



More Precision

scanCONTROL // 2D/3D Laser profile sensors



Powerful 2D/3D laser scanners with highest precision

scanCONTROL 30x0

- High resolution in x- and z-axis for accurate profile measurement
- Profile frequency up to 10 kHz for monitoring of dynamic processes
- Innovative exposure control
- For small and large measuring ranges
- Also available with patented Blue Laser Technology
- Compatible with **COGNEX® VisionPro**



Fast and precise 2D/3D profile measurements

The new LLT30x0 laser profile scanners provide calibrated profile data with up to 9.6 million points per second. Thanks to their high accuracy, high profile frequency and versatility, these powerful scanners are suitable for demanding measurement tasks. They measure and evaluate, e.g., angles, steps, gaps, distances and circles with high precision. These sensors also offer predefined operating modes that enable optimal results for various applications.


Available as PROFILE and SMART versions

The scanCONTROL 30x0 series is available as PROFILE and SMART versions. The PROFILE scanners provide calibrated profile data that can be further processed on a PC with software evaluation provided by the customer. The 3DInspect software allows for the scanCONTROL sensors to be used also for 3D evaluations. SMART scanners operate autonomously and provide selected measurement values. The scanCONTROL 30x0 series supports all SMART functions and programs that are set in the scanCONTROL Configuration Tools software and directly stored in the internal controller.



Article designation

LLT	30	x0	-25	/SI
Options - see below				
Measuring range				
25 mm				
50 mm				
100 mm				
200 mm				
430 mm				
600 mm				
Class				
00 =PROFILE				
10 =SMART				
Series				
LLT30xx				

Laser options*

	/SI	Hardware switch-off of the laser line
	/3R	Increased laser power (class 3R) e.g., for dark surfaces
	/BL	Blue laser line (405 nm) for (semi-) transparent, red-hot glowing and organic materials (Measuring ranges 25 - 100 mm)

Cable outlet options*

	/RT	Cable outlet on the rear side ("Rear Tail") for space-saving installation, cable length 0.3 m. Sockets at cable end (Measuring ranges 25 - 200 mm)
	/PT	Cable directly out of the sensor ("Pigtail") Available lengths: 0.3 / 0.6 / 1.00 m

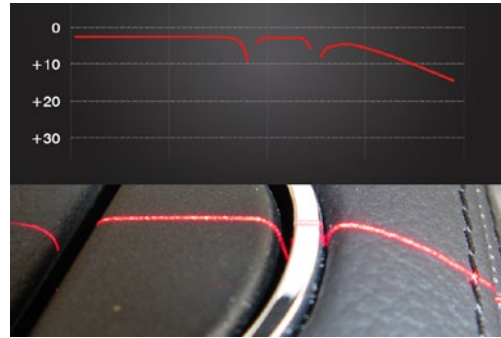
*Options can be combined

Accessories from page 42

Innovative exposure control to master difficult surfaces

On inhomogeneous or dark surfaces, the HDR (High Dynamic Range) data acquisition mode and the improved auto exposure optimizes the measurement results.

In HDR mode, the rows of the sensor matrix are exposed differently but at the same time which avoids time offsets between the recordings. This is how moving objects can be detected reliably. The areas for auto exposure can be selected individually.



High resolution

High dynamic range

High speed

Fast measurement results with operation modes

Choose from three predefined operating modes for your specific measurement task: "High-Resolution" for maximum precision, "High Dynamic Range" for optimal profile detection on difficult surfaces and "High Speed" for ultra-fast measurements.

NEW

Large measurement area up to 600 x 600 mm

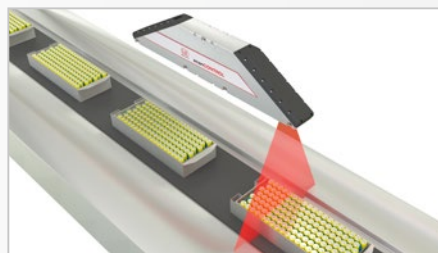
The scanCONTROL 30x2 laser scanners are now also available with a large measuring field up to 600 x 600 mm. This allows large measuring objects to be detected with high accuracy.



Application examples



Planarity of coated battery film



Assembly monitoring of battery packs



Inline 3D inspection of tire geometry

High performance laser scanner

scanCONTROL 30x0

Model		LLT 30x0-25	LLT 30x0-50	LLT 30x0-100	LLT 30x0-200	
Available laser type		Red Laser Blue Laser	Red Laser Blue Laser	Red Laser Blue Laser	Red Laser	
z-axis	Measuring range	Start of measuring range	77.5 mm	105 mm	200 mm	200 mm
		Mid of measuring range	85 mm	125 mm	270 mm	310 mm
		End of measuring range	92.5 mm	145 mm	340 mm	420 mm
		Height of measuring range	15 mm	40 mm	140 mm	220 mm
	Extended measuring range	Start of measuring range	-	-	190 mm	160 mm
		End of measuring range	-	-	360 mm	460 mm
Line linearity ^{1) 2)}		1.5 µm	3 µm	9 µm	26 µm	
		±0.01 %	±0.0075 %	±0.006 %	±0.012 %	
x-axis	Measuring range	Start of measuring range	23.0 mm	43.3 mm	75.6 mm	130 mm
		Mid of measuring range	25.0 mm	50.0 mm	100 mm	200 mm
		End of measuring range	26.8 mm	56.5 mm	124.4 mm	270 mm
	Extended measuring range	Start of measuring range	-	-	72.1 mm	100 mm
		End of measuring range	-	-	131.1 mm	290 mm
	Resolution		2,048 points/profile			
Profile frequency		up to 10,000 Hz				
Interfaces	Ethernet GigE Vision	Output of measurement values Sensor control Profile data transmission				
	Digital inputs	Mode switching Encoder (counter) Trigger				
	RS422 (half-duplex) ³⁾	Output of measurement values Sensor control Trigger Synchronization				
Output of measurement values		Ethernet (UDP / Modbus TCP); RS422 (ASCII / Modbus RTU) analog ⁴⁾ ; switch signal ⁴⁾ PROFINET ⁵⁾ ; EtherCAT ⁵⁾ ; EtherNet/IP ⁵⁾				
Control and display elements		3x color LEDs for laser, data and error				
Light source		≤ 10 mW			≤ 12 mW	
	Red Laser	Standard: laser class 2M, semiconductor laser 658 nm				
		≤ 30 mW		≤ 50 mW		
	Blue Laser	Option: laser class 3R, semiconductor laser 658 nm				
		≤ 10 mW			-	
		Standard: laser class 2M, semiconductor laser 405 nm				
	Laser switch-off	via software, hardware switch-off with /SI option				
Aperture angle of laser line		23°	28°	30°	45°	
Permissible ambient light (fluorescent light) ¹⁾		10,000 lx				
Protection class (DIN EN 60529)		IP67 (when connected)				
Vibration (DIN EN 60068-2-27)		2 g / 20 ... 500 Hz				
Shock (DIN EN 60068-2-6)		15 g / 6 ms				
Temperature range	Storage	-20 ... +70 °C				
	Operation	0 ... +45 °C				
Weight		415 g (without cable)				
Supply voltage		11 ... 30 VDC, nominal value 24 V, 500 mA, IEEE 802.3af class 2, Power over Ethernet (PoE)				

¹⁾ Based on the measuring range; measuring object: Micro-Epsilon standard object

²⁾ According to a one-time averaging over the measuring field (2,048 points)

³⁾ RS422 interface, programmable either as serial interface or as input for triggering/synchronization

⁴⁾ Only with 2D/3D Output Unit

⁵⁾ Only with 2D/3D Gateway

Model		LLT 30x0-430	LLT 30x0-600	
Available laser type		Red Laser	Red Laser	
z-axis	Measuring range	Start of measuring range	330 mm	530 mm
		Mid of measuring range	515 mm	770 mm
		End of measuring range	700 mm	1010 mm
	Extended measuring range	Height of measuring range	370 mm	480 mm
		Start of measuring range	330 mm	450 mm
		End of measuring range	720 mm	1050 mm
Line linearity ¹⁾²⁾		12 µm	15 µm	
		±0.0032 %	±0.0031 %	
x-axis	Measuring range	Start of measuring range	324 mm	456 mm
		Mid of measuring range	430 mm	600 mm
		End of measuring range	544 mm	762 mm
	Extended measuring range	Start of measuring range	324 mm	408 mm
		End of measuring range	560 mm	788 mm
Resolution		2,048 points/profile		
Profile frequency		up to 10,000 Hz		
Interfaces	Ethernet GigE Vision	Output of measurement values Sensor control Profile data transmission		
	Digital inputs	Mode switching Encoder (counter) Trigger		
	RS422 (half-duplex) ³⁾	Output of measurement values Sensor control Trigger Synchronization		
Output of measurement values		Ethernet (UDP / Modbus TCP); RS422 (ASCII / Modbus RTU) analog ⁴⁾ ; switch signal ⁴⁾ PROFINET ⁵⁾ ; EtherCAT ⁵⁾ ; EtherNet/IP ⁵⁾		
Control and display elements		3x color LEDs for laser, data and error		
Light source	Red Laser		≤ 26 mW	
			Standard: laser class 2M, semiconductor laser 660 nm	
			≤ 100 mW	
	Laser switch-off	via software, hardware switch-off with /SI option		
Aperture angle of laser line		60 °		
Permissible ambient light (fluorescent light) ¹⁾		5,000 lx		
Protection class (DIN EN 60529)		IP67 (when connected)		
Vibration (DIN EN 60068-2-27)		2 g / 20 ... 500 Hz		
Shock (DIN EN 60068-2-6)		15 g / 6 ms		
Temperature range	Storage	-20 ... +70 °C		
	Operation	0 ... +45 °C		
Weight		2630 g (without cable)		
Supply voltage		11 ... 30 VDC, nominal value 24 V, 500 mA, IEEE 802.3af class 2, Power over Ethernet (PoE)		
Connections		Sockets, cable outlets on top (/PT)		

¹⁾ Based on the measuring range; measuring object: Micro-Epsilon standard object

²⁾ According to a one-time averaging over the measuring field (2,048 points)

³⁾ RS422 interface, programmable either as serial interface or as input for triggering/synchronization

