EtherCAT, EtherNet/IP, Modbus TCP, UDP

PLC

3D DATA

GigE Vision



Third-party software

Software for surface inspection and 3D measurement
3DInspect

More information

3DInspect: powerful software for 3D measurement and inspection tasks

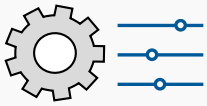
3DInspect is powerful software for industrial measurement and inspection tasks. The 3D measurement data generated by the sensor are processed, evaluated, and automatically assessed in the software based on defined criteria. Measurement results can be visualized, logged and, if required, output directly to a machine or line PLC. In addition, both the measurement results and the complete 3D data can be saved for documentation and later analysis.

Fast & intuitive path to a high-precision 3D solution

The 3D sensors are parameterized directly in 3DInspect. This enables quick configuration of the optimal sensor settings for the specific measurement task. The captured 3D data are preprocessed and optimized. For example, the part position is aligned automatically to enable repeatable evaluation of the point cloud regardless of the workpiece orientation. In addition, functions are available for filtering, smoothing, cropping, creating cross-sections, and highlighting relevant features.

3DInspect offers over 80 powerful measurement programs for data evaluation. This enables reliable localization and measurement of features such as edges, spheres, or bores. In addition to evaluating the complete 3D data, cross-sections can also be evaluated. All 2D and 3D objects can be referenced to one another to determine, for example, distances between a sphere and a plane or the angle between two edges. All determined values and performed evaluations can be output as measurement results.

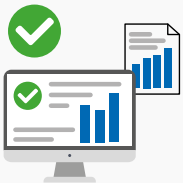
End-to-end workflow from parameterization to output



Parameterization
- Optimal sensor parameters for the application
- Save and reuse parameter sets
- Select measuring ranges

Data preprocessing
- Align and position the point cloud
- Set filters and cross-sections
- Highlight features, remove interference

Data evaluation
- Over 80 measurement programs
- Combination of multiple programs
- Evaluation of cross-sections or 3D areas

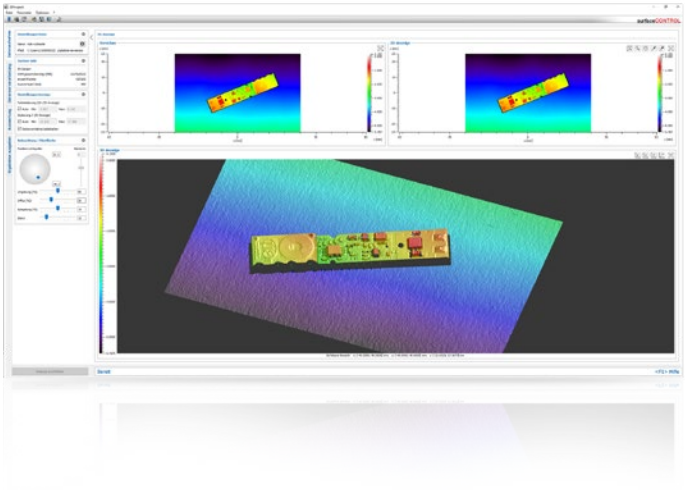


Evaluation & output
- Evaluation of results (OK/NOK)
- Output via digital outputs, fieldbus or Ethernet
- Logging and export of measurement values and 3D data

3DInspect with surfaceCONTROL

The 3DInspect software supports all surfaceCONTROL sensors. In the surfaceCONTROL 3D 3560 series, the 3DInspect evaluation programs can be run directly on the sensor. surfaceCONTROL 2610 series sensors require an external computing unit for evaluation. Both series support automated output of measurement values.

3DInspect supports the surfaceCONTROL 3D 3500, 3200 and 2600 series for test measurements and visualization. However, direct output of measurement values from the sensor is not possible with these models, as they are designed to transmit 3D point clouds.



