







More Precision

eddyNCDT // Inductive sensors based on eddy currents



Spindle Growth System

eddyNCDT SGS4701

-  Miniature sensor design
-  M12 controller – integrable in spindle or mountable with flange
-  Versions for ferromagnetic and non-ferromagnetic targets
-  Integrated temperature measurement



Measuring the thermal extension of spindles

The SGS4701 displacement measuring system (Spindle Growth System) is developed specifically for high speed milling machine applications. Due to high machining speeds and the heat generated, the linear thermal expansion of the spindle in precision machine tools needs to be compensated for in order to keep the tool in a defined position at all times. The SGS sensor measures the thermal and centrifugal force expansion of the spindle. These measurement values are fed into the CNC machine tool as correctional values, compensating for any positioning errors.

The SGS4701 uses the eddy current measuring principle, providing a non-contact, wear-free measurement. Furthermore, the measurement procedure is resistant to disturbances such as heat, dust and oil.

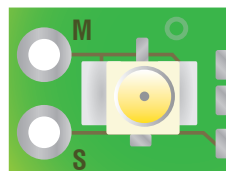
System design

The SGS 4701 consists of a sensor, a sensor cable and a controller, factory calibrated for ferromagnetic and non-ferromagnetic measuring objects. The miniature sensor design enables direct installation in the spindle, where measurements are typically performed on the spindle's labyrinth ring. In addition to measuring linear expansion, the temperature at the sensor is detected and output. The compact controller can be installed on the spindle housing using a flange or directly in the spindle.

The sensor cable must not be shortened as functionality loss may arise. Removing the connector is only permitted behind the plug-sided crimp when using the solder connections.

Customer-specific adjustment

For individual installation situations and measuring objects, sensor and controller can be adjusted in the factory which allows for the best possible measurement accuracy to be achieved.



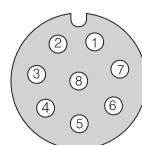
S = Signal = Inner conductor
M = Ground = Shield = Outer conductor

Pin assignment for power supply and signal

Pin	Assignment	Color (cable: PC4701-x)
1	GND	White
2	Supply 12 ... 32 VDC	Brown
3	Displacement signal	Green
4	Temperature signal	Yellow
5	NC	Gray
6	assigned internally	Pink
7	assigned internally	Blue
8	NC	Red



8-pole M12x1 housing connector
View on pin side



Model		SGS4701
Measuring range		500 μm (optionally 250 μm ^[1])
Start of measuring range		100 μm (optionally 50 μm ^[1])
Measuring rate	Analog output	64 kSa/s (16 bit)
Resolution ^{[2] [3]}		0.5 μm
Frequency response (-3dB)		2000 Hz
Linearity		< $\pm 2 \mu\text{m}$
Temperature stability ^[3]	Sensor	< 150 ppm FSO/K
	Controller	< 500 ppm FSO/K
Temperature compensation	Sensor	+10 ... +80 °C
	Controller	+10 ... +70 °C
Min. target size (flat)		6 mm (optionally 3.5 mm ^[1])
Target material ^[4]		Steel, aluminum
Supply voltage		12 ... 32 VDC
Power consumption		0.6 W
Analog output	Displacement	0.5 ... 9.5 V (100 ... 600 μm , optionally 50 ... 300 μm ^[1])
	Temperature	0.5 ... 9.5 V (0 ... +90 °C)
Connection		Sensor: integrated cable ^[5] , standard length 1 m (0.4 ... 1.5 m on request), min. bending radius 12 mm Supply/signal: 8-pole M12 connector (cable see accessories)
Temperature range	Sensor	0 ... +90 °C
	Controller	+10 ... +70 °C
Shock (DIN EN 60068-2-27)		50 g / 6 ms in each direction, 1000 shocks each
Vibration (DIN EN 60068-2-6)		20 g / 10 ... 3000 Hz
Protection class (DIN EN 60529)		IP67 (plugged) ^[6]
Weight ^[7]		approx. 85 g

FSO = Full Scale Output

¹⁾ For OEM modifications: sensor with a measuring range of 250 μm and an offset of 50 μm possible

²⁾ Static, at mid of measuring range

³⁾ Values are referenced to the mid of the measuring range within the compensated temperature range

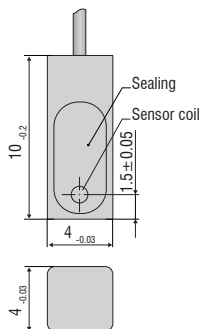
⁴⁾ Steel: St37 steel DIN1.0037, aluminum: AlMg

⁵⁾ Detailed cable specifications can be found in the operating instructions

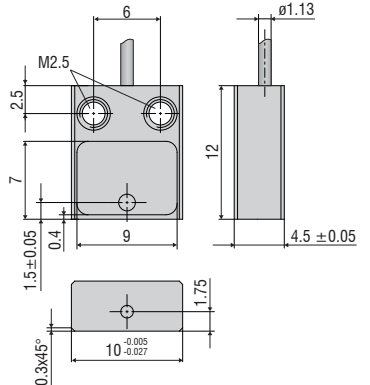
⁶⁾ Protection class does not apply for the controller sleeve!

