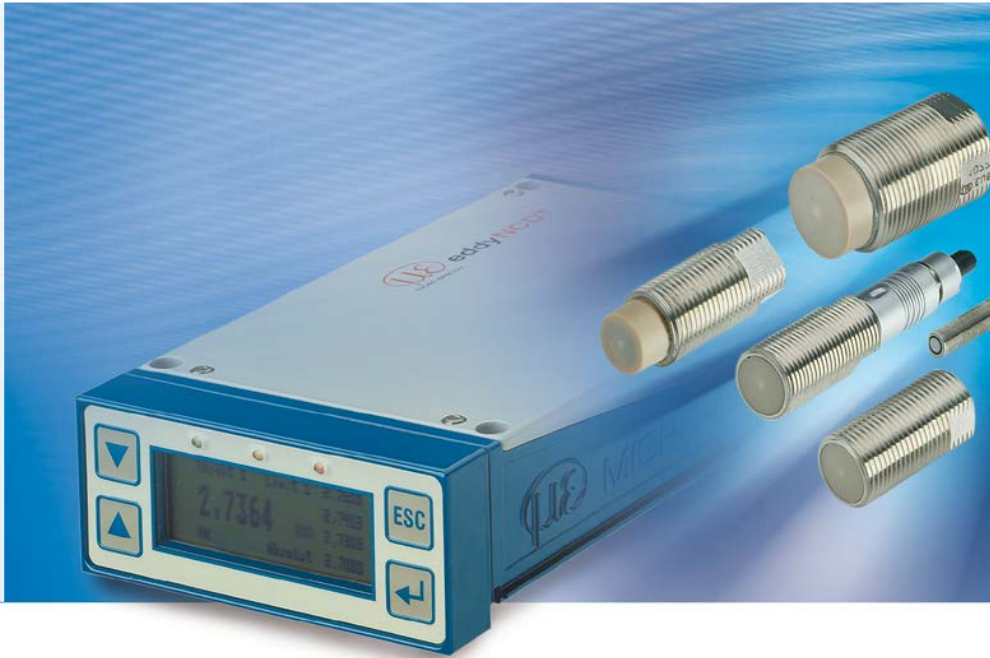




# More Precision

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



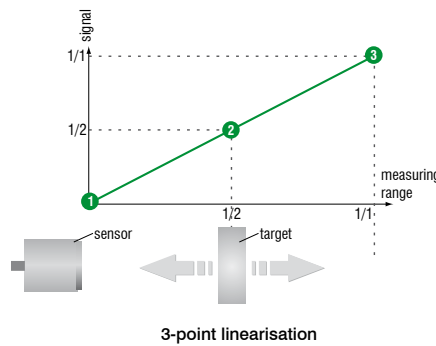


- *Micrometer accuracy*
- *Ideal for fast measurements: Bandwidth up to 100kHz (-3dB)*
- *Numerous sensor models even for customer-specific applications*
- *Robust sensor construction for harsh environments*
- *Synchronized multi-channel measurement*

The eddyNCDT 3300 eddy current measuring system is considered to be one of the most powerful displacement measurement systems in the world. Due to a mature technical design, the system offers numerous benefits to customers in multiple application areas such as manufacturing automation, machine monitoring and quality control. The eddyNCDT 3300 system includes high-performance processors for reliable signal conditioning and further processing. The innovative three-point linearisation technique it uses enables almost completely automatic linearisation which makes possible the optimum accuracies for every metallic measuring object and every installation environment. Operation is supported by an illuminated LC graphical display and on-screen prompts.

**Linearisation and calibration**

Systems in the eddyNCDT 3300 series can be individually linearised and calibrated by the user. Therefore, optimum measurement accuracies will always be achieved, even in the case of failed measuring object materials or harsh ambient conditions. The adjustment is made using three distance points (①,②,③) which are defined by a reference standard.

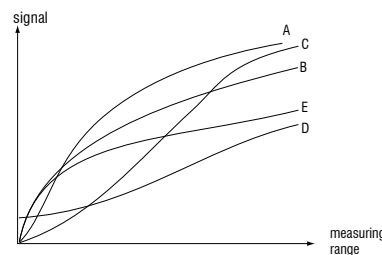


**Maximum precision due to field calibration**

In order to achieve maximum precision, eddyNCDT 3300 provides the field calibration function for achieving extremely precise measurement results. The following influences are taken into account:

- A: Different target materials**
- B: Different target sizes (measuring spot)**
- C: Target shape**
- D: Side preattenuation**
- E: Target tilt angle**

The measuring range can also be extended using the field calibration.

