



# More Precision.






indu**SENSOR** // Linear inductive displacement sensors



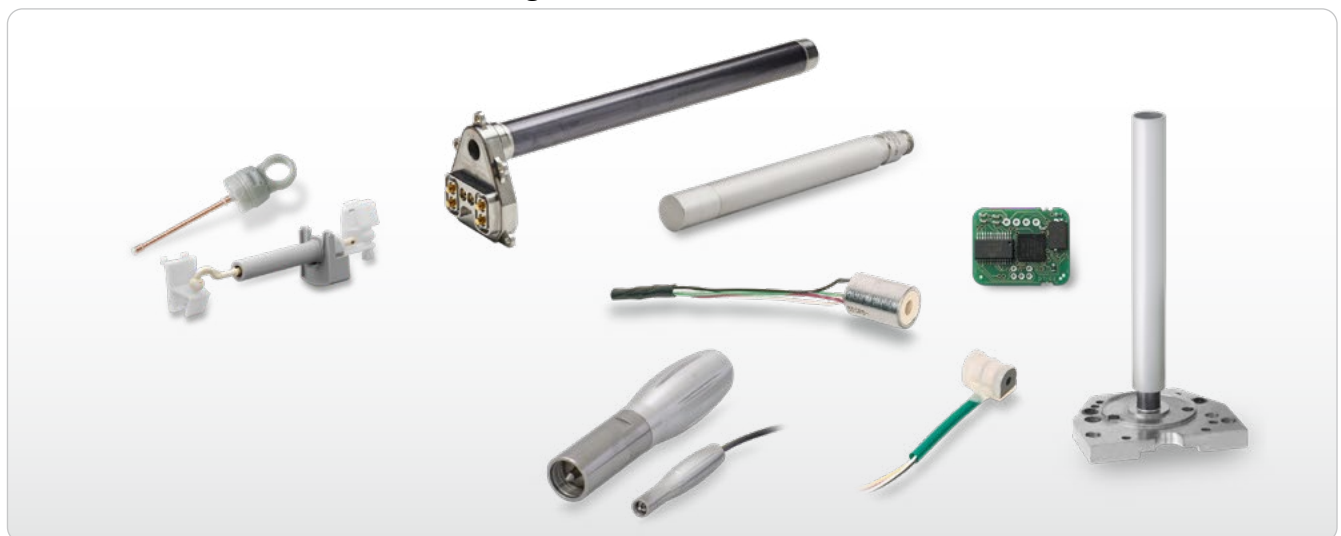
## Inductive displacement sensors for numerous measurement tasks & industries

For decades, Micro-Epsilon has been renowned for its inductive displacement sensors and gauges and has extended the range of classical measurement techniques such as LVDT by further innovative developments. Electromagnetic induSENSOR displacement sensors from Micro-Epsilon are used extensively in applications for automated processes, quality assurance, test rigs, hydraulics, pneumatic cylinders, and building monitoring. Typical measurement tasks require a long service life and reliability.

### Wide range of standard sensors













<p>Gauges with external controller</p>  <p><b>DTA Gauges</b></p> <p>Measuring ranges ±1 ... ±10 mm</p>	<p>Displacement sensors with external controller</p>  <p><b>DTA Sensors</b></p> <p>Measuring ranges ±1 ... ±25 mm</p>	<p>Linear displacement sensors</p>  <p>Measuring ranges 10 ... 50 mm</p>	<p>Robust long-stroke sensors for hydraulics &amp; pneumatics</p>  <p>Measuring ranges 75 ... 630 mm</p>	<p>Special sensors</p>  <p>Measuring ranges 3 /14 /25 mm</p>
LVDT		LDR	EDS	LVP / LDR

### Individual sensors from small to large series



Micro-Epsilon has the experience and the required resources to provide solutions starting from the basic idea through to series production, all from one source – and at a convincing price/performance ratio. A team of specialist development and application engineers implements concepts and designs according to customer-specific requirements. All project members are involved in development, prototype construction and series production.

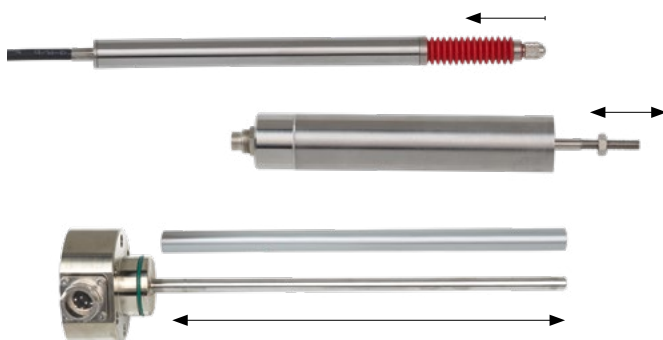
## induSENSOR Overview

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## Powerful controllers with more precision

Inductive displacement sensors from Micro-Epsilon impress with their robustness, reliability under harsh conditions, high signal quality and temperature stability. Combined with the modern MSC controller generation, numerous application fields and possibilities are opening up. Each sensor can be operated with every controller. Digital interfaces, operation via software and inclusion into bus environments support integration into different industries.



### Numerous measuring ranges for multiple measurement tasks

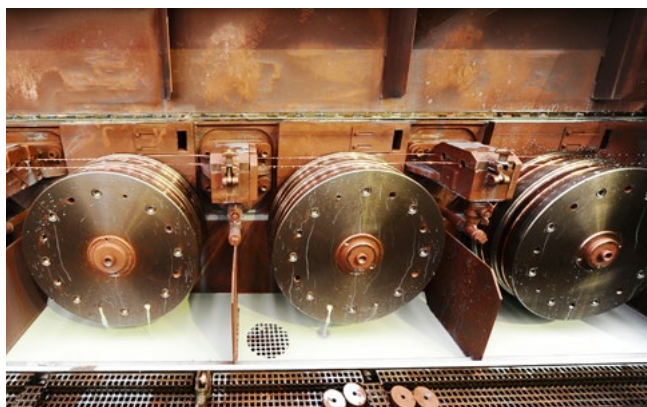
Inductive displacement sensors cover a variety of measuring ranges. Common LVDT displacement sensors and gauges are best suited to measuring ranges up to  $\pm 25$  mm. For large measuring ranges up to 630 mm, EDS long-stroke sensors are suitable.

### Plunger, aluminum tube and probe tips

The different sensor series are equipped with different targets. Plunger, aluminum tube and probe tips can be selected and adapted for mechanical integration. Accurate mounting enables non-contact and wear-free measurements.

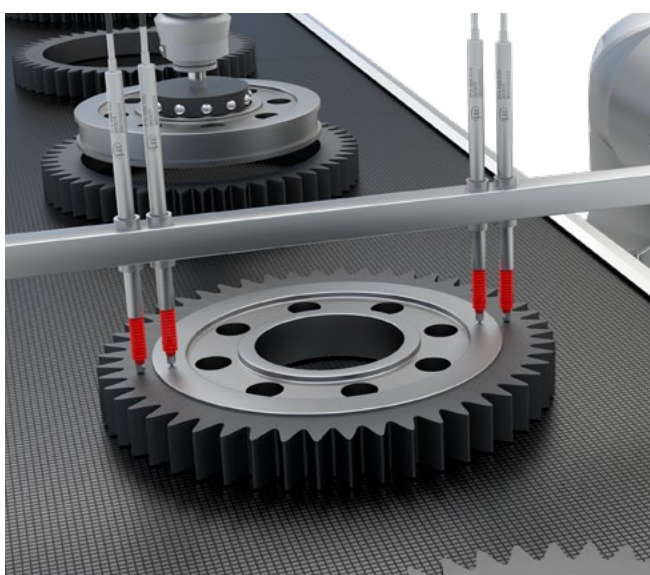
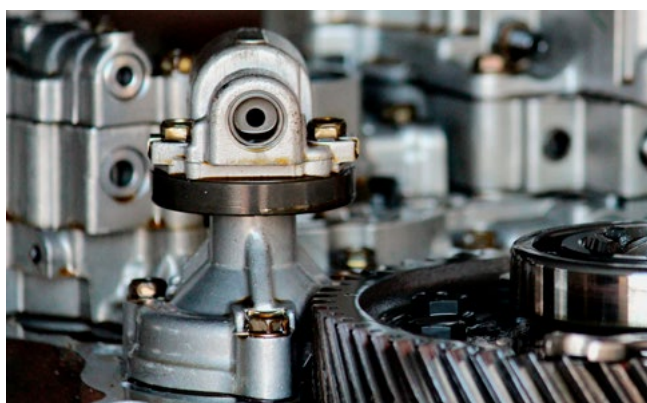
## Long mechanical service life

The induSENSOR series is designed in such a way that there is usually no contact between the target and the sensor. Therefore, no parts rub against each other or wear out. This is how the inductive displacement sensors from Micro-Epsilon attain a long, mechanical service life, which is favorable for measurement tasks requiring high reliability, e.g., in industrial factory and process automation, in aviation and aerospace as well as power plants and research facilities.



## Ideal for harsh ambient conditions

The induSENSOR models stand out due to their robustness and reliability under harsh conditions. As they provide high signal quality, temperature stability, resistance to shocks and vibrations as well as insensitivity to dirt and humidity, these sensors are the preferred choice for industrial measurement tasks.



## High repeatability and signal stability

Inductive sensors from Micro-Epsilon impress with their exceptional precision. Based on advanced technologies, these sensors provide resolutions down to the micrometer range. Combined with high signal stability, the induSENSORS impress in measurement tasks where high accuracy is required.

## Versatile integration possibilities with analog and digital interfaces

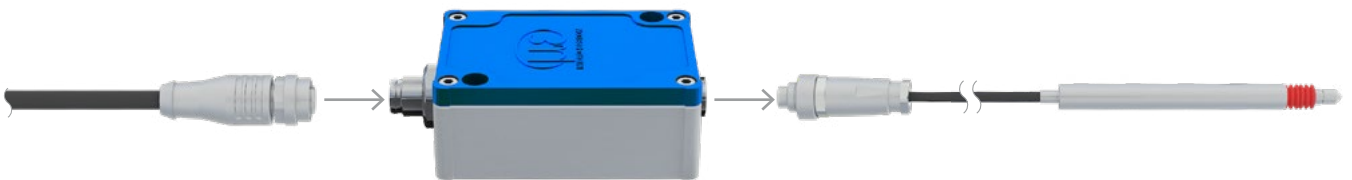
The MSC controllers convert the induced voltage into a standardized output signal. Depending on the controller, analog output types or digital outputs are available. For customer-specific sensor developments, the controller can be integrated directly into the sensor.

## Long Measurement Chains and Industrial Ethernet Connection

The induSENSOR systems are universally applicable and have been tried and tested in various industries. If necessary, the cables can easily be adapted to the respective requirement. When several measuring points are required, the 2-channel controllers or multi-channel systems are used that are equipped with digital interfaces and, in addition, enable integration into Bus environments. If needed, parameter setting of the sensors can be carried out via powerful software or a web interface.

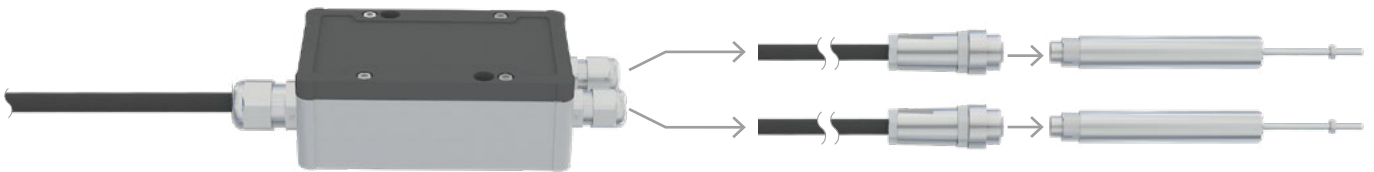
### 1-channel systems

The classic configuration consists of a sensor which is connected to an MSC7401 single-channel controller.



### 2-channel systems

For 2-channel measurement tasks, the MSC7802 controller is used which can be connected to two inductive displacement sensors.



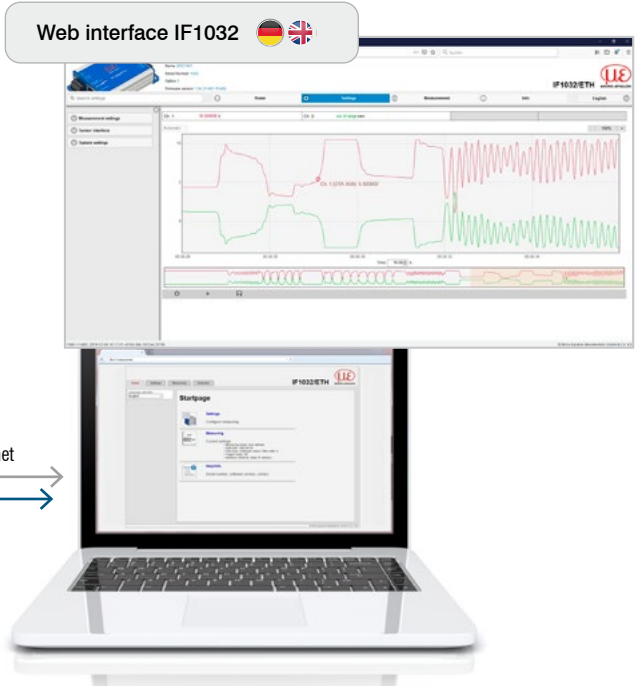
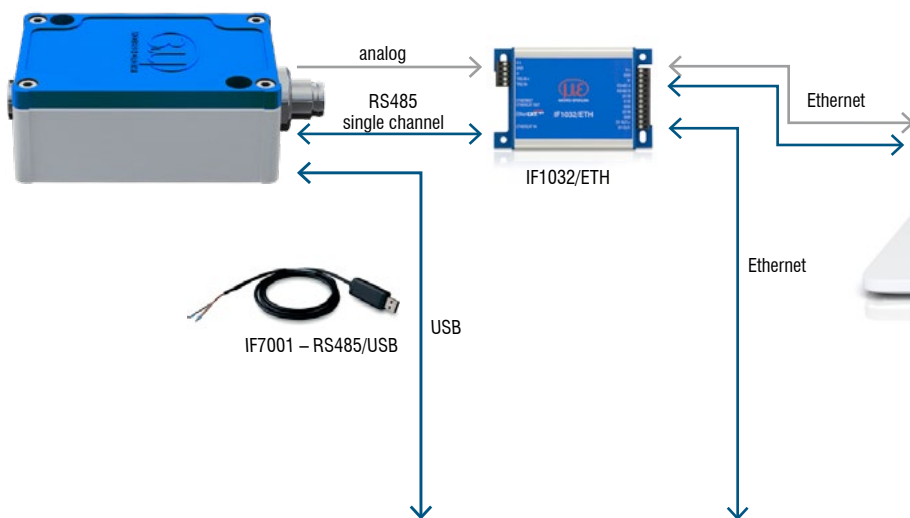
### Multi-channel systems

If more than two channels are required, the MSC7602 is used. This modular controller enables long measurement chains.

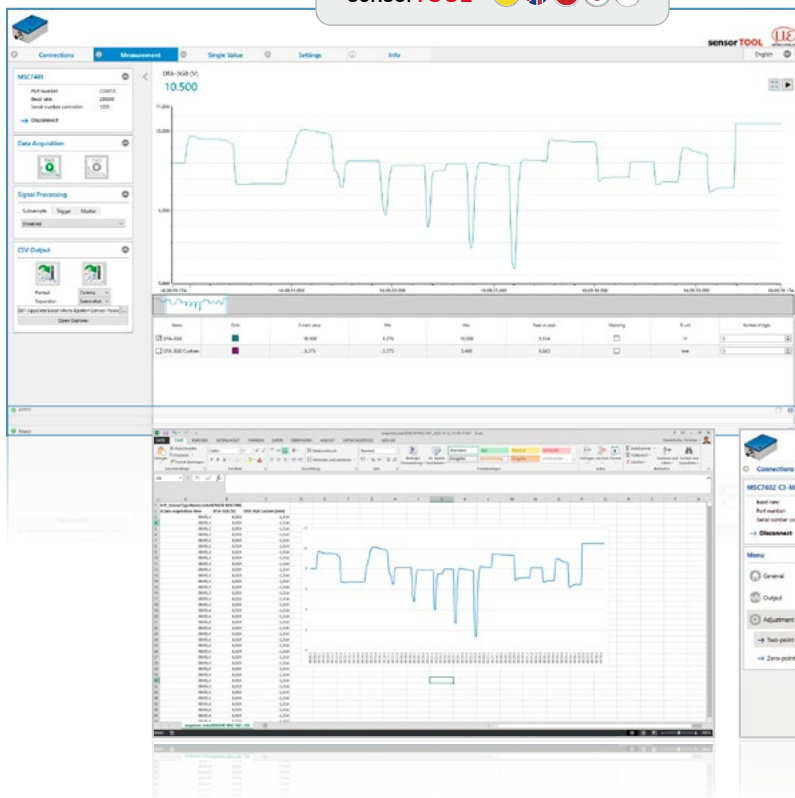


## Parameter Setting via Web Interface & sensorTOOL

The IF1032/ETH interface module allows the induSENSOR series to be accessed via web interface. The web interface is primarily used for display and visualization of measured data. Moreover, sensors can be connected to an EtherCAT bus.

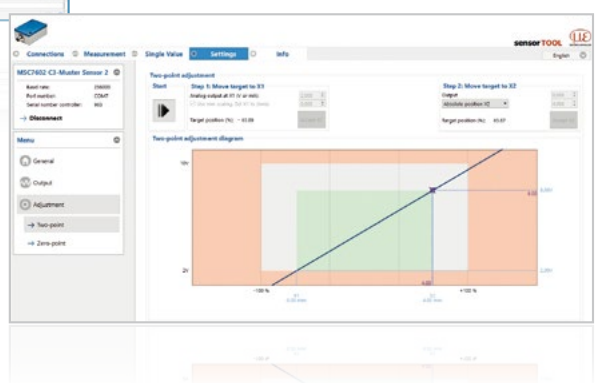


- Data display and scaling via Ethernet and web interface
- CSV export
- Easy integration without admin rights on PC
- Additional EtherCAT interface



The sensorTOOL software can be accessed via the IF1032/ETH and directly via the IF7001 USB converter. In addition to parameter settings, the controller displays, stores and exports measured values.

- Basic settings: sensor type, output signal, frequency response
- 2-point and zero point adjustments
- Scaling
- Visualization of data
- Sub-sampling
- Export



## High Modularity & OEM Capability

### From minor adaptations of standard products ...

If the standard models do not meet certain specific requirements, inductive sensors from the standard range can be adapted accordingly by Micro-Epsilon. Cost-effective implementation can already be achieved with medium-sized quantities (depending on the type and number of changes). Standard induSENSOR models form the basis for these modifications.

