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SENSORS AND SYSTEMS

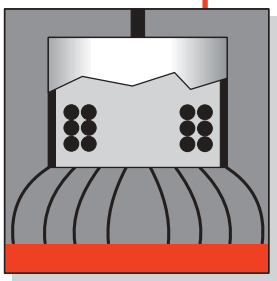
Eddy current displacement sensors

MICRO-EPSILON

EDDY CURRENT PRINCIPLE

MULTI NCDT





Non-Contact Eddy Current Displacement Measuring Systems

multiNCDT Series 100

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multiNCDT 100

Non-Contact Displacement Measuring Systems

The multiNCDT 100 (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.

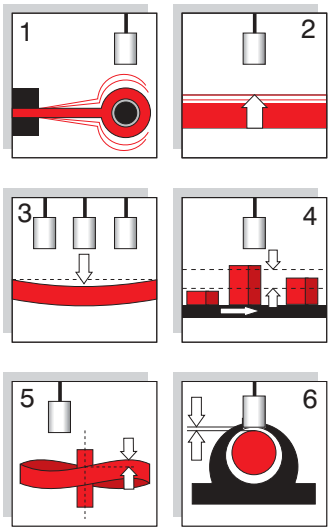
A high-frequency alternating current flows through a coil cast in the sensor housing. The electromagnetic coil field induces eddy currents in the conductive target which alters the AC resistance of the coil. This change in impedance produces a linear electrical signal proportional to the distance of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

- Wear and maintenance free
- Sensors apply no forces on the target
- 7 sensor models for measuring ranges from 0 - 0.5 to 0 - 15 mm/0 - 0.02 to 0 - 0.60 inches
- Linear and stable
- Temperature compensated
- Small sensor dimensions
- Applied in severe industrial environments
- Output options: voltage or current
- Multi-channel applications by synchronization

The special features of the series multiNCDT 100.

Temperature Compensation

The temperature operating range of series 100 sensors is very wide. In the case of fluctuating ambient temperatures stable output signals are very important for reliable measurements. Due to a patented temperature compensation method the multiNCDT series 100 offers excellent stability.



Areas of Use

The ***multiNCDT 100*** *is designed for industrial use in production plants, for machine supervision and for measuring and testing during in-process quality assurance. Illustrated are examples showing only a small selection of the numerous possibilities.*

1 - *vibration, amplitude, clearance, run-out*

2 - *displacement, distance, position, elongation*

3 - *deflection, deformation, waviness, tilt*

4 - *dimensions, measuring tolerances, sorting, part recognition*

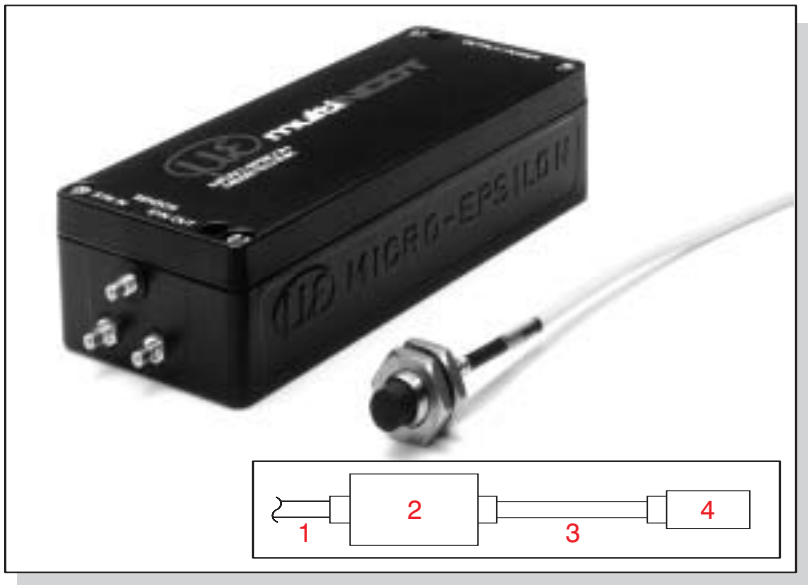
5 - *stroke, deformation, axial shaft oscillation*

6 - *bearing oscillations, lubricating gap, wear, displacement*

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System structure

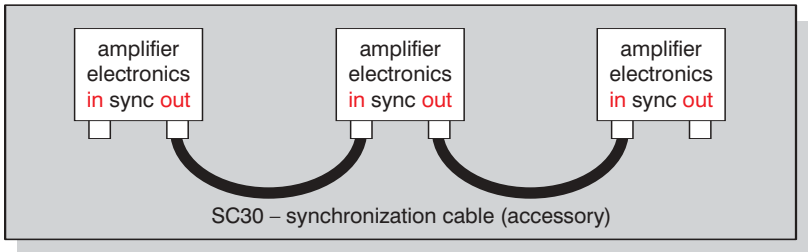
The multiNCDT 100 is a compact, single-channel system consisting of an eddy current sensor, a sensor connecting cable and an amplifier electronics (signal conditioning unit). In multi-channel set-ups, synchronization of separate channels is possible. The systems are matched to reference target materials (aluminum or steel AISI 4130) and are user-adjustable for other similar (ferro- or non-ferromagnetic) material by simple 3-point linearisation.