⁴⁾ Only with 2D/3D Output Unit

⁵⁾ Only with 2D/3D Gateway

Options

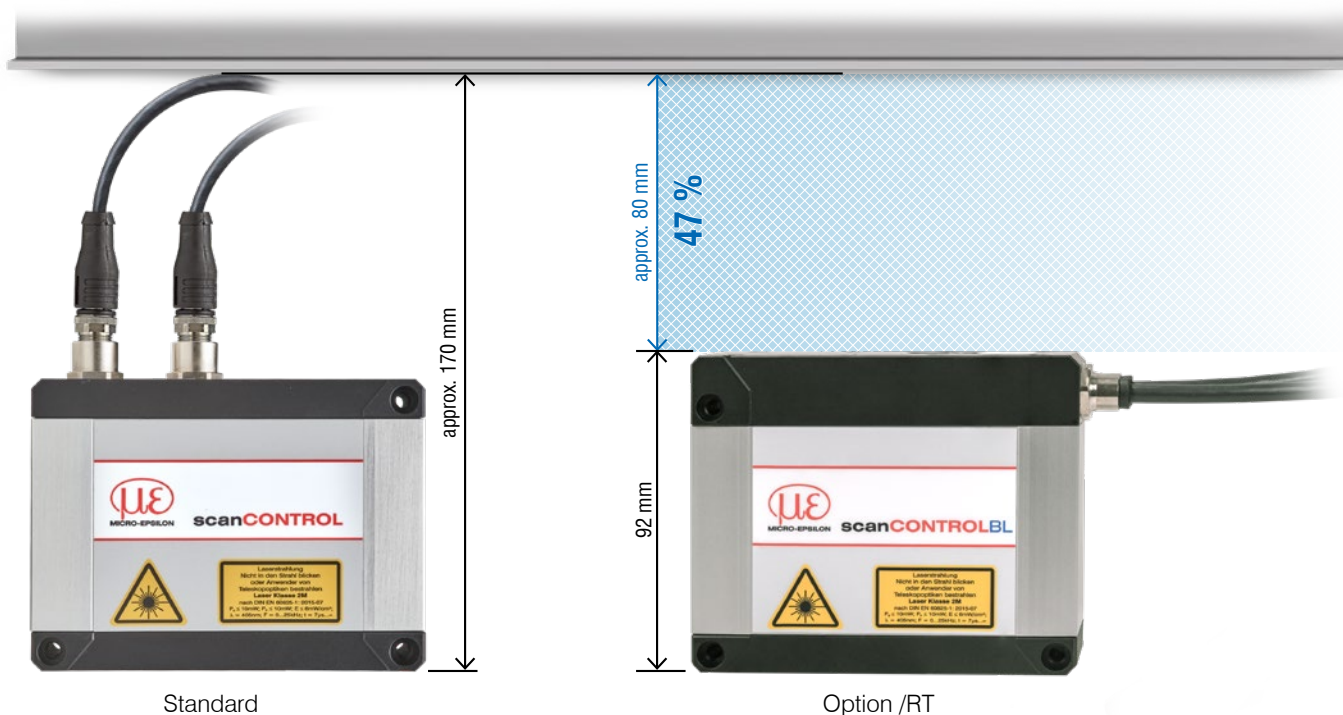
scanCONTROL 30xx

NEW

Option /RT = "Rear Tail"

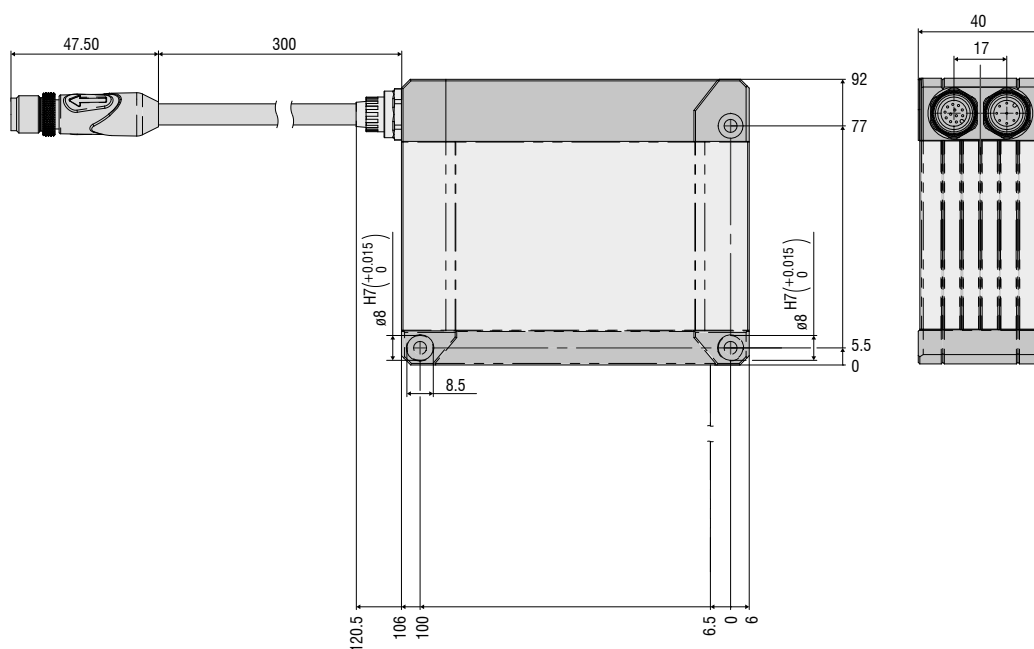
Cable outlet on the rear side ("Rear Tail") for space-saving installation

- Available for the measuring ranges from 25 to 200 mm
- 30 cm pigtail
- Reduces the installation height by 47%



