



MAGLINE^{MICRO}
MAGLINE^{BASIC}
MAGLINE^{MACRO}
MAGLINE^{ROTO}

Magnetic Length Measuring System...
...lengths ahead!



MAGLINE^{MICRO}

Especially suitable for precise and highly dynamic processes on linear guide systems and applications in the field of motive power engineering, MAGLINE^{MICRO} is a magnetically sensing incremental system with programmable resolutions up to 1 μm and a measuring accuracy of max. 10 μm . MAGLINE^{MICRO} system operates without wear, with measuring values captured contactlessly. This makes the system a robust and economic alternative to optical measuring systems.

μm

MAGLINE^{BASIC}

This system combines all advantages of the contactless magnetic measuring technology and offers resolutions up to 5 μm and a measuring accuracy of max. 50 μm . MAGLINE^{BASIC} is available as both an incremental or absolute measuring system. MAGLINE^{BASIC} either provides digital encoder signals or directly displays the values measured at the position the sensor is placed.

MAGLINE^{MACRO}

Especially designed for very long measuring lengths. A system for measuring lengths of 100 meters and more -incrementally or absolutely. Digital signal outputs allow data transmission of the measured values with a resolution and accuracy of up to 1 mm to a display unit or a master control.

MAGLINE^{ROTO}

Primarily developed for direct angle and rotation recording with all the advantages of magnetic, contactless sensing. Appropriate sensors register the incremental segmentation of magnet rings at revolutions of up to 6,000 rpm and a maximum resolution of 80,000 steps per revolution.

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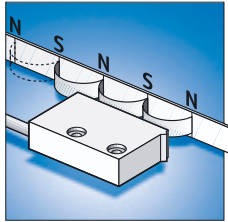
Magnetic length measuring system MAGLINE^{MICRO}

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MAGLINE^{MICRO} Safe Sensing Security

The magnetic linear system: Insensitive to contamination.
within Micrometer Range!



MAGLINE^{MICRO} senses magnetic fields contactlessly and transforms the measured values into digital or analog signals.

Many technical applications require capturing travel, rotary angle or positioning moves. Environmental conditions are often extreme, for example in the work-room of a machining center. Highest precision is demanded despite unfavorable environmental influences and high travel speeds. Values measured are directly shown on a display or transmitted as input signal to the machine's control.

The MAGLINE^{MICRO}-system fulfills these requirements effortlessly since it detects the movement contactlessly on a magnetic scale with

a technology that surpasses the sensing reliability of most optical processes.

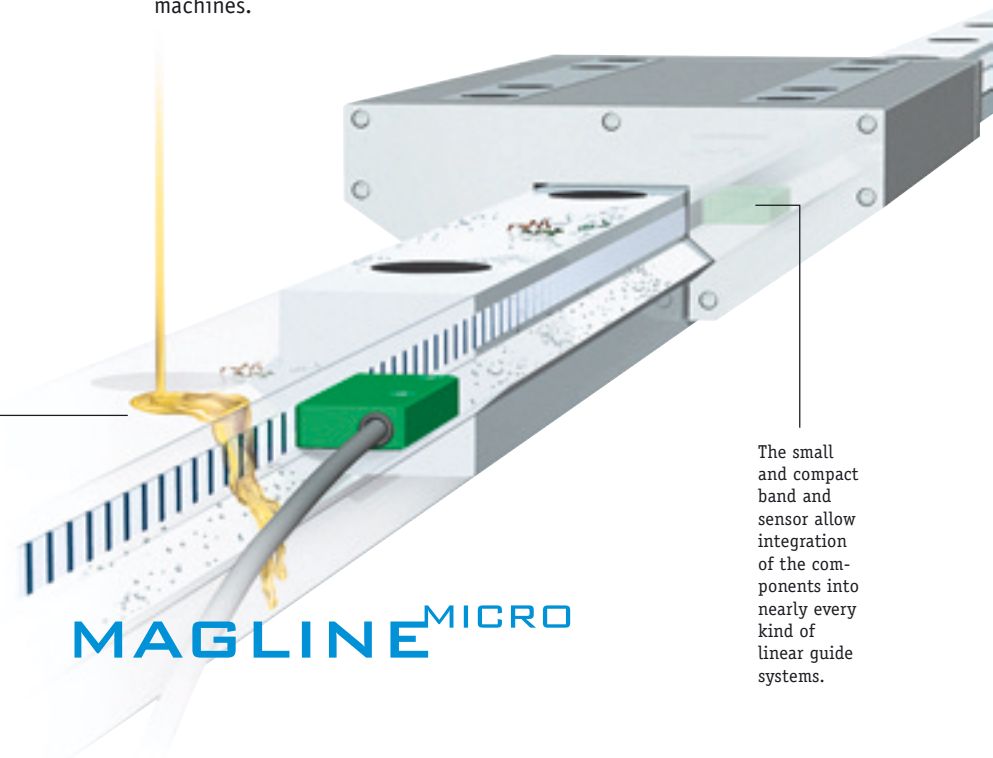
The scale is fabricated of specially developed magnetic materials depending on the necessary accuracy. As the sensor travels along the magnetic band contactlessly, the system works without wear and is completely insensitive to contamination such as dust or liquids. Measured data can either be displayed directly where the system is mounted or transmitted to an electronic control. Measured data is transformed into distance/direction information.

