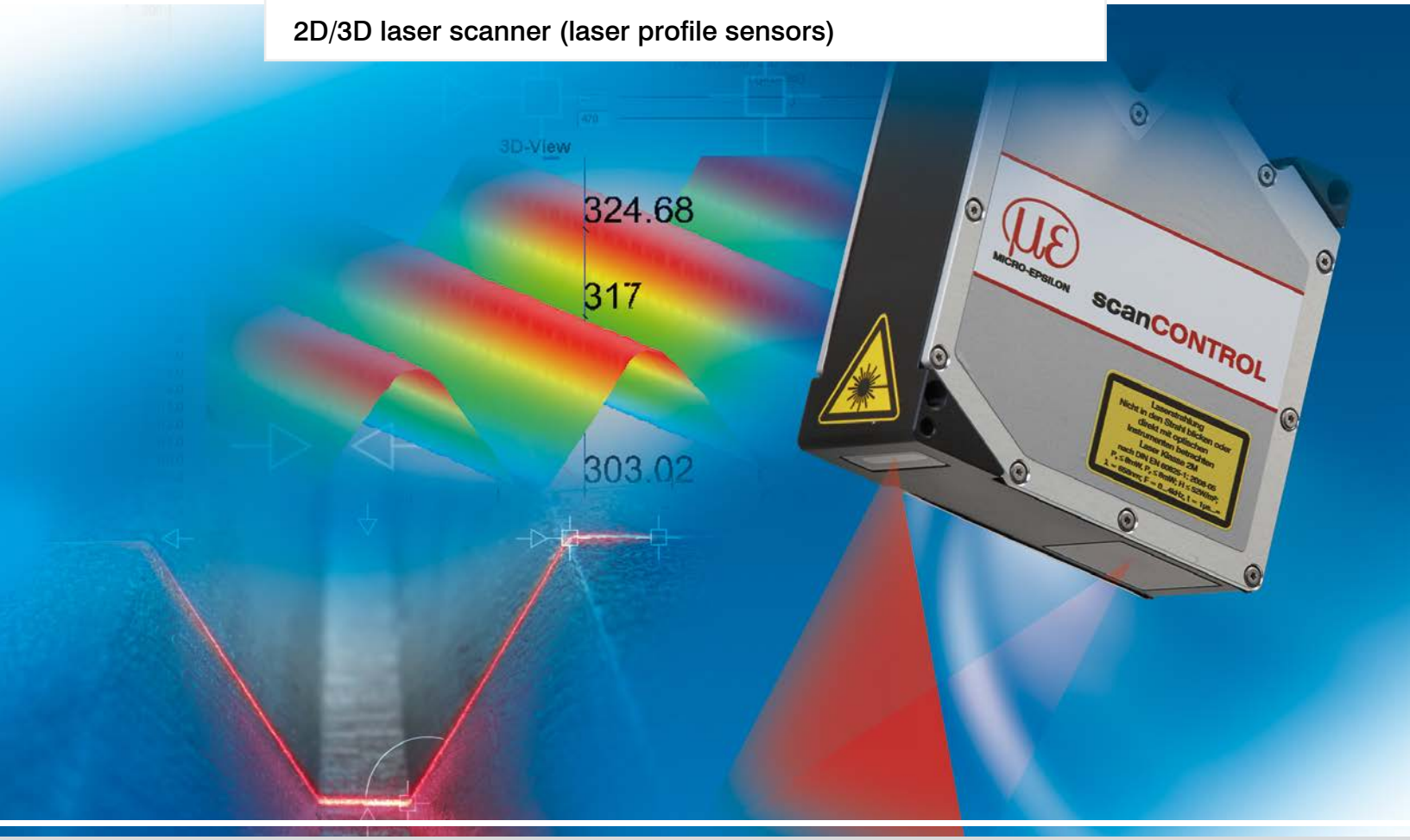
MICRO-EPSILON

More Precision

scanCONTROL

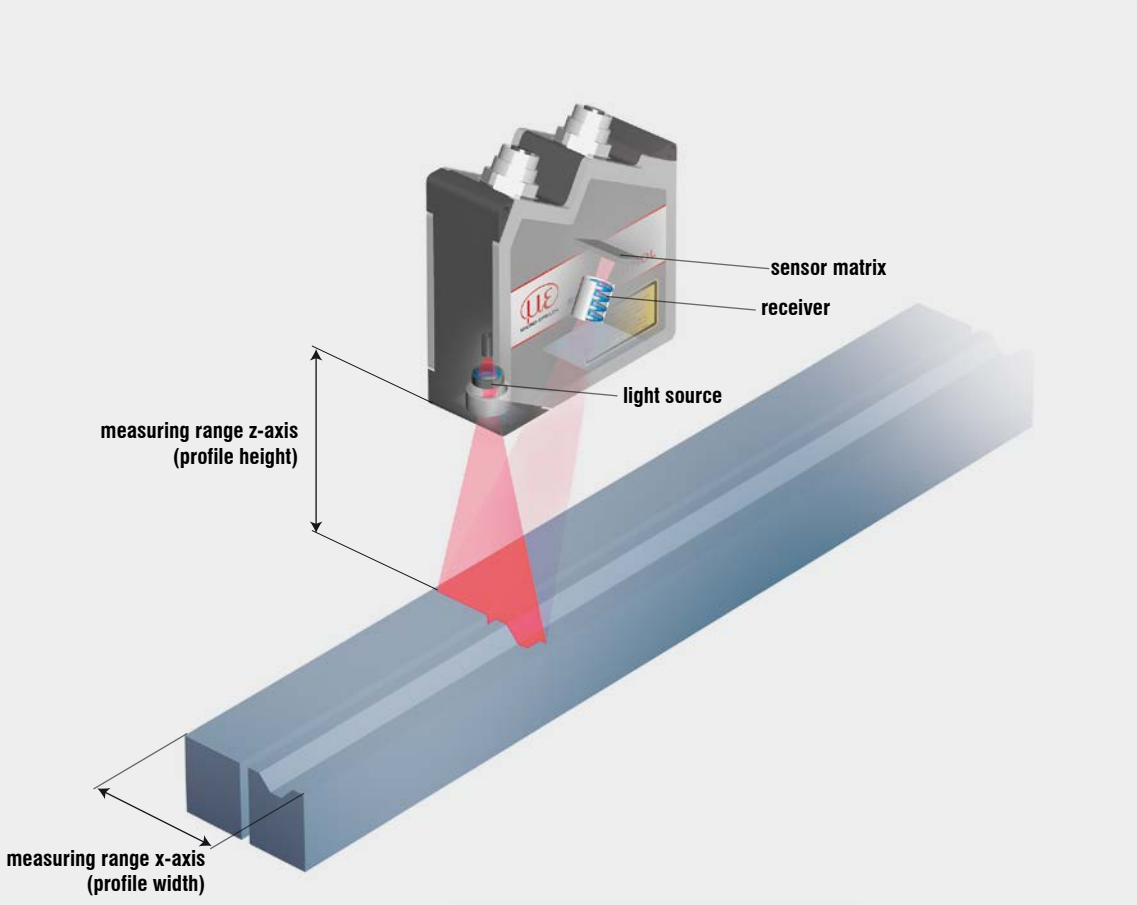
2D/3D laser scanner (laser profile sensors)



scanCONTROL

Laser scanner for precise profile measurement and evaluation

Measuring principle: laser line triangulation

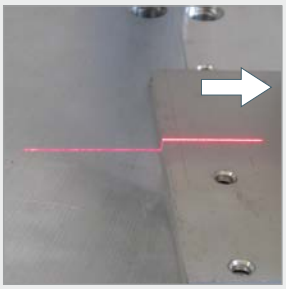


What is scanCONTROL?

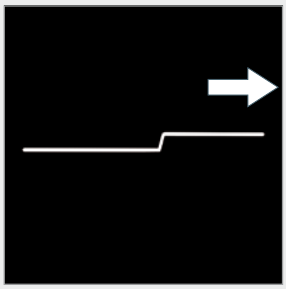
Laser scanners from the scanCONTROL series record, measure and evaluate profiles on a variety of different target surfaces. With its scanCONTROL series, Micro-Epsilon offers everything from pre-configured sensors to complex measuring systems from a single source.

The measuring principle

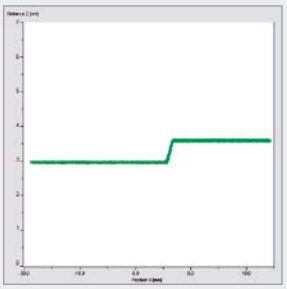
Laser scanners from Micro-Epsilon - often referred to as profile sensors - use the laser triangulation principle for two-dimensional profile detection on different target surfaces. By using special lenses, a laser beam is enlarged to form a static laser line and projected onto the target surface. A high quality optical system projects the diffusely reflected light of this laser line onto a highly sensitive sensor matrix. In addition to distance information (z-axis), the controller also uses this camera image to calculate the position along the laser line (x-axis). These measured values are then output in a two-dimensional coordinate system that is fixed with respect to the sensor. In the case of moving objects or a traversing sensor, it is therefore possible to obtain 3D measured values.



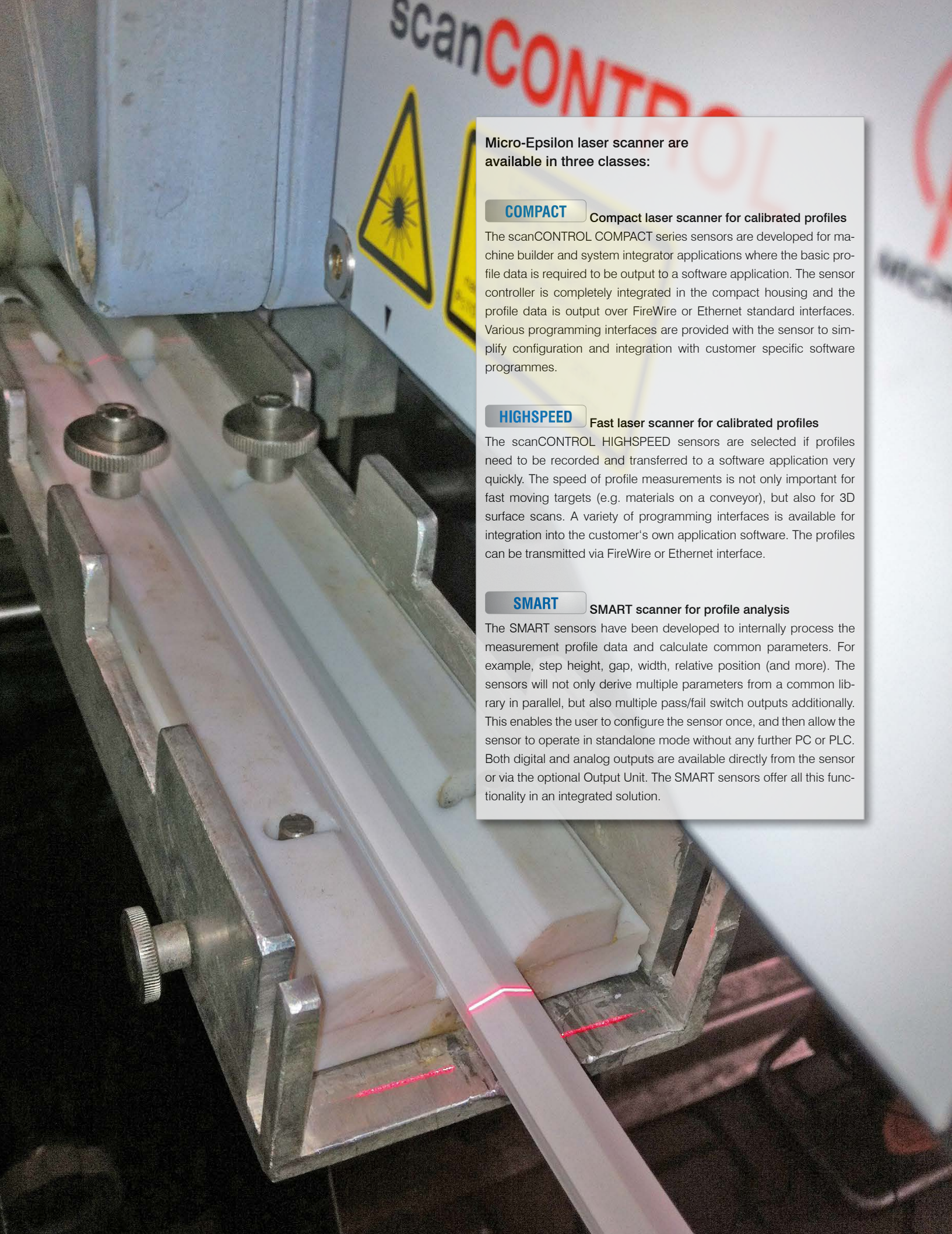
Laser line
Projecting a laser line onto the target surface



Sensor matrix (pixels)
The diffusely reflected light from the laser line is shown on the high quality sensor matrix



Calibrated x/z measuring points
Calculation of the distance coordinate z and the actual position x along the laser line for each measuring point



Micro-Epsilon laser scanner are available in three classes:

COMPACT **Compact laser scanner for calibrated profiles**

The scanCONTROL COMPACT series sensors are developed for machine builder and system integrator applications where the basic profile data is required to be output to a software application. The sensor controller is completely integrated in the compact housing and the profile data is output over FireWire or Ethernet standard interfaces. Various programming interfaces are provided with the sensor to simplify configuration and integration with customer specific software programmes.

HIGHSPEED **Fast laser scanner for calibrated profiles**

The scanCONTROL HIGHSPEED sensors are selected if profiles need to be recorded and transferred to a software application very quickly. The speed of profile measurements is not only important for fast moving targets (e.g. materials on a conveyor), but also for 3D surface scans. A variety of programming interfaces is available for integration into the customer's own application software. The profiles can be transmitted via FireWire or Ethernet interface.

SMART **SMART scanner for profile analysis**

The SMART sensors have been developed to internally process the measurement profile data and calculate common parameters. For example, step height, gap, width, relative position (and more). The sensors will not only derive multiple parameters from a common library in parallel, but also multiple pass/fail switch outputs additionally. This enables the user to configure the sensor once, and then allow the sensor to operate in standalone mode without any further PC or PLC. Both digital and analog outputs are available directly from the sensor or via the optional Output Unit. The SMART sensors offer all this functionality in an integrated solution.

scanCONTROL 26x0
Perfect for automation - integrated controller

	Measuring range 25 mm	Measuring range 50 mm	Measuring range 100 mm
COMPACT	scanCONTROL 2600-25	scanCONTROL 2600-50	scanCONTROL 2600-100
HIGHSPEED	scanCONTROL 2650-25	scanCONTROL 2650-50	scanCONTROL 2650-100
SMART	scanCONTROL 2610-25	scanCONTROL 2610-50	scanCONTROL 2610-100
Page	12 - 13	14 - 15	16 - 17

scanCONTROL 27x0
Compact with large measurement offset - integrated controller

	Measuring range 25 mm	Measuring range 50 mm	Measuring range 100 mm
COMPACT	scanCONTROL 2700-25	scanCONTROL 2700-50	scanCONTROL 2700-100
HIGHSPEED	scanCONTROL 2750-25	scanCONTROL 2750-50	scanCONTROL 2750-100
SMART	scanCONTROL 2710-25	scanCONTROL 2710-50	scanCONTROL 2710-100
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scanCONTROL 28x0
For precise measurements - external controller

	Measuring range 10 mm
HIGHSPEED	scanCONTROL 2800-10
SMART	scanCONTROL 2810-10
Page	32 - 33

scanCONTROL 29x0
High End scanner - integrated controller

	Measuring range 25 mm	Measuring range 50 mm	Measuring range 100 mm
COMPACT	scanCONTROL 2900-25	scanCONTROL 2900-50	scanCONTROL 2900-100
HIGHSPEED	scanCONTROL 2950-25	scanCONTROL 2950-50	scanCONTROL 2950-100
SMART	scanCONTROL 2910-25	scanCONTROL 2910-50	scanCONTROL 2910-100
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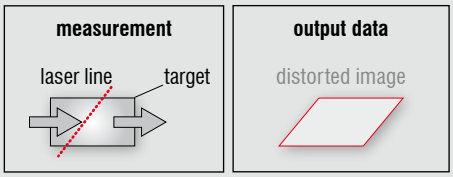
Technology advantages

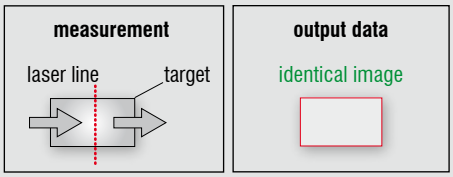
Real time synchronous measurement with high speed shutter

scanCONTROL uses an innovative CMOS array with a global, electronic shutter (high speed shutter) instead of a "rolling shutter" used in conventional scanners. This guarantees a synchronous measurement along the laser line without distorsions of the image. Therfore distortions of the measurement image are eliminated. The shutter can be controlled in real time via an external trigger input. The real time shutter renders the measurement system nearly independent of scanning or object displacement speed and acceleration. This is an important advantage for any high speed measurements and in applications with varying object accelerations.

Conventional scanner with "rolling shutter"



scanCONTROL with highspeed shutter



True calibrated data with precision optics

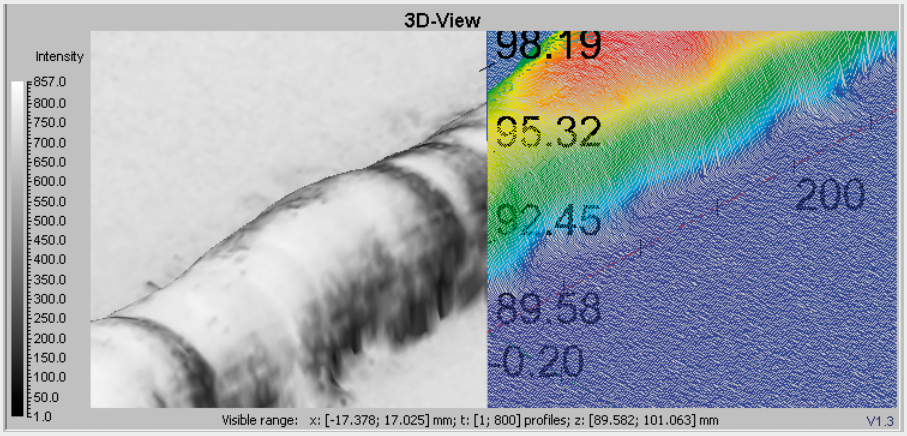
- Optimized optics and camera
- Absolute calibrated X/Z values
- Encoder, counter and trigger

Common systems are often equipped with standard optics showing distorsions (as often seen with simple photo cameras)

The scanCONTROL precision optics ensure optimized depth of view and minimized optical distortion

2 in 1 system

scanCONTROL sensors offers additional profile information for each measured point. The most important feature is the intensity for each point. The intensity is used for advanced post processing algorithms and for creating gray scale images.

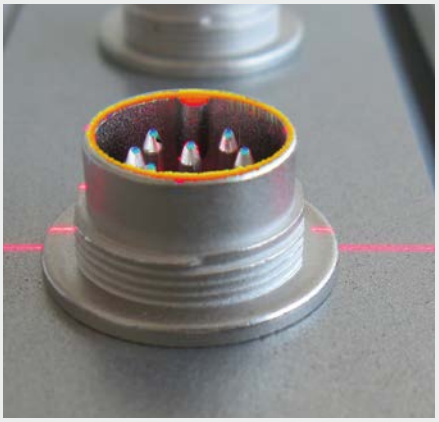


Designed for industrial applications

The sensors of the scanCONTROL product series are designed for industrial applications. Due to their design and technical features, the sensors offer precision measurement even in harsh environments. Each series is available in a number of different measuring ranges and so covers almost all common measuring distances.

Use on robots

In many measuring applications, e.g. positioning, tracking and 3D measurement, the sensor is mounted on a robot. For this reason, durable, high-flex and robotic rated cables are available.



High resolution is especially important for small features, e.g. pins.

Variable measuring field for improved performance

With scanCONTROL, depending on the application, either the data processing rate or the pixel resolution (x or z-axis) can be increased by optimizing the measurement field. In addition to the processing rate the number of measured points, the height and width of the measuring field can be selected: e.g. 512 points over a narrow measurement strip (for edge detection) or 256 points over a wide strip for high speed applications (e.g. surface measurements). A total of 128 pre-defined measuring fields are available.

Class 2M laser

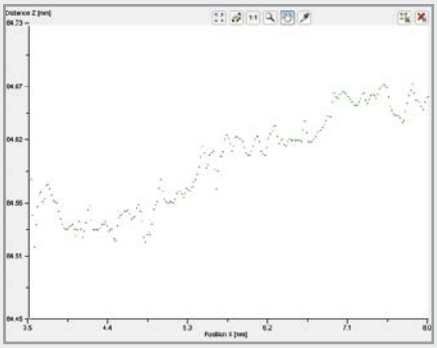
In the standard version, scanCONTROL uses a class 2M laser (visible, red semiconductor laser).

Class 3B laser

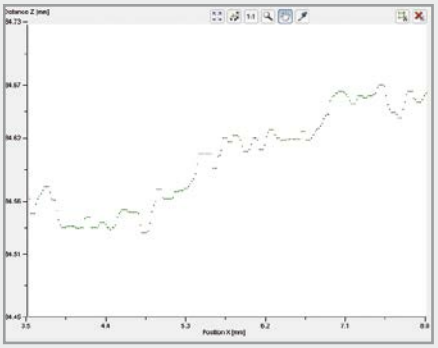
scanCONTROL sensors are also available with a class 3B laser for measuring against poorly reflective surfaces such as black rubber. This requires special safety precautions.

Adjustable profile filter functions

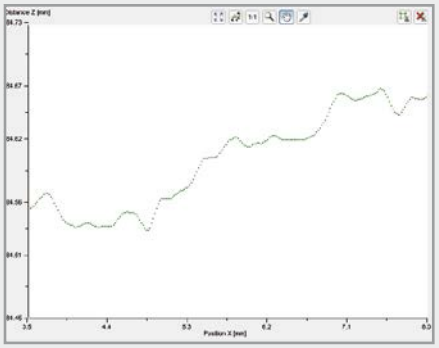
Median filter and average-filter features are available in order to achieve optimal results for every application. These filters are applied directly to each profile in real-time inside the controller.
In addition to filters, the profile can also be resampled for equidistant arrangement of the x-y data.