Standard

Option /RT



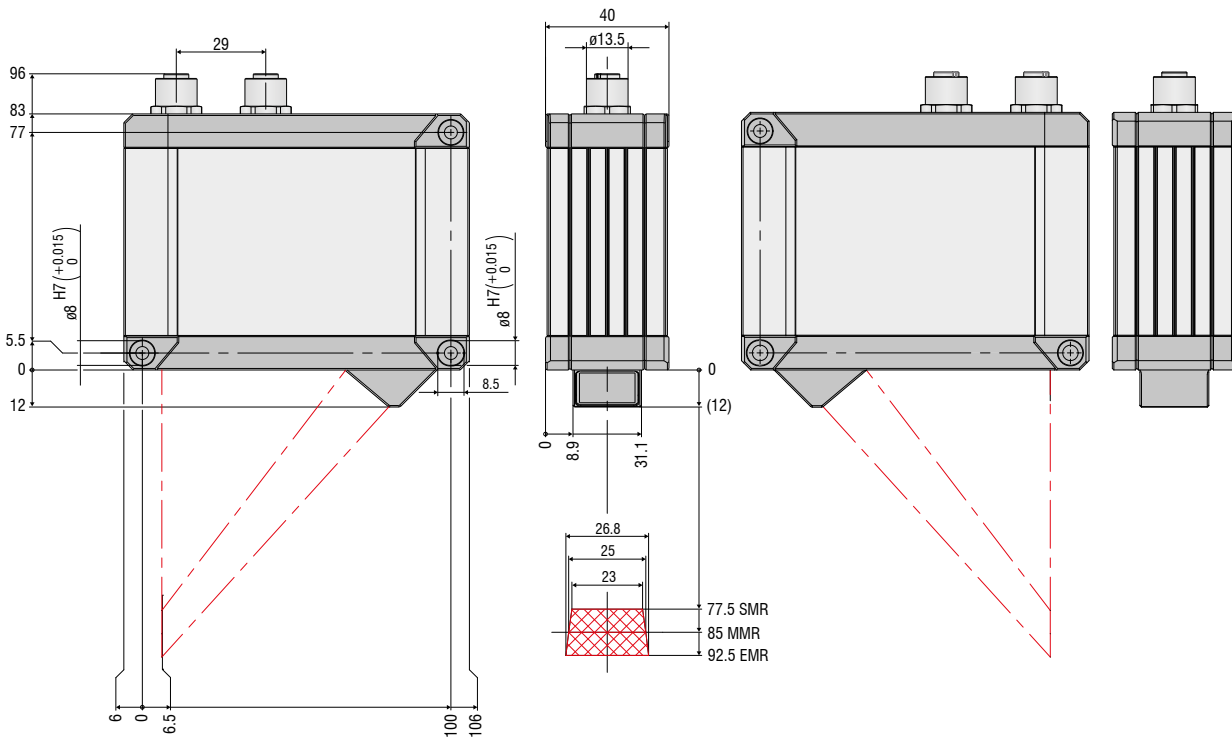
Dimensions and measuring ranges

scanCONTROL 30xx

LLT30x2-25 / LLT30x0-25

Red Laser

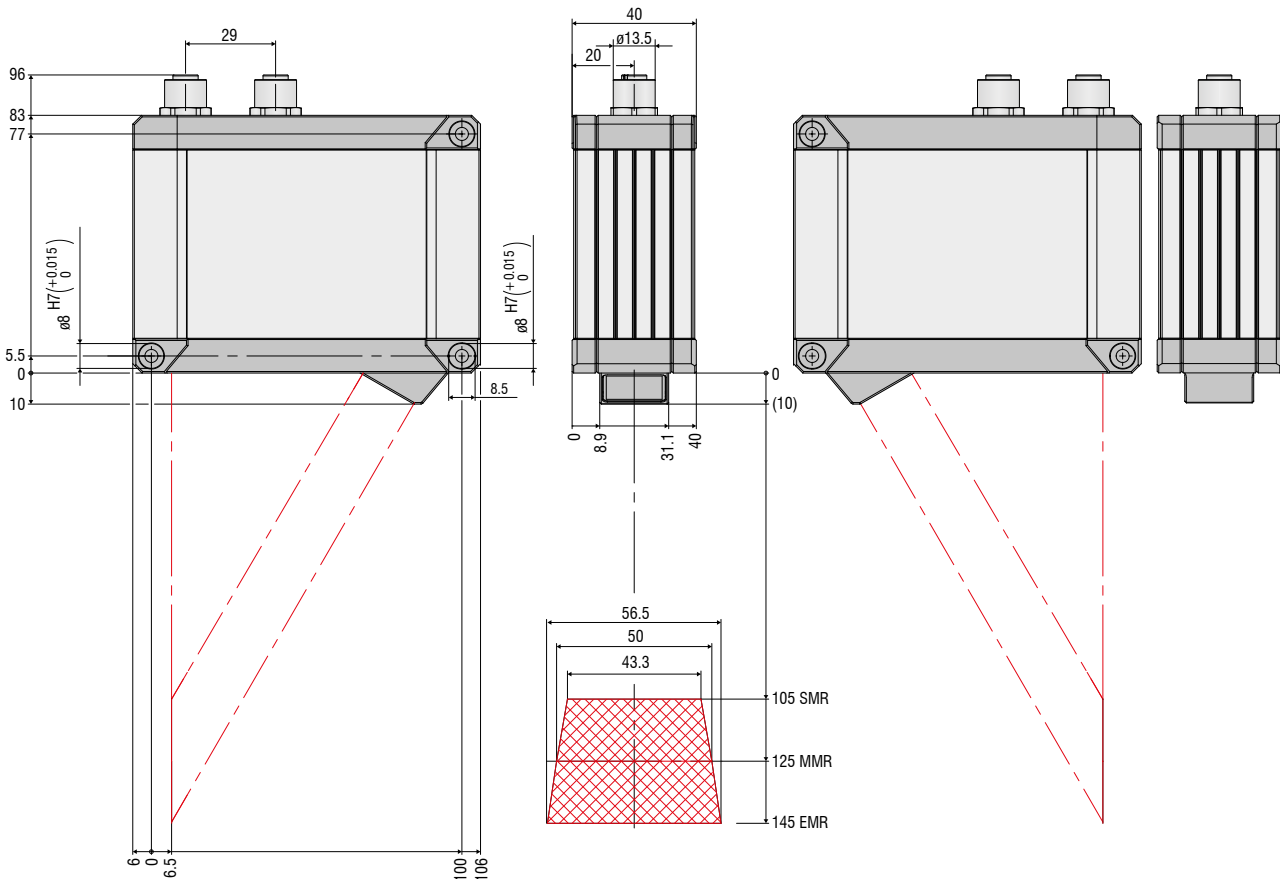
Blue Laser



LLT30x2-50 / LLT30x0-50

Red Laser

Blue Laser



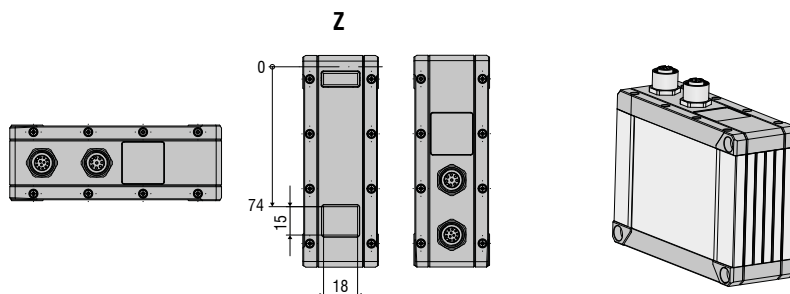
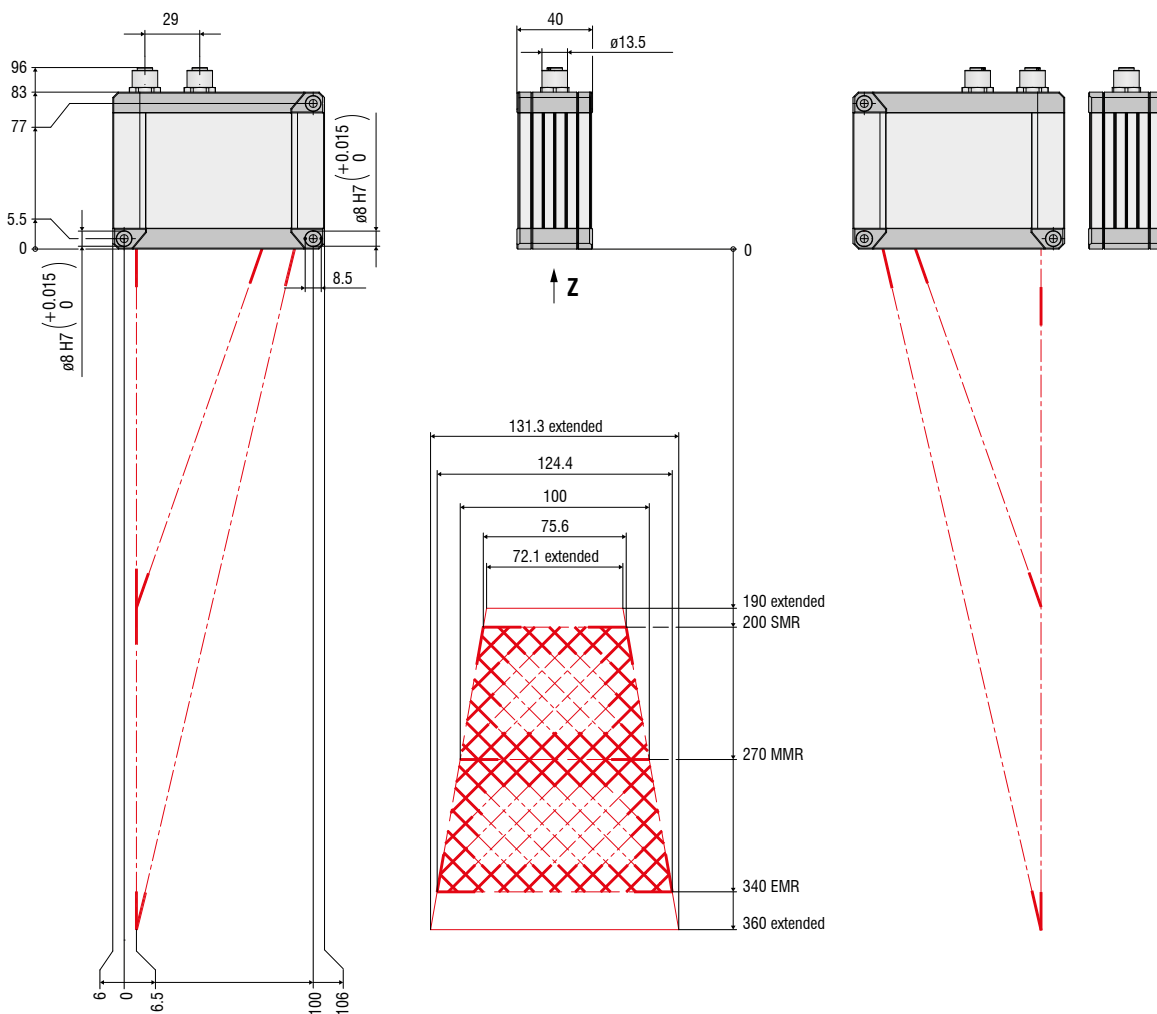
Dimensions and measuring ranges

scanCONTROL 30xx

LLT30x2-100 / LLT30x0-100

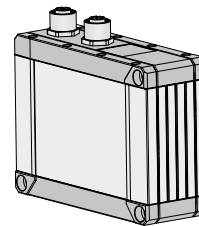
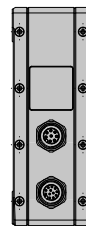
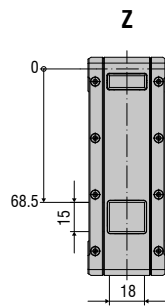
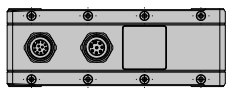
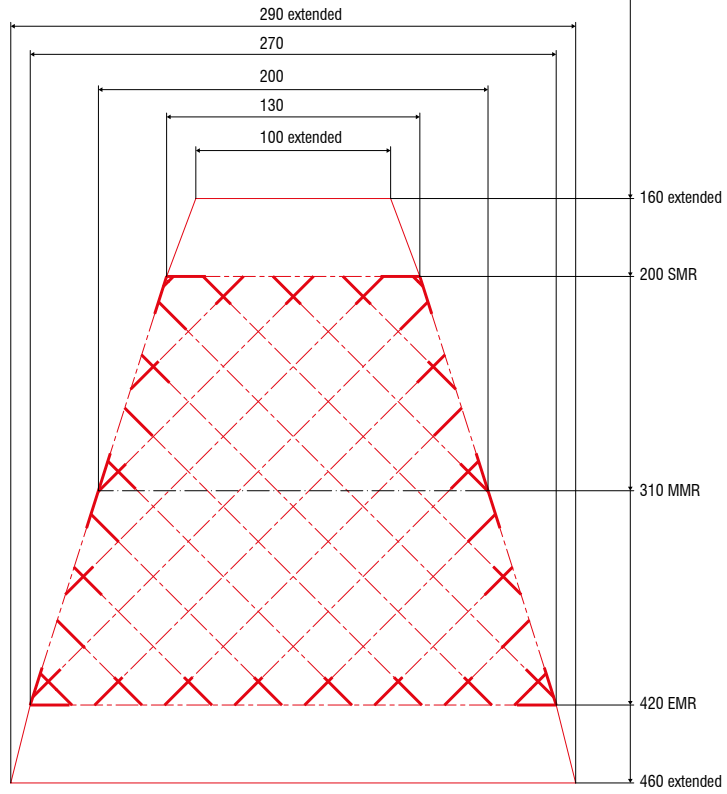
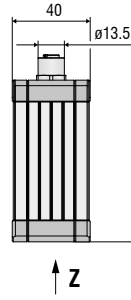
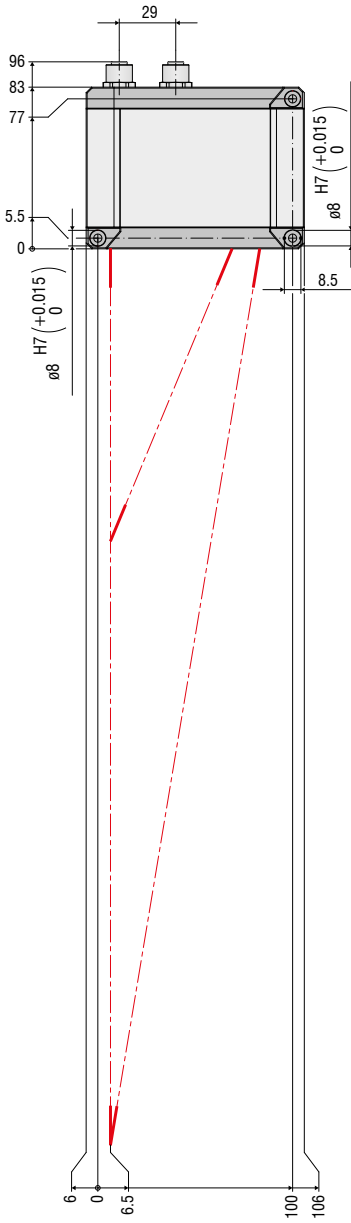
Red Laser