#### Ambient conditions

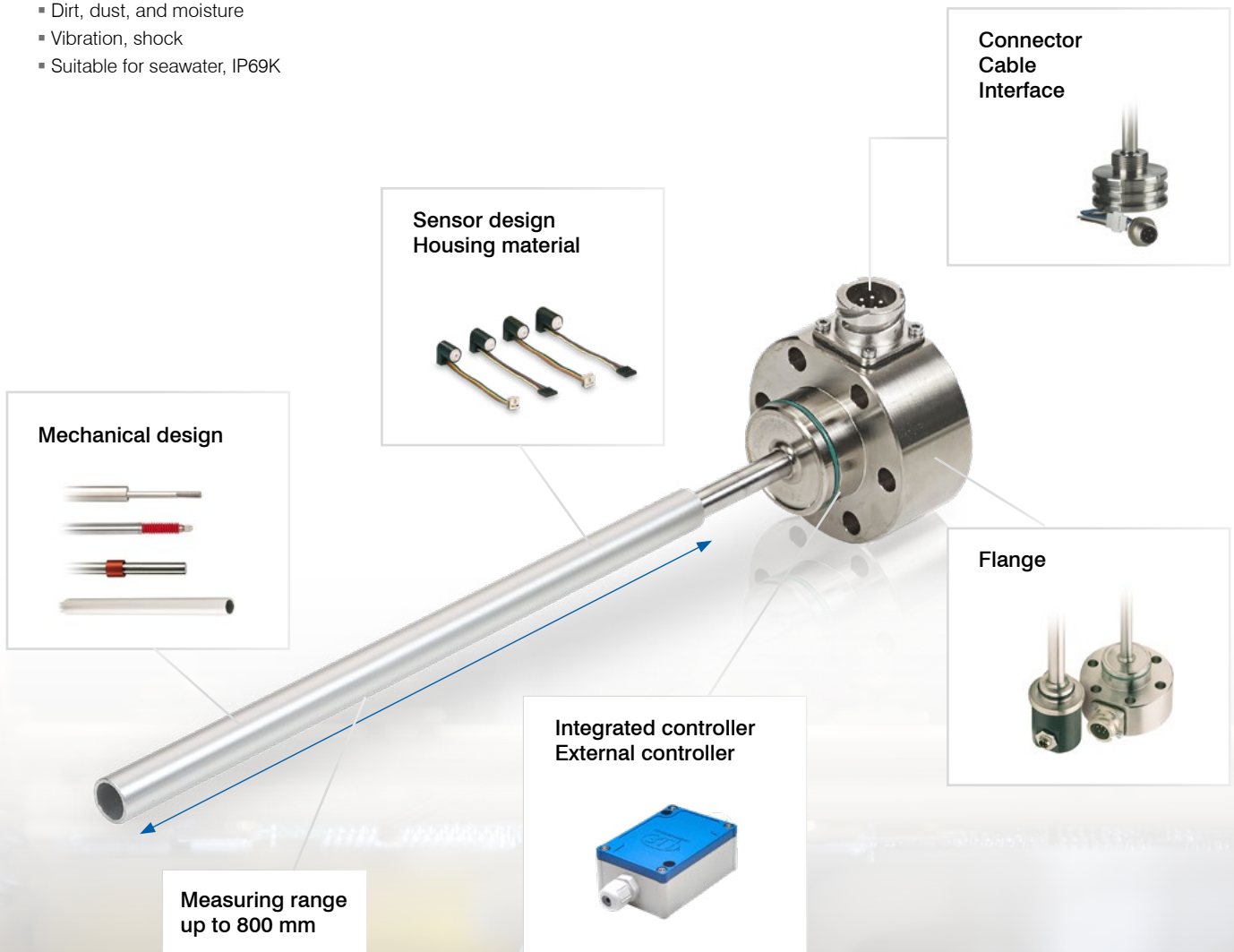
Depending on the location, industry, and application, different environmental conditions occur to which the sensors are adapted:

- Ambient temperature
- Pressure
- Interference fields
- Dirt, dust, and moisture
- Vibration, shock
- Suitable for seawater, IP69K

#### Basic types

Three basic types are available. Based on these technologies, measuring ranges and target versions can be combined with each other.

Technology	Measuring range	Target
① EDS	up to 800 mm	Tube
② LDR	up to 150 mm	Plunger / Probe tip
③ LVDT	up to $\pm 100$ mm	Plunger / Probe tip





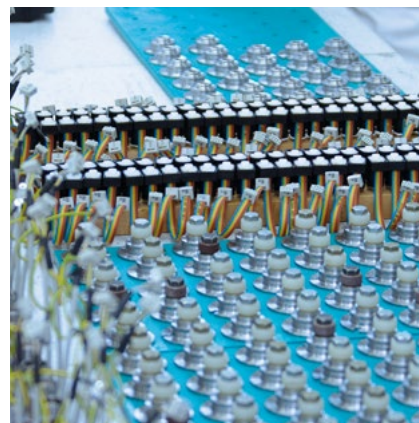
## ... to individual customized solutions

For special applications where large quantities are required, Micro-Epsilon develops sensors that are precisely tailored to the customer's requirements. Geometry, controllers and packaging are custom engineered to suit these specific requirements. Due to the high vertical range of manufacturing at Micro-Epsilon, large quantities can be produced at low cost.

### Fields of application

Customized OEM displacement sensors are often developed for fields of application where the highest standards apply:

- Applications with high ambient pressure
- High temperature environments
- Vacuum
- EX environments
- Contaminated installation and measuring rooms



## Series production

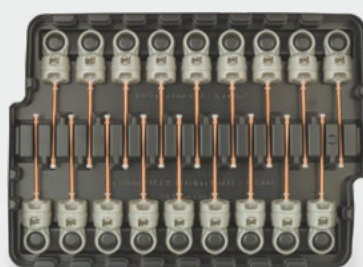
At the Micro-Epsilon headquarters, development projects are initiated and major projects coordinated. The development and sales of specific sensors for OEM customers in large quantities takes place in direct contact with the development and product specialists.

For series production of controllers, modern and automated production systems for screen and silk-screen printing with vision systems, automatic SMD assembly, reflow soldering in computer controlled convection ovens, CFC-free washing in multi-compartment washing systems, automatic die bonding and laser trimming are available.

With production capacities of more than 1 million sensors/year and the use of company-internal resources, the sensors are reasonably priced.

The production equipment for sensors includes the following:

- CNC lathes and milling machines
- Fully automatic four-spindle winding machine
- Arc welding equipment for welding the coil wires
- Varnish dip system for protecting the coil
- Automatic inspection system for testing the coil parameters
- Laser welding and marking systems
- etc.



All production systems are supplied in ergonomic and installation-friendly packaging units. In this respect, environmentally friendly and economical reusable packaging is used. Within the scope of Total Quality Management, a 100% check is integrated for numerous measurement and inspection processes.

### Examples for customer-specific modifications

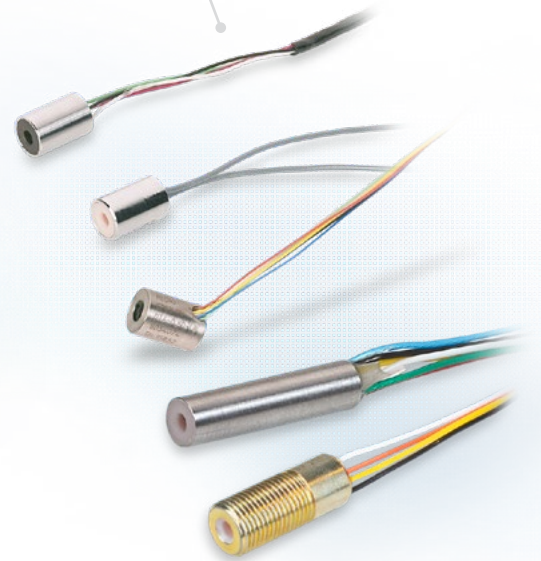
#### Special Systems

- Mechanical adaptations
- ATEX/FM approval
- Additional physical principles



#### Miniature LVDTs

- Small measuring ranges and designs for installation into confined spaces



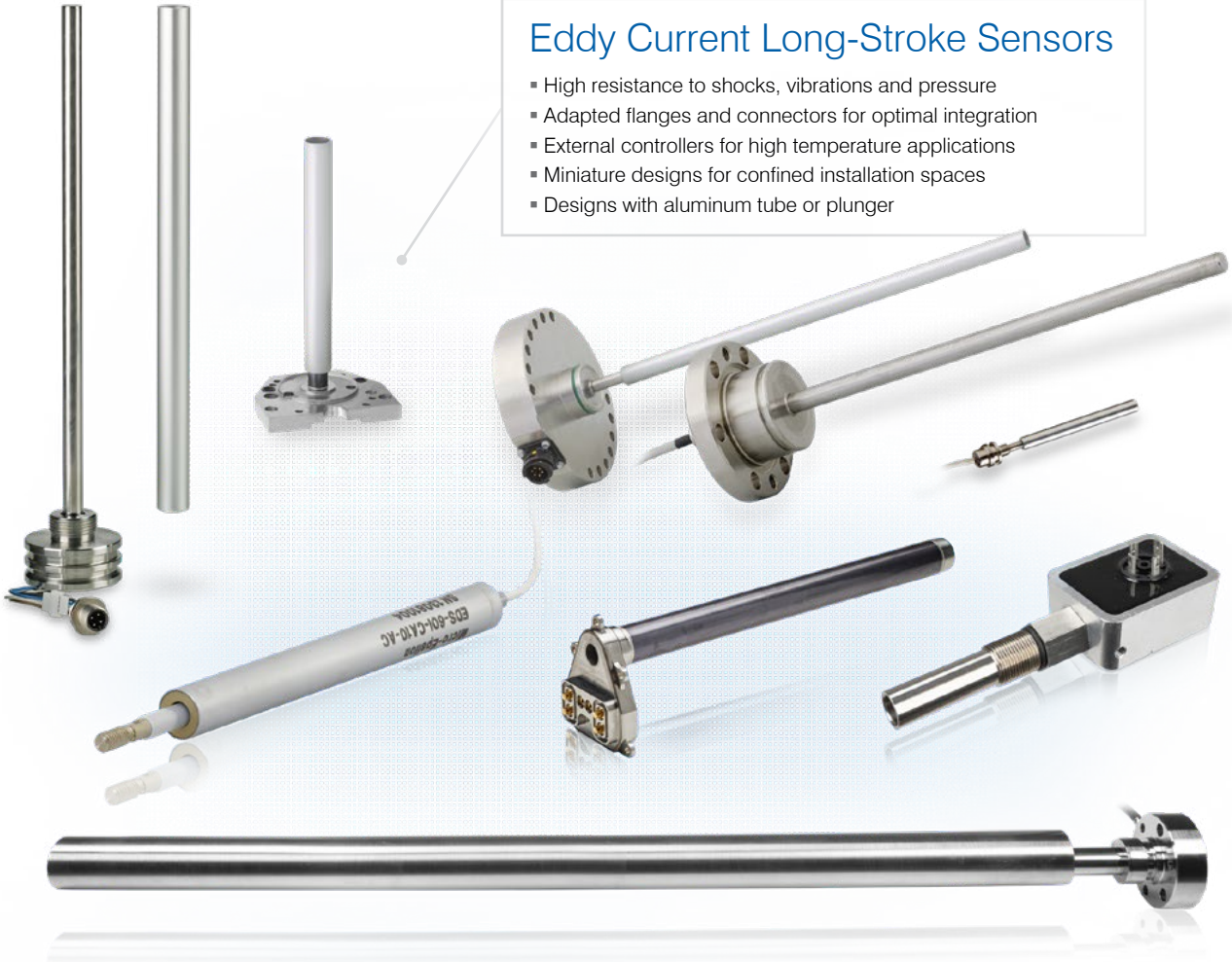
#### Optimized Sensor Technology for Large Series

- Hydraulic valves
- Process valves
- White goods



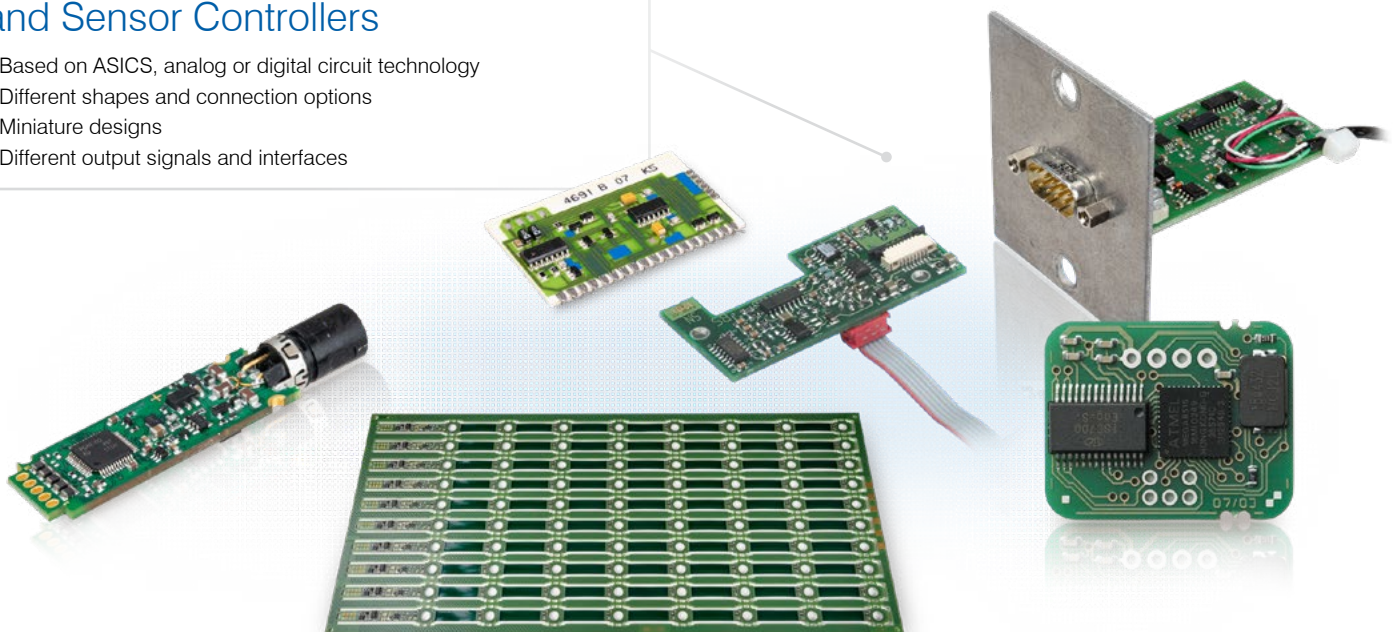
## Eddy Current Long-Stroke Sensors

- High resistance to shocks, vibrations and pressure
- Adapted flanges and connectors for optimal integration
- External controllers for high temperature applications
- Miniature designs for confined installation spaces
- Designs with aluminum tube or plunger








## Adapted Controller Components and Sensor Controllers

- Based on ASICs, analog or digital circuit technology
- Different shapes and connection options
- Miniature designs
- Different output signals and interfaces



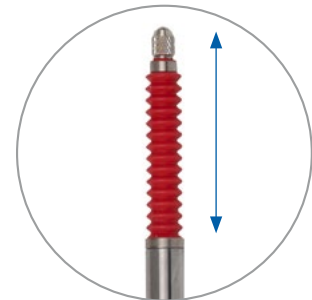


-  **Proven LVDT technology**
-  **Measuring ranges  $\pm 1 \dots \pm 10$  mm**
-  **Low cost especially with a large number of pieces**
-  **Sensor diameter of just  $\varnothing 8$  mm**
-  **Models with pneumatic push**

LVDT gauge sensors DTA-xG8 are primarily used for the measurement and inspection of workpiece geometry (e.g. length, width, diameter, thickness, depth, height). Therefore, different measuring ranges from  $\pm 1$  mm to  $\pm 10$  mm are available. The gauges are particularly suitable for applications involving a large number of pieces.

DTA gauges can be operated with every MSC controller. Depending on this controller, single-/dual-/multi-channel measurements are possible. In addition to the well-established analog output, modern fieldbuses are available for integration purposes.

These gauges have an axial cable outlet and are equipped with either a plain bearing-guided plunger and a return spring, or with a pneumatic push rod. Depending on the measuring object, different probe tips are available.

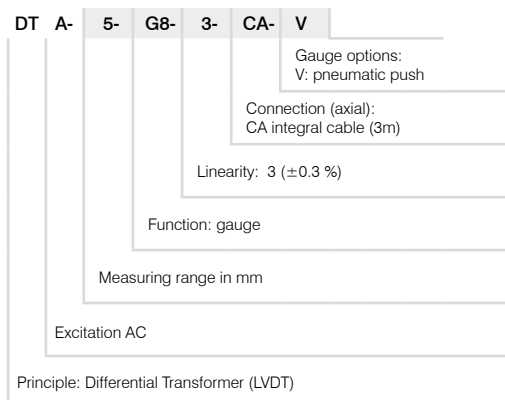


Plunger with return spring



Based on modern interfaces and multi-channel capability, the MSC controllers open up new fields of application.

