

PRODUCT OVERVIEW



Powerful sensors to meet growing demands

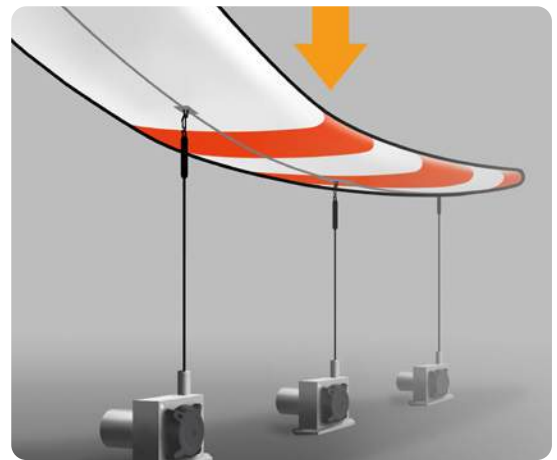
Draw Wire Sensors



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 or heavy duty 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 for encoder assembly



Technical Data

SERIES ▶ CHARACTERISTICS ▼	SX50	SX80/ SX120	SX135	GX200	MH60/ MH120	SXM30	SX300	ZX	LX	HX	FX
Measurement range	1250 mm	3 m / 5 m	42.5 m	12 m	4 m / 10 m	750 mm	15 m	38 mm	1250 mm	50 mm	375 mm
Linearity max. ¹⁾	±0.02 %			±0.1 %		±0.05 %	±1 %	±0.1 %		±1 %	
Output analog	0.5...4.5 V, 0...5 V, ±5 V, 0...10 V, 4...20 mA, optional 0...5 V or 0...10 V 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				-						
	SSI, CANopen	SSI, CANopen, Profibus, Ethernet, EtherCAT, Profinet			CANopen	-	SSI, CANopen, Profibus, Ethernet, EtherCAT, Profinet	-	TTL		
Protection class max.	IP67				IP69K	IP50	IP67	IP40		IP68	IP52
Operating temperature	-40...+120 °C		-40...+80 °C			-20...+70 °C	-55...+100 °C	-40...+70 °C	-20...+95 °C	-25...+75 °C	
Pressure max.	-					300 bar		-			

¹⁾ based on the measurement range

Inductive Sensors LVDT



Features

LVDTs (Linear Variable Differential Transformers) are a form of inductive sensors that are especially suited for applications in harsh environments and high temperature. The measurement is performed via a spring-loaded probe or a guided rod, that is attached to an iron-nickel core. The core moves inside a primary and two secondary coils, that generate an electromagnetic field. The movement of the core affects the electromagnetic field and the external electronics can interpret this into an analog output signal.

- ▶ Rod variants: spring loaded (optional with bellows), guided or with ball joint eyes
- ▶ Standard sensitivities allow the use of various common external electronics
- ▶ Analog outputs 0...10 V and 4...20 mA via external electronics or integrated electronics
- ▶ High temperature range of up to -40...+200 °C
- ▶ Protection class up to IP67
- ▶ Hydraulic version LVPH for operating pressure up to 350 bar

Technical Data

SERIES ▶ CHARACTERISTICS ▼	LV	LVIT	LVIG	LVISM	LVPH
Measurement range	25 mm	20 mm	200 mm	10 mm	500 mm
Linearity max. ¹⁾	±0.1 %	±0.25 %	±0.1 %	±0.25 %	±0.1 %
Resolution	0.8 µm	0.5 µm	0.2 µm	0.5 µm	2.5 µm
Sensitivity ²⁾	41...74 mV/V/mm	- ³⁾	27...82 mV/V/mm	60...130 mV/V/mm	1 V _{RMS} ±10 %
Output analog	0...10 V / 4...20 mA	0...10 V	0...10 V / 4...20 mA		
Protection class max.	IP67	IP65	IP67	IP65	IP67
Temperature range max.	-40...+200 °C	-25...+85 °C	-40...+120 °C	-25...+85 °C	-20...+120 °C
Rod variants	spring loaded, guided rod	spring loaded	rod with ball joint eyes	guided rod	