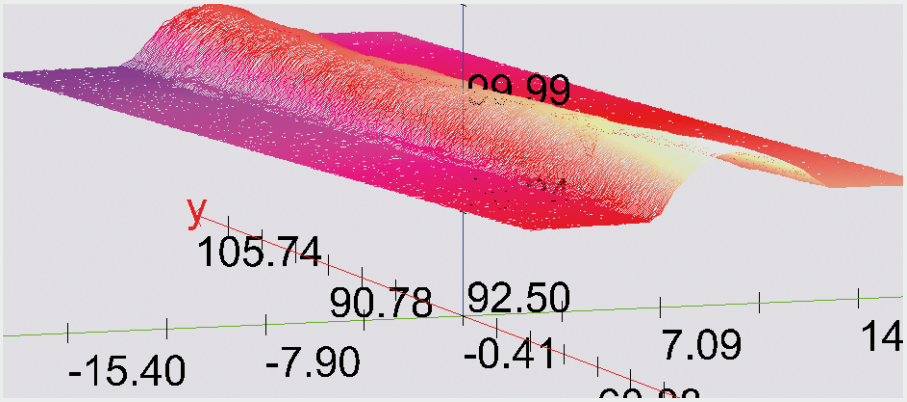
Unfiltered profile



Profile with median filter



Profile with average filter



Trigger for precise synchronized measurements

scanCONTROL sensors can trigger each individual measurement externally. In this way, the data rate can be optimized and measurements can be triggered at a specific event in time. This is particularly beneficial when several systems are operating synchronously. With its combination of a compact design and simple wiring, scanCONTROL is ideally suited to solving multi-scanning applications for various tasks.

Counter for easy 3D measurement

Sensors which are used for profile transfer, offer the option for a counter input. This counter enables the precise mapping of the profile to any external 3rd dimension. For the scanCONTROL 2700 series, the encoder is connected directly via the RS422 interface.

Calibrated measured values

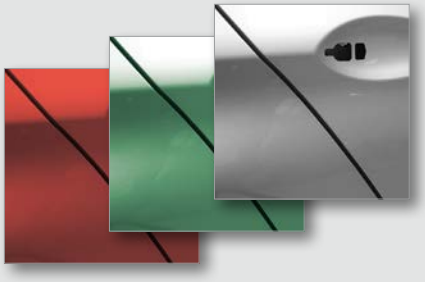
Unlike systems that combine only one camera and one laser line, scanCONTROL sensors deliver not just pixel values, but rather true measurement data with calibrated coordinates. Each sensor is equipped with an individual calibration protocol. This document is included in the scope of delivery and proofs the precision of each individual scanner.

Optimal integration thanks to standard interfaces

The Compact and Highspeed sensors use the following interfaces for profile transfer:
- FireWire: IEEE 1394 Bus Digital Camera Specification Version 1.30
- Ethernet: GigE Vision

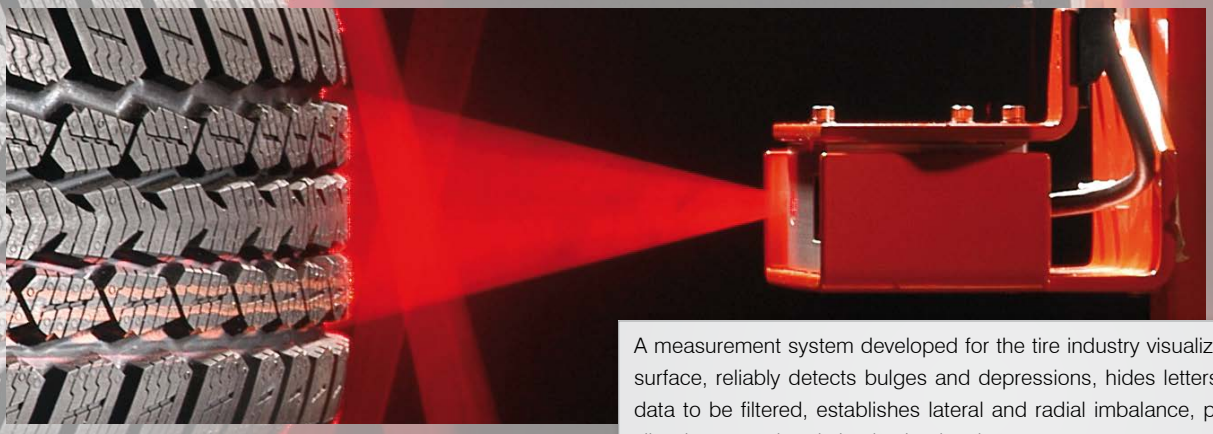
Auto exposure

One challenge when using optical measurements is whether the sensor can adapt to changing surfaces of different products during a constant measuring task (for example, the different types of paint applied in gap measurements on passenger cars). scanCONTROL sensors offer an auto-exposure feature. This setting selects the ideal exposure time for each surface color.

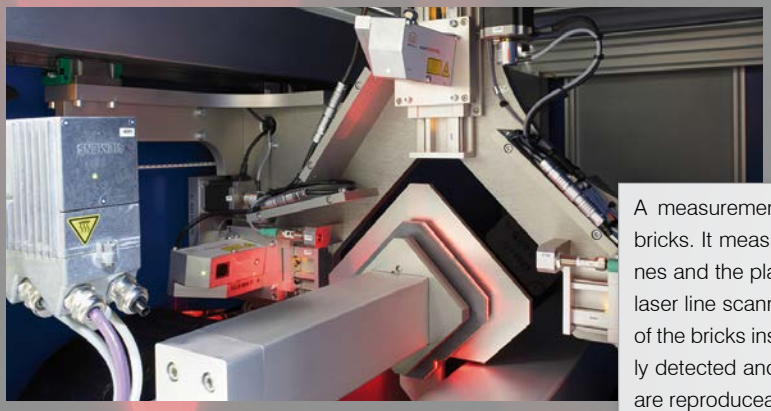


Auto exposure is crucial for measurements with changing surfaces

Sensors, solutions and systems from Micro-Epsilon
With its know-how and expertise in scanner integration Micro-Epsilon also offers turn-key systems for different applications.

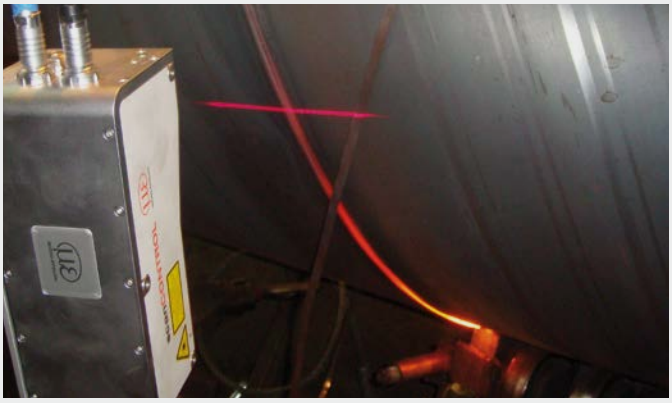


A measurement system developed for the tire industry visualizes the tire surface, reliably detects bulges and depressions, hides letters, enables data to be filtered, establishes lateral and radial imbalance, performs a vibration control and checks the tire size.

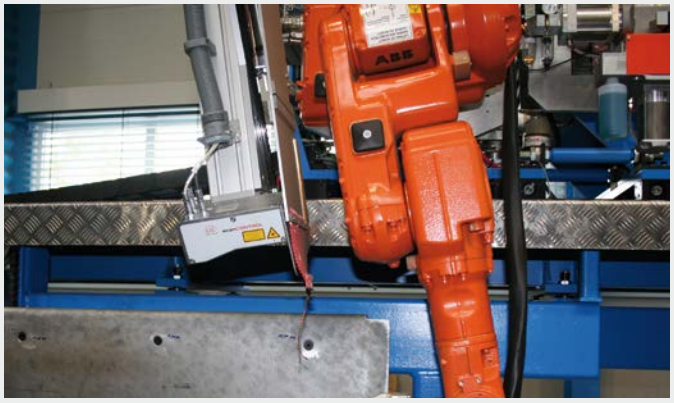


A measurement system has been developed to test the geometry of bricks. It measures the side length, phase lengths, angles, diagonal planes and the planarity of the side surfaces fully automatically with multiple laser line scanners. The system independently calibrates itself to the size of the bricks inserted. Any deviations from the nominal geometry are safely detected and marked up. Compared to manual inspection, the results are reproduceable and can be interfaced to a statistic control system.

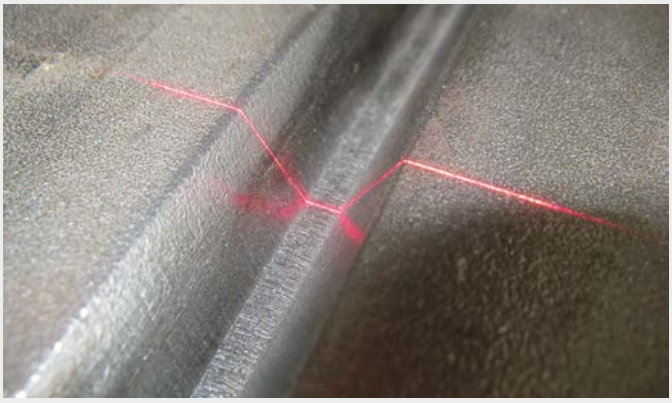
The laser scanner provides 'GO/NO GO' signals. Because glue bead is applied by lateral movements of the wind shield and rotational movements of the nozzle, the sensor also performs the appropriate rotational motion. If there is a deviation, a signal is triggered and the wind shield can be reworked manually.



Tracking weld seams



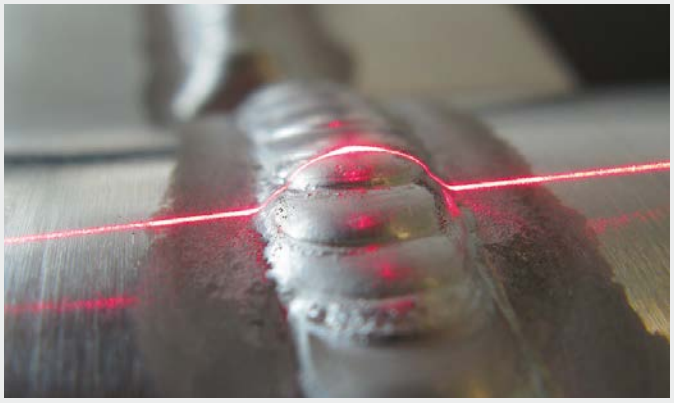
Edge tracking on a robot



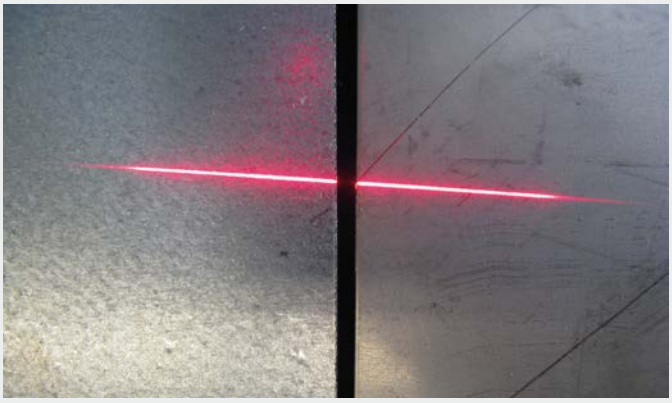
V-seam measurement on pipes

Gap measurement on a car body

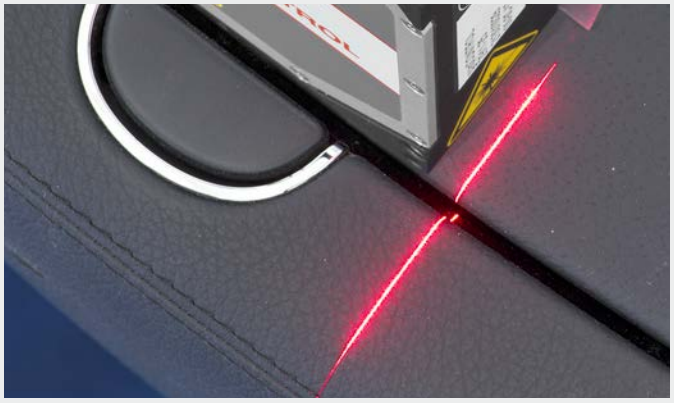
Profile measurements on brake disks



Measuring the weld seam profiles



Edge position of strip material (rubber/metal)



Gap distance measurement

Extremely compact design

The design of the scanCONTROL 26x0 series is focussed on minimal size and low weight. All available measuring ranges have the same sensor size. This makes switching the measuring range as easy as never before. The entire electronics was integrated inside of the sensor head in order to reduce cabling and to facilitate mechanical integration as well as using the sensor in robot-based applications.

Power over Ethernet

The scanners can be supplied via Ethernet (Power over Ethernet). If Industrial Ethernet is used as data connection to the sensor only one cable will remain that connects the sensor to the periphery. Connecting scanCONTROL sensors has never been easier.

Multi-function port

The multi-function port can be used for power supply, as data output, for switching parameters, as trigger input or for synchronizing several scanCONTROL sensors. This port makes the scanner very flexible.

Direct PLC integration

The modbus protocol is used to connect the sensors of the 26x0 series directly to any common PLC. The modbus protocol is supported via Ethernet and the RS422 interface.

Multi-scanner applications

The scanCONTROL 26x0 multi-function port provides the possibility to operate several sensors synchronously. The sensors have a special Synchronisation feature for overlapping laser lines. This “180° phase shift” mode provides an automatic alternating laser switch off. The laser beam of one sensor is switched off for a split second while the other sensor performs a mesurement. This is done automatically and does not affect the measurement frequency.

- z-axis measuring range up to 265mm
- x-axis measuring range up to 143.5mm
- Profile frequency up to 4000Hz
- Measuring rate up to 2,560,000 points/sec
- z-axis reference resolution 2µm
- Resolution x-axis up to 640 points

scanCONTROL 2600

The scanCONTROL 2600 sensors are the perfect choice for both static and and dynamic measurement tasks. The sensor provides a profile frequency of 200Hz and 128,000 measuring points per second.

scanCONTROL 2650

The scanCONTROL 2650 sensors offer everything for advanced high-speed and 3D applications. Up to 2,560,000 points per second with a profile frequency of up 4,000Hz can be acquired using these sensors.

scanCONTROL 2610

The SMART series scanCONTROL 2610 offers a Plug & Play solution with integrated controller for simple measurement tasks. The sensor design is identical to the 2600 and 2650 series.

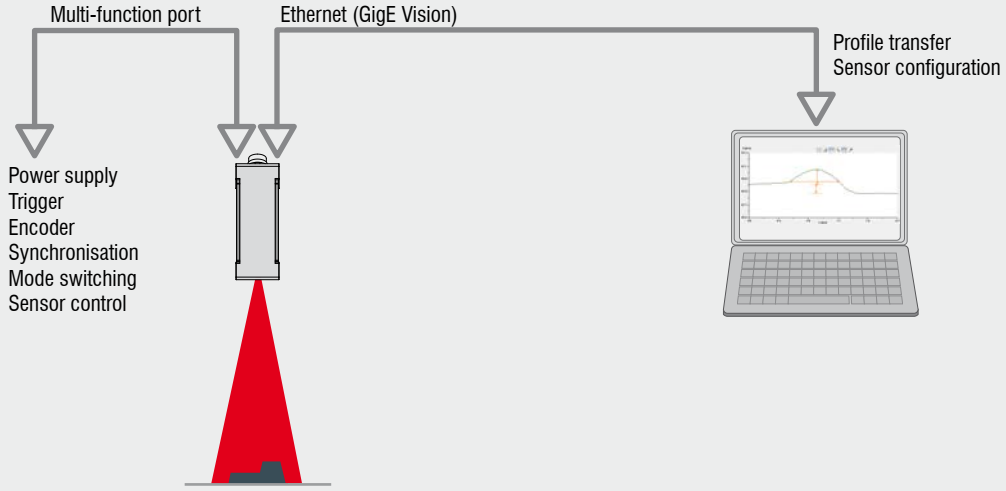
Calibrated profile data: COMPACT and HIGHSPEED

The scanCONTROL 2600 and 2650 models are used for supplying calibrated profile data for external profile analysis, for example in a PC. Sensor configuration and profile data transmission are done via Ethernet. More details of the software interface can be found in the „Integrating scanCONTROL in application software“ chapter.

The multi-function port can be used for power supply, for switching parameters, as trigger input, as encoder input or for synchronizing several scanCONTROL sensors.

COMPACT	HIGHSPEED
scanCONTROL 2600-25	scanCONTROL 2650-25
scanCONTROL 2600-50	scanCONTROL 2650-50
scanCONTROL 2600-100	scanCONTROL 2650-100

Scope of delivery:
Sensor, multi-function cable PC2600/2900-5, Demo-CD, SDK, sensor protocol, assembly instruction



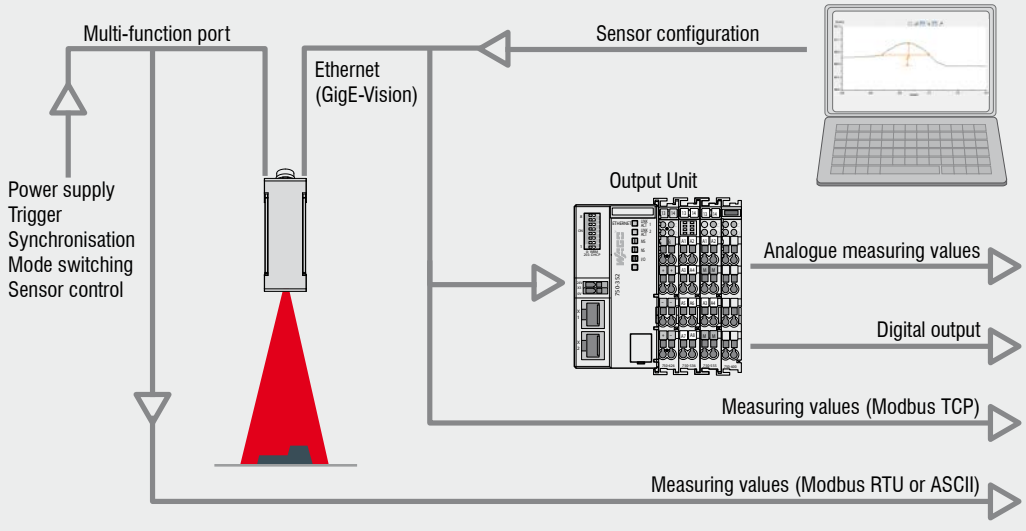
SMART: Profile analysis

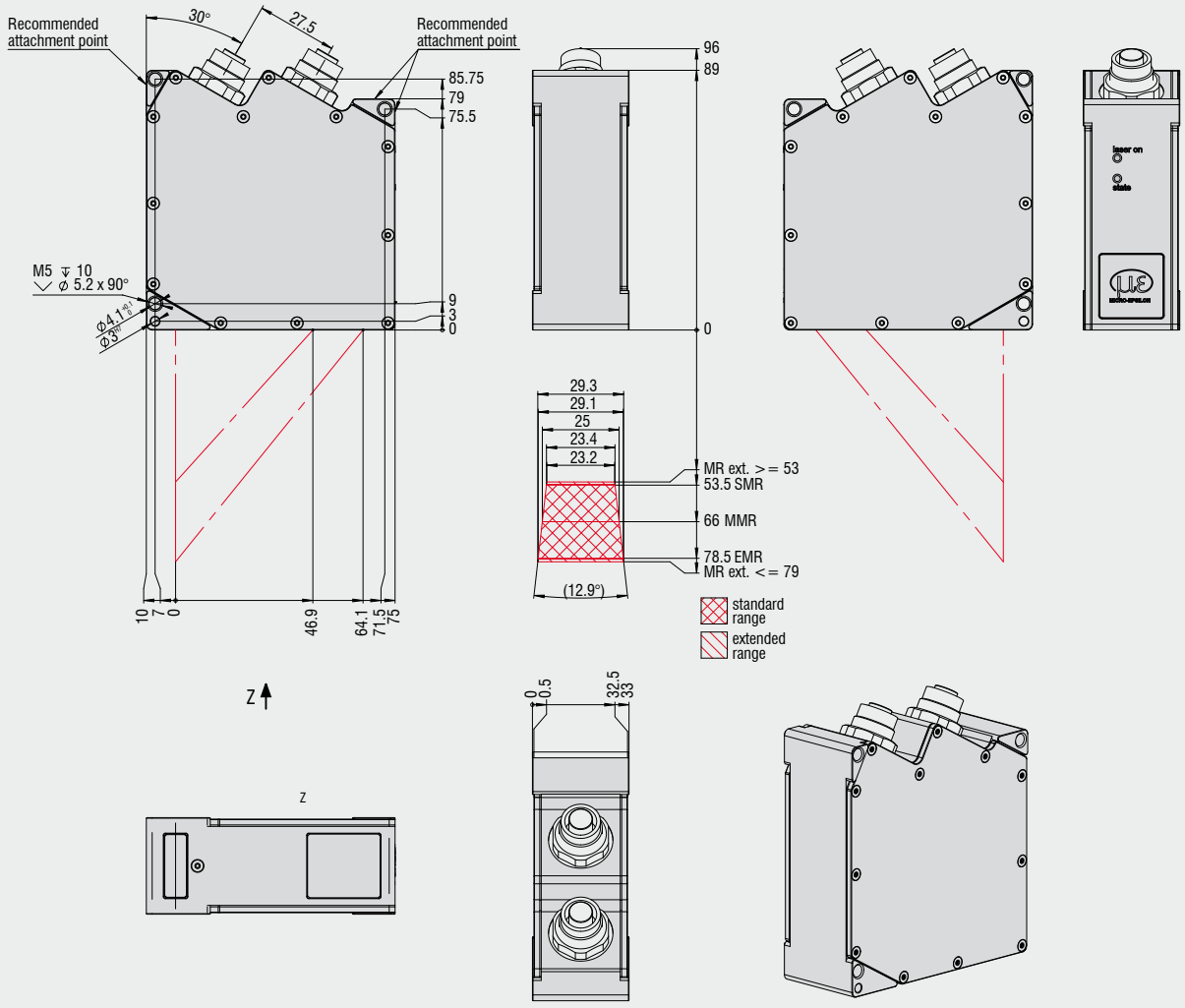
The SMART series scanCONTROL 2610 offers a Plug & Play solution on the integrated sensor controller for simple measurement tasks such as step, angle, seam and groove inspection.

The sensor is programmed via PC using the scanCONTROL Configuration Tools. The parameters can be stored on the integrated sensor controller. After parametrizing the sensor runs in standalone mode without connected PC. In addition to the measurement output via Ethernet (Modbus TCP protocol) and RS422 (Modbus RTU protocol oder ASCII data format), switching outputs and analog outputs are available via the optional Output Unit. The multi-function port can be used for power supply, for sensor control, for switching parameters, as trigger input ,for synchronizing several scanCONTROL sensors or for measurement value output via RS422.