**Article designation**



Model	DTA-1G8	DTA-3G8	DTA-5G8	DTA-10G8	DTA-1G8-V	DTA-3G8-V	DTA-5G8-V	DTA-10G8-V
Measuring range	±1 mm	±3 mm	±5 mm	±10 mm	±1 mm	±3 mm	±5 mm	±10 mm
Linearity	≤ ±6 μm							
Repeatability <sup>1)</sup>	≤ ±0.3% FSO							
Temperature stability	≤ 250 ppm FSO/K							
Sensitivity	133 mV / mm/V	85 mV / mm/V	53 mV / mm/V	44 mV / mm/V	133 mV / mm/V	85 mV / mm/V	53 mV / mm/V	44 mV / mm/V
Excitation frequency	5 kHz	5 kHz	5 kHz	2 kHz	5 kHz	5 kHz	5 kHz	2 kHz
Excitation voltage	550 mV							
Connection	integrated cable (3 m) with open ends; axial cable outlet; drag-chain suitable; cable diameter of 3.1 mm; min. bending radii: fixed installation 25 mm, moving 38 mm, drag chain 47 mm							
Temperature range	-40 ... +80 °C							
Storage								
Operation	-20 ... +80 °C (without bellows); 0 ... 80 °C (with bellows)							
Pressure resistance	atmospheric pressure							
Shock (DIN EN 60068-2-27)	40 g / 6 ms in 3 axes, 1000 shocks each							
Vibration (DIN EN 60068-2-6)	±1.5 mm / 10 ... 58 Hz in 2 axes, 10 cycles each ±20 g / 58 ... 500 Hz in 2 axes, 10 cycles each							
Protection class (DIN EN 60529)	IP65 (with bellows); IP54 (without bellows)							
Material	Stainless steel (housing); FPM (bellows); PUR (cable sheath); PVC/PP (cable braids)							
Weight	approx. 70 g	approx. 70 g	approx. 75 g	approx. 85 g	approx. 70 g	approx. 70 g	approx. 80 g	approx. 85 g
Typical spring forces <sup>2)</sup>	SMR	1.3 N	0.8 N	1 N	0.7 N	depending on air pressure		
	MMR	1.55 N	1.5 N	1.9 N	1.9 N			
	EMR	2 N	2.5 N	3 N	3.5 N			
Compatibility	MSC7401, MSC7802, MSC7602							
Typ. service life	5 million cycles							

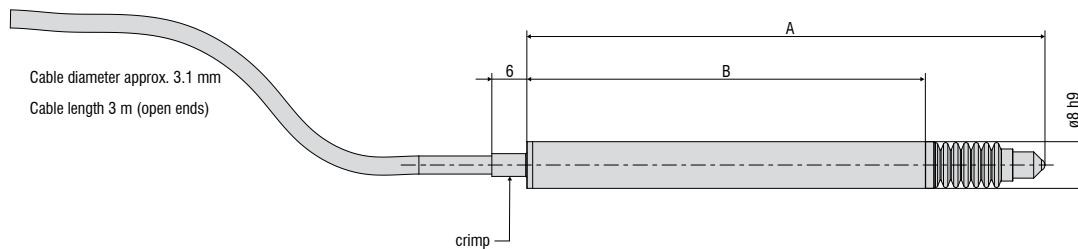
FSO = Full Scale Output

SMR = Start of measuring range, MMR = Mid of measuring range, EMR = End of measuring range

<sup>1)</sup> Averaging over 100 values; 200 repetitions

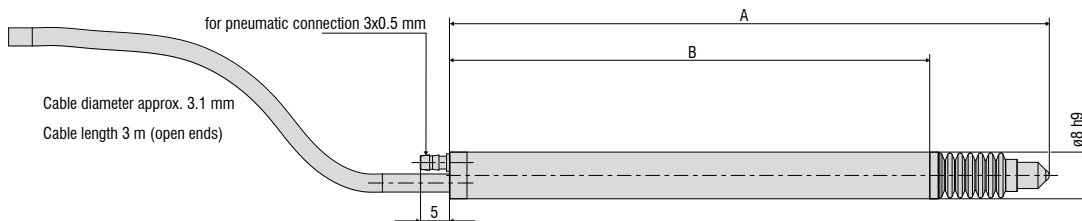
<sup>2)</sup> Removing the bellows changes the spring forces

#### DTA-xG8-3-CA



Model	A (zero position)	B
DTA-1G8-3-CA	82.8 mm	64.3 mm
DTA-3G8-3-CA	88.2 mm	68.3 mm
DTA-5G8-3-CA	118.0 mm	89.5 mm
DTA-10G8-3-CA	155.0 mm	121.7 mm

#### DTA-xG8-3-CA-V



Modell	A (zero position)	B
DTA-1G8-3-CA-V	94.8 mm	76.3 mm
DTA-3G8-3-CA-V	102.8 mm	82.3 mm
DTA-5G8-3-CA-V	134.0 mm	105.3 mm
DTA-10G8-3-CA-V	171.0 mm	137.3 mm

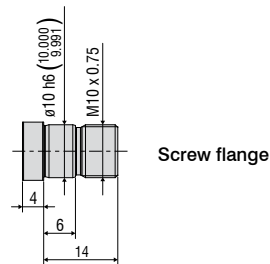
Dimensions in mm, not to scale

**Sensor cables**

- C701-3 Sensor cable, 3 m, with cable connector and tin-plated free ends
- C701-6 Sensor cable, 6 m, with cable connector and tin-plated free ends
- C701/90-3 Sensor cable, 3 m, with 90° cable connector and tin-plated free ends
- IF7001 Single-channel USB/RS485 converter for MSC7xxx

**Service**

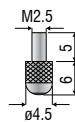
- Assembly of screw flange - DTA-xG8
- Connector assembly M9 and cable reduction XXXX mm - DTA-x
- Connector assembly M9 - DTA-x



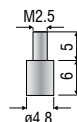
**Probe tips**

- Type 2 probe tip / hard metal
- Type 2 probe tip / plastics
- Type 2 probe tip / ruby
- Type 2 probe tip / steel
- Type 10 probe tip / steel
- Type 11 probe tip / steel
- Type 13 probe tip / steel

**Standard probe tip: type 2**



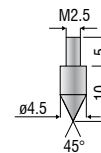
**Option: type 10**



**Option: type 11**

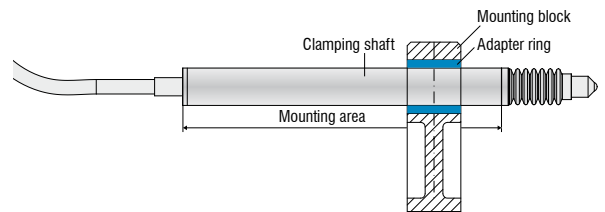


**Option: type 13**

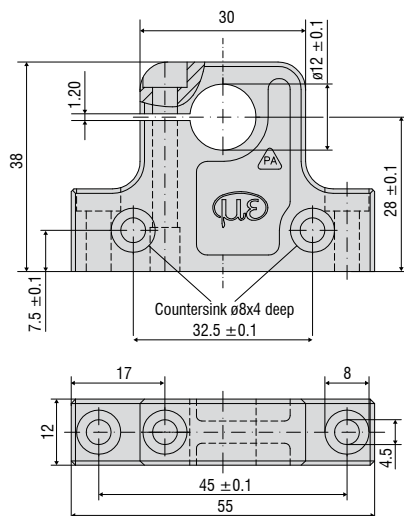


**Sensor mounting**

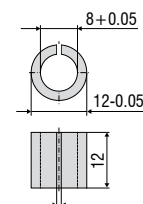
- MBS12/8 Mounting block
  - MBS12/8 Adapter ring
- Sensor mounting for circumferential clamping for reduction to D8 (gauge)



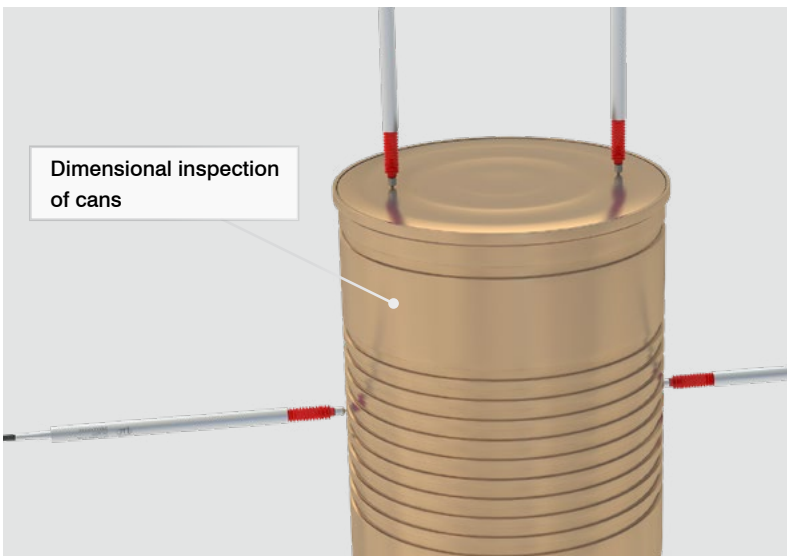
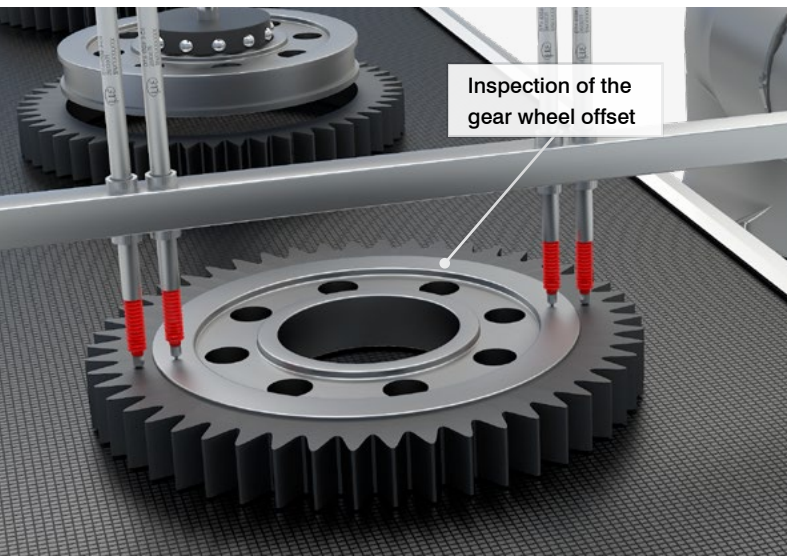
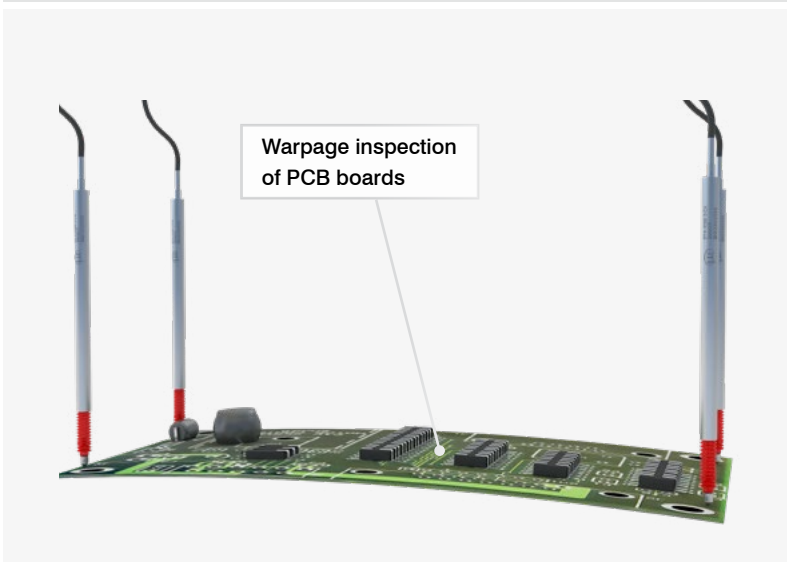
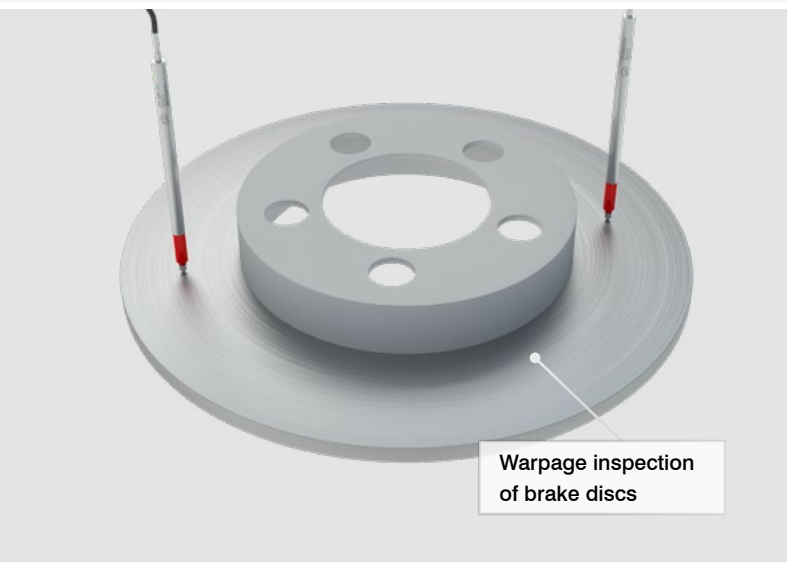
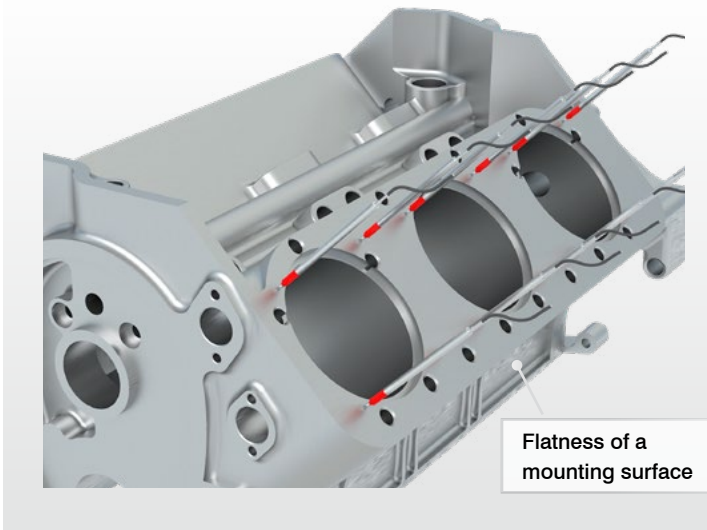
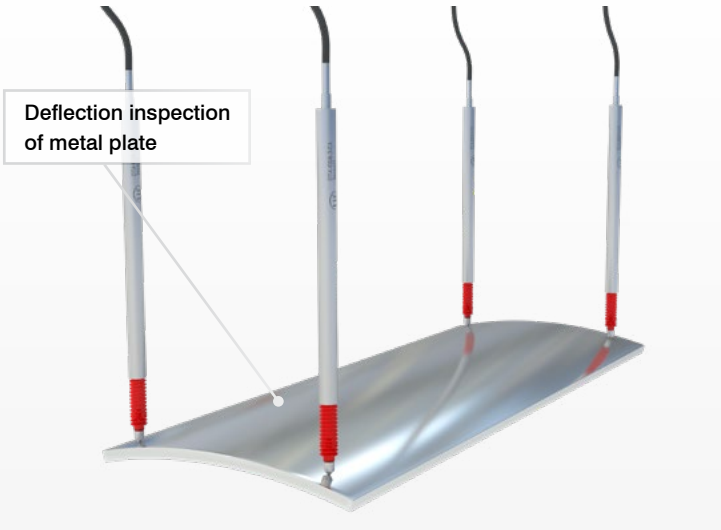
**Mounting block MBS12/8**








**Adapter ring**



Gauges from Micro-Epsilon have many possible fields of application. Due to different measuring ranges and configuration settings, the gauges are suitable for numerous measurement and inspection tasks. Combined with multi-channel controllers, the DTA gauges are often used for dimensional measurement and inspection tasks, e.g., in automated quality control, R&D and production monitoring.





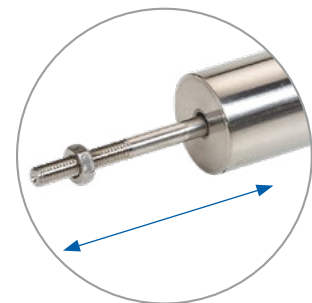
-  **Proven LVDT technology**
-  **Measuring ranges ±1 ... ±25 mm**
-  **Extremely accurate also under difficult ambient conditions**
-  **Long-term stability**
-  **Robust design IP67**

LVDT displacement sensors have a plunger which moves freely in the sensor housing. The plunger is joined to the object by a thread to transfer the movement of the measuring object. The measurement process in the sensor takes place without contact and is therefore wear-free.

The displacement sensors are primarily used to measure and monitor movements, displacements, positions, strokes, deflections, dislocations, etc. in vehicles, machines and systems.

The high sensor resolution is only limited by the noise of the sensor controller. Another advantage of the symmetric LVDT sensors is their zero point stability. The sensors are supplied with an excitation frequency of 1 to 5 kHz depending on the measuring range and an excitation voltage of  $0.4V_{eff}$ . Adapted sensor controllers are available for this purpose.

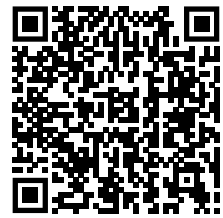
With appropriate setting possibilities for the excitation frequency and excitation voltage, the sensors can also be operated with alternative controllers.