Easy handling and mounting makes the MAGLINE^{MICRO} system perfectly suitable for retrofitting to existing machines.

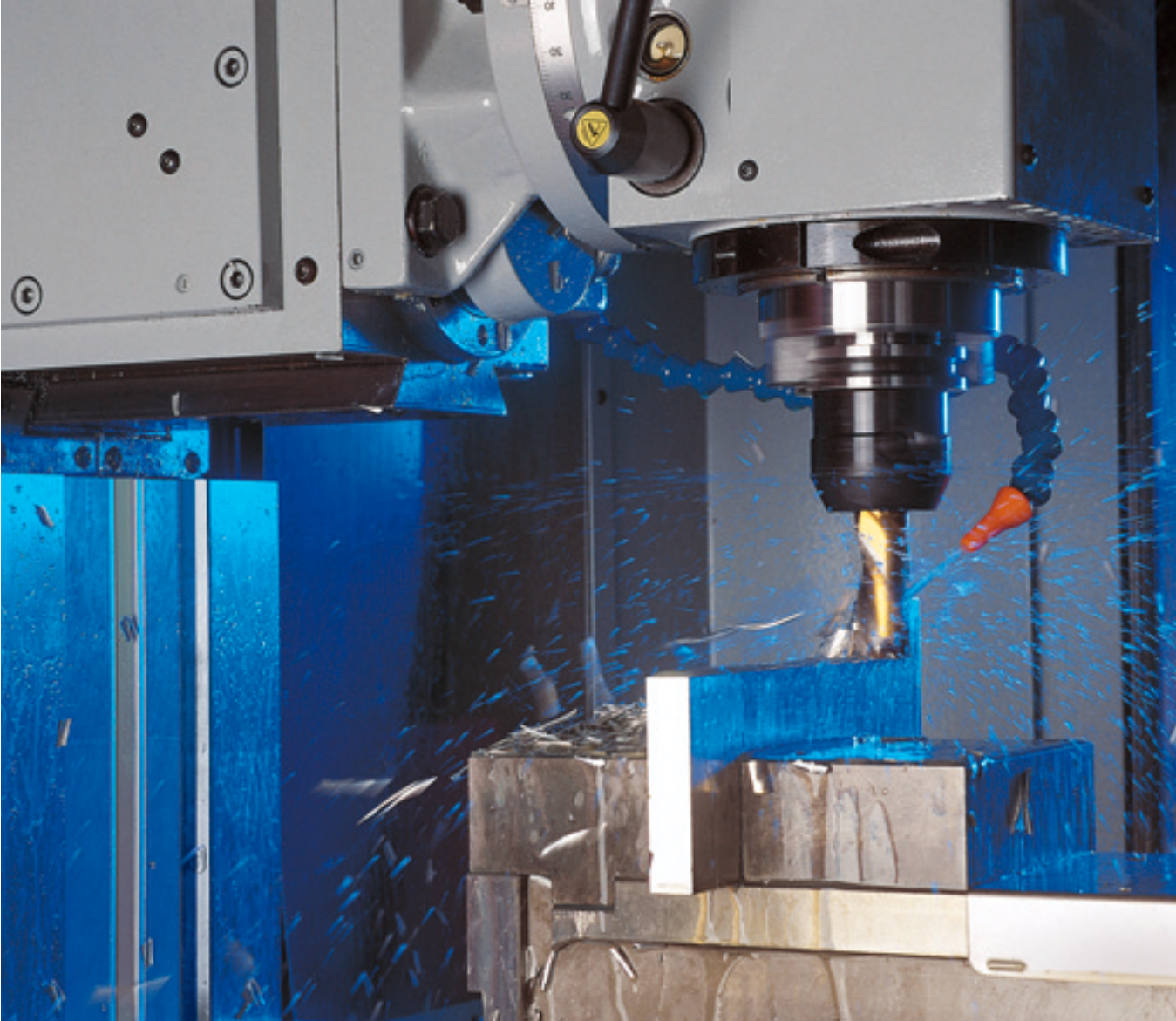
At a maximum measuring length of four meters MAGLINE^{MICRO} achieves a resolution of 1 μm . Repeat accuracy is also 1 μm , with an absolute accuracy of up to 10 μm . All important parameters are individually programmable allowing an adaptation of the system to the application's requirements. The system either issues digital square or analog signals.

