

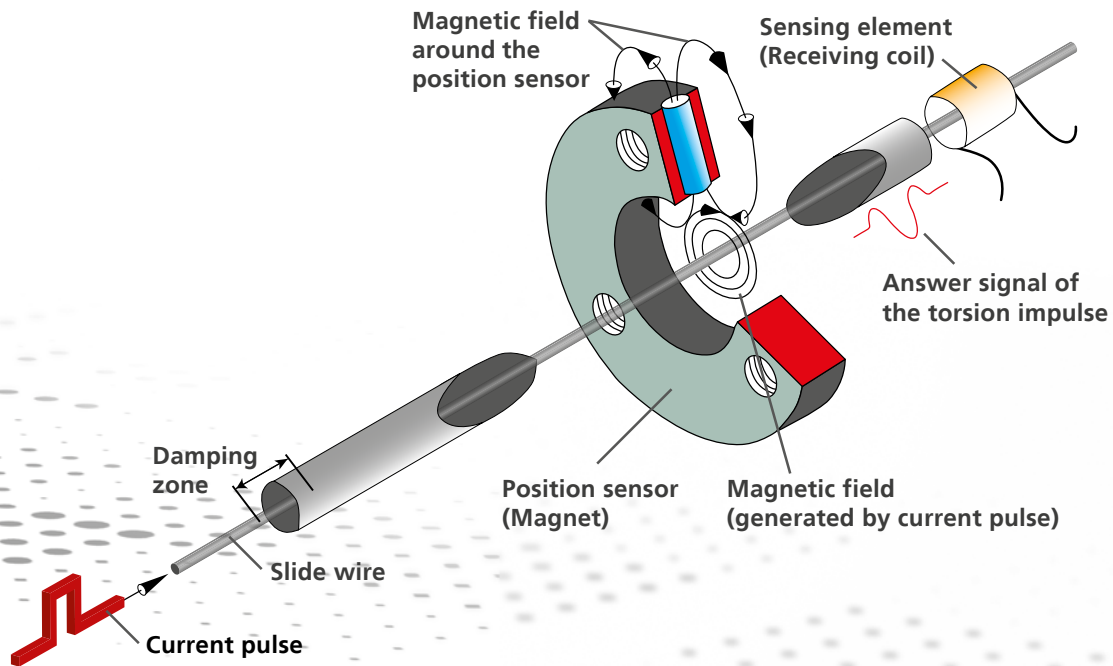
Magnetostrictive Linear Encoders Overview



Product Key

Magnetostrictive Linear Encoders						
Measuring Principle	Sampling	Housing	Performance Class	Size	Interchangeable Flange	Comments
L						Linear Measurement Principle Linear movements are detected mechanically and transmitted as an electrical signal to the higher-level control system.
		A				Absolute Measurement System The absolute measurement system in the tubular housing measures the position along a straight axis specified by the customer. "Absolute" means that this position can be uniquely identified within the permissible measurement range without performing a reference run.
		P				Profile Housing The absolute measuring system features a profile housing for flexible mounting.
				47		This series has a diameter of 47 mm and is available only with a plastic housing.
				50		This series has a diameter of 50 mm and is available only with a plastic housing.
				80		This series has a diameter of 80 mm and is available only with a plastic housing.
L						Linear Measurement Principle Linear movements are detected mechanically and transmitted as an electrical signal to the higher-level control system.
	M					Magnetostriction The position to be measured is determined using an electrical pulse and a permanent magnet.
		C				Cascade The cascable measurement system has a modular design. It enables absolute position measurement up to 20 m. Multiple measurements: It can detect up to 30 positions simultaneously.
		P				Profile Housing The measuring system features a profile housing for flexible mounting.
		R				Tube Housing The measuring system features a pressure-resistant tube housing for installation in hydraulic cylinders.
			B			"Economy" Performance Class The resolution is 0.1 mm. The Economy performance class is a series with a profile that is open on one side. It is cost-optimized and particularly suitable for high-volume production.
			E			"Economy" Performance Class The resolution is 0.1 mm. The E performance class is a series featuring a profile that is open on one side. It is cost-optimized and particularly suitable for high-volume production.
			H			"Industrial-High-Resolution Measurement Systems" Performance Class This performance class has a resolution of up to 0.001 mm.
			I			"Industrial" Performance Class This performance class has a resolution of up to 0.001 mm.
			S			"Standard" Performance Class This performance class has a resolution of 0.01 mm.
				27		The housing has a diameter of 27 mm .
				30		The profile has an edge dimension of 30 mm .
				34		The case has a diameter of 34 mm .
				41		The case has a diameter of 41 mm .
				44		The case has a diameter of 44 mm .
				46		The case has a diameter of 46 mm .
				48/46		The series features a screw-in flange with a wrench size of 46 mm .
				48		The case has a diameter of 48 mm .
				50		The case has a diameter of 50 mm .
				55		The case has a diameter of 55 mm .
				56		The case has a diameter of 56 mm .
				70		The case has a diameter of 70 mm .
				80		The case has a diameter of 80 mm .
					H	The measuring system has an interchangeable flange for hydraulic cylinders.