Freely moving plunger

**Article designation**

DT	A-	10-	D-	3-	CA-	W
Options (on request): W Welded sensor housing (water proof up to 5 bar) P Pressure-resistant sensor housing with tightness test (up to 100 bar) F Pressure-resistant mounting flange O-ring seal H High-temperature sensor models up to 200 °C with integral Teflon cable (only for sensor models with -CA/-CR connections)						
Axial connections			Radial connections			
CA integral cable (3m)			CR integral cable (3 m)			
SA plug-in connection			SR plug-in connection			
Linearity: 5 (±0.5 %)		3 (±0.3 %)		1.5 (±0.15 %)		
Function: displacement sensor						
Measuring range in mm						
Excitation AC						
Principle: Differential Transformer (LVDT)						



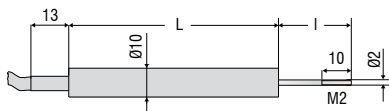


Model	DTA-1D	DTA-3D	DTA-5D	DTA-10D	DTA-15D	DTA-25D	
Series	CA, SA	CA, SA	CA, SA	CA, SA	CA, SA, CR, SR	CA, SA, CR, SR	
Measuring range	±1 mm	±3 mm	±5 mm	±10 mm	±15 mm	±25 mm	
Linearity	≤ ±0.5 % FSO	-	-	-	-	≤ ±300 μm	
	≤ ±0.3 % FSO	≤ ±6 μm	≤ ±18 μm	≤ ±30 μm	≤ ±60 μm	≤ ±90 μm	
	≤ ±0.15 % FSO	≤ ±3 μm	≤ ±9 μm	≤ ±15 μm	on request		
Temperature stability <sup>1)</sup>	Zero	≤ 70 ppm FSO/K					
	Max. temp. error	≤ 150 ppm FSO/K					
Sensitivity	133 mV / mm/V	85 mV / mm/V	53 mV / mm/V	44 mV / mm/V	45 mV / mm/V	33 mV / mm/V	
Excitation frequency	5 kHz			2 kHz	1 kHz		
Excitation voltage	550 mV						
Connection	CA/CR	integrated cable (3 m) with open ends; radial or axial cable outlet depending on series; cable diameter 4.6 mm; min. bending radius 20 mm (fixed installation)					
	SA/SR	5-pin connector; radial or axial output depending on series (see accessories for connection cable)					
Temperature range	Storage	-40 ... +80 °C					
	Operation	-20 ... +80 °C (optional up to 200 °C on request)					
Pressure resistance	atmospheric pressure (optional 5 bar or 100 bar on front side on request)						
Shock (DIN EN 60068-2-27)	40 g / 6 ms in 3 axes, 1000 shocks each 100 g / 6 ms in 3 axes, 3 shocks each						
Vibration (DIN EN 60068-2-6)	±1.5 mm / 10 ... 58 Hz in 2 axes, 10 cycles each; ±20 g / 58 ... 500 Hz in 2 axes, 10 cycles each						
Protection class (DIN EN 60529)	IP67 (plugged)						
Material	Stainless steel (housing)						
Weight	Sensor CA/CR	approx. 90 g	approx. 100 g	approx. 100 g	approx. 105 g	approx. 195 g	approx. 230 g
	Sensor SA/SR	approx. 15 g	approx. 20 g	approx. 25 g	approx. 30 g	approx. 106 g	approx. 145 g
	Plunger	approx. 2 g	approx. 3 g	approx. 4 g	approx. 5 g	approx. 12 g	approx. 17 g
Compatibility	MSC7401, MSC7802, MSC7602						

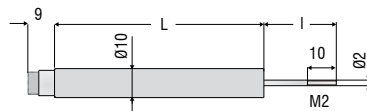
FSO = Full Scale Output

<sup>1)</sup> Determined according to box method (-40 ... +80 °C)

**Sensor types with measuring range up to ±10 mm** (inner diameter 2.7 mm; plunger diameter 2 mm)

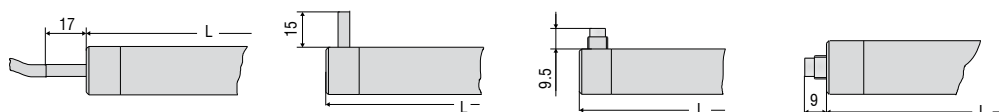


**Type - CA**  
with integral cable



**Type - SA**  
with axial plug connection

**Sensor types with measuring range ±15 mm and ±25 mm** (inner diameter 4.8 mm; plunger diameter 4 mm)



**Type - CA**  
with integral cable

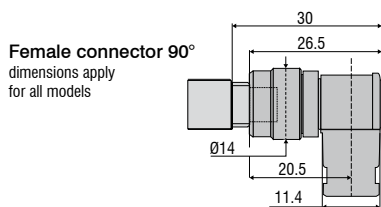
**Type - CR**  
with integral cable (radial)

**Type - SR**  
with radial plug connection

**Type - SA**  
with axial plug connection

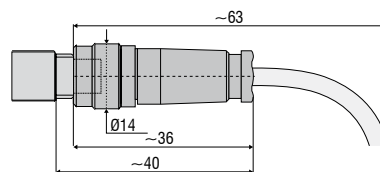
Basic model	DTA-1D-		DTA-3D-		DTA-5D-		DTA-10D-		DTA-15D-				DTA-25D-			
	CA	SA	CA	SA	CA	SA	CA	SA	CA	CR	SA	SR	CA	CR	SA	SR
Connection	CA	SA	CA	SA	CA	SA	CA	SA	CA	CR	SA	SR	CA	CR	SA	SR
Housing length L	40 mm	40 mm	57 mm	57 mm	73 mm	73 mm	87 mm	87 mm	106.5 mm				143.5 mm			
Plunger length l <sup>1)</sup>	19 mm		29 mm		30 mm		35 mm		51 mm				62 mm			
Housing diameter	10 mm								20 mm							

<sup>1)</sup> Plunger in zero position (±10% of measuring range ±1 mm)

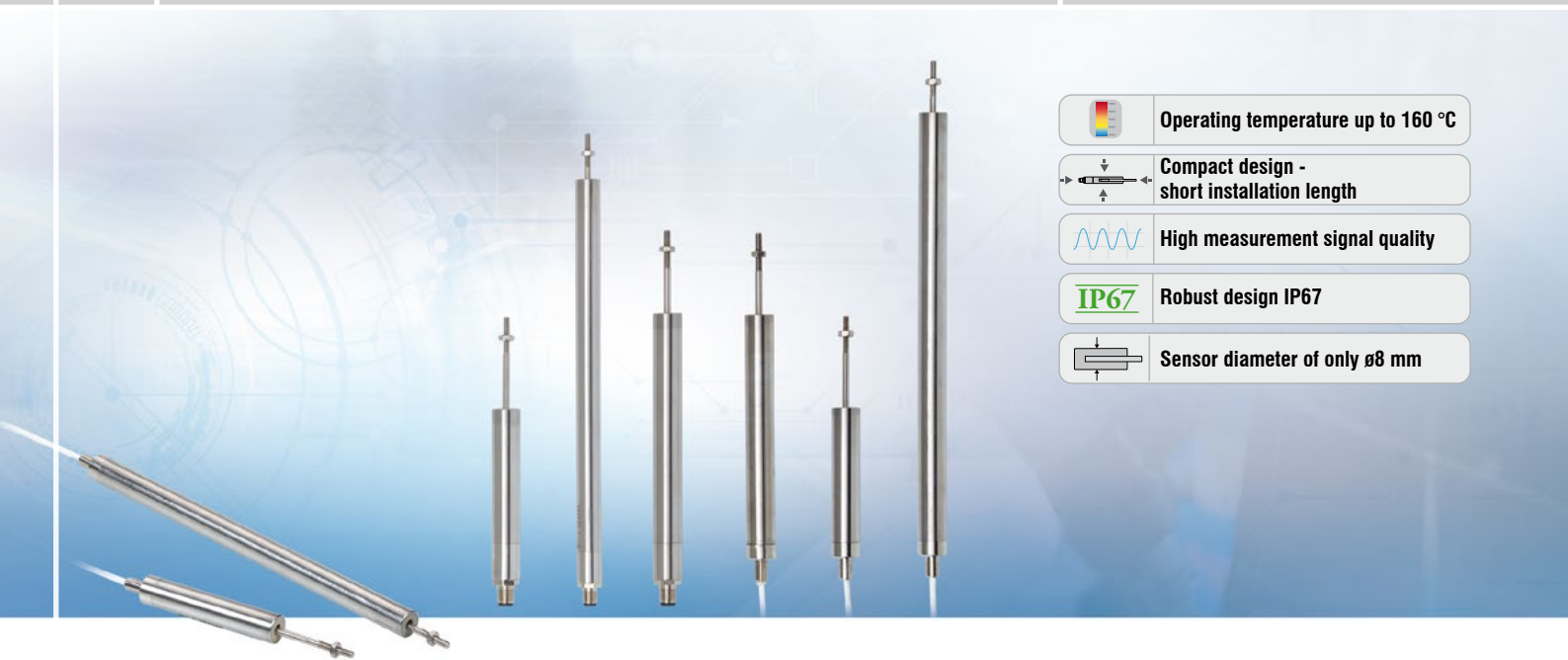


**Female connector 90°**  
dimensions apply for all models

**Female connector**  
dimensions apply for all models



Dimensions in mm, not to scale



Operating temperature up to 160 °C



Compact design -  
short installation length



High measurement signal quality



Robust design IP67

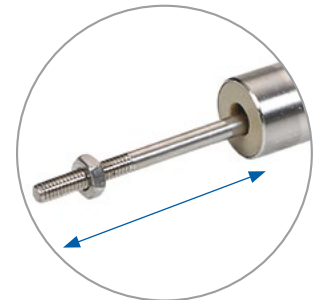


Sensor diameter of only  $\varnothing 8$  mm

The specific sensor configuration of the LDR linear displacement sensors is characterized by its short, compact design and small diameter. Only three connections are required as interface to the sensor. Their compact design and the small sensor diameter allow the measuring systems to be installed in confined spaces.

#### Fields of application

Low-cost LDR sensors are also particularly suitable for large-scale installation under restricted spatial conditions and in industrial environments with a high measuring rate.



Freely moving plunger

#### Article designation

LDR-

10-

CA

Axial connections  
CA integral cable (2 m)  
SA plug-in connection

Measuring range in mm

Principle: half-bridge sensor

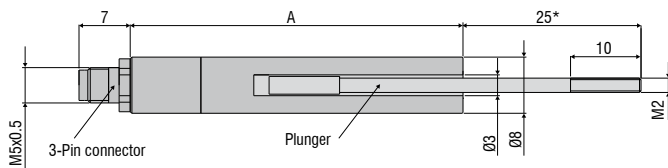


Model		LDR-10	LDR-25	LDR-50
Series		SA, CA	SA, CA	SA, CA
Measuring range		10 mm	25 mm	50 mm
Linearity	typ.	$\leq \pm 30 \mu\text{m}$	$\leq \pm 88 \mu\text{m}$	$\leq \pm 250 \mu\text{m}$
	max.	$\leq \pm 50 \mu\text{m}$	$\leq \pm 125 \mu\text{m}$	$\leq \pm 375 \mu\text{m}$
Temperature stability	Zero	$\leq 30 \text{ ppm FSO/K}$		$\leq 80 \text{ ppm FSO/K}$
	Max. temp. error	$\leq 100 \text{ ppm FSO/K}$		$\leq 150 \text{ ppm FSO/K}$
Sensitivity		51 mV / mm/V	21 mV / mm/V	5.5 mV / mm/V
Excitation frequency		21 kHz	13 kHz	9 kHz
Excitation voltage		550 mV		
Connection	CA	integrated cable (2 m) with open ends; axial cable outlet; cable diameter 1.8 mm; min. bending radius 10 mm (fixed installation)		
	SA	3-pin connector; axial output (see accessories for connection cable)		
Temperature range <sup>1)</sup>	Storage	SA: -40 ... +80 °C; CA: -40 ... +160 °C		
	Operation	SA: -15 ... +80 °C; CA: -40 ... +160 °C		
Pressure resistance		atmospheric pressure		
Shock (DIN EN 60068-2-27)		40 g / 6 ms in 3 axes, 1000 shocks each 100 g / 6 ms in 3 axes, 3 shocks each		
Vibration (DIN EN 60068-2-6)		$\pm 1.5 \text{ mm} / 10 \dots 58 \text{ Hz}$ in 2 axes, 10 cycles each $\pm 20 \text{ g} / 58 \dots 500 \text{ Hz}$ in 2 axes, 10 cycles each		
Protection class (DIN EN 60529)		IP67 (plugged)		
Material		Stainless steel (housing)		
Weight	Sensor	approx. 9 g (SA); approx. 24 g (CA)	approx. 14 g (SA); approx. 28 g (CA)	approx. 23 g (SA); approx. 37 g (CA)
	Plunger	approx. 1.5 g	approx. 2.2 g	approx. 3.5 g
Compatibility		MSC7401, MSC7802, MSC7602		

FSO = Full Scale Output

<sup>1)</sup> Determined according to box method (-40 ... +80 °C)

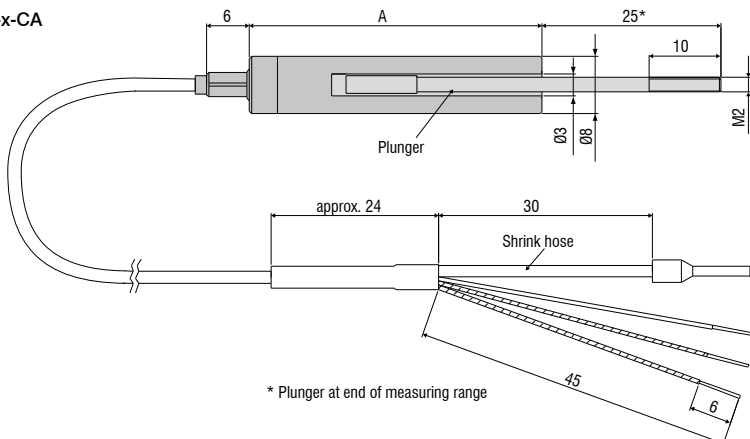
LDR-x-SA



\* Plunger at end of measuring range

Model	A
LDR-10-SA	47 mm
LDR-25-SA	73 mm
LDR-50-SA	127 mm

LDR-x-CA



\* Plunger at end of measuring range

Model	A
LDR-10-CA	41 mm
LDR-25-CA	67 mm
LDR-50-CA	121 mm

Dimensions in mm, not to scale

## Accessories for DTA series

### Sensor cables

C701-3	Sensor cable, 3 m, with cable connector and tin-plated free ends
C701-6	Sensor cable, 6 m, with cable connector and tin-plated free ends
C701/90-3	Sensor cable, 3 m, with 90° cable connector and tin-plated free ends

### Service

Connector assembly M9 and cable reduction XXXX mm - DTA-x  
 Connector assembly M9 - DTA-x (see page 30/31)

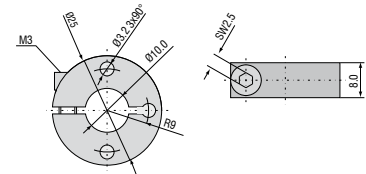
### Spare plungers

Plunger for DTA-1D	Spare plunger
Plunger for DTA-3D	Spare plunger
Plunger for DTA-5D	Spare plunger
Plunger for DTA-10D	Spare plunger
Plunger for DTA-15D	Spare plunger
Plunger for DTA-25D	Spare plunger

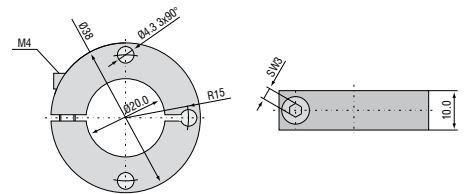
### Sensor mounting

0483090.01	DTA-F10	Mounting flange, slotted for DTA-1D, DTA-3D, DTA-5D, DTA-10D
0483083.02	DTA-F20	Mounting flange, slotted for DTA-15D, DTA-25D

Flange DTA-F10



Flange DTA-F20



## Accessories for LDR series

### Connection cables

0157047	C7210-5/3	Sensor cable, 5 m, with cable connector
0157048	C7210/90-5/3	Sensor cable, 5 m, with 90° cable connector

### Service

Connector assembly M9 and cable reduction XXXX mm - DTA-x  
 Connector assembly M9 - DTA-x (see page 30/31)

### Supply cable

2901087	PC710-6/4	Supply/output cable, 6 m
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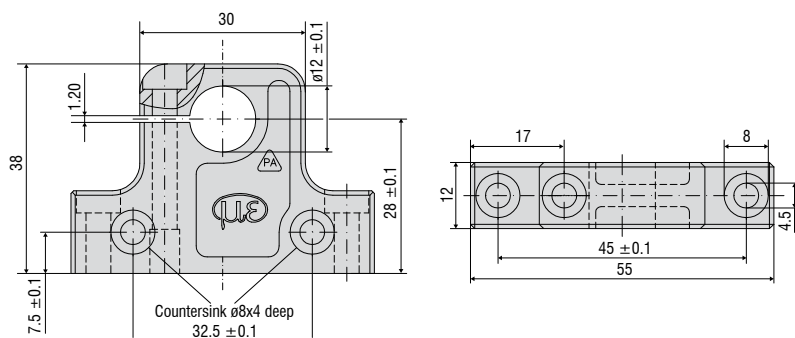
### Spare plungers

0800136	LDR-10	Spare plunger
0800137	LDR-25	Spare plunger
0800138	LDR-50	Spare plunger

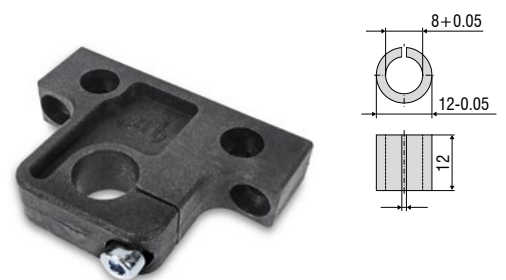
### Connector assembly

MBS12/8 Mounting block Sensor installation for circumferential clamping  
 MBS12/8 Adapter ring for reduction to D8 (gauge / LDR)