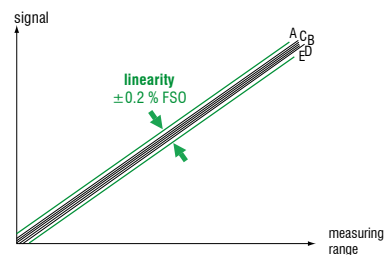


**Conventional sensor without field calibration**  
Massive linearity deviation results from the different influences



**Synchronization for multi-channel applications**

The MCT304 multi-channel platform is available for thickness and displacement measurements with up to four channels. Up to four controllers can be integrated in a single MCT platform. The platforms can be synchronized with each other, whereby the simultaneous operation of any number of eddyNCDT sensors is possible. In order to compensate for opposing sensor influences, there are synchronization inputs and outputs.



**Best practice:**  
eddyNCDT 3300 with Micro-Epsilon field calibration  
High accuracy through compensation of the influences

Controller	DT3300	DT3301
Linearity	≤0.2 % FSO	
	up to 25Hz	≤0.005 % FSO (≤0.01 % FSO using ES04, ES05 and EU05)
Resolution <sup>2)</sup>	up to 2.5kHz	≤0.01 % FSO
	up to 25 / 100kHz	≤0.2 % FSO
Bandwidth	selectable 25kHz / 2.5kHz / 25Hz (-3 dB); 100kHz for measuring ranges ≤1mm	
Temperature compensation	10 ... 100°C (option TCS: -40 ... 180°C) <sup>3)</sup>	
Temperature range	controller	5 ... 50°C
Outputs	selectable 0 ... 5V / 0 ... 10V / ±2.5V / ±5V / ±10V (or inverted) / 4 ... 20mA (load 350 ohm)	
Power supply	≤12VDC / 100mA, 5.2VDC / 220mA <sup>1)</sup>	11 - 32VDC / 700mA
Synchronization	via cable PSC 30 (accessories)	via cable E SC 30 (accessories)
Electromagnetic compatibility	acc. to EN 50081-2 / EN 61000-6-2	
Controller functions	limit switches, auto-zero, peak-to-peak, minimum, maximum, average, storage of 3 configurations (calibrations)	

FSO = Full Scale Output

Reference material: Aluminum (non-ferromagnetic) and Mild Steel DIN 1.0037 (ferromagnetic)

Reference temperature for reported data is 20°C (70°F); Resolution and temperature stability refer to midrange

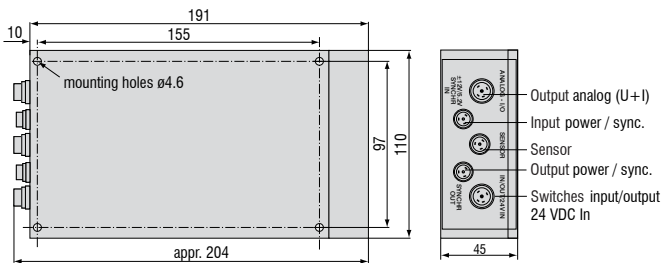
Data may differ with magnetic inhomogeneous material.

<sup>1)</sup> additional 24VDC for external reset and limit switch

<sup>2)</sup> resolution data are based on noise peak-to-peak values

<sup>3)</sup> temperature stability may differ with option TCS

#### Controller dimensions



#### Quadruple limit switch

- Two freely definable minimum and maximum limit values
- Individual switching threshold
- LED display for upper and lower limit warnings

#### Automatic calibration

- Three-point linearisation for optimum onsite calibration

#### Four configurations can be stored

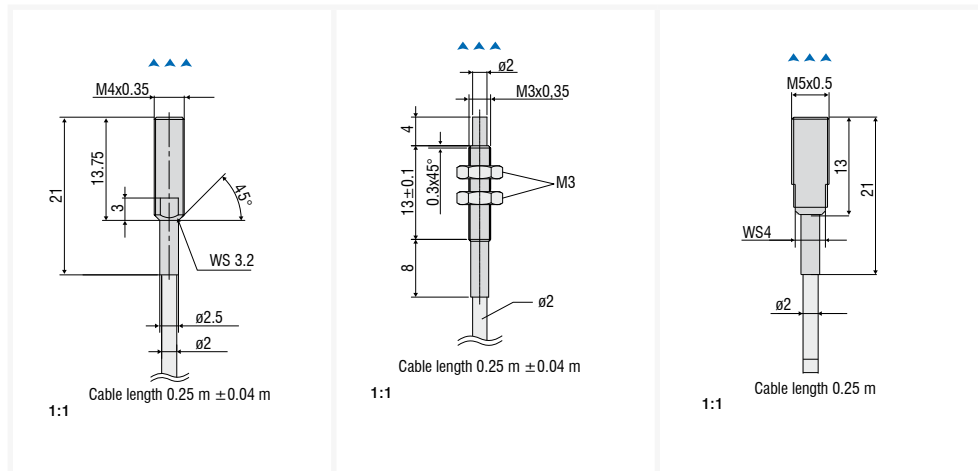
- Factory calibration and three individual configurations can be stored
- Simple microprocessor-controlled singlecycle calibration