⁷⁾ Total weight for controller, cable and sensor

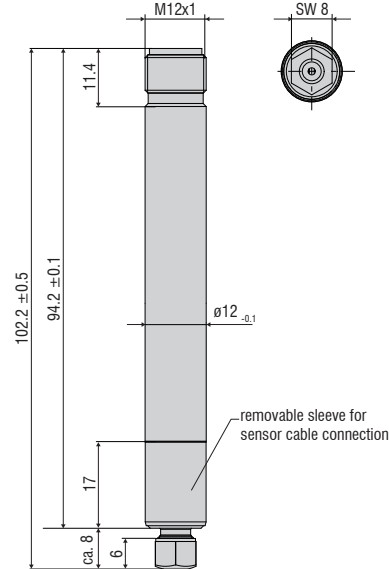
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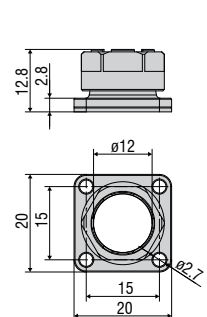
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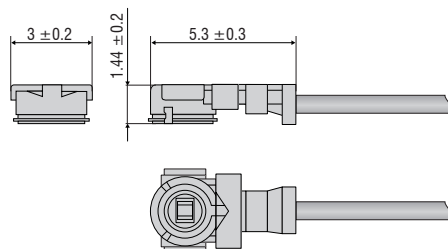
Controller



Clamping flange (optional)



Connector (max. 20 mating cycles possible)



Dimensions in mm, not to scale.

Item	Description	DT3001	DT3005	DT3020	DT3060	DT3070	DZ140	SGS
PCx/5-M12	Power supply and signal cable 5-pole with M12 connector Standard length: 5 m Optionally available: 10 m/20 m/40 m/80 m as drag-chain suitable variant	X	X					
PCx/8-M12	Power supply and signal cable 8-pole with M12 connector Standard length: 3 m Optionally available: 5 m/ 10 m / 15 m / 10 m also as drag-chain suitable variant			X	X	X		
PC5/8-M12/105	Power supply and signal cable Increased temperature resistance up to 105 °C 8-pole with M12 connector Length: 5 m as drag-chain suitable variant			X	X	X		
PC4701-x	Power supply and signal cable 8-pole with M12 connector Standard length: 10 m Optionally available: 15 m 10 m also available as drag chain-suitable variant							X
SCD2/4/RJ45	Ethernet cable 4-pole with M12 connector on RJ45 connector Standard length: 2 m				X	X		
PC140-x	Power supply and signal cable 8-pole connector Standard length: 3 m Optionally available: 6 m						X	
PS2020	Power supply unit Input 100-240 VAC Output 24 VDC / 2.5 A; installation on symmetrical standard rail 35 mm x 7.5 mm, DIN 50022	X	X	X	X	X	X	X
IF2035	Interface module for Industrial Ethernet connection Connection of RS422 or RS485 interfaces to PROFINET / Ethernet/IP / EtherCAT 2 network connections for different network topologies Ideal for confined spaces due to a compact housing and DIN rail mounting		X	X				
IF1032	Interface module for Ethernet/EtherCAT connection 1x RS485 2x analog-in (14 bit, max. 4 ksp/s), voltage 1x analog-in, (14 bit, max. 4 ksp/s), current		X	X				
IF7001	Single-channel converter cable from RS485 to USB Conversion from RS485 to USB Easy sensor connection via USB Integration into plant and machinery		X	X				

Sensors and Systems from Micro-Epsilon



Sensors and systems for displacement, distance and position



Sensors and measurement devices for non-contact temperature measurement



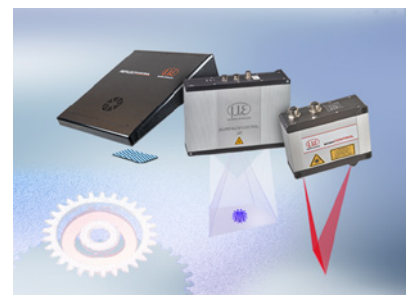
Measuring and inspection systems for metal strips, plastics and rubber



Optical micrometers and fiber optics, measuring and test amplifiers



Color recognition sensors, LED analyzers and inline color spectrometers



3D measurement technology for dimensional testing and surface inspection