Blue Laser



LLT30x2-200 / LLT30x0-200

Red Laser

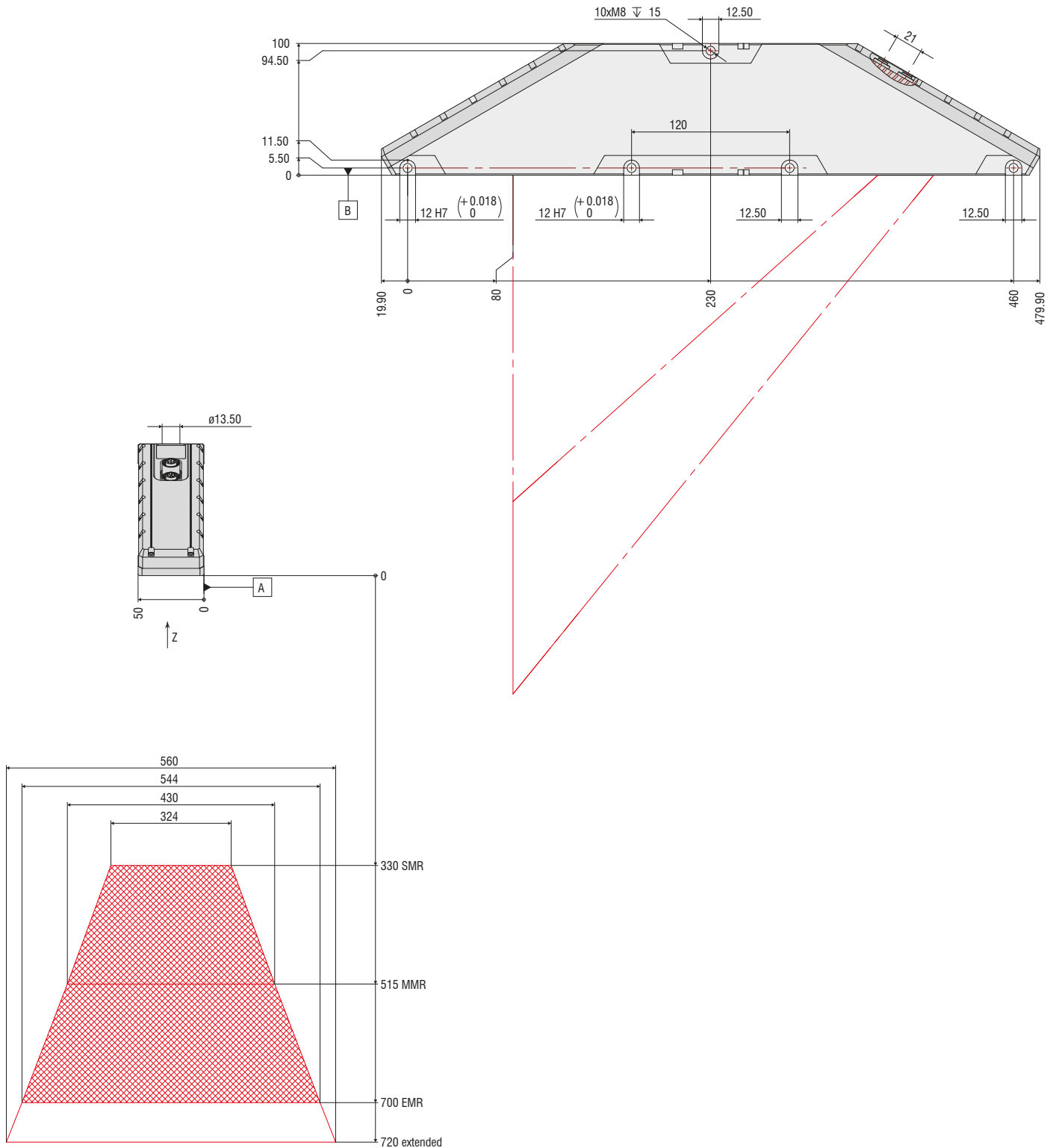


Dimensions and measuring ranges

scanCONTROL 30xx

LLT30x2-430 / LLT30x0-430

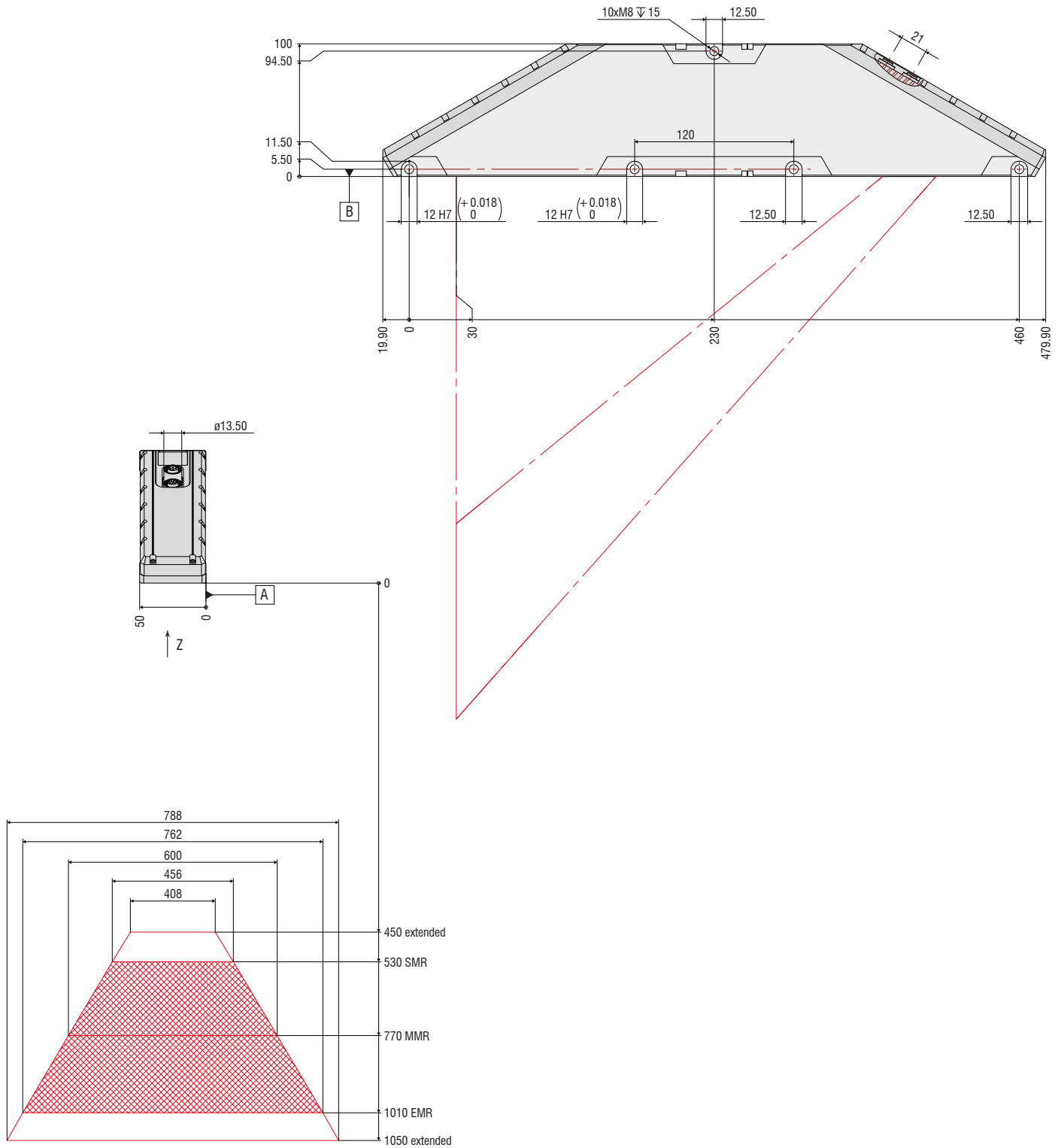
Red Laser



(dimensions in mm, not to scale)

LLT30x2-600 / LLT30x0-600

Red Laser



(dimensions in mm, not to scale)

Software

scanCONTROL Configuration Tools

Plug & Play solution for complex measurement tasks

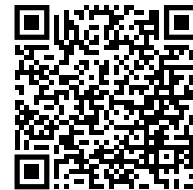
Evaluation directly in the sensor without external controller

Parallel execution of different measurement tasks and multiple evaluation

Easy online and offline analysis



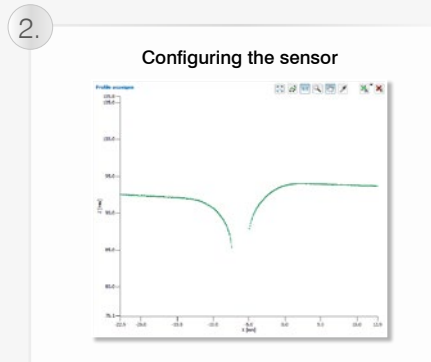
scanCONTROL SMART sensors have an integrated intelligent controller for easy profile evaluation without requiring an additional PC. Configuration and parameter setup of the sensor is via the scanCONTROL Configuration Tools software. It enables sensor setup, viewing of profiles, as well as saving, loading and exporting profiles. All software functions can also be executed without a sensor in order to test the measurement task offline for very fast processes.



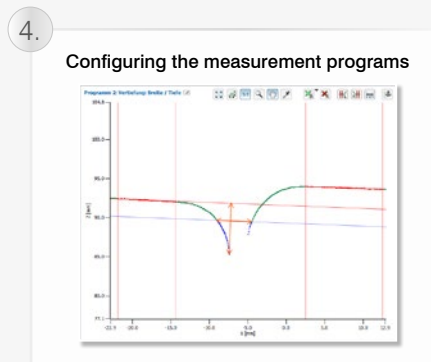
Download:
[micro-epsilon.com/
 2D_3D/laser-scanner/
 Software/downloads/](http://micro-epsilon.com/2D_3D/laser-scanner/Software/downloads/)