SMART
scanCONTROL 2610-25
scanCONTROL 2610-50
scanCONTROL 2610-100

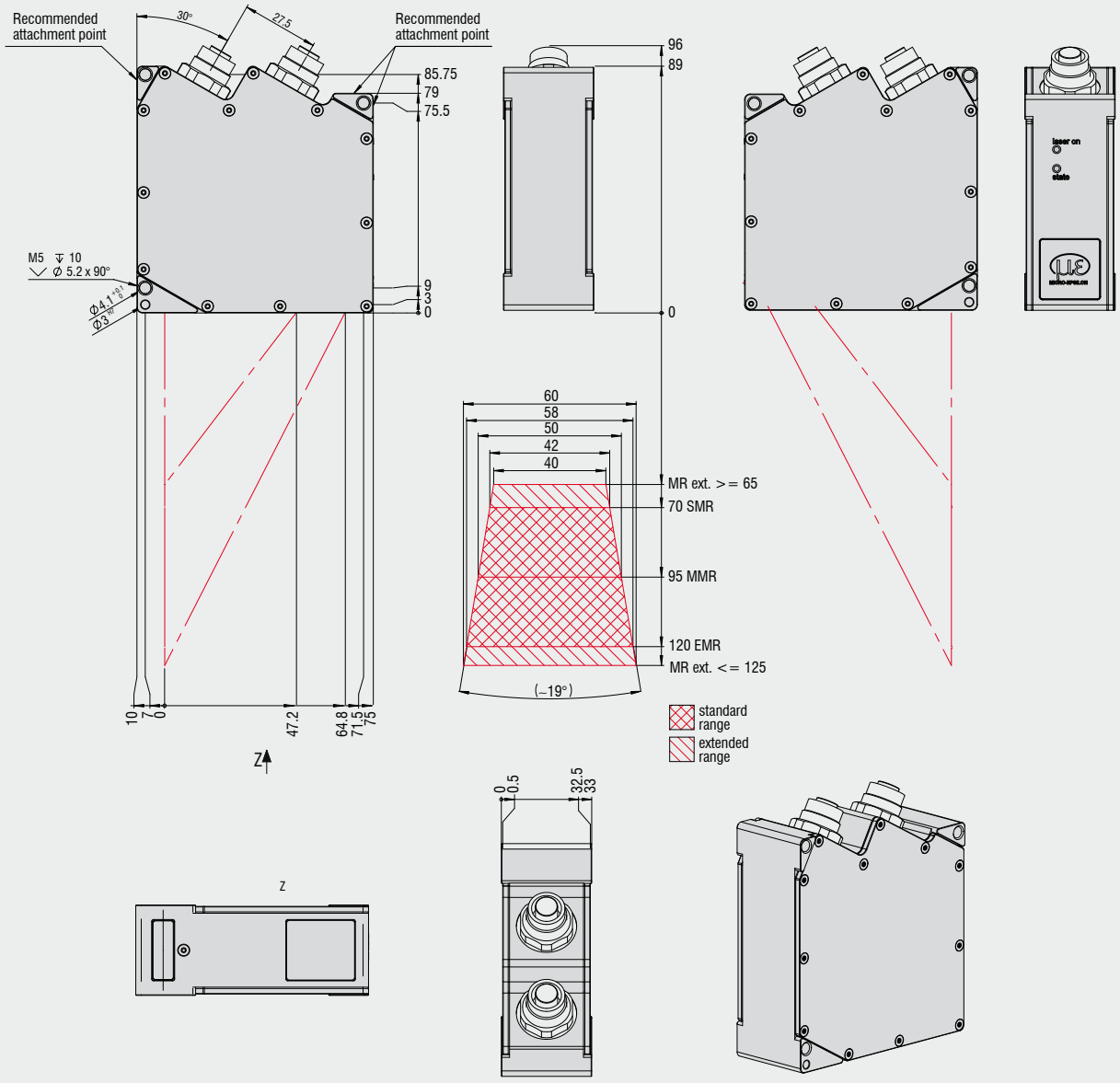
Scope of delivery:
Sensor, multi-function cable PC2600/2900-5, CD Configuration Tools, sensor protocol, assembly instruction




Recommended attachment point
30°
27.5
Recommended attachment point
85.75
79
75.5
M5 ↧ 10
⌵ ⌀ 5.2 x 90°
9
3
0
10
7
0
46.9
64.1
71.5
75
96
89
0
29.3
29.1
25
23.4
23.2
MR ext. >= 53
53.5 SMR
66 MMR
78.5 EMR
MR ext. <= 79
(12.9°)
standard range
extended range
Z
Z
0
0.5
32.5
33
laser on
state

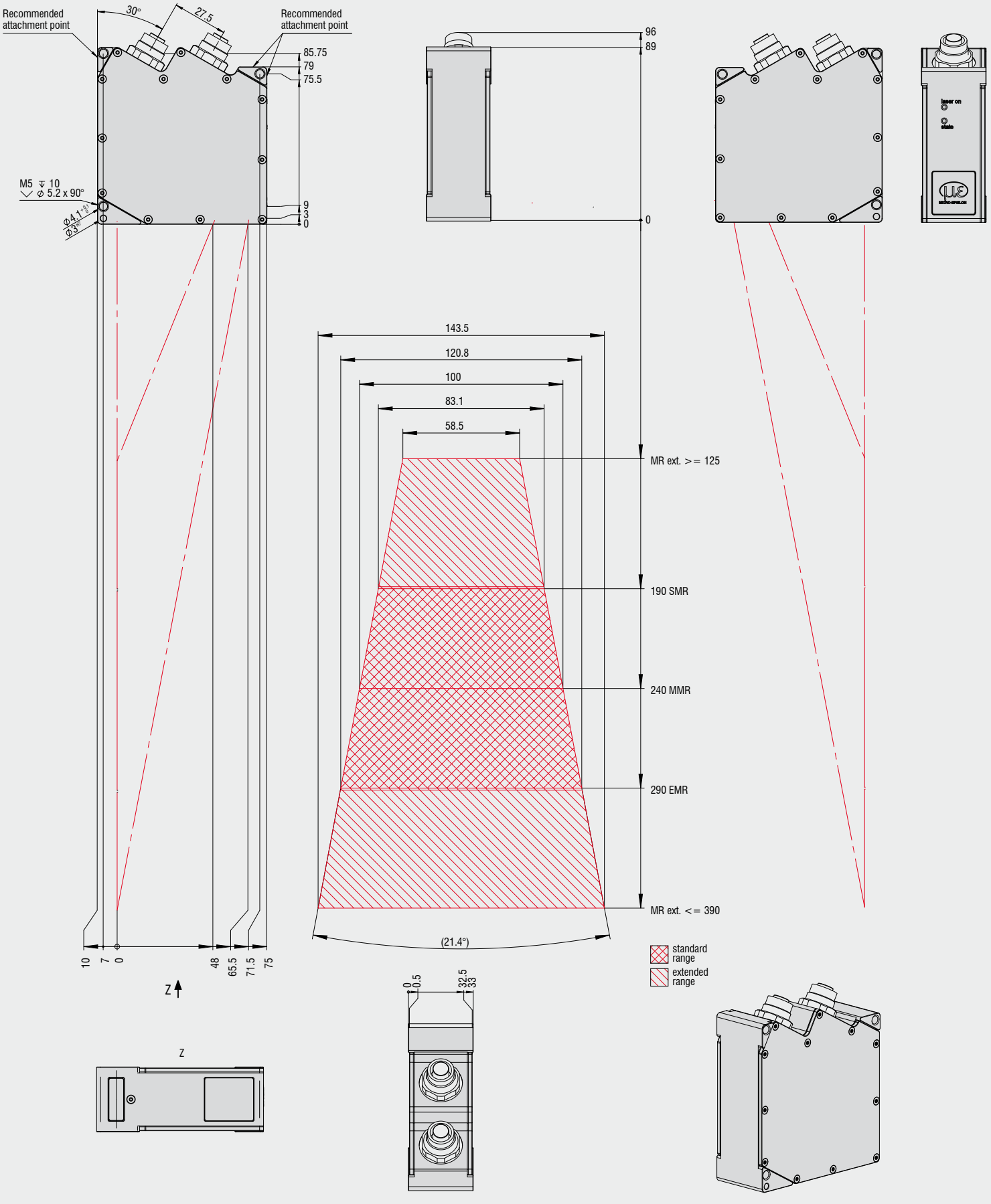
				COMPACT	*HIGHSPEED*	*SMART*
	Model		scanCONTROL	2600-25	2650-25	2610-25
z-axis (height)	Standard measuring range 25mm		Start of measuring range	53.5mm		
			Midrange	66mm		
			End of measuring range	78.5mm		
	Extended measuring range 26mm		Start of measuring range	53mm		
			End of measuring range	79mm		
	Linearity [1]		(3sigma)	±0.16% FSO		
	Reference resolution [2] [3]			2µm		
x-axis (width)	Standard measuring range		Start of measuring range	23.4mm		
			Midrange	25mm		
			End of measuring range	29.1mm		
	Extended measuring range		Start of measuring range	23.2mm		
			End of measuring range	29.3mm		
	Resolution x-axis			640 points/profile		
	Profile frequency			200Hz	4,000Hz	200Hz
	Measurement rate			128,000 points/sec	2.56 Mio. points/sec	
	Interfaces		Ethernet GigE-Vision	Profile data, sensor configuration and measurement values [4]		
		multi function port	Digital inputs	Mode switching Encoder Trigger		
			RS422 (half-duplex)	Output of measurement values [5] Sensor control Trigger Synchronisation		
	Display (LED)			1x laser ON/OFF, 1x power/error/status		
	Light source			Semiconductor laser 658nm		
	Aperture angle laser line			20°		
	Laser power			8mW (class 2M)		
	Laser off			via external contact (optional)		
	Permissible ambient light (fluorescent light) [2]			10,000lx		
	Protection class			IP 65		
	EMC			acc. EN 61326-1: 2006-10 DIN EN 55011: 2007-11 (group 1, class B) EN 61000-6-2: 2006-03		
	Operating temperature			0°C to 45°C		
	Storage temperature			-20°C to 70°C		
	Dimensions			96 x 85 x 33mm		
	Weight			380g		
	Supply			11-30VDC, 24V, 500mA, IEEE 802.3af class 2, Power over Ethernet		

[1] Standard measuring range
[2] Measuring object: Micro-Epsilon standard object (metallic, diffusely reflecting material)
[3] According to a one-time averaging across the measuring field (640 points)
[4] Output of measurement values only with SMART sensors via Modbus TCP or switching signals / analog outputs (only with Output Unit)
[5] Output of measurement values only with SMART sensors via Modbus RTU or ASCII data


Recommended attachment point
Recommended attachment point
30°
27.5
85.75
79
75.5
9
3
0
M5 ↧ 10
⌵ Ø 5.2 x 90°
Ø4.1 +0.1 0
Ø3 H7
10
7
0
47.2
64.8
71.5
75
Z
96
89
0
60
58
50
42
40
MR ext. >= 65
70 SMR
95 MMR
120 EMR
MR ext. <= 125
(~19°)
standard range
extended range
laser on
state
0
0.5
32.5
33
Z

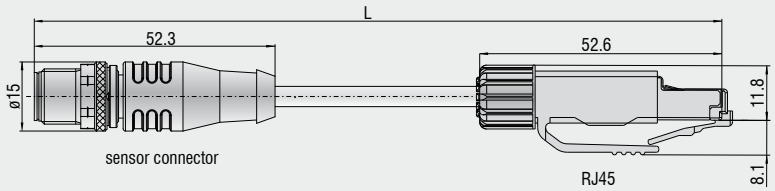
				COMPACT	*HIGHSPEED*	*SMART*
	Model		scanCONTROL	2600-50	2650-50	2610-50
z-axis (height)	Standard measuring range 50mm		Start of measuring range	70mm		
			Midrange	95mm		
			End of measuring range	120mm		
	Extended measuring range 60mm		Start of measuring range	65mm		
			End of measuring range	125mm		
	Linearity [1]		(3sigma)	±0.16% FSO		
	Reference resolution [2] [3]			4µm		
x-axis (width)	Standard measuring range		Start of measuring range	42mm		
			Midrange	50mm		
			End of measuring range	58mm		
	Extended measuring range		Start of measuring range	40mm		
			End of measuring range	60mm		
	Resolution x-axis			640 points/profile		
	Profile frequency			200Hz	4,000Hz	200Hz
	Measurement rate			128,000 points/sec	2.56 Mio. points/sec	
	Interfaces		Ethernet GigE-Vision	Profile data, sensor configuration and measurement values [4]		
		multi function port	Digital inputs	Mode switching Encoder Trigger		
			RS422 (half-duplex)	Output of measurement values [5] Sensor control Trigger Synchronisation		
	Display (LED)			1x laser ON/OFF, 1x power/error/status		
	Light source			Semiconductor laser 658nm		
	Aperture angle laser line			25°		
	Laser power			8mW (class 2M)		
	Laser off			via external contact (optional)		
	Permissible ambient light (fluorescent light) [2]			10,000lx		
	Protection class			IP 65		
	EMC			acc. EN 61326-1: 2006-10 DIN EN 55011: 2007-11 (group 1, class B) EN 61000-6-2: 2006-03		
	Operating temperature			0°C to 45°C		
	Storage temperature			-20°C to 70°C		
	Dimensions			96 x 85 x 33mm		
	Weight			380g		
	Supply			11-30 VDC, 24V, 500mA, IEEE 802.3af class 2, Power over Ethernet		

[1] Standard measuring range
[2] Measuring object: Micro-Epsilon standard object (metallic, diffusely reflecting material)
[3] According to a one-time averaging across the measuring field (640 points)
[4] Output of measurement values only with SMART sensors via Modbus TCP or switching signals / analog outputs (only with Output Unit)
[5] Output of measurement values only with SMART sensors via Modbus RTU or ASCII data


Recommended attachment point
30°
27.5
Recommended attachment point
85.75
79
75.5
M5 ↧ 10
⌵ ⌀ 5.2 x 90°
9
3
0
96
89
0
143.5
120.8
100
83.1
58.5
MR ext. >= 125
190 SMR
240 MMR
290 EMR
MR ext. <= 390
(21.4°)
standard range
extended range
10
7
0
48
65.5
71.5
75
Z
0
0.5
32.5
33
laser on
state

				COMPACT	*HIGHSPEED*	*SMART*
	Model		scanCONTROL	2600-100	2650-100	2610-100
z-axis (height)	Standard measuring range 100mm		Start of measuring range	190mm		
			Midrange	240mm		
			End of measuring range	290mm		
	Extended measuring range 265mm		Start of measuring range	125mm		
			End of measuring range	390mm		
	Linearity [1]		(3sigma)	±0.2% FSO		
	Reference resolution [2] [3]			12µm		
x-axis (width)	Standard measuring range		Start of measuring range	83.1mm		
			Midrange	100mm		
			End of measuring range	120.8mm		
	Extended measuring range		Start of measuring range	58.5mm		
			End of measuring range	143.5mm		
	Resolution x-axis			640 points/profile		
	Profile frequency			200Hz	4,000Hz	200Hz
	Measurement rate			128,000 points/sec	2.56 Mio. points/sec	
	Interfaces		Ethernet GigE-Vision	Profile data, sensor configuration and measurement values [4]		
		multi function port	Digital inputs	Mode switching Encoder Trigger		
			RS422 (half-duplex)	Output of measurement values [5] Sensor control Trigger Synchronisation		
	Display (LED)			1x laser ON/OFF, 1x power/error/status		
	Light source			Semiconductor laser 658nm		
	Aperture angle laser line			25°		
	Laser power			8mW (class 2M)		
	Laser off			via external contact (optional)		
	Permissible ambient light (fluorescent light) [2]			10,000lx		
	Protection class			IP 65		
	EMC			acc. EN 61326-1: 2006-10 DIN EN 55011: 2007-11 (group 1, class B) EN 61000-6-2: 2006-03		
	Operating temperature			0°C to 45°C		
	Storage temperature			-20°C to 70°C		
	Dimensions			96 x 85 x 33mm		
	Weight			380g		
	Supply			11-30VDC, 24V, 500mA, IEEE 802.3af class 2, Power over Ethernet		

[1] Standard measuring range
[2] Measuring object: Micro-Epsilon standard object (metallic, diffusely reflecting material)
[3] According to a one-time averaging across the measuring field (640 points)
[4] Output of measurement values only with SMART sensors via Modbus TCP or switching signals / analog outputs (only with Output Unit)
[5] Output of measurement values only with SMART sensors via Modbus RTU or ASCII data

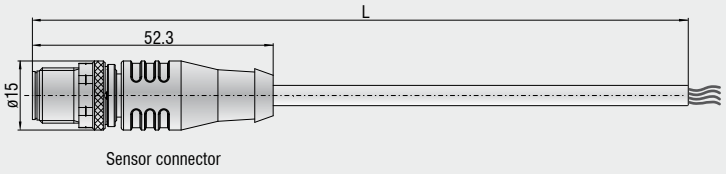


Ethernet connecting cable, qualified for drag chain use

Part. No.	*Model*	*Description*
2901856	SC2600/2900-0,5	Ethernet interface cable, 0.5m
2901857	SC2600/2900-2	Ethernet Interface cable, 2m
2901858	SC2600/2900-5	Ethernet Interface cable, 5m
2901769	SC2600/2900-10	Ethernet Interface cable, 10m
2901859	SC2600/2900-15	Ethernet Interface cable, 15m
2901783	SC2600/2900-20	Ethernet Interface cable, 20m
2901860	SC2600/2900-35	Ethernet Interface cable, 35m

Ethernet connecting cable, qualified for robotic use

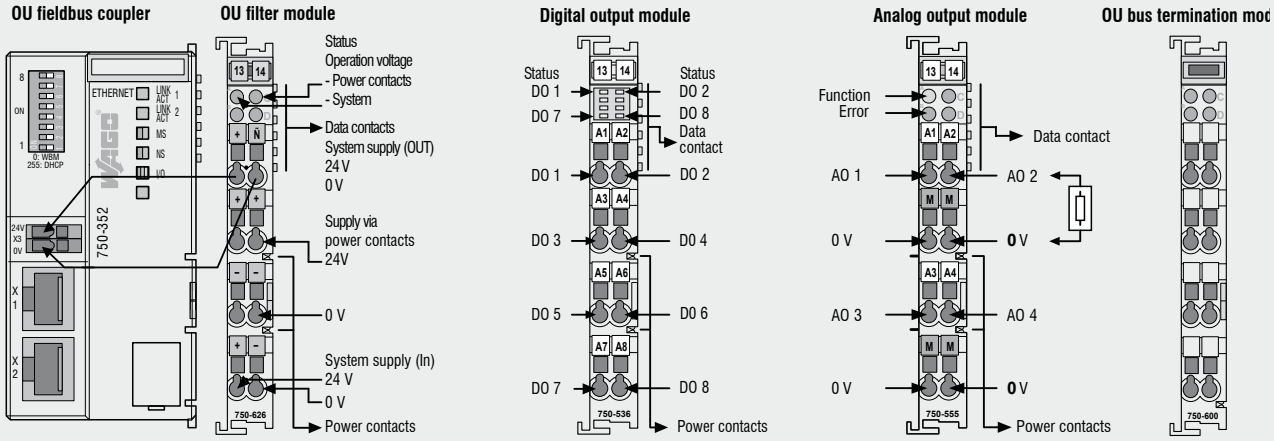
Part. No.	*Model*	*Description*
2901861	SCR2600/2900-0,5	Ethernet Interface cable 0.5m
2901862	SCR2600/2900-2	Ethernet Interface cable 2m
2901863	SCR2600/2900-5	Ethernet Interface cable 5m
2901864	SCR2600/2900-10	Ethernet Interface cable 10m
2901865	SCR2600/2900-15	Ethernet Interface cable 15m
2901866	SCR2600/2900-20	Ethernet Interface cable 20m
2901867	SCR2600/2900-35	Ethernet Interface cable 35m



Multi-function cable, qualified for drag chain use

Part. No.	*Model*	*Description*
2901868	PC2600/2900-5	Multi-function cable (qualified for drag chain use): Power supply, digital inputs (TTL or HTL), RS422 (half-duplex), 5m
2901767	PC2600/2900-10	Multi-function cable (qualified for drag chain use): Power supply, digital inputs (TTL or HTL), RS422 (half-duplex), 10m
2901869	PC2600/2900-20	Multi-function cable (qualified for drag chain use): Power supply, digital inputs (TTL or HTL), RS422 (half-duplex), 20m

Output Unit



Digital output modules:
24V positive switching
24V negative switching
5V positive switching

Analog output modules:
±10V
0-10V
0-20mA
4-20mA

Part. No. Model
6414073 Output Unit Basic/ET: Fieldbus coupler with filter module and bus termination
0325126 OU-AnalogOut 2-Channel/0-10V
0325127 OU-AnalogOut 2-Channel/0-20mA
0325128 OU-AnalogOut 2-Channel/4-20mA
0325129 OU-AnalogOut 2-Channel/±10V
0325132 OU-AnalogOut 4-Channel/0-20mA
0325133 OU-AnalogOut 4-Channel/4-20mA
0325135 OU-AnalogOut 4-Channel/0-10V
0325116 OU-AnalogOut 4-Channel/±10V
0325122 OU-DigitalOut 4-Channel/DC24V/0.5A/positive switching
0325123 OU-DigitalOut 4-Channel/DC24V/0.5A/negative switching
0325124 OU-DigitalOut 4-Channel/DC5V/20mA/positive switching
0325125 OU-DigitalOut 4-Channel/DC24V/0.5A/positive switching
0325131 OU-DigitalOut 8-Channel/DC24V/0.5A/negative switching
0325115 OU-DigitalOut 8-Channel/DC24V/0.5A/positive switching

Compact design with integrated controller

scanCONTROL 2700/2710 combines technology and performance in a single device, providing the dual benefits of an integrated controller and compact dimensions.

Extended measuring ranges for large targets

Extended measuring ranges are available for larger objects. Using software, the user can switch over from the standard range to the extended range. To document the measuring ranges, each sensor is equipped with a calibration protocol.

Protective cover plate for harsh environments

A protective cover plate is available for harsh industrial environments. This can be equipped with an air knife. The cover plate is attached to the sensor and has a protective window, through which the beam passes through.

