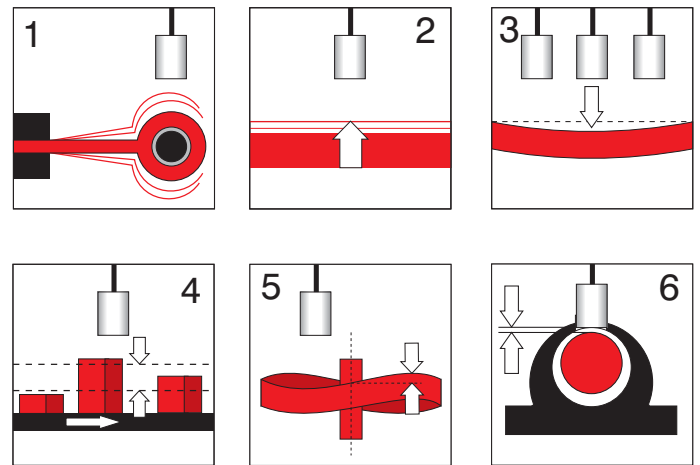




## Non-Contact Displacement Measuring Systems

The eddyNCDT 3010 (Non-Contacting Displacement Transducers) is a non-contacting displacement measuring system operating on the eddy current principle. It is used for measuring targets made of electrically conductive materials which may be either ferromagnetic or non-ferromagnetic.

A high-frequency alternating current flows through a coil cast in the sensor housing. The electromagnetic coil field induces eddy currents in the conductive target which alters the AC resistance of the coil. This change in impedance produces a linear electrical signal proportional to the distance of the target from the sensor. Temperature-dependent measuring errors are reduced to a minimum by a unique electronic compensation method.



### ADVANTAGES

- Wear and maintenance free
- Excellent linearity <math><0.25\% \text{ FSO}</math>
- Active temperature compensation (<math><150 \text{ ppm/F}</math>)
- Flexible field calibration
- Multi-channel applications by synchronization

### Temperature Compensation

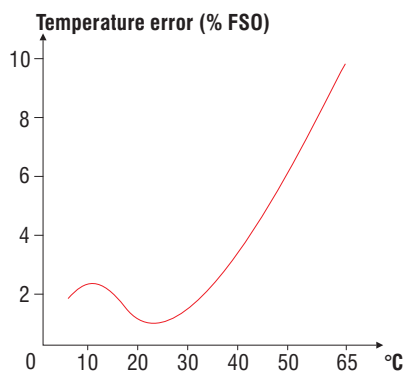
The temperature operating range of the 3010 sensors ranges from  $-50\text{ }^{\circ}\text{C}$  up to  $150\text{ }^{\circ}\text{C}$ . In the case of fluctuating ambient temperatures a stable output signal is very important for reliable measurements. Due to a patented temperature compensation method the eddyNCDT series 3010 offers a unique thermal stability, which no other system can offer.

### TYPICAL APPLICATIONS

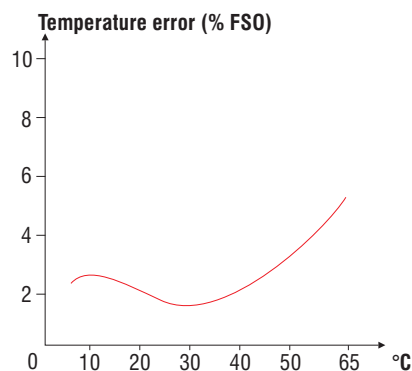
- 1 - vibration, amplitude, clearance, run-out
- 2 - displacement, distance, position, elongation
- 3 - deflection, deformation, waviness, tilt
- 4 - dimensions, measuring tolerances, sorting, part recognition
- 5 - stroke, deformation, axial shaft oscillation
- 6 - bearing oscillations, lubricating gap, wear, displacement

The eddyNCDT 3010 is designed for industrial use in production plants, for machine control and for measuring and testing during in-process quality assurance. Illustrated are examples showing only a small selection of the numerous possibilities.