Series multiNCDT 100 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 100 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.



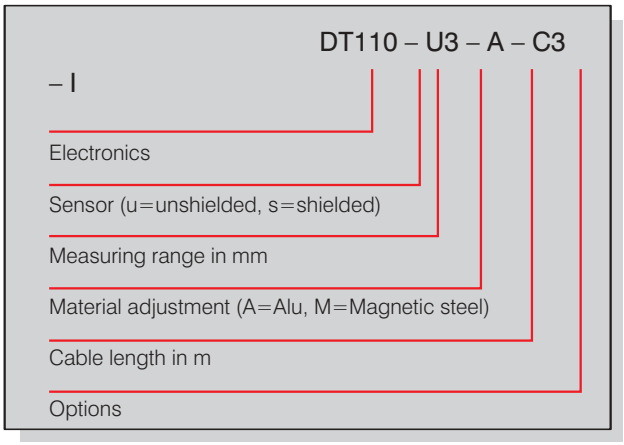
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multiNCDT 100

Technical specifications

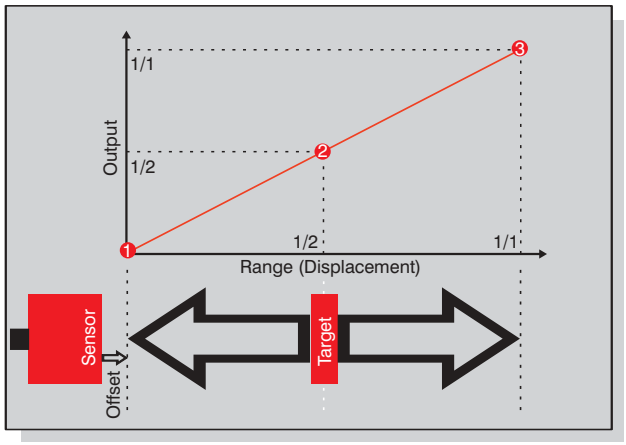
Technical specifications are valid for the aluminum or mild steel DIN 1.0116 (St 37) reference materials at 20 °C (70 °F). The data may deviate for other materials.

Ordering information for the multiNCDT series 100.



Standard version:
Standard spec's in linearity and temperature stability

T-version :
Improved spec's in linearity and temperature stability



Systems of multiNCDT 100 can be individually linearized and calibrated by simple 3-point adjustment

Linearization and Calibration

multiNCDT 100 systems can be individually linearized and calibrated. 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

Certified acc. to

DIN EN ISO 9001 :1994

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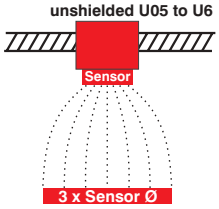
Technical data

Specification \ Model		DT 110-U05-A-C3	DT 110-U05-M-C3	DT 110-U1-A-C3	DT 110-U1-M-C3	DT 110-S1-A-C3	DT 110-S1-M-C3	DT 110-S2-A-C3	DT 110-S2-M-C3	DT 110-U3-A-C3	DT 110-U3-M-C3	DT 110-U6-A-C3	DT 110-U6-M-C3	DT 110-U15-A-C3	DT 110-U15-M-C3
Non-ferromagnetic target		•		•		•		•		•		•		•	
Ferromagnetic target			•		•		•		•		•		•		•
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		Standard ±0.8 % FSO • T-Version 0.5 % FSO													
Static resolution	µm	0.05		0.1		0.1		0.2		0.3		0.6		1.5	
(midrange)	mils	0.002		0.004		0.004		0.008		0.012		0.025		0.060	
Dynamic Resolution	µm	0.5		1		1		2		3		6		15	
(midrange)	mils	0.02		0.04		0.04		0.08		0.12		0.25		0.60	
Frequency response		10 kHz (-3dB)													
Temperature range Sensors and cables		Operation: -50 to 150 °C / -60 to 300 °F Storage: -50 to 150 °C / -60 to 300 °F													
Temperature Compensation range		Standard: 10 to 50 °C / 50 to 125 °F T-Version: 10 to 65 °C / 50 to 150 °F													
Temperature stability Sensors (midrange)		Standard: 0.09 % FSO / °C • 0.05 % FSO / °F T-Version: 0.036 % FSO / °C • 0.02 % FSO / °F													
Temperature range Electronics		Operation: 10 to 50 °C / 50 to 125 °F Storage: -25 to 75 °C / -15 to 170 °F													
Temperature stability Electronics (midrange)		0.05% FSO / °C • 0.03% FSO / °F													
Signal output		Standard: 0 to 10 V / 10 mA													
		Option I: 4 to 20 mA													
Power supply		±15 Vdc / 60 mA (Option I: 85 mA)													
		Option: 24 Vdc / 180 mA (with option I: 205 mA)													
Electromagnetic Compatibility (EMC)		acc. EN 50081-2 • EN 50082-2													
Synchronization		with cable SC 30 (accessory)													
Protection class Electronics		IP 54													

