

MagLine | OptoLine

Magnetic and optical length and
angle measurement systems,
speed measuring technology



Magline Product Overview

MagLine Micro

MagLine Basic

MagLine Macro

MagLine Roto

Inclinometers

OptoLine Product Overview

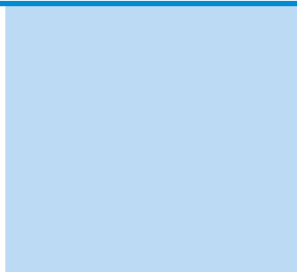




1963
Dr.-Ing. Günther Wandres found-
ed SIKO GmbH.



1980
A milestone on the way to a global mar-
ket: establishment of the subsidiary
SIKO Products in the USA.



1992
Introduction of the magnetic
measuring principle.

1993
Start of magnetic tape produc-
tion.

1995
Introduction / development of the
magnetic compact sensors (MSK).



1996
Introduction / development of mag-
netic, absolute length measurement
(MSA/MBA).



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2000

Introduction / development of the first linear encoders for direct drives.



2006

Introduction / development of the first high-resolution absolute sensor.



2003 and 2005

Foundation of subsidiaries in Switzerland, Italy and China.



2013

Foundation of the Singapore affiliate.

2014

Introduction of the optical measurement systems (OptoLine).



2008

Introduction of the patented compact sensor solution with 20 mm reading distance .



1999

Introduction of the unique "MagLine" product range and brand label .

From the idea to the solution

The MagLine product line follows the idea of replacing measurement systems based on encoders with rack-and-pinion by a contactless system based on a magnetic principle.

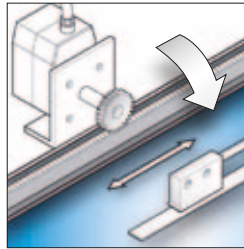
To date, four product groups cover the whole scope of industrial measurement tasks. System accuracy, resolution and tape reading distance are major distinguishing features. The magnetic SIKO technology of MagLine is the first choice wherever precision, reproducibility and robustness of the measurement processes are demanded.

The focus of application is on the acquisition of linear and radial positions, angle values, and rotational speeds.

Benefits:

- Absolutely wear-free technology
- Resistant to dust, shavings, humidity, oil, grease, etc.
- Robust against shock and vibration
- No measurement errors caused by transmission errors or backlash
- High system accuracy and reproducibility
- Easy handling and assembly
- Nearly maintenance-free

The non-contacting measurement technology replaces vulnerable, mechanically acting systems



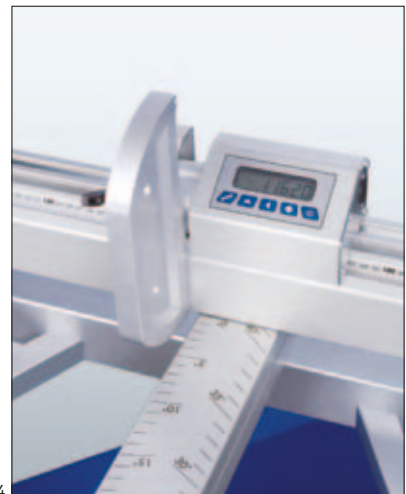
The magnetic measurement principle

A permanently mounted magnetic tape (also called scale) is the core element of magnetic linear measurement. A magnetic sensor fastened on the movable part of the relevant machine scans this tape contactlessly. The sensor converts the measurement values acquired into digital or analog signals via an integrated electronic unit. These signals are available for a variety of devices including translation modules, superordinate controls (PLC) or displays connected on-site.

The actual magnetic measurement process results from magnetoresistance. SIKO encodes the magnetic tapes in specially developed processes. The resulting tape encoding enables incremental or absolute measuring procedures with different levels of resolution.



MagLine is being successfully used – magnetic sensor and measuring tape of the measurement system fit in perfectly: [1] In speed and position monitoring of wheel balancers, [2] precise tracking of sun mirrors, [2] cutting of slabs Magnetic measurement in a customized solution: [4] autonomous, electronic length end stop on panel saws.



FELDER KG, Austria



Incremental systems

In the incremental system, the magnetic tape is magnetized with north and south poles at uniform periods with the pole length among others determining maximum resolution and system accuracy. When the sensor is moved over the tape, the periods generate the path information which is processed in the form of digital square-wave signals (counting pulses) or analogous sine / cosine signals. Counting of the pulses permits a statement concerning the distance traveled.

In an incremental system, at least absolute reference is required – the so-called reference point. This point serves for realignment of the system and can be stored as additional information on the magnetic tape. This reference point in an incremental system is important because the actual position value is lost as a rule after power interruption (e.g. after system shutdown and restart) or when the sensor position has changed.

A system with no buffer battery will require a new reference travel. Battery-buffered systems are regarded as quasi-absolute systems.