#### Types of output

- Voltage / current
- Metric / inch and graphical display
- Display of auto-zero, peak-to-peak value, minimum, maximum
- Scalable display for conversion to indirect measured values

▲▲▲▲  
Measurement direction

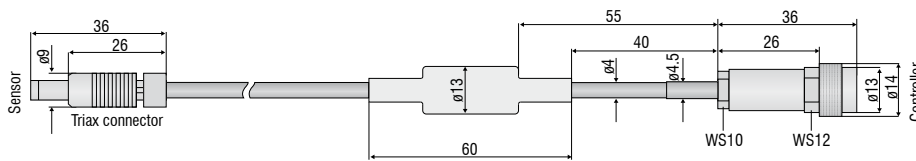
▲  
Connector side



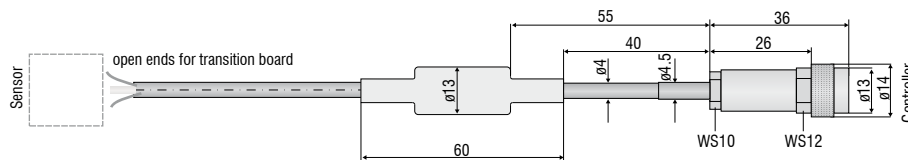
Sensor type	ES04	EU05	ES08
Design	shielded	unshielded	shielded
Measuring range	0.4mm	0.4mm	0.8mm
Offset distance	0.04mm	0.05mm	0.08mm
Linearity	≤0.8μm	≤1μm	≤1.6μm
Resolution	0.02μm	0.025μm	0.04μm
Temperature stability (MMR)	≤0.06μm/°C	≤0.075μm/°C	≤0.12μm/°C
Temperature max.	150°C	150°C	150°C
Pressure resistance sensor front	100bar	-	20bar
Integrated cable/ length	approx. 0.25m	approx. 0.25m	approx. 0.25m
Temperature sensor cable	180°C	180°C	180°C
Housing material	stainless steel	stainless steel and ceramic	stainless steel and plastic

MMR = midrange

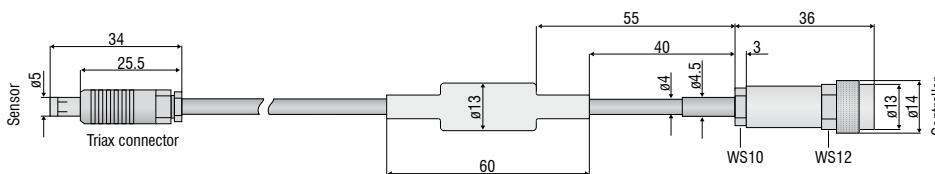
**ECx sensor cable**, length is selectable up to x≤15m



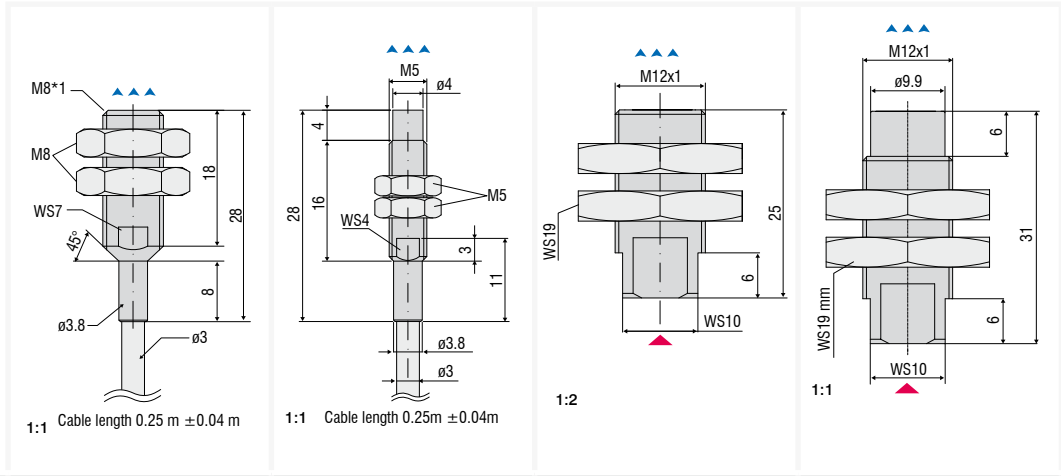
**ECx/1 extension cable for solder connection**, length is selectable up to x≤15 m