¹⁾ based on the measurement range

²⁾ depending on the measuring range

³⁾ sensor with integrated electronics

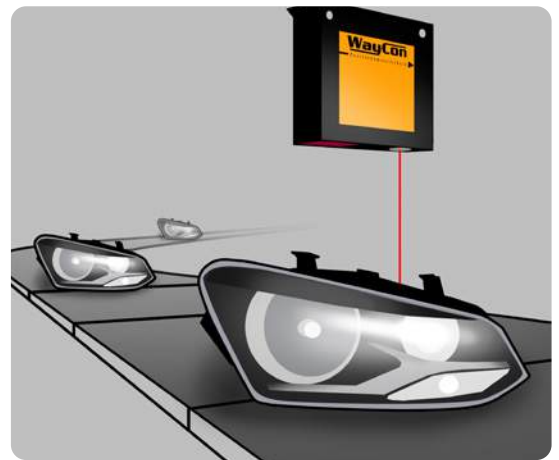
Laser Sensors



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 5 kHz
- ▶ Object detection up to 500 m
- ▶ Spot and line lasers
- ▶ Measurement through glass
- ▶ Sensor with integrated display



Technical Data

SERIES ▶ CHARACTERISTICS ▼	LAS	LAR	LAH-G1	LAW	LDI
Measurement range max.	800 mm	400 mm	300 mm	4 mm	500 m
Linearity max.	±13 µm	±10 µm	±8 mm	±2 µm	±1 mm
Repeatability / Resolution max.	4 µm	10 µm	0.5 µm	0.06 µm	±0.3 mm
Measuring frequency	5 kHz	660 Hz	5 kHz	30 kHz	50 Hz
Output analog	0...10 V, 4...20 mA	0...5 V	0...10 V, 3.2...20.8 mA	0...10 V, 4...20 mA	0...20 mA, 4...20 mA
Output digital	-			Ethernet	RS232, RS422, RS485, SSI, ProfiNet, Ethernet, EtherCAT
Switching output	-	PNP, NPN			-
Protection class max.	IP67				IP65
Operating temperature max.	-10...+50 °C	-10...+45 °C		-10...+40 °C	-10...+60 °C

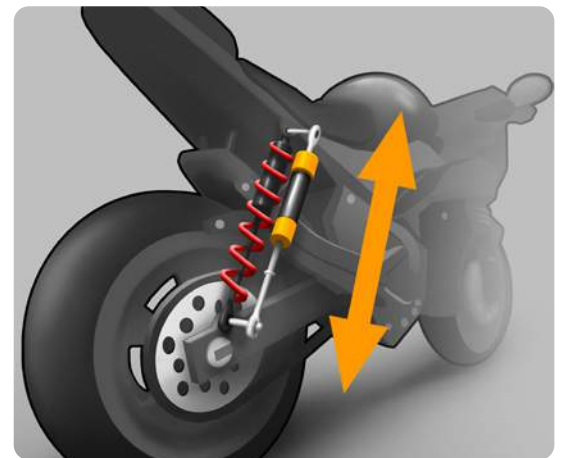
Linear Potentiometer



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

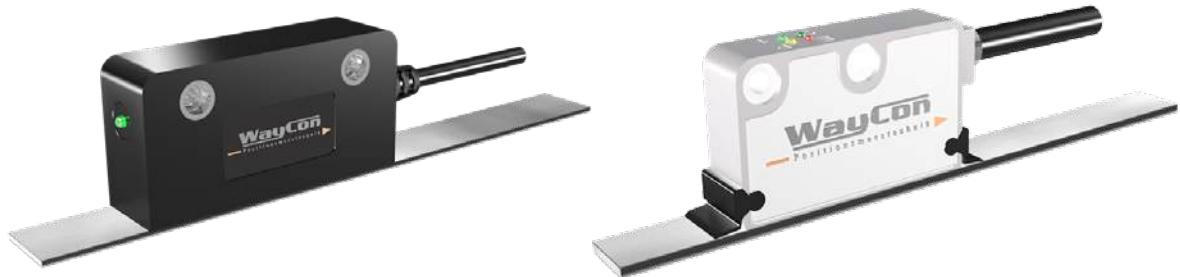


Technical Data

SERIES ▶ CHARACTERISTICS ▼	LZW, LZW1, LZW2	LRW, LRW1, LRW2, LRW3	LMI12	LMS18	LSW
Measurement range max.	750 mm	900 mm	1000 mm		2000 mm
Linearity max. ¹⁾	±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

