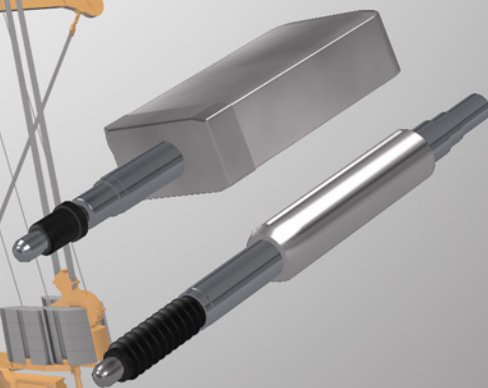
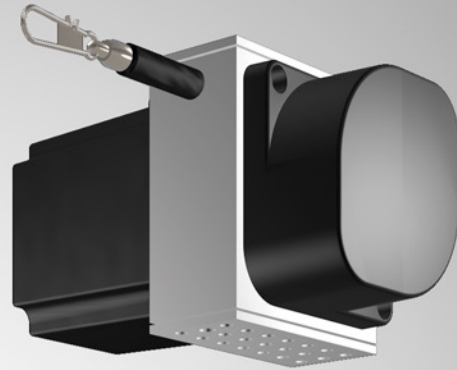
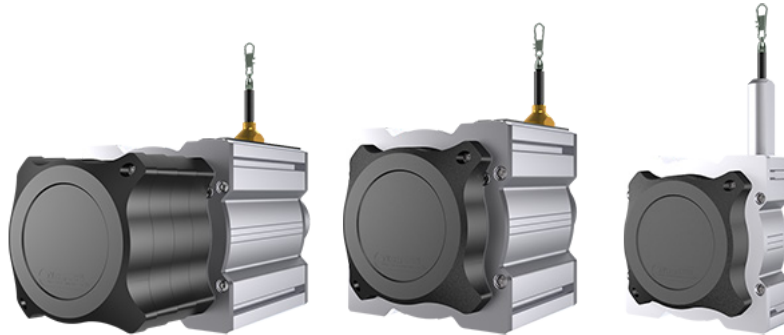


**PRODUCT OVERVIEW**



Powerful sensors to meet growing demands

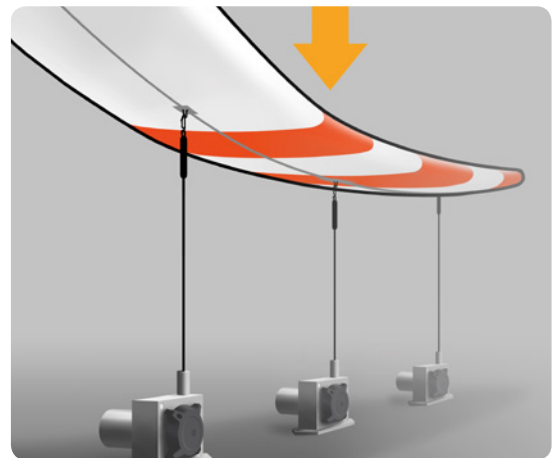
# Draw Wire Sensors



## Features

Draw wire sensors are low-cost, compact sensors that are quick and easy to mount. Thanks to their high reliability, durability and accuracy, WayCon draw wire sensors are used in all areas of research and industry.

- ▶ Robust aluminium housing, stainless steel measuring cable
- ▶ Travel speed up to 10 m/s
- ▶ Special versions for Hydraulic cylinders, maritime applications
- ▶ Redundant measurement principle by means of double potentiometers possible
- ▶ Optional with Hartcoat® corrosion protection and coramid draw wire
- ▶ Customer-specific designs
- ▶ Alternatively pure wire draw mechanism