**ECx/2 extension cable for plug connection**, length is selectable up to x≤15 m



▲▲▲▲  
Measurement direction  
▲  
Connector side



Sensor type	ES1	EU1	ES2	EU3
Design	shielded	unshielded	shielded	unshielded
Measuring range	1mm	1mm	2mm	3mm
Offset distance	0.1mm	0.1mm	0.2mm	0.3mm
Linearity	≤2µm	≤2µm	≤4µm	≤6µm
Resolution	0.05µm	0.05µm	0.1µm	0.15µm
Temperature stability (MMR)	≤0.15µm/°C	≤0.15µm/°C	≤0.3µm/°C	≤0.45µm/°C
Temperature max.	150°C	150°C	150°C	150°C
Pressure resistance sensor front	-	-	20 bar	20 bar
Integrated cable/ length	approx. 0.25m	approx. 0.25m	-	-
Temperature sensor cable	180 °C	180 °C	-	-
Housing material	stainless steel and plastic	stainless steel and plastic	stainless steel and plastic	stainless steel and plastic

MMR = midrange

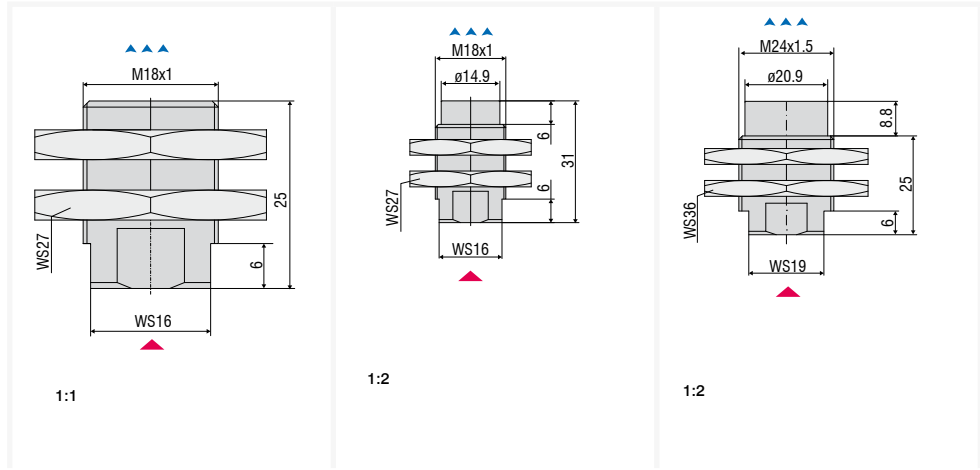
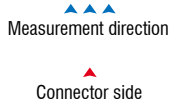
**Cable**

Cable design: coaxial with sheath wire  
 Sheath material: FEP/Flour-Thermoplast  
 Temperature resistance: -30°C to +200°C  
 Outer diameter: 3.9mm ±0.1mm  
 Bending radius: one-time bending during installation: 2 x cable diameter  
 minimum bending radius for movement: 5 x cable diameter  
 optimum bending radius at continuous movement: 10 x cable diameter

Suitable for use with robots: no

**Plug Model**

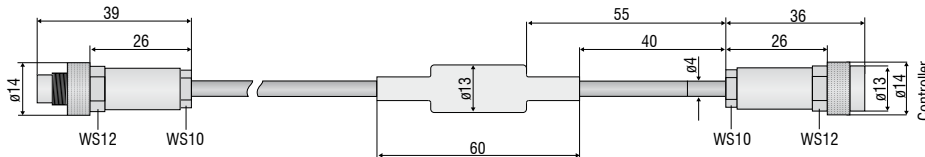
	Controller side	Sensor side	ECx/1	ECx/2
Type	5-pole female connector, cable socket	male connector, triaxial	male connector 5-pol	male connector, triaxial
Locking method	screw	push-pull	screw	push-pull
Protection class	IP67	IP67 (when connected)	IP67 (when connected)	IP68
Temperature resistance	-30 to +85°C	-30 to +150°C	-40 to +85°C	-65 to +135°C
Material housing	Brass nickel-plated	Brass nickel-plated, mat	Brass nickel-plated	Brass nickel-plated, mat
Mechanical service life	> 500 mating cycles	> 500 mating cycles	> 500 mating cycles	> 500 mating cycles