Easy 5-Step Configuration

1. **Alignment of the sensor**



3. **Selection of measurement programs**

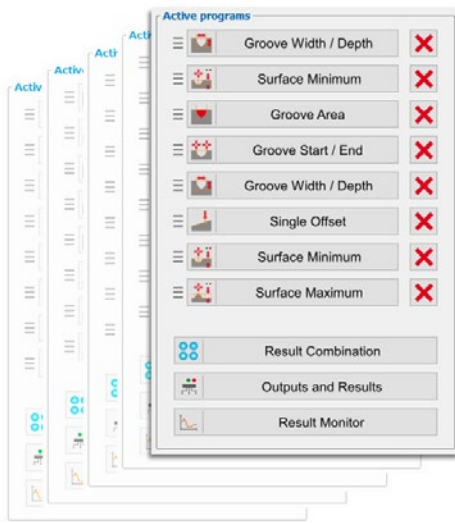


5. **Output and display of measured values**

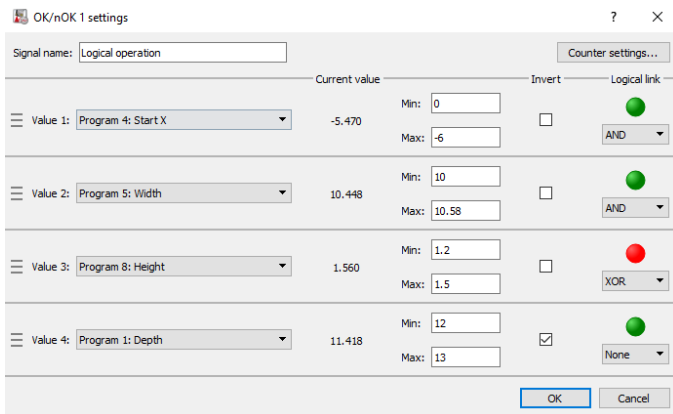
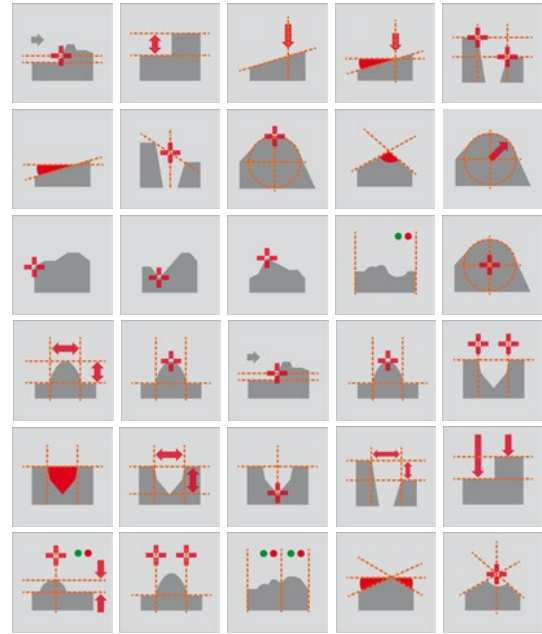
The software enables the user to completely configure the scanner in just five simple steps. After configuration, the scanner is in standalone mode and transmits the measured values to a PLC.

Numerous Setting Options

- 16 measuring programs + 8 evaluations per parameter set
- 15 independent parameter packages can be stored in the sensor
- Unlimited memory for parameter sets on the computer



Wide Range of Measurement Tools



Logical Links

- Combined query of different conditions
- Summarized result evaluation in the sensor as OK/NOK

scanCONTROL Result Monitor

Result Monitor is a new software tool for displaying measured values of up to 4 SMART sensors.

- Display of profile and measured value history
- Different views, e.g., for workers
- Parallel transmission of the measured values to the control unit is possible and recommended
- Ring buffer logging and memory
- Adjustable layout



Software 3DInspect

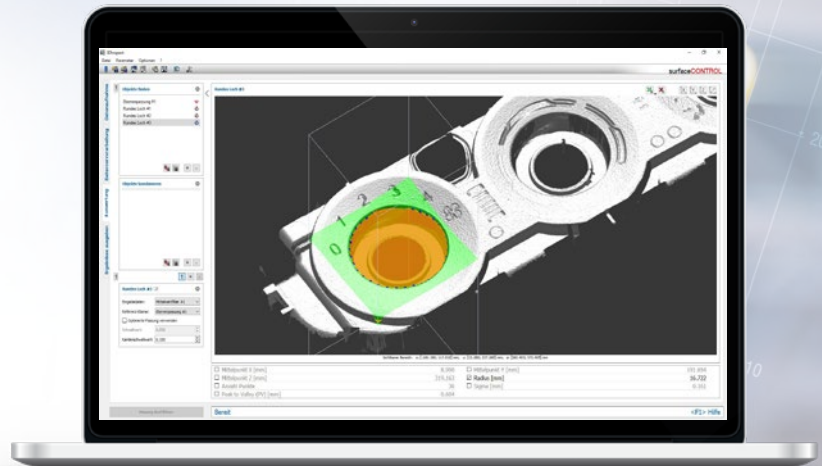
Intuitive user interface

Real 3D evaluation, not just 2.5D

Object extraction in 3D

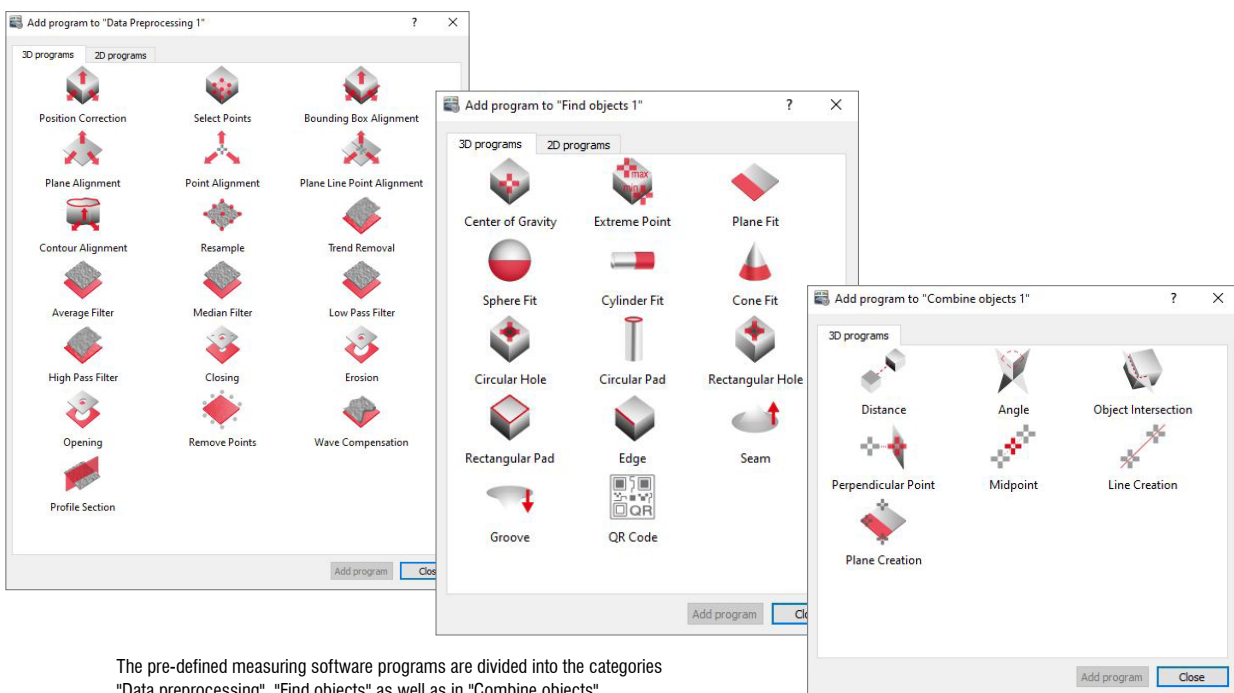
Direct feedback with algorithms

Compatible with all 3D sensors
from Micro-Epsilon



3DInspect software for 3D measurement and inspection tasks

The 3DInspect software is a powerful tool for sensor parameter set up and industrial measurement tasks. This software transmits the measurement data from the sensor via Ethernet and provides the data in three-dimensional form. This 3D data is further processed, evaluated and assessed with 3DInspect measuring programs on the PC and, if necessary, logged and transmitted via Ethernet to a control unit. Furthermore, the software enables the storage of 3D data. In addition to the scanCONTROL 30xx models, the 3DInspect software is also supported by the 3D Profile Unit as well as the surfaceCONTROL and reflectCONTROL sensors.

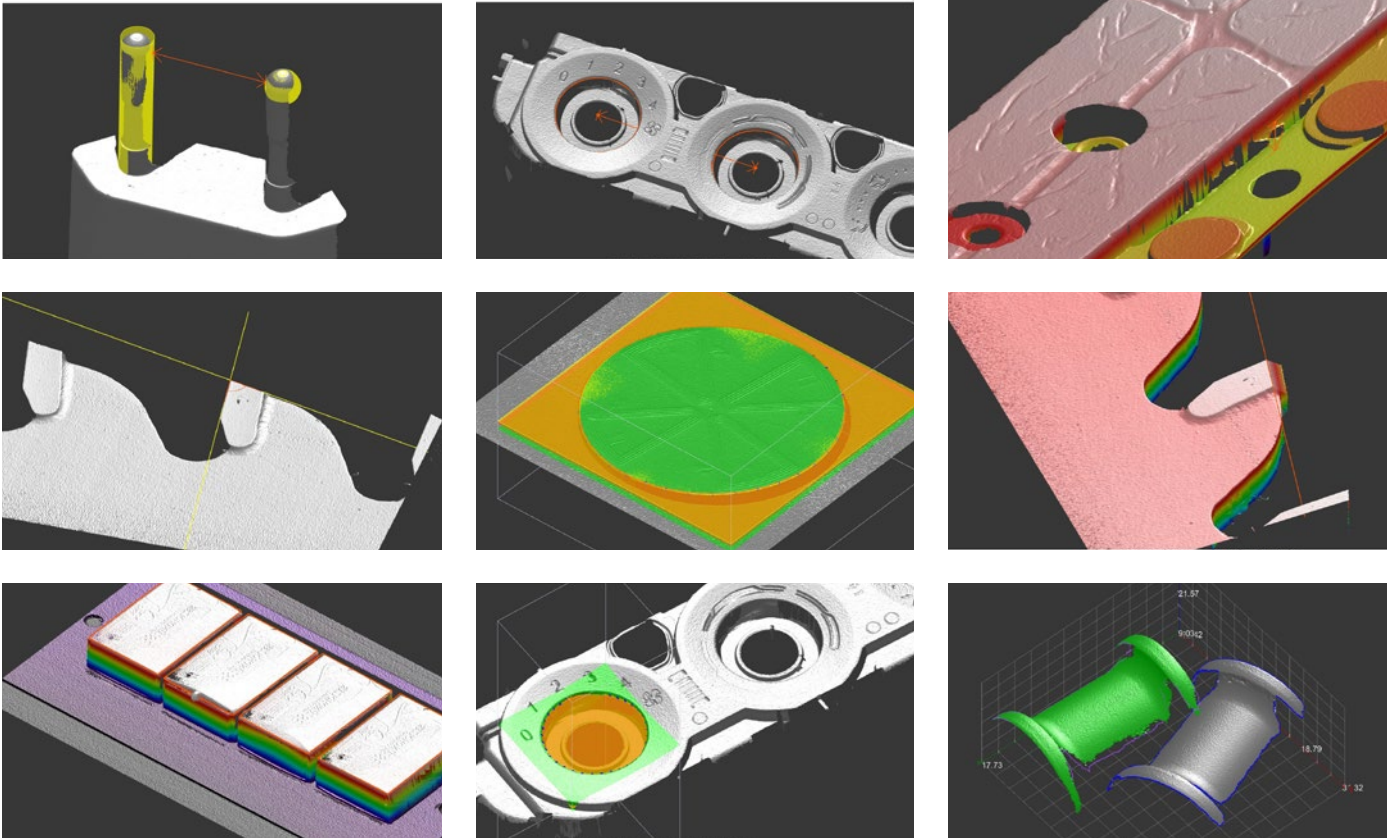


The pre-defined measuring software programs are divided into the categories "Data preprocessing", "Find objects" as well as in "Combine objects".