MAGLINE^{MICRO} system is an economical alternative to conventional length measuring systems. Robust components and the insensitive measuring principle make this system suitable for a multitude of applications.

Even when the magnetic band is completely covered with oil or grease, the length information will be correctly captured and recorded.



The small and compact band and sensor allow integration of the components into nearly every kind of linear guide systems.



At the Customer

The technically feasible!

Repeatedly measure, test, adjust: Precision tools in the proven SIKO design guaranteed by quality assurance for a multitude of user groups.



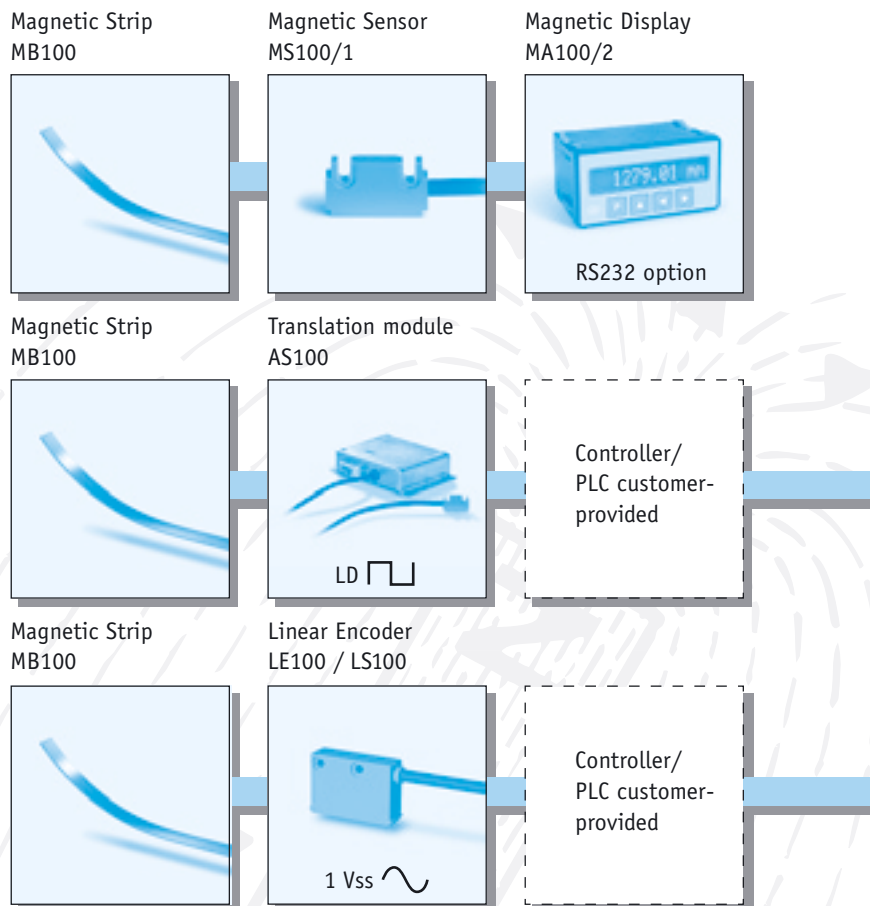
MAGLINE^{MICRO} is a length measuring system for micrometer range use, suitable for various applications and a perfect solution for linear guide and motive power engineering systems. As the magnetic band can be bent to a radius, MAGLINE^{MICRO} may also be used for angle measurement applications with large angle resolution such as circular tables. Direct or close mounting to the place of

positioning/processing helps to prevent incorrect measuring values which might result from gear backlash or spindle tolerances. Thanks to its solid design, additional protection of the measuring system is not necessary. That makes mounting easy and saves costs.