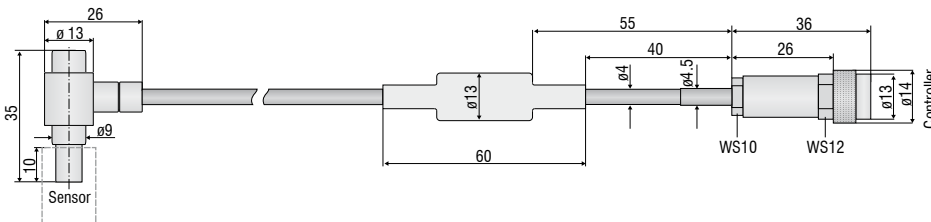
Sensor type	ES4	EU6	EU8
Design	shielded	unshielded	unshielded
Measuring range	4mm	6mm	8mm
Offset distance	0.4mm	0.6mm	0.8mm
Linearity	≤8μm	≤12μm	≤16μm
Resolution	0.2μm	0.3μm	0.4μm
Temperature stability (MMR)	≤0.6μm/°C	≤0.9μm/°C	≤1.2μm/°C
Temperature max.	150°C	150°C	150°C
Pressure resistance sensor front	20bar	20bar	20bar
Integrated cable/ length	-	-	-
Temperature sensor cable	-	-	-
Housing material	stainless steel and plastic	stainless steel and plastic	stainless steel and plastic

MMR = midrange

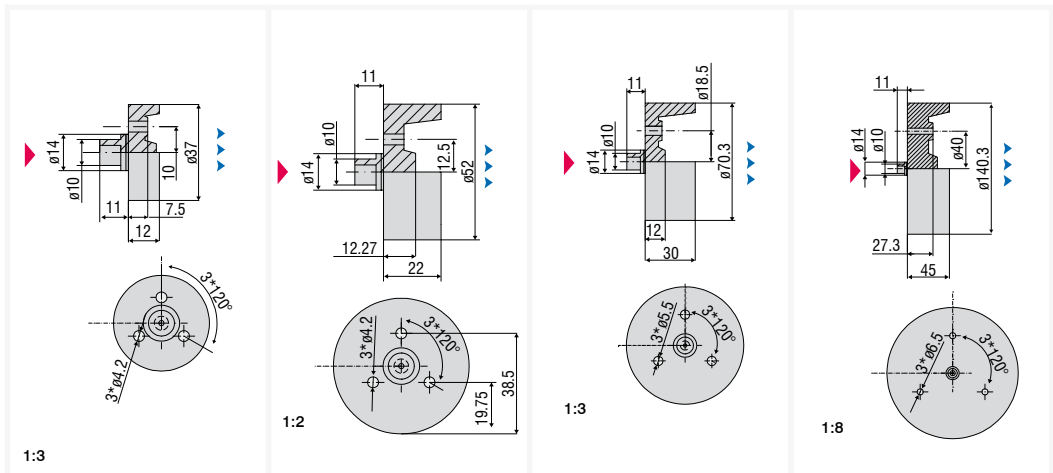
**ECEx sensor cable extension**, length is selectable up to  $x \leq 15$  m



**ECx/90 sensor cable with 90° connector (sensor-sided)**, length is selectable up to  $x \leq 15$  m



Measurement direction  
 Connector side



Sensor type	EU15	EU22	EU40	EU80
Design	unshielded	unshielded	unshielded	unshielded
Measuring range	15mm	22mm	40mm	80mm
Offset distance	1.5mm	2.2mm	4mm	8mm
Linearity	≤30μm	≤44μm	≤80μm	≤160μm
Resolution	0.75μm	1.1μm	2μm	4μm
Temperature stability (MMR)	≤2.25μm/°C	≤3.3μm/°C	≤6μm/°C	≤12μm/°C
Temperature max.	150°C	150°C	150°C	150°C
Pressure resistance sensor front	-	-	-	-
Integrated cable/ length	-	-	-	-
Temperature sensor cable	-	-	-	-
Housing material	epoxy	epoxy	epoxy	epoxy

MMR = midrange

**Cable**

Cable design: coaxial with sheath wire  
 Sheath material: FEP/Flour-Thermoplast  
 Temperature resistance: -30°C to +200°C  
 Outer diameter: 3.9mm ± 0.1mm  
 Bending radius: one-time bending during installation: 2 x cable diameter  
 minimum bending radius for movement: 5 x cable diameter  
 optimum bending radius at continuous movement: 10 x cable diameter