## Technical Data

GROUP ► CHARACTERISTICS ▼	SX50	SX80/ SX120	SX135	SX200/ SX300	MH60/ MH120	ZX	LX	HX	FX
Measurement range max.	1250 mm	3 m / 5 m	42,5 m	12 m / 15 m	4 m / 10 m	38 mm	1250 mm	50 mm	375 mm
Linearity max. <sup>1)</sup>	±0.02 %			±0.05 %	±0.1 %	±1 %	±0.1 %		±1 %
Output analog	0...10 V (optional teachable), 4...20 mA			-	0...10 V (optional teachable), 4...20 mA	Voltage	-	0...10 V, 4...20 mA	0...10 VDC + 0...0.4 VDC
	Potentiometer			-	Potentiometer				-
Output digital	TTL (RS422), HTL			-	CANopen	-	TTL		-
	SSI, CANopen	SSI, CANopen, Profibus, DeviceNet, EtherCAT, Profinet							
Protection class max.	IP67			-	IP69k	IP40		IP68	IP52
Operating temperature max.	-40...+120 °C		-40...+80 °C	-20...+70 °C	-40...+80 °C	-55...+100 °C	-40...+70 °C	-20...+95 °C	-25...+75 °C
Pressure max.	-			300 bar	-				

<sup>1)</sup> based on the measurement range

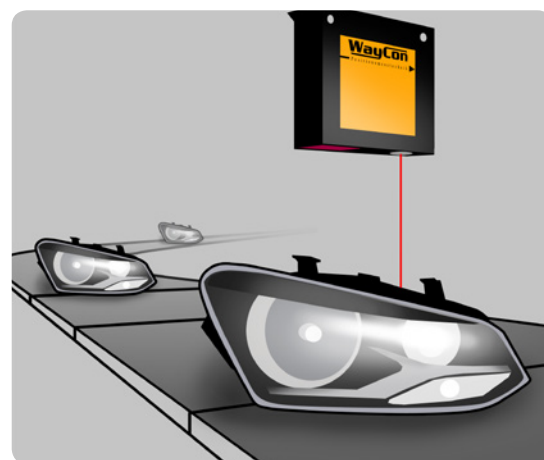
## Laser Sensors



### Features

Laser sensors are optoelectronic sensors and are excellent for fast and accurate measurement without touching the measurement object due to their high resolution, accuracy and measuring rate.

- ▶ Micrometer resolution
- ▶ Special versions for low-reflective surfaces
- ▶ Fast measuring frequencies up to 100 kHz
- ▶ Object detection up to 150 m
- ▶ Spot and lines lasers
- ▶ Measurement through glass
- ▶ Sensor with integrated display



### Technical Data

GROUP ► CHARACTERISTICS ▼	LAS	LAR	LAH-G1	LAM	LAV	LLD-150	LLD-500
Measurement range max.	800 mm	400 mm	300 mm	200 mm	50 m	150 m	500 m
Linearity max.	±6 µm	±10 µm	±8 mm	±1 µm	±25 mm	±3 mm	±1 mm
Output analog	0...10 V, 4...20 mA	0...5 V	0...10 V, 3.2...20.8 mA	0...10 V, ±10 V, 0...5 V, 4...20 mA, 0...20 mA	4...20 mA		
Output digital	-			Ethernet	IO-Link	RS232C, RS422, Profibus, SSI	
Switching output	-	PNP, NPN		PNP	PNP, NPN	PNP	
Protection class max.	IP67			IP64	IP65		IP67
Operating temperature max.	0...+50 °C	-10...+45 °C		0...+50 °C	-30...+50 °C	-40...+50 °C	-40...+60 °C
Measuring frequency	1 kHz	660 kHz	5 kHz	100 kHz	100 kHz	50 kHz	100 kHz

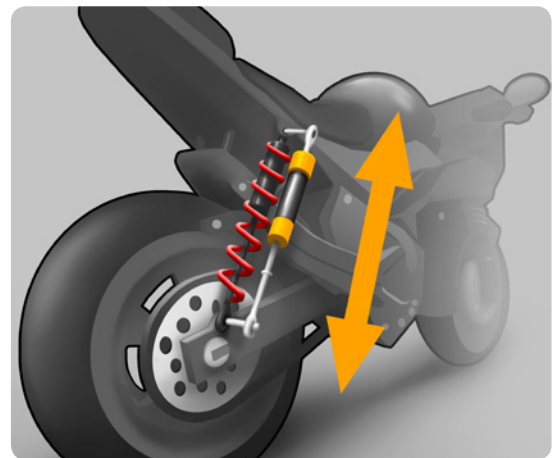
# Linear Potentiometer



## Features

Linear potentiometer essentially consists of a resistor and a moving wiper contact. The attractive cost-to-performance ratio, the variety of housings and types of installation make these sensors ideal for simple measuring tasks.