How Magnetostriction Works

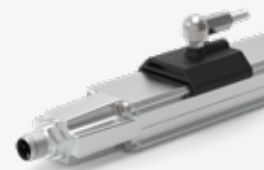
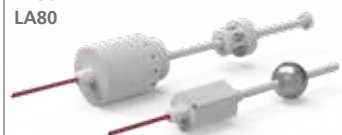


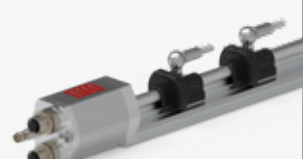
How It Works

The magnetostrictive linear position sensors from TR Electronic detect linear movements and output them as an electrical signal. The measuring principle of these linear encoders is based on a time-of-flight measurement. A magnetostrictive wire (waveguide) is stretched inside a protective tube, through which current pulses are sent. This creates a ring-shaped magnetic field around the wire. A non-contact permanent magnet, whose magnetic field intersects the waveguide, serves as the position sensor. At the measurement point, the two differently oriented magnetic fields meet.

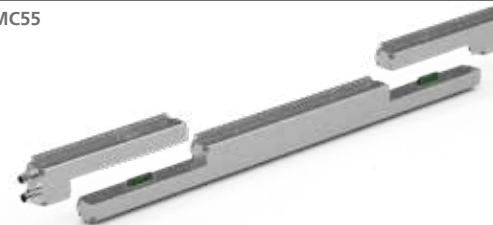
This triggers a torsional pulse at that point. The pulse travels at a constant speed of sound along the wire in both directions. The time between the transmission of the current pulse and the arrival of the torsional pulse at the measuring transducer is measured. From this, the measurement electronics calculate a signal proportional to the displacement or distance of the magnet from the measuring transducer. This signal is processed as a digital or analog output signal and made available.

Overview of Performance Classes

		Performance Class			
		Economy (Resolution: 0.1 mm)	Basic (Resolution: 0.1 mm)	Standard (Resolution: 0.01 mm)	
Housing	Tube		LMR44 LMR48 LMR48/46 LMRB27 	LMRS34 LMRS41H LMRS27 	
	Tube with interchangeable flange				
	Profile	LMPE30 	LMP48 	LMP534 	
Technical Specifications	Plastic			LA50 LA80 	
	Resolution	0.1 mm	0.1 mm	0.01 mm	
	Reproducibility	±0.005% of full scale (min. ±50 µm)	±0.005% of full scale (min. ±50 µm)	±0.005% of full scale (min. ±10 µm)	
	Hysteresis	< 100 µm	<100 µm	typical: <20 µm Measuring lengths up to 2000 mm: 10 µm	
	Measured length	up to 3000 mm (other lengths available upon request)	50 mm to 4000 mm (other measurement lengths available upon request)	50 mm to 4000 mm (other measurement lengths available upon request)	
	Interface	– EtherCAT – Synchronous Serial Interface – Analog – IO-Link	– CANopen – Synchronous Serial Interface – Analog	– CANopen – Synchronous Serial Interface – Analog – IO-Link About Remote Electronics (LMRS 27): – EtherCAT – Profibus – Profinet – EtherNet/IP – Ethernet Powerlink	