Suitable for use with robots: no

**Plug Model**

Type: 5-pole female connector, cable socket  
 Locking method: screw  
 Protection class: IP67  
 Temperature resistance: -30 to +85°C  
 Material housing: Brass nickel-plated  
 Mechanical service life: > 500 mating cycles

**Controller side**

Type: 5-pole female connector, cable socket  
 Locking method: screw  
 Protection class: IP67  
 Temperature resistance: -30 to +85°C  
 Material housing: Brass nickel-plated  
 Mechanical service life: > 500 mating cycles

**Sensor side ECEx**

Type: 5-pole male connector  
 Locking method: screw  
 Protection class: IP67 (when connected)  
 Temperature resistance: -30 to +85°C  
 Material housing: Brass nickel-plated  
 Mechanical service life: > 500 mating cycles

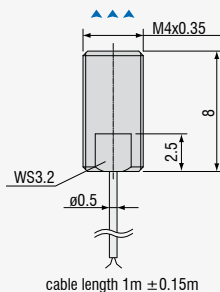
**ECx/90**

Type: male connector, triaxial, angle  
 Locking method: push-pull  
 Protection class: IP67 (when connected)  
 Temperature resistance: -65 to +135°C  
 Material housing: Brass nickel-plated, mat  
 Mechanical service life: > 500 mating cycles



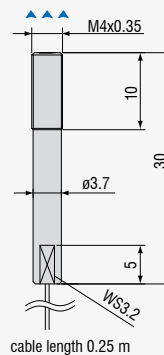
### Subminiature sensors for confined installation space

Apart from standard sensors in popular styles, miniature sensors can also be supplied which achieve high precision measurement results with the smallest possible dimensions. Pressure-resistant versions, screened housings, ceramic types and other special features characterise these sensors, which achieve highly accurate measurement results despite the small dimensions. The miniature sensors are employed in high pressure applications, e.g. in combustion engines.



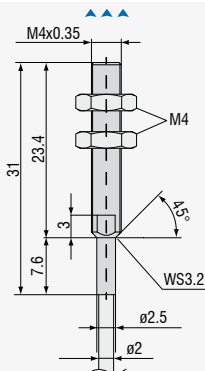
**ES04/180(25) Shielded Sensor**  
 Measuring range 0.4mm  
 Temperature stability  $\leq 0.025\% \text{FSO}/^\circ\text{C}$   
 Connection: integrated coaxial cable 1m ( $\varnothing 0.5\text{mm}$ ), short silicon tube at cable exit  
 Pressure resistance (static): front 100bar  
 Max. operating temperature:  $180^\circ\text{C}$   
 Housing material: stainless steel  
 Sensor cable: ECx/1 or ECx/2, length  $\leq 6\text{m}$

2:1



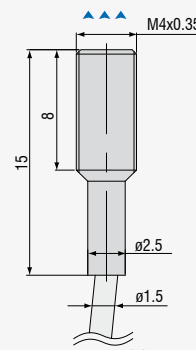
**ES04/180(27) Shielded Sensor**  
 Measuring range 0.4mm  
 Temperature stability  $\leq 0.025\% \text{FSO}/^\circ\text{C}$   
 Connection: integrated coaxial cable 0.25m ( $\varnothing 0.5\text{mm}$ ) with solder connection board  
 Pressure resistance (static): front 100bar  
 Max. operating temperature:  $180^\circ\text{C}$   
 Housing material: stainless steel  
 Sensor cable: ECx/1, length  $\leq 6\text{m}$

1:1



**ES04(34) Shielded Sensor**  
 Measuring range 0.4mm  
 Temperature stability  $\leq 0.025\% \text{FSO}/^\circ\text{C}$   
 Connection: integrated coaxial cable 0.25m ( $\varnothing 2\text{mm}$ ) with sealed triaxial connector  
 Pressure resistance (static): front 100bar / rear side splash water  
 Max. operating temperature:  $150^\circ\text{C}$   
 Housing material: stainless steel and ceramic  
 Sensor cable: ECx, length  $\leq 6\text{m}$

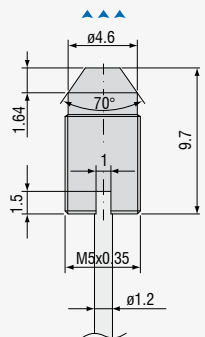
1:1

cable length 0.25m  $\pm 0.04\text{m}$ 

**ES04(35) Shielded Sensor**  
 Measuring range 0.4mm  
 Temperature stability  $\leq 0.025\% \text{FSO}/^\circ\text{C}$   
 Connection: integrated coaxial cable 0.25m ( $\varnothing 1.5\text{mm}$ ) with sealed triaxial connector  
 Pressure resistance (static): front 100bar / rear side 5 bar  
 Max. operating temperature:  $150^\circ\text{C}$   
 Housing material: stainless steel and ceramic  
 Sensor cable: ECx/1, length  $\leq 6\text{m}$