- z-axis measuring range up to 300mm
- x-axis measuring range up to 148mm
- Profile frequency up to 2,000Hz
- Measuring rate up to 1,280,000 points per second
- z-axis reference resolution <4µm
- Resolution x-axis up to 640 points

scanCONTROL 2700

The scanCONTROL 2700 sensors are the most economic sensors for static and dynamic applications. The sensor provides a profile frequency of 100Hz and up to 64,000 measuring points per second.

scanCONTROL 2750

The scanCONTROL 2750 sensors offer everything you need for advanced high speed, 3D applications. Up to 1,280,000 points per second with a profile frequency of up to 2,000Hz are possible using these sensors.

scanCONTROL 2710

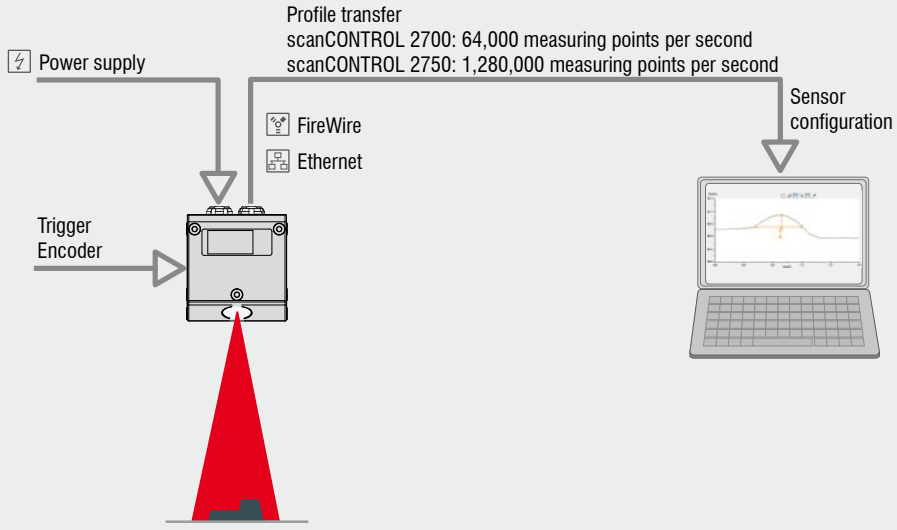
The SMART series scanCONTROL 2710 offers a Plug & Play solution with integrated controller for simple measurement tasks and profile analysis. The sensor design is identical to the 2700 and 2750 series.

COMPACT and HIGHSPEED: **Calibrated profile data**

The scanCONTROL 2700 and 2750 series are used for the transfer of calibrated profile data for external profile analysis, for example in a PC. The sensor can be configured via a FireWire or Ethernet interface. The profile information is also transferred via this same interface. Details of the software interface can be found in the “Integration scanCONTROL“ chapter. The programable RS422 port can be used as a trigger or encoder input.

COMPACT	HIGH-SPEED
scanCONTROL 2700-25	scanCONTROL 2750-25
scanCONTROL 2700-50	scanCONTROL 2750-50
scanCONTROL 2700-100	scanCONTROL 2750-100

Scope of delivery:
Sensor, power supply cable 4.5m, RS422 connector,
Demo-CD, SDK, sensor protocol, assembly instruction

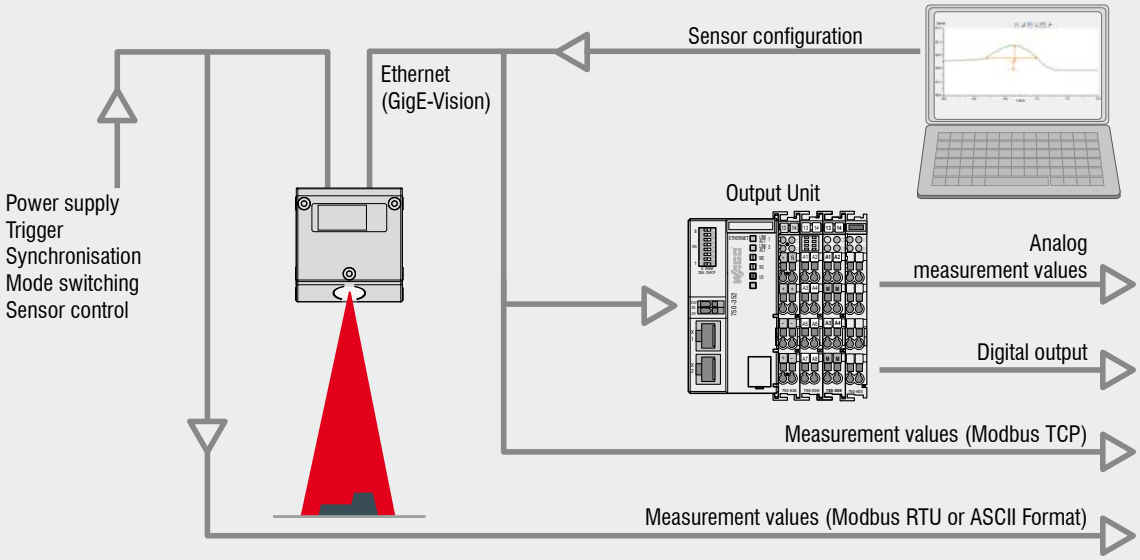


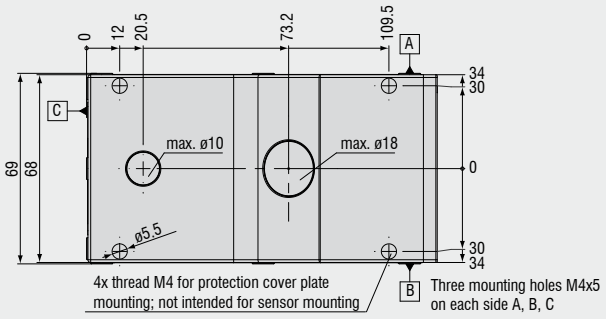
SMART: **Profile analysis**

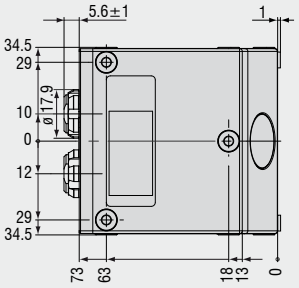
The SMART series 2710 offers a Plug & Play solution within the integrated controller for simple measurement tasks such as step, angle, seam and groove inspection.
The sensor is programed via a PC using the scanCONTROL Configuration Tools. This setup is stored inside the integrated controller. The sensor can run in the standalone mode without a PC. In addition to the measurement output via RS422, switch outputs and analog measuring values are available via the external output unit. The RS422 can be programed as a serial interface (measurement value output) or as a trigger input.

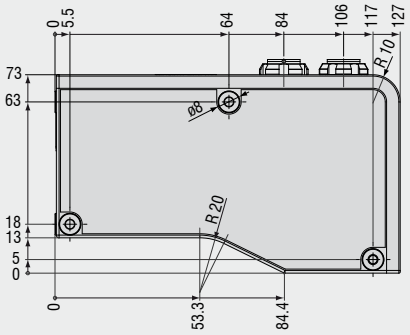
SMART
scanCONTROL 2710-25
scanCONTROL 2710-50
scanCONTROL 2710-100

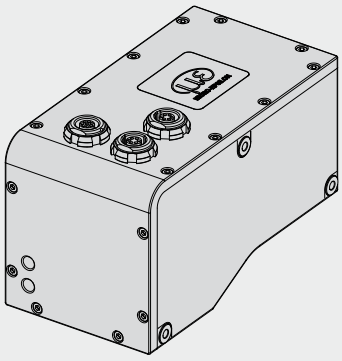
Scope of delivery:
Sensor, power supply cable 4.5m, RS422 connector,
sensor protocol, CD Configuration Tools, assembly instruction

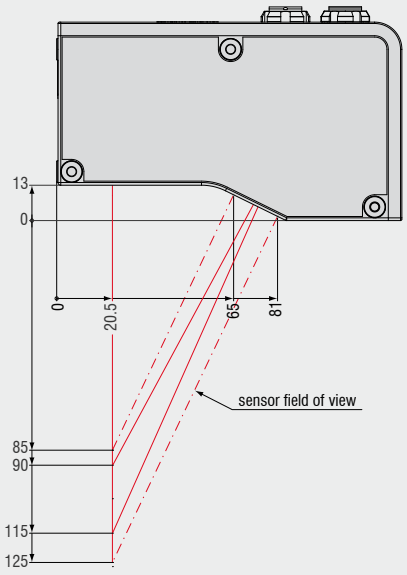


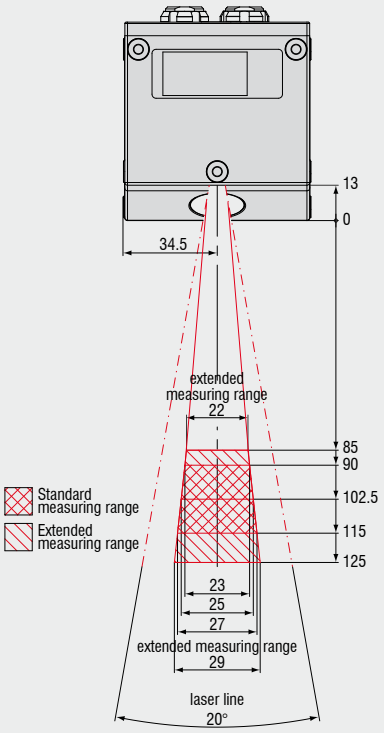

0
12
20.5
73.2
109.5
A
34
30
C
max. ø10
max. ø18
69
68
0
ø5.5
30
34
4x thread M4 for protection cover plate mounting; not intended for sensor mounting
B
Three mounting holes M4x5 on each side A, B, C


5.6±1
1
34.5
29
ø17.9
10
0
12
29
34.5
73
63
18
13
0


0
5.5
64
84
106
117
127
R 10
73
63
ø5
R 20
18
13
5
0
0
53.3
84.4

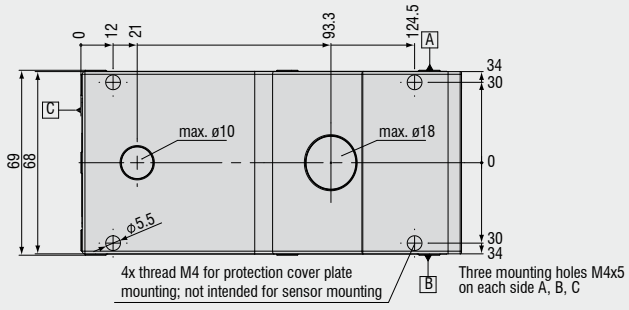


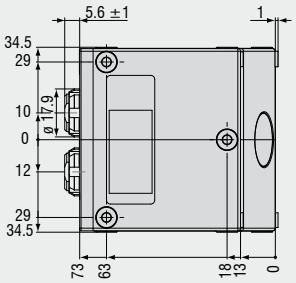

13
0
0
20.5
65
81
sensor field of view
85
90
115
125

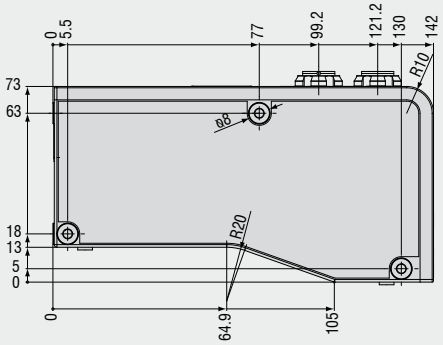

13
0
34.5
extended measuring range
22
85
90
102.5
115
125
Standard measuring range
Extended measuring range
23
25
27
extended measuring range
29
laser line
20°

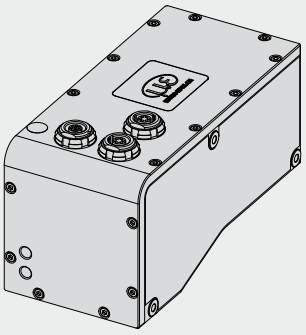
			COMPACT	*HIGHSPEED*	*SMART*
	Model	scanCONTROL	2700-25	2750-25	2710-25
z-axis (height)	Standard measuring range 25mm	Start of measuring range	90mm		
		Midrange	102.5mm		
		End of measuring range	115mm		
	Extended measuring range 40mm	Start of measuring range	85mm		
		End of measuring range	125mm		
	Linearity [1]	±0.2% FSO (3sigma)	±50µm		
	Resolution	0.04% FSO	10µm		
	Reference resolution [2] [3]		4µm		
x-axis (width)	Standard measuring range	Start of measuring range	23mm		
		Midrange	25mm		
		End of measuring range	27mm		
	Extended measuring range	Start of measuring range	22mm		
		End of measuring range	29mm		
	Resolution x-axis		640 points/profile		
	Profile frequency		100Hz	2,000Hz	100Hz
	Measurement rate		64,000 points/sec	1,28 mio points/sec	-
	Interfaces profile data	FireWire	■	■	■
		Ethernet	■	■	■
		RS422 [4]	■	■	■
		Trigger [4]	■	■	■
		Counter (encoder) [4]	■	■	
	Signal output SMART	RS422 (Modbus, ASCII) [4]			■
		Ethernet (Modbus)			■
		Analog [5]			■
		Switching signal [5]			■
	Protection class		IP 64		
	Operating temperature		0°C up to 50°C		
	Storage temperature		-20°C up to 70°C		
	Cable length		up to 20m		
		Ethernet with Switch FireWire with HUB	up to 50m		
	Weight		appr. 700g		
	Galvanic isolation		Only at RS422, no isolation of 24V-supply, internal circuit and FireWire bus. If isolation necessary, external 24V-DC-DC-converter required		
	Vibration		2g / 20 ... 500Hz		
	Shock		15g / 6ms		
	Supply		8-30 VDC, 500mA		
	Light source		semiconductor laser 658nm		
	Aperture angle laser line		20°		
	Laser power	standard	10mW (class 2M)		
		optional	20mW (class 3B)		
	Laser off		via software (standard) / via external contact (optional)		
	Permissible ambient light (fluorescent light) [2]		10,000lx		

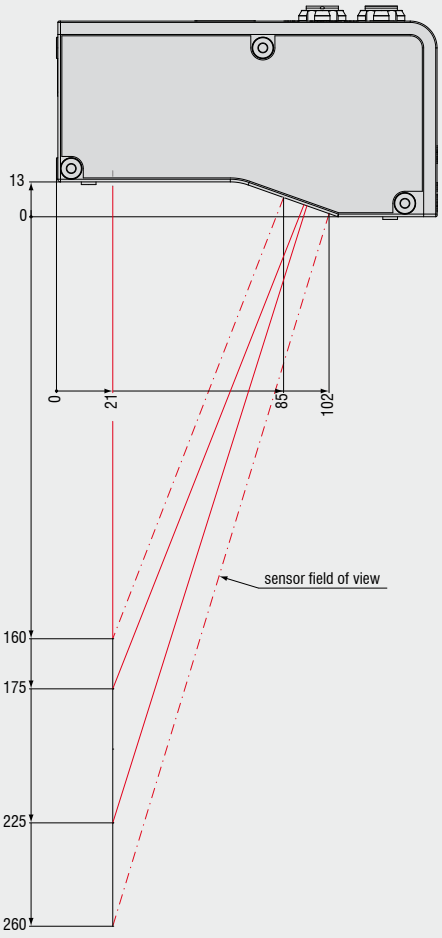
[1] Standard measuring range
[2] Measuring object: Micro-Epsilon standard object (metallic, diffusely reflecting material)
[3] According to a one-time averaging across the measuring field (640 points)
[4] Programable as serial interface or synchronisation input or encoder input
[5] Only with Output Unit
FSO = Full scale output

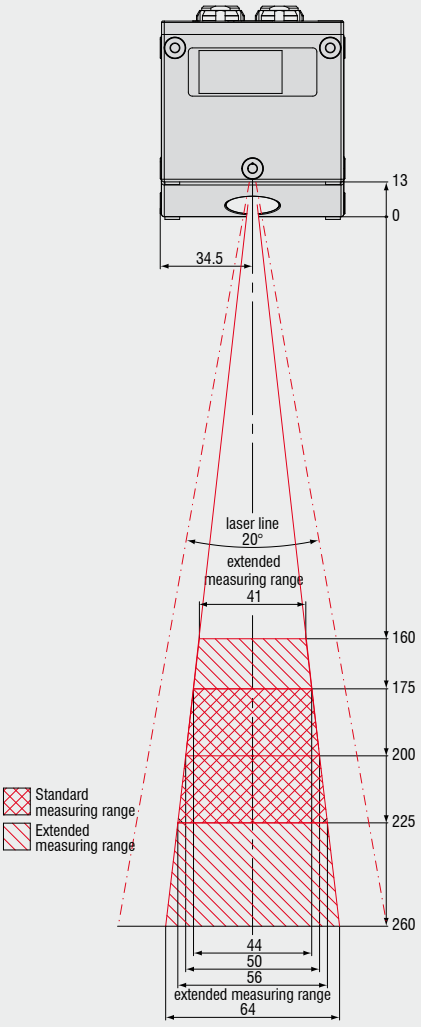

0
12
21
93.3
124.5
A
34
30
0
30
34
C
max. ø10
max. ø18
69
68
ø5.5
4x thread M4 for protection cover plate mounting; not intended for sensor mounting
B
Three mounting holes M4x5 on each side A, B, C


5.6 ±1
1
34.5
29
10
0
12
29
34.5
ø 17.9
73
63
18
13
0


0
5.5
77
99.2
121.2
130
142
R10
73
63
ø8
18
13
5
0
R20
0
64.9
105

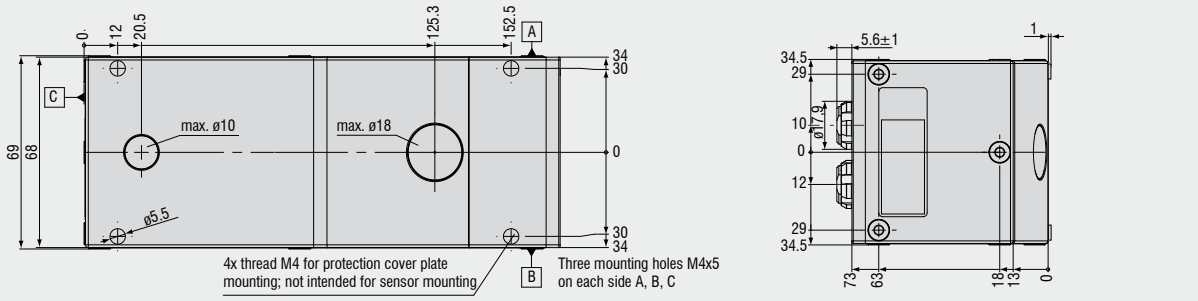


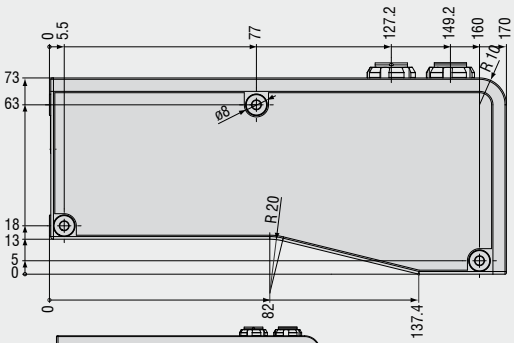

13
0
0
21
85
102
sensor field of view
160
175
225
260

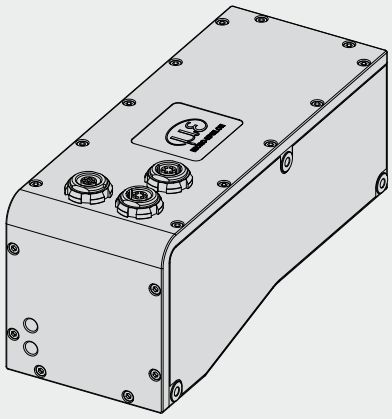

13
0
34.5
laser line
20°
extended measuring range
41
160
175
200
225
260
Standard measuring range
Extended measuring range
44
50
56
extended measuring range
64

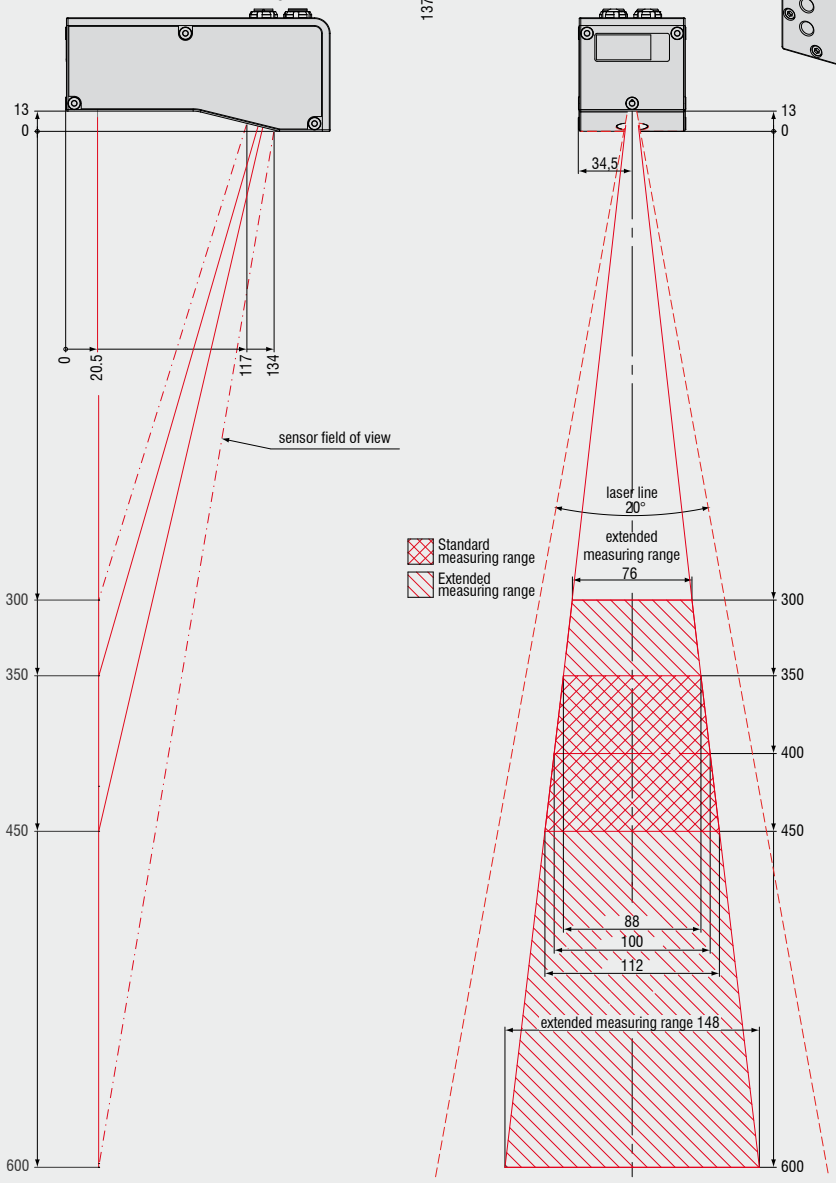
			COMPACT	*HIGHSPEED*	*SMART*
	Model	scanCONTROL	2700-50	2750-50	2710-50
z-axis (height)	Standard measuring range 50mm	Start of measuring range	175mm		
		Midrange	200mm		
		End of measuring range	225mm		
	Extended measuring range 100mm	Start of measuring range	160mm		
		End of measuring range	260mm		
	Linearity [1]	±0.2% FSO (3sigma)	±100µm		
	Resolution	0.04% FSO	20µm		
	Reference resolution [2] [3]		10µm		
x-axis (width)	Standard measuring range	Start of measuring range	44mm		
		Midrange	50mm		
		End of measuring range	56mm		
	Extended measuring range	Start of measuring range	41mm		
		End of measuring range	64mm		
	Resolution x-axis		640 points/profile		
	Profile frequency		100Hz	2,000Hz	100Hz
	Measurement rate		64,000 points/sec	1,28 mio points/sec	-
	Interfaces profile data	FireWire	■	■	■
		Ethernet	■	■	■
		RS422 [4]	■	■	■
		Trigger [4]	■	■	■
		Counter (encoder) [4]	■	■	
	Signal output SMART	RS422 (Modbus, ASCII) [4]			■
		Ethernet (Modbus)			■
		Analog [5]			■
		Switching signal [5]			■
	Protection class		IP 64		
	Operating temperature		0°C up to 50°C		
	Storage temperature		-20°C up to 70°C		
	Cable length		up to 20m		
		Ethernet with Switch FireWire with HUB	up to 50m		
	Weight		appr. 800g		
	Galvanic isolation		Only at RS422, no isolation of 24V-supply, internal circuit and FireWire bus. If isolation necessary, external 24V-DC-DC-converter required		
	Vibration		2g / 20 ... 500Hz		
	Shock		15g / 6ms		
	Supply		8-30 VDC, 500mA		
	Light source		semiconductor laser 658nm		
	Aperture angle laser line		20°		
	Laser power	standard	10mW (class 2M)		
		optional	20mW (class 3B)		
	Laser off		via software (standard) / via external contact (optional)		
	Permissible ambient light (fluorescent light) [2]		10,000lx		

