

## More Precision

### induSENSOR // Linear inductive displacement sensors



### Linear displacement sensors induSENSOR LDR



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 CA ir SA p	connections ntegral cable (2m) lug-in connection
Measuring range in mm		ange in mm	
Principl	e: half-l	oridge s	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.	$\leq \pm 30\mu{ m m}$	$\leq \pm 88\mu{ m m}$	$\leq \pm 250\mu{ m m}$	
	max.	$\leq \pm 50\mu{ m m}$	$\leq \pm 125 \mu { m m}$	$\leq \pm 375\mu{ m m}$	
Tomporaturo etability	Zero	$\leq$ 30 ppm FSO/K	$\leq$ 30 ppm FSO/K	$\leq$ 80 ppm FSO/K	
Temperature stability	Max. temp. error	$\leq$ 100 ppm FSO/K	$\leq$ 100 ppm FSO/K	$\leq$ 150 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 reage [1]	Storage	SA: -40 +80 °C; CA: -40 +160 °C			
lemperature range of	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)		$\pm 1.5$ mm / 10 … 58 Hz in 2 axes, 10 cycles each $\pm$ 20 g / 58 … 500 Hz in 2 axes, 10 cycles each			
Protection class (DIN EN 60529)		IP67 (plugged)			
Material		Stainless steel (housing)			
Woight	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)	
weight	Plunger	approx. 1.5 g	approx. 2.2 g	approx. 3.5 g	
Compatibility		MSC7401, MSC7802, MSC7602			

 $^{[1]}\mbox{Determined using the box method (-40 <math display="inline">\ldots$  +80  $^{\circ}\mbox{C})$ 



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





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

Dimensions in mm, not to scale

### Mounting options and accessories induSENSOR DTA/LDR

#### **Connection cables**

0157047C7210-5/3Sensor cable, 5 m, with cable connector0157048C7210/90-5/3Sensor cable, 5 m, with 90° cable connector

#### Service (see page 34/35)

Connector assembly M9 and cable reduction XXXX mm - DTA-x Connector assembly M9 - DTA-x (see page 34/35)

#### Power supply cable

2901087 PC710-6/4

Supply/output cable, 6 m

#### Spare plungers

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

#### Connector assembly

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

#### Mounting block



# $\approx 17$



#### Adapter ring



### Applications induSENSOR DTA/LDR

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.



### Accessories and connection possibilities induSENSOR MSC

#### Accessories for MSC7401 / MSC7602 / MSC7802

#### **Connection cables**

PC7400-6/4Supply and output cable, 6 mPC5/5-IWTSupply and output cable, 5 m (only MSC7401 / MSC7802)IF7001Single-channel USB/RS485 converter for MSC7xxxMSC7602 connector kit



MSC7602 connector kit

#### Service

Connection, adjustment and calibration including manufacturer certificate

#### Interface modules

IF2035-EIP	DIN rail interface module for Ethernet/IP (multi-channel)
IF2035-PROFINET	DIN rail interface module for PROFINET (multi-channel)
IF2035-EtherCAT	DIN rail interface module for EtherCAT (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





### Technology and measuring principle induSENSOR

#### 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 soft-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



#### 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



### Technology and measuring principle induSENSOR

#### 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.



#### Sensors and Systems from Micro-Epsilon



Sensors and systems for displacement, distance and position



Optical micrometers and fiber optics, measuring and test amplifiers



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3D measurement technology for dimensional testing and surface inspection



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