2:1

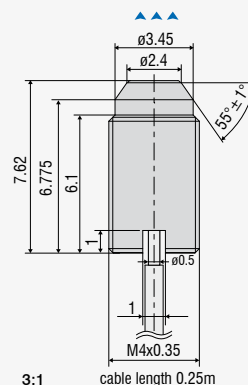
cable length 0.25 m



**ES04(44) Shielded Sensor**  
 Measuring range 0.4mm  
 Temperature stability  $\leq 0.025\% \text{FSO}/^\circ\text{C}$   
 Connection: integrated coaxial cable 0.2m ( $\varnothing 1.2\text{mm}$ ) with sealed triaxial connector  
 Pressure resistance (static): front 100bar / rear side splash water  
 Max. operating temperature:  $150^\circ\text{C}$   
 Housing material: stainless steel and ceramic  
 Sensor cable: ECx, length  $\leq 6\text{m}$

2:1

cable length 0.2m

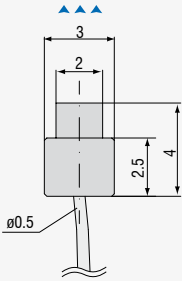


**ES04(70) Shielded Sensor**  
 Measuring range 0.4mm  
 Temperature stability  $\leq \pm 0.025\% \text{FSO}/^\circ\text{C}$   
 Connection: integrated coaxial cable 0.25m ( $\varnothing 0.5\text{mm}$ ) with solder connection board  
 Pressure resistance (static): front 100bar / rear side splash water  
 Max. operating temperature:  $150^\circ\text{C}$   
 Housing material: stainless steel and ceramic  
 Sensor cable: ECx/1, length  $\leq 6\text{m}$

3:1

cable length 0.25m



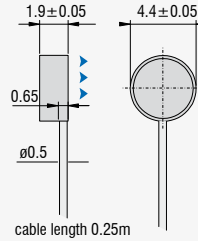


cable length 0.25m ± 0.04m

3:1

**EU05(10) Unshielded Sensor**

Measuring range 0.5mm  
 Temperature stability  $\leq 0.025\% \text{FSO}/^\circ\text{C}$   
 Connection: integrated coaxial cable 0.25m ( $\varnothing 0.5\text{mm}$ ) with solder connection board  
 Max. operating temperature: 150°C  
 Housing material: stainless steel and ceramic  
 Sensor cable: ECx/1, length  $\leq 6\text{m}$

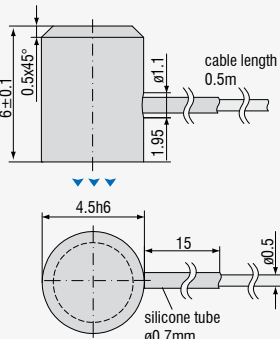


cable length 0.25m

3:1

**ES05/180(16) Shielded Sensor**

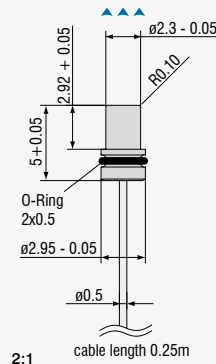
Measuring range 0.5mm  
 Temperature stability  $\leq 0.025\% \text{FSO}/^\circ\text{C}$   
 Connection: integrated coaxial cable 0.25m ( $\varnothing 0.5\text{mm}$ ) with solder connection board  
 Max. operating temperature: 180°C  
 Housing material: stainless steel and epoxy  
 Sensor cable: ECx/1, length  $\leq 6\text{m}$



3:1

**ES05(36) Shielded Sensor**

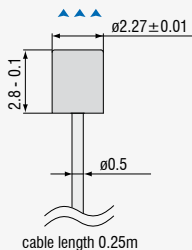
Measuring range 0.5mm  
 Connection: integrated coaxial cable 0.5m ( $\varnothing 0.5\text{mm}$ ) with solder connection board  
 Max. operating temperature: 150°C  
 Housing material: stainless steel and epoxy  
 Sensor cable: ECx/1, length  $\leq 6\text{m}$



2:1

**EU05(65) Unshielded Sensor**

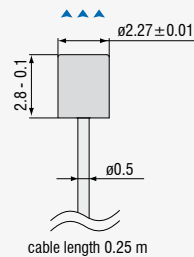
Measuring range 0.5mm  
 Connection: integrated coaxial cable 0.25m ( $\varnothing 0.5\text{mm}$ ) with solder connection board  
 Pressure resistance (static): front 700bar / rear side splash water  
 Max. operating temperature: 150°C  
 Housing material: ceramic  
 Sensor cable: ECx/1, length  $\leq 6\text{m}$



