




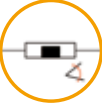




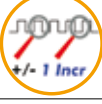



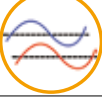


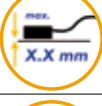

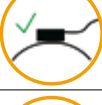




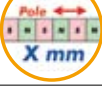
MEASURE

MEASURING SYSTEMS



MEASURE ▶ CONTROL ▶ POSITION

Symbols & Meanings of Technical Specifications

System features	Symbol	Explanation
Measuring method	    	incremental, absolute, rotative, inclinometric or absolute- or incremental-rotative
Power supply		10... 30 or 5 VDC
Resolution (incremental)		resolution at 4-edge triggering
Resolution (absolute)		with absolute measuring systems
Repeat accuracy		at standard- respectively highest resolution
Output signals	    	square waves (HTL / TTL), sine waves or pulse width modulation
Max. measuring distance		theoretical measuring length of the system (depends on available tape length)
Max. distance sensor / tape		allowed gap from 0.1 mm up to the indicated value
Operation speed		max. allowed speed
Radial measurement possible		these systems are suitable for rotative resp. radial tasks
Protection class of sensor head *		defines the insensitivity against dust, dirt and wetness. * in standard version (optionally most systems can be extended up to IP67 by sealing)
Number of absolute tracks	  	indicates the number of tracks in absolute measuring systems (1-3 tracks)
Pole pitch		indicates the pole pitch of the suitable magnetic tape

ELGO - Innovative Solutions regarding Measuring and Control Technology



For more than 30 years we concentrate on our core competencies „Measure - Control - Position“ which made us well known in the market.

Our success results from the consistent, innovative collaboration with our customers on the basis of a „win-win“ strategy. The foundation of our steady growth is the satisfaction of all our employees and partners who support our company.

A high degree of innovative potential and the proverbial ingenuity are the impulse for new developments. Our milestones show that ELGO consistently is distinguished by significant innovations.

The special market novelties are the following milestones:

- 1982** ELGO develops the first electronic counter with LED display
- 1985** Small single-axis controller based on the new microprocessor technology captured the world market
- 1992** First linear, magnetic length measuring system of own development goes into serial production
- 1997** First battery-powered magnetic length measuring system (magnetic tape – sensor – digital display)
- 1999** First absolute linear magnetic length measuring system, based on three coded tracks
- 2000** Magnetic length measuring system for elevators up to 600 meters with an accuracy of +/- 0.1 mm
- 2001** PC-PLC-control-system, axes and measuring system united in a complete modular system
- 2002** Magnetic length measuring system with a resolution of 1 / 1000 mm
- 2003** LIMAX: Linear absolute measuring system for the elevator industry, measuring lengths of 1000 m, 16 m/s
- 2007** First compact 3-axis control with LCD/touch-version (series P40)
- 2010** First redundant measuring system for SIL-2/SIL-3 with TÜV approbation for elevators: LIMAX RED

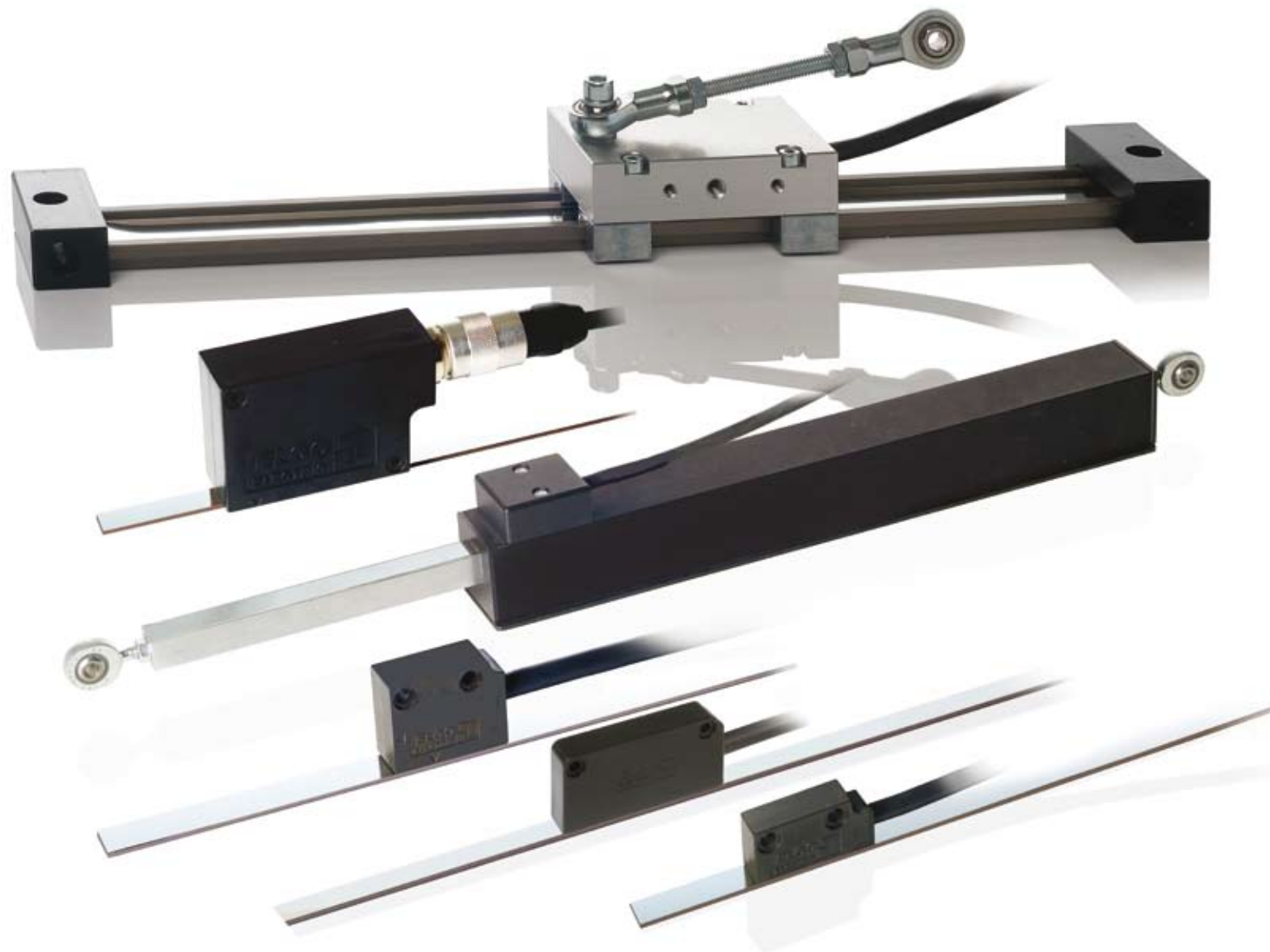
The consistent high quality of our products from design to mass production is the most important pillar of ELGO's success. The core competence in hardware and software development with expertise regarding soldering, assembly technology and test technique ensures the smooth flow to new developments and perfect products.

„ELGO-exact“ has become a popular saying for the quality of the measuring and control systems.

The high quality standards up to the point of zero fault tolerance, mandatory standards and guidelines for a quality management system according to DIN EN ISO 9001:2008 as well as an advanced testing technique ensure that the ELGO products fulfill the high requirements. At ELGO the production is „absolute“ and does not tolerate any compromise.

Please contact us!

Incremental Measuring Systems



The basis of magnetic incremental encoders consists of a scanning technology, which scans the north and south poles on the coded magnetic tape and produces a single Sine/Cosine wave for each pole.

The complete Sine/Cosine signal process is interpolated electronically. Depending on the refinement of the interpolation, the resolution of the measuring system is determined together with the pole pitch of the magnetic tape. There are magnetic tapes with different pole pitches available, which are used correspondingly to the suitable measuring system.

A special interpolation unit processes the Sine/Cosine signal information of the magnetic tape into square output signals. These square signals are compatible with conventional rotary encoders or with optical linear measuring systems. Depending on the requirement, the interpolation unit is already integrated in the sensor head, situated in an external box or in the D-SUB connector housing.

Protection against dust, dirt and humidity: Most of our sensor heads are already delivered in the sealed high protection class of IP67 or can be protected optionally by IP67 (Option V).

To provide complete measuring solutions, our magnetic linear encoders can be used together with our ELGO position indicators and controllers.

DMIX1

Type: **Magnetic length measuring system with a maximum measuring distance of 10 mm**



Max. measuring distance of 10 mm

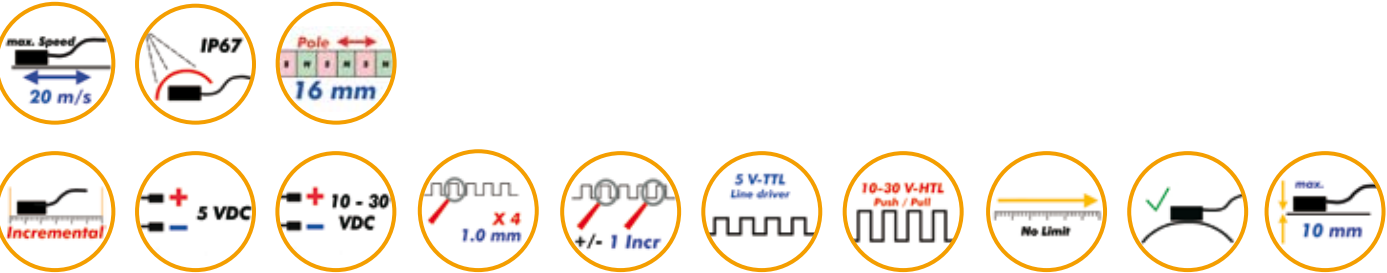
Features:

- **Big distance between sensor and magnetic tape possible (max. 10 mm)**
- **Interpolation unit in D-Sub-Connector**
- **Direct contactless measurement**
- **Periodic index pulse**
- **Measuring theoretically unlimited**
- **Resolution of 1 mm**
- **Repeat accuracy +/- 1 increment**
- **Very robust against pollution**
- **Speed-proportional square wave outputs**



The DMIX1 is a magnetic length measuring system, which allows a contact-free measurement. The benefit of this technology is, that the sensor can be installed up to a maximum distance of 10 mm to the magnet tape. The sensor is also very robust against pollution. The sensor technology and the interpolation unit are placed in two different housings. The magnetic tape is fixed to a surface with the provided adhesive tape. A, \bar{A} , B, \bar{B} , Z, \bar{Z} signals are available.

Technical Data DMIX1	
Mechanical Data	
Measuring principle	incremental
Repeat accuracy	+/- 1 increment
System accuracy in µm at 20 °C	+/- (1000 + 20 x L) L = effective measuring length
Distance from the sensor to magnetic tape	max. 10 mm
Pole pitch	16 mm
Sensor housing material	zinc diecasting
Housing dimensions	L x W x H = 30 x 10 x 15 mm
Necessary magnetic tape	MB20-160-10-1-R
Max. measuring length	theoretically unlimited
Cable connection	D-SUB connector 9-pin
Weight	sensor + D-SUB connector: ca. 40 g without cable cable: ca. 60 g per meter
Ambient Temperature	
Storage temperature	-25... +85 °C
Operation temperature	-10... +70 °C (-25... +85 °C) on request
Protection class	IP67
Electrical Data	
Power supply	10 - 30 VDC / 5 VDC
Periodic and random deviation	10 - 30 V: < 10% ; 5V: +/- 25 mV
Current consumption	10 - 30 VDC: max. 150 mA / 5 VDC: max. 200 mA
Output signals	A, \bar{A} , B, \bar{B} , Z, \bar{Z} push/pull - short-circuit-proof
Output level	10... 30 V HTL / 5V TTL
Resolution (4-edge triggering)	1 mm
Index pulse	16 mm periodical
Max. output frequency per channel	10 kHz
Max. movement speed	20 m/s
Sensor cable	1.5 m standard cable length, others on request, drag chain compliant



Updates and further details on www.elgo.de

SMIX

Type: **Magnetic length measuring system with integrated end position signals (MIN/MAX)**



Features:

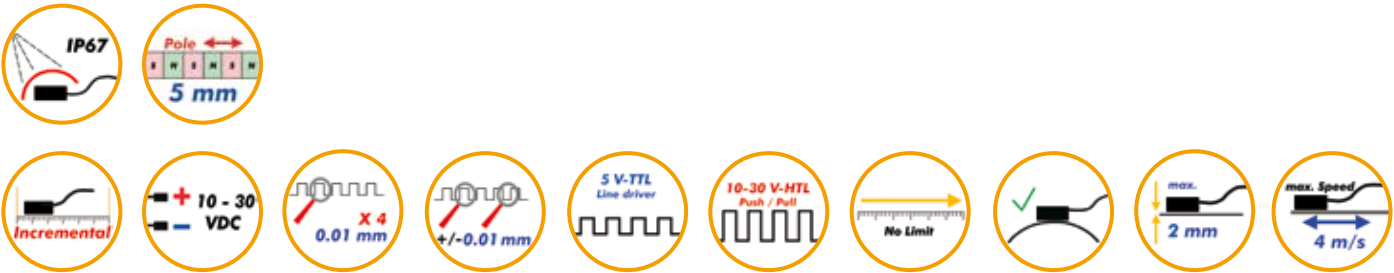
- End position-detection integrated
- Push/pull outputs for MIN/MAX
- Free defineable reference point
- Project-specific manufactured magnetic tape or starting-kit for a small number of pieces
- Resolution of 0.01 mm
- Repeat accuracy +/- 0.01 mm
- Maximum distance between sensor and magnetic tape 2 mm
- High protection class IP67

The series SMIX is an incremental magnetic length measuring system, which provides an end position-detection with project-specific manufactured magnetic tapes. These characteristics create a substantial security increase for many applications.

Based on the established LMIX2-series the system consists of a sensor with integrated interpolation unit and a project-specific magnetic tape. The magnetic tape is fixed by simple adhesive mounting along the distance, which has to be measured. The flexible tape can also be fixed to a radius and is therefore suitable for contactless angle- or rotary speed measurement. The sensor can be installed up to a maximum distance of 2 mm.