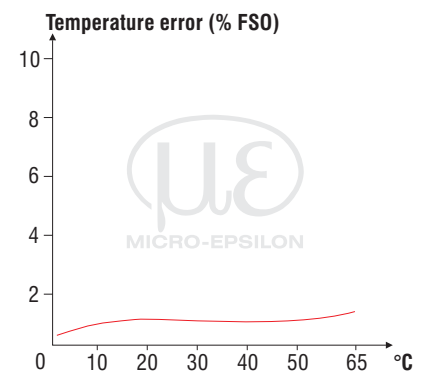
### Temperature error by comparison



common inductive sensor with ferrite core



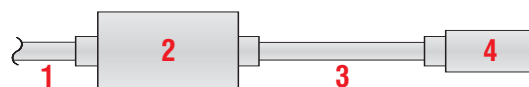
common eddy current sensor without temperature compensation



best practice: eddyNCDT 3010 with temperature compensation

## System structure

The eddyNCDT 3010 is a compact, single-channel system consisting of an eddy current sensor, a sensor connecting cable and an amplifier electronics (signal conditioning unit). In multi-channel set-ups, synchronization of separate channels is possible. The system is matched to a reference target material (aluminum or steel AISI 4130) and is adjustable for ferro- or non-ferromagnetic material.



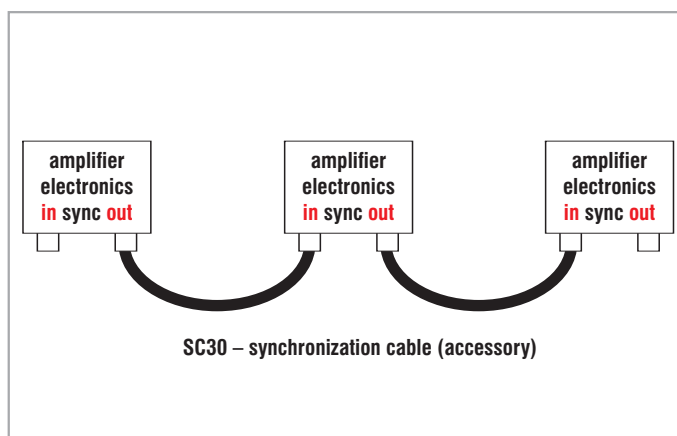
Series eddyNCDT 3010 is a non-contact displacement measuring system using the eddy current principle:

- 1) power and output cable (accessory)**
- 2) amplifier electronics**
- 3) sensor cable**
- 4) sensor**



## Synchronization

If several channels of series 3010 operate simultaneous close to one another, a mutual interference is possible because of slight differences in the oscillator frequencies. This can be avoided by synchronization. Two SMC-connectors at the electronic box, one for oscillator signal output (sync out) and one for input (sync in) are standard equipment. The electronics operate independently as long as they are not interconnected. If connected together, they automatically switch to synchronized operation and are controlled by the first electronics (master). Any quantity of units can be synchronized by serial connection.



Technical specifications are valid for the aluminum or mild steel AISI 4130 reference materials at 20 °C (70 °F). The data may deviate for other materials.

**Linearization and Calibration**

eddyNCDT 3010 systems can be individually linearized and calibrated by simple 3-point adjustment. Therefore optimum accuracy can always be achieved even with special target materials or critical sensor mounting conditions.

The adjustment is carried out at 3 distances (1, 2, 3) which are measured by an independent reference.