Performance Class	
Industrial (Resolution: 0.001 mm)	Industrial-High Resolution (Resolution: 0.1 µm)
LMRI46 LMRI27 LMRI46H 	LMRH46 
LMPI46 	LMPH46 
0.001 mm	0.0001 mm (0,1 µm)
5 µm	5 µm
Typical: <10 µm Measurement lengths of 1000 mm or more: 20 µm Measurement lengths of 1500 mm or more: 50 µm	Typical: <10 µm Measurement lengths of 1000 mm or more: 20 µm Measurement lengths of 1500 mm or more: 50 µm
50 mm to 4000 mm (other measurement lengths available upon request)	50 mm to 4000 mm (other measurement lengths available upon request)
_ EtherCAT _ CANopen _ Synchronous Serial Interface _ Analog _ Profibus _ Profinet _ EtherNet/IP _ Ethernet Powerlink LA50/80 _ Synchronous Serial Interface _ Analog	_ EtherCAT synchronized

Special Solutions	
Triple Redundancy	
LMR70 	
Resolution:	Measurement lengths up to 1500 mm: 0.01 mm Measurement lengths of 1500 mm or more: 0.15 mm
Reproducibility:	40 µm
Hysteresis:	Measurement lengths up to 1500 mm: 0.02 mm Measurement lengths of 1500 mm or more: 0.1 mm
Measurement length:	50 mm ... 2000 mm
Interfaces:	_ SSI (12 bit/16 bit) _ Analog

Up to 20 m measurement length	
LMC55 	
Resolution:	0.05 mm
Reproducibility:	50 µm
Hysteresis:	0.1 mm
Measurement length:	5 m ... 20 m
Interfaces:	_ EtherCAT _ CANopen _ Profibus _ Profinet _ EtherNet/IP _ Ethernet Powerlink

Tube housing LMRI46 (H), LMRS 34, LMRS41H

Product	LMRI 46 (H) 	LMRS 34 	LMRS 41H 
Mechanic execution	(R) Tube, (H) Hydraulic Tube	(R) Tube	(H) Hydraulic Tube
Measurement Length	50...4000 mm* (other lengths available upon request)	50...3000 mm (other lengths available upon request)	50...3000 mm (other lengths available upon request)
Size	46 mm	34 mm	41 mm
Supply voltage	24 VDC, -20...+10 %*	24 VDC, -20...+10 %*	24 VDC, -20...+10 %*
Resolution	0.001 mm	0.01 mm	0.01 mm
Linearity defect (ML= Measurement Length)	typical: ±30 µm ML <1000 mm: ±0,05 mm ML ≥1000...1500 mm: ±0,1 mm ML >1500 mm: ±0,15 mm	≤±0,015 % Full scale (min ±50 µm)	≤±0,015 % Full scale (min ±50 µm)
Reproducibility	0.005 mm	≤±0.005 % Full scale (min ±10 µm)	≤±0.005 % Full scale (min ±10 µm)
Hysteresis (ML= Measurement Length)	typical: <10 µm ML <1000 mm: <0,02 mm ML ≥1000...1500 mm: <0,1 mm ML >1500 mm: <0,15 mm	-	-
Temperature coefficient (ML= Measurement Length)	ML ≤500 mm: <8 µm/°C ML >500 mm: <15 ppm/°C Full Scale	-	-
Ambient temperature	0...+70 °C option: -20...+70 °C	-40...+80 °C	-40...+80 °C
Protection class	IP65	IP67	IP67
Options	Multimagnet*, Rod end mounting	Rod end mounting	Rod end mounting, without sheath, replaceable sensor
Orientation	Any desired	Any desired	Any desired
Material	Stainless Steel / Aluminum	Stainless Steel / Aluminum	Stainless Steel / Aluminum
Maximum pressure	600 bar static	600 bar static	600 bar static
Interface	SSI CANopen EtherCAT Analog DeviceNet Ethernet/IP PROFIBUS PROFINET	SSI CANopen Analog	SSI CANopen Analog IO-Link
Weblink	www.tr-electronic.com/s/S011361	www.tr-electronic.com/s/S018151	www.tr-electronic.com/s/S027046
QR Code			