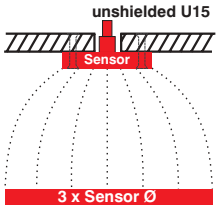
FSO = Full Scale Output
mils = 1/1000 inch

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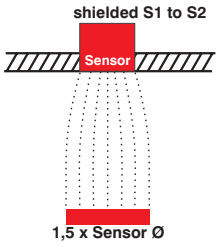
Sensors and sensor cables



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.

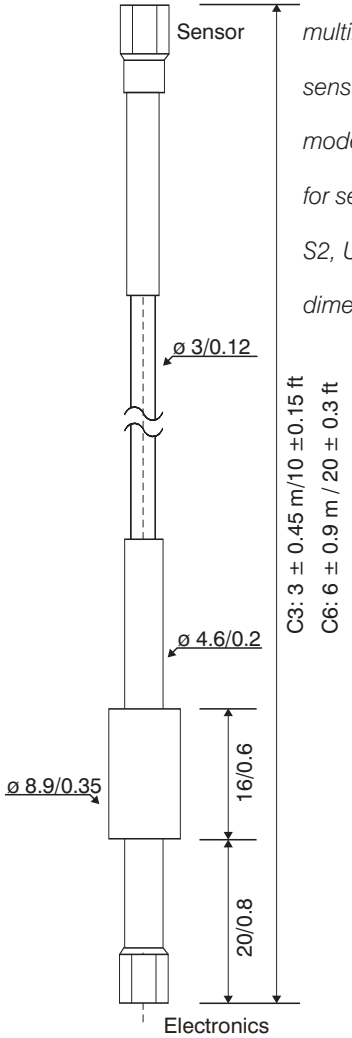


The shielded sensors S1, and S2 are encased in a stainless steel housing with mounting thread right up to its face. This shields the coil from the influence of adjacent metal parts. These sensor models are especially suitable for mounting flush with metal surfaces.

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 ±15% in length.

Sensor model		U05	U1	S1	S2	U3	U6	U15
Shielded sensor				•	•			
Unshielded sensor		•	•			•	•	•
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



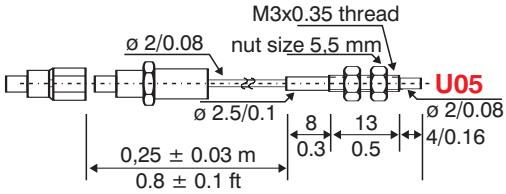
multiNCDT 100 sensor cables models C3 and C6 for sensors U05, S2, U3, U6, U15 dimensions (mm/inch)

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multiNCDT series 100 sensor dimensions (mm/inch)