[1] Standard measuring range
[2] Measuring object: Micro-Epsilon standard object (metallic, diffusely reflecting material)
[3] According to a one-time averaging across the measuring field (640 points)
[4] Programable as serial interface or synchronisation input or encoder input
[5] Only with Output Unit
FSO = Full scale output


max. ø10
max. ø18
ø5.5
4x thread M4 for protection cover plate mounting; not intended for sensor mounting
Three mounting holes M4x5 on each side A, B, C



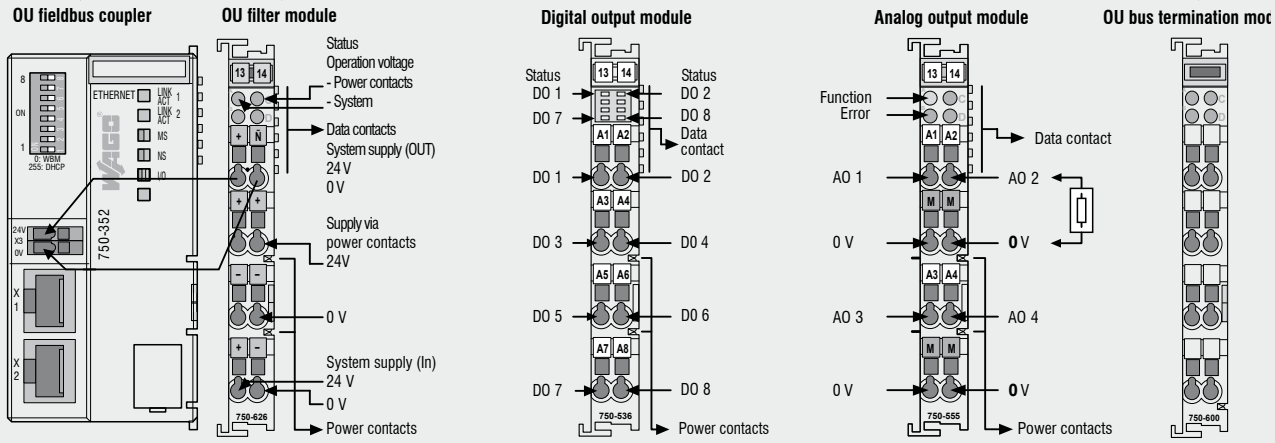



sensor field of view
laser line
20°
Standard measuring range
Extended measuring range
extended measuring range
76
88
100
112
extended measuring range 148

			COMPACT	*HIGHSPEED*	*SMART*
	Model	scanCONTROL	2700-100	2750-100	2710-100
z-axis (height)	Standard measuring range 100mm	Start of measuring range	350mm		
		Midrange	400mm		
		End of measuring range	450mm		
	Extended measuring range 300mm	Start of measuring range	300mm		
		End of measuring range	600mm		
	Linearity [1]	±0.2% FSO (3sigma)	±200µm		
	Resolution	0.04% FSO	40µm		
	Reference resolution [2] [3]		15µm		
x-axis (width)	Standard measuring range	Start of measuring range	88mm		
		Midrange	100mm		
		End of measuring range	112mm		
	Extended measuring range	Start of measuring range	76mm		
		End of measuring range	148mm		
	Resolution x-axis		640 points/profile		
	Profile frequency		100Hz	2,000Hz	100Hz
	Measurement rate		64,000 points/sec	1,28 mio points/sec	-
	Interfaces profile data	FireWire	■	■	■
		Ethernet	■	■	■
		RS422 [4]	■	■	■
		Trigger [4]	■	■	■
		Counter (encoder) [4]	■	■	
	Signal output SMART	RS422 (Modbus, ASCII) [4]			■
		Ethernet (Modbus)			■
		Analog [5]			■
		Switching signal [5]			■
	Protection class		IP 64		
	Operating temperature		0°C up to 50°C		
	Storage temperature		-20°C up to 70°C		
	Cable length		up to 20m		
		Ethernet with Switch FireWire with HUB	up to 50m		
	Weight		appr. 850g		
	Galvanic isolation		Only at RS422, no isolation of 24V-supply, internal circuit and FireWire bus. If isolation necessary, external 24V-DC-DC-converter required		
	Vibration		2g / 20 ... 500Hz		
	Shock		15g / 6ms		
	Supply		8-30 VDC, 500mA		
	Light source		semiconductor laser 658nm		
	Aperture angle laser line		20°		
	Laser power	standard	10mW (class 2M)		
		optional	20mW (class 3B)		
	Laser off		via software (standard) / via external contact (optional)		
	Permissible ambient light (fluorescent light) [2]		10,000lx		

[1] Standard measuring range
[2] Measuring object: Micro-Epsilon standard object (metallic, diffusely reflecting material)
[3] According to a one-time averaging across the measuring field (640 points)
[4] Programable as serial interface or synchronisation input or encoder input
[5] Only with Output Unit
FSO = Full scale output

Output Unit

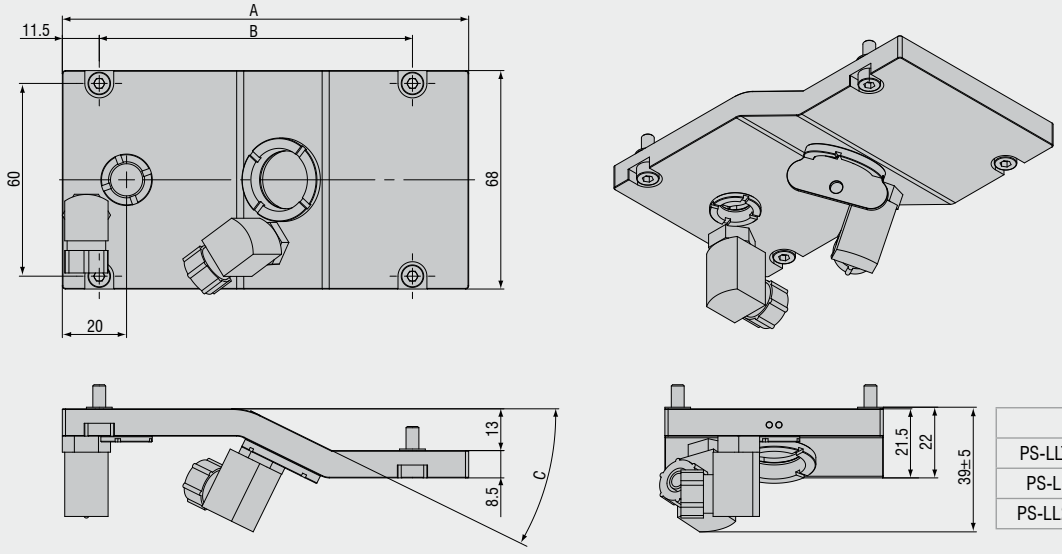


Part. No. *Model*
6414073 Output Unit Basic/ET: Fieldbus coupler with filter module and bus termination
0325126 OU-AnalogOut 2-Channel/0-10V
0325127 OU-AnalogOut 2-Channel/0-20mA
0325128 OU-AnalogOut 2-Channel/4-20mA
0325129 OU-AnalogOut 2-Channel/±10V
0325132 OU-AnalogOut 4-Channel/0-20mA
0325133 OU-AnalogOut 4-Channel/4-20mA
0325135 OU-AnalogOut 4-Channel/0-10V
0325116 OU-AnalogOut 4-Channel/±10V
0325122 OU-DigitalOut 4-Channel/DC24V/0.5A/positive switching
0325123 OU-DigitalOut 4-Channel/DC24V/0.5A/negative switching
0325124 OU-DigitalOut 4-Channel/DC5V/20mA/positive switching
0325125 OU-DigitalOut 4-Channel/DC24V/0.5A/positive switching
0325131 OU-DigitalOut 8-Channel/DC24V/0.5A/negative switching
0325115 OU-DigitalOut 8-Channel/DC24V/0.5A/positive switching

Digital output modules:
24V positive switching
24V negative switching
5V positive switching

Analog output modules:
±10V
0-10V
0-20mA
4-20mA

Protective cover plate, mounted to the sensor (with or without air knife)



	A	B	C
PS-LLT2700-25	126.5	97.5	26.14°
PS-LL2700-50	141.5	112.5	19.5°
PS-LL2700-100	169.5	140.5	13.78°

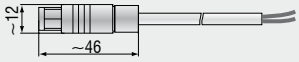
Part. No. *Model* *Description*
2105029 PS-LLT2700-25 protective cover plate, mounted
2105028 PS-LLT2700-25/AIR protective cover plate with air supply, mounted
2105027 PS-LLT2700-50 protective cover plate, mounted
2105026 PS-LLT2700-50/AIR protective cover plate with air supply, mounted
2105025 PS-LLT2700-100 protective cover plate, mounted
2105024 PS-LLT2700-100/AIR protective cover plate with air supply, mounted

Connecting cable for power supply and interfaces

FireWire connecting cable

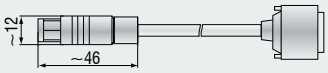
Sensor connector — IEEE1394a FireWire (6-pin)

External power supply cable



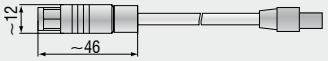
Sensor connector

RS422 interface cable



Sensor connector

Ethernet connecting cable RJ45



Sensor connector

FireWire connecting cable

Part. No.	*Model*	*Description*
2901391	SC2700-1,8	FireWire connecting cable 1.8m
2901392	SC2700-4,5	FireWire connecting cable 4.5m
2901393	SC2700-10	FireWire connecting cable 10m
2901394	SC2700-15	FireWire connecting cable 15m
2901395	SC2700-20	FireWire connecting cable 20m

FireWire connecting cable, perma flex

Part. No.	*Model*	*Description*
2901400	SCR2700-4,5	FireWire connecting cable 4.5m
2901401	SCR2700-10	FireWire connecting cable 10m
2901402	SCR2700-15	FireWire connecting cable 15m
2901434	SCR2700-20	FireWire connecting cable 20m

Ethernet connecting cable, high flex

Part. No.	*Model*	*Description*
2901512	SC2700-2/ET	Ethernet connecting cable 2m
2901513	SC2700-5/ET	Ethernet connecting cable 5m
2901514	SC2700-10/ET	Ethernet connecting cable 10m
2901515	SC2700-15/ET	Ethernet connecting cable 15m
2901516	SC2700-20/ET	Ethernet connecting cable 20m
2901640	SC2700-35/ET	Ethernet connecting cable 35m

Ethernet connecting cable, robotic rated

Part. No.	*Model*	*Description*
2901542	SCR2700-2/ET	Ethernet connecting cable 2m
2901543	SCR2700-5/ET	Ethernet connecting cable 5m
2901544	SCR2700-10/ET	Ethernet connecting cable 10m
2901545	SCR2700-15/ET	Ethernet connecting cable 15m
2901546	SCR2700-20/ET	Ethernet connecting cable 20m
2901702	SCR2700-35/ET	Ethernet connecting cable 35m

Other cables

Part. No.	*Model*	*Description*
2901407	PC2700-4,5	Power supply cable, 4.5m
2901406	SC2700-4,5/RS422	RS422 interface cable 4.5m
2901581	SC2700-0,5/SYNC	Synchronization cable for two scanCONTROL 2700 sensors

Accessories

Part. No.	*Model*	*Description*
0254026	Case	Transport case for scanCONTROL 2700 series
2420062	PS2020	Power supply, 24V/2.5A

Precise laser scanner for high speed profile aquisition

scanCONTROL 2800 / 2810 consists of a compact sensor and an intelligent controller, which are connected by a cable. The controller outputs both the 2D profile information as well as analyzed data.
scanCONTROL has been developed for industrial applications. Using innovative technologies significantly increases the functionality of the system and its flexibility for different applications.
Unlike conventional systems, the scanCONTROL 2800 / 2810 is not limited to specific applications and is therefore ideal suited for a large variety of industrial fields. The integrated FireWire interface enables both complete control for several scanCONTROL systems via a PC, as well as high data rates.

- **z-axis measuring range up to 10mm**
- **x-axis measuring range up to 10.5mm**
- **Profile frequency up to 4,000Hz**
- **Measuring rate up to 256,000 points per second**
- **z-axis reference resolution <2µm**
- **Resolution x-axis up to 1,024 points**

High measuring rate

Fast quality testing is guaranteed by the high measuring rate of up to 256,000 measuring points per second. A profile frequency of up to 4,000 profiles per second can be achieved, depending on the resolution and measuring range.

Profile resolution scanCONTROL 2800/2810

A profile consists of a maximum of 1,024 points and one calibrated measurement value each for X and Z. These points are acquired simultaneously across the entire line and made immediately available to a PC for a real time evaluation of the profile.

scanCONTROL 2800

The scanCONTROL 2800 sensors are the industrial standard sensors for high resolution and fast applications. The sensor provides a profile frequency of 4,000Hz and up to 256,000 measuring points per second.

scanCONTROL 2810

The SMART series scanCONTROL 2810 offers a Plug & Play solution with integrated controller for simple measurement tasks and profile analysis. The sensor design is identical to the 2800 series.

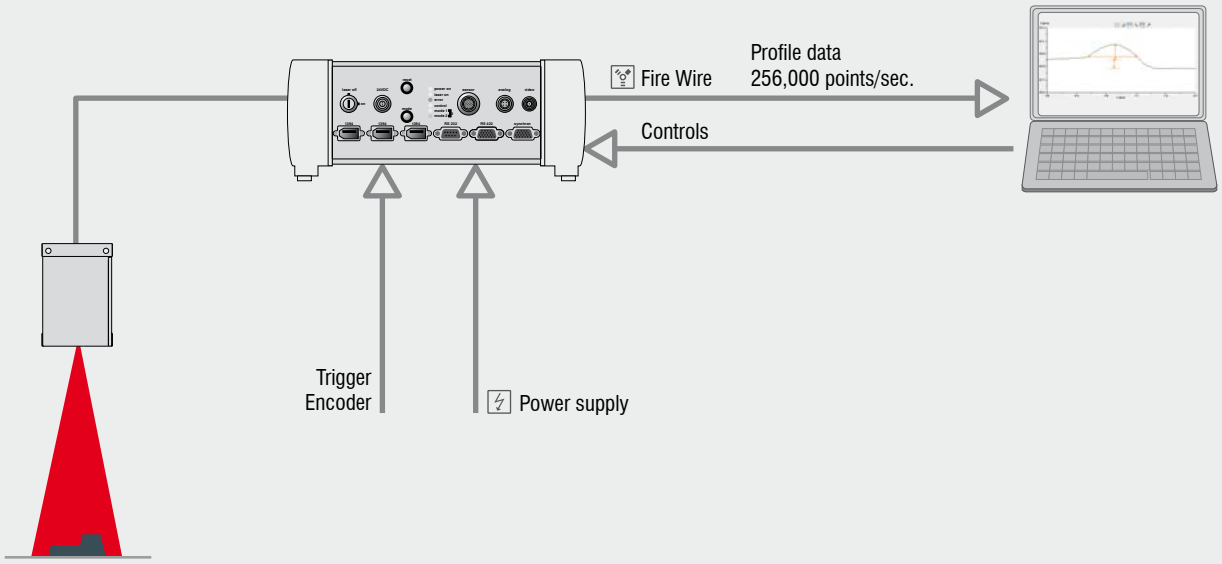
HIGHSPEED: **Calibrated profile data**

The scanCONTROL 2800 and 2810 series are used for the transfer of calibrated profile data for external profile analysis, for example in a PC. The profile information is also transferred via the same interface. Details of the software interface can be found in the „Integration scanCONTROL“ chapter.

HIGH-SPEED

scanCONTROL 2800-10

Scope of delivery:
Sensor, controller, power supply cable 3m, FireWire cable 3m, sensor protocol, Demo CD incl. SDK



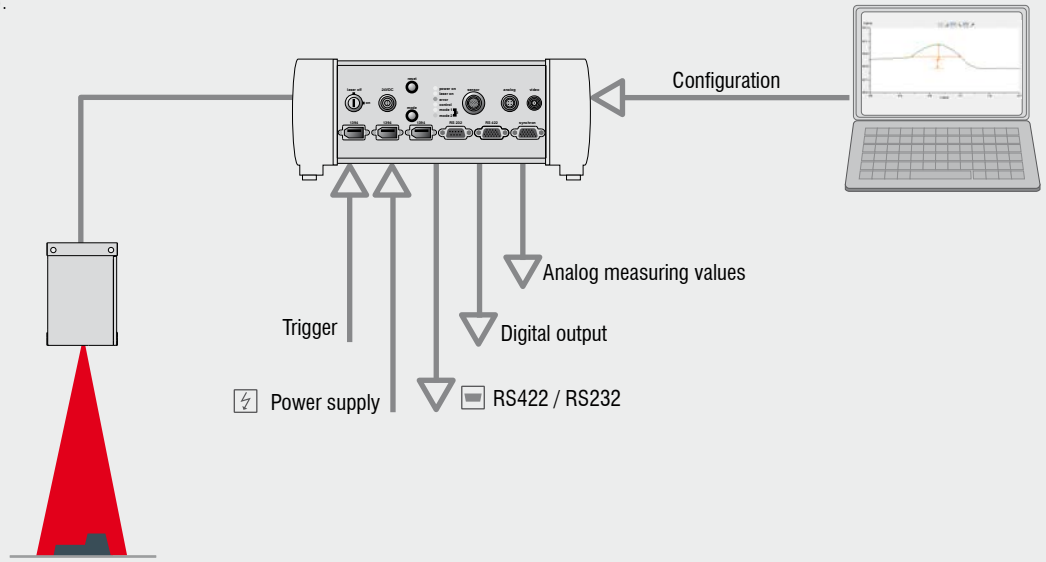
SMART: **Profile analysis**

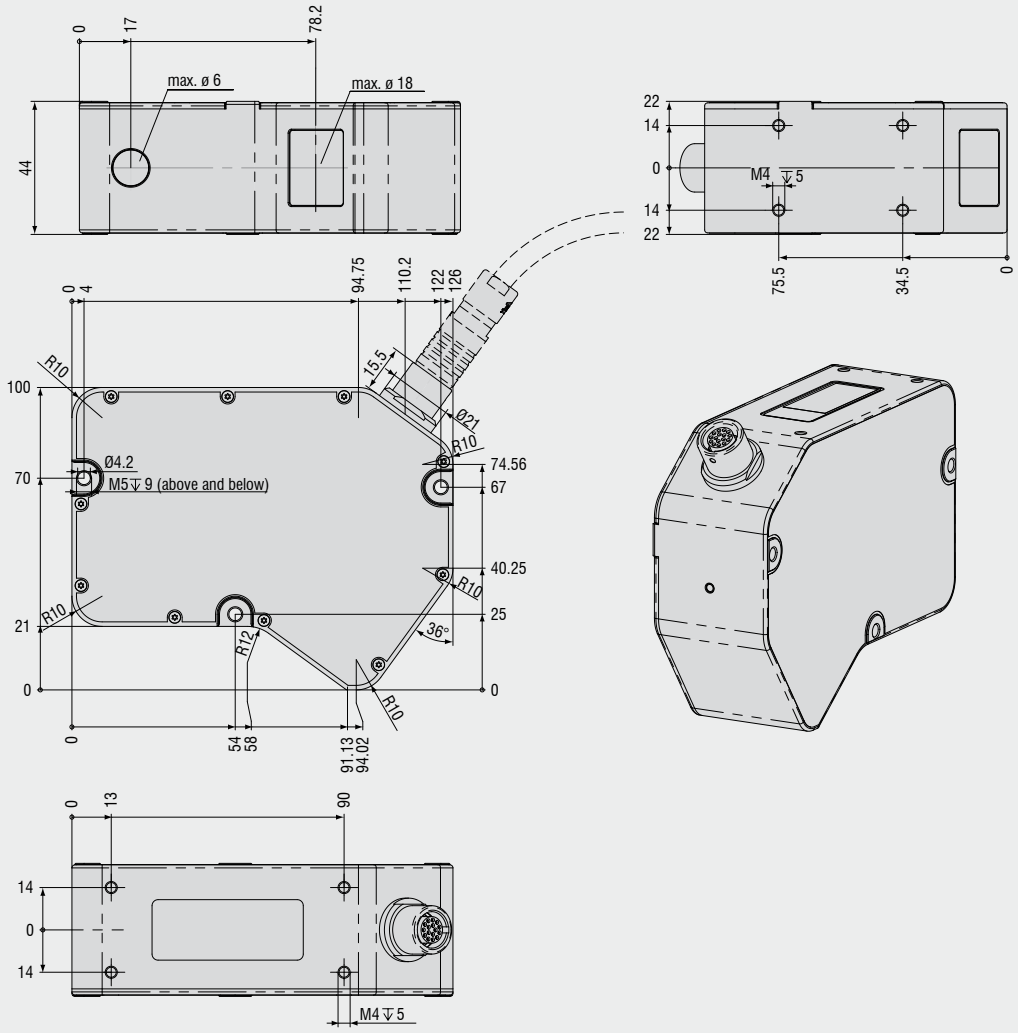
The SMART series 2810 offers a Plug & Play solution within the integrated controller for simple measurement tasks such as step, angle, seam and groove inspection. The sensor is programed via a PC using the scanCONTROL Configuration Tools. This setup is stored inside the integrated controller. The sensor can run in the standalone mode without a PC. In addition to the measurement output via RS422, switch outputs and analog measuring values are available.
The RS422 can be programed as a serial interface (measurement value output).

