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SENSORS & SYSTEMS

Authority in displacement measurement

MICRO-EPSILON

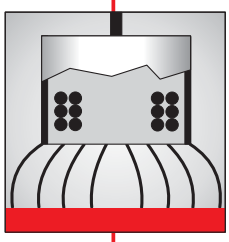
EDDY CURRENT PRINCIPLE



Highest resolution

High repeatability

Ideal for OEM



non-contact eddy-current displacement and position measurement

OEM-Sensor-System

eddyNCDT 3700

eddyNCDT 3700

Eddy-Current displacement sensors

The measurement principle

Non-contact displacement sensors, series NCDT 3700 are based on the eddy current principle and are used for measurements against electrically conductive, non-ferromagnetic materials. A high frequency alternating current is fed through a coil embedded in a sensor housing. The electromagnetic field from the coil induces eddy currents in the conductive target. As a consequence, the alternating current resistance of the coil changes. This change of impedance produces an electrical signal proportional to the distance of the target to the sensor.

Highest resolution

Measurement results down to 0.09 nanometers (0.00000000009 m) have been established with eddyNCDT displacement sensors in the series 3700. The system has been specifically developed and rated for applications with high and ultra-high requirements of resolution.

Designed for OEMs

eddyNCDT 3700 is intended for use in production systems for machine monitoring as a customized system for OEM applications, particularly when extreme resolution is demanded. Due to the high repeatability the system can be further optimized by computed linearization.
Positioning and closed-loop control tasks are solved with the highest precision.

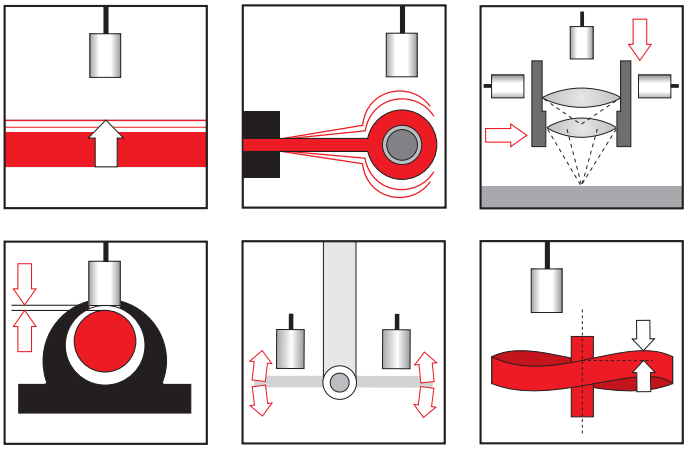
ADVANTAGES

- extremely high resolution
- miniaturized design
- low current consumption
- versatile OEM system
- stable eddy current technique



TYPICAL APPLICATIONS:

- **Wafer:** Positioning in semiconductor manufacture
- **Photolithography:** Positioning of the exposure unit
- **VLT telescope:** Mirror positioning
- **Microscopy:** Positioning of the optical system
- **Target tracking:** Positioning of the optical system
- **Air-gap monitoring** in magnetic bearings
- **Spindle movement** in machine tools
- **Alignment** of stepper systems



Technical data

		single-channel system			dual-channel system			differential system		
Model		DT3701-U1-A-C3	DT3701-U3-A-C3	DT3701-U6-A-C3	DT3702-U1-A-C3	DT3702-U3-A-C3	DT3702-U6-A-C3	DT3703-U1-A-C3	DT3703-U3-A-C3	DT3703-U6-A-C3
Measuring range [1]	mm	1	3	6	1	3	6	0.5	1.5	3
	inch	0.04	0.12	0.24	0.04	0.12	0.24	0.02	0.06	0.12
Reference distance / SMR	mm	0.1	0.3	1.0	0.1	0.3	1.0	0.1	0.4	1.0
	inch	0.004	0.012	0.04	0.004	0.012	0.04	0.004	0.016	0.04
Sensor model [2]		U1	U3	U6	U1	U3	U6	U1	U3	U6
Measurement target		non ferromagnetic metal (reference: aluminum)								
Measuring principle		non-contact eddy-current principle								
Linearity		±6 % FSO						±5 % FSO		
Repeatability		**< 0.001 % FSO**						**< 0.0005 % FSO**		
Resolution (static) output of external lowpass filter fg=10 Hz)		**< 0.000033 % FSO**						**< 0.000018 % FSO**		
	nm	0.2	0.77	2.0	0.2	0.77	2.0	0.09	0.22	0.45
Resolution (dynamic) output of external lowpass filter fg=1 kHz)		**< 0.00016 % FSO**						**< 0.00008 % FSO**		
	nm	1.3	3.9	9.8	1.3	3.9	9.8	0.4	1.0	2.1
Frequency response (-3 dB)		10 kHz								
Temperature range		controller: 10…60 °C (50…140 °F) / sensor/cable: -50…150 °C (-58…302 °F)								
Temperature stability (midrange)		controller: 10...60 °C (50…140 °F): 0.025 % FSO / °C (0.014 % FSO / °F)								
		sensors 0...100 °C (32...212 °F)								
	% FSO / °C	0.05	0.06	0.19	0.05	0.06	0.19	0.025	0.015	0.06
	% FSO / °F	0.03	0.03	0.34	0.03	0.03	0.34	0.014	0.008	0.03
Sensor cable length		3 m ± 0.45 m (10 ft ± 1.5 ft)								
Signal output [3]		0 ...10 VDC								
Adjustment		zero / gain								
Power supply		12.5…30 V / 30 mA			12.5…30 V / 50 mA			12.5…30 V / 30 mA		
Electromagnetic compatibility		acc. EN 50081-2 / EN 61000-6-2								
Vibration controller		EN 60068-2-64 (noise)								
Shock controller		EN 60068-2-29 (permanent shock)								