The SMIX provides with an factory-adjustable resolution and a repeat accuracy of up to 0.01 mm speed proportional signals to the interpolation unit. Owing to its high protection class the SMIX is even suitable for demanding measurings under extreme conditions (dust, oil, grease, vibration or shock).

Technical Data SMIX	
Mechanical Data	
Measuring principle	incremental
Repeat accuracy	+/- 0.01 mm
System accuracy in µm at 20 °C	+/- (25 + 20 x L) L = effective measuring length
Distance from the sensor to magnetic tape	max. 2 mm
Pole pitch	5 mm
Sensor housing material	ABS plastic material
Housing dimensions	L x W x H = 50 x 12 x 25 mm
Necessary magnetic tape	MB20-50-10-2-R
Max. measuring length	theoretically unlimited
Cable connection	open cable end
Weight	ca. 40 g without cable cable: ca. 60 g per meter
Ambient Temperature	
Storage temperature	-25... +85 °C
Operation temperature	-10... +70 °C (-25... +85 °C) on request
Protection class	IP67
Electrical Data	
Power supply	10 - 30 VDC
Periodic and random deviation	10 - 30 V: < 10%
Current consumption	10 - 30 VDC: max. 150 mA
Output signals	A, \bar{A} , B, \bar{B} , Z, \bar{Z} push/pull - short-circuit-proof (for MIN/MAX end position)
Output level	10... 30 V HTL
Resolution (4-edge triggering)	0.01 mm
Index pulse	5 mm periodical
Max. output frequency per channel	80 kHz
Max. movement speed	4 m/s
Sensor cable	1.5 m standard cable length, others on request, drag chain compliant



Updates and further details on www.elgo.de

RMIX2

Type: Magnetic length and angle measuring system

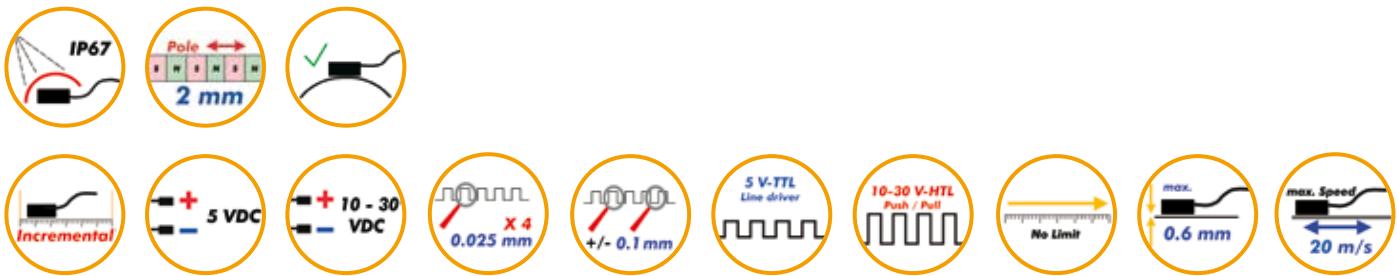


Features:

- Excellent cost effectiveness
- Resolution of 0.025 mm (at 4-edge triggering)
- Repeat accuracy +/- 0.1 mm
- High protection class IP67
- Direct contactless measuring principle
- Distance to magnetic tape up to 0.6 mm
- Standard pole rings of 72 mm, 38 mm and 19.75 mm available
- Integration of Hall-sensor technology and interpolation as single-chip

The series RMIX2 is a magnetic length- and angle measuring system. Sensor technology and interpolation unit are integrated in the same housing. The magnetic tape is fixed to a surface with the provided adhesive tape (included in delivery). The RMIX2 can be installed up to a maximum distance of 0.6 mm. A, B, Z signals are available. Owing to its high protection class the RMIX2 is even suitable for demanding measurings under extreme conditions (dust, oil, grease, vibration or shock).

Technical Data RMIX2	
Mechanical Data	
Measuring principle	incremental
Repeat accuracy	+/- 0.1 mm
System accuracy in µm at 20 °C	+/- (25 + 20 x L) L = effective measuring length
Distance from the sensor to magnetic tape	max. 0.6 mm
Pole pitch	2 mm
Sensor housing material	ABS plastic material
Housing dimensions	L x W x H = 50 x 12 x 25 mm
Necessary magnetic tape	MB20-20-10-1-R
Max. measuring length	theoretically unlimited
Cable connection	open cable end
Weight	ca. 40 g without cable cable: ca. 60 g per meter
Ambient Temperature	
Storage temperature	-25... +85 °C
Operation temperature	-10... +70 °C (-25... +85 °C) on request
Protection class	IP67
Electrical Data	
Power supply	10 - 30 VDC (5 VDC on request)
Periodic and random deviation	10 - 30 V: < 10% ; 5V: +/- 25 mV
Current consumption	10 - 30 VDC: max. 150 mA (5 VDC: max. 200 mA on request)
Output signals	A, B, Z, push/pull - short-circuit-proof
Output level	10... 30 V HTL (5V TTL on request)
Resolution (4-edge triggering)	0.1 mm (0.025 mm)
Index pulse	4 mm periodical
Max. output frequency per channel	200 kHz
Max. movement speed	linear: 20 m/s rotative: 300,000 rpm / amount of pole pairs
Sensor cable	1.5 m standard cable length, others on request, drag chain compliant



Updates and further details on www.elgo.de

EMIX23

Type: **High resolution (0.001 mm)**
magnetic length measuring system
for angle and linear movements



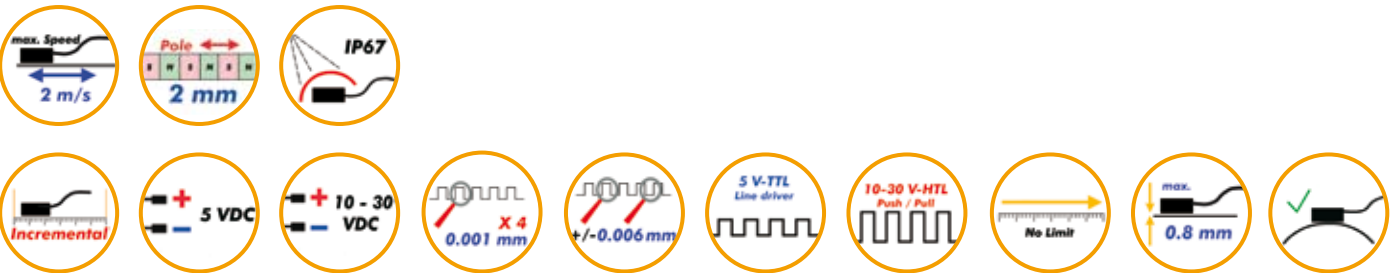
- Features:
- **High resolution of sensor technology (0.001 mm) at 4-edge triggering**
 - **Allowed distance sensor/tape: up to 0.8 mm**
 - **Insensitive to dust, dirt and water**
 - **With periodic index pulse**
 - **Repeat accuracy +/- 0.006 mm**
 - **Small sensor with integrated interpolation unit**
 - **Speed-proportional square wave outputs**
 - **Predestined for precise applications in the control technique**

EMIX23 is based on EMIX2 and is suitable for high precision tasks within the μm range. The cable output can be located sideways or above (depending on order details).

The interpolation unit, which converts the signals into rotary encoder compatible square signals, is already integrated in the sensor head. Additionally, a periodic index pulse is displayed. The maximum mounting distance to the tape is up to 0.8 mm.

On request further customized resolutions can be provided.

Technical Data EMIX23	
Mechanical Data	
Measuring principle	incremental
Repeat accuracy	+/- 0.006 mm
System accuracy in μm at 20 °C	+/- (20 + 20 x L) L = effective measuring length
Distance from the sensor to magnetic tape	max. 0.8 mm
Pole pitch	2 mm
Sensor housing material	zinc diecasting
Housing dimensions	L x W x H = 30 x 12.5 x 25 mm
Necessary magnetic tape	MB20-20-10-1-R
Max. measuring length	theoretically unlimited
Cable connection	open cable end
Weight	ca. 35 g without cable cable: ca. 60 g per meter
Ambient Temperature	
Storage temperature	-25... +85 °C
Operation temperature	-10... +70 °C (-25... +85 °C) on request
Protection class	IP67
Electrical Data	
Power supply	5 VDC or 10- 30 VDC
Periodic and random deviation	10 - 30 V: < 10% ; 5V: +/- 25 mV
Current consumption	5 VDC: max. 200 mA 10... 30 VDC: max. 150 mA
Output signals	A, \bar{A} , B, \bar{B} , Z, \bar{Z} push/pull - short-circuit-proof
Output level	10... 30 V HTL / 5V TTL
Resolution (4-edge triggering)	0.001 mm
Index pulse	2 mm periodical
Max. output frequency per channel	TTL: 100 kHz at 0.4 m/s, esp. 500 kHz at 2 m/s, HTL: 100 kHz at 0.4 m/s, esp. 500 KHz at 2 m/s, with optimal evaluation
Max. movement speed	2 m/s
Sensor cable	1.5 m standard cable length, others on request, drag chain compliant

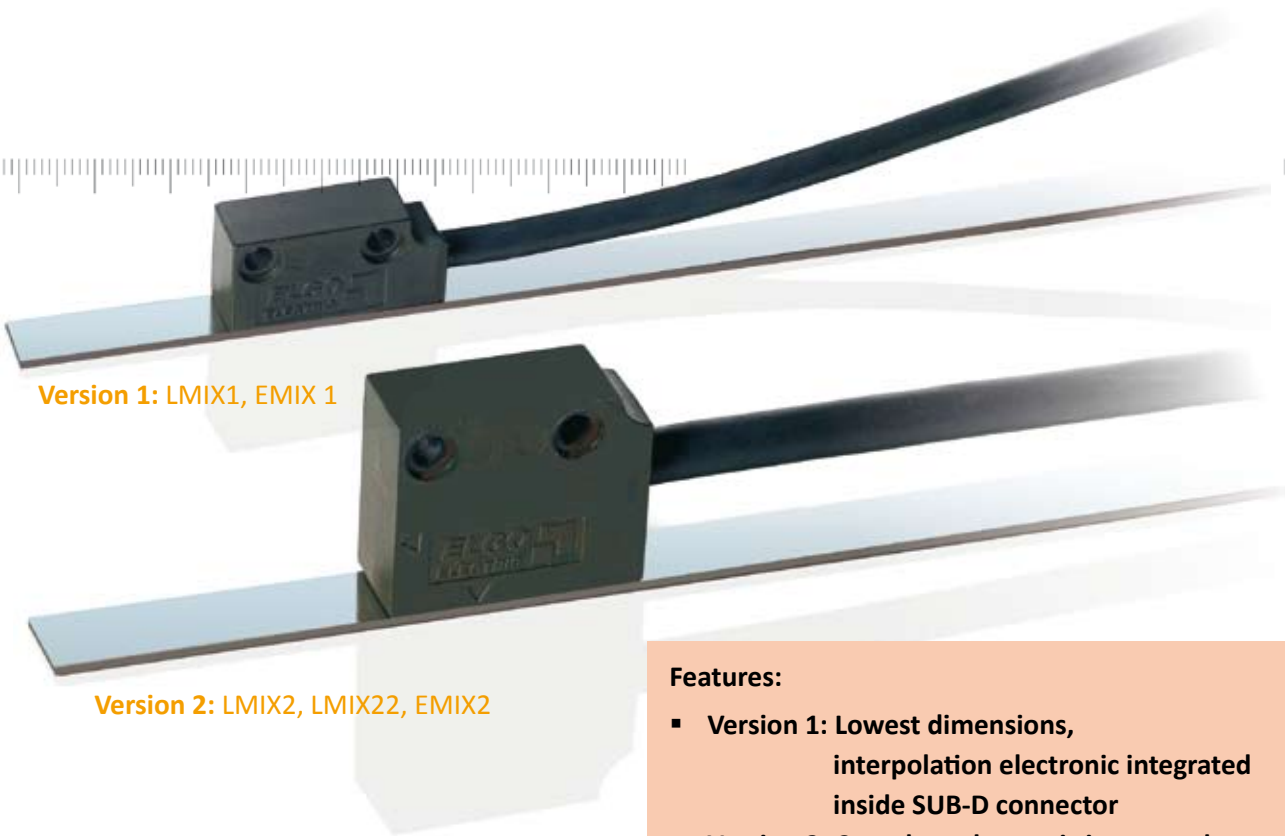


The maximum movement speed is valid for output frequencies of 10... 30 V HTL only for optimal evaluation of the output signals!

Updates and further details on www.elgo.de

LMIX EMIX

Type: **Magnetic length measuring systems
for angle- and linear movements**

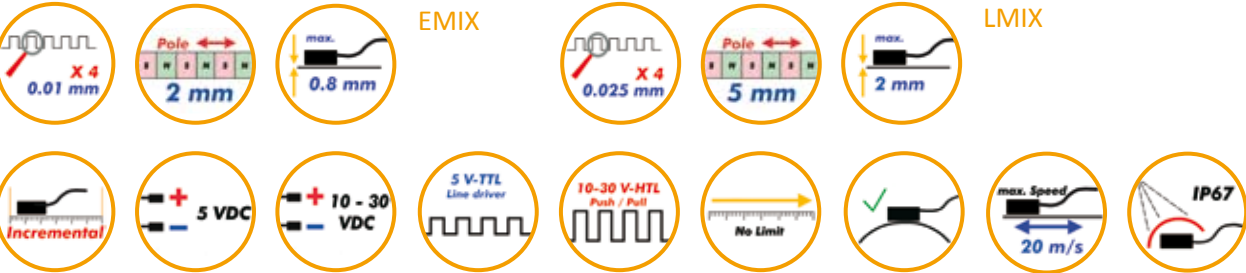


Version 1: LMIX1, EMIX 1

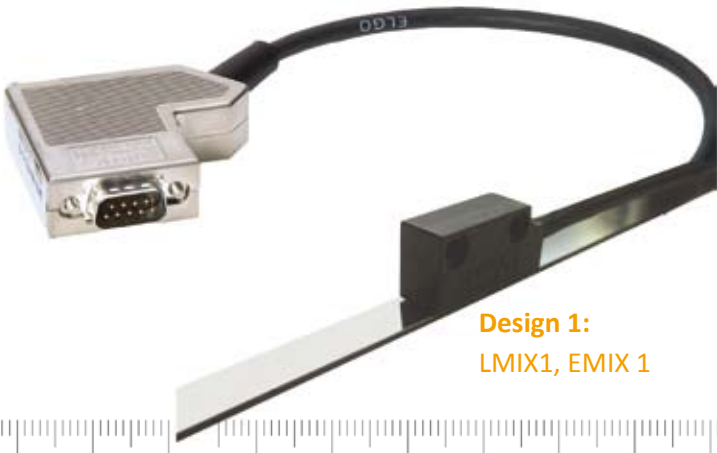
Version 2: LMIX2, LMIX22, EMIX2

Features:

- Version 1: Lowest dimensions, interpolation electronic integrated inside SUB-D connector
- Version 2: Complete electronic integrated
- Differences EMIX - LMIX:
Resolution / Repeat accuracy
EMIX = 0.01 mm / +/- 0,01 mm
LMIX = 0.025 mm / +/- 0,025 mm (at 4-edge triggering)
- Speed-proportional output of square waves



The maximum movement speed is valid for output frequencies of 10... 30 V HTL only for optimal evaluation of the output signals!