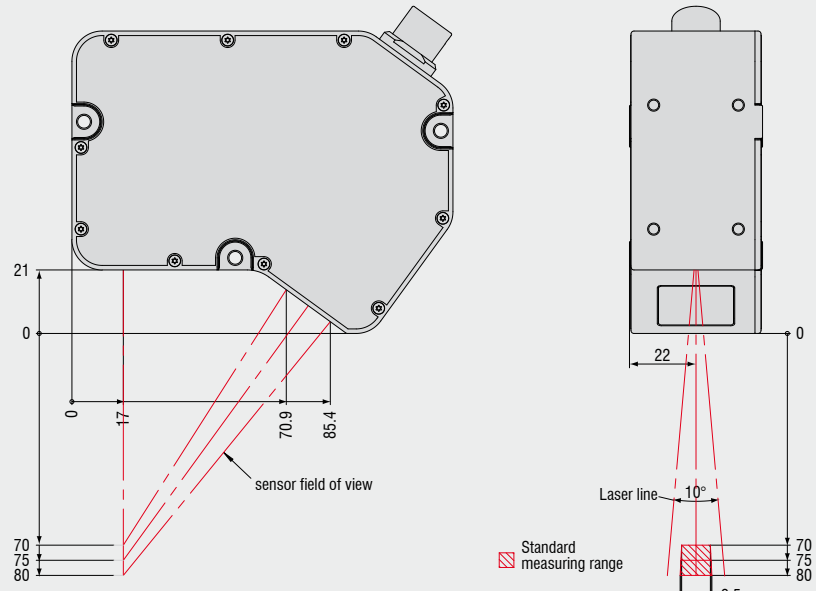
SMART

scanCONTROL 2810-10

Scope of delivery:
Sensor, controller, power supply cable 3m, FireWire cable 3m, sensor protocol, Software Configuration Tools

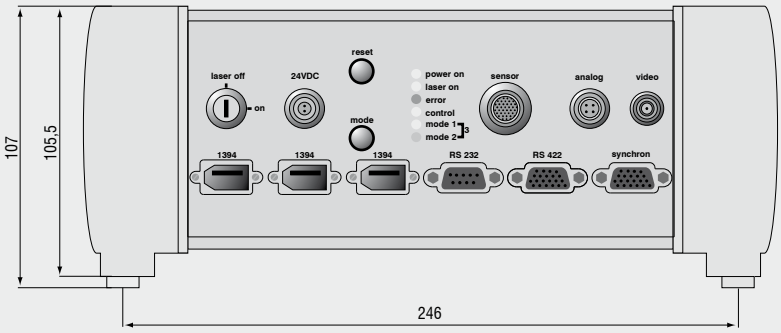


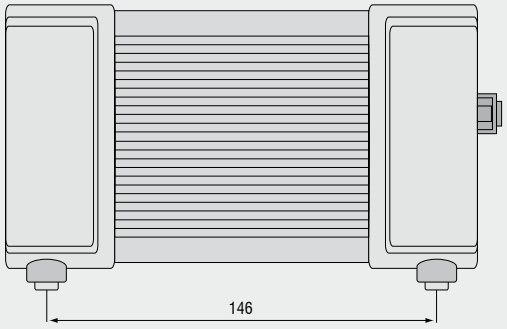

0
17
78.2
max. ø 6
max. ø 18
44
22
14
0
14
22
M4
5
75.5
34.5
0
0
4
94.75
110.2
122
126
15.5
Ø21
R10
100
70
21
0
Ø4.2
M5↧9 (above and below)
74.56
67
40.25
25
0
R10
R12
36°
54
58
91.13
94.02
0
13
90
14
0
14
M4↧5

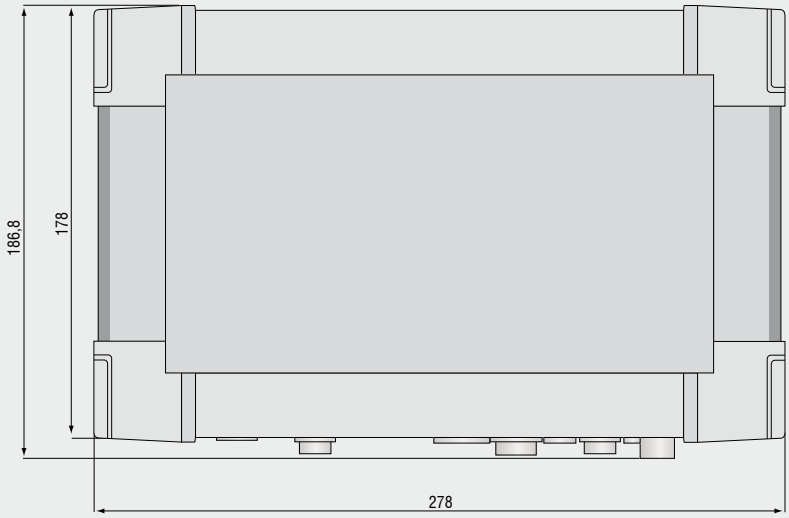

21
0
0
17
70.9
85.4
sensor field of view
70
75
80
22
0
Laser line
10°
Standard
measuring range
70
75
80
9.5
10
10.5

			HIGHSPEED	*SMART*
	Model	scanCONTROL	2800-10	2810-10
z-axis (height)	Standard measuring range 10mm	Start of measuring range	70mm	
		Midrange	75mm	
		End of measuring range	80mm	
	Linearity [1]	±0.3% FSO (3sigma)	±30µm	
	Resolution	0.04% FSO	4µm	
	Reference resolution [2] [3]		2µm	
x-axis (width)	Standard measuring range	Start of measuring range	9.5mm	
		Midrange	10mm	
		End of measuring range	10.5mm	
	Resolution x-axis		1024 points/profile	
	Profile frequency		4000 Hz	
	Measurement rate		256,000 points/sec	
	Interfaces profile data	FireWire	■	■
		RS232	■	■
		RS422	■	■
		Trigger HTL/TTL	■	■
		Counter (encoder)	■	■
	Signal output SMART	RS232		■
		RS422		■
		Analog		■
		Switching signal		■
	Display (LED)		1x laser, 1x power/error/control, 2x mode	
	Protection class	Sensor	IP 64	
		Controller	IP 40	
	Operating temperature		0°C up to 50°C	
	Storage temperature		-20°C up to 70°C	
	Cable length		up to 10m	
	Weight	Sensor	appr. 560g	
		Controller	appr. 3.5kg	
	Galvanic isolation		All interfaces are galvanically isolated	
	Vibration		2g / 20 ... 500Hz	
	Shock		15g / 6ms	
	Supply		20-27 VDC, 500mA	
	Light source		semiconductor laser 655nm	
	Aperture angle laser line		10°	
	Laser power		7mW (class 2M)	
	Laser off		via software and external contact	
	Permissible ambient light (fluorescent light) [2]		10,000lx	

[1] Standard measuring range
[2] Measuring object: Micro-Epsilon standard object (metallic, diffusely reflecting material)
[3] According to a one-time averaging across the measuring field (1024 points)
FSO = Full scale output


laser off
on
24VDC
reset
mode
power on
laser on
error
control
mode 1
mode 2
sensor
analog
video
1394
1394
1394
RS 232
RS 422
synchron
107
105,5
246


146


186,8
178
278

Cable and accessories

Sensor cable, high-flex rated

Part.-No.	*Model*	*Description*
2901146	CE2800-3-SB	Extension cable for sensor, 3m (female-male)
2901146.01	CE2800-3-SS	Connection cable for sensor, 3 m (male-male)
2901219	CE2800-5-SB	Extension cable for sensor, 5m (female-male)
2901219.01	CE2800-5-SS	Connection cable for sensor, 4.75m (male-male)
2901147	CE2800-8-SB	Extension cable for sensor, 8m (female-male)
2901228	CE2800-8-SS	Connection cable for sensor, 7.75m (male-male)
2901167	CE2800-10-SS	Connection cable for sensor, 9.75m (male-male)

Sensor cable, robotic rated

Part.-No.	*Model*	*Description*
2901202	CER2800-5-SS	Connection cable for sensor, 4.75m (male-male)
2901222	CER2800-8-SB	Extension cable for sensor, 8m (female-male)
2901229	CER2800-8-SS	Connection cable for sensor, 7.75m (male-male)
2901164	CER2800-10-SS	Connection cable for sensor, 9.75m (male-male)

Other cables

Part.-No.	*Model*	*Description*
2901145	PC2800-3	Power supply cable, 3m
2901159	SCD-IEEE-1394-3	FireWire cable, 3m
2901150	SC2800-0,5	Synchronization cable, 0.5m suitable for controller LLT2800 and LLT2810

Accessories

Part.-No.	*Model*	*Description*
2420062	PS2020	Power supply 24 V/2.5A
8360006	3D-View	scanCONTROL 3D-View software

Extremely compact design

The design of the scanCONTROL 29x0 series is focussed on minimal size and low weight. All available measuring ranges have the same sensor size. This makes switching the measuring range as easy as never before. The entire electronics was integrated inside of the sensor head in order to reduce cabling and to facilitate mechanical integration as well as using the sensor in robot-based applications.

High-end automation

For tasks that require high resolutions and high profile frequencies, the scanCONTROL 29x0 is the perfect choice. The scanner's high-performance receiving matrix supports a high point density along the sensor line.

Power over Ethernet

The scanners can be supplied via Ethernet (Power over Ethernet). If Industrial Ethernet is used as data connection to the sensor only one cable will remain that connects the sensor to the periphery. Connecting scanCONTROL sensors has never been easier.

Multi-function port

The multi-function port can be used for power supply, as data output, for switching parameters, as trigger input or for synchronizing several scanCONTROL sensors. This port makes the scanner very flexible.

Direct PLC integration

The modbus protocol is used to connect the sensors of the 29x0 series directly to any common PLC. The modbus protocol is supported via Ethernet and the RS422 interface.

- z-axis measuring range up to 265mm
- x-axis measuring range up to 143.5mm
- Profile frequency up to 4000Hz
- Measuring rate up to 2,560,000 points/sec
- z-axis reference resolution 2µm
- Resolution x-axis up to 1280 points

scanCONTROL 2900

The scanCONTROL 2900 sensors are the perfect choice for both static and and dynamic measurement tasks. The sensor provides a profile frequency of 200Hz and 256,000 measuring points per second.

scanCONTROL 2950

The scanCONTROL 2950 sensors offer everything for advanced high speed and 3D applications. Up to 2,560,000 points per second with a profile frequency of up 2,000 Hz can be acquired using these sensors.

scanCONTROL 2910

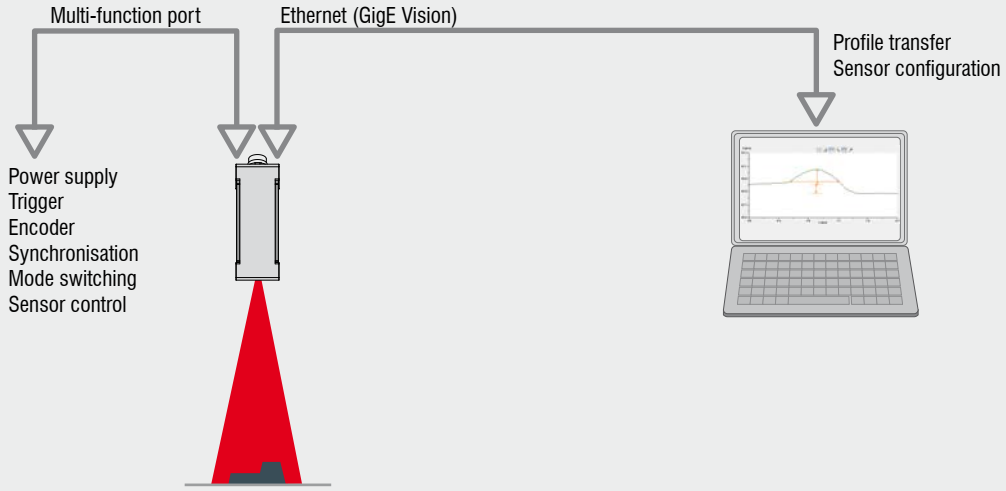
The SMART series scanCONTROL 2910 offers a Plug & Play solution with integrated controller for simple measurement tasks. The sensor design is identical to the 2900 and 2950 series.

Calibrated profile data: COMPACT and HIGHSPEED

The scanCONTROL 2900 and 2950 models are used for supplying calibrated profile data for external profile analysis, for example in a PC. Sensor configuration and profile data transmission are done via Ethernet. More details of the software interface can be found in the „Integrating scanCONTROL in application software“ chapter.

The multi-function port can be used for power supply, for switching parameters, as trigger input, as encoder input or for synchronizing several scanCONTROL sensors.

COMPACT	HIGHSPEED
scanCONTROL 2900-25	scanCONTROL 2950-25
scanCONTROL 2900-50	scanCONTROL 2950-50
scanCONTROL 2900-100	scanCONTROL 2950-100
Scope of delivery: Sensor, multi-function cable PC2600/2900-5, Demo-CD, SDK, sensor protocol, assembly instruction	

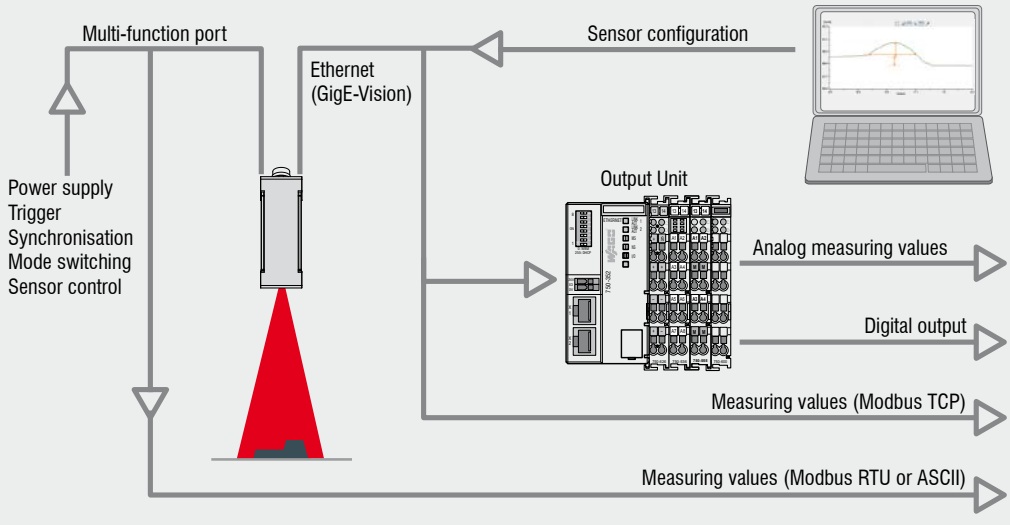


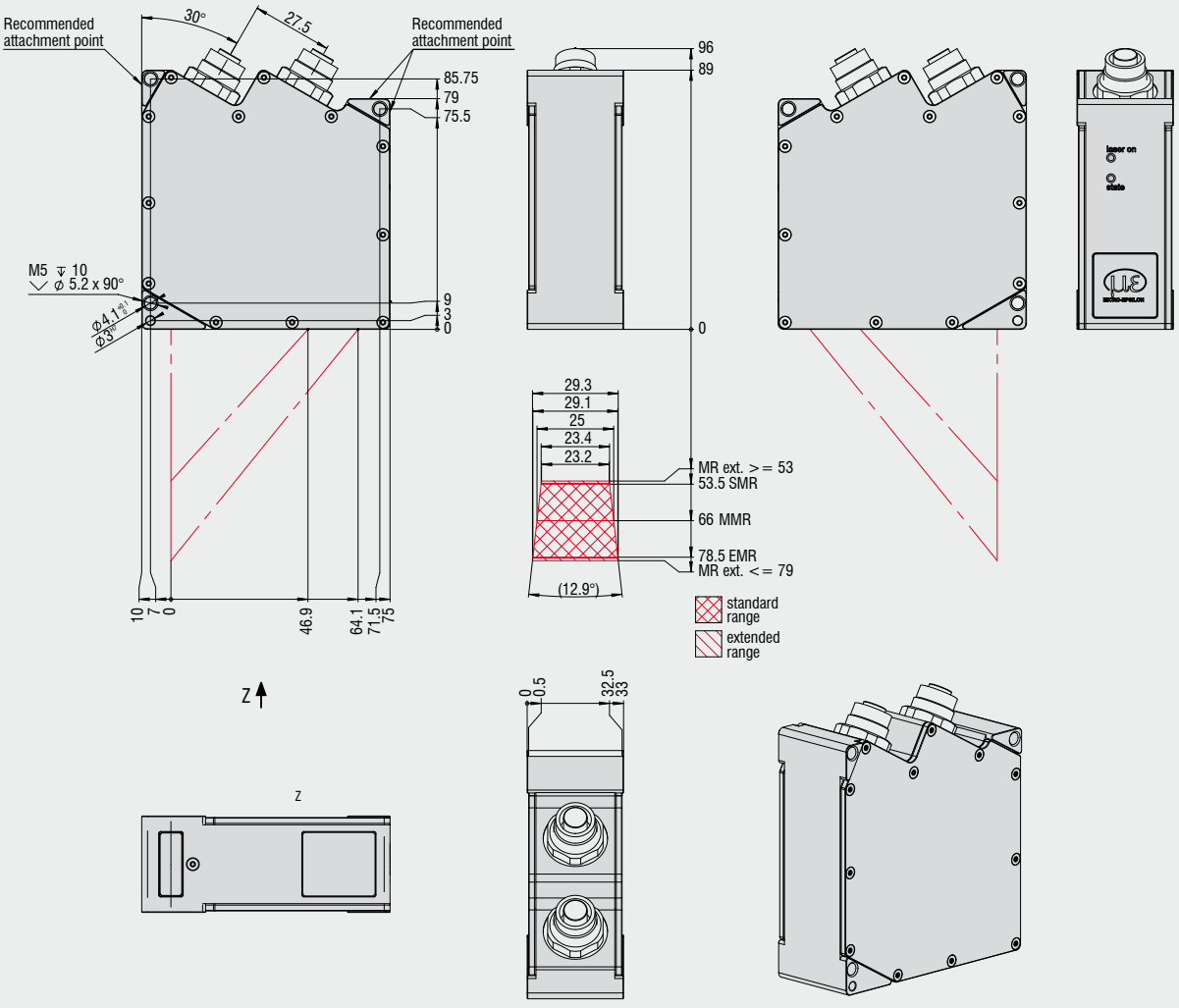
SMART: Profile analysis

The SMART series scanCONTROL 2910 offers a Plug & Play solution on the integrated sensor controller for simple measurement tasks such as step, angle, seam and groove inspection.

The sensor is programmed via PC using the scanCONTROL Configuration Tools. The parameters can be stored on the integrated sensor controller. After parametrizing the sensor runs in standalone mode without connected PC. In addition to the measurement output via Ethernet (Modbus TCP protocol) and RS422 (Modbus RTU protocol oder ASCII data format), switching outputs and analog outputs are available via the optional Output Unit. The multi-function port can be used for power supply, for sensor control, for switching parameters, as trigger input ,for synchronizing several scanCONTROL sensors or for measurement value output via RS422.