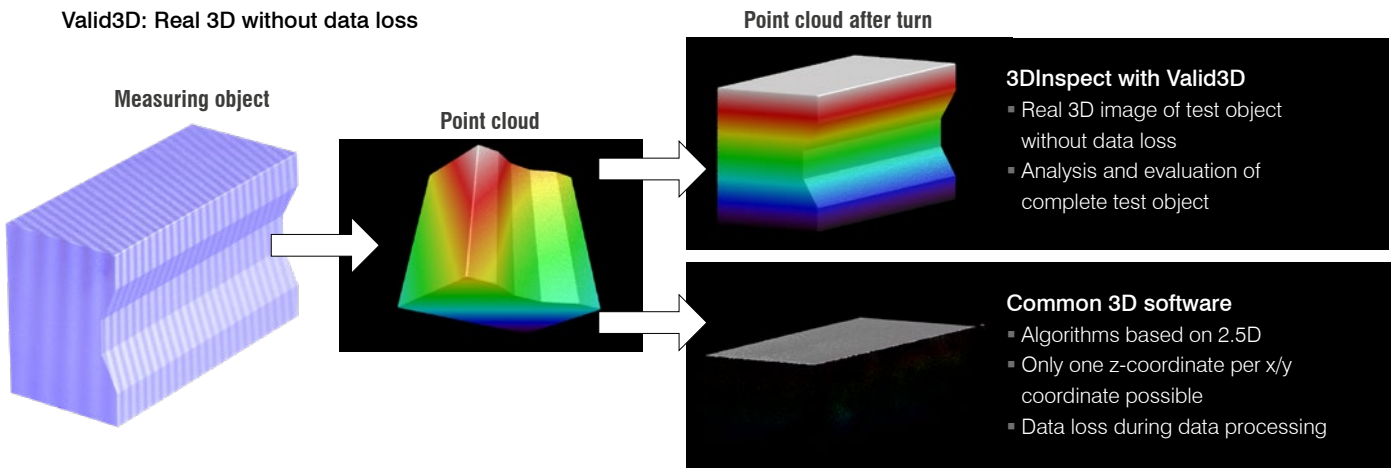
**Industrial Performance Unit:
Industrial PC with GigE Vision Sensors**

The Industrial Performance Unit is a powerful computing platform for 3D applications. The scanner can be parameterized directly via the 3DInspect software, allowing measurements to be started immediately. Results can be output via the integrated PROFINET, EtherCAT and EtherNet/IP interfaces.



Valid3D technology from Micro-Epsilon vs. conventional 2.5D systems

The unique Valid3D technology enables lossless display and processing of the point clouds. This is how scanned 3D objects can be moved arbitrarily in the coordinate system.



Integration of LLT sensors scanCONTROL



The scanCONTROL PROFILE sensors detect one profile from individual, calibrated points per measurement. Users can transfer these profiles to their own applications either individually or combined as an array/matrix in a container set. In addition to the data transfer of individual measuring points and their additional information (e.g. intensity, counter reading) the entire configuration of the sensor can also be controlled from its own application software.

Micro-Epsilon provides a number of interfaces to access the parameter and data transfer functions. The transmission interface primarily used by scanCONTROL sensors for communications and profile transfer is Ethernet.

Ethernet and GigE Vision

Each scanCONTROL sensor complies with the GigE Vision Standard (Gigabit Ethernet for Machine Vision) of the AIA (Automated Imaging Association).

The standard is widely used in the image processing industry and is therefore supported by all conventional computer vision tools. This ensures fast and smooth integration into different image processing tools – also for 3D evaluation.

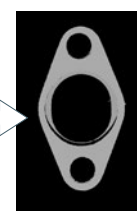
The GigE Vision standard stands for optimal data security, perfect performance and short implementation times. GigE Vision is based on Gigabit Ethernet and thus offers a high data transfer rate. Ethernet technology offers advantages such as long cable lengths without using repeaters/hubs, and it permits the use of inexpensive network components. The GigE Vision standard provides an open framework for data transmission (e.g. profiles, data sets) and control signals between the laser scanner and a PC. There are numerous infrastructure topology options for single- and multi-scanner applications.



Download:
[micro-epsilon.com/2D_3D/
laser-scanner/Software/
scanCONTROL-Integration/](http://micro-epsilon.com/2D_3D/laser-scanner/Software/scanCONTROL-Integration/)



Profile acquisition



Grayscale image

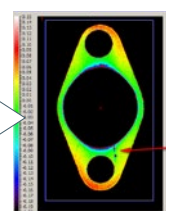


Image processing software

Profile stitching for up to 8 sensors 3D Profile Unit

NEW

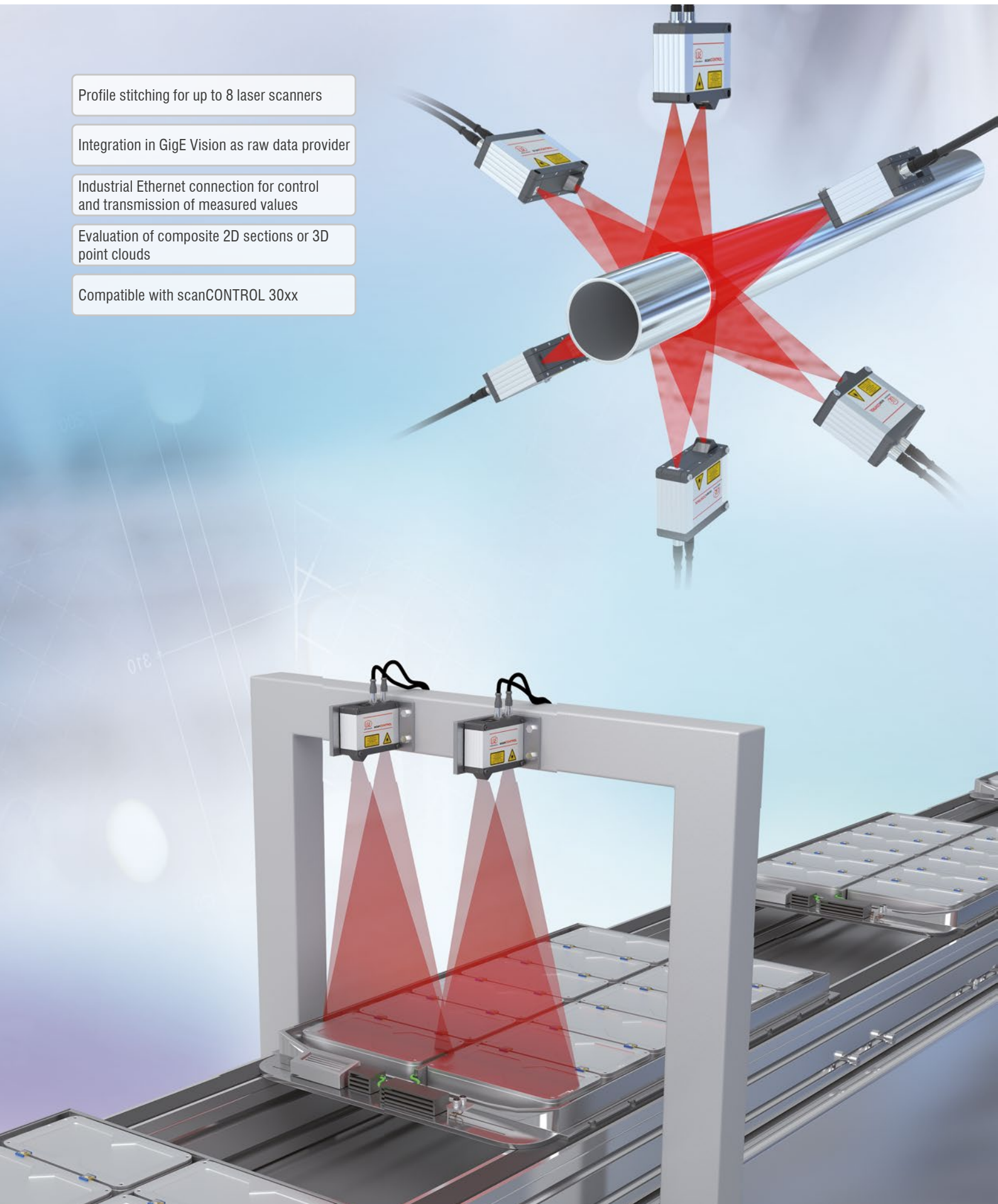
Profile stitching for up to 8 laser scanners

Integration in GigE Vision as raw data provider

Industrial Ethernet connection for control
and transmission of measured values

Evaluation of composite 2D sections or 3D
point clouds

Compatible with scanCONTROL 30xx



The 3D Profile Unit enables the calculation of several individual profiles of scanCONTROL 30xx sensors in a common coordinate system. This is how a composite 2D profile or a composite 3D point cloud can be generated. This enables the detection of various geometries, the extension of measuring ranges and the performance of thickness measurements.

The evaluation of the data and the parameterization of the system can be implemented in the 3DInspect software. The 3D-Profile-Unit controller offers an optional integrated evaluation feature in conjunction with the Industrial Ethernet connection, enabling the application to be controlled and measured values to be output to a PLC.

Alternatively, the 3D-Profile-Unit controller can also be integrated into common image processing programs via GigE Vision and acts as a raw data provider.