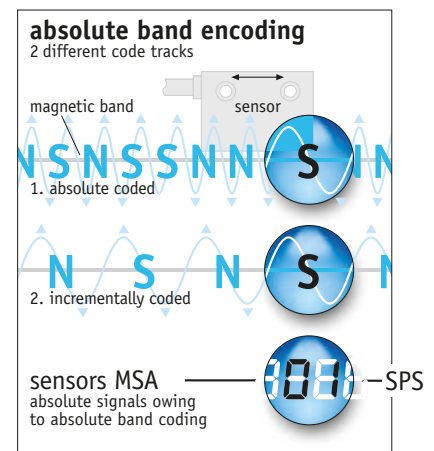
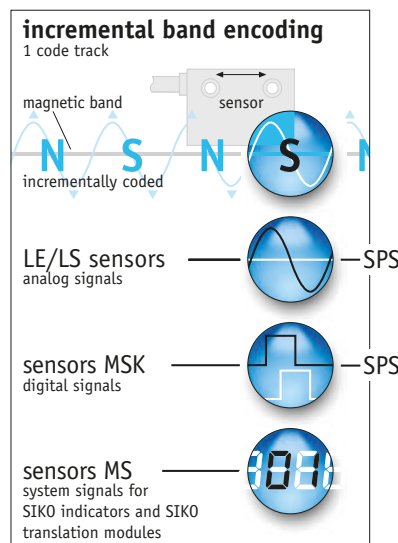


Absolute systems

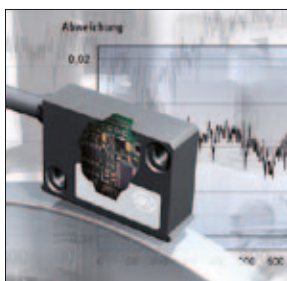
By contrast, no reference travel is required at all for linear measurements with absolutely coded magnetic tapes. The flexible plastic tape has been magnetized with a specific absolute Code.

Commissioning is via one-time calibration of the system. No buffer battery is required owing to the absolute coding of the tape because the actual position value will be available at any position immediately after starting the system.

A change of position even in the de-energized state will not influence the correctness of the measured value displayed since the position is stored absolutely on any place in the coded magnetic tape. Likewise, no reference travel is required when the sensor is lifted from the tape e.g. for maintenance purposes.



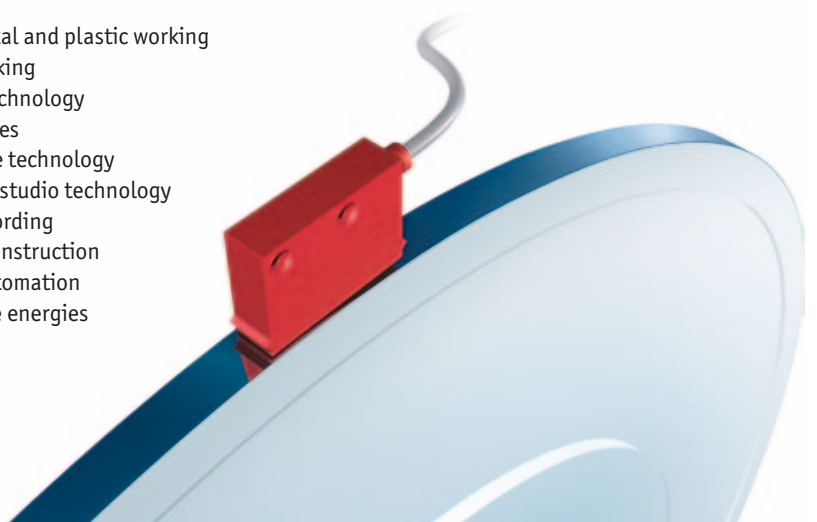
Incremental and absolute coding methods enable position acquisition with differently utilizable feedback (see picture).



MagLine benefits ...

... mainly the branches of industry that put high requirements on repeat accuracy of linear or rotative measuring processes under adverse ambient conditions, including ...

- Wood, metal and plastic working
- Stone working
- Medical technology
- Direct drives
- Warehouse technology
- Stage and studio technology
- Speed recording
- Window construction
- Mobile Automation
- Renewable energies



Profile

This high-resolution feedback system is especially designed for precise, highly dynamic processes with special measurement requirements in the μm range.

**Features:**

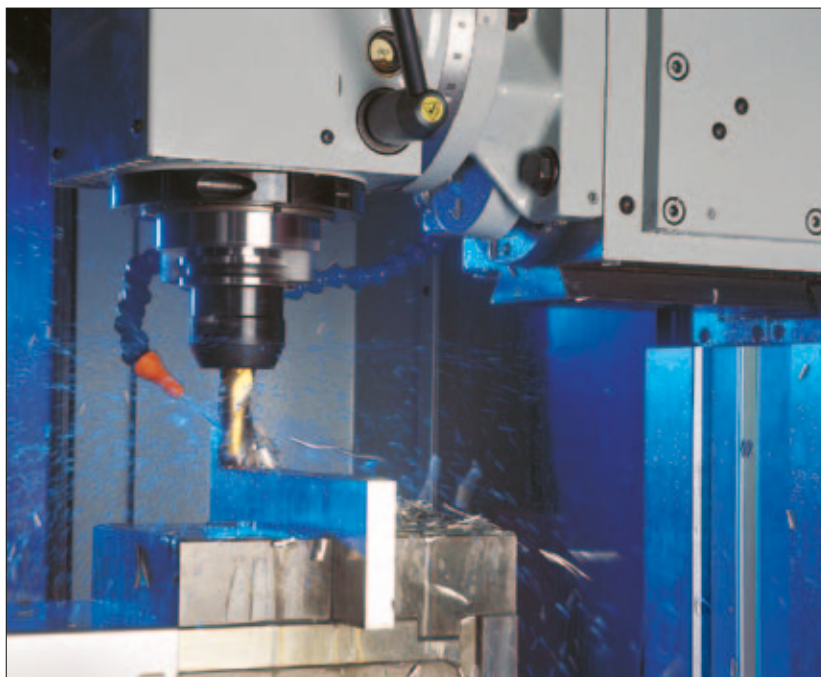
- Measurement lengths up to 100 m
- Freely selectable parameters
- Sensors with or without integrated translation module
- System for incremental or absolute acquisition of measured values
- Primary application: linear and rotative guide and drive technologies