- ▶ Versions for pneumatic and hydraulic cylinders
- ▶ Various designs including spring loaded potentiometers
- ▶ Travel speed up to 10 m/s
- ▶ Versions with 4... 20 mA output signal
- ▶ Stainless steel versions available
- ▶ Flexible mounting using brackets, rod end bearings or flange
- ▶ Optional teachable electronics 0...10 V



## Technical Data

GROUP ► CHARACTERISTICS ▼	LZW, LZW1, LZW2	LRW, LRW1, LRW2, LRW3	LMI12	LMS18	LSW
Measurement range max.	750 mm	900 mm	1000 mm		2000 mm
Linearity max. <sup>1)</sup>	±0.05 %				
Output analog	Potentiometer, 0...10 V (optional and teachable)				
Travel speed	≤ 10 m/s		≤ 5 m/s		≤ 10 m/s
Protection class max.	IP67				IP40
Operating temperature max.	-30...+100 °C				
Pressure max.	-		250 bar	-	
Profile	Cylinder	Square	Cylinder		Square
Mechanics	Push rod		Magnetic drag cursor		Sliding contact
Mounting	Rod end bearing, brackets, flange	Mounting bracket	Plug-in flange, Threaded flange	Rod end bearing	Mounting bracket nut mounting

<sup>1)</sup> based on the measurement range

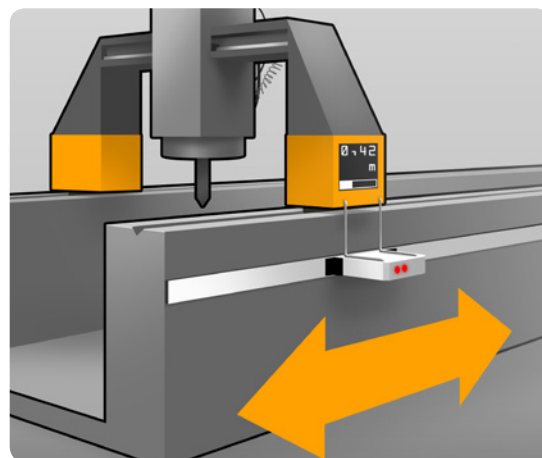
## Magnetic Scales



### Features

Magnetic Scales are useful for metering ranges under industrial conditions like plant construction, engine building or testing equipment. Because of the freedom from wear and the impassiveness towards dirt, Magnetic Scales are qualified for surroundings in that swarf or metal splinters are accrued.

- ▶ Wear-free path measurement, impassiveness towards dirt
- ▶ Protection class up to IP69K
- ▶ Ranges up to 100 m
- ▶ Output: analog or digital
- ▶ Resolution up to 0.5  $\mu\text{m}$
- ▶ Magnetic scale with top strip made of steel



### Technical Data

GROUP ► CHARACTERISTICS ▼	MXAZ	MXS2	MXW11	MXW21	MXI11	MXI21	MXI51
Measurement range max.	1250 mm	8165 mm	99,99 m				
Linearity max. <sup>1)</sup>	±2 µm		1% of period length		±15 µm		
Resolution max.	10 bit (teachable)	1 µm	theoretically infinite		0.5 µm	1 µm	5 µm
Output analog	0...10 V, 4...20 mA	-					
Output incremental	-	NPN	1 Vpp		HTL, TTL		
Output digital	-	SSI, BiSS	-				
Process speed max. (mechanic)	5 m/s	10 m/s	16 m/s				
Protection class max.	IP68	IP67					
Operating temperature max.	-25...+85 °C						
Gap between sensor/ tape	0.1...2 m	0.1...0.6 mm	0.1...0.5 mm	0.1...1 mm	0.1...0.5 mm	0.1...1 mm	0.1...2 mm