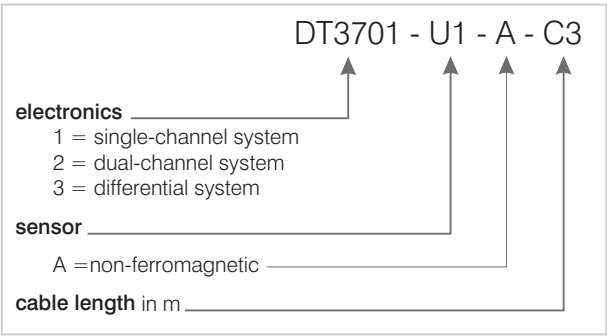
All data apply for aluminium at 20 °C.
FSO = Full Scale Output SMR = Start Measuring Range
1) Smaller / larger measuring range for OEM applications on request.
2) Matched sensor designs for OEM applications on request (more than 500 different sensor models available).
3) -2.5 ... 0 V / -2.5 ... 2.5 V /-2.5 ... 5 V / -2.5 ... 10 V / 0 ... 2.5 V / 0 ... 5 V / 4 ... 20 mA for OEM on request

eddyNCDT3701:
Single-channel system:
one sensor; one output signal

eddyNCDT3702:
Dual-channel system:
two sensors; two separate, independent output signals

eddyNCDT3703:
Differential system:
two sensors; differential output

Sensor identification

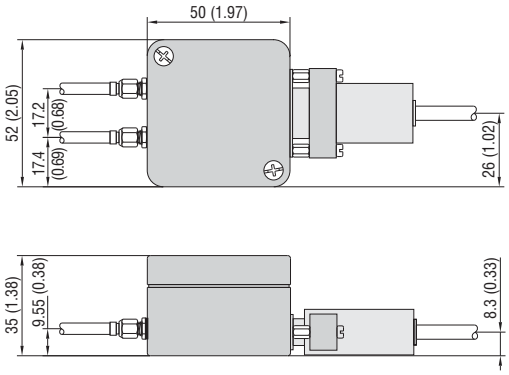


For fastest order processing we need the exact sensor identification.

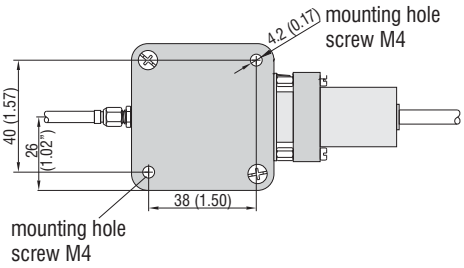
Dimensions and mounting Dimensions in mm (inch), not to scale - all inches are rounded

Controller

dual-channel/differential system:

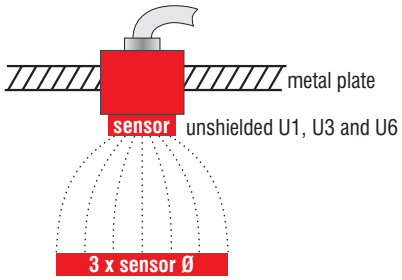


single-channel system:



Mounting instructions

Standard mounting of the sensor and ideal target size



The unshielded sensors 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.
In the radial environment any metallic components must be kept away.

Sensors



U1
Thread M5 x 0.8
Front face ø4 mm (.16")
Wrench size 8 mm (.31 ")
Length 20 mm (.79 ")
Integral cable 3 m



U3
Thread M12 x 1
Front face ø9 mm (.35")
Wrench size 19 mm (.75 ")
Length 20 mm (.79 ")
SMC-plug connection



U6
Thread M18 x 1
Front face ø14 mm (.55")
Wrench size 27 mm (1.06 ")
Length 25 mm (.98 ")
SMC-Plug connection

Accessories:

PC 3701-3 for DT 3701 and DT 3703
PC 3702-3 for DT 3702
Supply and output cable, 3 m long

MC 25D Micrometer calibration device
Adjustment range 0 to 25 mm (0 to .98 "),
Readout 1 µm

PS 2010 Power supply unit
mouting on DIN rail (DIN 50022)
Input 115/230 VAC switchable
Output 24 VDC / 2.5 A
L/B/H 120 x 20 x 40 mm (4.72 x 0.79 x 1.57 ")

DD 800
Digital display unit, programable

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