All benefits at a glance

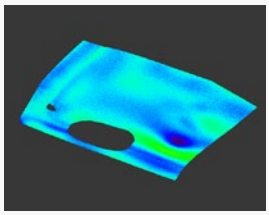
- User-friendly interface – easy creation of measurement programs
- Inline operation – stand-alone operation of the measurement programs directly on the SMART sensors
- Wide range of predefined programs for 2D & 3D geometry measurements and surface inspection
- Logging and storage of 3D data directly in the software
- Valid3D – real 3D instead of only 2.5D enables a true representation of the measuring object without data loss
- Parameterization of fieldbus integration via the automation interface

Functional extensions

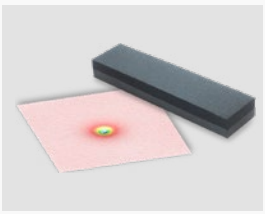
Optional functional extensions allow the functionality to be tailored specifically to the application. The following functional extension is available for surfaceCONTROL:

Functional extension: Surface inspection

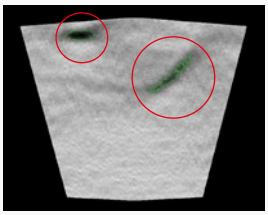
The *surface inspection* extension enables reliable detection of deviations from a homogeneous surface. Tools such as Digital Stone, Digital Master, and defect detection with sorting and counting options are available from 3DInspect 3.1 onwards.



Digital Master:
Objective target/actual comparison with good parts (including variance taken into account)



Digital Stone:
Simulates a physical whetstone. High precision with high repeatability

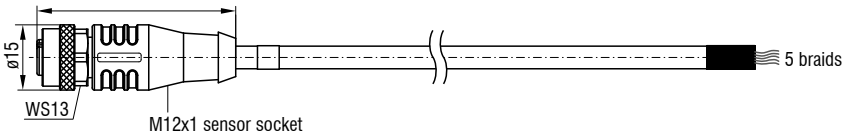


Defect detection with sorting and counting function:
Automatic defect detection and height evaluation

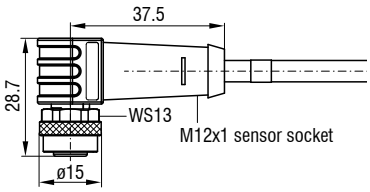
Accessories
surfaceCONTROL 3D SC35xx

Connection cables

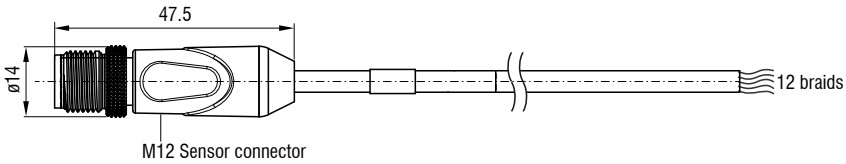
Supply cable ECR3000-x
Power supply cable for drag chains and robots
Cable length: 2 / 5 / 10 / 15 / 20 / 25 / 35 m



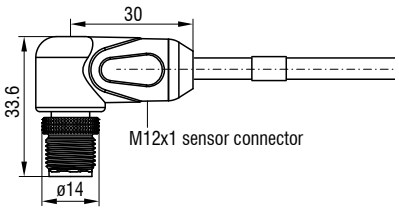
Supply cable ECR3000/90-x
For space-saving installation with 90° connector



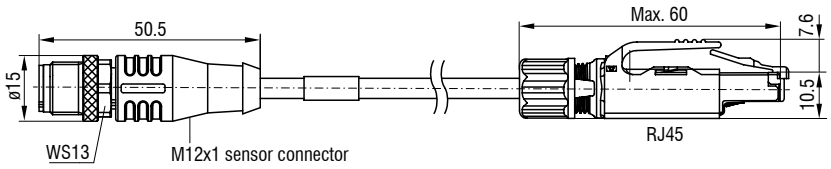
Multifunction cable PCR3000-x
Cable suitable for drag chains and robots for optional connection of digital inputs and outputs (TTL or HTL)
Cable length: 2 / 5 / 10 / 15 / 20 / 25 / 35 m