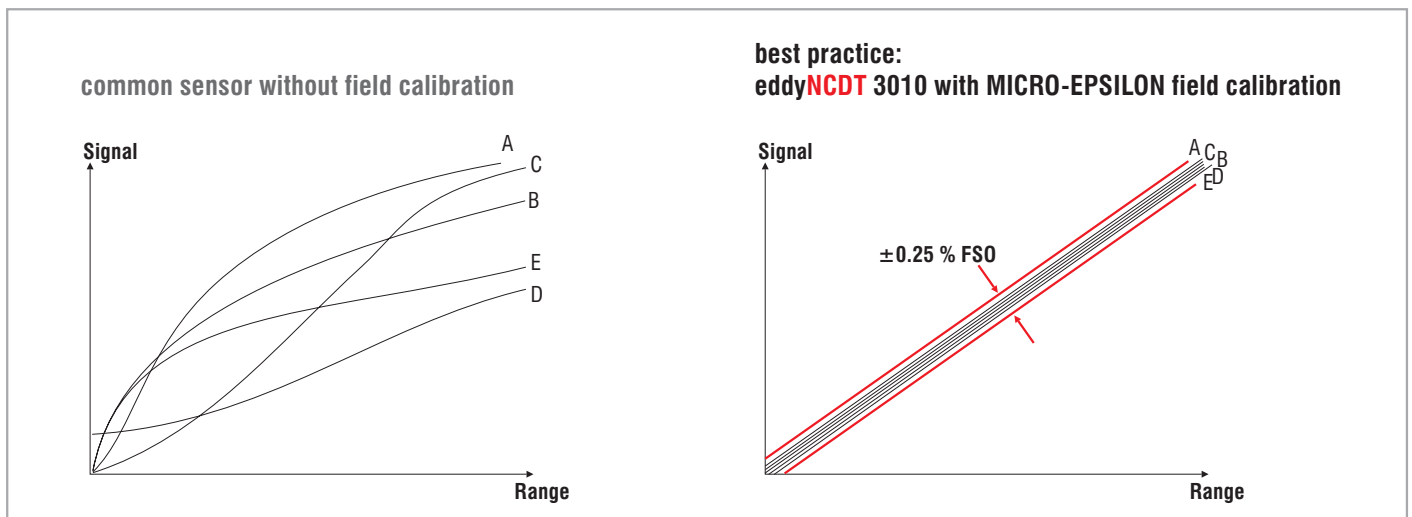
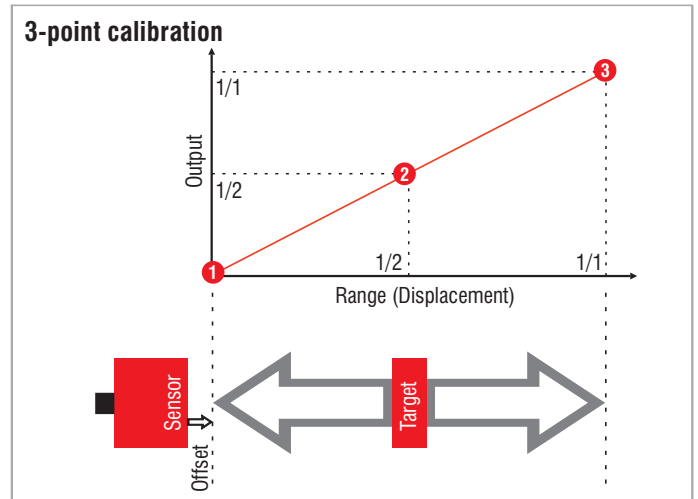
Accessory: Micrometer calibration device

**Why is field calibration needed?**

To gain best performance the eddyNCDT 3010 supports a field calibration. This is necessary to get best measuring results in respect to

- A: different target materials
- B: target size (measuring spot)
- C: target shape
- D: side load
- E: target tilt

Also with the field calibration the measuring range can be extended.



## Technical data



Sensor model		U05	U1	S1	S2	U3	U6	U15
DT3010-A		Non-ferromagnetic target (reference target: alu)						
DT3010-M		Ferromagnetic target (reference target: ST37)						
Measuring range *	mm	0.5	1	1	2	3	6	15
	inch	0.02	0.04	0.04	0.08	0.12	0.25	0.60
Offset distance	mm	0.05	0.1	0.1	0.2	0.3	0.6	1.5
	inch	0.002	0.004	0.004	0.008	0.012	0.025	0.060
Linearity		≤±0.25% FSO						
Static repeatability	μm	0.05	0.1	0.1	0.2	0.3	0.6	1.5
Resolution <sup>1</sup>	μm	0.025	0.05	0.05	0.1	0.15	0.3	0.75
		0.005 % FSO						
Frequency response		25 kHz (-3dB)						
Temperature range		Operation: -50 to 150 °C / -60 to 300 °F						
Sensors and cables		Storage: -50 to 150 °C / -60 to 300 °F						
Temperature stability		≤0.025% FSO / °C • ≤0.015% FSO / °F						
Sensors (≤ midrange)								
Temperature		10 to 65 °C / 50 to 150 °F						
Compensation range								
Temperature range		Operation: 10 to 50 °C / 50 to 125 °F						
Electronics		Storage: -25 to 75 °C / -15 to 170 °F						
Temperature stability		≤0.05% FSO / °C • ≤0.03% FSO / °F						
Electronics (≤ midrange)								
Signal output		0 ... 10 V / 10 mA and 4 ... 20 mA						
Power supply		24 VDC (9 ... 30 V) / 205 mA						
Electromagnetic		acc. EN 50081-2 • EN 50082-2						
Compatibility (EMC)								
Synchronization		with cable SC 30 (accessory)						
Protection class		Electronics IP 54 Sensors IP 65						