Design 1:
LMIX1, EMIX 1

LMIX and EMIX are suitable for dynamic operations with a maximum operating speed of 4 m/s. The outputs are speed proportional square waves with an additional periodic index pulse (except LMIX1). The power supply and output levels of the LMIX/EMIX encoder systems are available as variants of 10...30 VDC or 5 VDC.

The variants differ as follows:

Version 1: LMIX1, EMIX1: Small sensor head with external interpolation electronic (9-pin D-SUB connector).
Version 2: LMIX2, LMIX22 and EMIX2: Sensor head with complete electronic integrated.
The cable output can be located sideways or above (order detail).

In contrast to the other product variations, the advantage of LMIX22 system is, the possibility of a customized programming of different resolutions. Reference position by permanent magnet possible.

Updates and further details on www.elgo.de

Technical Data LMIX and EMIX	
Ambient Temperature	
Storage temperature	-25... +85 °C
Operation temperature	-10... +70 °C (-25... +85 °C) on request
Protection class	IP67

Technical Data LMIX and EMIX	
Mechanical Data	
Measuring principle	incremental
Repeat accuracy	LMIX: +/- 0.025 mm EMIX: +/- 0.01 mm
System accuracy in µm at 20 °C	LMIX: +/- (25 + 20 x L) EMIX: +/- (20 + 20 x L) L = effective measuring length
Distance from the sensor to magnetic tape	LMIX: max. 2 mm EMIX: max. 0.8 mm
Pole pitch	LMIX: 5 mm EMIX: 2 mm
Sensor housing material	zinc diecasting
Housing dimensions	Version 1: LMIX1, EMIX1: L x W x H =30 x 10 x 15 mm Version 2: LMIX2, EMIX2, LMIX22: L x W x H =30 x 12.5 x 25mm
Necessary magnetic tape	LMIX: MB20-50-10-1-R EMIX: MB20-20-10-1-R
Max. measuring length	theoretically unlimited
Cable connection	LMIX1, EMIX1: D-SUB connector 9-pin LMIX2, EMIX2, LMIX22: open cable end
Weight	LMIX1, EMIX1 Sensor + D-SUB connector: ca. 40 g without cable LMIX2, EMIX2, LMIX22 sensor: ca. 35 g without cable cable: ca. 60 g per meter
Electrical Data	
Power supply	5 VDC or 10- 30 VDC
Periodic and random deviation	10 - 30 V: < 10% ; 5V: +/- 25 mV
Current consumption	max. 150 mA at 10-30 V
Output signals	A, \bar{A} , B, \bar{B} , Z, \bar{Z} push/pull - short-circuit-proof (only LMIX2, EMIX2)
Output level	10... 30 V HTL / 5V TTL
Resolution (4-edge triggering)	LMIX: 0.025 mm EMIX: 0.01 mm
Index pulse	LMIX: 5 mm periodical EMIX: 2 mm periodical
Max. output frequency per channel	LMIX: 80 kHz EMIX: 200 kHz
Max. movement speed	up to 20 m/s (depending on the version)
Sensor cable	1.5 m standard cable length, others on request, drag chain compliant

EMSC LMSC

Type: **Magnetic linear measuring system with Sine/Cosine outputs**



EMSC3



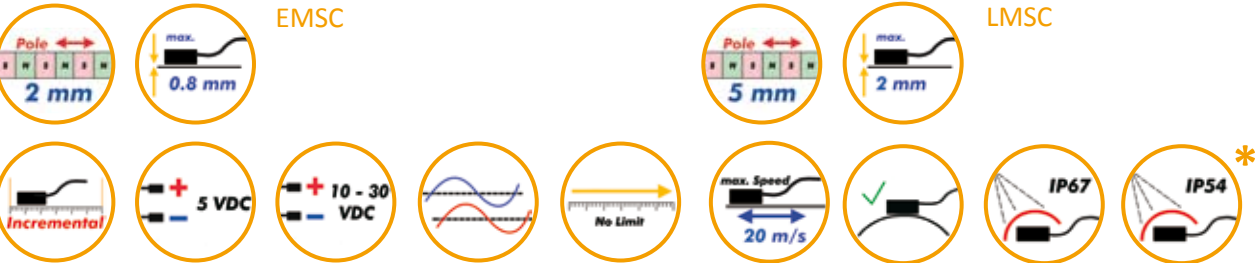
EMSC1

- Features:**
- Speed proportional Sine/Cosine outputs
 - Wearless measuring principle
 - 2 mm measuring action results in a Sine/Cosine period (EMSC)
 - 5 mm measuring action results in a Sine/Cosine period (LMSC)
 - Differences EMSC - LMSC:
 - EMSC pole pitch 2 mm distance to magnetic tape 0.8 mm
 - LMSC pole pitch 5 mm distance to magnetic tape 2 mm
 - Two different types available

The EMSC encoder supplies a sine/cosine wave as output signal (instead of A and B with conventional incremental systems) and is suitable as measuring system e.g. for CNC controls or other evaluation units with sine/cosine encoder input.

A magnetic tape with a pole pitch of 2 mm or 5 mm is used. Within a single pole (north or south) a dynamic sine/cosine signal of 1 Vpp is obtained. This means, per each movement a complete sine/cosine period is created.

Technical Data EMSC	
Mechanical Data	
Measuring principle	incremental
Repeat accuracy	depending on the evaluation
System accuracy in µm at 20 °C	+/- (20 + 20 x L) L = effective measuring length
Distance from the sensor to magnetic tape	EMSC: 0.8 mm LMSC: 2 mm
Pole pitch	EMSC: 2 mm LMSC: 5 mm
Sensor housing material	zinc diecasting
Housing dimensions	LMSC1/EMSC1 sensor head: L x W x H = 30 x 10 x 15 mm LMSC3/EMSC3 translator box: L x W x H = 72 x 24 x 48 mm
Necessary magnetic tape	EMSC: MB20-20-10-1-R LMSC: MB20-50-10-1-R
Max. measuring length	theoretisch unbegrenzt
Cable connection	M16 connector
Weight	EMSC1/LMSC1 amplifier unit: ca. 150 g without cable EMSC1/LMSC1 sensor head: ca. 40 g without cable EMSC3/LMSC3: ca. 150 g without cable cable: ca. 60 g per meter
Ambient Temperature	
Storage temperature	-25... +85 °C
Operation temperature	-10... +70 °C (-25... +85 °C) on request
Protection class	EMSC1: IP67 (translator box IP40) EMSC3: IP54
Electrical Data	
Power supply	10 - 30 VDC / 5 VDC
Periodic and random deviation	10 - 30 V: < 10% ; 5V: +/- 25 mV
Current consumption	50 mA / 120 mA
Output signals	Sine / Cosine
Output level	1 Vpp
Resolution	depending on interpolation unit
Max. output frequency per channel	10 kHz
Max. movement speed	20 m/s
Sensor cable	EMSC1: 1.5 m standard cable length EMSC3: without cable drag chain compliant

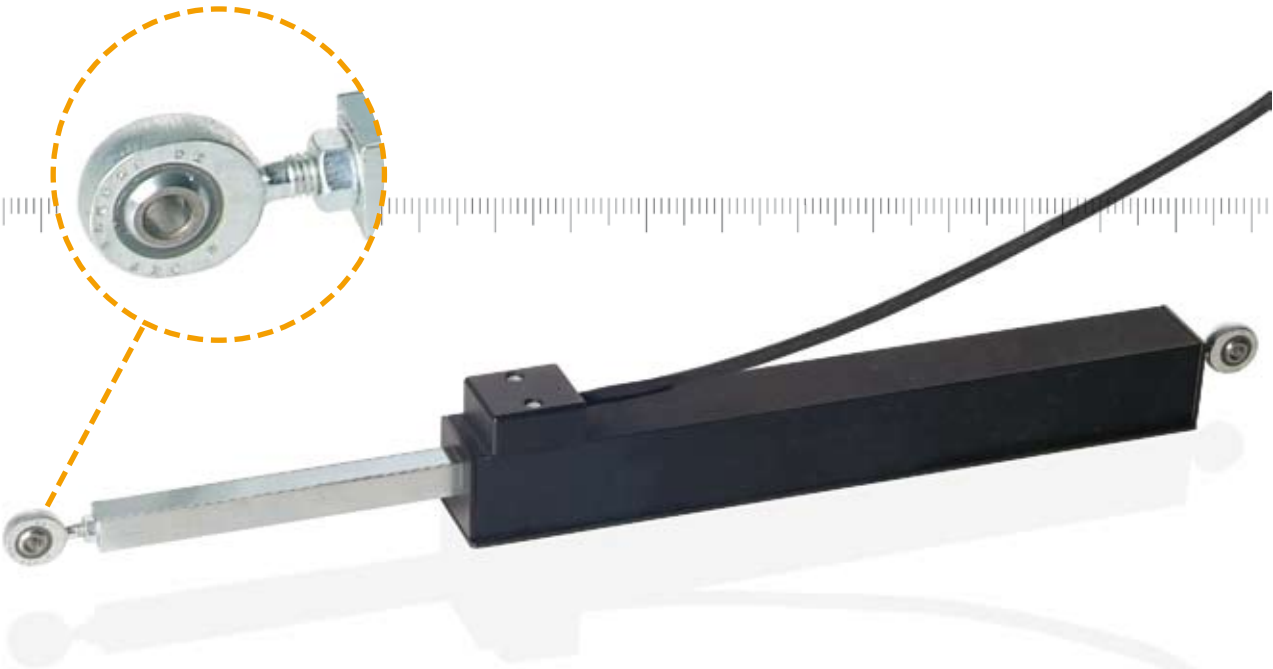


* Protection Class of the external evaluation box: IP40

Updates and further details on www.elgo.de

PMIX

Type: Guided linear measuring system



- Features:
- Wear-free alternative to the potentiometer
 - Mechanically guided linear measuring system
 - Resolution of 0.01 mm or 0.025 mm
 - Alternative to conventional linear measuring systems
 - Measuring lengths 200, 400, 600 mm available
 - Based on the series LMIX2, EMIX2
 - Also available in combination with battery-powered position indicators IZ14, IZ15, IZ16
 - Sensor head and magnetic tape integrated
 - Optimally guided
 - Simple installation

With an integrated incremental sensor PMIX is a wearfree, already guided alternative to conventional linear units and ready for assembly. The magnetic measuring system and the magnetic tape are integrated in a mechanical aluminium cylinder and provide an optimal guidance. The installation can be simplified with additional available swivel heads and mounting parts (accessories). The cylinder is available in three different standard measuring lengths of 200, 400 and 600 mm. Other lengths are available on request. PMIX can be delivered with an integrated LMIX2 or EMIX2 sensor head or in combination with an IZ14, IZ15 or IZ16 position indicator.

Technical Data PMIX	
Mechanical Data	
Measuring principle	incremental
Repeat accuracy	EMIX: +/- 0.01 mm LMIX: +/- 0.025 mm IZ15 / IZ16: +/- 0.01 mm
System accuracy in µm at 20 °C	EMIX: +/- (20 + 20 x L) LMIX: +/- (25 + 20 x L) L = effective measuring length
Distance from the sensor to magnetic tape	defined by guidance
Pole pitch	LMIX: 5 mm EMIX: 2 mm
Housing material	cylinder: aluminium sensor: plastic material
Necessary magnetic tape	LMIX: MB20-50-10-1-R EMIX: MB20-20-10-1-R
Max. measuring length	600 mm
Cable connection	open cable end
Weight	ca. 50 g without cable for 200 mm measuring length cable: ca. 60 g per meter
Ambient Temperature	
Storage temperature	-25... +85 °C
Operation temperature	-10... +70 °C (-25... +85 °C) on request
Protection class	cylinder: IP40 sensor: IP65
Electrical Data	
Power supply	5 VDC / 10 - 30 VDC
Periodic and random deviation	10 - 30 V: < 10% ; 5V: +/- 25 mV
Current consumption	max. 150 mA
Output signals	A, \bar{A} , B, \bar{B} , Z, \bar{Z} push/pull - short-circuit-proof
Output level	10... 30 V HTL / 5V TTL
Resolution (4-edge triggering)	LMIX: 0.025 mm EMIX: 0.01 mm
Index pulse	LMIX: 5 mm periodical EMIX: 2 mm periodical
Max. output frequency	LMIX: 80 kHz EMIX: 200 kHz
Max. movement speed	LMIX max. 5 m/s EMIX max. 4 m/s at optimal interpolation unit
Sensor cable	1.5 m standard cable length, others on request, drag chain compliant



Further technical data are depending on the desired measuring system.