Product Survey

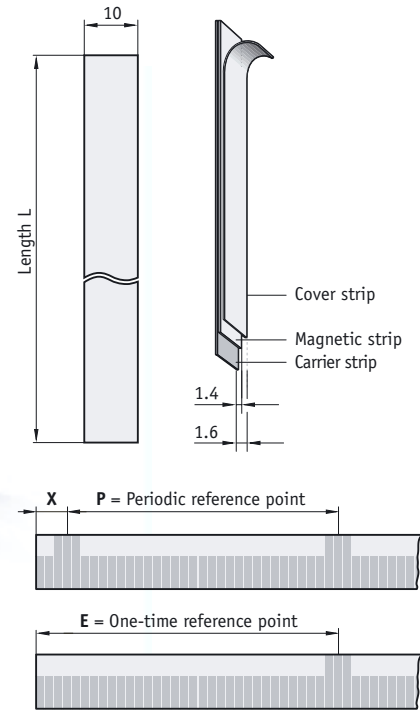
MAGLINE^{MICRO} and its components

Series 100



Magnetic Strip MB100

The magnetic band consists of a magnetic tape magnetized at regular distances and firmly joined with the carrier strip. For mounting a special adhesive tape is pre-mounted.



Features:

- easy mounting by simple glueing
- insensitive to humidity, liquids and oil
- insensitive to dust, shavings...
- highest accuracy

Reference points, all in m

X	P	E
0.02	0.02/ 0.06/ 0.1/ 0.14	0.02/ 0.08/ 0.14/ 0.2
	0.18/ 0.22/ 0.26/ 0.34	0.26/ 0.32/ 0.38/ 0.44
	0.42/ 0.5	0.5

other reference points on request

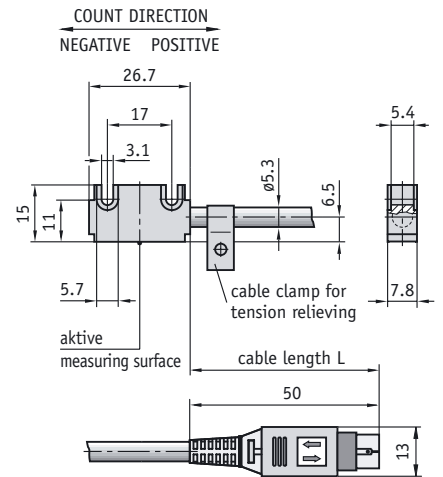
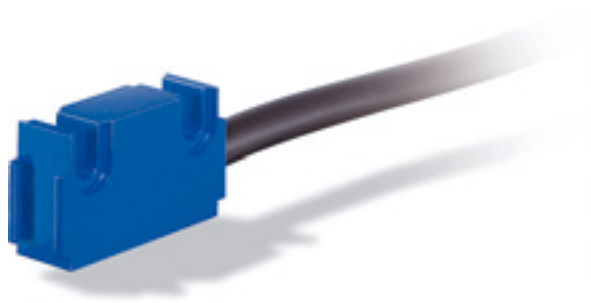
Feature	Ordering data	Technical data	Additional information
Length	...	length in meter, available in steps of 100 mm	ordering length = required length + 30 mm
Width	10 5	10 mm 5 mm	standard
Precision class	0.01 0.05	10 µm, ordering length 4000 mm 50 µm, max. ordering length 90000 mm	standard
Carrier material	St VA	spring steel strip stainless steel strip	standard
Adhesive carrier band	TM TO	with without	standard
Cover strip	AM AO	with without	standard
Reference point	0 E P	without one time periodic	standard only for 10 mm width only for 10 mm width
Position of E reference point (ohne-time)	0.02	in m	standard, see drawing
or			
Position of P reference point (periodic)	0.02	in m	standard, see drawing
Temperature coefficient		$(11 \pm 1) \times 10^{-6} / K$	
Temperature ranges		working temperature: -20 ... +70 °C	storage temperature: -40 ... +70 °C
Type of protection		IP67 according to DIN VDE 0470	
Mounting type		glued joint	pre-mounted special adhesive tape

Your order:

MB100 - - - - - - - - -

Magnetic Sensor MS100/1

The information of the magnetic strip MB100 is captured contactlessly. The sensor with the permanently connected cable passes the information on to a magnetic display or a follower electronics unit.



Features:

- small, compact size
- solid casing
- insensitive to mechanical influences
- **Attention!** No modification of the sensor connection is permitted (e.g. other cable/ cable length/...)