FSO = Full Scale Output

1) static resolution at midrange

Sensor model *		U05	U1	S1	S2	U3	U6	U15
Shielded Sensors				•	•			
Unshielded Sensors		•	•			•	•	•
Sensor weight (appr.)	g	0.6	1.5	5	9	7.5	22	24
without cable	ounce	0.02	0.05	0.2	0.3	0.25	0.8	0.85
Standard Sensor	m	3	3	3	3	3	3	3
cable length	ft	10	10	10	10	10	10	10
Optional Sensor	m	6	6	6	6	6	6	6
cable length	ft	20	20	20	20	20	20	20
* customized sensors / ranges available								

Sensors and sensor cables

The **unshielded sensors U05, U1, U3 and U6**, are designed with a coil located directly behind the face of a non-metallic cylinder. They provide maximum sensitivity in non-flush installations.

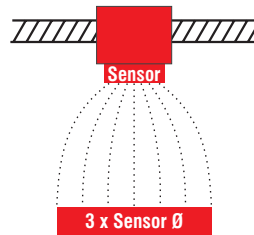
The **unshielded sensor U15** has to be mounted on a metal plate with a minimum diameter of 2 times the diameter of the sensor.

The **shielded sensors S1, and S2** are encased in a stainless steel housing with mounting thread right up to its face. This shields the coil from the influence of adjacent metal parts. These sensor models are especially suitable for mounting flush with metal surfaces.

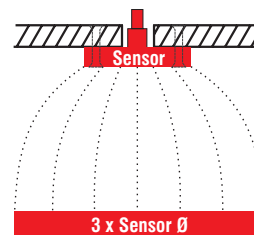
Sensor connecting cable

Systems equipped with sensors U1 and S1 have a 3 meter (10 ft) integral cable. All other sensors are connected by a 3 meter (10 ft) long coaxial cable with an SMC socket on both ends. Systems with a 6 meter (20 ft) sensor connecting cable are available optionally. All cables are tuned to the same capacitance and therefore have a tolerance of  $\pm 15\%$  in length.