*depends on interface

LMR 48/46, LMR 48

Product	LMR 48/46	LMR 48
		
Mechanic execution	(R) Tube	(R) Tube
Measurement Length	50...2500 mm (other lengths available upon request)	50...2500 mm* (other lengths available upon request)
Size	48 mm	48 mm
Supply voltage	9...36 VDC	9...36 VDC
Resolution	0.1 mm	0.1 mm
Linearity defect	±0.04 % + 1 LSB	±0.04 % + 1 LSB
Reproducibility	<0.005 % Full scale ≥50 µm	<0.005 % Full scale ≥50 µm
Hysteresis	0.1 mm	0.1 mm
Temperature coefficient	±15 ppm/°C Full Scale, typical ±30 ppm/°C Full Scale	±15 ppm/°C Full Scale, typical ±30 ppm/°C Full Scale
Ambient temperature	-40...+85 °C	-40...+85 °C
Protection class	IP65, Option: IP69K	IP65, Option: IP69K
Options	-	-
Orientation	Any desired	Any desired
Material	Stainless Steel / Aluminum	Stainless Steel / Aluminum
Maximum pressure	600 bar static	600 bar static
Interface	Analog	SSI CANopen Analog IO-Link
Weblink	www.tr-electronic.com/s/5010986	www.tr-electronic.com/s/5007102
QR Code		

Tubular/Profile Housing

LMRB27, LMRS27 / LMRI27, LMPI46

Product	Sensor LMRB27 	Interface box LMRS27 	LMPI46 
Mechanic execution	(R) Tube	(R) Tube	(P) Profile
Measurement Length	50...2000 mm (other lengths available upon request)	50...4000 mm (other lengths available upon request)	50...4000 mm* (other lengths available upon request)
Size	27 mm	27 mm	46
Supply voltage	24 VDC ± 10 %	24 VDC, ± 10 %	24 VDC, -20...+10 %*
Resolution	0.1 mm	0.01 mm; (0.001 mm on request)	0.001 mm
Linearity defect	Measurement Length ≤ 2000 mm: ± 0.20 mm	± 0.015 % Full scale (min ± 50 μ m)	ML typical: ± 15 μ m ML < 1000 mm: $\pm 0,03$ mm ML ≥ 1000 ...1500 mm: $\pm 0,1$ mm ML > 1500 mm: $\pm 0,15$ mm
Reproducibility	0.1 mm	± 0.005 % Full scale (min ± 10 μ m)	0.005 mm
Hysteresis	Measurement Length ≤ 2000 mm: 0.1 mm	Measurement Length ≤ 1500 mm: 0.03 mm Measurement Length ≥ 1500 mm: 0.1 mm	ML typical: < 6 μ m ML < 1000 mm: < 0.015 mm ML ≥ 1000 ...1500 mm: < 0.1 mm ML > 1500 mm: < 0.15 mm
Temperature coefficient	< 40 ppm/ $^{\circ}$ C Full scale	< 40 ppm/ $^{\circ}$ C Full scale	ML ≤ 500 mm: < 8 μ m/ $^{\circ}$ C ML > 500 mm: < 15 ppm/ $^{\circ}$ C*
Ambient temperature	-40...+80 $^{\circ}$ C	-40...+80 $^{\circ}$ C	0...+70 $^{\circ}$ C (Option: -20...+70 $^{\circ}$ C)
Protection class	IP65	IP65	IP65
Options	Rod end mounting	Rod end mounting	Multi-magnet*, ATEX Zone 2/22
Orientation	Any desired	Any desired	Any desired
Material	Stainless Steel / Aluminum	Stainless Steel / Aluminum	Extruded aluminium profile
Maximum pressure	600 bar static	600 bar static	-
Interface	Analog 	SSI  Analog   EtherNet/IP CANopen 	SSI  Analog   EtherNet/IP CANopen  DeviceNet
Weblink	www.tr-electronic.com/s/S011927	www.tr-electronic.com/s/S011928	www.tr-electronic.com/s/S011362
QR Code			

