



# More Precision

**eddyNCDT** // Eddy current sensors for displacement and position





- *Miniature sensor design*
- *Sensor technology can be integrated completely into the sensor*
- *Miniature, compact controller – can be integrated in the spindle or installed on the housing via a flange*
- *Suitable for ferro- and non-ferromagnetic materials*
- *Temperature measurement integrated in the sensor*
- *Cost-effective design*

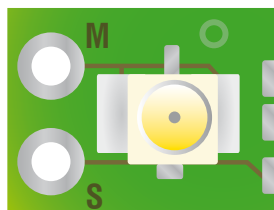
#### Measuring thermal extension in spindles

The displacement measurement system SGS 4701 (Spindle Growth System) has been developed specifically for high speed milling machine applications. Due to high machining speeds and the heat generated, the linear thermal extension of the precision machine tool spindle needs to be compensated in order to keep the tool in a defined position at all times. The SGS sensor measures the thermal and centrifugal force extension of the spindle. These measurement values are fed into the CNC machine tool as correction values, compensating for any positioning errors.

The SGS 4701 operates on the eddy current measuring principle. This non-contact measurement is wear-free. Furthermore, the measurement procedure is resistant to disturbances such as heat, dust and oil.

#### System structure

The SGS 4701 consists of a sensor, a sensor cable and a controller, factory calibrated for ferromagnetic and non-ferromagnetic measurement objects. Two miniature sensors enable it to be installed directly in the spindle, where the measurements take place, typically on the labyrinth-ring of the spindle. As well as measuring linear thermal extension, the temperature of the sensor is also detected and output. The compact controller can be installed on the spindle housing via a flange or directly in the spindle.



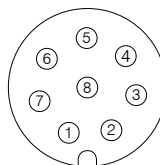
The sensor cable must not be shortened as functionality loss may arise. Removing the connector is only permitted behind the plug-sided crimp when using the solder connections.

**S** = Signal = inner conductor

**M** = ground = shield = outer conductor

#### 8-pin. M12 connector

Pin assignment (view on controller)



Pin	Signal
1	Ground
2	+24V
3	Displacement signal
4	Temperature signal
5	not connected
6	do not connect
7	do not connect
8	not connected

Sensor system		SGS4701
Measuring range		500 $\mu$ m (option 250 $\mu$ m <sup>2)</sup> )
Offset		100 $\mu$ m (option 50 $\mu$ m <sup>2)</sup> )
Linearity		$\leq 2\mu$ m
Resolution <sup>1)</sup>		0.5 $\mu$ m
Bandwidth		2000Hz
Target		ferromagnetic / non-ferromagnetic
Minimum target diameter		6 mm (option 3.5 mm <sup>2)</sup> )
Operating temperature	sensor	0 ... +90°C
	controller	10 ... +70°C
Temperature stability	sensor	$\leq 150$ ppm FSO/°C (MMR)
	controller	$\leq 500$ ppm FSO/°C (MMR)
Temperature compensation range	sensor	+10 ... +80°C
	controller	+10 ... +70°C
Supply voltage		12 ... 32VDC
Analog out	displacement	0.5 - 9.5V $\pm$ 100 - 600 $\mu$ m (option 50 - 300 $\mu$ m <sup>2)</sup> )
	temperature	0.5 - 9.5V ( $\pm$ 0 ... +90°C)
Protection class	sensor / controller	IP67 <sup>3)</sup>
Dimensions	EMU04(102)	12x10x4.5mm <sup>4)</sup>
	EMU04(121)	10x4x4mm <sup>4)</sup>
	diameter	$\varnothing$ 1.13mm
Sensor cable <sup>3)</sup>	length	1000mm (400 - 1500mm on request)
	min. bending radius	12mm
	jacket	FEP

FSO = Full Scale Output; MMR = Midrange

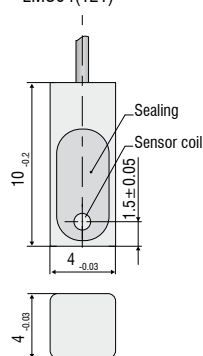
<sup>1)</sup> static, MMR

<sup>2)</sup> For OEM modifications: sensor with measuring range 250 $\mu$ m and offset 50 $\mu$ m

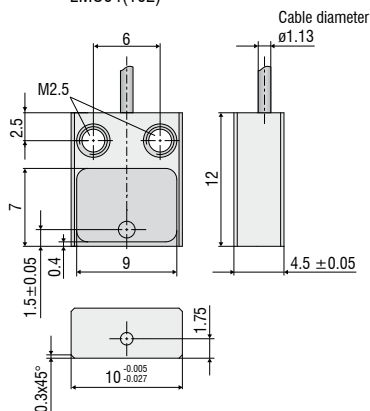
<sup>3)</sup> In mated condition

<sup>4)</sup> Detailed cable specifications can be found in the operating manual

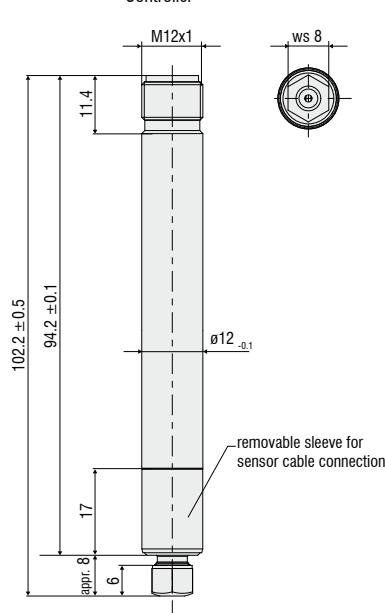
EMU04(121)



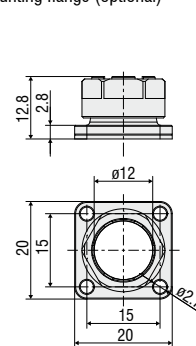
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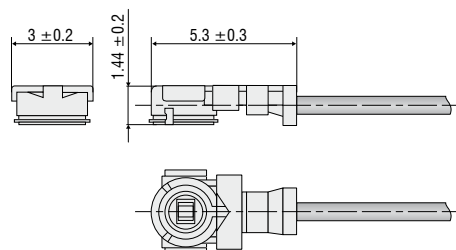
Controller



Mounting flange (optional)



Connector (max. 20 mating cycles possible)



## High performance sensors made by Micro-Epsilon



Sensors and systems for displacement and position



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Measurement and inspection systems