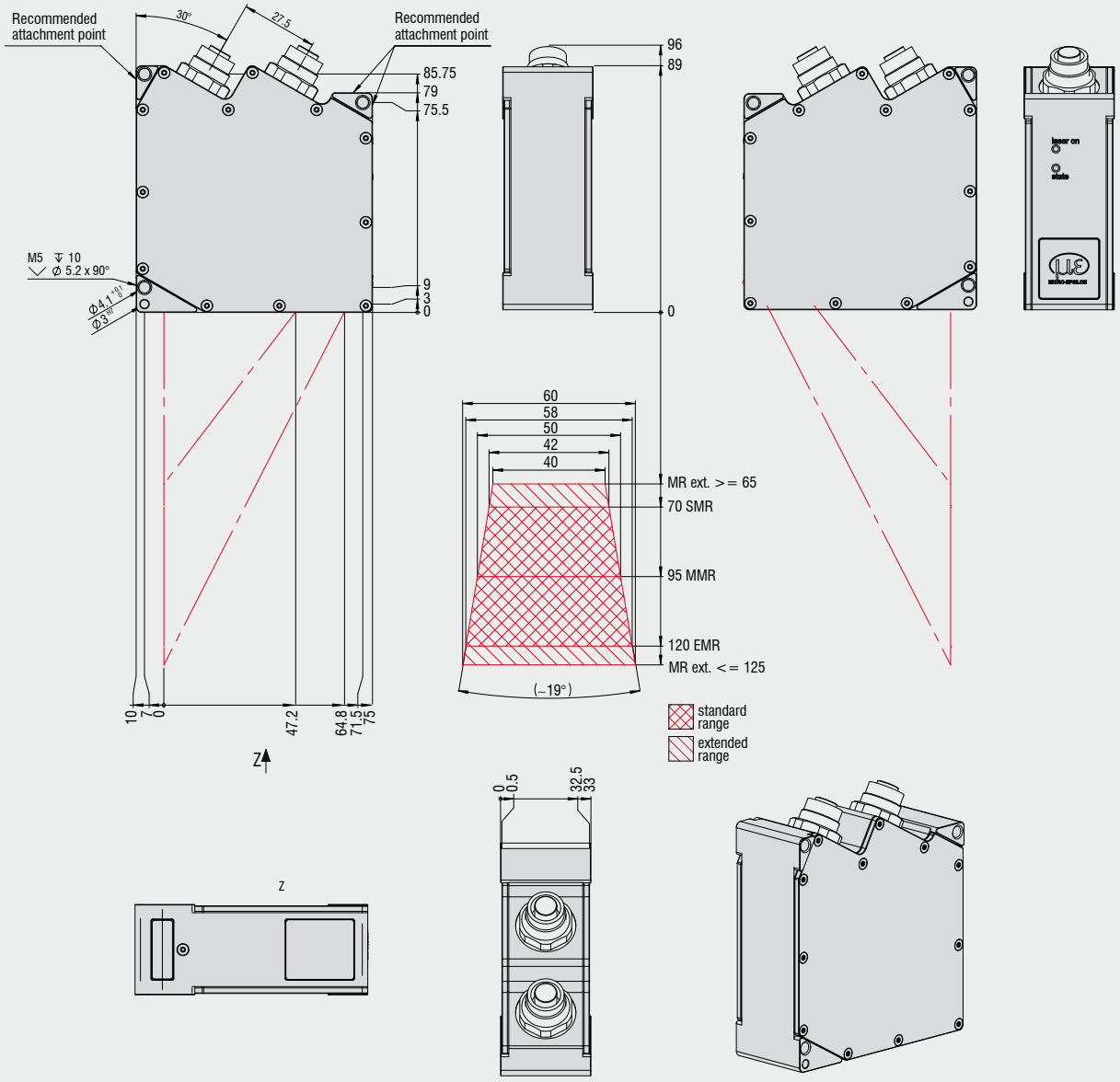
SMART
scanCONTROL 2910-25
scanCONTROL 2910-50
scanCONTROL 2910-100
Scope of delivery: Sensor, multi-function cable PC2600/2900-5, CD Configuration Tools, sensor protocol, assembly instruction




Recommended attachment point
30°
27.5
Recommended attachment point
85.75
79
75.5
M5 ↧ 10
⌀ 5.2 x 90°
9
3
0
10
7
0
46.9
64.1
71.5
75
96
89
0
29.3
29.1
25
23.4
23.2
MR ext. >= 53
53.5 SMR
66 MMR
78.5 EMR
MR ext. <= 79
(12.9°)
standard range
extended range
laser on
state
Z
Z
0
0.5
32.5
33

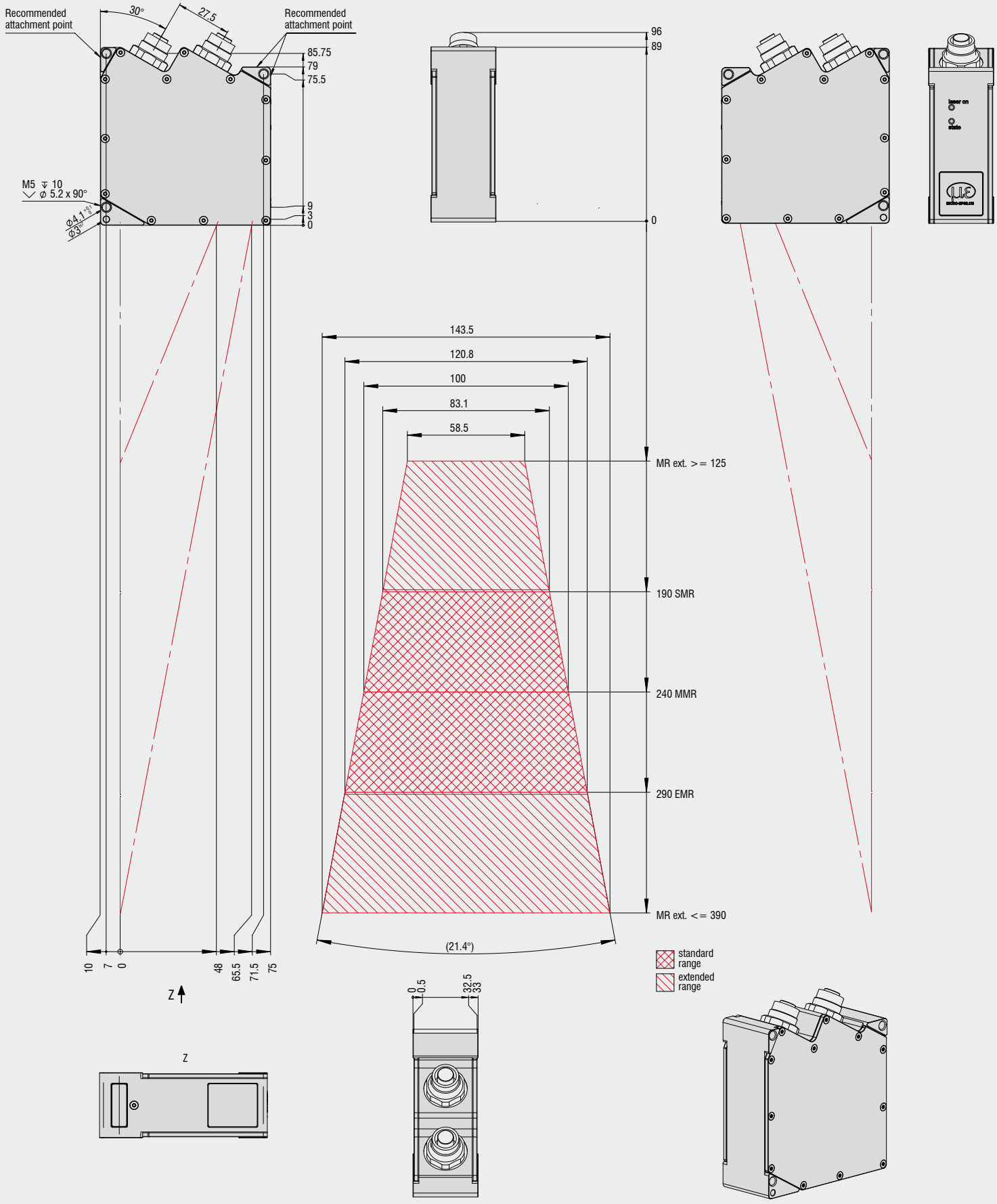
				COMPACT	*HIGHSPEED*	*SMART*
	Model		scanCONTROL	2900-25	2950-25	2910-25
z-axis (height)	Standard measuring range 25mm		Start of measuring range	53.5mm		
			Midrange	66mm		
			End of measuring range	78.5mm		
	Extended measuring range 26mm		Start of measuring range	53mm		
			End of measuring range	79mm		
	Linearity [1]		(3sigma)	±0.16% FSO		
	Reference resolution [2] [3]			2µm		
x-axis (width)	Standard measuring range		Start of measuring range	23.4mm		
			Midrange	25mm		
			End of measuring range	29.1mm		
	Extended measuring range		Start of measuring range	23.2mm		
			End of measuring range	29.3mm		
	Resolution x-axis			1,280 points/profile		
	Profile frequency			200Hz	2,000Hz	200Hz
	Measurement rate			256,000 points/sec	2.56 Mio. points/sec	
	Interfaces		Ethernet GigE-Vision	Profile data, sensor configuration and measurement values [4]		
		multi function port	Digital inputs	Mode switching Encoder Trigger		
			RS422 (half duplex)	Output of measurement values [5] Sensor control Trigger Synchronisation		
	Display (LED)			1x laser ON/OFF, 1x power/error/status		
	Light source			Semiconductor laser 658nm		
	Aperture angle laser line			20°		
	Laser power			8mW (class 2M)		
	Laser off			via external contact (optional)		
	Permissible ambient light (fluorescent light) [2]			10,000lx		
	Protection class			IP 65		
	EMC			acc. EN 61326-1: 2006-10 DIN EN 55011: 2007-11 (group 1, class B) EN 61000-6-2: 2006-03		
	Operating temperature			0°C to 45°C		
	Storage temperature			-20°C to 70°C		
	Dimensions			96 x 85 x 33mm		
	Weight			380g		
	Supply			11-30VDC, 24V, 500mA, IEEE 802.3af class 2, Power over Ethernet		

[1] Standard measuring range
[2] Measuring object: Micro-Epsilon standard object (metallic, diffusely reflecting material)
[3] According to a one-time averaging across the measuring field (640 points)
[4] Output of measurement values only with SMART sensors via Modbus TCP or switching signals / analog outputs (only with Output Unit)
[5] Output of measurement values only with SMART sensors via Modbus RTU or ASCII data


Recommended attachment point
Recommended attachment point
30°
27.5
85.75
79
75.5
9
3
0
M5 ↧ 10
⌵ ⌀ 5.2 x 90°
⌀4.1 +0.1
⌀3 +0.05
10
7
0
47.2
64.8
71.5
75
Z
96
89
0
60
58
50
42
40
MR ext. >= 65
70 SMR
95 MMR
120 EMR
MR ext. <= 125
(–19°)
standard range
extended range
laser on
state
0
0.5
32.5
33
Z

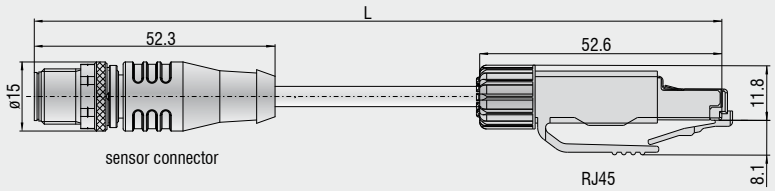
				COMPACT	*HIGHSPEED*	*SMART*
	Model		scanCONTROL	2900-50	2950-50	2910-50
z-axis (height)	Standard measuring range 50mm		Start of measuring range	70mm		
			Midrange	95mm		
			End of measuring range	120mm		
	Extended measuring range 60mm		Start of measuring range	65mm		
			End of measuring range	125mm		
	Linearity [1]		(3sigma)	±0.16% FSO		
	Reference resolution [2] [3]			4µm		
x-axis (width)	Standard measuring range		Start of measuring range	42mm		
			Midrange	50mm		
			End of measuring range	58mm		
	Extended measuring range		Start of measuring range	40mm		
			End of measuring range	60mm		
	Resolution x-axis			1,280 points/profile		
	Profile frequency			200Hz	2,000Hz	200Hz
	Measurement rate			256,000 points/sec	2.56 Mio. points/sec	
	Interfaces		Ethernet GigE-Vision	Profile data, sensor configuration and measurement values [4]		
		multi function port	Digital inputs	Mode switching Encoder Trigger		
			RS422 (half-duplex)	Output of measurement values [5] Sensor control Trigger Synchronisation		
	Display (LED)			1x laser ON/OFF, 1x power/error/status		
	Light source			Semiconductor laser 658nm		
	Aperture angle laser line			25°		
	Laser power			8mW (class 2M)		
	Laser off			via external contact (optional)		
	Permissible ambient light (fluorescent light) [2]			10,000lx		
	Protection class			IP 65		
	EMC			acc. EN 61326-1: 2006-10 DIN EN 55011: 2007-11 (group 1, class B) EN 61000-6-2: 2006-03		
	Operating temperature			0°C to 45°C		
	Storage temperature			-20°C to 70°C		
	Dimensions			96 x 85 x 33mm		
	Weight			380g		
	Supply			11-30 VDC, 24V, 500mA, IEEE 802.3af class 2, Power over Ethernet		

[1] Standard measuring range
[2] Measuring object: Micro-Epsilon standard object (metallic, diffusely reflecting material)
[3] According to a one-time averaging across the measuring field (640 points)
[4] Output of measurement values only with SMART sensors via Modbus TCP or switching signals / analog outputs (only with Output Unit)
[5] Output of measurement values only with SMART sensors via Modbus RTU or ASCII data


Recommended attachment point
30°
27.5
Recommended attachment point
85.75
79
75.5
M5 ↧ 10
⌵ ⌀ 5.2 x 90°
9
3
0
96
89
0
143.5
120.8
100
83.1
58.5
MR ext. >= 125
190 SMR
240 MMR
290 EMR
MR ext. <= 390
(21.4°)
standard range
extended range
10
7
0
48
65.5
71.5
75
Z
0
0.5
32.5
33
laser on
state

				COMPACT	*HIGHSPEED*	*SMART*
	Model		scanCONTROL	2900-100	2950-100	2910-100
z-axis (height)	Standard measuring range 100 mm		Start of measuring range	190mm		
			Midrange	240mm		
			End of measuring range	290mm		
	Extended measuring range 265 mm		Start of measuring range	125mm		
			End of measuring range	390mm		
	Linearity [1]		(3sigma)	±0.16% FSO		
	Reference resolution [2] [3]			12µm		
x-axis (width)	Standard measuring range		Start of measuring range	83.1mm		
			Midrange	100mm		
			End of measuring range	120.8mm		
	Extended measuring range		Start of measuring range	58.5mm		
			End of measuring range	143.5mm		
	Resolution x-axis			1,280 points/profile		
	Profile frequency			200Hz	2,000Hz	200Hz
	Measurement rate			256,000 points/sec	2.56 Mio. points/sec	
	Interfaces		Ethernet GigE-Vision	Profile data, sensor configuration and measurement values [4]		
		multi function port	Digital inputs	Mode switching Encoder Trigger		
			RS422 (half-duplex)	Output of measurement values [5] Sensor control Trigger Synchronisation		
	Display (LED)			1x laser ON/OFF, 1x power/error/status		
	Light source			Semiconductor laser 658nm		
	Aperture angle laser line			25°		
	Laser power			8mW (class 2M)		
	Laser off			via external contact (optional)		
	Permissible ambient light (fluorescent light) [2]			10,000lx		
	Protection class			IP 65		
	EMC			acc. EN 61326-1: 2006-10 DIN EN 55011: 2007-11 (group 1, class B) EN 61000-6-2: 2006-03		
	Operating temperature			0°C to 45°C		
	Storage temperature			-20°C to 70°C		
	Dimensions			96 x 85 x 33mm		
	Weight			380g		
	Supply			11-30VDC, 24V, 500mA, IEEE 802.3af class 2, Power over Ethernet		

[1] Standard measuring range
[2] Measuring object: Micro-Epsilon standard object (metallic, diffusely reflecting material)
[3] According to a one-time averaging across the measuring field (640 points)
[4] Output of measurement values only with SMART sensors via Modbus TCP or switching signals / analog outputs (only with Output Unit)
[5] Output of measurement values only with SMART sensors via Modbus RTU or ASCII data

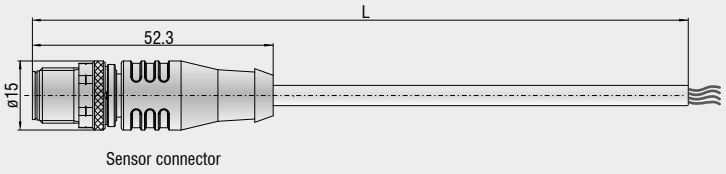


Ethernet connecting cable, qualified for drag chain use

Part. No.	*Model*	*Description*
2901856	SC2600/2900-0,5	Ethernet interface cable, 0.5m
2901857	SC2600/2900-2	Ethernet Interface cable, 2m
2901858	SC2600/2900-5	Ethernet Interface cable, 5m
2901769	SC2600/2900-10	Ethernet Interface cable, 10m
2901859	SC2600/2900-15	Ethernet Interface cable, 15m
2901783	SC2600/2900-20	Ethernet Interface cable, 20m
2901860	SC2600/2900-35	Ethernet Interface cable, 35m

Ethernet connecting cable, qualified for robotic use

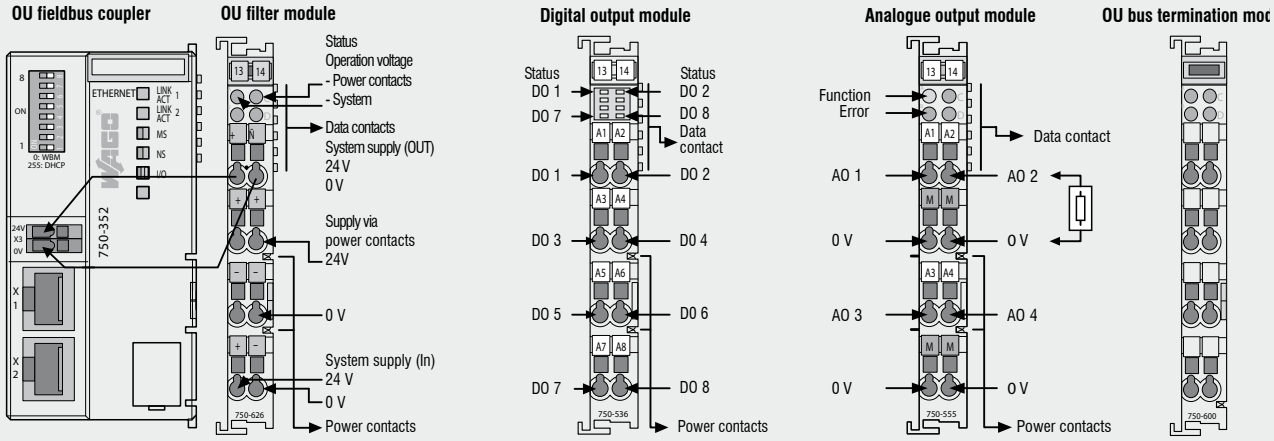
Part. No.	*Model*	*Description*
2901861	SCR2600/2900-0,5	Ethernet Interface cable 0.5m
2901862	SCR2600/2900-2	Ethernet Interface cable 2m
2901863	SCR2600/2900-5	Ethernet Interface cable 5m
2901864	SCR2600/2900-10	Ethernet Interface cable 10m
2901865	SCR2600/2900-15	Ethernet Interface cable 15m
2901866	SCR2600/2900-20	Ethernet Interface cable 20m
2901867	SCR2600/2900-35	Ethernet Interface cable 35m



Multi-function cable, qualified for drag chain use

Part. No.	*Model*	*Description*
2901868	PC2600/2900-5	Multi-function cable (qualified for drag chain use): Power supply, digital inputs (TTL or HTL), RS422 (half-duplex), 5m
2901767	PC2600/2900-10	Multi-function cable (qualified for drag chain use): Power supply, digital inputs (TTL or HTL), RS422 (half-duplex), 10m
2901869	PC2600/2900-20	Multi-function cable (qualified for drag chain use): Power supply, digital inputs (TTL or HTL), RS422 (half-duplex), 20m

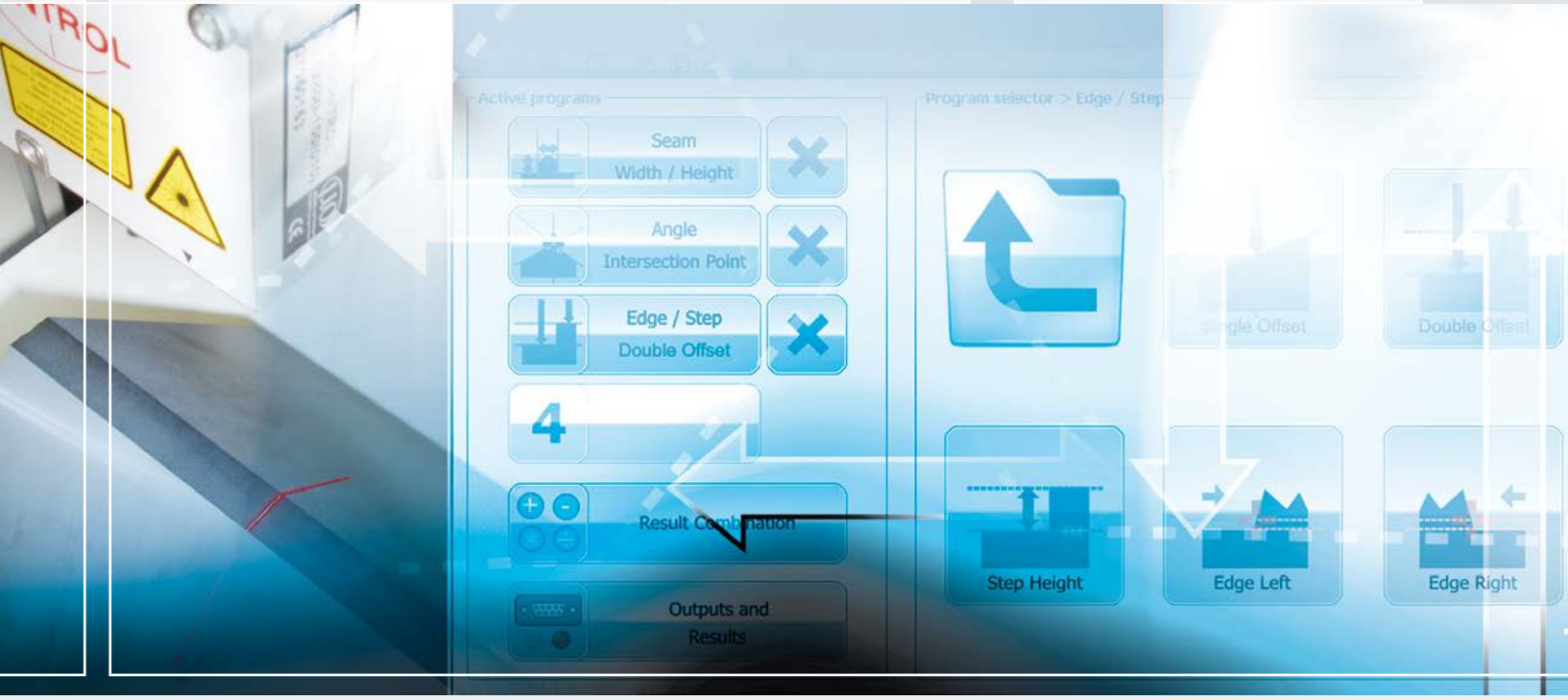
Output Unit



Digital output modules:
24V positive switching
24V negative switching
5V positive switching

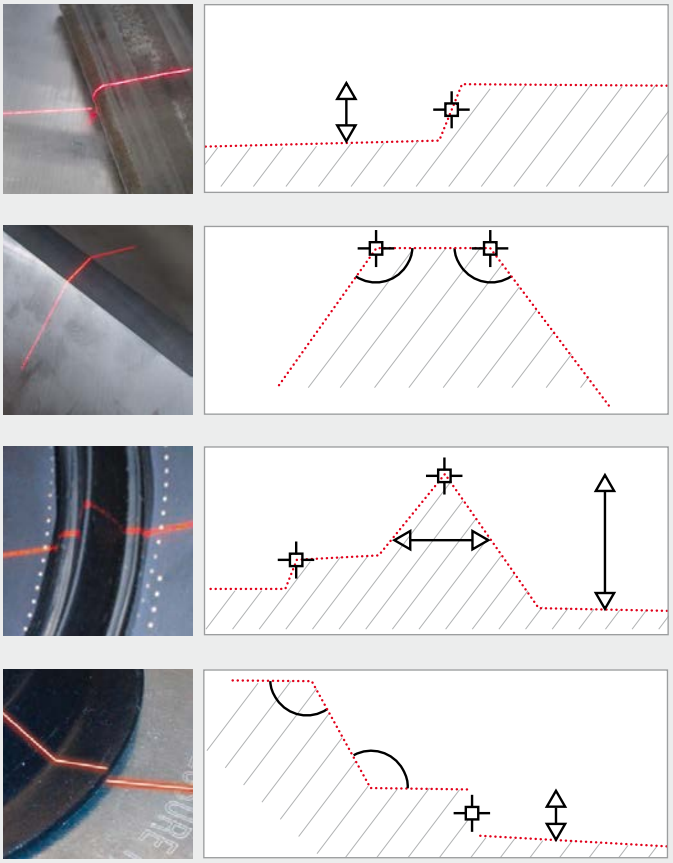
Analog output modules:
±10V
0-10V
0-20mA
4-20mA

Part. No. Model
6414073 Output Unit Basic/ET: Fieldbus coupler with filter module and bus termination
0325126 OU-AnalogOut 2-Channel/0-10V
0325127 OU-AnalogOut 2-Channel/0-20mA
0325128 OU-AnalogOut 2-Channel/4-20mA
0325129 OU-AnalogOut 2-Channel/±10V
0325132 OU-AnalogOut 4-Channel/0-20mA
0325133 OU-AnalogOut 4-Channel/4-20mA
0325135 OU-AnalogOut 4-Channel/0-10V
0325116 OU-AnalogOut 4-Channel/±10V
0325122 OU-DigitalOut 4-Channel/DC24V/0.5A/positive switching
0325123 OU-DigitalOut 4-Channel/DC24V/0.5A/negative switching
0325124 OU-DigitalOut 4-Channel/DC5V/20mA/positive switching
0325125 OU-DigitalOut 4-Channel/DC24V/0.5A/positive switching
0325131 OU-DigitalOut 8-Channel/DC24V/0.5A/negative switching
0325115 OU-DigitalOut 8-Channel/DC24V/0.5A/positive switching



- **Plug & Play solution for standard measurement tasks**
- **Real time profile analysis inside the controller**
- **Load and save parameters**
- **Data export**
- **Easy online and offline analysis**

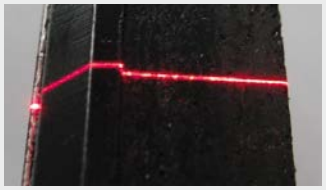
The sensors of the SMART series have an intelligent controller which allows simple profile analysis without an additional PC. The scanCONTROL Configuration Tools software is used for parameter setup of the profile analysis.
For offline testing of very fast processes, the functions of the software also runs with recorded profiles without a sensor.
A complete profile analysis task can be programed in four simple steps. After programing the sensor operates in standalone mode and outputs the analyzed measurements results.