¹⁾ based on the measurement range

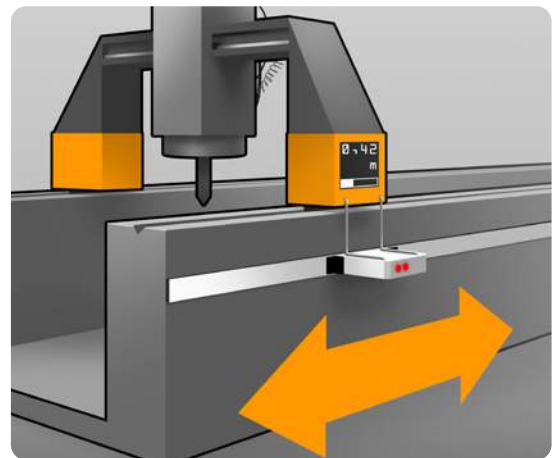
Magnetic Scales



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 IP68
- ▶ Ranges up to 100 m
- ▶ Output: analog or digital
- ▶ Resolution up to 0.5 μm
- ▶ Magnetic scale with top strip made of stainless steel



Technical Data

SERIES ▶ CHARACTERISTICS ▼	MXAZ	MXS2	MXW11	MXW21	MXI11	MXI21	MXI51
Measurement range max.	1250 mm	8165 mm	99.99 m				
Linearity max. ¹⁾	$\pm 2 \mu\text{m}$		1 % of period length		$\pm 15 \mu\text{m}$		
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

¹⁾ Additional deviation by magnetic tape

Non-Contact Inductive Sensors



Features

Non-contact inductive sensors generate a high-frequency electromagnetic field. Eddy currents are generated in metallic measuring objects within this field, which lead to a change in inductance. This distortion of the inductance is in turn influenced by the distance, the material and the size of the object. The sensor detects the change in inductance and converts it into a proportional output signal.

- ▶ Precise and wear free measurement on metallic objects
- ▶ Measurement ranges from 0...2 mm to 0...24 mm
- ▶ Cylindrical housing with thread for easy installation
- ▶ ISZL: Standard series for various applications, teach function for high flexibility
- ▶ ISIP: Resilient series with high protection class and temperature range, suited for high-pressure cleaning

Technical Data

SERIES ► CHARACTERISTICS ▼	ISZL	ISIP
Measurement range max.	24 mm	7 mm
Linearity max.	±0.025 mm	±0.35 mm
Resolution max.	<10 µm	<5 µm
Output analog	0...10 V, 4...20 mA	4...20 mA
Protection class max.	IP67	IP68 / IP69K
Temperature range max.	-25...+75 °C	-40...+70 °C

Eddy Current Probes



Features

The distance, the position or the change of position of an electrically conductive material can be detected contactless and wear-free by an eddy current sensor. A high-frequency alternating current feeds a coil in the sensor head. The resulting electromagnetic field induces an eddy current in the material to be measured, perpendicular to the excitation field. The resulting change in the AC resistance of the coil is directly proportional to the distance of the sensor from the target material.

- ▶ Precise and wear-free measurement on metallic objects
- ▶ Measurement range up to 0...4 mm
- ▶ Cylindrical design with external thread enables easy mounting
- ▶ Especially suited for dynamic measurements thanks to high measuring frequencies up to 50 kHz

Technical Data

SERIES ▶ CHARACTERISTICS ▼	WST
Measurement range max.	0...4 mm
Linearity max.	±8 µm
Sensitivity max.	2.5 V/mm
Measurement frequency max.	50 kHz
Output analog	0...10 V, 0...20 mA, 4...20 mA
Protection class max.	IP65
Operating temperature max.	-20...+125 °C