Specifications of MagLine Micro

Resolution 0.2 ... 5 μm
System accuracy $\pm 10 \mu\text{m}$
Repeat accuracy $\pm 1 \mu\text{m}$
Sensor-tape gap up to 0.4 mm

Advantages:

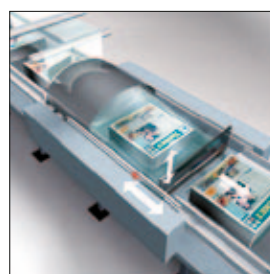
- Highest resolution
- Incremental/absolute
- Economical
- Small and compact



Highly efficient even with flying metal cuttings.

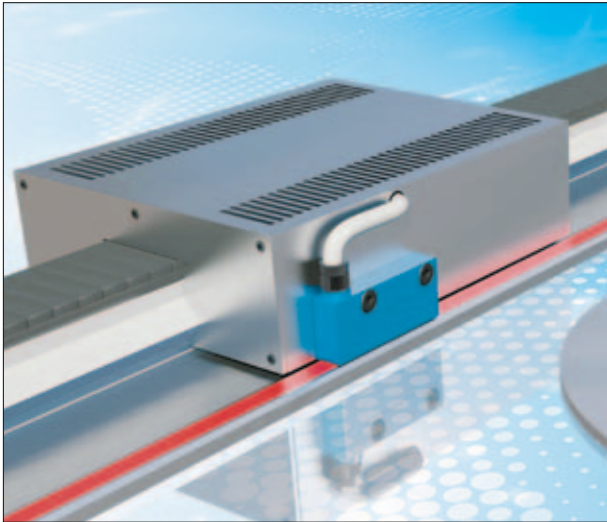


Open feature

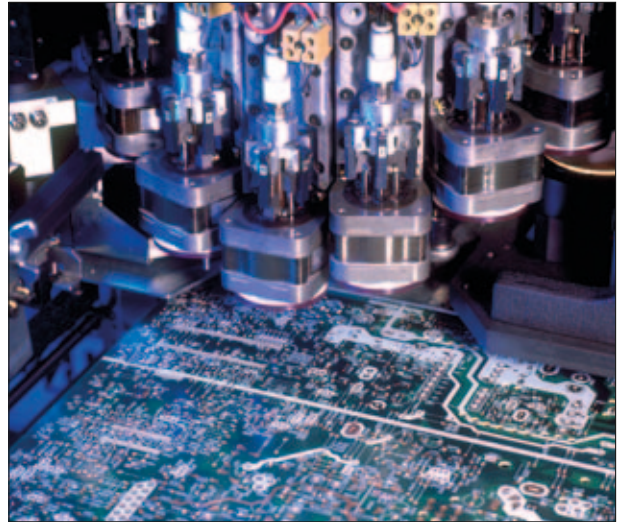


e.g. pick-and-place linear drives with dowel drill stations, parquet production, blown film packaging ...

MagLine Micro



The Micro systems reliably realize highly precise acquisition of measured values and positions even under particularly demanding ambient conditions.



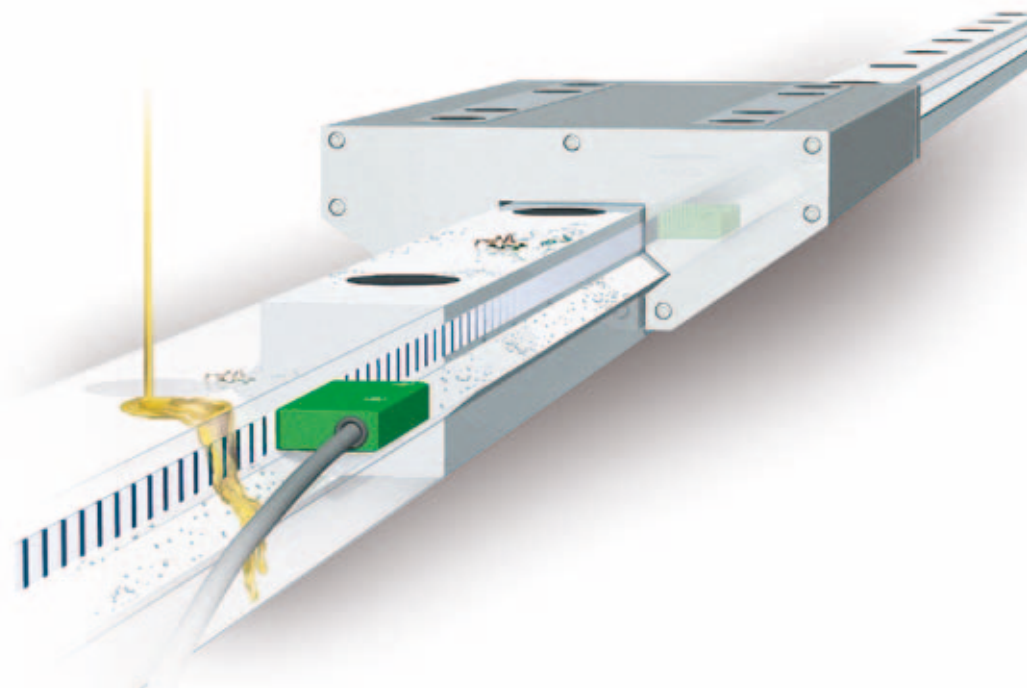
Use of Micro systems in the production of printed circuit boards.