<sup>1)</sup> Additional deviation by Digital Magnetic Scales

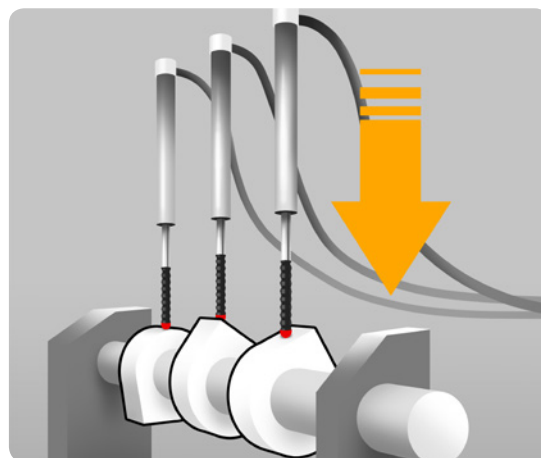
## Digital Length Gauges



### Features

Digital Length Gauges with integrated electronics and DIADUR-graduation on glass or Zerodur-ceramic glass. Digital Length Gauges are suited for high-precision measurement and most diverse applications. Possible application areas are for example for the production measurement technology, multipoint inspection stations and kind of measurement monitoring.

- ▶ Pneumatic plunger actuation
- ▶ variable measuring heads
- ▶ any operating position
- ▶ Version with TTL or 1Vss
- ▶ position error per signal period until  $\pm 0.02 \mu\text{m}$
- ▶ Mechanic permissible process speed  $\leq 30 \text{ m/min}$



### Technical Data

GROUP ► CHARACTERISTICS ▼	MT12	MT25	ST12	ST30
Measurement range max.	12 mm	25 mm	12 mm	30 mm
Linearity max.	±0.2 μm		±1 μm	
Resolution max.	0.02 μm		0.2 μm (TTL) or 20 μm (1 Vpp)	
Output incremental	TTL, 1 Vpp			
Protection class max.	IP50		IP67	
Operating temperature max.	+10...+40 °C			
Plunger actuation	cable-type lifter or with the device under test		device under test or pneumatic	

## Ultrasonic Sensors



### Features

Ultrasonic sensors operate by measuring the travel time of sound waves. They measure the distance to the measurement object, without contact and regardless of colour and material. The WayCon ultrasonic product range offers a variety of different designs and special solutions.

- ▶ Versions with ATEX certification
- ▶ Distance sensor and/or proximity switch
- ▶ Chemical-resistant version available
- ▶ Detection of liquids or bulk material
- ▶ Version with minimised sound beam
- ▶ Durable, robust sensors



### Technical Data

GROUP ► CHARACTERISTICS ▼	UX micro	UPK	UPR-A-ATEX	UFA	UFP	UPT	UPA
Measurement range max.	500 mm	1200 mm	1500 mm		3500 mm		6000 mm
Linearity max. <sup>1)</sup>	±1 %				±0.3 %	±0.5 %	
Output analog	-	0...10 V					
		4...20 mA					
Switching output	PNP, NPN		PNP		PNP, NPN		
Protection class max.	IP67						
Operating temperature max.	-20...+50 °C	-20...+70 °C	0...+60 °C	-25...+75 °C	-20...+70 °C		
Housing	rectangular	cylindrical M18		cylindrical M12, M18	cylindrical M12, M18, M30	rectangular	square

<sup>1)</sup> based on the measurement range



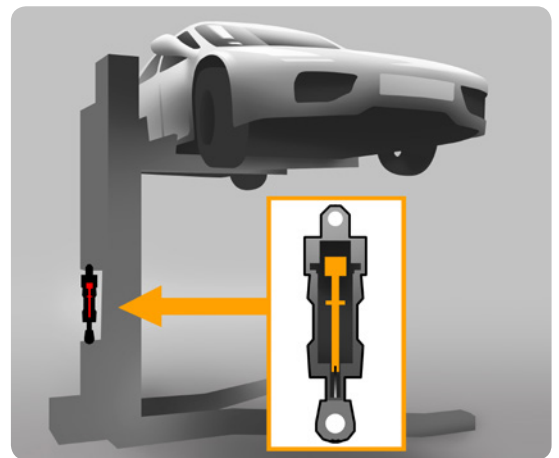
# Magnetostrictive Transducers



## Features

Magnetostrictive displacement transducers do not wear and have been successfully used in automation, fill-level measurement and hydraulic cylinders pressures up to 350 bar for many years.