Updates and further details on www.elgo.de

GS-I

Type: Guided linear measuring system



Features:

- Robust alternative to glass scales
- High-quality guiding system
- Maximum resolution of 0.00122 mm (at 4-edge triggering)
- Power supply / signal 5 V or 10-30 V
- Differential signals / reference pulse
- Measuring length up to 1 meter, longer on request
- Speed proportional square wave outputs
- Robust, dirt and shock resistant

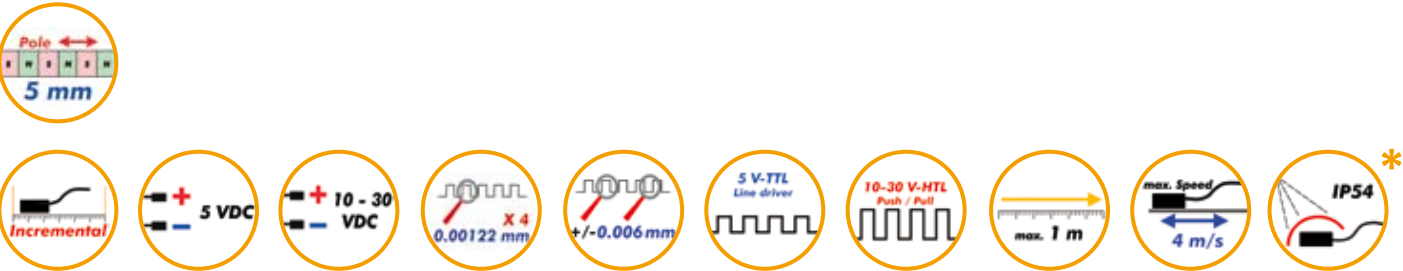
GS-I is a guided magnetic incremental length measuring system. GS-I consists of a sensor head, an internal interpolation unit, a guiding carriage and a guiding rail with magnetic tape (series MB20-50-10-1-R).

The guiding rail is available in all lengths up to one meter. The series GS-I operates with a resolution of up to 0.00122 mm at 4-edge triggering.

The length measuring system GS-I is conceived for dynamic applications up to 4 m/s operation speed. The sensor provides speed-proportional, 90° phase shifted square wave signals in 5 V/TTL- Line Driver or 10-30 V/HTL push/pull. The sensor head is moved contactless over the magnetic tape with a distance of 2 mm. This is ensured through the mechanic guiding system.

The measuring system is totally maintenance-free and wearless. Due to direct measuring, tolerances like slip or pitch errors are balanced.

Technical Data GS-I	
Mechanical Data	
Measuring principle	incremental
Repeat accuracy	+/- 0.006 mm (depending on order)
System accuracy in µm at 20 °C	+/- (25 + 20 x L) L = effective measuring length
Distance from the sensor to magnetic tape	determined by guiding carriage
Pole pitch	5 mm
Housing material guiding carriage	steel
Housing dimensions guiding carriage	L x W x H = 80 x 55 x 33 mm
Necessary magnetic tape	MB20-50-10-1-R
Max. measuring length	1 meter
Cable connection	open cable end (option connector possible)
Weight at 300 mm measuring length	ca. 690 g without cable guiding rail: ca. 600 g per meter cable: ca. 60 g per meter
Ambient Temperature	
Storage temperature	-25... +85 °C
Operation temperature	-10... +70 °C (-25... +85 °C) on request
Protection class	IP54 (sensor head)
Electrical Data	
Power supply	10... 30 VDC / 5 VDC, stabilized
Periodic and random deviation	10 - 30 V: < 10% ; 5V: +/- 25 mV
Current consumption	10...30 VDC: max. 50 mA 5 VDC: max. 100 mA at unstressed output signals
Output signals	A, \bar{A} , B, \bar{B} , Z, \bar{Z} push/pull - short-circuit-proof
Output level	10... 30 V HTL / 5V TTL
Resolution (4-edge triggering)	up to 0.00122 mm (depending on order)
Reference pulse	pos. factory-adjustable when ordering
Max. output frequency	80 kHz
Max. movement speed	4 m/s at 0.1 mm resolution
Sensor cable	1.5 m standard cable length, others on request, drag chain compliant



* Sensor head

Updates and further details on www.elgo.de

Apprentices:

Electronic technician for devices and systems
Industrial business management assistant
Industrial business management assistant
(European business management with foreign languages)
Warehouse logistics operator

Students at Universities of Cooperative Education:

Bachelor of arts - management in industry
for small and medium-sized companies
Bachelor of engineering - electrical engineering/
automation engineering
Bachelor of arts - trade / sales management
Bachelor of arts - international business management



The New Generation We recruit for ELGO



Absolute Measuring Systems



In the past mostly incremental linear encoders have been used for automation equipment.

A recent change of trend suggests that more and more absolute linear measuring systems are installed.

Not only because of simpler handling, but also for safety and quality considerations, absolute systems offer more comfort and additional security.

Referencing or gauging of the evaluation unit is not necessary any longer, because an absolute encoder supplies the correct absolute value immediately after power is on. This means that the position remains at the same point, even if the carriage is moved manually when the power is off. As soon as supply voltage is connected, the actual position is immediately recognized as a fixed value by the interface of the magnetic sensor and transferred to the evaluation unit.

The magnetic tape is magnetically coded as “absolute”, which always indicates the actual position. There are 1, 2 and 3 track systems, which exhibit different characteristics and technical data.

In contrast to an incremental system, an absolute encoder needs a serial based output interface. Instead of square wave signals, real position values must be processed.

IMAX

Type: Autonomous-referencing, absolute, magnetic length measuring system



Features:

- Resolution of 1 mm
- Repeat accuracy +/- 1 mm
- Measuring length up to 1000 m
- CANopen interface (optional SSI)
- Actual position memory
- Robust housing IP67

The series IMAX is an autonomous-referencing, absolute magnetic length measuring system. Autonomous-referencing, absolute means, that the absolute code is recognized through a one-time movement after power up. At this point the IMAX measures absolute. So it is possible to detect a measuring length of up to 1000 meter with a sensor head length of only 50 mm.

The device includes an actual value memory to store the absolute position before power down.

Owing to its high protection class the IMAX is also suitable for demanding measurements under extreme conditions (dust, oil, grease, vibration or shock).

Technical Data IMAX	
Mechanical Data	
Measuring principle	autonomous-referencing, absolute
Repeat accuracy	+/- 1 mm
System accuracy in µm at 20 °C	+/- (1250 + 20 x L) L = effective measuring length
Distance from the sensor to magnetic tape	1.8 mm
Basic pole pitch	4 mm
Sensor housing material	ABS plastic material
Housing dimensions	L x W x H = 50 x 12 x 25 mm
Necessary magnetic tape	AB20-40-10-1R-D-18
Max. measuring length	1000 m
Cable connection	open cable end
Weight	ca. 40 g without cable cable: ca. 60 g per meter
Ambient Temperature	
Storage temperature	-25... +85 °C
Operation temperature	-10... +70 °C (-25... +85 °C) on request
Protection class	IP67
Electrical Data	
Power supply	10... 30 VDC +/- 10 %
Periodic and random deviation	10 - 30 V: < 10%
Current consumption	max. 150 mA
Interfaces	CANopen (DS406)
Resolution	1 mm
Max. output frequency	4 m/s
Sensor cable	1.5 m standard cable length, others on request, drag chain compliant



Updates and further details on www.elgo.de

MAX3

Type: Magnetic length measuring system



Features:

- Available at extremely favourable price
- Resolution of 0.1 mm
- Simple and flexible installation
- Robust measuring principle, inured to dirt, smoke and humidity
- Compatible with every established control with absolute encoder
- Available interfaces: RS422, RS485 and SSI

MAX3 is an absolute, 1-track measuring system that is used for all adjustments of operation tracks with measuring lengths below 1 meter. It has a measuring length of up to 1 meter. The measuring occurs always contactless at a resolution of 0.1 mm.

The greatest advantage of the MAX3 system is its extremely favourable price. The precise magnetic measuring system is extremely robust and inured to dirt, smoke and humidity. Even the tape is robust enough to withstand the harshest conditions.

Due to the small space requirement and simple installation, MAX3 is suitable for various applications in many different sectors. MAX3 is provided with the interfaces RS422, RS485 and SSI and can be connected to most of the established controls.

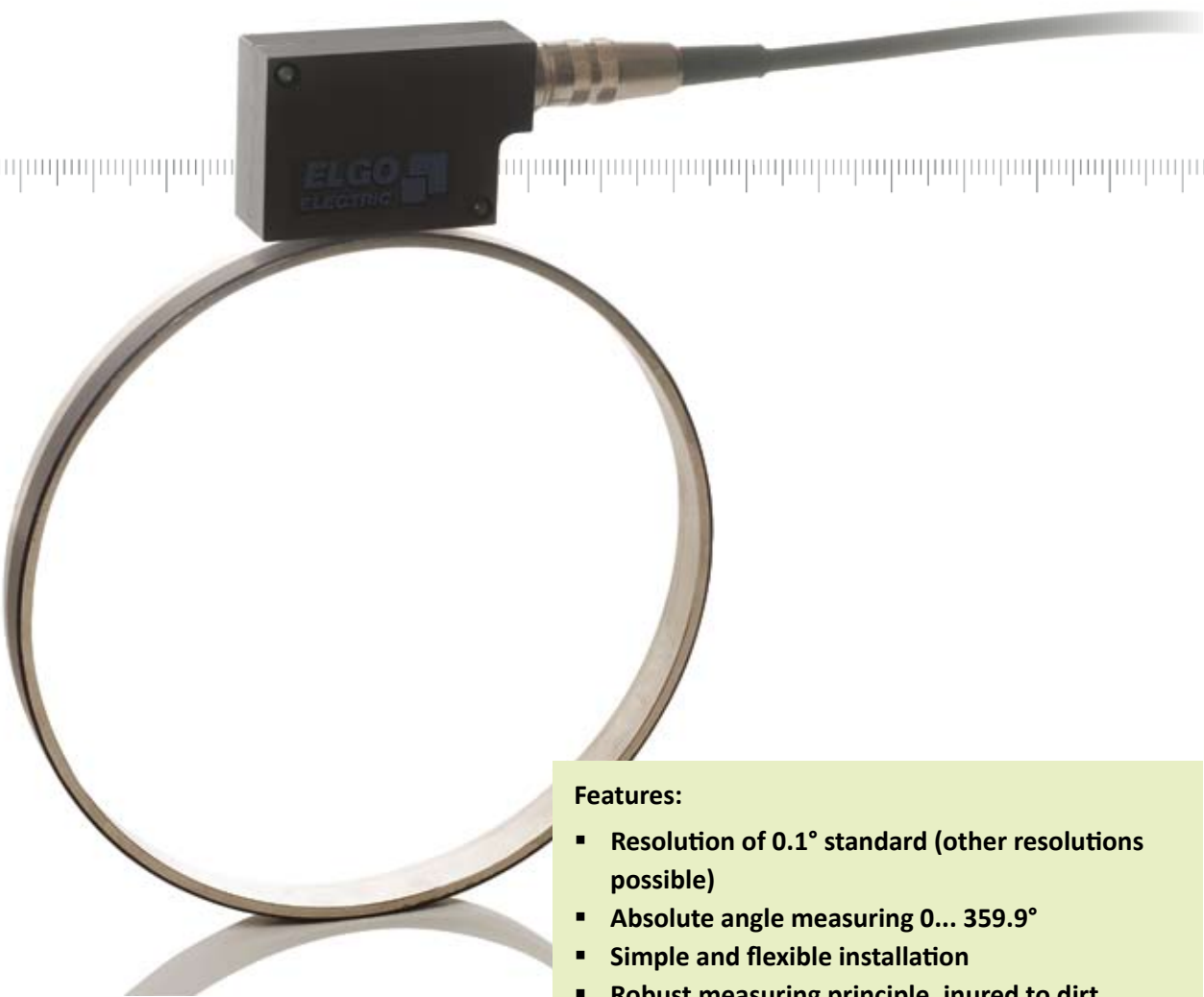
Technical Data MAX3	
Mechanical Data	
Measuring principle	absolute
Repeat accuracy	+/- 1 mm
System accuracy in µm at 20 °C	+/- (1000 + 20 x L) L = effective measuring length
Distance from the sensor to magnetic tape	max. 1 mm
Basic pole pitch	4 mm
Sensor housing material	ABS plastic material
Housing dimensions	L x W x H = 50 x 12 x 25 mm
Necessary magnetic tape	AB20-40-10-1-R
Max. measuring length	1 m
Cable connection	open cable end
Weight	ca. 40 g without cable cable: ca. 60 g per meter
Ambient Temperature	
Storage temperature	-25... +85 °C
Operation temperature	-10... +70 °C (-25... +85 °C) on request
Protection class	IP65
Electrical Data	
Power supply	10... 30 VDC
Periodic and random deviation	10 - 30 V: < 10%
Current consumption	max. 0.2 A
Interfaces	RS422, RS485, SSI
Resolution	0.1 mm
Max. output frequency	1 m/s
Sensor cable	1.5 m standard cable length, others on request, drag chain compliant



Updates and further details on www.elgo.de

MAX2

Type: **Magnetic measuring system for rotative movements (absolute measurement)**



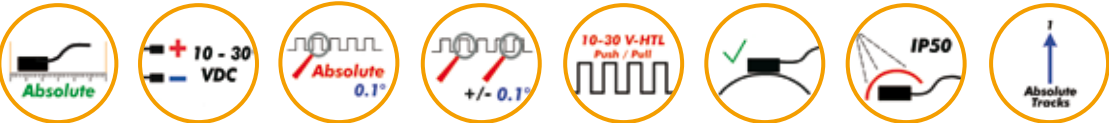
- Features:**
- Resolution of 0.1° standard (other resolutions possible)
 - Absolute angle measuring 0... 359.9°
 - Simple and flexible installation
 - Robust measuring principle, inured to dirt, smoke and humidity
 - No loss of data after power cut
 - Compatible with every established control with absolute encoder interface
 - Available interfaces: CAN, RS422

MAX2 is an absolute measuring system that is suitable for all rotative measurements with a predefined radius especially when a transition-free measurement of 0...359.9° is required.