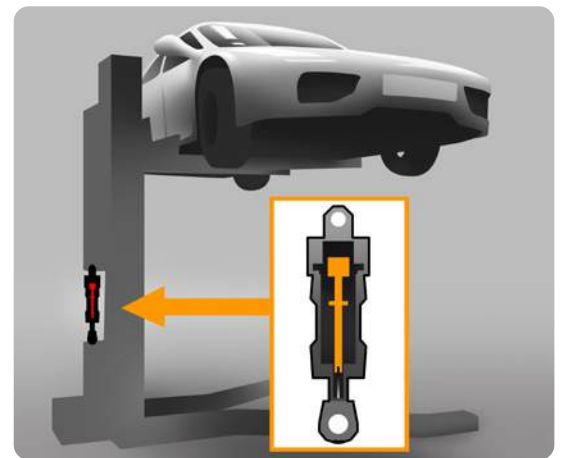
Magnetostrictive Transducers



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

SERIES ▶ CHARACTERISTICS ▼	MAP	MAB	MAZ	MSB
Measurement range max.	1500 mm	2500 mm		
Linearity max. ¹⁾	±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		-
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

¹⁾ based on the measurement range

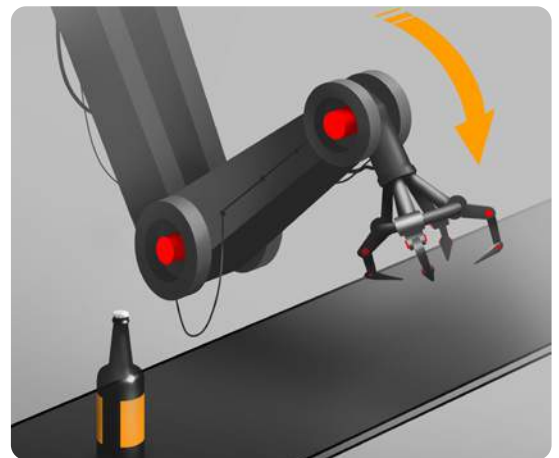
Encoders & Rotary Transducers



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

SERIES ▶ CHARACTERISTICS ▼	WP	WPH	WPI	B36/B58	M36/M58	8.58 SSI	8.58 CANopen	8.58 Profibus	8.58 EtherCAT
Resolution max.	noise	12 bit	2500 pulses	5000 pulses	12 bit	17 bit ST + 12 bit MT	13 bit ST + 12 bit MT	13 bit ST + 12 bit MT	16 bit ST + 13 bit MT
Output analog	0...5 V 0...10 V, 4...20 mA, potentiometer	0.5...4.5 V, 0...5 V, 0...10 V, 4...20 mA	-	-	0...5 V, 0...10 V, 4...20 mA	-			
Output incremental	-		TTL	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...+120 °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, through hollow shaft		
Housing Ø	40 / 60 mm			36 / 58 mm		58 / 63 mm	58 / 63 mm		

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.

- ▶ Distance sensor and/or proximity switch
- ▶ Detection of liquids or bulk material
- ▶ Version with minimised sound beam
- ▶ Durable, robust sensors
- ▶ UBA: fork sensor for edge detection



Technical Data

SERIES ► CHARACTERISTICS ▼	UFA2	UFP	UPT	UPA	UBA
Measurement range max.	6000 mm	3500 mm		6000 mm	70 mm
Linearity max. ¹⁾	±0.4 %	±0.3 %	±0.5 %		±2 %
Output analog	0...10 V, 4...20 mA				0...10 V
Switching output	PNP, NPN				-
Protection class max.	IP67			IP65	IP67
Operating temperature max.	-25...+70 °C	-20...+70 °C			0...+60 °C
Housing	cylindrical M12, M18, M30	cylindrical M12, M18, M30	rectangular	square	fork shaped

¹⁾ based on the measurement range

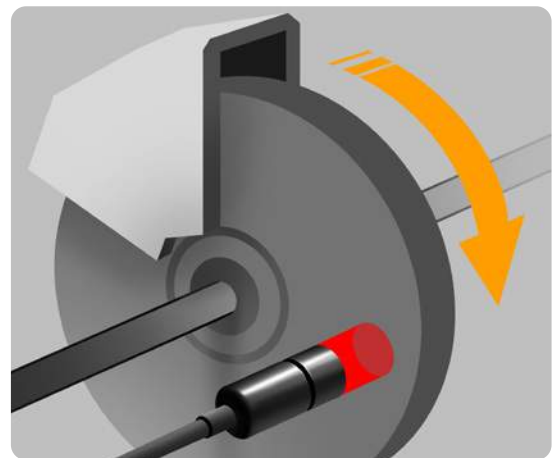
Capacitive Displacement Sensors



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

SERIES ▶ 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. ¹⁾	±0.2 %							
Resolution ¹⁾	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
Ø measuring object min.	3 mm	6 mm	7 mm	9 mm	17 mm	27 mm	37 mm	57 mm