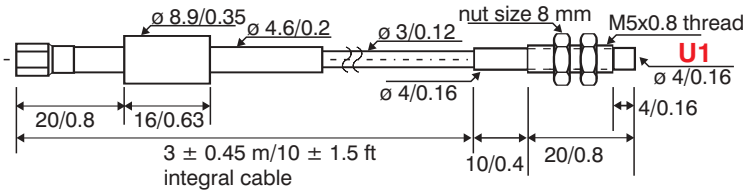
U05





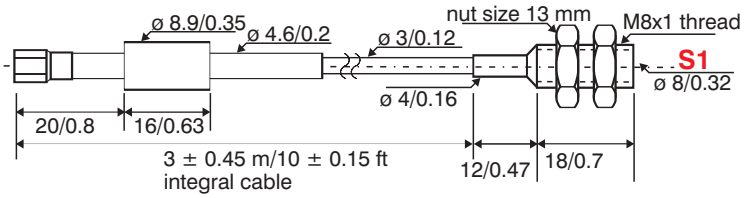
U1





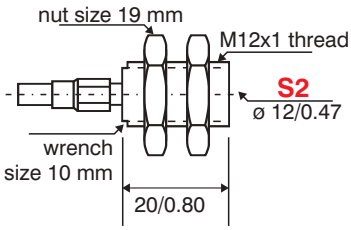
S1





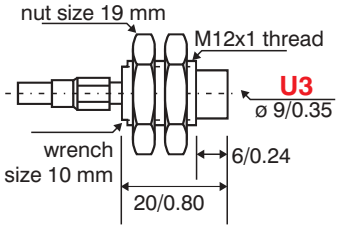
S2





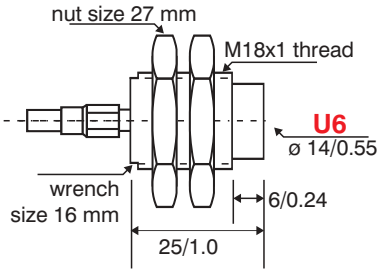
U3





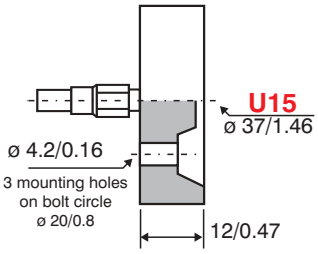
U6





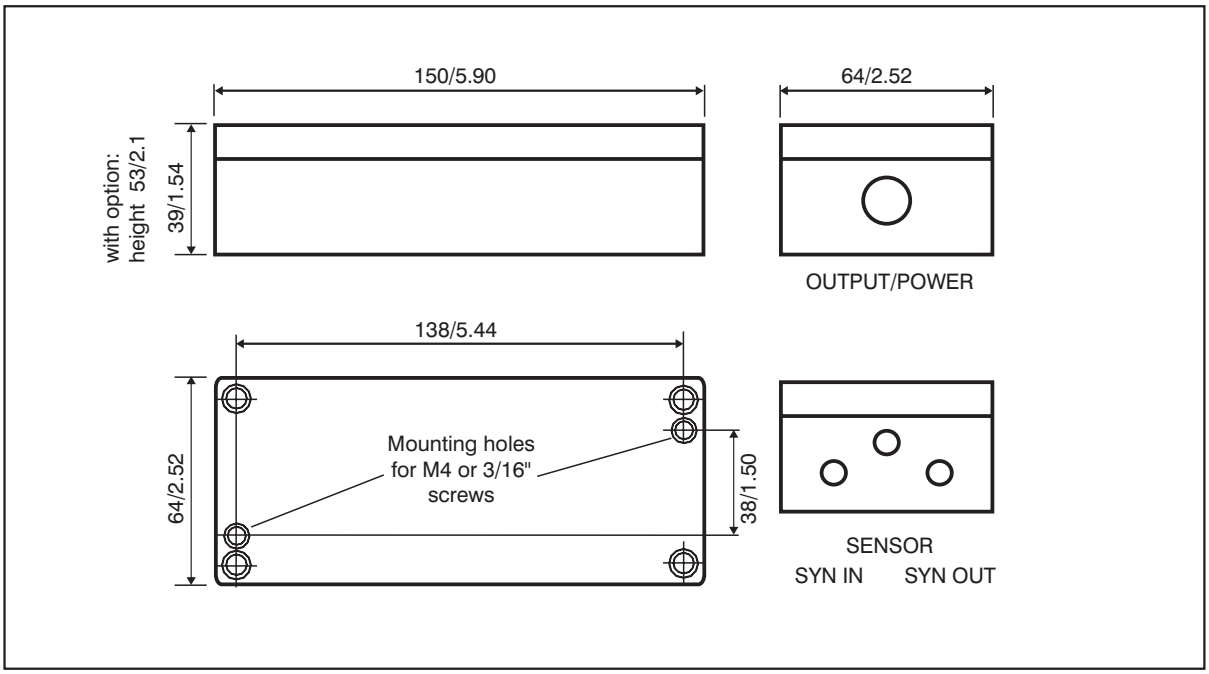
U15





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multiNCDT series 100: electronics dimensions (mm/inch)



Accessories

PC3/8
Power- and output cable, 3 m / 10 ft long, 8-pin

SC30
Synchronization cable 30 cm / 1 ft long

PS100/230/15
Power supply for mounting in cabinets
output ± 15 VDC, input 230 VAC

DD1605
Digital readout unit, programmable

MC25
Micrometer calibration fixture
range 0 to 25 mm
division 2 µm
adjustable offset (zero), for sensors U1 - U15

MC2.5
Micrometer calibration fixture
range 0 to 2.5 mm , division 1 µm
for sensors U05, U1, S1 and S2

Representative:

MICRO-EPSILON MESSTECHNIK
GmbH & Co KG
Koenigbacher Str. 15
D-94496 Ortenburg • Germany
Tel.: +49/85 42/1 68-0 • Fax +49/85 42/1 68 90

e-mail: info@micro-epsilon.de
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