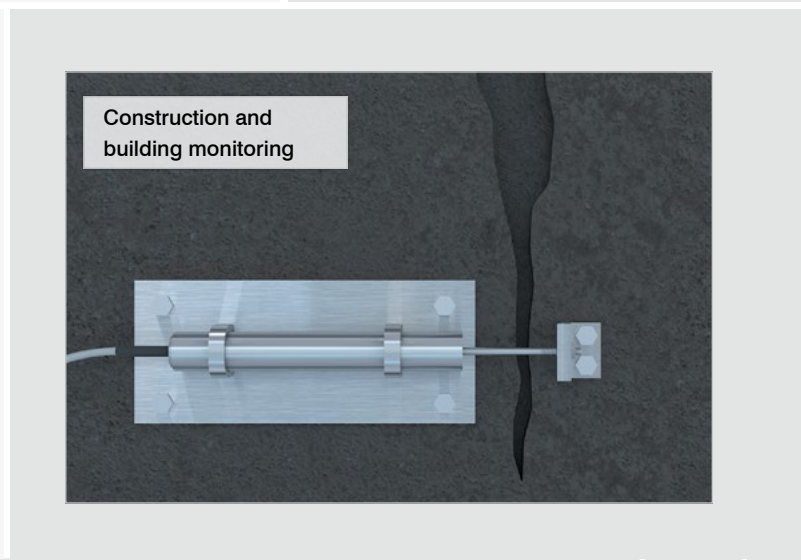
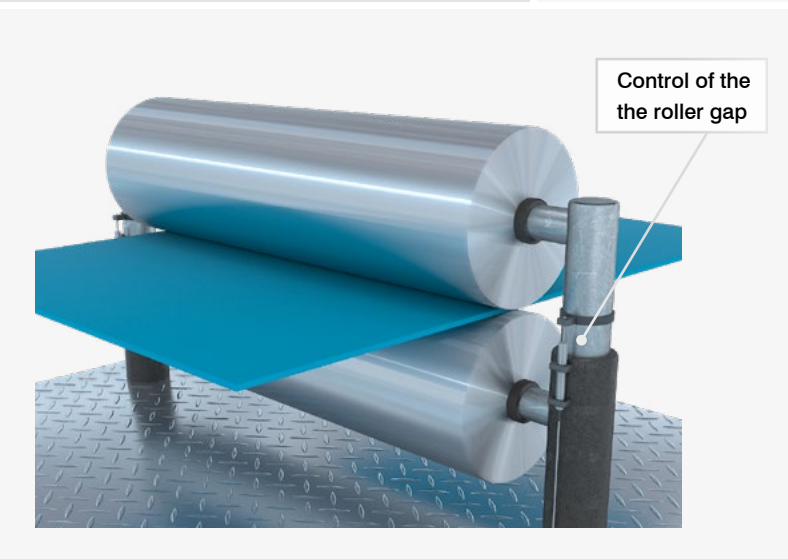
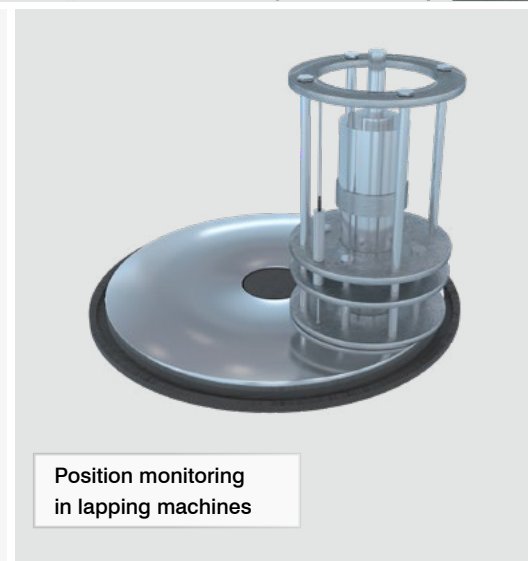
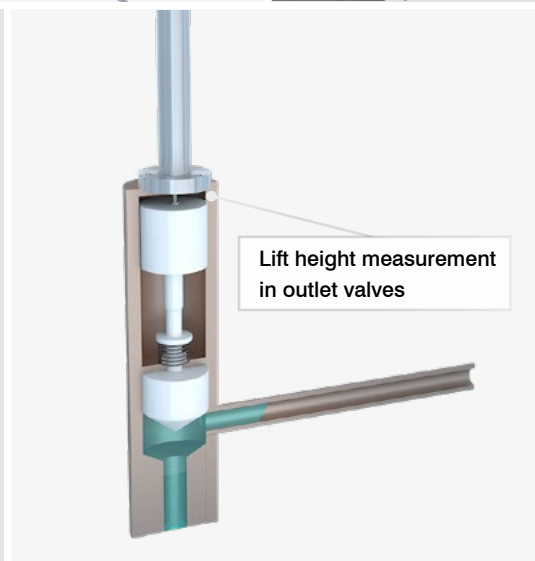
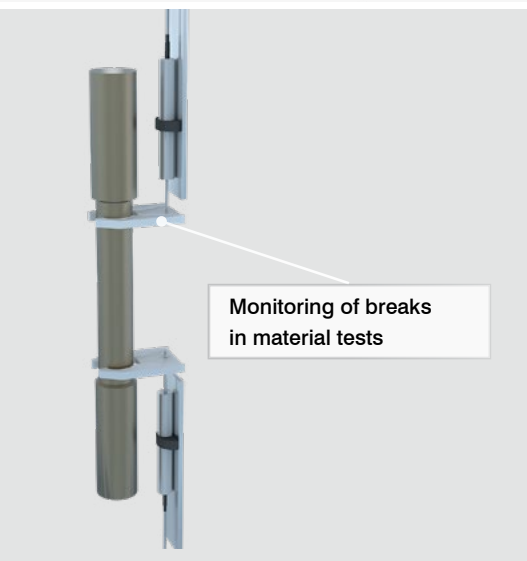
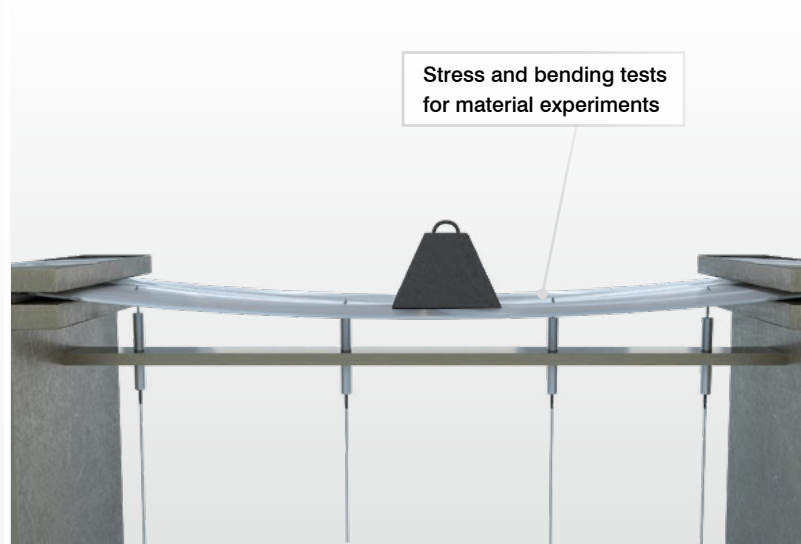
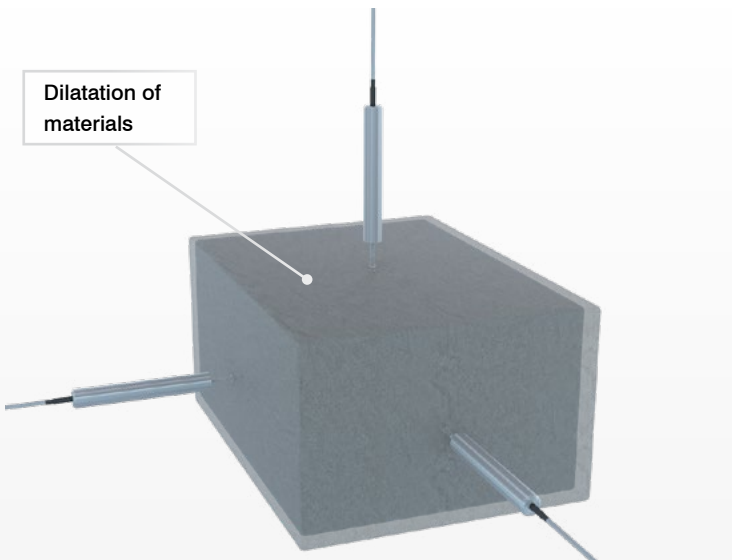
#### Mounting block MBS12/8

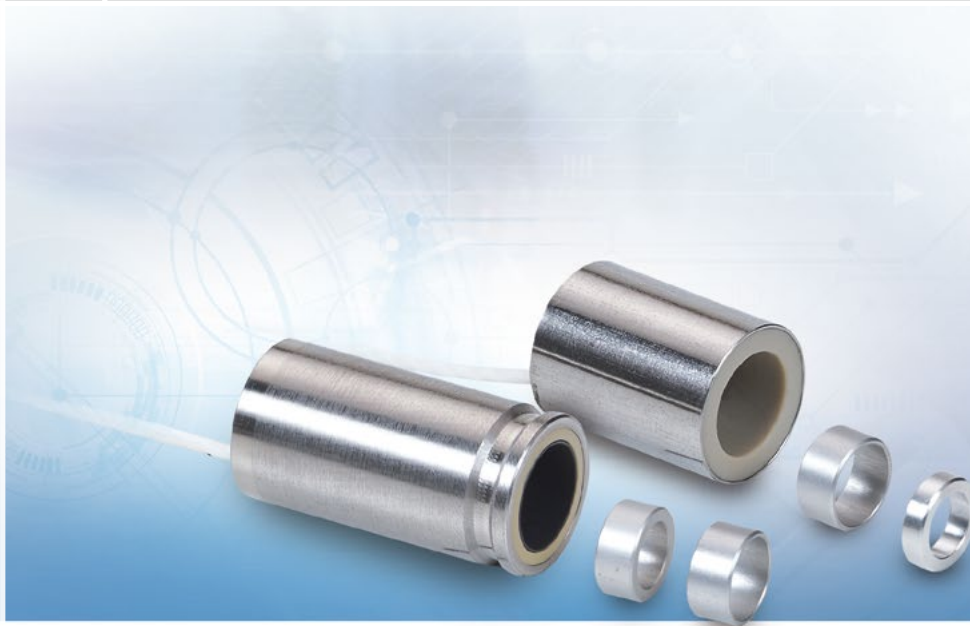






#### Adapter ring



The DTA / LDR displacement sensors are suitable for numerous measurement tasks which require robust designs and high signal stability. Due to their wear-free design, the DTA / LDR sensors impress with longevity and long-term stability.





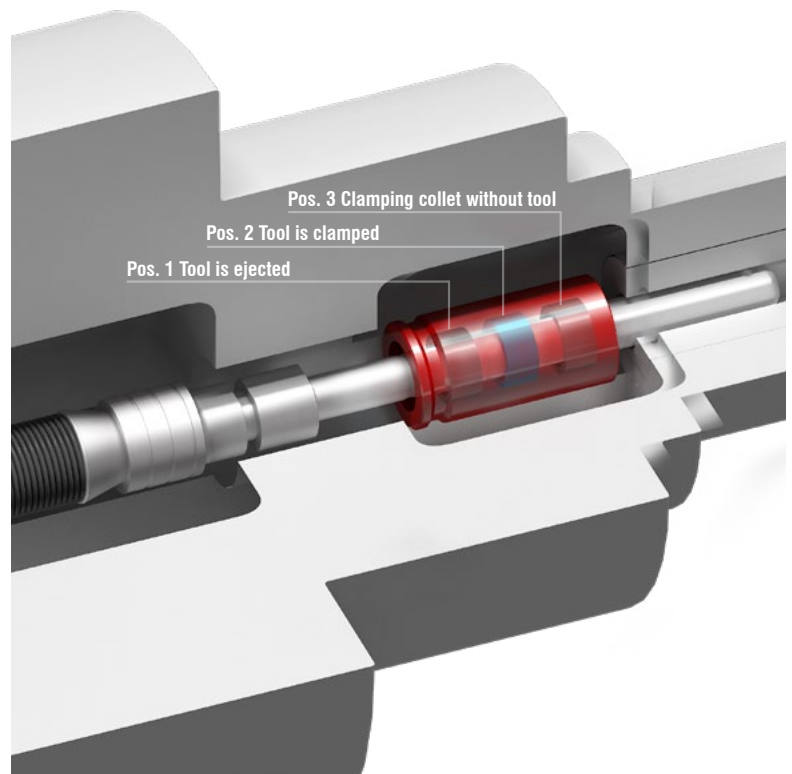
	<b>Compact design</b>
	<b>High ambient temperatures</b>
	<b>High temperature stability</b>
	<b>High repeatability</b>
<b>IP67</b>	<b>Robust design IP67</b>

The LVP-25-Z20 and LDR-14-Z20 sensors are designed for monitoring the clamping position in machine tools.

The cylindrical sensors are integrated into the release device and detect the clamping stroke of the drawbar. The measuring object is a ring which is glued onto the drawbar.

The sensors can be universally used for different types of tools due to their extremely compact sensor design. The sensors provide an analog signal according to the stroke motion of the drawbar when clamping the tool. Consequently, continuous monitoring is possible without the switching point having to be set mechanically.

The miniature sensor controller can either be accommodated at the point of measurement or in the control cabinet. Thanks to their high accuracy, the sensors contribute significantly to meeting the ever increasing requirements for precision and availability of machine tools.



Model		LVP-25-Z20	LDR-14-Z20
Measuring range		25 mm	14 mm
Resolution <sup>1)</sup>	50 Hz	6 $\mu\text{m}$	7 $\mu\text{m}$
	300 Hz	12 $\mu\text{m}$	14 $\mu\text{m}$
Linearity	typ. $\leq \pm 1.5\%$ FSO	$\leq \pm 0.375$ mm	$\leq \pm 0.21$ mm
Temperature stability		$\leq 150$ ppm FSO/K	$\leq 200$ ppm FSO/K
Sensitivity <sup>2)</sup>		16 mV / mm/V	26 mV / mm/V
Excitation frequency		16 kHz	23 kHz
Excitation voltage		550 mV	
Measuring object		Ring for shaft diameter 8 mm or 10 mm (included in delivery)	
Connection		integrated cable (2 m) with open ends; axial cable outlet; cable diameter 1.8 mm; min. bending radius 10 mm (fixed installation)	
Temperature range	Storage	-40 ... +85 °C	
	Operation	-40 ... +120 °C <sup>3)</sup>	
Pressure resistance		atmospheric pressure	
Shock (DIN EN 60068-2-27)		40 g / 5 ms, 6 axes, 1000 shocks each	
Vibration (DIN EN 60068-2-6)		10 Hz - 49.9 Hz: 2 mm;	
		20 g / 49.9 Hz - 2000 Hz, 3 axes, 10 cycles each	
Protection class (DIN EN 60529)		IP67	
Material		Stainless steel, PEEK	
Weight	Sensor	approx. 40 g	approx. 30 g
	Target ring	< 1 g	< 1 g
Compatibility		MSC7401, MSC7802, MSC7602	

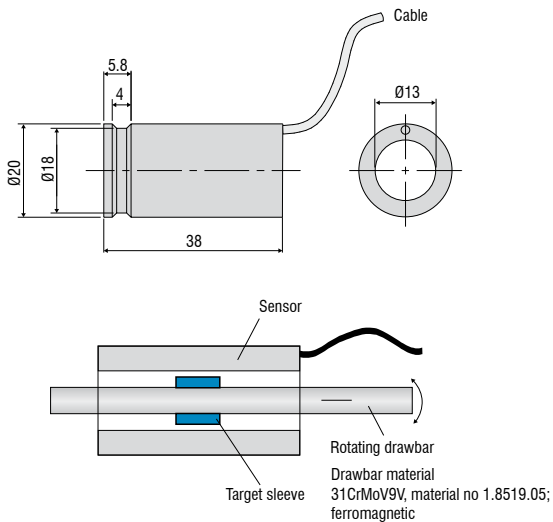
FSO = Full Scale Output

<sup>1)</sup> Valid when operated with compatible Micro-Epsilon controller

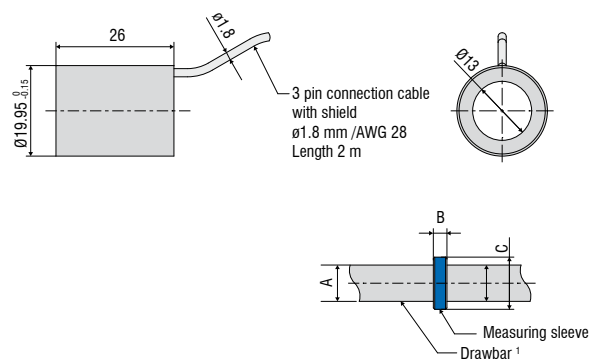
<sup>2)</sup> With 10 mm reference drawbar

<sup>3)</sup> Max. temperature change: 3 K / min; higher temperatures on request

#### LVP-25-Z20



#### LDR-14-Z20










Dimensions in mm, not to scale

Model	Drawbar <sup>1)</sup>	Dimensions		
		A	B	C
LVP-25-Z20	D8	ø8 mm	ø5 mm	ø11.5 mm
	D10	ø10 mm	ø5.5 mm	ø11.5 mm
LDR-14-Z20	D8	ø8 mm	ø3 mm	ø11.5 mm
	D10	ø10 mm	ø5.5 mm	ø11.5 mm

<sup>1)</sup> Not included in delivery

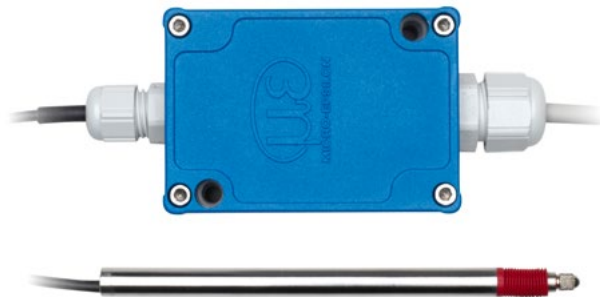


-  **Compact and robust aluminum housing**
-  **High resolution and linearity**
-  **Ideal for serial applications in machine building and automation**
-  **User-friendly parameter setting via buttons or software**
-  **Models with plug and cable bushings**
-  **Robust design IP67**
-  **Analog (U/I) / RS485/ Ethernet / EtherCAT / PROFINET / EtherNet/IP**

The MSC7401 / MSC7802 controllers are designed to be operated with measuring gauges and displacement sensors of the DTA (LVDT) and LDR (half-bridge sensors) series. Due to their robust aluminum housing protected to IP67, the controllers are predestined for industrial measurement tasks.

A large variety of compatible, inductive displacement sensors and gauges from Micro-Epsilon combined with an optimized price/performance ratio opens up numerous fields of applications in automation technology and machine building. The controller is easily set up using buttons or software. Besides the basic settings, adjusting the measuring systems is also possible. Users can either choose the symmetrical adjustment around the zero point in order to make optimum use of the specific advantages of differential sensors, or teach in two almost arbitrary points within the measuring range. If desired, these settings can be made at the factory and documented with a manufacturer test certificate.