Profile housing LMPE30, LMP30, LMP48

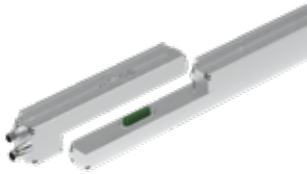
Product	LMPE30 	LMP30 	LMP48 
Mechanic execution	(P) Profile	(P) Profile	(P) Profile
Measurement Length	50...3000 mm* (other lengths available upon request)	50...4000 mm* (other lengths available upon request)	30...3000 mm* (other lengths available upon request)
Size	30	30	48
Supply voltage	24 VDC, $\pm 10\%$	24 VDC, $-20...+10\%$ *	24 VDC $\pm 20\%$; 9...36 VDC *
Resolution	0,1 mm	0.01 mm*	0.1 mm
Linearity defect (ML= Measurement Length)	$\leq \pm 0,04\%$ Full Scale + 1 LSB* (min. $\pm 100\ \mu\text{m}$)	ML $\leq 1500\text{ mm}$: $\pm 0,15\text{ mm}$ ML $> 1500\text{ mm}$: $\pm 0,20\text{ mm}$	$\pm 0,04\%$ + 1 LSB*
Reproducibility	$\leq 0,005\%$ Full Scale (min 100 μm)	0.05 mm*	$< 0.005\%$ Full scale, $\geq 50\ \mu\text{m}$ *
Hysteresis (ML= Measurement Length)	0,1 mm	0.1 mm	0.1 mm*
Temperature coefficient (ML= Measurement Length)	$< 100\text{ ppm}/^\circ\text{C}$ Full scale*	$< 40\text{ ppm}/^\circ\text{C}$ Full scale	$\pm 15\text{ ppm}/^\circ\text{C}$ Full scale, typical $\pm 30\text{ ppm}/^\circ\text{C}$ Full scale
Ambient temperature	0...+70 $^\circ\text{C}$	0...+70 $^\circ\text{C}$ (Option: $-20...+70\text{ }^\circ\text{C}$)	-40...+85 $^\circ\text{C}$
Protection class	IP64	IP65	IP67
Options	-	Multi-magnet*	
Orientation	Any desired	Any desired	Any desired
Material	Extruded aluminium profile	Extruded aluminium profile	Extruded aluminium profile
Interface	SSI EtherCAT [®] Analog IO-Link	SSI PROFINET [®] Analog EtherCAT [®] ISI EtherNet/IP [®] PROFIBUS [®] ETHERNET POWERLINK [®] CANopen	SSI CANopen Analog
Weblink	www.tr-electronic.com/s/S027141	www.tr-electronic.com/s/S008395	www.tr-electronic.com/s/S008396
QR Code			

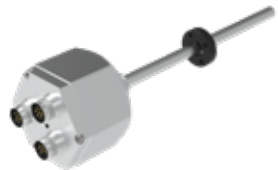
*depends on interface

Can't find the right variant? Please contact us (info@tr-electronic.de)

Cascadable Measurement System – LMC55

Multi-Channel Measurement System – LMR70

Product	LMC 55
	
Supply voltage	24 VDC, -20...+10 %
Current consumption no load	24...30 VDC
_ Master-System	<60 mA
_ Single component	<90 mA
Measuring principle	magnetostrictive
Measuring length, standard	5...20 m
Resolution	0.05 mm
Linearity defect	<0,02 %, ±0,20 mm / modul
Reproducibility	0.05 mm
Hysteresis	0.1 mm
Material	Aluminium extruded profile
Cycle time, internal	5 ms
Number of magnets	30
Magnet - Minimum distance	100 mm
Ambient temperature	0...+70 °C
Ambient temperature option	-20...+70 °C
Storage temperature, dry	-30...+85 °C
Protection class	IP65
Stray magnetic field	DIN EN 61000-4-8, Test Level 4
Measuring reference	Measuring plane
Interface	    
Weblink	www.tr-electronic.com/s/5008458
QR Code	

Product	LMR 70
	
Mechanic execution	(R) Tube
Measurement Length	50...2000 mm (other lengths available upon request)
Size	70 (triple redundant)
Supply voltage	24 VDC, ±10 %
Resolution	0,01 mm, 12 bit or 16 bit
Linearity defect (ML= Measurement Length)	ML ≤1500 mm: ±0.10 mm ML >1500 mm: ±0.15 mm
Reproducibility	0.04 mm
Hysteresis (ML= Measurement Length)	ML ≤1500 mm: 0.02 mm ML >1500 mm: 0.1 mm
Temperature coefficient	<40 ppm/°C Full Scale
Ambient temperature	-40...+85 °C
Protection class	IP65
Options	Rod end mounting
Orientation	Any desired
Material	Stainless steel / Aluminium
Maximum pressure	600 bar static
Interface	SSI Analog
Weblink	www.tr-electronic.com/s/5008380
QR Code	

Can't find the right variant? Please contact us (info@tr-electronic.de)