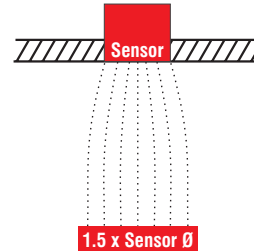
unshielded U05 to U6



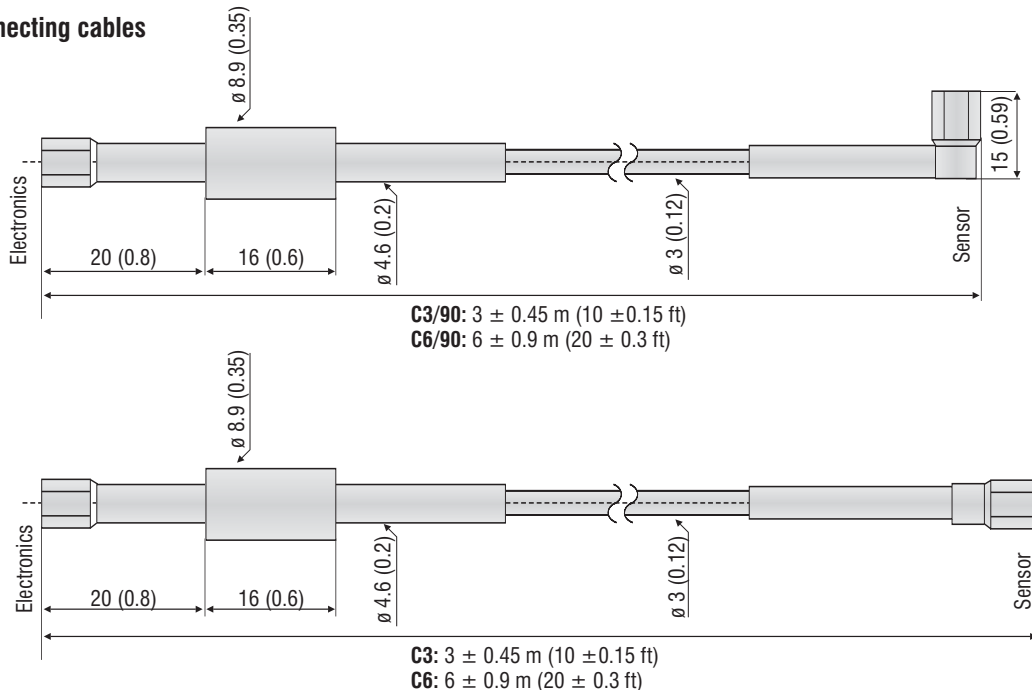
unshielded U15



shielded S1 to S2


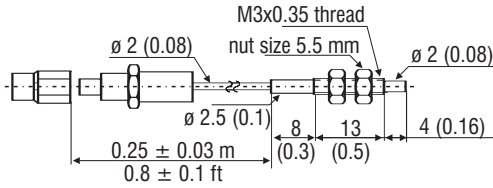

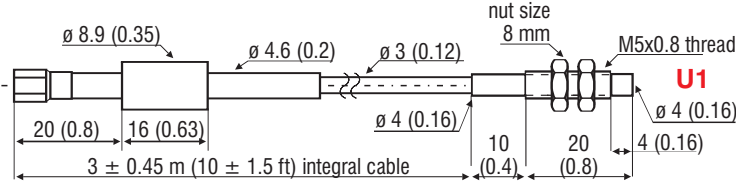

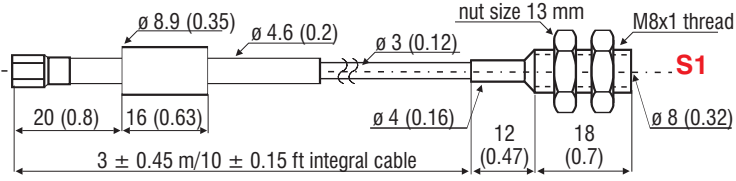

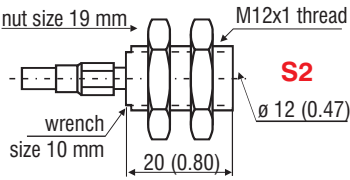

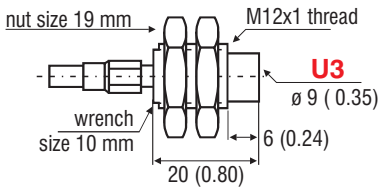

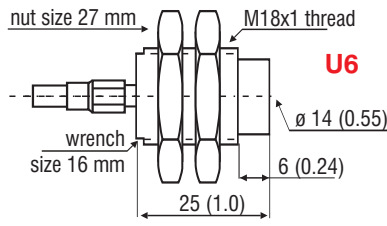

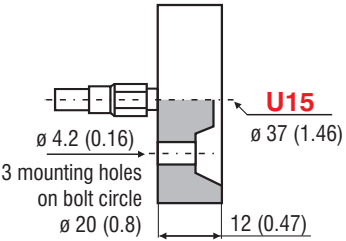


Connecting cables

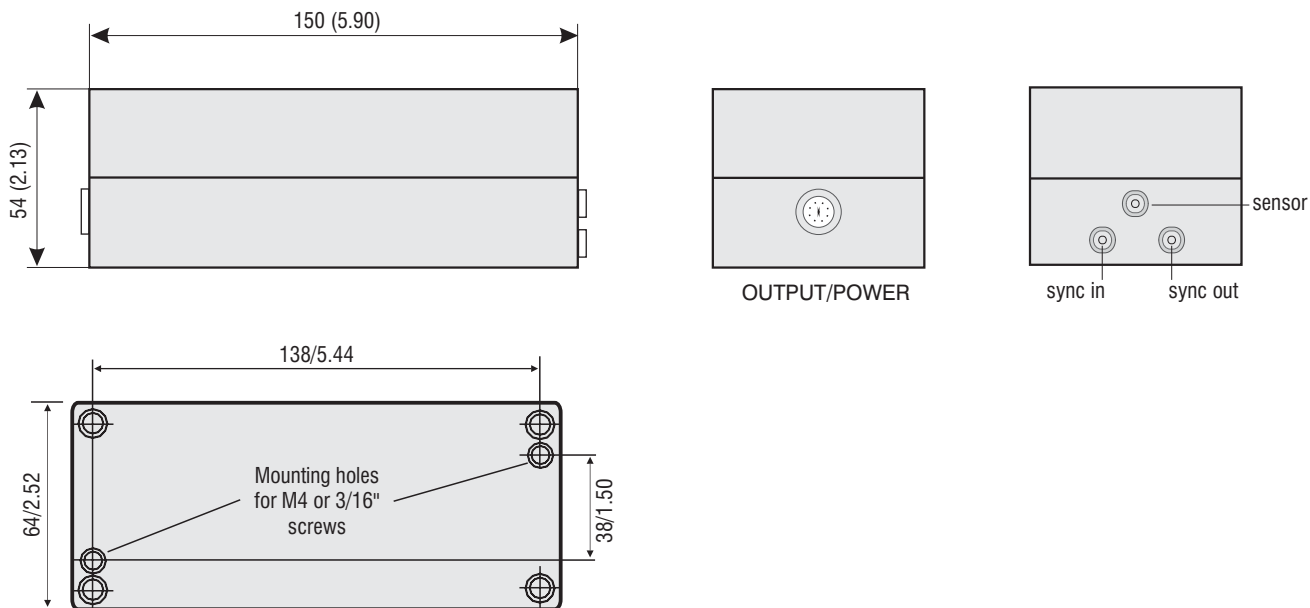


eddyNCDT 3010 sensor cables models C3 and C6 for sensors U05, S2, U3, U6, U15 dimensions (mm/inch)

# eddyNCDT series 3010 sensor dimensions (mm/inch)

<b>U05</b>		 <p>M3x0.35 thread nut size 5.5 mm ø 2 (0.08) ø 2.5 (0.1) ø 2 (0.08) 0.25 ± 0.03 m 0.8 ± 0.1 ft 8 (0.3) 13 (0.5) 4 (0.16)</p>	<b>U05</b>
<b>U1</b>		 <p>ø 8.9 (0.35) ø 4.6 (0.2) ø 3 (0.12) nut size 8 mm M5x0.8 thread ø 4 (0.16) 20 (0.8) 16 (0.63) 3 ± 0.45 m (10 ± 1.5 ft) integral cable 10 (0.4) 20 (0.8) 4 (0.16)</p>	<b>U1</b>
<b>S1</b>		 <p>ø 8.9 (0.35) ø 4.6 (0.2) ø 3 (0.12) nut size 13 mm M8x1 thread ø 4 (0.16) 20 (0.8) 16 (0.63) 3 ± 0.45 m / 10 ± 0.15 ft integral cable 12 (0.47) 18 (0.7) ø 8 (0.32)</p>	<b>S1</b>