- ▶ Non-contact displacement transducer, therefore maintenance-free
- ▶ Measurement of 2 positions possible
- ▶ Up to 2 µm resolution
- ▶ Up to 350 bar
- ▶ Version with position & speed
- ▶ With floats for fill-level measurement
- ▶ Variants for pneumatic cylinders



## Technical Data

GROUP ► CHARACTERISTICS ▼	MAP	MAB	MAZ	MSB
Measurement range max.	1500 mm	2500 mm		4000 mm
Linearity max. <sup>1)</sup>	±0.04 %	±0.01 %	±0.02 %	
Output analog	0.1...10.1 V, 4...20 mA	0...10 V, 4...20 mA		0.1...10.1 V, 4...20 mA
Output digital	-	SSI, CANopen		-
Travel speed	≤ 10 m/s			
Protection class max.	IP65	IP67		
Operating temperature max.	-20...+75 °C	-40...+90 °C		
Pressure max.	-		350 bar	
Magnetic cursors	Guided magnet, free magnet		Float, open ring, closed ring	
Housing	Profile with guided or free magnet		Sensor head with mounting thread	Sensor head with plug-on or threaded flange

<sup>1)</sup> based on the measurement range



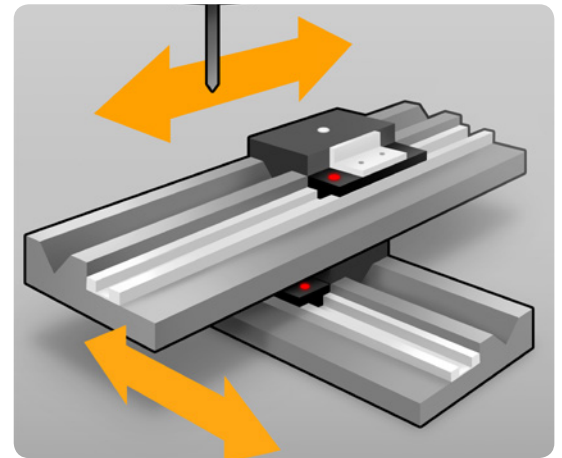
# Digital Linear Scales



## Features

Digital Linear Scales are working high-precision and are qualify for controlled machine tools. Typical applications are milling machines or rotation works. The Digital Linear Scales DMO and LS are completely capsuled and protected from dust, swarf and splash water.

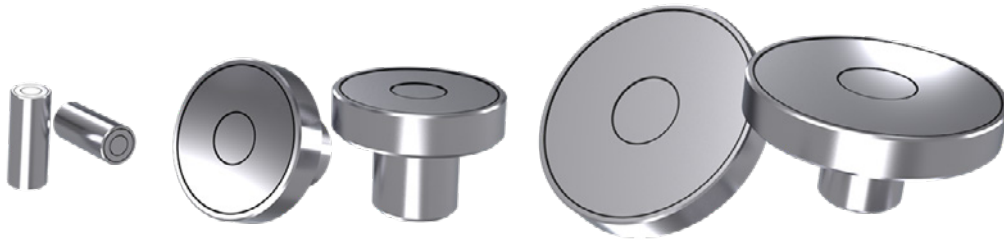
- ▶ Completely symmetric Profile
- ▶ Adjustable reference point
- ▶ High-precision mount for low friction movements
- ▶ Contactless, magnetic or optical measuring principle
- ▶ Protection class max. IP65