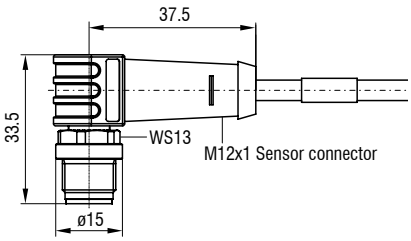
Multifunction cable PCR3000/90-x
For space-saving installation with 90° connector



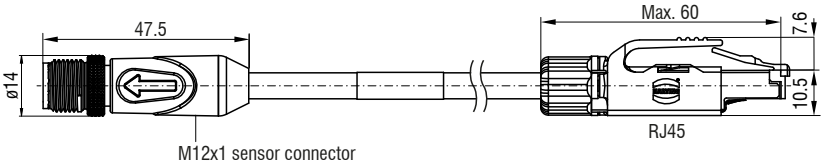
Ethernet connection cable SCR3000X-x
Cable suitable for drag-chains and robots for parameterization, image and 3D data transmission
Cable length: 2 / 5 / 10 / 15 / 20 / 25 / 35 m



Ethernet connection cable SCR3000X/90-x
For space-saving installation with 90° connector



Interface cable PC3000-IE-x/RJ45
Drag chain-compatible cable for fieldbus connection
Cable length: 2, 5, 35 m



Other accessories

Articulated arms

Article no.: 2961008 for MR -30, -80, -120
Article no.: 2961011 for MR -240
For mounting and alignment. Ideal for rapid, flexible testing or laboratory setups.

Compact tripod

Article no.: 2961007
For mounting and alignment.
Ideal for rapid, flexible testing or laboratory setups.

Mounting brackets / adapter plates

Article no.: 3007579 for MR -30, -80, -120
Article no.: 3008681 for MR -240

Air cooling

Article no.: 2105079
Industrial-grade, IP67-rated ventilation unit for quiet, continuous cooling.
Suitable for models -30, -80 and -120 mm.

Desktop power supply PS3000

Article no.: 2420103
Input 90-240 VAC
(50/60 Hz ~1.5 A)
Output 24 VDC (12.5 A)

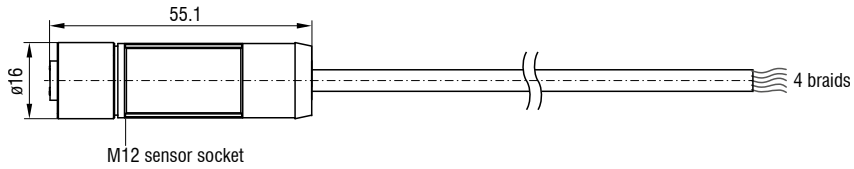
Power supply PS2020

Article no.: 2420062
For mounting on a symmetrical 35 mm × 7.5 mm DIN rail (DIN 50022)
Input 100–240 VAC
Output 24 VDC / 2.5 A

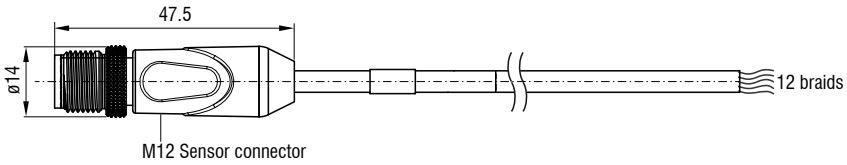
Accessories
surfaceCONTROL 3D 26x0

Connection cables

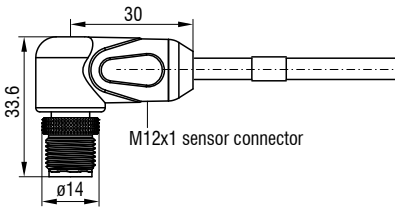
Supply cable EC2600-x
Drag chain-compatible power supply cable
Cable length: 5 / 20 m



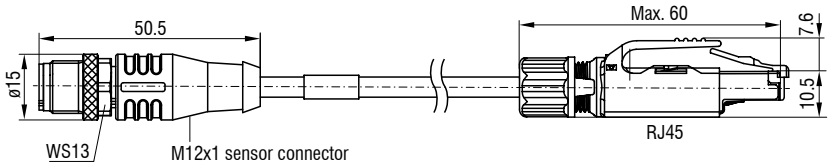
Multifunction cable PCR3000-x
Cable suitable for drag chains and robots for optional connection of digital inputs and outputs (TTL or HTL)
Cable length: 2 / 5 / 10 / 15 / 20 / 25 / 35 m