<b>S2</b>		 <p>nut size 19 mm M12x1 thread wrench size 10 mm ø 12 (0.47) 20 (0.80)</p>	<b>S2</b>
<b>U3</b>		 <p>nut size 19 mm M12x1 thread wrench size 10 mm ø 9 (0.35) 6 (0.24) 20 (0.80)</p>	<b>U3</b>
<b>U6</b>		 <p>nut size 27 mm M18x1 thread wrench size 16 mm ø 14 (0.55) 6 (0.24) 25 (1.0)</p>	<b>U6</b>
<b>U15</b>		 <p>ø 4.2 (0.16) ø 37 (1.46) 3 mounting holes on bolt circle ø 20 (0.8) 12 (0.47)</p>	<b>U15</b>

**Electronics dimensions / Accessories** Dimensions in mm (inch), not to scale - all inches are rounded



**Accessories**

**PC3/8**

Power- and output cable, 3 m / 10 ft long, 8-pin

**SC30**

Synchronization cable 30 cm / 1 ft long

**CSP 301**

Digital signal processing and display unit up to 2 channels

**MC2.5 (E)**

Micrometer calibration fixture range 0 to 25 mm / 0 to 1 inch (E), division 2  $\mu\text{m}$  / 0.001 inch (E), adjustable offset (zero), for sensors U1 - U15

**MC2.5**

Micrometer calibration fixture range 0 to 2.5 mm / 0 to 0.1 inch, division 1  $\mu\text{m}$  for sensors U05, U1, S1 and S2