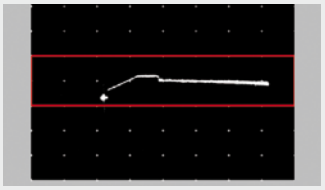


scanCONTROL can be easily programed for a variety of tasks

Step 1
Alignment / exposure

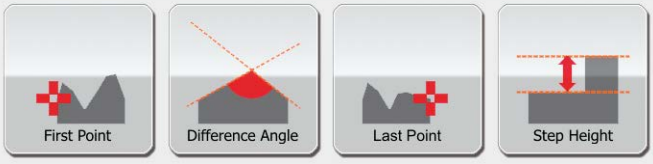
The ‚Display Image Data' module will help you to mount the sensor. This shows a live image of the sensor matrix and the optimum measuring range, as well as the reflection characteristics of the target for proper exposure setting.





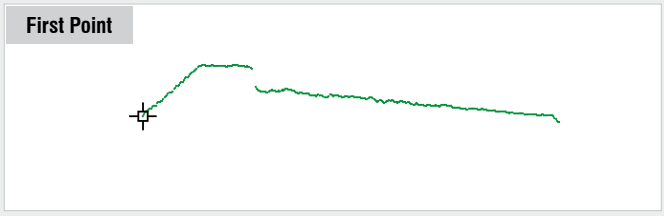
Step 2
Selection of measurement programs

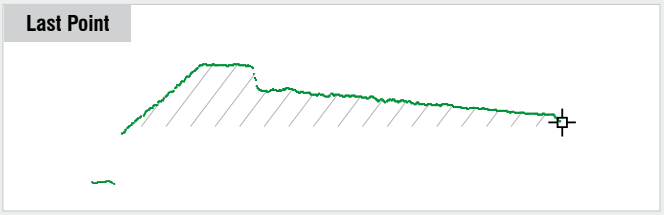
Depending on the measurement task, one or more measurement programs can be selected with a simple mouse click. More than 25 modules are available. To the right four examples are shown for the profile above.

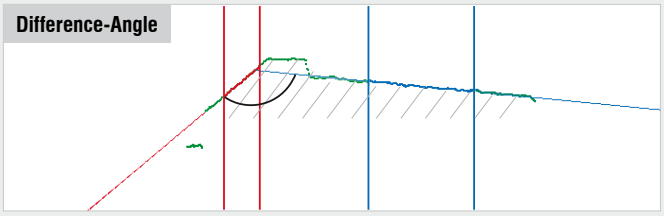


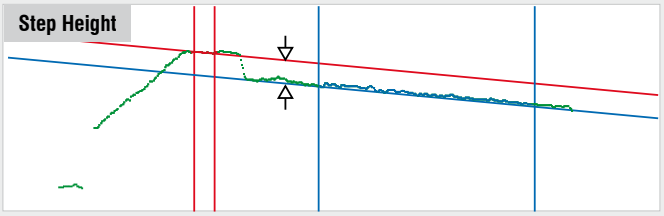
Step 3
Configuration of measurement programs

Each of these measurement programs can be individually configured. Via a easy to use grafic user interface, different methods of interacting with the live measurement signal are possible. For example, the relevant areas of the signal can be cut out and a reference points is set. The result of the individual measurement packages are displayed directly in the signal.







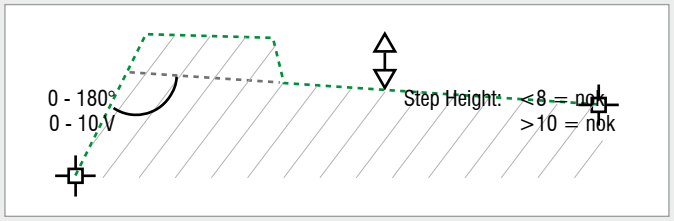


Step 4
Data processing

Once the individual measurement tasks have been parameterized, the different results are applied against each other. This is an easy way to apply, for example, several angles or distances between points or lines against each other or to project points onto lines. There are no limits to the flexibility of calculating measurement values.

Step 5
Defining the outputs and displaying measured values

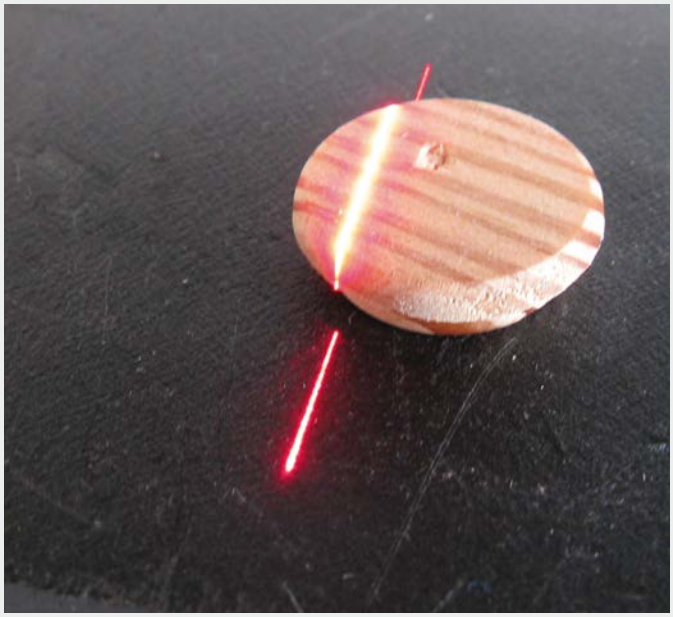
In the final step, all measured values in the profile are displayed in an online overview, and assigned to the different outputs. Limits and interfaces can be easily programed.

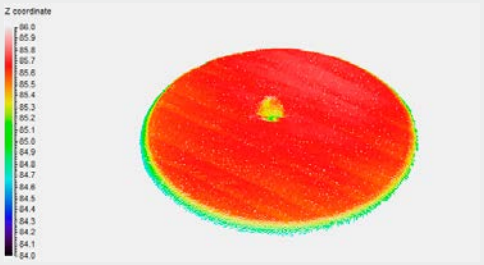


Interactive 3D visualization for all scanCONTROL models

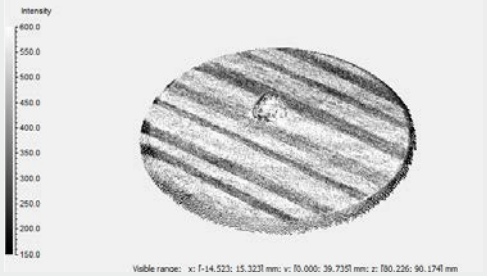
By means of the relative movement between sensor and target, the third dimension for the measurement data is obtained. The y-coordinates are assigned via a trigger or CMM counter.
The scanCONTROL 3D-View software is designed for viewing and exporting this 3D data. In addition, 3D-View also supports the configuration of the scanCONTROL sensor.
The software enables the interactive viewing of 3D data and the export of this measurement data to common data formats (ASCI, STL, or PNG). Various display modes, views and color codes help in setting up the sensors and analysing the profiles. The software supports the online visualization of the profiles as well as offline analysis of stored profile sequences.

- **Display of consecutive frames**
- **Offline or real-time display of 3D profiles**
- **Synchronization with moving axis (e.g. by encoder)**
- **2D export of the profile sequences (PNG)**
- **3D export (ASC, STL) for CAD programs**
- **Intensity (grayscale) can be displayed and exported**

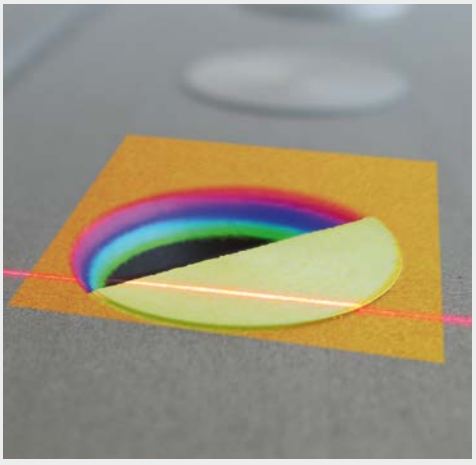




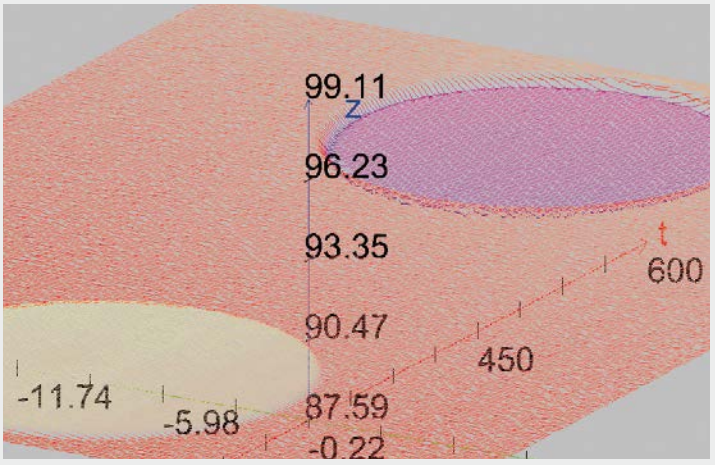
Distance profile



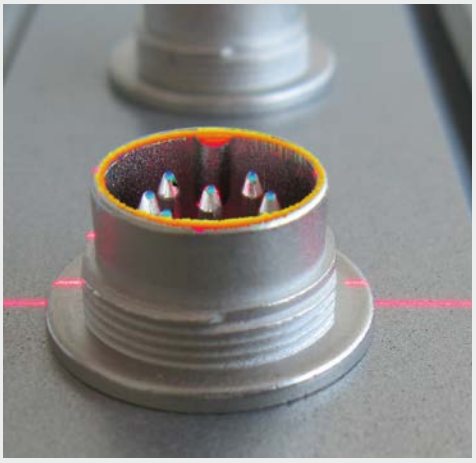
Intensity



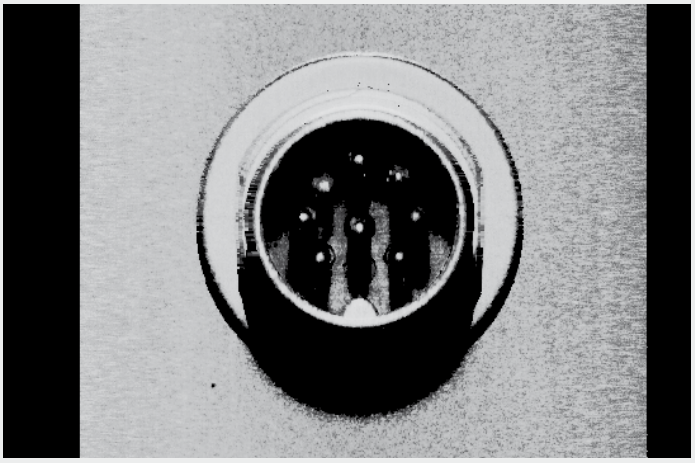
Rivet



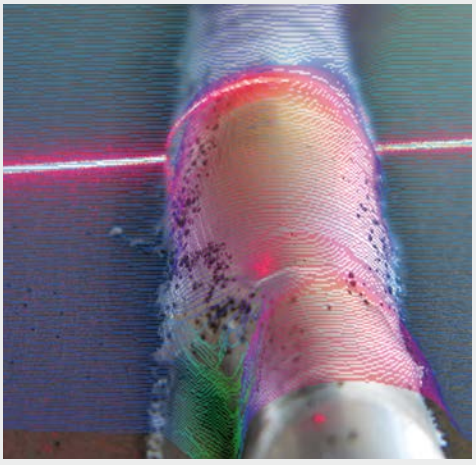
Display mode: "3D view lines"; Color-coding "z-coordinates"



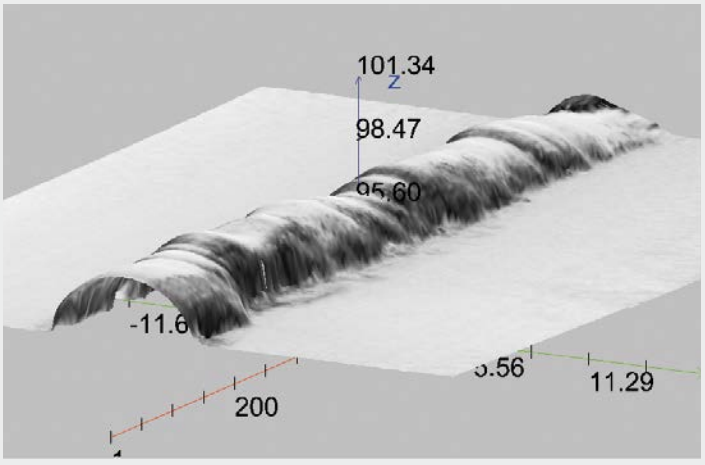
Connector pin



Display mode: "2D view"; Color-coding "intensity"



Weld seam



Display mode: "3D view Triangles"; Color-coding "intensity"

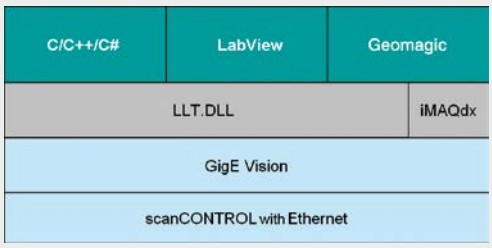
scanCONTROL integration for user application software

The scanCONTROL 2700 and 2800 sensors record a profile from individual calibrated points for each measurement. These profiles can be used individually or combined in a container set, and transferred to your own applications as an array or matrix. 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 within its own application software.
Micro-Epsilon provides a number of interfaces to access the parameter and data transfer functions.

The transmission interfaces used primarily by scanCONTROL sensors for communications and profile transfer are FireWire and Ethernet.

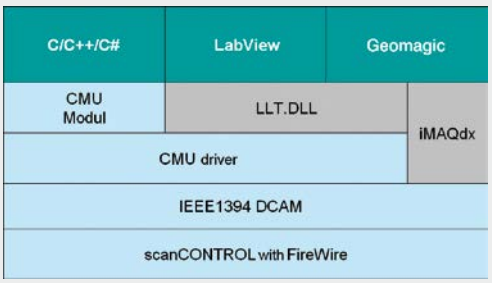
Ethernet and GigE Vision

The scanCONTROL with Ethernet interface complies with the GigE Vision (Gigabit Ethernet for machine vision) standard of the AIA (Automated Imaging Association).
GigE Vision ensures optimum data security, perfect performance and short design-in times during implementation. GigE Vision is based on Gigabit Ethernet and offers a maximum transfer rate of more than 100MB/s. 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 scanCONTROL and a PC. The infrastructure topology provides numerous opportunities for single and multiple scanner applications.



FireWire and DCAM

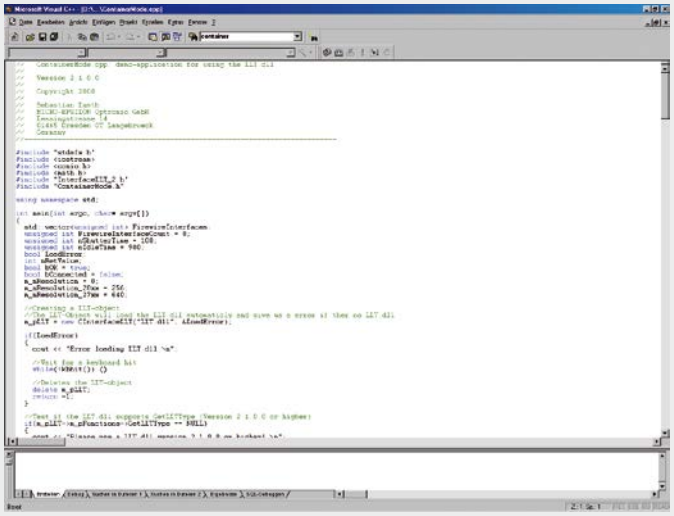
Communication between computers and scanCONTROL by FireWire is based on the widely used DCAM standard protocol. It was defined by the IIDC working group of the 1394 Trade Association and has been evolving constantly since then. IIDC stands for „Instrumentation and Industrial Digital Camera“. DCAM defines the structure of the data stream and the configuration of scanCONTROL (measuring fields, measuring frequency, and exposure time, etc.).
Communication from scanCONTROL sensors that are equipped with an IEEE1394 interface is compatible with the DCAM standard. As an interface, FireWire is either already available on most modern PCs, or is very easy to retrofit. The interface allows a quick and easy „Plug&Play“ connection of scanCONTROL sensors.



Integration with the C/C++ library

The C/C++ library for scanCONTROL supports both static and dynamic loading. Both stdcall and cdecl are supported as calling conventions. The individual functions of the library are clearly documented in the interface description and explained using examples.

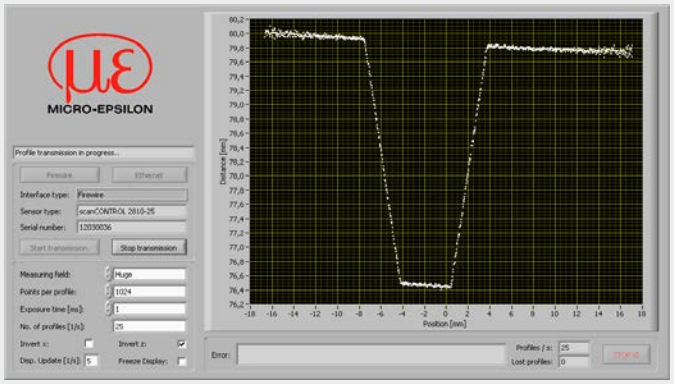
The scanCONTROL C-SDK integration package includes:
- The LLT.DLL library file
- Interfaces and scanCONTROL documentation
- Numerous programming examples for C++, e.g. for trigger and container mode
- Programming example for C # and .NET
- DeveloperDemo.exe demo for quick testing of the sensor configuration



Integration with LabView

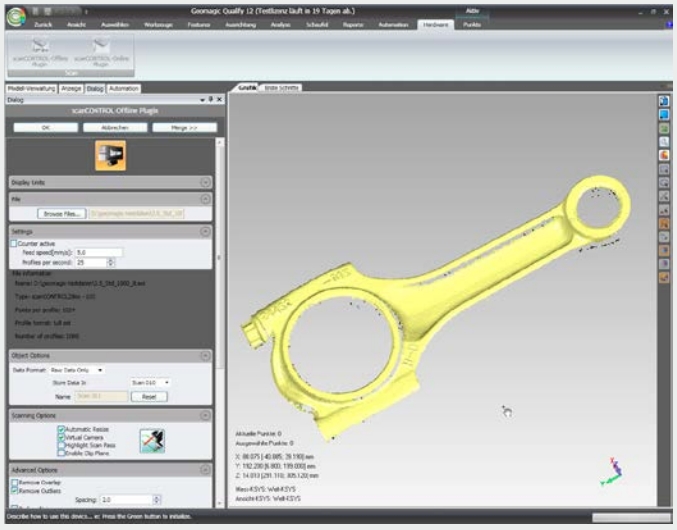
The integration of scanCONTROL sensors in the LabView programming environment from National Instruments can be achieved in two ways: with the aid of the C/C++ library LLT.dll from Micro-Epsilon, or by using the IMAQdx driver that comes with the Vision Acquisition software from National Instruments. Both interfaces enable rapid and reliable integration of the scanCONTROL sensors in LabView.

The scanCONTROL LabView-SDK integration package contains:
- Several example VIs (individual profile transfer and container mode)
- Detailed documentation



Integration with Geomagic

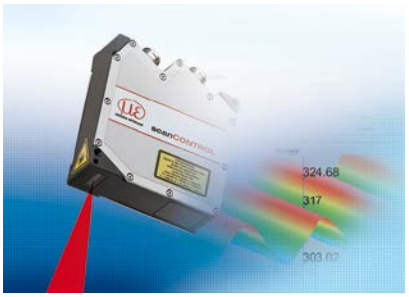
Geomagic Wrap / Geomagic Qualify and Geomagic Studio offer fast and accurate comparisons between digital reference models and scanned 3D data. These programs are used for testing pre-production products, production checks and managing supplier quality. The plug-in developed by Micro-Epsilon supports both online operations with all scanCONTROL sensors and importing offline data. So the plug-in can be used quickly and easily even without a sensor.



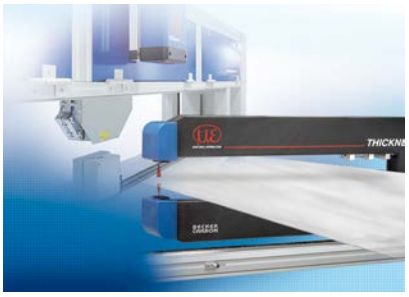
High performance sensors made by Micro-Epsilon

Sensors and systems for displacement and position

Sensors and measurement devices for non-contact temperature measurement



2D/3D profile sensors (laser scanner)



Measurement and inspection systems for quality assurance

Optical micrometers, fiber optic sensors and fiber optics

Color recognition sensors, LED analyzers and color online spectrometer

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