The magnetic measuring principle is extremely robust. Smoke and higher temperatures do not affect the measurement in any way. Also dust, dirt and humidity have no influence on the measuring quality. Therefore, MAX1 is also particularly suited for machine construction applications. Also the tape is robust enough to withstand the sometimes harsh conditions during mounting and operating in the mechanical engineering industry.

MAX2 is provided with different interfaces and can be connected to most of the established controls.

Technical Data MAX2	
Mechanical Data	
Measuring principle	absolute, rotative
Repeat accuracy	+/- 0.1°
System accuracy in µm at 20 °C	+/- (200 + 20 x L) L = effective measuring length
Distance from the sensor to magnetic tape	0.5 at sensor center
Diameter round magnet	192 mm (others on request)
Sensor housing material	Zinc diecasting
Housing dimensions	L x W x H = 72 x 24 x 48 mm
Necessary magnet	Ring magnet 192 mm, others on request
Max. measuring length	0... 359.9°
Cable connection	Connector M16 or open cable end
Weight	ca. 150 g without cable cable: ca. 60 g per meter
Ambient Temperature	
Storage temperature	-25... +85 °C
Operation temperature	10... +70 °C (-25... +85 °C) on request
Protection class	IP50
Electrical Data	
Power supply	10... 30 VDC
Periodic and random deviation	10 - 30 V: < 10%
Current consumption	max. 0.2 A
Interfaces	CAN, RS422
Resolution	0.1°
Max. rotation speed	max. 100 R/min depending on the measured rate
Sensor cable	1.5 m standard cable length, others on request, drag chain compliant



Updates and further details on www.elgo.de

EMAX2

EMAX3

Type: **Magnetic length measuring system with distance detection**



Features:

EMAX2:

- **Absolute measuring**
- **Contactless**
- **10 m or 20 m measuring length**
- **Resolution of 0.01 mm**
- **Detection of position changes also in the currentless state - no gauging necessary**
- **Automatic recognition of too big distance between sensor and magnetic tape**
- **Optional incremental square- (A, B) and Sine/ Cosine signals (1 Vpp) for dynamic movement control**

EMAX3:

- **Extreme narrow aluminium housing for special installation-situations**



The sensor is guided above a **two-track** encoded magnetic tape with one fine interpolation track and one absolute track. The absolute track supplies with a sensor line an absolute value and the fine interpolation track supplies with the interpolation electronics the resolution of 0.01 mm.

The sensor technology is placed in a mechanical zinc die cast case and is conceived for rough industrial use. In the sealed version the high protection category of IP65 is fulfilled. As standard version the EMAX fulfills the protection class IP40. A considerable advantage of the system is that the sensor head has not to be slid rigidly, but can be moved in a distance between 0.1 mm to 2 mm above the magnetic tape.

Difference between guided and unguided version (EMAX2):

The EMAX2 consists of a sensor head and the magnetic tape, which is necessary for measuring. The guided version provides the guide carriage FW2080 (included in delivery). Necessary for operation are the guide rail with the magnetic tape. The magnetic tape is bonded in the groove of the aluminium guide rail (possible up to 2 m). On this aluminium guide rail the sensor can be moved wear-free and contactless (the guide carriage is not wearless!).

In order to reach the maximum measuring length of 20 m (EMAL) up to 10 rails (of 2 meter) can be arranged in one row. The magnetic tape will be delivered in the desired length (as roller ware up to 20 m) and will be fixed afterwards, in the whole length, into the grooves of the arranged rails.

Updates and further details on www.elgo.de

Technical Data EMAX2, 3

Mechanical Data

Measuring principle	absolute
Repeat accuracy	+/- 1 increment
System accuracy in µm at 20 °C	+/- (150 + 20 x L) (type design. 010) +/- (50 + 20 x L) (type design. F10) L = effective measuring length
Distance from the sensor to magnetic tape	max. 1.5 mm, 2.0 mm with reduced accuracy
Basic pole pitch	5 mm
Sensor housing material	EMAX2: zinc diecasting EMAX3: aluminium
Housing dimensions	EMAX2: L x W x H = 75 x 24 x 26 mm EMAX2 with guide carriage: L x B x H = 100 x 34 x 48 mm EMAX3: L x W x H = 194.5 x 14 x 27 mm
Necessary magnetic tape	Meas. length 10 m: AB20-50-10-2-R-11 Meas. length 20 m: AB20-50-10-2-R-12
Max. measuring length	EMAX : up to 10 m EMAL : up to 20 m
Cable connection	open cable end
Weight	EMAX2: ca. 100 g without cable EMAX3: ca. 85 g without cable cable: ca. 60 g per meter

Ambient Temperature

Storage temperature	-25... +85 °C
Operation temperature	-10... +70 °C (-25... +85 °C) on request
Protection class	IP40 (Standard) IP65 (Option V)

Electrical Data

Power supply	10... 30 VDC +/- 10 %
Periodic and random deviation	10 - 30 V: < 10%
Current consumption	max. 150 mA
Interfaces	SSI-Interface, CANopen (DS406), RS422, addressable RS422
Resolution	0.01 mm
Max. output frequency	4 m/s
Sensor cable	1.5 m standard cable length, others on request, drag chain compliant

MAX1

Type: Magnetic length measuring system



- Features:**
- Resolution of 0.5 mm standard (other resolutions possible)
 - Absolute positioning up to 524 m measuring length at a housing length of only 98 mm
 - Simple and flexible installation
 - Robust measuring principle, inured to dirt, smoke and humidity
 - No loss of data after power cut
 - Compatible with every established control with absolute encoder
 - Available interfaces: RS422, SSI (others on request)

MAX1 is an absolute measuring system that is used for various positioning applications in many different sectors. MAX1 can be installed horizontally and vertically. The definite position information is set as magnetic code on the tape. The measuring occurs always contactless.

The magnetic measuring principle is extremely robust. Smoke and higher temperatures do not affect the measurement in any way. Also dust, dirt and humidity have no influence on the measuring quality. Therefore, MAX1 is also particularly suited for applications in high bay warehouses. Also the tape is robust enough to withstand the sometimes harsh conditions during mounting and operating warehouse applications.

Depending on the given space - it can be installed anywhere on the storage service system. Due to the small space requirement, MAX1 is perfect for retrofitting and modernization. MAX1 is provided with different interfaces and can be connected to most of the established controls.

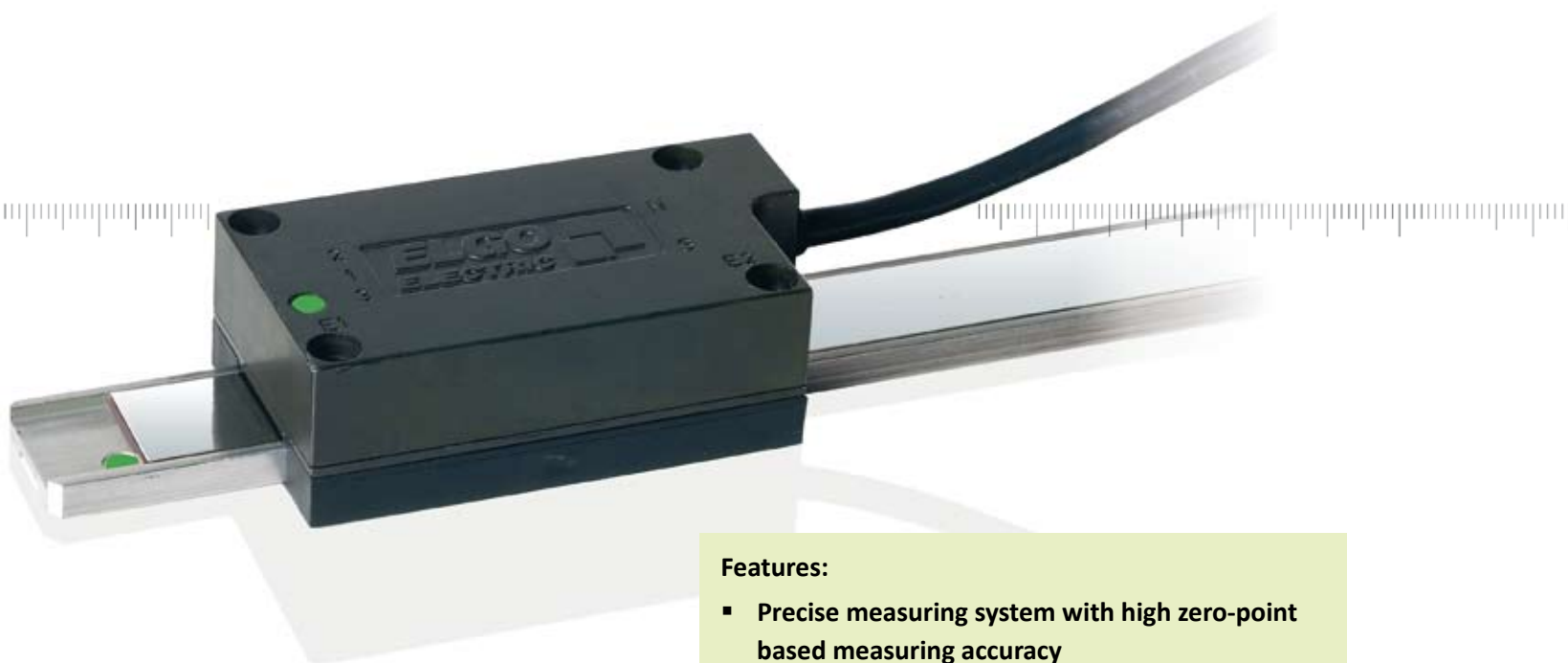
Technical Data MAX1	
Mechanical Data	
Measuring principle	absolute
Repeat accuracy	+/- 1 mm
System accuracy in µm at 20 °C	+/- (1000 + 20 x L) L = effective measuring length
Distance from the sensor to magnetic tape	max. 1.5 mm
Basic pole pitch	4 mm
Sensor housing material	ABS plastic material
Sensor housing dimensions	L x W x H = 98 x 12 x 32 mm
Necessary magnetic tape	AB20-40-08-1-R-D-17A
Max. measuring length	524 m
Cable connection	open cable end
Weight	ca. 55 g without cable cable: ca. 60 g per meter
Ambient Temperature	
Storage temperature	-25... +85 °C
Operation temperature	-10... +70 °C (-25... +85 °C) on request
Protection class	IP65
Electrical Data	
Power supply	10... 30 VDC
Periodic and random deviation	10 - 30 V: < 10%
Current consumption	max. 0.2 A
Interfaces	RS422, SSI (others on request)
Resolution	0.5 mm
Max. output frequency	6 m/s
Sensor cable	1.5 m standard cable length, others on request, drag chain compliant



Updates and further details on www.elgo.de

FMAX

Type: Guided magnetic length measuring system



- Features:
- Precise measuring system with high zero-point based measuring accuracy
 - Absolute positioning up to 650 mm
 - High resolution of 0.01 mm
 - Without rail it can also be used for rotative applications
 - Simple and flexible installation
 - Robust measuring principle, inured to dirt, smoke and humidity
 - No loss of data after power cut
 - Compatible with every established control with absolute encoder interface
 - No reference necessary
 - Direct measuring
 - Repeat accuracy +/- 0.01 mm



* Optional: IP67

The magnetic absolute length measuring system FMAX consists of a guide rail with integrated magnetic tape and a guide carriage, in which the three sensors and the interpolation unit are accommodated. It is an advantage of absolute measurement that position modifications are detected also in the currentless status. This is a substantial security aspect and saves annoying gauging procedures with every new connection. Owing to its high accuracy, the measuring system is predestined for various industrial positioning applications. The absolute measuring principle guarantees a maximum of security. As standard the absolute position is translated by the interfaces RS422 or SSI. The interfaces are integrated in the housing together with the sensors and the interpolation unit. The protection class of the sensor is IP54. It is also available as sealed version with protection class IP67.

The resolution of the system amounts to 0.01 mm. With the maximum measuring length of 650 mm it can be used for short operating ranges, where a reference run is not possible or required. At the same time it offers the advantage of complete guidance, which involves a considerable less mounting effort and less material costs.

Function principle: Three sensors are guided along a magnetic tape (which is described with three tracks), with following north- and south pole magnetization. Due to different lengths of the three magnetic tracks different phase offsets arise, which supply the absolute value together with the signals of the sensors.

Updates and further details on www.elgo.de

Technical Data FMAX	
Mechanical Data	
Measuring principle	absolute
Repeat accuracy	+/- 0.01 mm
System accuracy in µm at 20 °C	+/- (50 + 20 x L) L = effective measuring length
Basic pole pitch	5 mm
Sensor housing material	Zinc diecasting
Sensor housing dimensions	L x W x H = 90 x 48 x 28 mm
Necessary magnetic tape	FMAB
Max. measuring length	650 mm
Cable connection	open cable end
Weight	ca. 200 g without cable / guide rail Kabel: ca. 60 g per meter guide rail with magnetic tape ca. 390 g per meter
Ambient Temperature	
Storage temperature	-25... +85 °C
Operation temperature	-10... +70 °C (-25... +85 °C) on request
Protection class	IP54
Electrical Data	
Power supply	10-30 VDC +/- 10 %
Periodic and random deviation	10 - 30 V: < 10%
Current consumption	max. 150 mA
Interfaces	RS422, SSI
Resolution	0.01 mm
Max. output frequency	0.5 m/s
Sensor cable	1.5 m standard cable length, others on request, drag chain compliant

LIMAX1

Type: **Magnetic length measuring system for industrial applications in a horizontal position**

LIMAX1, unguided

LIMAX1, guided

Features:

- **Absolute measurement up to 1000 meter length**
- **Resolution of 1 mm**
- **No gauging necessary**
- **Inured to dust and dirt**
- **Simple installation**
- **Different mechanical accessories available**
- **The magnetic tape can be installed free hanging, vertically or horizontally**
- **Wear-free, contactless and noiseless measuring principle**

LIMAX1 was developed as a global platform solution and represents a cost-effective, insensitive and installation-friendly alternative to conventional positioning systems. Owing to the absolute measuring principle, no gauging after operation is necessary. Mounting and measuring occur directly.