3:1

**EU05(66) Unshielded Sensor**

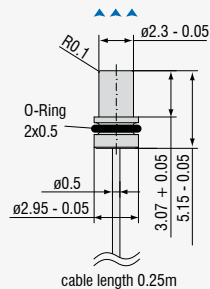
Measuring range 0.5mm  
 Temperature stability  $\leq 0.025\% \text{FSO}/^\circ\text{C}$   
 Connection: integrated coaxial cable 0.25m ( $\varnothing 0.5\text{mm}$ ) with solder connection board  
 Pressure resistance (static): front 400bar / rear side splash water  
 Max. operating temperature: 150°C  
 Housing material: ceramic  
 Sensor cable: ECx/1, length  $\leq 6\text{m}$



3:1

**EU05(72) Unshielded Sensor**

Measuring range 0.4mm  
 Temperature stability  $\leq 0.025\% \text{FSO}/^\circ\text{C}$   
 Connection: integrated coaxial cable 0.25m ( $\varnothing 0.5\text{mm}$ ) with solder connection board  
 Pressure resistance (static): front 2000bar / rear side splash water  
 Max. operating temperature: 150°C  
 Housing material: ceramic  
 Sensor cable: ECx/1, length  $\leq 6\text{m}$



2:1

**EU05(93) Unshielded Sensor**

Measuring range 0.4mm  
 Temperature stability  $\leq 0.025\% \text{FSO}/^\circ\text{C}$   
 Connection: integrated coaxial cable 0.25m ( $\varnothing 0.5\text{mm}$ ) with solder connection board  
 Pressure resistance (static): front 2000bar / rear side splash water  
 Max. operating temperature: 150°C  
 Housing material: ceramic  
 Sensor cable: ECx/1, length  $\leq 6\text{m}$

Articel	Description	eddyNCDT 3001	eddyNCDT 3005	eddyNCDT 3010	eddyNCDT 3100	eddyNCDT 3300
PC3/8	Power- and output cable, 3m, 8 pin			•		
PC5/5	Power- and signal cable	•	•			
SC30	Synchronization cable, 30cm			•		
CSP 301	Digital signal processing and display unit up to 2 channels			•		
PC3100-3/6/BNC	Outputcable and supply unit, 3m				•	
PS2020	Power Supply 24V / 2.5A; Input 100-240 VAC; Output 24 VDC / 2.5A; DIN rail mounting; 35mm x 7.5mm, DIN 50022				•	•
MC2.5	Micrometer calibration fixture, range 0 to 2.5 mm, division 1 $\mu$ m, for sensors EPU05 to EPS2, adjustable offset (zero)			•	•	•
MC25D	Micrometer calibration fixture, range 0 to 25mm, division 1 $\mu$ m, for sensors EPU05 to EPU15, adjustable offset (zero)			•	•	•
ECx	Sensor cable, length selectable up to 15m					•
ECx/90	Sensor cable with 90° connector (sensor-sided) length selectable up to 15m					•
ECx/1	Extension cable for solder connection					•
ECx/2	Extension cable for plug connection					•
SCA3/5	Signal cable analog, 3m					•
SCA3/5/BNC	Signal cable analog with BNC connector, 3m					•
SCD3/8	Signal cable digital (switch input/outout), 3m (also for supply 11 - 32VDC); for DT3301					•
SIC3(07)	Signal cable with BNC connector for direct operation with oscilloscope					•
PSC30	Power / Synchronization cable, 0.3m, for DT3300					•
ESC30	Synchronization cable, 0.3m, for DT3301					•
PS300/12/5	Power supply Input 100 - 240VAC; Output $\leq$ 12VDC / 5.2VDC integrated cable 1.5m; for max. 4x DT3300					•
MBC300	Mounting base for controller DT330x, fixing through M4 threaded holes 166x108x60mm					•
MCT304-SM	Tower for max. 4 controller DT 3300; supply 100 - 240VAC					•
MCT304(01)	Tower for max. 4 controller DT 3301; supply 11 - 32VDC					•

## High performance sensors made by Micro-Epsilon



Sensors and systems for displacement and position



Sensors and measurement devices for non-contact temperature measurement



2D/3D profile sensors (laser scanner)



Optical micrometers, fiber optic sensors and fiber optics



Color recognition sensors, LED analyzers and color online spectrometer



Measurement and inspection systems