**Example configuration**  
MSC7401 with DTA-5G8-3-CA gauge:



Technical Data	Channel with DTA-5G8-3-CA
Measuring range	±5 mm
Linearity	30 µm
Resolution	~1.2 µm
Output	Analog and RS485





Model	MSC7401	MSC7802
Resolution <sup>1)</sup>	DTA series	13 bits (0.012 % FSO) at 50 Hz 12 bits (0.024 % FSO) at 300 Hz
	LDR series	12 bits (0.024 % FSO) at 50 Hz 11 bits (0.048 % FSO) at 300 Hz
Frequency response (-3dB)	300 Hz (adjustable only via software)	
Linearity	≤ ±0.02% FSO	
Temperature stability	DTA series	≤ 100 ppm FSO/K
	LDR series	≤ 125 ppm FSO/K
Supply voltage	14 ... 30 VDC (5 ... 30 VDC <sup>2)</sup> )	
Max. current consumption	40 mA	80 mA
Input impedance <sup>3)</sup>	> 100 kOhm	
Digital interface	RS485 / PROFINET <sup>4)</sup> / EtherNet/IP <sup>4)</sup> / Ethernet <sup>4)</sup> / EtherCAT <sup>4)</sup>	RS485 / PROFINET <sup>4)</sup> / EtherNet/IP <sup>4)</sup>
Analog output <sup>4)</sup>	(0)2 ... 10 V; 0.5 ... 4.5 V; 0 ... 5 V (R <sub>a</sub> > 1 kOhm) or 0(4) ... 20 mA (load < 500 ohm)	
Connection	Sensor: screw terminal AWG 16 up to AWG 24; with ferrule up to AWG 28 or 5-pin M9 connector (cable see accessories) Supply/signal: screw terminal AWG 16 up to AWG 24; with ferrule up to AWG 28 or 5-pin M12 connector (cable see accessories)	
Mounting	2x mounting holes for M4	
Temperature range	Storage	-40 ... +85 °C
	Operation	-40 ... +85 °C
Shock (DIN EN 60068-2-27)	40 g / 6 ms in 3 axes, 2 directions and 1000 shocks each 100 g / 5 ms in 3 axes, 2 directions and 9 shocks each	
Vibration (DIN EN 60068-2-6)	± 1.5 mm / 5 ... 57 Hz in 3 axes, 10 cycles each ± 20 g / 57 ... 500 Hz in 3 axes, 10 cycles each	
Protection class (DIN EN 60529)	IP67 (plugged)	
Material	Aluminum die casting	
Weight	approx. 200 g	approx. 280 g
Compatibility	full-bridge sensor/LVDT (DTA series) and half-bridge sensor (LDR series)	
No. of measurement channels	1	2

FSO = Full Scale Output

<sup>1)</sup> Noise: AC RMS measurement via RC low-pass filter of the 1st order with  $f_c = 5$  kHz

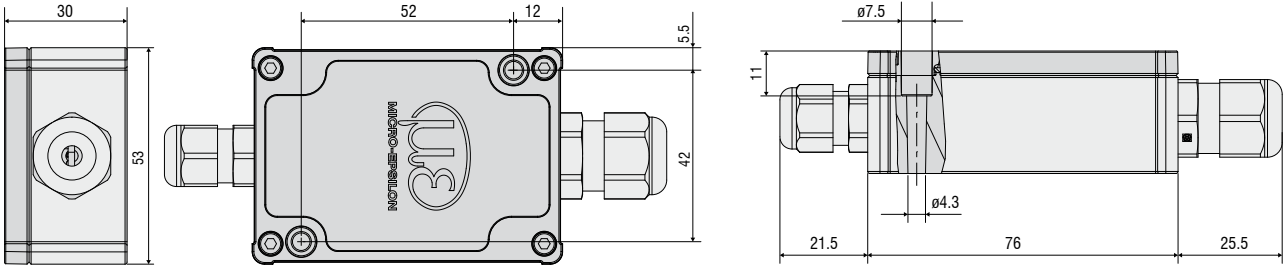
<sup>2)</sup> With technical restrictions of the output signal (load and signal span)

<sup>3)</sup> Sensor side

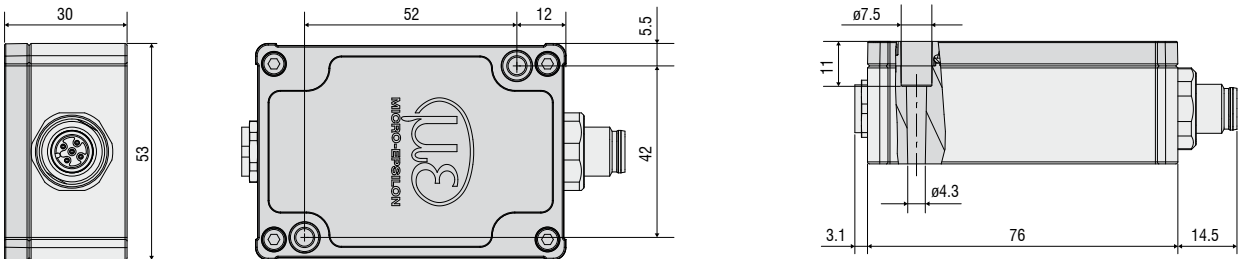
<sup>4)</sup> Connection via interface module (see accessories)

<sup>5)</sup>  $0\text{ V} \triangleq < 30\text{ mV}$ ,  $0\text{ mA} \triangleq < 35\text{ }\mu\text{A}$ ; with controllers including a current output, the output signal is limited to approx. 21 mA

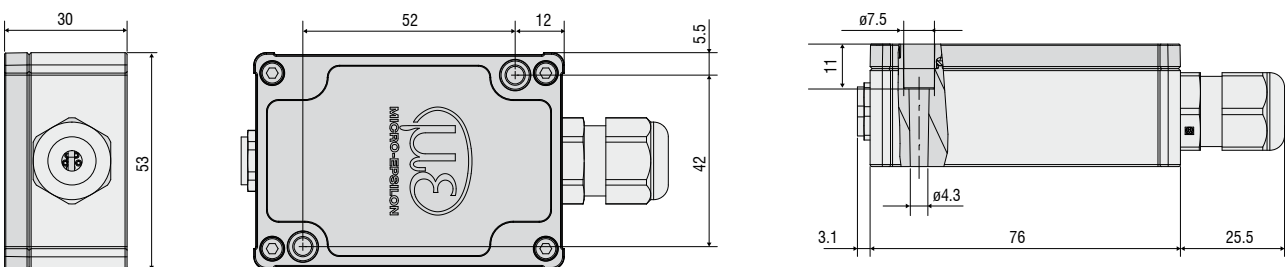
MSC7401



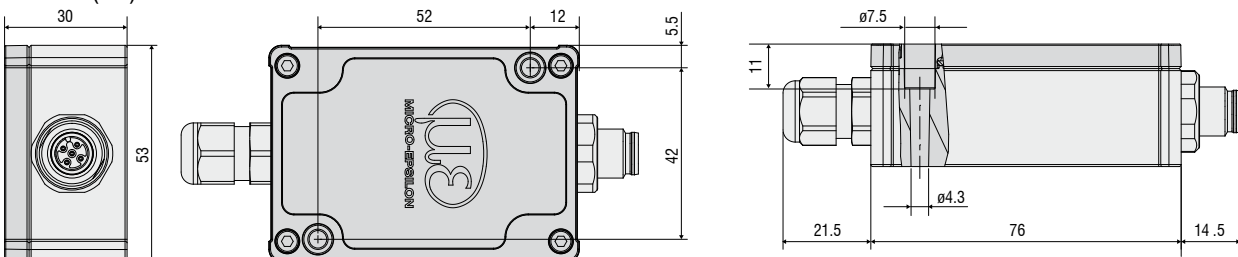
MSC7401 (010)

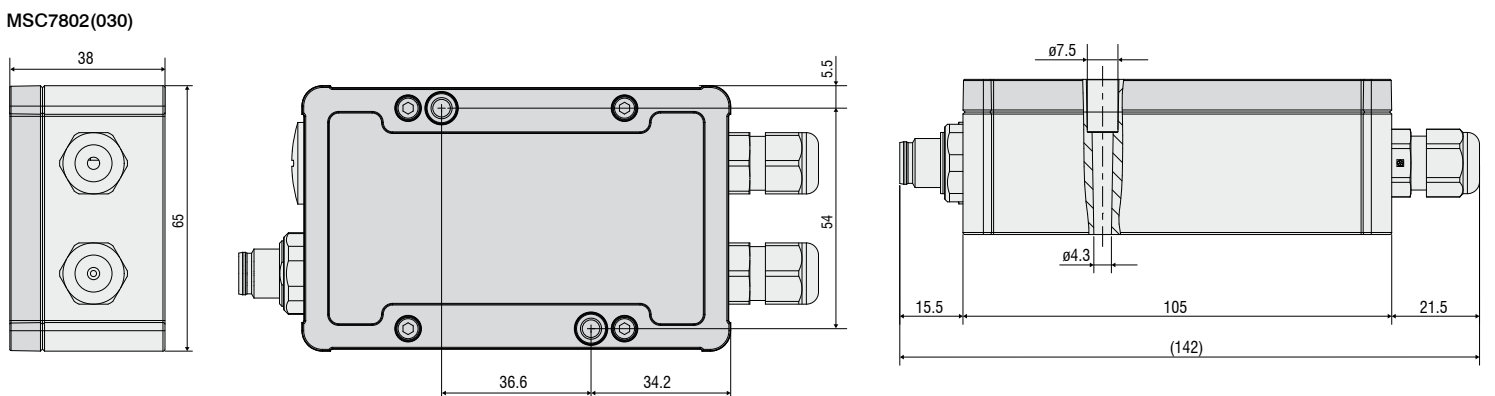
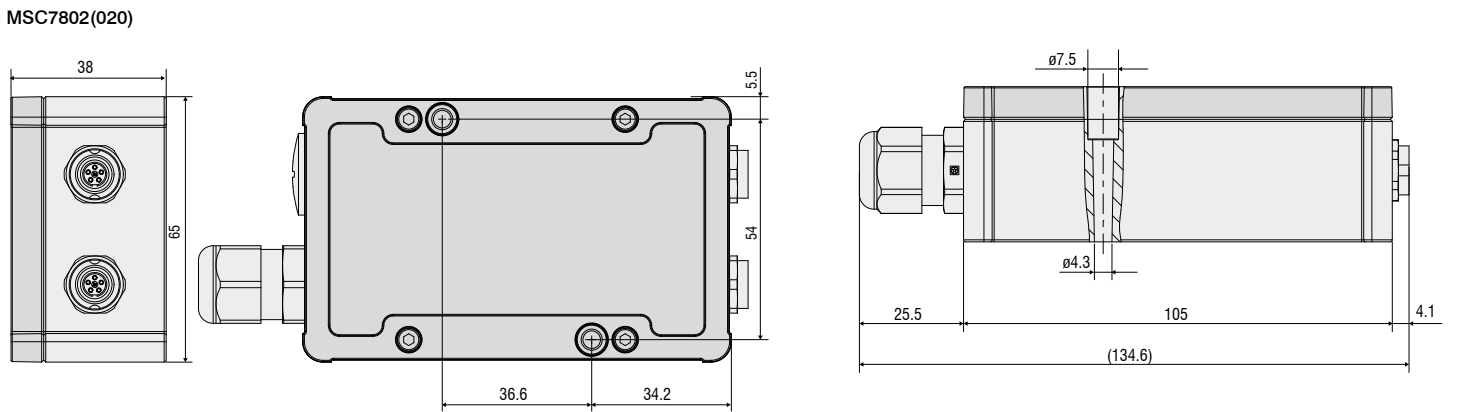
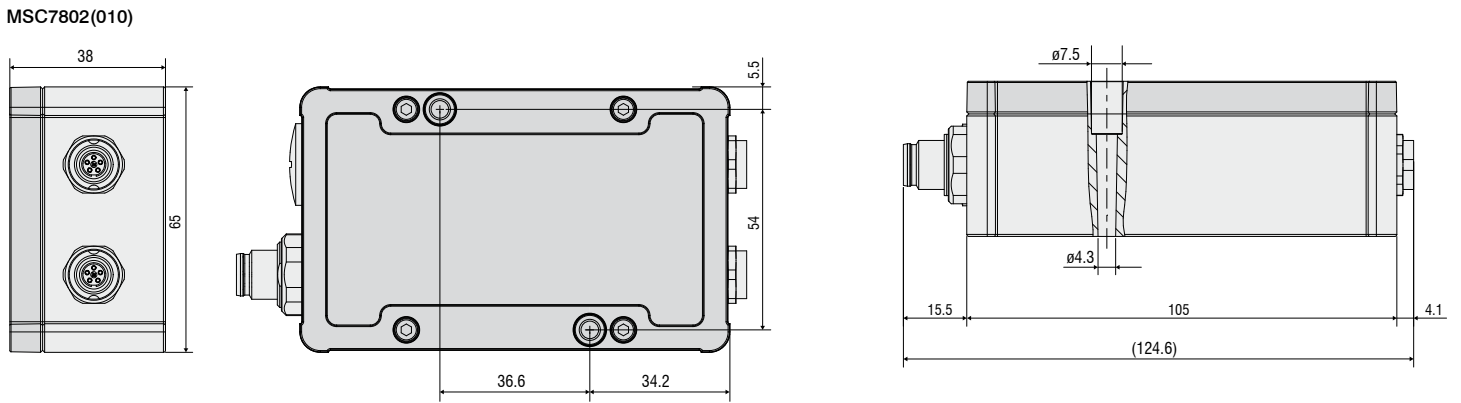
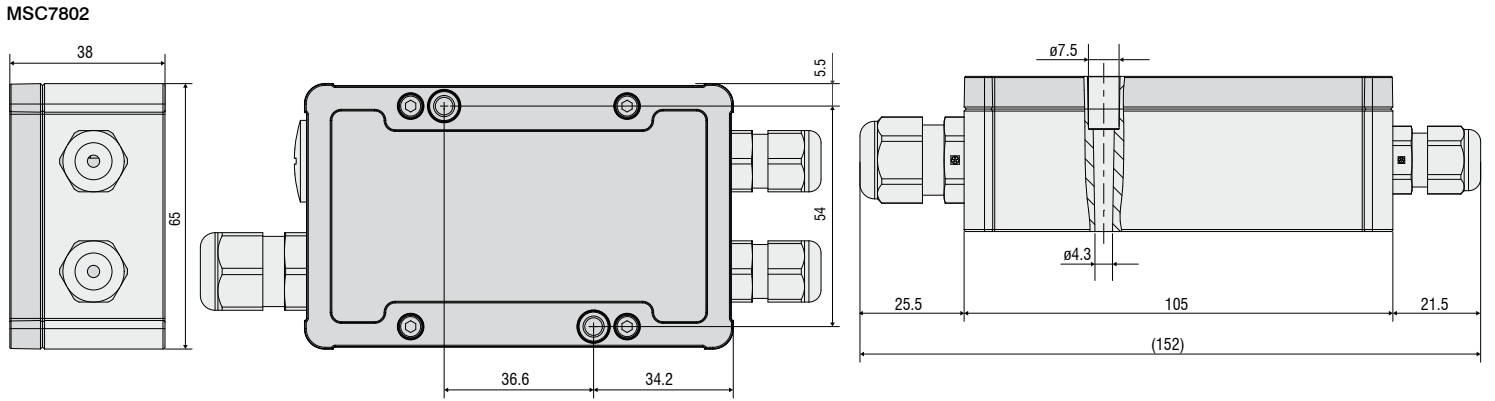


MSC7401 (020)







MSC7401 (030)





Dimensions in mm, not to scale



-  **Ideal for serial applications in machine building and automation**
-  **High resolution and linearity**
-  **User-friendly set up and configuration via buttons or software**
-  **Multi-channel capability & synchronous operation**
- INTER FACE** **Analog (U/I) / RS485 / PROFINET / EtherNet/IP**

The MSC7602 controller is designed to be operated with measuring gauges and displacement sensors of the DTA (LVDT) and LDR (half-bridge sensors) series. A large variety of compatible, inductive displacement sensors and gauges from Micro-Epsilon combined with an optimized price/performance ratio opens up numerous fields of applications in automation technology and machine building.

Users can either choose the symmetrical adjustment around the zero point in order to make optimum use of the specific advantages of differential sensors, or teach in two almost arbitrary points within the measuring range. If desired, these settings can be made at the factory and documented with a manufacturer test certificate.

The controller is ideally suited to multi-channel applications. The bus connector on the rear side significantly reduces wiring effort. The controller can be easily set up via buttons/LEDs or software.



Easy "click-fit" installation with DIN rail

#### Long measurement chains with up to 64 subscribers/bus



Model	MSC7602	
Resolution <sup>1)</sup>	DTA series	13 bits (0.012 % FSO) at 50 Hz 12 bits (0.024 % FSO) at 300 Hz
	LDR series	12 bits (0.024 % FSO) at 50 Hz 11 bits (0.048 % FSO) at 300 Hz
Frequency response (-3dB)	300 Hz (adjustable only via software)	
Linearity	≤ ±0.02% FSO	
Temperature stability	DTA series	≤ 100 ppm FSO/K
	LDR series	≤ 125 ppm FSO/K
Supply voltage	14 ... 30 VDC (5 ... 30 VDC <sup>2)</sup> )	
Max. current consumption	80 mA	
Input impedance <sup>3)</sup>	> 100 kOhm	
Digital interface	RS485 / PROFINET <sup>4)</sup> / EtherNet/IP <sup>4)</sup>	
Analog output <sup>4)</sup>	(0)2 ... 10 V; 0.5 ... 4.5 V; 0 ... 5 V (R <sub>a</sub> > 1 kOhm) or 0(4) ... 20 mA (load < 500 ohm)	
Connection	Sensor: screw terminal AWG 16 to AWG 28 Supply/signal: screw terminal AWG 16 to AWG 28 Supply/Sync/RS485: DIN rail bus connector	
Mounting	DIN rail 35 mm	
Temperature range	Storage	-40 ... +85 °C
	Operation	-40 ... +85 °C
Shock (DIN EN 60068-2-27)	5 g / 6 ms in 6 axes, 1000 shocks each 15 g / 11 ms in 6 axes, 10 shocks	
Vibration (DIN EN 60068-2-6)	±2 mm / 10 ... 15.77 Hz in 3 axes, 10 cycles each ±2 g / 15.77 ... 2000 Hz in 3 axes, 10 cycles each	
Protection class (DIN EN 60529)	IP20	
Material	Polyamide	
Weight	approx. 120 g	
Compatibility	full-bridge sensor/LVDT (DTA series) and half-bridge sensor (LDR series)	
No. of measurement channels	2	

FSO = Full Scale Output

<sup>1)</sup> Noise: AC RMS measurement via RC low-pass filter of the 1st order with  $f_c = 5$  kHz

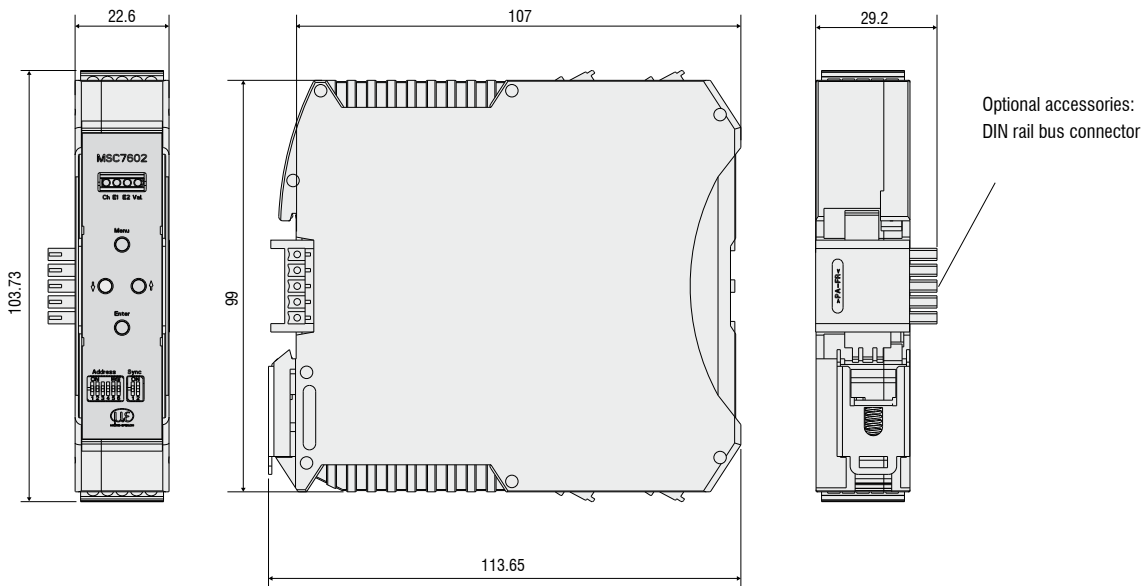
<sup>2)</sup> With technical restrictions of the output signal (load and signal span)

<sup>3)</sup> Sensor side

<sup>4)</sup> Connection via interface module (see accessories)

<sup>5)</sup>  $0\text{ V} \triangleq < 30\text{ mV}$ ,  $0\text{ mA} \triangleq < 35\text{ }\mu\text{A}$ ; with controllers including a current output, the output signal is limited to approx. 21 mA

### MSC7602



Dimensions in mm, not to scale

**Accessories for MSC7401 / MSC7602 / MSC7802**

**Connection cables**

- PC7400-6/4     Supply and output cable, 6 m
- PC5/5-IWT     Supply and output cable, 5 m (only MSC7401 / MSC7802)
- IF7001         Single-channel USB/RS485 converter for MSC7xxx
- MSC7602 connector kit