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Combinations

Measuring method	Scale	Magnetic sensor	Interface	Downstream electronic unit
incremental	MB100/1	LE100/1	analog	governor/controller *
		MSK1000	digital	PLC, counter*
		MS100/1	direct connection	MA100/2
absolute	MBA111	MSA111C	SSI, analog	governor/controller *
			SSI	

*Customer's downstream electronic unit



Profile

Proven and technically sophisticated, the Basic product series offers a particularly wide range of components which are geared to each other. The economical solutions offer a variety of individual applications, which fulfill all standard requirements regarding measurement accuracy.



Features:

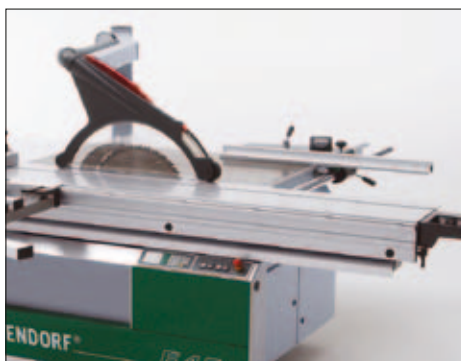
- Measurement lengths infinite
- Sensors with or without integrated translation module
- System for incremental / absolute acquisition of measured values
- Complete systems with sensor and connected display

Specifications of MagLine Basic

Resolution 1 ... 100 μm
System accuracy $\pm 25 \mu\text{m}$
Repeat accuracy $\pm 5 \mu\text{m}$
Sensor-tape gap up to 2.5 mm

Advantages:

- Versatile system
- Easily customizable
- Ideal in serial use
- Uncomplicated retrofitting



Motifs Saw, radial stop: Wilhelm Altmendorf GmbH & Co. KG



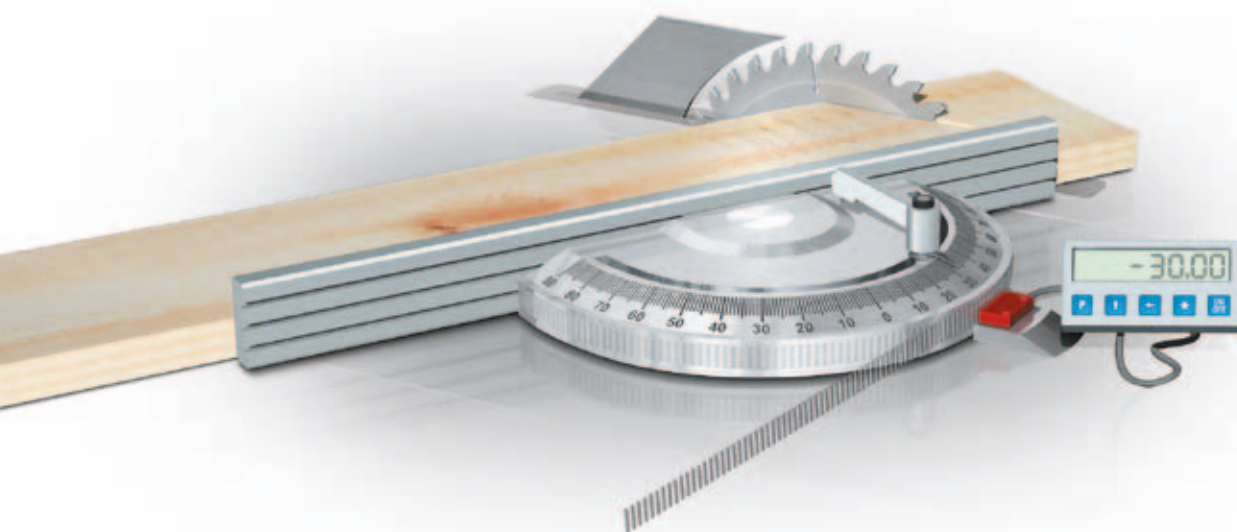
On duty: Incremental and absolute position acquisition by means of Basic systems. The combination with compatible electronic equipment enables the connection to control units or direct display on-site.



Open feature



Open flyer





















Direct display of measured values with a vertical panel saw ...

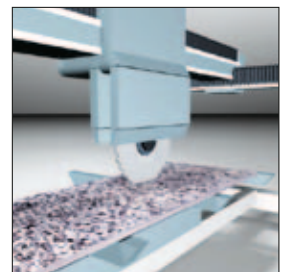
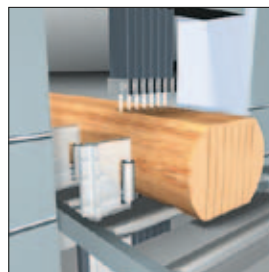
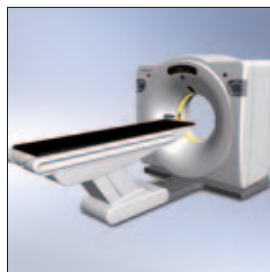


...or adjustment of the length stop .