¹⁾ Depending on the connected electronics

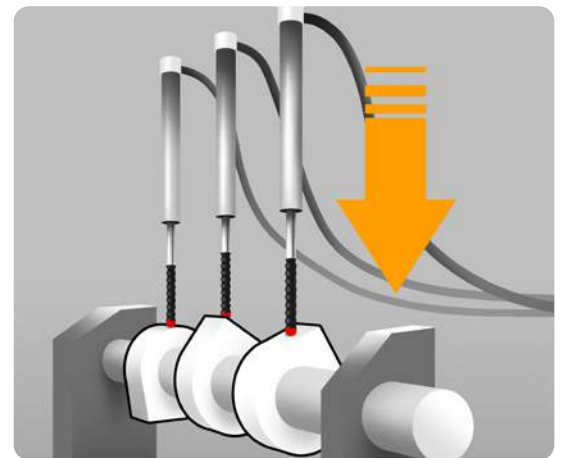
Digital Length Gauges



Features

Length gauges of the GMR series have integrated electronics and a photoelectric linear encoder. They are suitable for high-precision measurements and a wide range of applications. Areas of application are, for example, in production measurement technology, multi-point inspection stations and measuring equipment monitoring.

- ▶ Photoelectric linear encoder
- ▶ Any operating position
- ▶ RS422 incremental output
- ▶ Response speed up to 1500 mm/s
- ▶ Protection class IP67



Technical Data

SERIES ▶ CHARACTERISTICS ▼	GMR-10	GMR-25	GMR-50
Measurement range max.	10 mm	25 mm	50 mm
Linearity max. ¹⁾	(0.8 + L/50) μm		(1.5 + L/50) μm
Repeatability	0.3 μm		
Resolution max.	0.1 μm		1 μm
Respond speed max.	1500 mm/s		
Output incremental	RS422		
Protection class	IP67		
Operating temperature max.	0...+50 °C		

¹⁾ L = actual measured length (mm)

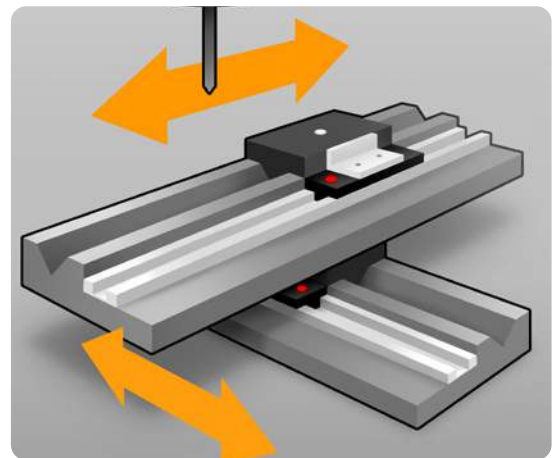
Digital Linear Scales



Features

Digital Linear Scales are working high-precision and are qualified for controlled machine tools. Typical applications are milling machines or rotation works. The Digital Linear Scales of the DMO Series 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 measuring principle
- ▶ Protection class IP65



Technical Data

SERIES ▶ CHARACTERISTICS ▼	DMO
Measurement range max.	2000 mm
Linearity max.	$\pm 20 \mu\text{m}$
Resolution max.	$\pm 10 \mu\text{m}$
Output incremental	TTL, HTL
Protection class	IP65
Operating temperature max.	-20...+80 °C
Pole pitch	5 mm

Signal Conditioners and Digital Displays



Features Signal Conditioners

Signal Conditioners, also known as Signal Converters, are used to convert output signals of sensors into different signals. For example: the signal conditioner PMX-24 converts the signals of sensors with potentiometric output into analog signals like 0...10 V or 4...20 mA.