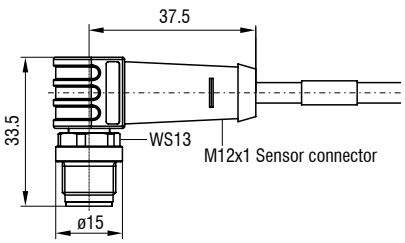
Multifunction cable PCR3000/90-x
For space-saving installation with 90° connector



Ethernet connection cable SCR3000X-x
Cable suitable for drag-chains and robots for parameterization, image and 3D data transmission
Cable length: 2 / 5 / 10 / 15 / 20 / 25 / 35 m



Ethernet connection cable SCR3000X/90-x
For space-saving installation with 90° connector



Other accessories

Mounting adapter

Article no.: 4350954

Mounting the sensor on a quick-release plate with a dovetail profile of size 050/87 or on a profile system.

Mounting adapter 47°

Article no.: 4350953

Mounting the sensor on a quick release plate with a dovetail profile of size 050/87. Enables perpendicular alignment to the floor.

Tripod set

Article no.: 2961010

For mounting and alignment. Includes tripod bag, ground spreader, tripod head, tripod adapter.

Column stand

Article no.: 2961002

For mounting and alignment.

Desktop power supply PS2600

Article no.: 2420137

Input 90-240 VAC (50/60 Hz ~1.5 A)

Output 24 VDC (12.5 A)

Power supply PS2020

Article no.: 2420062

For mounting on a symmetrical 35 mm × 7.5 mm DIN rail (DIN 50022)

Input 100–240 VAC

Output 24 VDC / 2.5 A

Transport case

Article no.: 9335492

For SC2600 and SC2610 models, a rugged case is available for safe transport of the sensors.

Calibration kit

Article no.:

2968003.01 for model -300

2968003.02 for model -400

2968003.03 for model -575

Enables on-site recalibration of the projector and cameras. Includes camera calibration plate, projector calibration plate and calibration plate mount for surfaceCONTROL 3D in a case.

Industrial Performance Unit

Article no.: 6414160

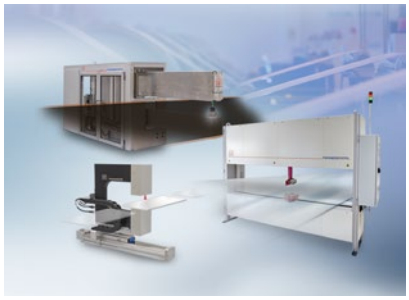
The Industrial Performance Unit (IPU) is a high-performance computing platform for evaluating 3D data from SC2610 models:

- Solving 3D measurement tasks
- Full compatibility and inline capability for customer applications
- Intuitive 3DInspect software with Valid3D technology
- Efficient commissioning of Micro-Epsilon sensors
- Hardware with passive cooling suitable for industrial use
- Integrated interfaces: Modbus/TCP, EtherCAT, PROFINET, EtherNet/IP

Sensors and Systems from Micro-Epsilon

Sensors and systems for displacement, distance and position

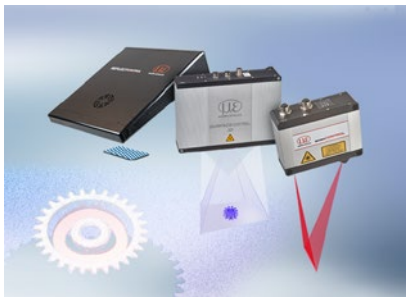
Sensors and measurement devices for non-contact temperature measurement



Measuring and inspection systems for metal strips, plastics and rubber

Optical micrometers and fiber optics, measuring and test amplifiers

Color recognition sensors, LED analyzers and inline color spectrometers



3D measurement technology for dimensional testing and surface inspection

MICRO-EPSILON

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