The system is available with magnetic tape guidance and other mechanical accessories and provides therefore a simpler installation. The magnetic tape guidance ensures the correct distance from the sensor to the magnetic tape and consists of a special self-lubricating material. The flexible tape can be used horizontally or can be bonded in a guiding groove.

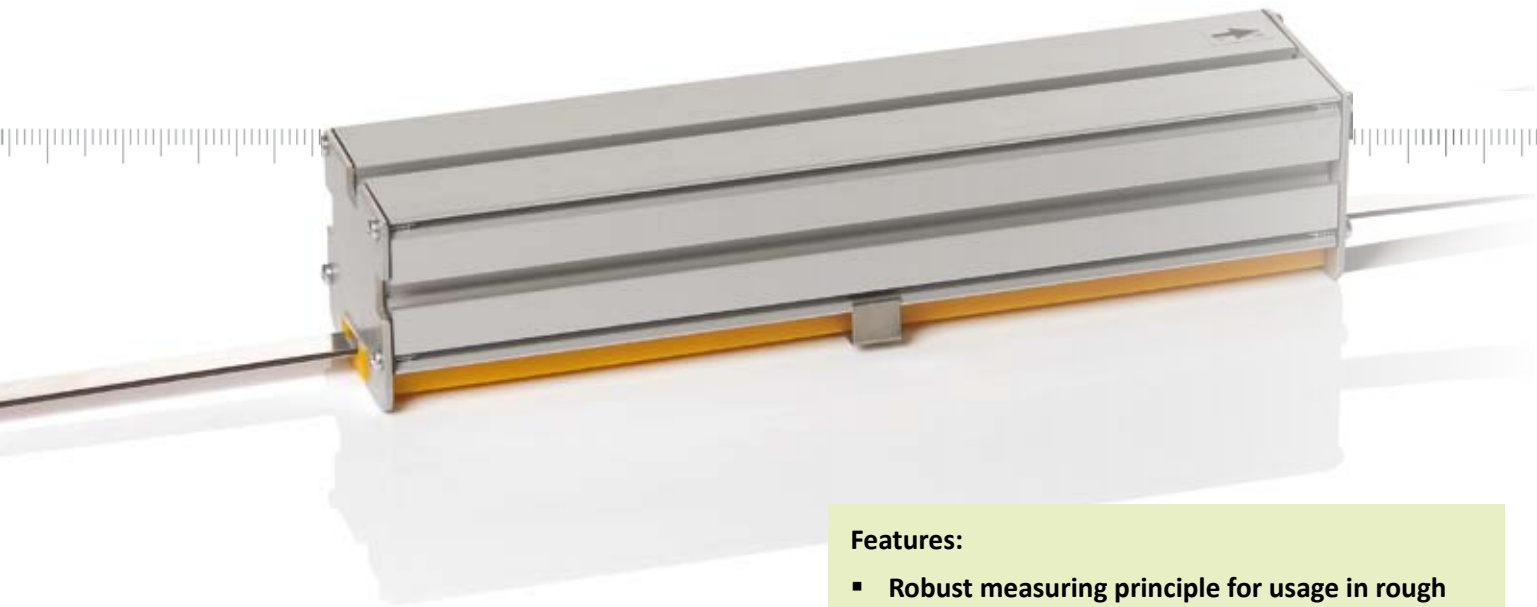
Technical Data LIMAX1	
Mechanical Data	
Measuring principle	absolute
Repeat accuracy	+/- 1 mm
System accuracy in µm at 20 °C	+/- (1000 µm + 20 µm x L) L = effective measuring length
Distance from the sensor to magnetic tape	max. 1.5 mm
Basic pole pitch	4 mm
Sensor housing material	aluminium
Sensor housing dimensions	L x W x H = 180 x 55 x 40 mm (unguided) L x W x H = 180 x 55 x 48 mm (guided)
Necessary magnetic tape	AB20-40-10-1-R-18
Max. measuring length	1000 m
Cable connection	open cable end
Weight	ca. 320 g without cable unguided ca. 440 g without cable guided cable: ca. 60 g per meter
Ambient Temperature	
Storage temperature	-25... +85 °C
Operation temperature	-10... +70 °C (-25... +85 °C) on request
Protection class	IP50
Electrical Data	
Power supply	10... 30 VDC
Periodic and random deviation	10 - 30 V: < 10%
Current consumption	max. 0.2 A
Interfaces	SSI, CANopen (DS406)
Resolution	1 mm
Max. output frequency	max. 16 m/s
Sensor cable	3 m standard cable length, others on request, drag chain compliant



Updates and further details on www.elgo.de

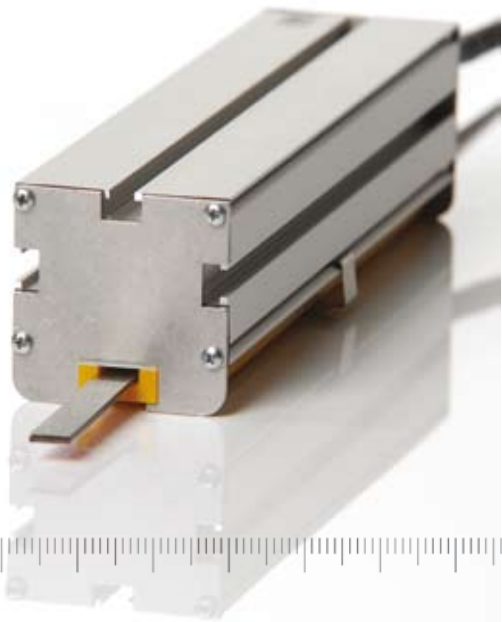
LIMAX2

Type: **Magnetic length measuring system for position detection in elevators**



Features:

- **Robust measuring principle for usage in rough environments**
- **Inured to dirt, smoke, and humidity**
- **Simple and flexible installation**
- **High accuracy and repeatability**
- **Absolute positioning up to 260 m**
- **Resolution up to 0.25 mm**
- **Absolute position is always directly available - no referencing even after long power cuts**
- **Compatible with most established controls with absolute encoder interface**
- **Available interfaces: SSI, CANopen (DS406, DS417), RS422**



LIMAX2 is an absolute measuring shaft information system that is used for positioning of elevator cars.

The magnetic measuring principle is extremely robust. Dust, dirt, and humidity do not affect the measurement in any way. Also, smoke and even higher temperatures have no influence on the measuring quality. Therefore, LIMAX2 is also particularly suited for applications in fire fighter elevators. Also the tape is robust enough to withstand the sometimes harsh conditions in elevator shafts.

Another advantage of the system is the simple and flexible installation. Typical installation time will take about one to two hours. The system can be placed anywhere in the shaft where space conditions allow. Due to the small space requirements LIMAX2 is perfect for retrofitting and modernization.

With LIMAX2 lifting heights up to 260 meters and speeds up to 6 m/s can be covered. Longer lifting heights are available on request. In the standard configuration LIMAX2 evaluates the position with a resolution of 1 mm. Resolutions up to 0.25 mm are possible.

LIMAX2 is provided with different interfaces and can be connected to most of the established elevator controls.

Technical Data LIMAX2	
Mechanical Data	
Measuring principle	absolute
Repeat accuracy	+/- 1 mm
System accuracy in µm at 20 °C	+/- (1000 µm + 20 µm x L) L = effective measuring length
Distance from the sensor to magnetic tape	4 mm
Basic pole pitch	8 mm
Sensor housing material	aluminium
Sensor housing dimensions	L x W x H = 244 x 55 x 40 mm
Necessary magnetic tape	AB20-80-10-1-R-D-15
Max. measuring length	260 m
Cable connection	open cable end
Weight	ca. 460 g without cable cable: ca. 60 g per meter
Ambient Temperature	
Storage temperature	-25... +85 °C
Operation temperature	-10... +70 °C (-25... +85 °C) on request
Protection class	IP50
Electrical Data	
Power supply	10 - 30 VDC
Periodic and random deviation	10 - 30 V: < 10%
Current consumption	max. 0.2 A
Interfaces	SSI, CANopen (DS406, DS417), RS422
Resolution	1 mm
Max. output frequency	max. 6 m/s (in guided version)
Sensor cable	3 m standard cable length, others on request, drag chain compliant



Updates and further details on www.elgo.de

LIMAX2 S

Type: Unguided magnetic length measuring system



Features:

- Resolution of 0.5 mm standard (other resolutions possible)
- Absolute positioning up to 260 meter
- Simple and flexible installation
- Robust measuring principle, inured to dirt, smoke and humidity
- No loss of data after power cut
- Compatible with most established controls with absolute encoder
- Available interfaces: RS422, SSI, CANopen (DS406)
- Mounting accessories available

LIMAX2 S is a measurement system that delivers absolute linear position information. It is suitable for various industrial positioning applications. It consists of only two components: magnetic tape and sensor. The installation of both, tape and sensor, is simple and flexible.

The sensor is extremely robust. Smoke and higher temperatures do not affect the measurement in any way. Also, dust, dirt and humidity have no influence on the measuring quality. Therefore, LIMAX2 S is also particularly suited for applications in high bay warehouses. Also the tape is robust enough to withstand the sometimes harsh conditions during mounting and operating warehouse applications. Depending on the given space - it can be installed anywhere on the storage service system. Due to the small space requirement LIMAX2 S is perfect for retrofitting and modernization.

LIMAX2 S is provided with different interfaces and can be connected to most of the established controls.

Technical Data LIMAX2 S	
Mechanical Data	
Measuring principle	absolute
Repeat accuracy	+/- 1 mm
System accuracy in µm at 20 °C	+/- (1000 µm + 20 µm x L) L = effective measuring length
Distance from the sensor to magnetic tape	4 mm
Basic pole pitch	8 mm
Sensor housing material	aluminium
Sensor housing dimensions	L x W x H = 245 x 26 x 55 mm
Necessary magnetic tape	AB20-80-10-1-R-D-15
Max. measuring length	260 m
Cable connection	open cable end
Weight	ca. 280 g without cable cable: ca. 60 g per meter
Ambient Temperature	
Storage temperature	-25... +85 °C
Operation temperature	-10... +70 °C (-25... +85 °C) on request
Protection class	IP50
Electrical Data	
Power supply	10 - 30 VDC
Periodic and random deviation	10 - 30 V: < 10%
Current consumption	max. 0.2 A
Interfaces	RS422, SSI, CANopen (DS406)
Resolution	0.5 mm; 1 mm
Max. output frequency	max. 6 m/s
Sensor cable	3 m standard cable length, others on request, drag chain compliant

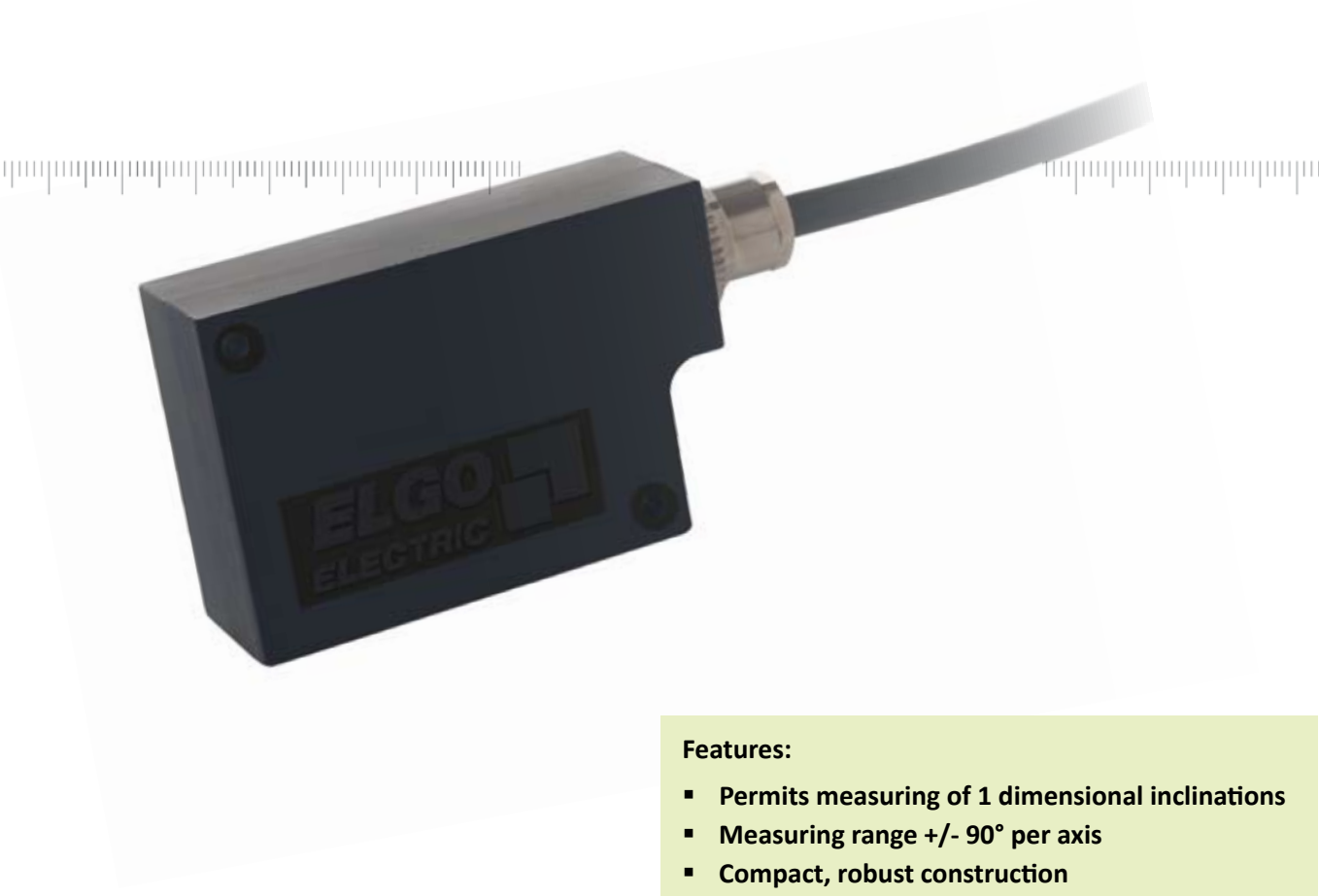


* Optional: IP67

Updates and further details on www.elgo.de

INAX

Type: **Inclinometric measuring system for the inclination angle measurement**



- Features:**
- Permits measuring of 1 dimensional inclinations
 - Measuring range +/- 90° per axis
 - Compact, robust construction
 - Simple installation
 - High degree of shock resistance
 - INAX1: 1° resolution
 - INAX2: high resolution of 0.025°
 - Serial interface

The 1 / 2 – axis inclinometer INAX can be used for high precision inclination measurement. It measures inclinations from +/- 90°.