## Technical Data

GROUP ► CHARACTERISTICS ▼	DMO	LS177	LS187	LIP471	LIP481
Measurement range max.	2000 mm	3040 mm		420 mm	
Linearity max.	±20 µm	±3 µm		±0.5 µm	
Resolution max.	±10 µm	±1 µm	±20 µm	±0.2 µm	±2 µm
Output incremental	TTL, HTL	TTL	1 Vpp	TTL	1 Vpp
Protection class max.	IP65	IP64		-	
Operating temperature max.	-20...+80 °C	0...+50 °C		0...+40 °C	
Pole pitch	5 mm	20 µm		4 µm	

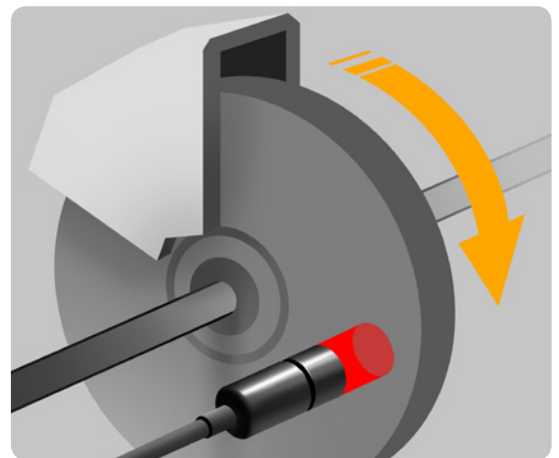
# Capacitive Displacement Sensors



## Features

Capacitive displacement sensors have an extremely high resolution and work even under demanding conditions, where other sensors fail. The non-contact and wear-free measuring principle has proven successful for many decades.

- ▶ Resolution in nanometer range
- ▶ Special designs
- ▶ Temperature-independent measurement
- ▶ Operating temperature -50...+200 °C
- ▶ Protection class up to IP68
- ▶ Very high sensitivity



## Technical Data

GROUP ► CHARACTERISTICS ▼	K0005	K0020	K0050	K0100	K0200	K0300	K0500	K1000
Measurement range max.	0.05 mm	0.2 mm	0.5 mm	1 mm	2 mm	3 mm	5 mm	10 mm
Linearity max. <sup>1)</sup>	±0.2 %							
Resolution <sup>1)</sup>	dynamic 0.01 %							
Output analog	0...10 V							
Protection class max.	IP68							
Operating temperature max.	-50...+200 °C							
Ø active measuring area	1.1 mm	2.3 mm	3.8 mm	5.5 mm	7.9 mm	9.8 mm	12.6 mm	17.7 mm
Min. Ø measuring object	3 mm	6 mm	7 mm	9 mm	17 mm	27 mm	37 mm	57 mm

<sup>1)</sup> Depending on the connected electronics

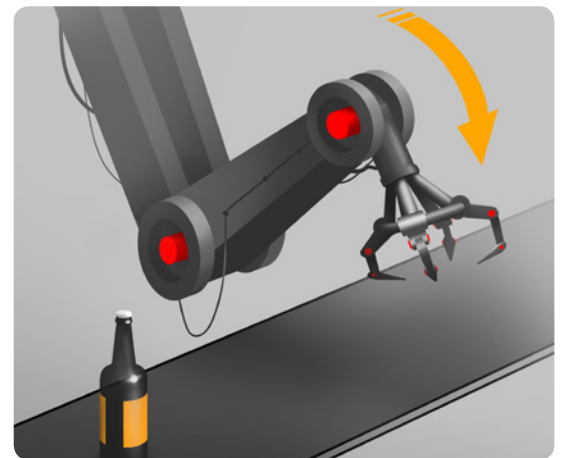
## Encoders & Rotary Transducers



### Features

These sensor classes engage angle changes of rotating parts with highest precision. The measurement process of the Digital Encoders are based on periodic graduation marks that are available as incremental TTL, HTL, or absolute in terms of Bus Interfaces like Profibus or SSI. On the contrary analog Rotary Transducers are working by Potentiometers.