Technical Data Signal Conditioners

SERIES ► CHARACTERISTICS ▼	PMX	IMX	LVA
Type	Potentiometer-Analog-Converter	Digital-Analog-Converter	LVDT-Amplifier
Input	1...20 kΩ	TTL, HTL, SSI	200...1900 mV
Output	4...20 mA, 0...5 V, 0...10 V, ±5 V, ±10 V	0...20 mA, 4...20 mA, ±10 V	0...10 V, 4...20 mA
Interfaces	-	RS232, RS485	-
Protection class max.	IP30	IP20	IP40
Operating temperature max.	-40...+85 °C	-20...+60 °C	-25...+85 °C

Features Digital Displays

If you require a visualization of the measured values provided by a sensor, WayCon offers you the perfect solution for all common sensor signals with our display series WAY. Functions, such as resetting to zero, setting limits, linearisation, scaling and many more add to the universal applicability of the displays.

Technical Data Digital Displays

SERIES ► CHARACTERISTICS ▼	WAY-AX	WAY-DX	WAY-SX
Channels	2		
Input	Potentiometer, -10...+10 V, 0...20 mA, 4...20 mA, PNP	HTL, TTL, PNP	SSI, PNP
Sensor supply	bis 250 mA		
Display	8 digits + sign		
Operating temperature max.	-20...+60 °C		

Product Overview



Draw Wire Sensors

- ▶ Measurement ranges 50 mm to 42.5 m
- ▶ Linearity up to $\pm 0.02\%$
- ▶ Resolution up to $\pm 0.02\%$



Inductive Sensors LVDT

- ▶ Measurement ranges 2 mm to 500 mm
- ▶ Linearity up to $\pm 0.1\%$
- ▶ Resolution up to $0.8\ \mu\text{m}$



Laser Sensors

- ▶ Measurement ranges 0.5 mm to 500 m
- ▶ Linearity up to $\pm 1\ \mu\text{m}$
- ▶ Resolution up to $0.2\ \mu\text{m}$



Linear Potentiometer

- ▶ Measurement ranges 10 mm to 2000 mm
- ▶ Linearity up to $\pm 0.05\%$
- ▶ Output: potentiometer, analog



Digital Magnetic Scales

- ▶ Measurement ranges up to 99.99 m
- ▶ Linearity up to $\pm 2\ \mu\text{m}$
- ▶ Resolution up to $0.5\ \mu\text{m}$



Inductive Sensors

- ▶ Measurement ranges 2 mm to 24 mm
- ▶ Linearity up to $\pm 25\ \mu\text{m}$
- ▶ Resolution up to $0.012\ \mu\text{m}$



Eddy Current Probes

- ▶ Measurement ranges 0.8 mm to 4 m
- ▶ Linearity up to $\pm 8\ \mu\text{m}$
- ▶ Resolution up to $0.4\ \mu\text{m}$



Magnetostrictive Transducer

- ▶ Measurement ranges 50 mm to 2500 mm
- ▶ Linearity up to $\pm 0.02\%$
- ▶ Resolution up to $2\ \mu\text{m}$



Encoder

- ▶ Singleturn and Multiturn
- ▶ Solid-, hollow- and through hollow shaft
- ▶ Outputs: analog, digital, incremental



Ultrasonic Sensors

- ▶ Measurement ranges 100 mm to 6000 mm
- ▶ Linearity up to $\pm 0.3\%$
- ▶ Resolution up to $0.125\ \text{mm}$



Capacitive Sensors

- ▶ Measurement ranges 0.05 mm to 10 mm
- ▶ Linearity up to $\pm 0.2\%$
- ▶ Resolution up to 0.01%



Digital Length Gauges

- ▶ Measurement ranges 10 mm to 50 mm
- ▶ Linearity up to $0.8\ \mu\text{m}$
- ▶ Resolution up to $0.1\ \mu\text{m}$



Digital Linear Scales

- ▶ Measurement ranges 150 mm to 2000 mm
- ▶ Linearity up to $\pm 20\ \mu\text{m}$
- ▶ Resolution up to $10\ \mu\text{m}$



Signal Conditioners and Displays

- ▶ Amplifiers for LVDTs
- ▶ Teaching of potentiometer outputs
- ▶ Multifunctional displays