MSC7602 connector kit

**Service**

Connection, adjustment and calibration including manufacturer certificate

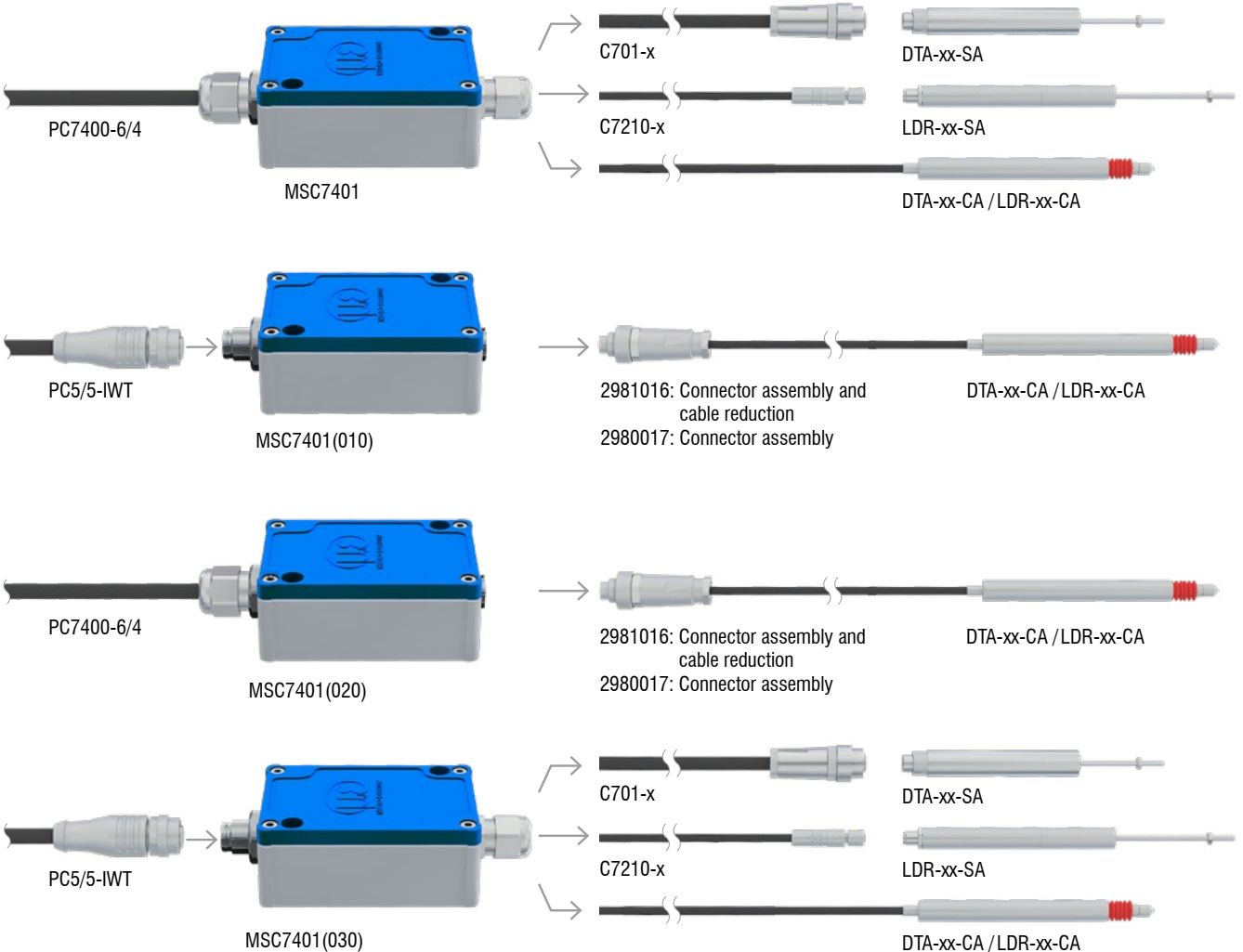
**Interface modules**

- IF2030/ENETIP     DIN rail interface module for Ethernet/IP (multi-channel)
- IF2030/PNET     DIN rail interface module for ProfiNet (multi-channel)
- IF1032/ETH     Interface module for Ethernet/EtherCAT (single channel) (only MSC7401 / MSC7802)

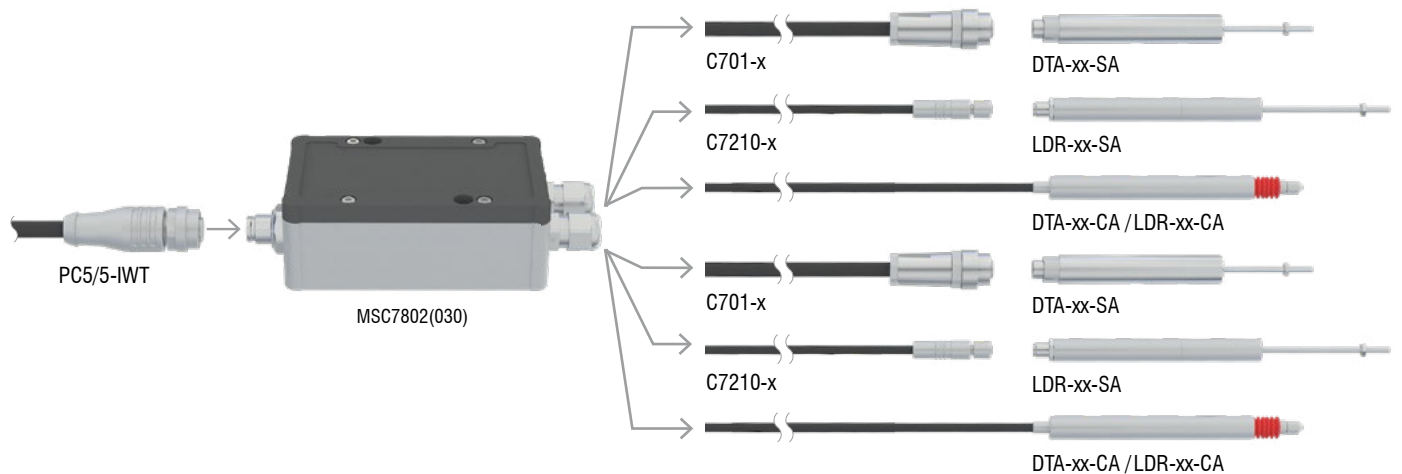
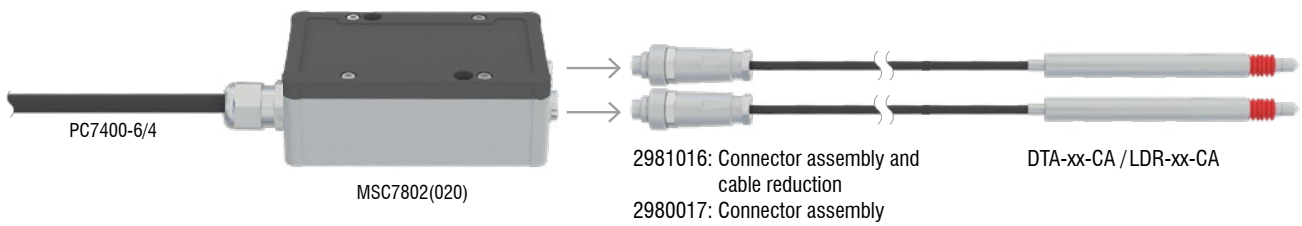
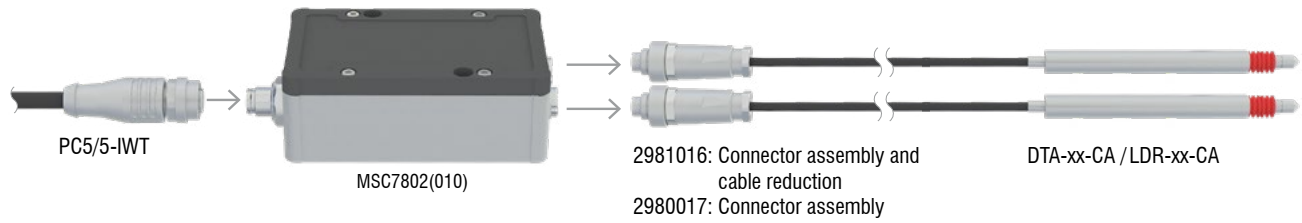
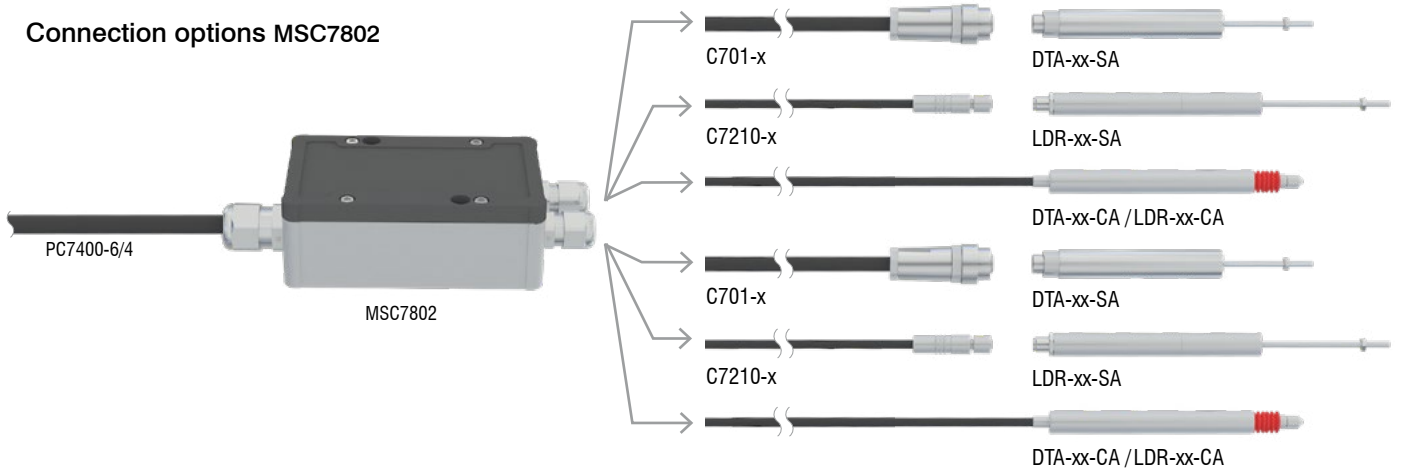
**Power supply units**

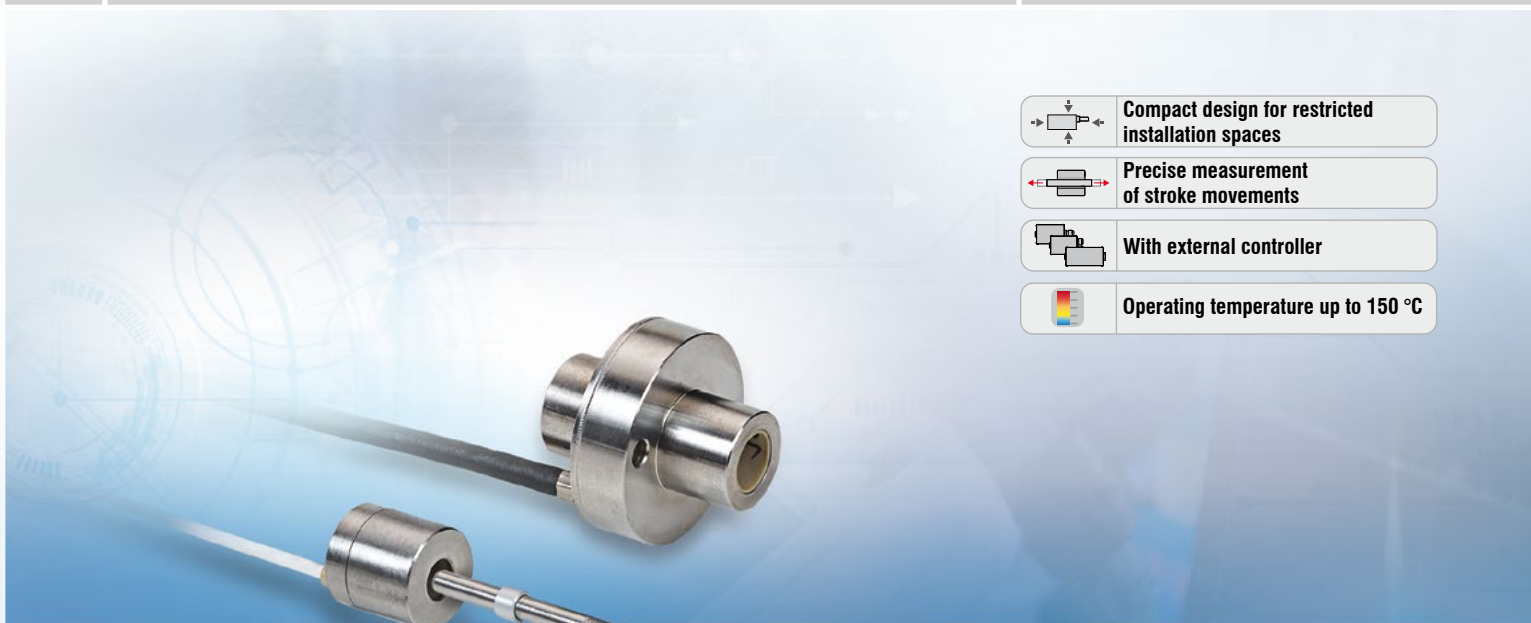
- PS2401/100-240/24V/1A     Universal power supply unit with open ends





**Connection options MSC7401**



Connection options MSC7802



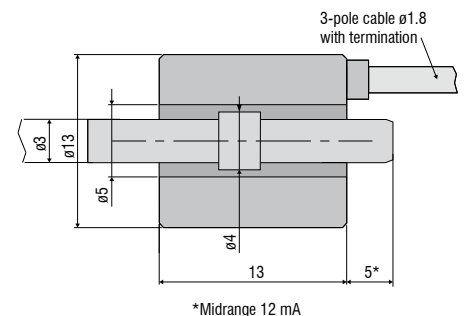


- 
**Compact design for restricted installation spaces**
- 
**Precise measurement of stroke movements**
- 
**With external controller**
- 
**Operating temperature up to 150 °C**

#### Sensor for needle stroke movements

The compact LVP-3-Z13-5-CA displacement sensor is suitable for acquiring small measuring ranges with high accuracy. The large free hole for the passage of the core also enables over-strokes. The measuring object, realized as a simple aluminum ring, is mounted on the rod, plunger, pin, needle or other similar part to be measured. In a typical application the displacement sensor

LVP-3-Z13-5-CA is used in automatic glue application guns. The continuously measuring sensor monitors the switching point, also for wear of the needle seating. Additionally, the continuous measurement offers the option of checking the needle for the correct stroke position. The small, compact sensor is easy to integrate even in tight installation spaces.



Model	LVP-3-Z13-5-CA	
Measuring range		3 mm
Linearity	typ. $\leq \pm 0.3\%$ FSO	$\leq \pm 9 \mu\text{m}$
Temperature stability	Max. temp. error	$\leq 500$ ppm FSO/K
Excitation frequency		25 kHz
Excitation voltage		550 mV
Measuring object	Standard	Ring on plunger $\varnothing 3$ mm, length 30 mm with M3 thread (included in delivery)
	Option 01	Aluminum ring $\varnothing 3$ mm, length 3.3 mm (included in delivery)
Connection		integrated cable (2 m) with open ends; axial cable outlet, cable diameter 1.8 mm, min. bending radius 10 mm (fixed installation)
Mounting		circumferential clamping
Temperature range	Storage	$-40 \dots +150$ °C
	Operation	$-40 \dots +150$ °C
Protection class (DIN EN 60529)		IP67
Material		Stainless steel, PEEK
Weight	Sensor	approx. 20 g
	Target ring	$< 0.1$ g
Compatibility		MSC7401, MSC7602, MSC7802



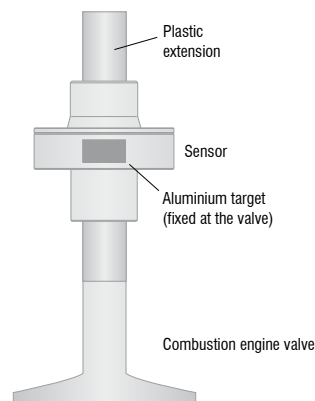
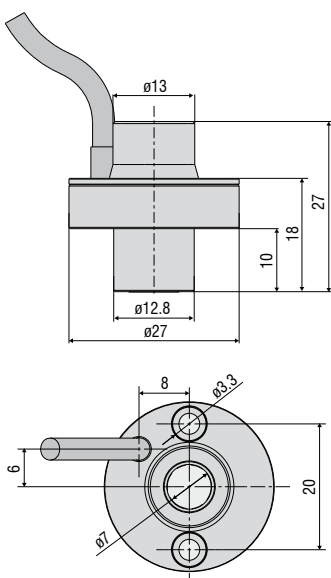
### Valve stroke sensor in stainless steel housing

The LVP-14-F-5-CR is designed for valve lift measurements in combustion engines. The sensor detects the displacement of the electromechanically or electro-hydraulically driven inlet and outlet valves.

The measured values are fed into the control loop in order to enable variable inlet and outlet control of the valves. Ultimately, this reduces fuel consumption, emission values and adapts engine power to the individual driving situation.