- ▶ Wide spectrum of output signals
- ▶ Solid shaft, hollow shaft and through hollow shaft
- ▶ Miscellaneous kinds of flanges
- ▶ ATEX variants
- ▶ Protection class up to IP67
- ▶ Flange-mounting on wire rope mechanics



### Technical Data

GROUP ► CHARACTERISTICS ▼	WP	B36/B58	M36/M58	8.58 SSI	F36 SSI	8.58 CANopen	8.58 Profibus	8.58 EtherCAT
Resolution max.	noise	5000 pulses	12 bit	17 bit ST + 12 bit MT	17 bit ST + 24 bit MT	13 bit ST + 12 bit MT	13 bit ST + 12 bit MT	16 bit ST + 13 bit MT
Output analog	0...10 V, 4...20 mA, potentio- meter	-	0...5 V, 0...10 V, 4...20 mA	-				
Output incremental	-	HTL, TTL	-					
Output digital	-			SSI Binary/Gray, BiSS Binary		CANopen, CANlift	Profibus	EtherCAT
Protection class max.	IP67		IP67/IP65	IP67				
Operating temperature max.	-40...+90 °C	-20...+85 °C	-40...+85 °C	-40...+90 °C		-40...+80 °C		
Shaft type	solid shaft	solid shaft, hollow shaft	solid shaft, hollow shaft/ solid shaft	solid shaft, hollow shaft, through hollow shaft	solid shaft, hollow shaft	solid shaft, through hollow shaft		
Housing Ø	40 & 60 mm	36 & 58 mm		58 & 63 mm	36 & 46 mm	58 & 63 mm		

# Product Overview



## Draw Wire Sensors

- ▶ Ranges 50 mm - 42,5 m
- ▶ Linearity up to  $\pm 0.02\%$
- ▶ Resolution up to  $\pm 0.02\%$
- ▶ Output: potentiometric, analog, digital incremental, digital absolute, Bus



## Laser Sensors

- ▶ Ranges 0.5 mm - 500 m
- ▶ Linearity up to  $\pm 1\ \mu\text{m}$
- ▶ Resolution up to  $0.2\ \mu\text{m}$
- ▶ Triangulation or optical phase comparison



## Linear Potentiometers

- ▶ Ranges 10 mm - 2000 mm
- ▶ Linearity up to  $\pm 0.05\%$
- ▶ Output: potentiometric, analog
- ▶ Protection class up to IP67



## Magnetic Scales

- ▶ Ranges up to 99.99 m
- ▶ Linearity up to  $\pm 2\ \mu\text{m}$
- ▶ Resolution up to  $0.5\ \mu\text{m}$
- ▶ Output: analog, TTL, HTL, SSI, BiSS, 1 Vpp, tachometer



## Digital Length Gauges

- ▶ Ranges 12 mm - 30 m
- ▶ Linearity up to  $\pm 0.2\ \mu\text{m}$
- ▶ Output: TTL, HTL
- ▶ Protection class up to IP64



## Ultrasonic Sensors

- ▶ Ranges 100 mm - 6000 mm
- ▶ Linearity up to  $\pm 0.3\%$
- ▶ Resolution up to  $0.125\ \text{mm}$
- ▶ Output: analog, proximity switch



## Magnetostrictive Transducers

- ▶ Ranges 50 mm - 4000 mm
- ▶ Linearity up to  $\pm 0.02\%$
- ▶ Resolution up to  $2\ \mu\text{m}$
- ▶ Output: analog, SSI, CANopen, tachometer



## Digital Linear Scales

- ▶ Ranges 150 mm - 2000 mm
- ▶ Linearity up to  $\pm 0.5\ \mu\text{m}$
- ▶ Resolution up to  $5\ \mu\text{m}$
- ▶ Output: TTL, HTL



## Capacitive Sensors

- ▶ Ranges 50 mm - 42,5 m
- ▶ Linearity up to  $\pm 0.2\%$
- ▶ Resolution dynamic up to  $0.01\%$
- ▶ Output: analog



## Encoders/Rotary Transducers

- ▶ Single- and Multiturn
- ▶ Analog Multiturn up to 120 turns
- ▶ Solid-, hollow- and through hollow shaft
- ▶ Output: analog, digital incremental, digital absolute