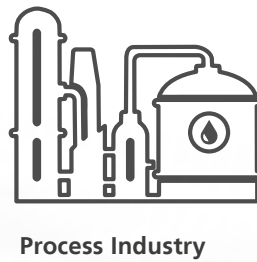
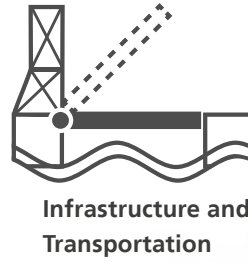
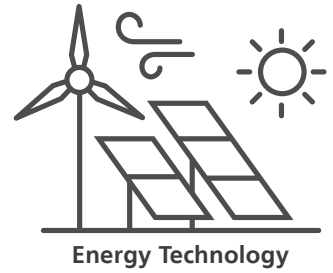
Plastic Housing LA50, LA80

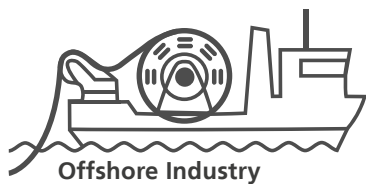
Product	LA50	LA 80
		
Mechanic execution	(R) Tube (plastic)	(R) Tube (plastic)
Measurement Length	100...1000 mm (other lengths available upon request)	100...1000 mm (other lengths available upon request)
Size	50	80
Supply voltage	24 VDC, -20...+10 %	24 VDC, ±10 %
Resolution	0.01 mm	0.05 mm
Linearity defect (ML= Measurement Length)	±0.10 mm	<0.05 %
Reproducibility	0.005 mm	0.01 mm
Hysteresis (ML= Measurement Length)	ML ≤1500 mm: 0.02 mm ML >1500 mm: 0.1 mm	0.1 mm
Temperature coefficient	<40 ppm/°C Full Scale*	<40 ppm/°C Full Scale*
Ambient temperature	0...+70 °C (Option: -20...+70 °C)	0...+70 °C (Option: -20...+70 °C)
Protection class	IP68	IP68
Orientation	Any desired	Any desired (as a vertical level measurement system)
Material	Polypropylene	Polypropylene
Interface	SSI Analog	SSI Analog
Weblink	www.tr-electronic.com/s/S008501	www.tr-electronic.com/s/S008502
QR Code		

*Depending on the measurement length and interface

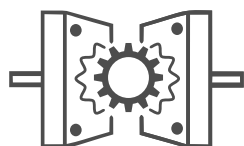
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Your Industry, Our Expertise