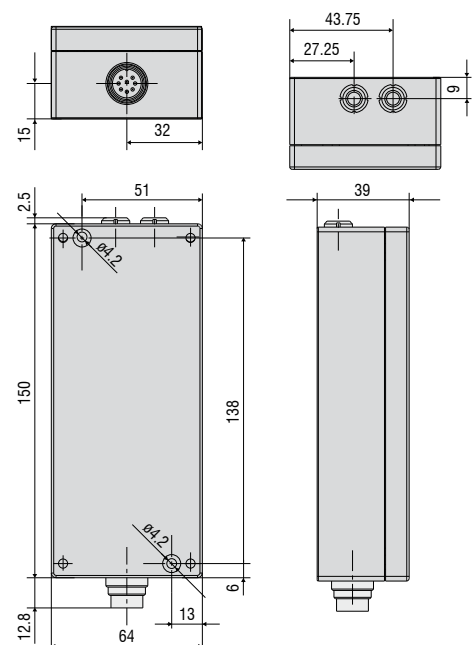
Model	LVP-14-F-5-CR	
Measuring range	14 mm	
Resolution	0.02 % FSO	
Frequency response (-3dB)	20 kHz	
Linearity	typ. $\leq \pm 1\%$ FSO	$\leq \pm 140 \mu\text{m}$
Temperature stability	Zero	$\leq 150 \text{ ppm FSO/K}$
	Max. temp. error	$\leq 250 \text{ ppm FSO/K}$
Supply voltage	12 VDC $\pm 10\%$	
Analog output	2x voltage outputs (1 ... 9 V)	
Measuring object	Aluminum ring: inner diameter 4 mm, outer diameter 6 mm, height 3.5 mm (optionally available)	
Connection	Supply/signal: pluggable cable via 8-pin Lumberg KV81 connector, length 6 m; Sensor: integrated cable, length 0.5 m, optional extension by 2 m (see accessories for suitable connection cable)	
Mounting	Sensor: through bores for 2x M3 screws Controller: through bores for 2x M4 screws	
Temperature range	Storage	Sensor: $-30 \dots +150 \text{ }^\circ\text{C}$ Controller: $+10 \dots +50 \text{ }^\circ\text{C}$
	Operation	Sensor: $-30 \dots +150 \text{ }^\circ\text{C}$ Controller: $+10 \dots +50 \text{ }^\circ\text{C}$
Protection class (DIN EN 60529)	Sensor: IP67 Controller: IP40 (plugged)	
Material	Stainless steel, PEEK	
Weight	Sensor	approx. 50 g
	Controller	approx. 400 g
	Target ring	< 0.2 g
Compatibility	MSC739VS-U	
No. of measurement channels	2	

FSO = Full Scale Output



Dimensions in mm, not to scale

### MSC739VS-U Controller





	<b>Measuring ranges</b> from 75 ... 630 mm
	<b>Linearity</b> $\pm 0.3$ % FSO
	<b>Integrated controller</b>
	<b>High resistance to pressure and oil, maintenance free</b>
	<b>Short offset ranges</b>

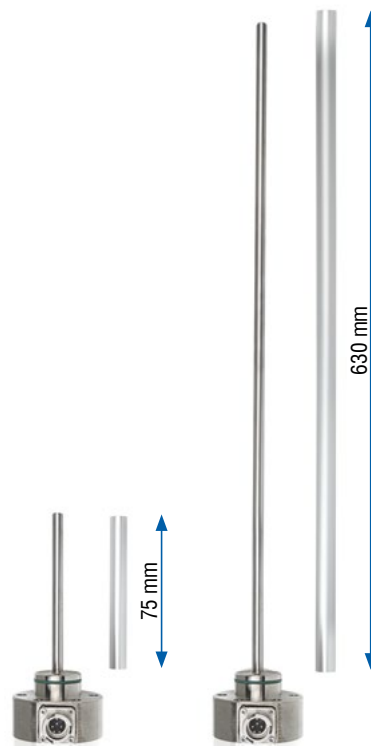
induSENSOR EDS long-stroke sensors are designed for industrial use in hydraulic and pneumatic cylinders for displacement and position measurements of pistons or valves, e.g., to measure

- displacement, position, gap
- deflection
- movement, stroke
- filling level, immersion depth and spring travel

The sensor elements of the EDS series are protected by a pressure resistant stainless steel housing. The sensor controller and signal processing are completely integrated in a sensor flange.

An aluminum tube is used as target, which is guided over the sensor rod in a non-contact and wear-free manner.

Due to their robust, constructional design, the EDS long-stroke sensors have proven invaluable for integration into hydraulic and pneumatic cylinders and for position monitoring in harsh industrial environments. Due to the eddy current principle applied, no permanent magnets need to be mounted inside the cylinder.



induSENSOR EDS sensors impress with an optimal ratio of compact design and large measuring range. Due to their small offset, the measuring range starts very close to the flange.



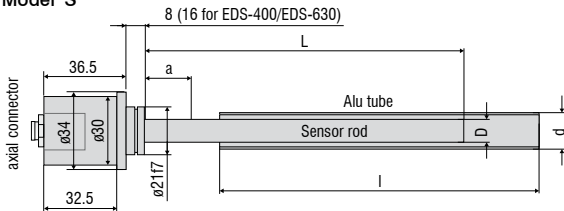
Model	EDS-75	EDS-100	EDS-160	EDS-200	EDS-250	EDS-300	EDS-400	EDS-500	EDS-630
Series	S	S, F	S, F	S	S, F	S, F	S, F	S	S, F
Measuring range	75 mm	100 mm	160 mm	200 mm	250 mm	300 mm	400 mm	500 mm	630 mm
Resolution	0.038 mm	0.05 mm	0.08 mm	0.1 mm	0.125 mm	0.15 mm	0.2 mm	0.25 mm	0.315 mm
Frequency response (-3dB)	150 Hz								
Measuring rate	600 Sa/s								500 Sa/s
Linearity $\leq \pm 0.3\%$ FSO	$\leq \pm 0.23$ mm	$\leq \pm 0.3$ mm	$\leq \pm 0.48$ mm	$\leq \pm 0.6$ mm	$\leq \pm 0.75$ mm	$\leq \pm 0.9$ mm	$\leq \pm 1.2$ mm	$\leq \pm 1.5$ mm	$\leq \pm 1.89$ mm
Temperature stability	$\leq 200$ ppm FSO/K								
Supply voltage	18 ... 30 VDC								
Max. current consumption	40 mA								
Analog output <sup>1)</sup>	4 ... 20 mA (load 500 Ohm)								
Connection	S Series -	7-pin M9 screw/plug connection (Binder); axial, radial on request (see accessories for connection cable)							
	F series	Bayonet 5-pin screw/plug connection; radial output (see accessories for connection cable)							
Temperature range	Storage	-40 ... +100 °C							
	Operation	-40 ... +85 °C							
Pressure resistance	450 bar (front)								
Shock (DIN EN 60068-2-27)	40 g / 6 ms in 3 axes, 1000 shocks each 100 g / 6 ms radial, 3 shocks each 300 g / 6 ms axial, 3 shocks each								
Vibration (DIN EN 60068-2-6)	$\pm 2.5$ mm / 5 ... 44 Hz, 10 cycles each $\pm 23$ g / 44 ... 500 Hz, 10 cycles each								
Protection class (DIN EN 60529) <sup>2)</sup>	IP65 (F series) / IP67 (S series)								
Material	Stainless steel (housing); aluminum (measuring tube)								

FSO = Full Scale Output

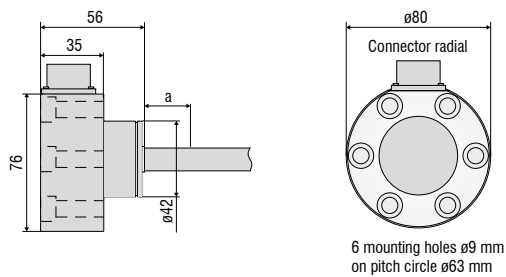
<sup>1)</sup> Optional voltage output (1 ... 5 V) with output cable C703-5/U for EDS, S series

<sup>2)</sup> Models with plug connection only with suitable and connected mating plug

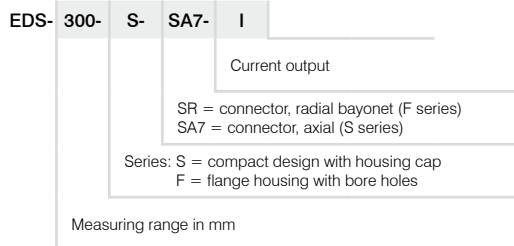
**Model S**



**Model F**



**Article designation**



Measuring ranges	Sensor rod		Aluminum tube		Offset
	L	D	l	d	
75	110	10	110	16	15
100	140	10	140	16	20
160	200	10	200	16	20
200	240	10	240	16	20
250	290	10	290	16	20
300	340	10	340	16	20
400	450	12	450 (S) 460 (F)	18 (S) 26 (F)	25
500	550	12	550	18	25
630	680	12	680 (S) 690 (F)	18 (S) 26 (F)	25

## Accessories for S series

### Connection cables

- C703-5 EDS connection cable for S series, 7-pin, length 5 m  
 C703-5/U EDS connection cable for S series, 7-pin, length 5 m, for voltage output 1 - 5 V  
 C703/90-5 EDS connection cable for S series, 7-pin, length 5 m with 90° angled cable connector

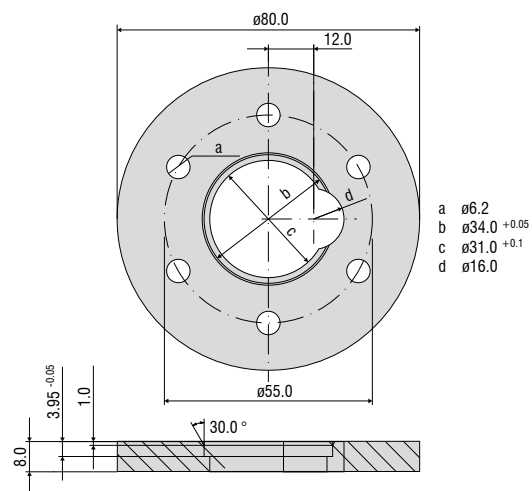
Mating plug, S series

### Spare tubes

- Measuring tube for EDS-75-S Spare tube  
 Measuring tube for EDS-100-S Spare tube  
 Measuring tube for EDS-160-S Spare tube  
 Measuring tube for EDS-200-S Spare tube  
 Measuring tube for EDS-250-S Spare tube  
 Measuring tube for EDS-300-S Spare tube  
 Measuring tube for EDS-400-F Spare tube  
 Measuring tube for EDS-630-F Spare tube

### Installation ring

- 0483326 EDS mounting ring



## Accessories for the F series

### Connection cables

- C705-5 EDS connection cable for F series, 5-pin, length 5 m  
 C705-15 EDS connection cable for F series, 5-pin, length 15 m

EDS connector kit, F series

### Spare tubes

- Measuring tube for EDS-100-F Spare tube  
 Measuring tube for EDS-160-F Spare tube  
 Measuring tube for EDS-200-F Spare tube  
 Measuring tube for EDS-250-F Spare tube  
 Measuring tube for EDS-300-F Spare tube  
 Measuring tube for EDS-400-F Spare tube  
 Measuring tube for EDS-630-F Spare tube



EDS-F: Measuring the grinding gap in crushers



EDS-S: Lift height measurement in pneumatic cylinders; flange outside the cylinder

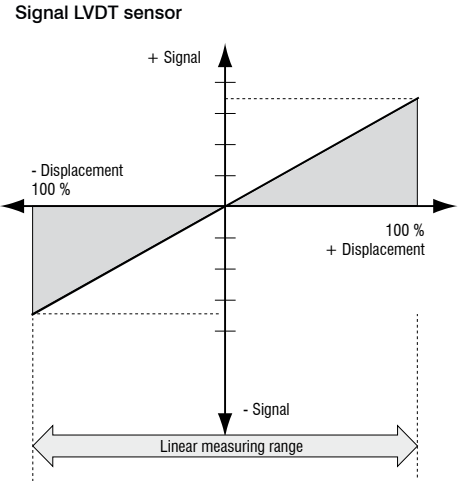


EDS-Z: Integration in hydraulic cylinders; integrated flange and M12 built-in plug

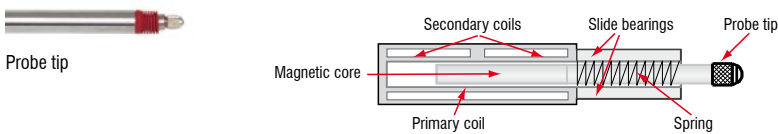
**LVDT Gauges and LVDT displacement sensors (DTA series)**

LVDT displacement sensors and gauges (Linear Variable Differential Transformer) are constructed with a primary and two secondary coils, which are arranged symmetrically to the primary winding. As a measuring object, a rod shaped magnetic core can be moved within the differential transformer. An electronic oscillator supplies the primary coil with an alternating current of constant frequency. The excitation is an alternating voltage with an amplitude of a few volts and a frequency between 1 and 10 kHz.

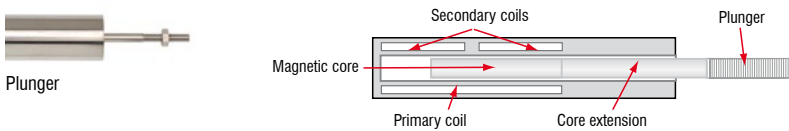
Depending on the core position, alternating voltages are induced in the two secondary windings. If the core is located in its "zero position", the coupling of the primary to both secondary coils is equally large. Movement of the core within the magnetic field of the coil causes a higher voltage in one secondary coil and a lower voltage in the second coil. The difference between the two secondary voltages is proportional to the core displacement. Due to the differential design of the sensor, the LVDT series has an output signal which is very stable.



**Measuring principle gauging sensor**



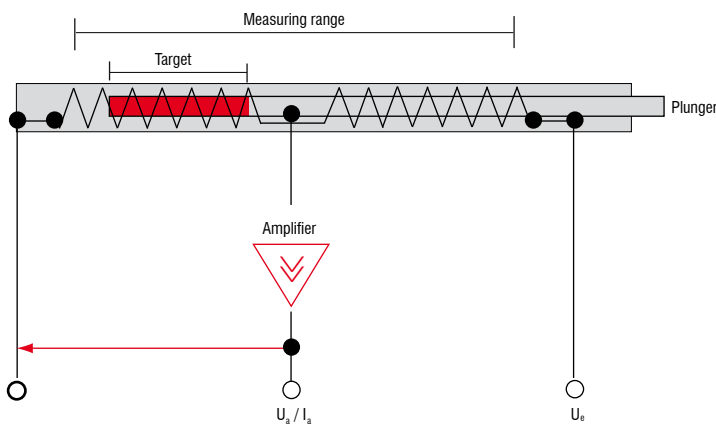
**Measuring principle displacement sensor**



**LDR Displacement sensors**

The inductive sensors in the LDR series are constructed as half-bridge systems with center tap. An unguided plunger moves in the interior of the sensor coil, which consists of symmetrically constructed winding compartments. The plunger is joined to the moving measuring object via a thread. Due to the movement of the plunger within the coil, an electrical signal is produced which is proportional to the displacement covered. The specific sensor configuration facilitates a short, compact design with a small diameter. Three connections are required as an interface to the sensor.

**Block diagram LDR series**



**Independent and absolute linearity of LVDT sensors**

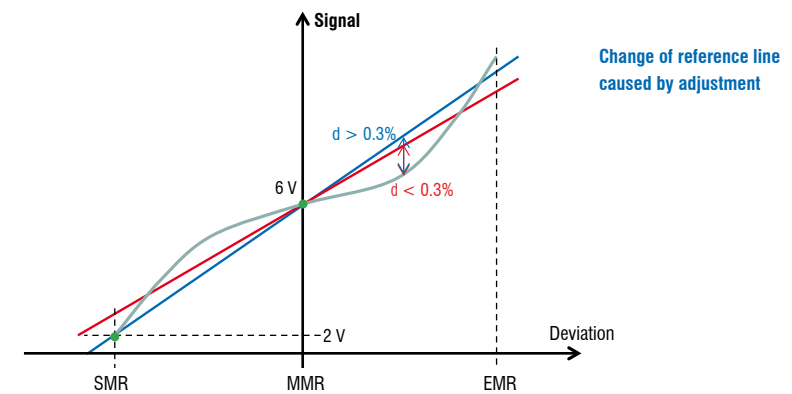
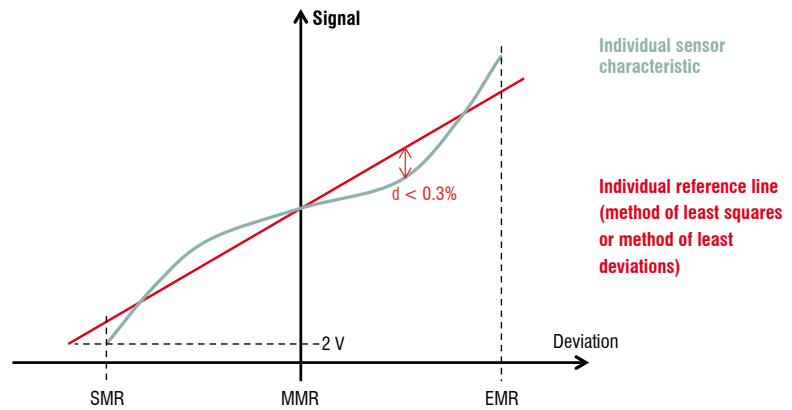
Please consider that with LVDT sensors, two kinds of linearity must be distinguished:

With the independent linearity, an individual linearity characteristic is determined for the recorded sensor signal of each sensor. It describes the deviation of the recorded sensor signal from the individually calculated reference line (red, see figure).

The maximum deviation ( $d$ ) must not exceed the values specified in the datasheet.

With the absolute linearity, a new straight line is laid through two fixed points during the adjustment which may cause the gradient of the reference line to change.

Therefore, the recorded values of the sensor signal may deviate more from the new line (blue) than is the case with the independent linearity (see figure), and also exceed the values specified in the datasheet.



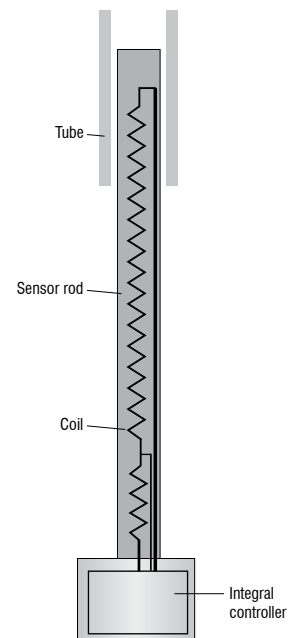
**EDS Long-stroke sensors**

The measuring principle of the EDS series is based on the eddy current effect. The displacement transducer consists of a measurement coil and a compensation coil which are integrated into a pressurized sensor rod composed of stainless, non-ferromagnetic material. An aluminum tube which can be moved along the housing without making contact is used as the target.

If both coils are supplied with an alternating current, then two orthogonal magnetic fields are produced in the sleeve. The field produced from the single-layer measuring coil has a magnetic coupling with the tube. Therefore, the eddy currents produced in the tube form a magnetic field, which influences the impedance of the measuring coil. This changes linearly with the target position. The magnetic field of the compensation coil has in contrast no coupling with the target and the impedance of the compensation coil is largely independent of the target position.

The electronic circuit generates a signal from the ratio of the impedance of the measurement coil and the compensation coil and converts the sleeve position into a linear electrical output signal of 4 - 20mA. In achieving this, the temperature effects and the temperature gradient are essentially eliminated.

Block diagram EDS series



## Sensors and Systems from Micro-Epsilon



Sensors and systems for displacement, distance and position



Sensors and measurement devices for non-contact temperature measurement



Measuring and inspection systems for metal strips, plastics and rubber



Optical micrometers and fiber optics, measuring and test amplifiers



Color recognition sensors, LED analyzers and inline color spectrometers



3D measurement technology for dimensional testing and surface inspection