Due to its high protection class IP67 the INAX is particularly suited for measuring in rough environments.

The INAX system provides simple mounting, high shock resistance and a high resolution of 0.025°.

A cost-effective alternative is the INAX1 variation with a resolution of 1°.

In inclinometric measuring a seismic mass is placed between two capacitor plates. An electrostatic feedback defines the variation in inclination of the sensor. An integrated circuit converts the electrostatic feedback into the corresponding interface signals.

Technical Data INAX	
Mechanical Data	
Measuring principle	inclinometric
Repeat accuracy	+/- 0.6° (at 25° C)
Relative Accuracy	INAX1: +/- 1° INAX2: +/- 0.6°
Sensor housing material	zinc diecasting
Sensor housing dimensions	L x W x H = 72 x 24 x 48 mm
Max. angle measuring range	+/- 90°
Cable connection	M12 connector or open cable end
Weight	ca. 150 g without cable cable: ca. 60 g per meter
Ambient Temperature	
Storage temperature	-25... +85 °C
Operation temperature	-10... +70 °C (-25... +85 °C) on request
Protection class	IP67
Electrical Data	
Power supply	10 - 30 VDC
Periodic and random deviation	10 - 30 V: < 10%
Current consumption	max. 50 mA
Interfaces	INAX1: analogue INAX2: RS422 (SSI, CANopen, RS485 on request)
Resolution	INAX1: 1° INAX2: 0.025°
Max. transformation time	500 ms
Sensor cable	1.5 m standard cable length, others on request, drag chain compliant



Rotative Measuring Systems



The rotative measuring system is based on the contact-free measuring principle where a bipolar round magnet is rotated in front of the sensor.

Three rotative measurement techniques are available:

1. Measurement at the front page of a shaft
The measurement data is available in several output variations. Differential, $A \bar{A} B \bar{B} Z \bar{Z}$ incremental outputs, sine- and cosine signals and via BISS-interface. The sensor evaluates the magnetic field lines of the rotating magnet. The Single-Turn-Absolute-information is also available via the BISS-interface. A round magnet with a diameter of 6 mm and two poles is used. No referencing is necessary in the Single-Turn-Absolute mode.
Owing to the contactless measuring principle no signs of wear occur in the measuring system, it operates completely maintenance-free.
The mechanical dimensions of the sensor are compatible with the rotary encoder type 15.32 and can therefore be replaced easily and cost-effectively.
2. Contact-free measurement of the circumference of a magnetic scale
The sensor evaluates contactless the magnetic field lines which flow out of the poles of the magnetic ring. There are any diameter and ring geometries feasible. A steel ring is manufactured according a drawing, covered with magnetic tape and then magnetized. By default ELGO provides hard ferrite pole rings with different pole pitches and the following outer diameters: 19.7 mm, 38 mm or 72 mm.
3. Mechanically coupled measurement at a shaft
Optical shaft encoders, provided in various sizes and numbers of pulses, can be mounted with various coupling elements to an existing shaft or axis. As accessories are also available different flanges for mounting the shaft encoders, bevel wheels, gear racks and measuring wheels.

Magnetic Rings

Type: **Magnetic rings for rotative measurements**



Features:

- Interpolation of up to 22800 pulses / revolution possible
- Available in many different sizes and materials
- Direct installation on shafts or simple hollow shaft-installation
- Vibration- and shock-resistant
- Contactless and wear-free measuring principle
- Applicable in roughest environments (protection class IP67)

Application example:
EMIX2 / LMIX2
with magnetic ring



Magnetic rings offer substantial advantages during rotational measurements such as rotative speed-, angle- or scope measurements. The magnetic rings are a space saving alternative to optical rotary encoders and inured to dirt, dust, liquids and vibrations.

The rings are coded with a magnetic north/south pole division. The rings can be scanned contactless with the **ELGO linear measuring systems EMIX, LMIX and RMIX**.

Magnetic ring standard sizes:

Large:	Outside Ø 72 mm Inside Ø 54 mm Width 7 mm
Medium:	Outside Ø 38 mm Inside Ø 30 mm Width 6.5 mm
Small:	Outside Ø 19.7 mm Inside Ø 14.7 mm Width 4.1 mm

Other sized available on request.

Updates and further details on www.elgo.de

Magnetic rings made of hard ferrite

The hard ferrite magnetic rings are suitable for fixation on different shafts. The hard ferrite magnetic rings are available in three different standard sizes. Deviating sizes can be delivered on request. All magnetic rings are available with a pole pitch of 2 or 5 mm. The pole pitch must be selected corresponding to the used measuring system.

Magnetic rings with hollow shaft-ring

Simple installations provide magnetic rings with hollow shaft-ring and hub bolt. On request, they are produced in all standard sizes.

Steel rings elastomer-based

Magnetic rings made of steel are available in any diameters. The approved ELGO tape system is mounted on the steel ring. This steel ring can be magnetized with a pole pitch of 2.5 or 5 mm. Mounting holes are provided on customer's request.

Compared to conventional magnetic rings, Elastomer-bound magnetic rings provide substantial advantages owing to the used material and due to a special moulding- and coding-process. The elasticity of the magnet allows expansion and deformation. They are very robust against thermal, chemical and mechanical impacts and are therefore suitable for applications in rough environments as well as for outdoor-applications.

RMAX1

Type: Magnetic absolute, rotative pulse sensor



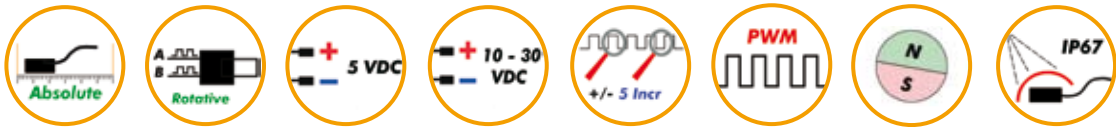
Features RMAX1:

- Single-turn-encoder
- Small, robust sensor
- Absolute measuring
- Resolution of 12 bit per revolution
- Different interfaces possible:
Analogue 0.5 ... 4.5V or PWM-interface

Like all linear-magnetic sensors the angle measuring system RMAX1 is also based on the contactless magnetic measuring principle. The positioning element is a round magnet, which detects the angular position contactless in a distance of up to 1 mm from the sensor housing.

In addition, the rotational measuring system RMAX1 provides the advantage of an absolute measuring principle and belongs therefore to the category of single-turn-encoders.

Technical Data RMAX1	
Mechanical Data	
Measuring principle	absolute, rotative, single-turn
Repeat accuracy	+/- 5 incremente
System accuracy in µm at 20 °C	+/- 1° higher resolutions on request
Sensor distance to the magnet	0.2 – 1 mm
Diameter round magnet	6 mm
Sensor housing material	Zinc diecasting
Sensor housing dimensions	L x W x H = 30 x 12.5 x 25 mm
Necessary magnet	DRM round magnet
Max. measurement angle	360°
Cable connection	open cable end
Weight	ca. 40 g without cable cable: ca. 60 g per meter
Ambient Temperature	
Storage temperature	-25... +85 °C
Operation temperature	-10... +70 °C (-25... +85 °C) on request
Protection class	IP67
Electrical Data	
Power supply	10 - 30 VDC / 5 VDC
Periodic and random deviation	10 - 30 V: < 10% ; 5V: +/- 25 mV
Current consumption	40 mA at unstressed output drivers
Interfaces	0.5 - 4.5 V analogue or PWM
Max. resolution	12 Bit = 4096 resolution steps / revolution
Max. rotational speed	10,000 revolutions/min
Sensor cable	1.5 m standard cable length, others on request, drag chain compliant



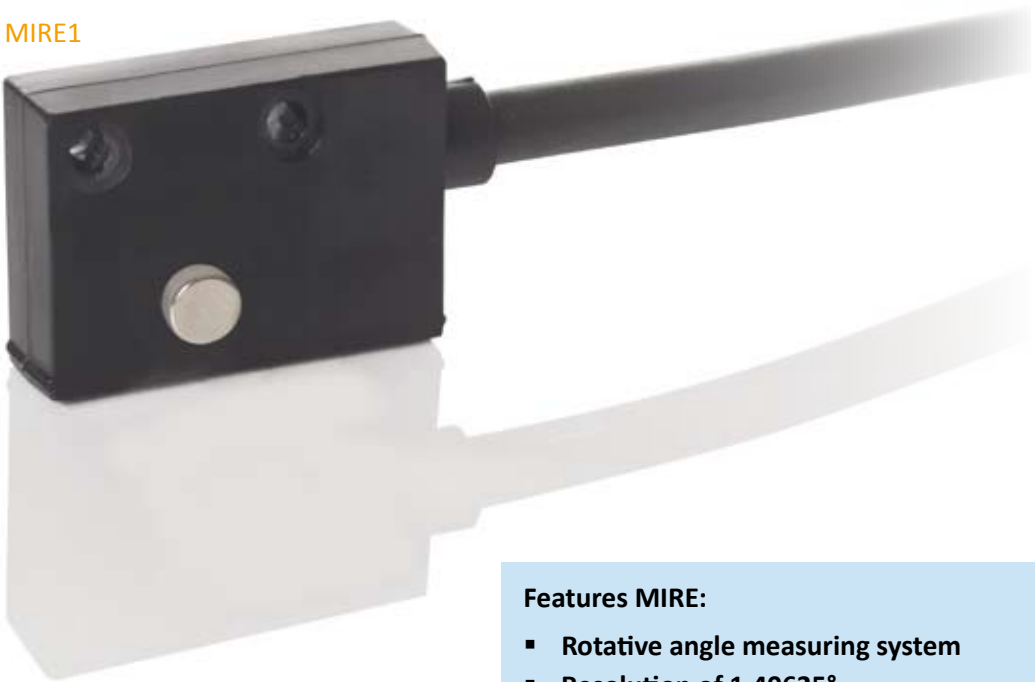
Updates and further details on www.elgo.de

MIRE1

MIRE2

Type: Magnetic incremental, rotative pulse sensor

MIRE1



Features MIRE:

- Rotative angle measuring system
- Resolution of 1.40625°
- Up to 10,000 revolutions per minute
- Direct measuring (with round magnet) at engine shaft or axis possible
- Wear-free due to contactless measuring principle
- 256 pulses / revolution (resolution 1.40625°)
1024 pulses / revolution on request
- Speed proportional square wave outputs A and B



MIRE2

MIRE = Magnetic Incremental Rotary Encoder.
The angle measuring system MIRE is a combination of a sensor and a round magnet. The measuring system particularly suits for rotative angle measurement and for rotative speed detection.

The magnet can be mounted directly on an axis (for example a drive shaft). Due to its high protection class, the sensor head is resistant against any kind of dust and dirt and absolutely wearless. The distance to the magnet may be between 0.2 and 1 mm.

The sensor MIRE2 is flange-compatible to the shaft encoder 15.32 and available on request. The round magnet is here integrated in a cartridge.

Technical Data MIRE1, 2

Mechanical Data

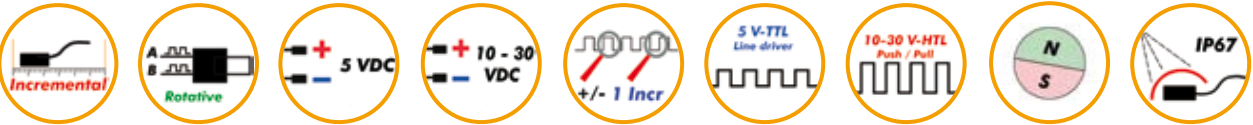
Measuring principle	incremental, rotative
Repeat accuracy	+/- 1 increment
System accuracy in µm at 20 °C	+/- 1 inkrement esp. +/- 1.40625°
Sensor distance to the magnet	0.2 – 1 mm
Diameter round magnet	6 mm
Sensor housing material	MIRE1: Hotmelt plastic material MIRE2: aluminium
Sensor housing dimensions	MIRE1: L x B x H = 35 x 10 x 25 mm MIRE2: diameter 45 mm
Necessary magnet	MIRE1: DRM round magnet MIRE2: round magnet, inside the holder, diameter 20 mm
Max. measurement angle	360°
Cable connection	open cable end
Weight	MIRE1: ca. 25 g without cable MIRE2: ca. 100 g with magnet, without cable cable: ca. 60 g per meter

Ambient Temperature

Storage temperature	-25... +85 °C
Operation temperature	-10... +70 °C (-25... +85 °C) on request
Protection class	IP67