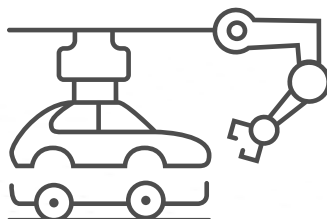
Offshore Industry



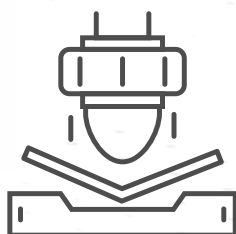
Plastics and
Rubber Machinery



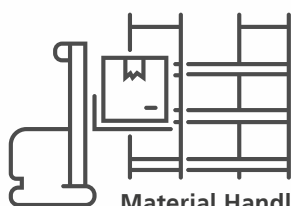
Woodworking Machines



Assembly / Handling / Robotics

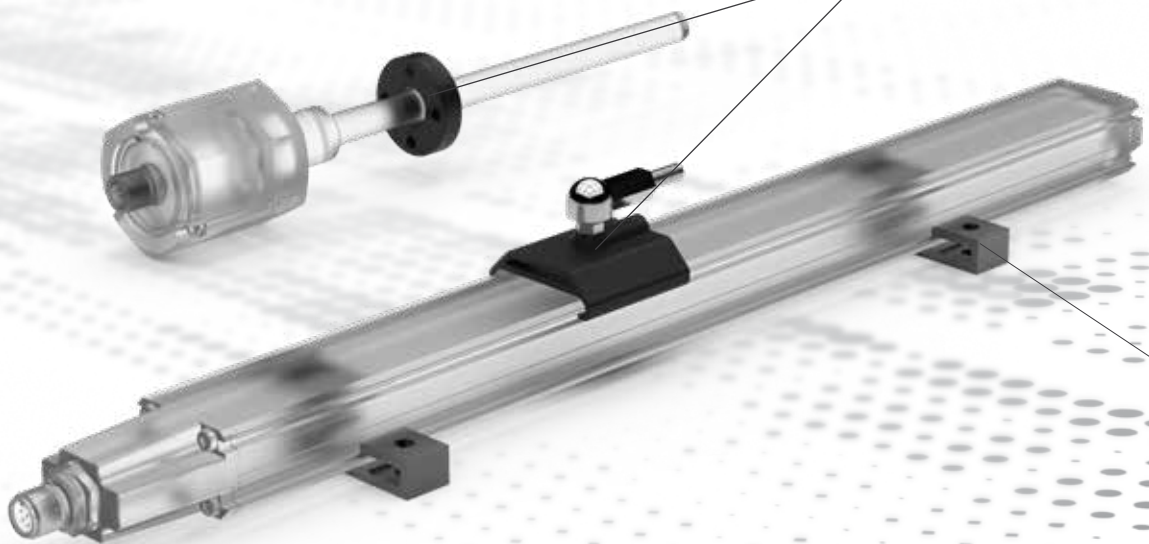


Machine Tools / Metal



Material Handling,
Cranes, Hoists

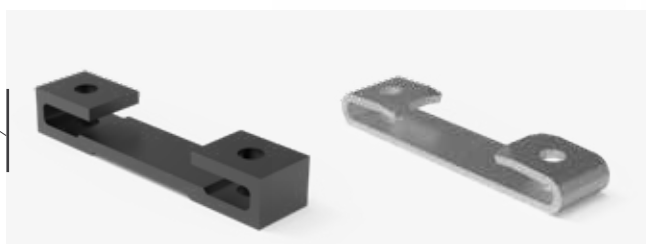
Accessories for Linear Encoders



Magnets



Double clamping



For a complete overview of the accessories, please see brochure TR-V-PR-GB-0045



For bar lengths up to 1,250 mm, two double clamps are required; for every additional 500 mm, one additional double clamp is needed.

TR Electronic – your partner in automation

Rotary encoders

Absolute encoder, incremental rotary encoder, wire-actuated encoder

Rotary encoders precisely measure position in a wide variety of applications and industries. Our range extends from miniature versions for medical technology to SIL3-certified rotary encoders, including those with the necessary OT safety. Naturally, we also offer a comprehensive range of accessories for our rotary encoders.

Linear encoders

Linear absolute measuring systems, laser displacement measurement

Linear encoders register linear motions in machines, tools and systems according to specific requirements using different technologies. Linear encoders allow measuring distances of max. 20 m almost without any wear. This value is max. 240 m for laser measuring systems. Machines and systems can be precisely controlled to reach their desired positions.

Motion

Compact actuating and positioning drives

EncoTRive compact drives offer decentralised solutions in the power range from 50 to 400 watts. The combination of flexibly selectable gear motors and integrated positioning controllers saves space in the control cabinet and simplifies cabling. The integrated absolute encoder provides the current position at any time without referencing. Uniform control of all variants enables easy integration into all common fieldbus systems.



Components

**Industrial PC, field bus I/O,
PLC, HMI controller**

Industrial PCs are available in numerous variants and offer customized calculation power for PC-assisted automation. Programmable logic controllers (PLC) are the traditional means for automation. HMI controllers establish the interface to the user. Field bus nodes, I/O modules and cam controllers complete the range of automation components.

Automation

**Consulting and implementation
for new machines and retrofit**

You want to set up a largely automated new machine or retrofit and modernize your existing machine with automation systems? Then you just need our extensive expert knowledge and the more than 20 years of our experience.

Unidor

**Blanking and forming,
systems, controls and sensors**

Trendsetting blanking and forming technology for more than 30 years. We are your reliable partner in the world of blanking and pressing and can prove this with thousands of machines which we have successfully installed all over the world. Sensors, controls and systems ensure optimal results in machines, tools and retrofit projects.



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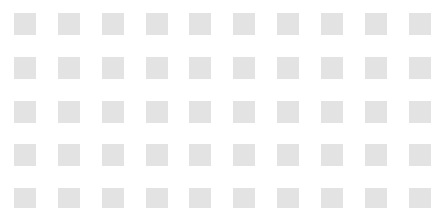
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