3D-Profile-Unit Controller

- Communication with any GigE Vision clients
- Direct integration into image processing software
- Transfer of profile data or 3D point clouds

3D-Profile-Unit Controller with Industrial Ethernet

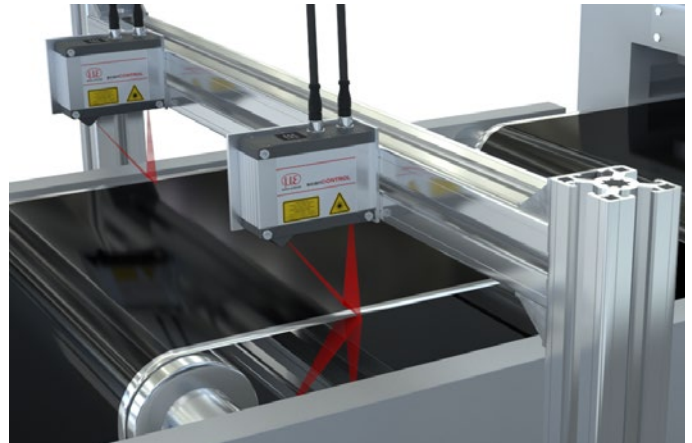
- Integrated evaluation
- Transmission of measured values
- Industrial Ethernet interface for control and transmission of measured values



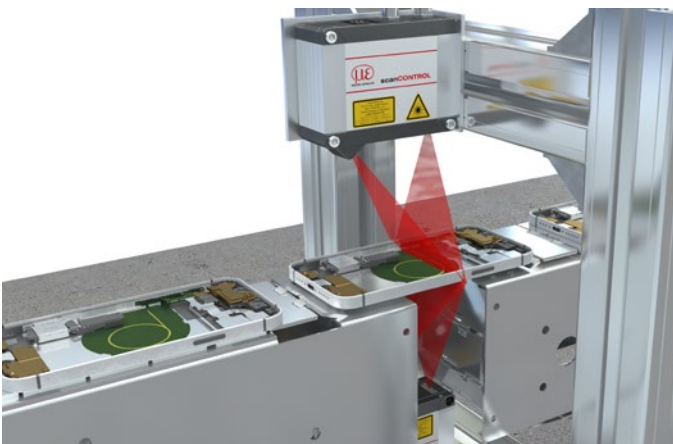
Application examples:



Volume measurement of food



Width, thickness and Heavy Edge of battery film



Thickness of smartphone carrier plates



Inspection of pouch cells

Accessories

scanCONTROL

2D/3D Gateway

PROFINET / EtherCAT / EtherNet/IP for all SMART scanners

One 2D/3D Gateway is connectable with up to 4 sensors. Operation of more than one sensor requires a switch. The 2D/3D Gateway communicates with the scanCONTROL SMART sensor via Ethernet Modbus. The resultant values are then converted to PROFINET, EtherCAT or EtherNet/IP. The customer carries out the parameter setup with a detailed instruction manual. The gateway can also be parameterized in advance at the factory.

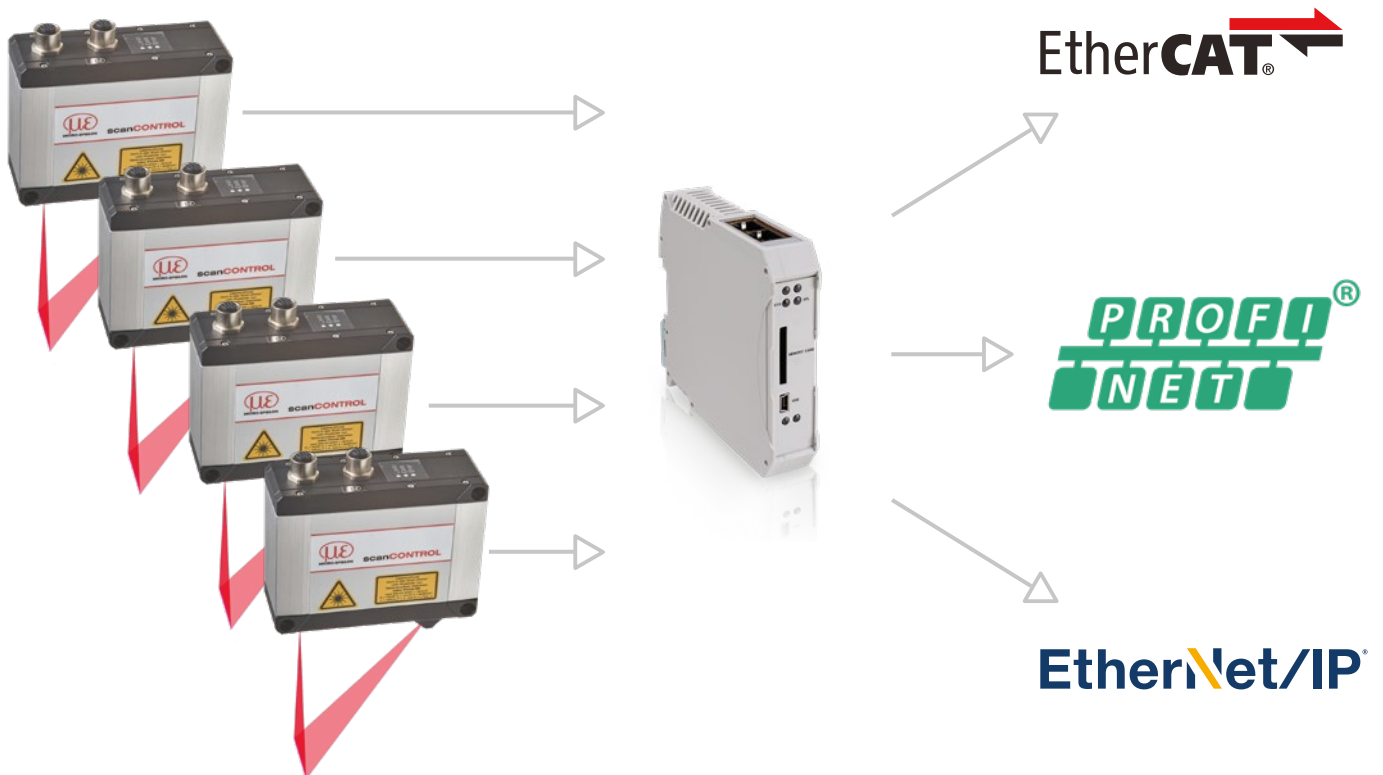
Models

6414142	2D/3D Gateway	Fieldbus coupler, configurable for PROFINET, EtherNet/IP and EtherCAT
6414142.001	2D/3D Gateway, pre-parameterized	Pre-parameterized to customer log and IP addresses

Number of sensors on the gateway	Maximum measurement frequency
1	500 Hz
2	500 Hz
3	330 Hz
4	250 Hz

NEW

Higher measurement frequencies are also possible with the 30xx sensors due to the Modbus bundling option.



2D/3D Output Unit

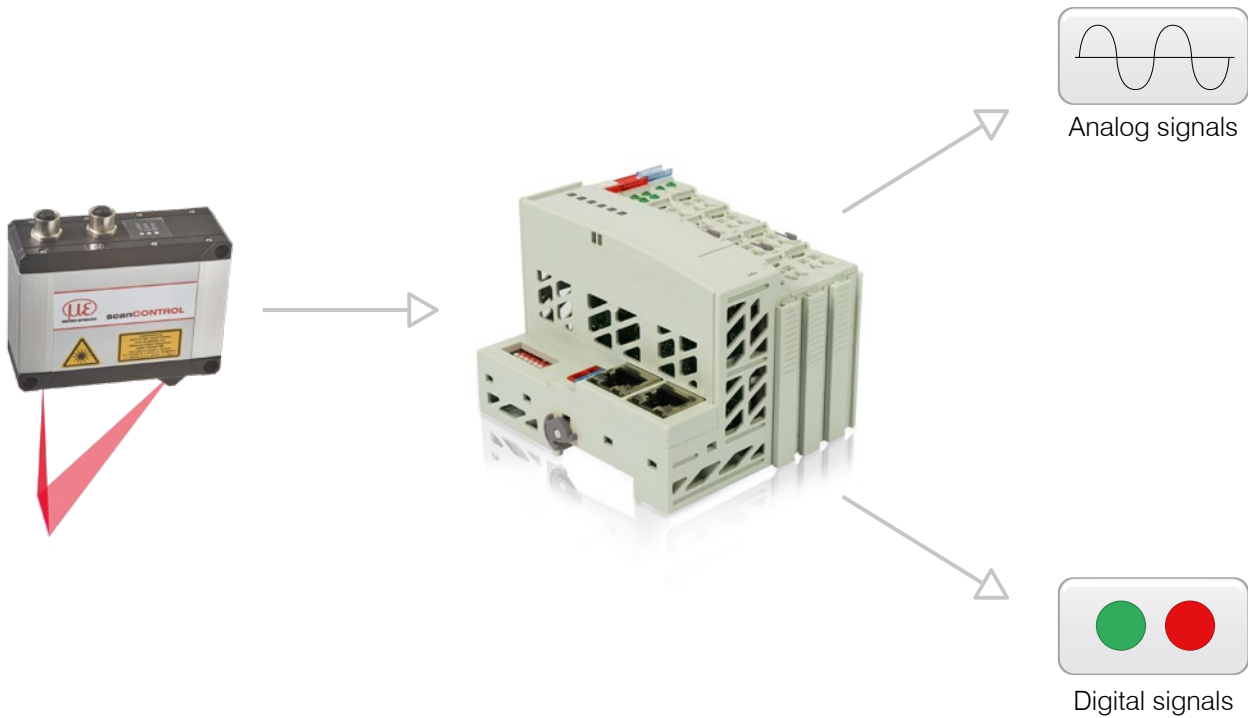
Analog signals / digital switch signals for all SMART scanners

The 2D/3D Output Unit is addressed via Ethernet and outputs analog and digital signals. Different output terminals can be connected to the fieldbus coupler.

Models

6414073	2D/3D Output Unit Basic/ET	Fieldbus coupler with filter module and bus end terminal
0325131	OU-DigitalOut/8-channel/DC24V/0.5A/negative	8-channel digital output terminal; DC 24 V; 0.5 A; negative switching
0325115	OU-DigitalOut/8-channel/DC24V/0.5A/positive	8-channel digital output terminal; DC 24 V; 0.5 A; positive switching
0325116	OU-AnalogOut/4-channel/ ± 10 V	4-channel analog output terminal; ± 10 V
0325135	OU-AnalogOut/4-channel/0-10 V	4-channel analog output terminal; 0-10 V
0325132	OU-AnalogOut/4-channel/0-20 mA	4-channel analog output terminal; 0-20 mA
0325133	OU-AnalogOut/4-channel/4-20 mA	4-channel analog output terminal; 4-20 mA

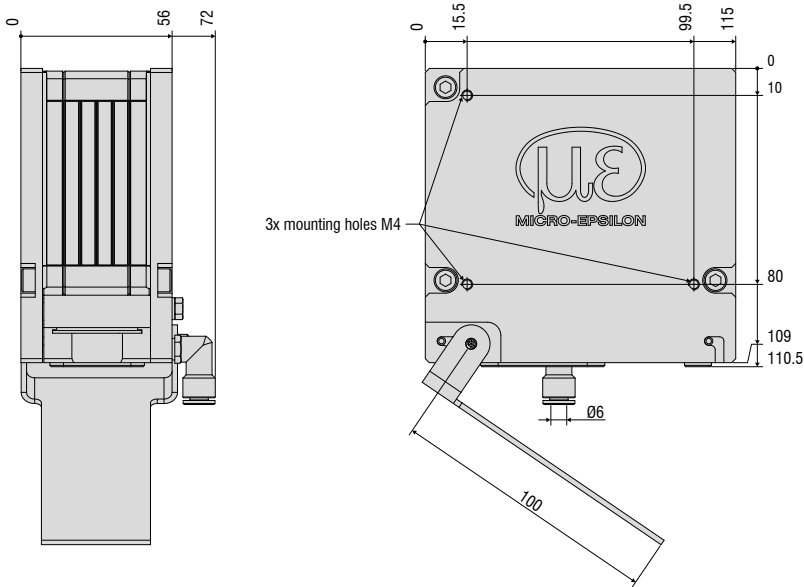
Other terminals available on request.