Combinations

Measuring method	Scale	Magnetic sensor	Interface	Downstream electronic unit
incremental	MB320/1	MSK320	digital	PLC, counter*
				
	MB500/1	MSK5000	digital	PLC, counter*
				
absolute		MS500H	direct connection	MA503/2 (MagScale)
				
	MBA501	MSA501	SSI, digital	PLC, controller*
				
	MBA	MSA	Direct connection	MA505
				

*Customer's downstream electronic unit



e.g. CT patient beds, frame saws, stone cutting ...

MagLine Basic

Profile

Specially designed for very long measurement distances, MagLine Macro enables safe position detection with millimeter accuracy and interplay of many flexible units.

**Features:**

- Measurement lengths infinite
- Height differences in the measuring length can be compensated for thanks to a reading gap of up to 20 mm
- System for incremental acquisition of measured values
- Particularly suitable for extended measuring lengths, as for example in storage or conveyor applications

Specifications of MagLine Macro

Resolution 0.25 ... 2 mm
System accuracy ± 1 mm
Repeat accuracy ± 1 mm
Sensor-tape gap up to 20 mm

Advantages:

- High resolution with very extended measuring lengths
- High protection class (IP67)
- Large mounting tolerances are admissible



broadcast-service Hagen: ARD-capital studio Berlin

The small and compact design of scale and associated sensors is the basis for simple and unobtrusive integration into nearly any guide unit.



e.g. stone cutting, forklifts, waste and scrap presses ...






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MAN Logistics: High rack warehouse

MagLine sensors on duty in the storage and conveyor technologies.

Combinations

Measuring method	Scale	Magnetic sensor	Interface	Downstream electronic unit
incremental	MB2000, MB4000	MSK2000, MSK4000	digital	PLC, counter*
				

*Customer's downstream electronic unit



Profile

The open system of the Roto series is the ideal alternative to conventional optical rotary encoder systems – especially for exact revolution or angle measurement under extreme conditions.

**Features:**

- Acquisition of measurement values under difficult ambient conditions
- Particularly durable, since high mechanical stress is not transferred to the measuring system
- Typical areas of application include speed measurement or angle measurement, e.g. on rotary tables

MagLine Roto

Resolution 100 ... 200.000 pulses/revolution
System accuracy $\pm 0.05^\circ$
Repeat accuracy ± 1 increment
Sensor-ring gap up to 2 mm

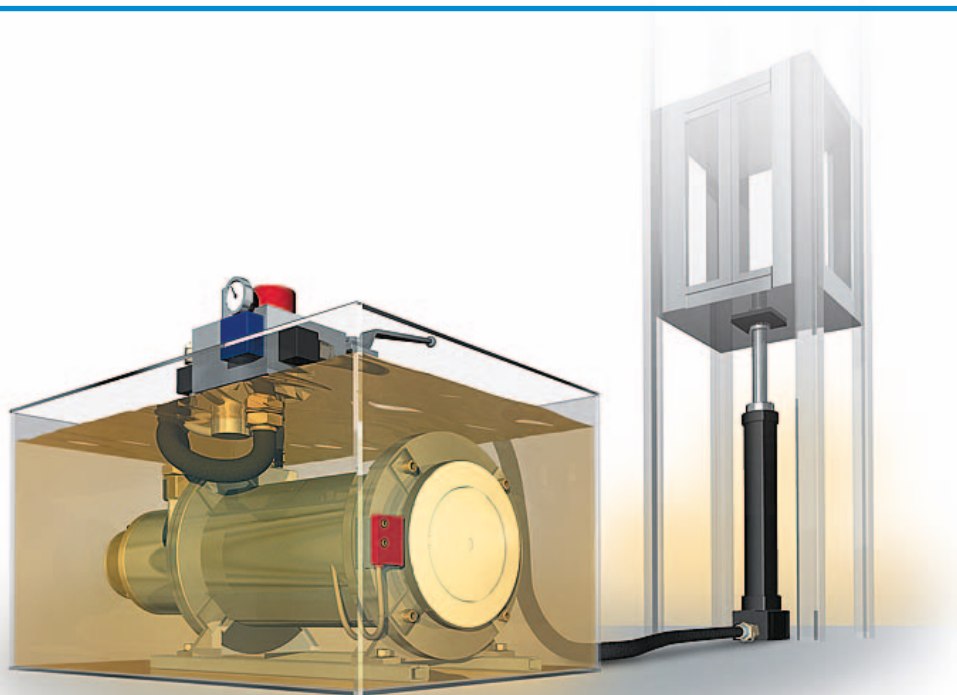
Advantages:

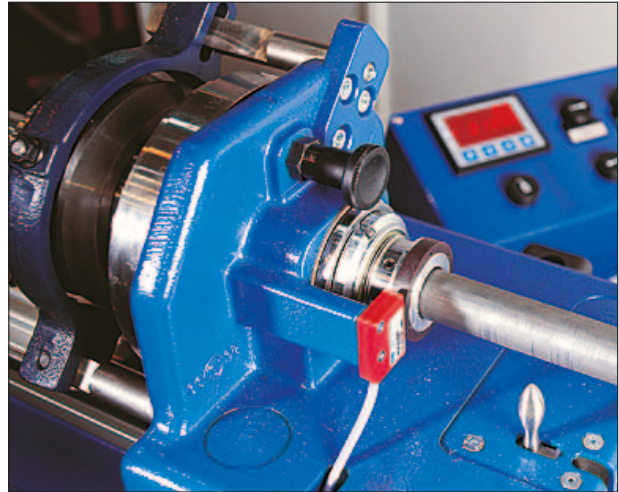
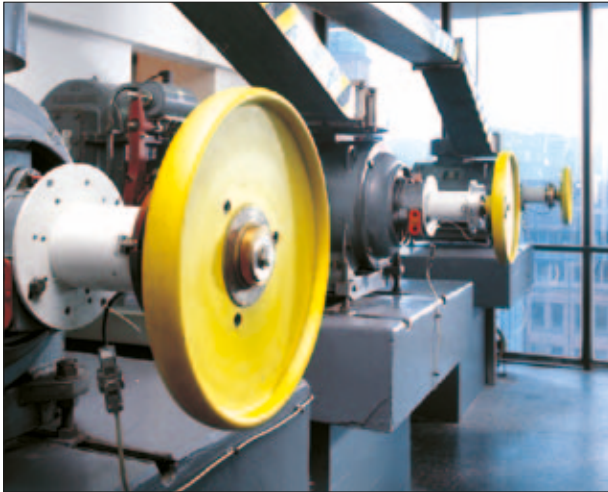
- High service reliability
- Long service life
- High protection class (IP67)
- Flexible, customer-specific ring solutions



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








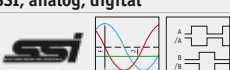



Use in the elevator technology for measuring speeds.



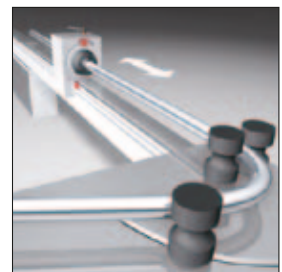


Extremely robust and designed for direct angle and speed recording – the typical applications of MagLine Roto benefit from the contactless magnetic measuring method in several aspects.

Combinations

Measuring method	Scale	Magnetic sensor	Interface	Downstream electronic unit
incremental	MR320, MBR320	MSK320	digital	PLC, counter*
				
	MBR200, MR200	MSK210	digital	PLC, counter*
				
absolute	MBR500, MR500	MSK5000	digital	PLC, controller*
				
	MBR500, MR500	ASA510H	SSI, analog, digital	PLC, controller*
				
	MRAC501	MSAC501	SSI, digital	PLC, controller*
				

*Customer's downstream electronic unit



e.g. speed measurement, elevator technology, tube bending technology ...

MagLine Roto

Profile

Inclinations with respect to the earth's center can be measured most easily by means of SIKO inclinometers.



The SIKO inclinometers all work according to the modern principle of MEMS technology (Micro-Electronic-Mechanical System). With this measuring principle, a series of electrodes are housed in a hermetically sealed ASIC chip. The capacitive voltage between the electrodes is then measured.

Recording can be done either as a single axis (0 ... 0.1° (0 ... 360°) or as a double (2) axis (±80°) with a system accuracy of a maximum of ±0.1° and a resolution of 0.01°.

The measured data is output directly as analog (0 ... 10 Volt or 4 ... 20 mA) or digital (RS232) values or via CANopen. When using the CANopen interface, a bus operation is also possible for up to 127 participants.

SIKO inclinometers, however, have further advantages such as being able to program various parameters freely (e.g., filters, rotating direction, the zero point) via the RS232 or CANopen or limiting the measured area via the 'teach-in-function' in the client application (For example, 45° ... 180°).

It is possible to set the zero point of the encoder on-site in the application via a separate PIN (teach-in-function).

Additional advantages are the easy installation of the encoder onto the surface to be measured (by means of simple screwing) as well as a high IP protective class. All encoders are protected for submersion in water for a long period (IP68) or with high pressure /steam jet cleaning (IP69k).

Whether medical technology, mobile automation or renewable energies – inclinometers cover a wide range of applications.

Features:

- Resolution: max. 0.01°
- System accuracy: ±0.1° or ±0.5°
- Repeat accuracy: ±0.02°

Advantages:

- High protection classes IP68 and IP69K
- Robust mechanical design
- Truly-absolute measurement