Electrical Data

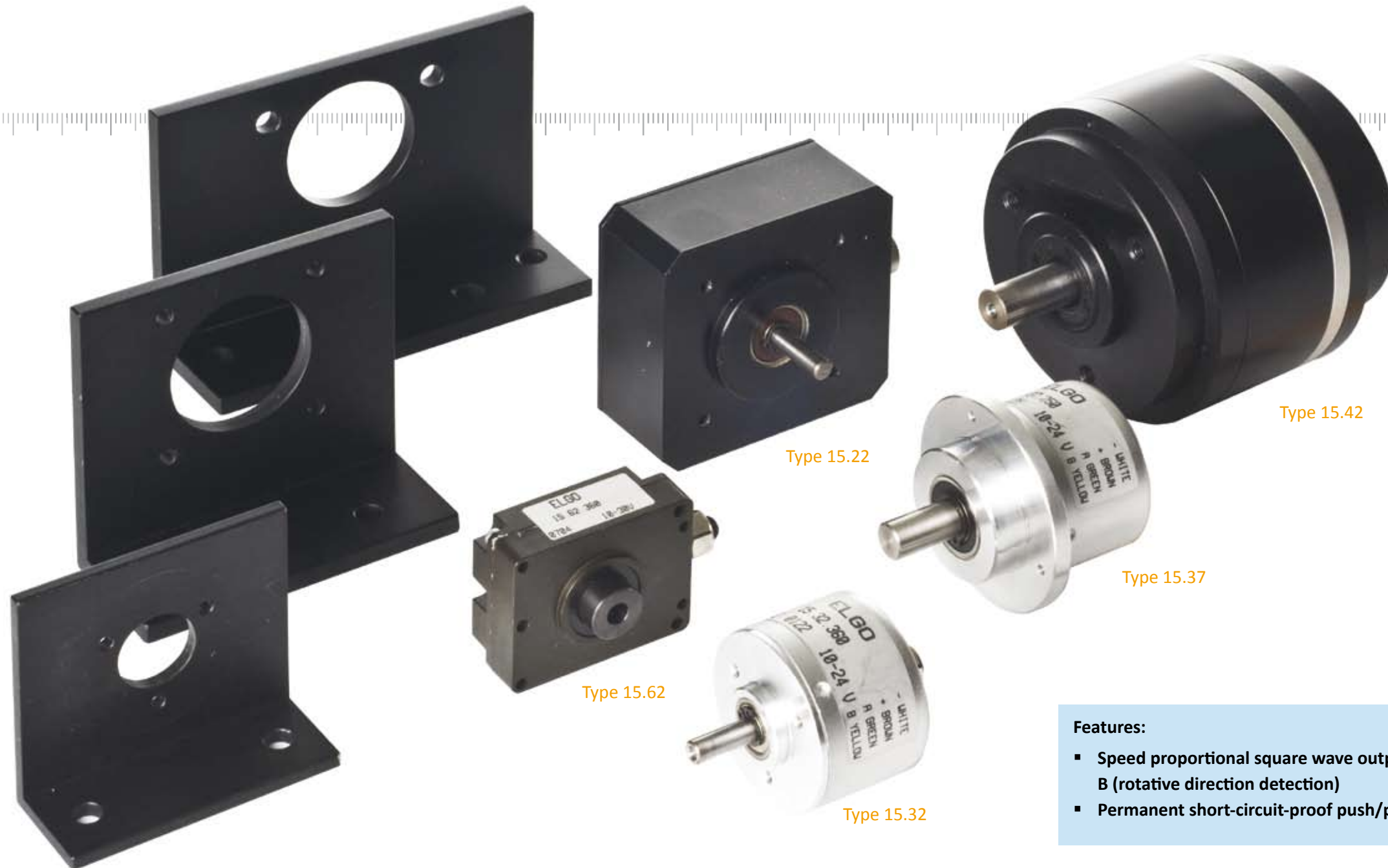
Power supply	10 - 30 VDC / 5 VDC
Periodic and random deviation	10 - 30 V: < 10% ; 5V: +/- 25 mV
Current consumption	40 mA at unstressed output drivers
Output signals	A, \bar{A} , B, \bar{B} , Z, \bar{Z} push/pull - short-circuit-proof
Output level	10... 30 V HTL / 5V TTL
Resolution (4-edge triggering)	1.40625° = 256 edges/revolution
Index pulse	1 x per revolution
Max. output frequency per channel	max. 50 mA
Max. rotational speed	10,000 revolutions/min
Sensor cable	1.5 m standard cable length, others on request, drag chain compliant



Updates and further details on www.elgo.de

Shaft Encoders

Type: **Shaft encoder for rotative measurement**



Features:

- Speed proportional square wave outputs A and B (rotative direction detection)
- Permanent short-circuit-proof push/pull-outputs

Rotary encoders work with opto-electric scanning of a line disc. An infrared beam is interrupted by light impermeable strokes on the disc. The rotation of the shaft creates an ongoing exchange of light and dark. The passing of a stroke (maximum 1.250 strokes per revolution possible) is converted to a definable electric pulse. As it is difficult to scan fine strokes individually, an aperture with the same line division intervenes. The result is (although several lines are scanned at the same time) a light- and dark change while passing the stroke.

The detection of direction (or right / left running or incrementing / decrementing) is effected by two scanning orders. Due to the geometric order of the scanning points and the associated aperture-strokes, two output signals are generated. Their pulses are equal regarding form and frequency. Their phases, however, are shifted by 90° (equivalent to ¼ pulse division). The interpolation unit (e.g. ELGO - position indicator) detects the rotational direction from the position of the shift.

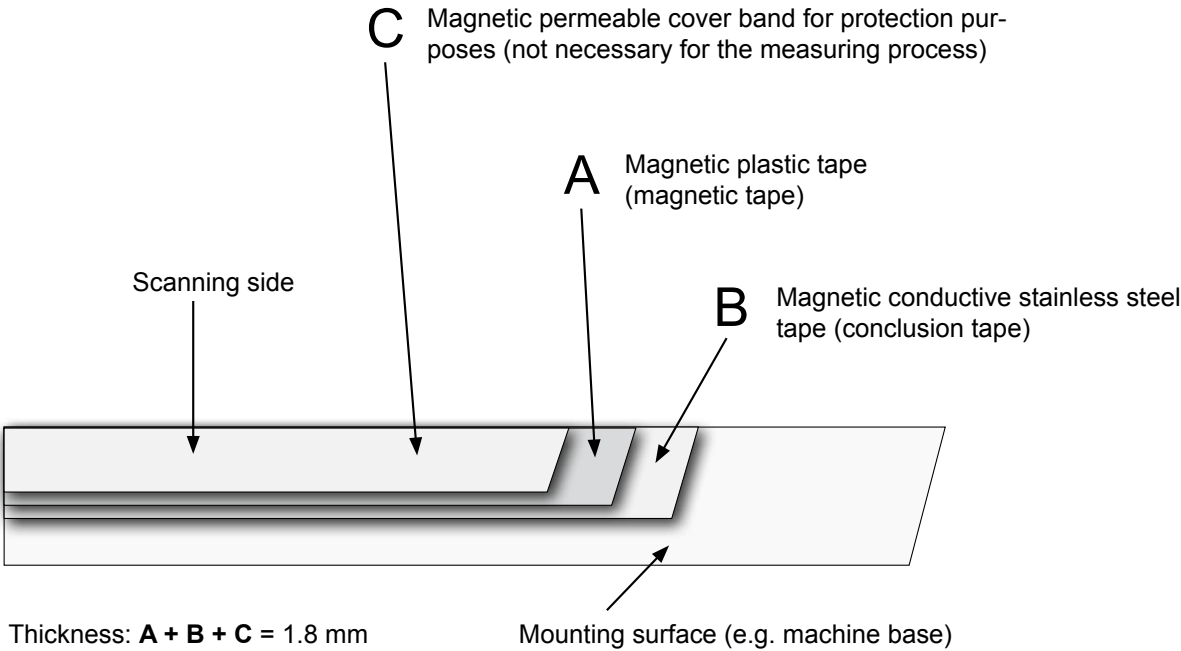
The pulse disc is an essential element of the encoder. A high accuracy and stability (e.g. regarding delay tolerance and temperature resistance) is required. Because of the necessary precision of the stroke division, the originals are drawn on a computer (enlarged view of about 40 cm diameter). This original draft is photographically minimized to the actual disc size. The same applies to the aperture. It is transferred photographically to a high-tensile carrier material. A punching device with built-in projection optics allows an exact central punching of the disc.

The mechanical construction is adapted to the highest robustness and to a high protection class. The housings consist of solid aluminium rotating parts or die casting. The dual swivel heads ensure a precise concentricity and a high vibration tolerance at high rotary speeds. The swivel heads are protected by lock-rings or are available as rubber-sealed version.

The accuracy is 1 increment (1 pulse). The metrological allocation (which measuring unit is allocated to a pulse) results from the application.

Accessories

Magnetic Tapes

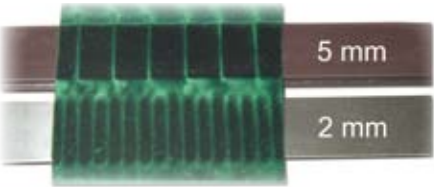


The Magnetic tape consists of 3 components:

- A** The magnetized, highly flexible plastic tape, connected on the lower side with:
- B** Conclusion tape, magnetic conductive and flexible stainless steel tape. It protects the plastic tape from mechanical damages and is a magnetic short circuit at the same time. This provides a significant increase of the functional security under extreme magnetic influences. The parts A and B are already bonded (factory-made).
- C** To keep the flexibility for transport and installation a magnetic permeable steel tape provided with adhesive tape is delivered separately. It serves for mechanical protection of the magnetic plastic tape (A).

Pole searcher film

For the determination of the pole pitch and the number of tracks of already installed tapes, a special pole searcher film (about 4 cm x 4 cm) is available. This pole searcher film makes the magnetization of an ELGO magnetic tape visible. This is especially helpful in order to detect the pole pitch or the number of absolute tracks for already installed or unknown tapes which have to be replaced.



Incremental tapes with different pole pitch

The ELGO magnetic tapes contain the necessary digital information for a linear length measuring via ELGO measuring systems, either as incremental coding or as absolute coding.

As standard (tape construction R), the magnetic tape is arranged along the distance which has to be measured and is there bonded on the mounting surface. Due to its own magnetic pull it can also be fixed without any tools on ferromagnetic areas such as steel beams, machine bases etc. (variant tape construction A). For incremental or absolute measuring systems, different types of magnetic tapes are necessary. In addition, the magnetic tapes differ regarding their pole pitch, which determine –together with the magnetic sensor- the accuracy and the resolution of the measuring system.

For any industrial application we deliver customized magnetic tapes on request.



ELGO magnetic tape end caps are available for all magnetic tapes. They serve for an additional fixation in the radial and the linear area as well as for protection of the endings of the magnetic tape.

Technical Data Magnetic Tapes	
Operation temperature	- 20° ... + 85 °C (depending on the type)
Humidity	max. 80 % (non-condensing)
Linear expansion	$\Delta L = L \times \alpha \times \Delta \vartheta$
Linear expansion coefficient	$\alpha = 16 \times 10^{-6} \text{ 1/K}$
Curvature radius	minimal 150 mm
Protection class	IP67
Available widths	10 mm 20 mm 8 mm (on request) 5 mm (on request) 2 mm (on request)
Thickness	1.8 mm +/- 0.1 mm (tape construction R) 1.5 mm +/- 0.1 mm (tape construction A)
Max. available length	Incremental: standard roll 32 m (up to 70 m on request) Absolute: up to 600 m rolls (longer on request)
Pole pitch	depending on the measuring system: 2 mm pole pitch 2.5 mm pole pitch 4 mm pole pitch 5 mm pole pitch 8 mm pole pitch
Amount of traces (absolute)	1-3 traces depending on the measuring system
Influence of external magnets	External magnetic fields must not exceed 64 mT (640 Oe; 52kA/m) on the surface of the magnetic tape. This can damage or destroy the magnetic tape coding. Magnetic fields > 1 mT at the measuring system affect the system accuracy

Guide Rail

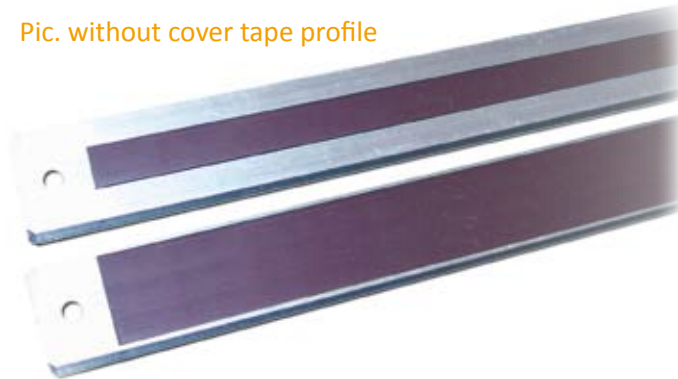
FS - Guide rail

Guide rail for 10 and 20 mm tape. This special 25 mm wide and 6 mm high aluminium rail is provided with a groove on both sides (1 x 10 mm and 1 x 20 mm) into which the corresponding magnetic tape can be bonded. The rails are available in maximum lengths up to 2 meters and are already prepared with 4.5 mm mounting holes. Type designation: FS-XXXX (Length in XXXX millimeters!)

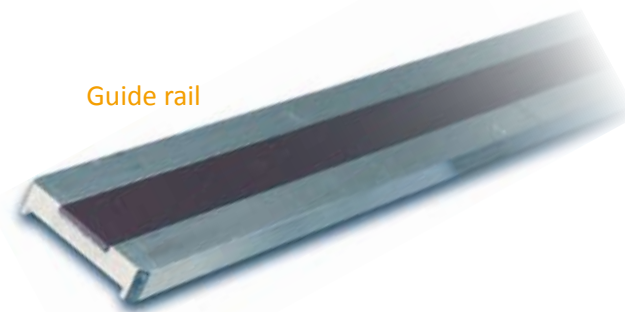
AP - Cover tape profile (without picture)

This 2 mm high and 20 mm wide aluminium cover tape profile can be used as an alternative for the cover band. The magnetic tape is bonded without the steel cover band into the groove and is optimally protected. The profile is available in lengths up to 2 meters. Type designation: AP.X.X (Length in X.X Meters)

Pic. without cover tape profile



Guide rail



Guide Carriage

An ideal addition to the FS guide rail:

The guide carriage consists of a self-lubricating plastic material and is suitable for the installation of the following incremental measuring systems:

LMIX1, EMIX 1, EMSC1, IZ15, IZ16 (FW2060)
LMIX2, EMIX2, LMIX22, EMIX23 (FW2070)
EMAX (FW2080)

Outer dimensions:

FW2060: L = 80 x W = 48 x H = 24 mm
FW2070: L = 80 x W = 48 x H = 33 mm
FW2080: L = 100 x W = 48 x H = 34 mm

Order code: FW-2060, FW-2070, FW-2080

Updates and further details on www.elgo.de



FW-2080



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You can download operation manuals, brief descriptions and product photos.

Please be assured that our team is always on hand to answer any further questions you may have.

Please contact us!

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