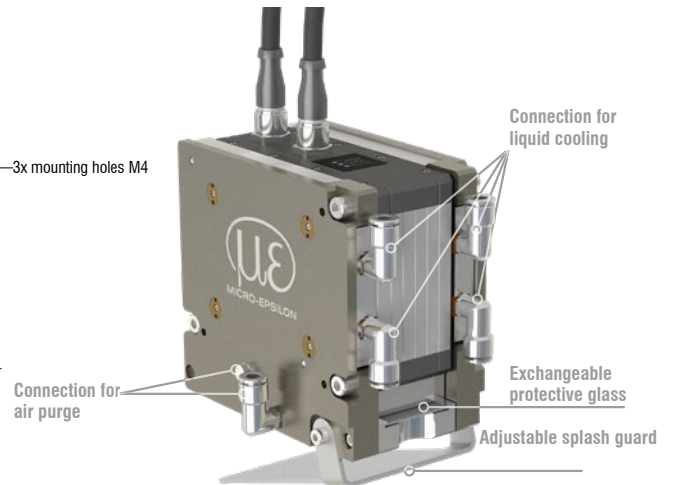
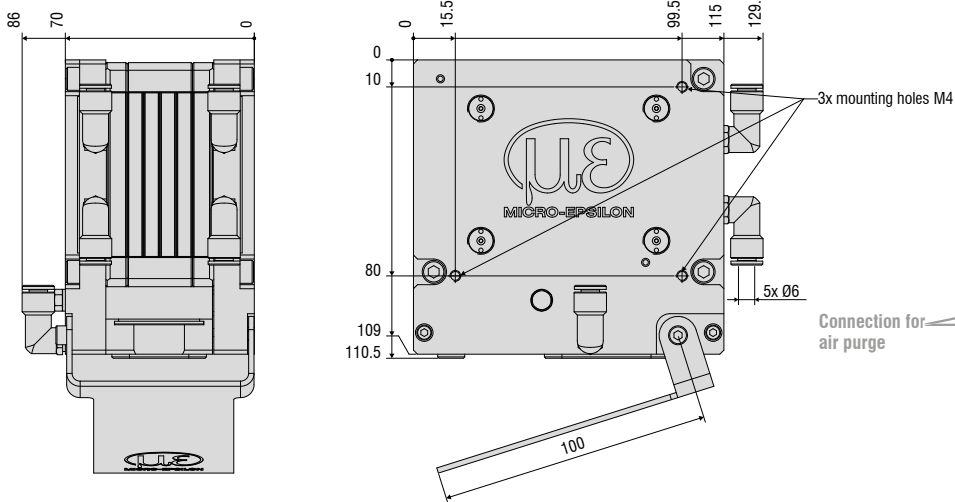
Protection and cooling housing for LLT30xx

for the measuring ranges 25 - 200 mm

Protective housing with blow-out system



Protective housing with blow-out system and water cooling



Art. no. Model

- 2105076 Protective housing for LLT30 series
- 2105077 Protective housing for LLT30 series
- 0755083 Exchangeable glass for protective housing LLT30

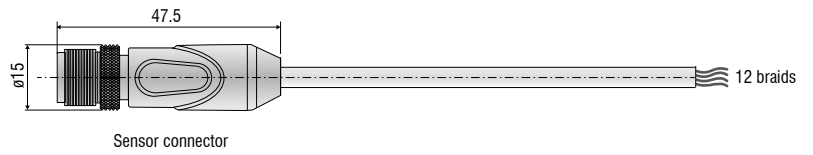
Description

- Adaptive protective housing for LLT30xx
- Adaptive protection and cooling housing for LLT30xx
- Exchangeable glass for protection/cooling concept LLT30, packaging unit with 30 pcs.

Connection cables

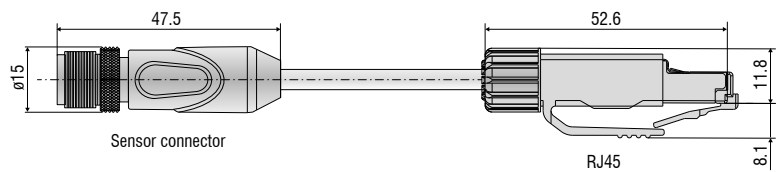
PCR3000-x Multi-function cable

Cable for power supply, digital inputs (TTL or HTL), RS422 (half-duplex); suitable for drag chains and robots
Cable length (m): 2 / 5 / 10 / 15 / 20 / 25 / 35



SCR3000A-x Ethernet connection cable

Cable for parameter setting, value and profile transmission; suitable for drag chains and robots
Cable length (m): 0.5 / 2 / 5 / 10 / 15 / 20 / 25 / 35



Other accessories

Art. no. Model

0323478 Connector/12-pin/Multifunction for LLT25/29/30 series
0323479 Connector/8-pin/Ethernet for LLT25/29/30 series
2420067 PS25/29/30
0254111 Case for LLT25/29/30 (up to MR 200)
0254153 Case for LLT30 series, MR 430/600
2960097 Measuring stand for LLT25/26/29/30 series
2960115 Measuring stand for LLT30 series, MR 430/600

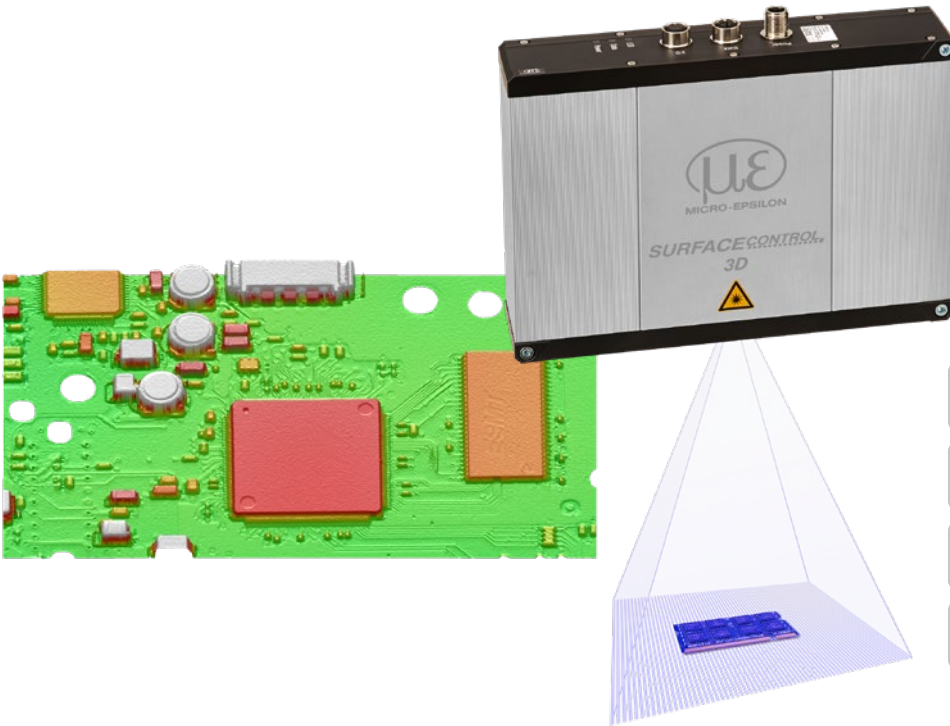
Description

Plug for multifunction port
Plug for Ethernet socket
Power supply unit for scanCONTROL
Transport case for scanCONTROL sensors incl. measuring stand
Transport case for scanCONTROL sensors incl. measuring stand
Measuring stand with sensor adapter board, flexible rod and clamp base
Measuring stand with sensor adapter board, flexible rod and clamp base

3D snapshot sensors for the inspection of shapes and surfaces

surfaceCONTROL 3D 3500

Innovative 3D snapshot sensor for inline inspection of geometry, shapes and surfaces

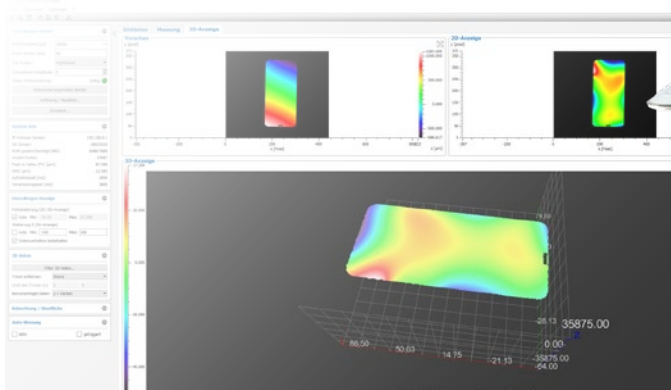
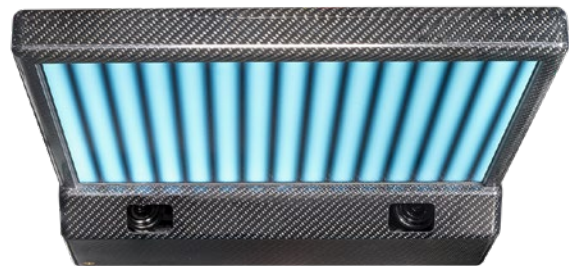


- Highest repeatability up to $0.25 \mu\text{m}$
- Best Z-axis resolution from $0.7 \mu\text{m}$
- Up to 2.2 million 3D points / second
- Easy integration in all common 3D image processing packets

reflectCONTROL

3D inline inspection of shiny surfaces: flat glass, mirrors and wafers

- Complete inspection of reflecting and shiny surfaces
- Highest z-accuracy $< 1 \mu\text{m}$
- Fastest 3D inspection $< 1 \text{ s}$
- High compatibility via different interfaces



Sensors and Systems from Micro-Epsilon



Sensors and systems for displacement, position and dimension



Sensors and measurement devices for non-contact temperature measurement



Measuring and inspection systems for quality assurance



Optical micrometers, fiber optics, measuring and test amplifiers



Color recognition sensors, LED Analyzers and inline color spectrometers



3D measurement technology for dimensional testing and surface inspection