e.g. medical and laboratory technologies, mobile automation, dancer rolls













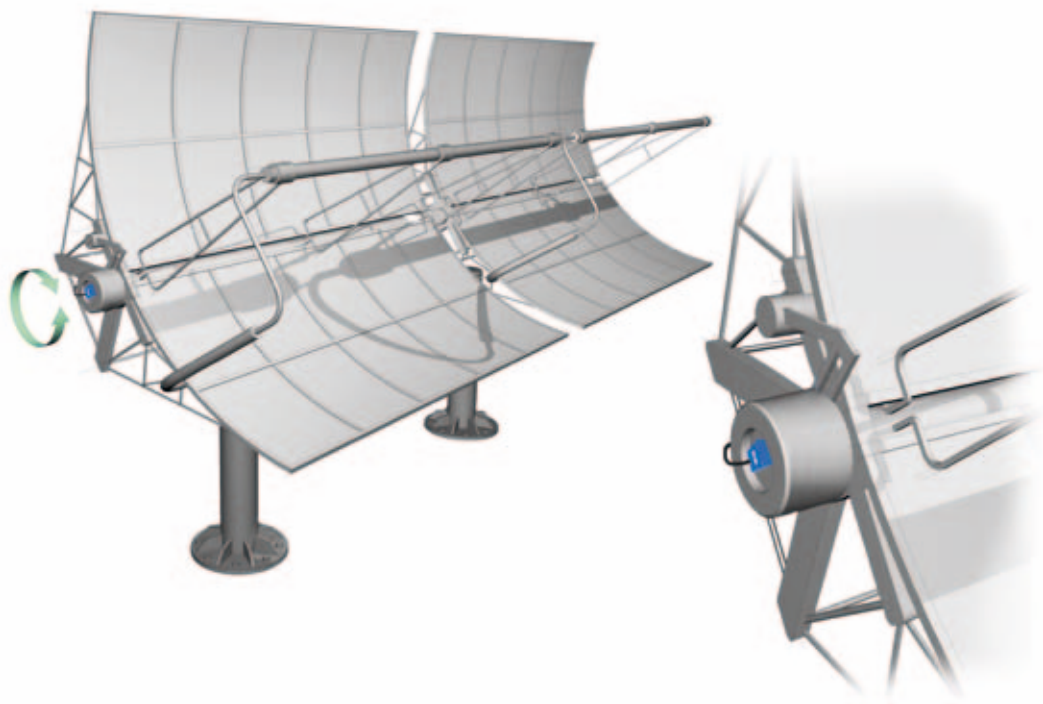
Measurement of angle adjustment in an X-ray unit.



Determination of horizontal cage position of work cages.

Combinations

Measuring method	Sensor	Interface	Downstream electronic unit
absolute	IK360 	CANopen, digital 	PLC, PC 
		CANopen, digital 	PLC, PC 
	IK360L 	CANopen, digital 	PLC, PC 
		CANopen, digital 	PLC, PC 



Profile

The LSC20 and TS20 OptoLine measuring systems complete the SIKO solutions for the length and angle measurement technologies in the high-precision area.

The system works on the basis of optical scanning of fine structures via laser light and is completely free from hysteresis. It is used for length measurement up to 30 m or also angle measurement $< 360^\circ$ (min. diameter of 300 mm).

Its main area of application covers measurement tasks with high electromagnetic interfering fields or highly precise measurement with a system accuracy of $\pm 5 \mu\text{m}$ or a resolution of up to $0.05 \mu\text{m}$. Therefore you will find the OptoLine products as feedback from linear motors or in the clean room in the medical or analytical technology.

Additional applications include ultra-precision machines and high-precision equipment as well as measuring microscopes and other high-precision measuring instruments.



Features:

- High system accuracy up to $\pm 5 \mu\text{m}$
- High resolution up to $0.05 \mu\text{m}$
- No hysteresis
- Free from electromagnetic interference
- High sensor-tape gap $1.0 \text{ mm} \pm 0.15 \text{ mm}$
- Fastening according to industry standard
- Signal interpolation in the scanning head

OptoLine

Resolution $0.05 \dots 0.1 \mu\text{m}$

System accuracy $\pm 5 \mu\text{m}$

Repeat accuracy $0.05 \dots 0.01 \mu\text{m}$

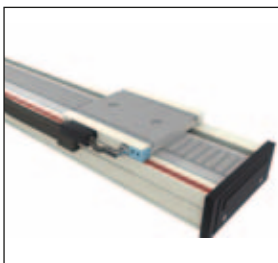
Sensor-tape gap $1.0 \pm 0.15 \text{ mm}$

Advantages:

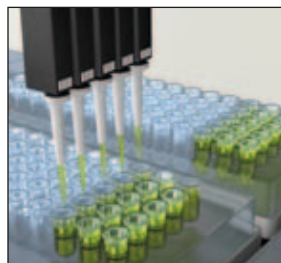
- High resolution and accuracy
- No hysteresis
- Insensitive to magnetic fields



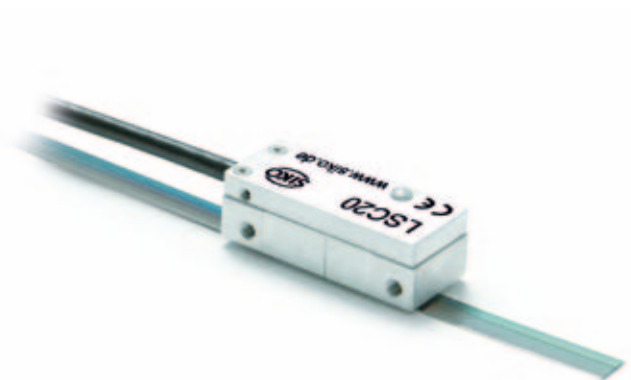
High repeat accuracy is of particular importance for pipetting plants.

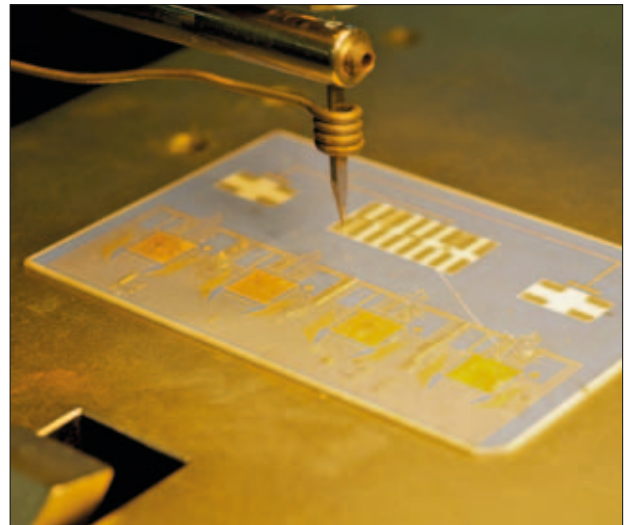


OptoLine can be employed especially as feedback with linear motors, e.g. with the requirement of $5 \mu\text{m}$ system accuracy or in the presence of high electromagnetic interfering fields.



Due to their clean room conditions, distance or angle measurement in the areas of medical or analytical technologies are virtually predestined for OptoLine measuring systems.








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The highly accurate sensors in use in the semiconductor industry.

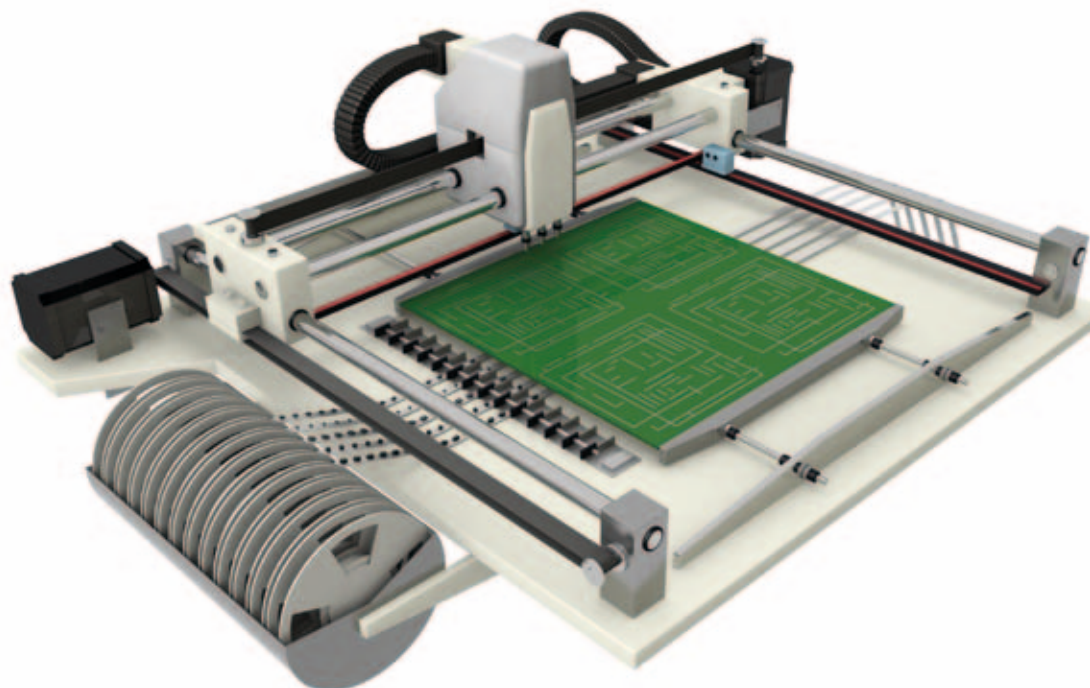
Combinations

Measuring method	Scale	Magnetic sensor	Interface	Downstream electronic unit
incremental	TS20	LSC20	digital	PLC, counter*
				

*Customer's downstream electronic unit



Open feature



Sales / personal contact

Our sales team and our international sales partners would be pleased to answer your enquiries. Contact us at

Phone +49 7661 394-0

Web site with download area

PDF data and program routines for our programmable devices are available via the SIKO homepage.

At www.siko-global.com you can find:

- Data sheets
- Catalogues
- User information
- Manuals
- GSD and EDS files
- 3D design files
- Product movies
- Directory of sales partners

Technical support

Our technical support team provides you with assistance and first-hand information.

Phone +49 7661 394-457

E-mail: support@siko.de



Advantages include:

- Native and neutral data formats, suitable for your CAD system
- Preview function and direct download
- Full-text search
- 24 h access to product catalogue
- Versatile display options
- Free service

3D models for mechanical engineering

We offer design engineers true-to-size, reduced-detail 3D data via the Cadenas platform. This allows configuration of attributes which define the contours of the SIKO device. After registering via our product pages on the internet, there is 24-hour on-line access to this service : www.siko-global.com

Cadenas PARTcommunity ...

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Visit or website www.siko-global.com, and go to the „Contact“ menu item to access all the latest contact data of our agencies.

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Australia
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Romania
Russia
Serbia
Slovakia
Slovenia
Spain
Sweden
Switzerland
Turkey
Ukraine

America


Argentina
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Mexico
USA



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Sales: World wide



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 **SIKO Products Asia Pte. Ltd.**

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