Feature	Ordering data	Technical data	Additional information
Design	L A	type L, aluminium anodized, blue color	standard
Cable length	1.0 B	in meter, in steps of 1.0 m	standard (available up to 10 m)
Cable sheath	PVC PUR C	oil-resistant	standard
Mounting position		arbitrary	
Connection		Mini-DIN	for magnetic display MA100/2
Gap strip/ sensor		0.1 – 0.4 mm	over whole measuring range, without cover strip
Travel speed		max. 5 m/s	
Temperature ranges		working temperature: -20 ... +70 °C	storage temperature: -20 ... +85 °C
Humidity		100 % rH	condensation permitted
Protection class		IP 67 according to DIN VDE 0470	
Mounting type		by means of screws	

Your order:

MS100/1 - - -

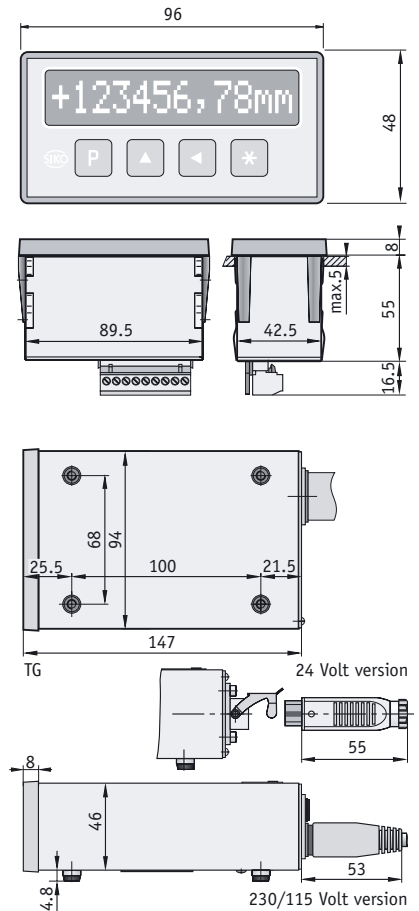
Magnetic Display MA100/2

This display interprets the data of distance and angle measurement captured by the magnetic sensor MS100/1. The display is widely and individually programmable and is also available with integrated power pack and bench-top housing.



Features:

- high-contrast 12-digit LCD, dot matrix
- integrated translation module for length and angle measurement
- Resolution max. 1 μm , precision class 10 μm
- incremental/ reset function
- input for reference switch
- direct input of reference/ offset value
- serial RS232/ RS485 interface as an option



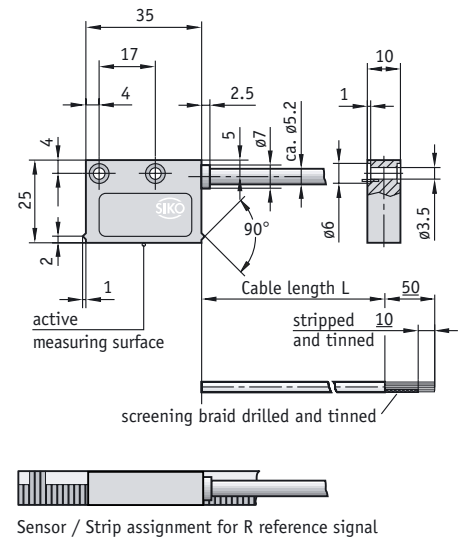
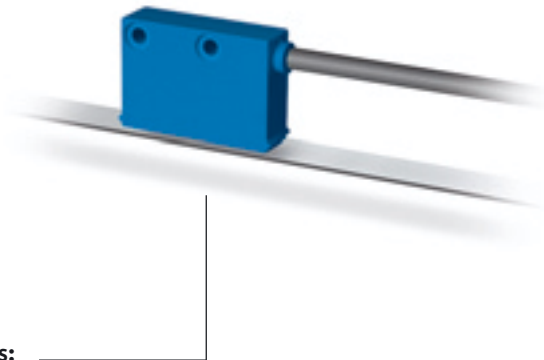
Feature	Ordering data	Technical data	Additional information
Design	EG	panel-mount housing, cutout 92 x 45 mm	standard, Noryl GFN 2 SE 1, as snap-in module
	TG	bench top housing	aluminium profile, black anodized
Operating voltage	4	24 V DC $\pm 20\%$	standard
	1	230 V AC $\pm 10\%$	
	2	115 V AC $\pm 10\%$	
Reference connection	RM	with connection	standard
	RO	without (only bench-top housing)	
Interface/ protocol	XX/XX	without	standard
	S1/00	RS232 with standard protocol	
	S3/00	RS485 with standard protocol	
Switching output	S0	without	standard
	SM	with	only for XX/XX interface
Display/ display range		12-digit LCD dot matrix	-9 999 999 ... 9 999 999 + sign + units
Connection		sensor pluggable: Mini-DIN	supply: 9-pin screwed terminal strip (EG)
Travel speed		max. 5 m/s (of the magnetic sensor)	with 0.1 – 0.4 mm strip/ sensor gap
Resolution		in mm 0.001/ 0.01/ 0.1/ 1/ 10	in inch 0.001/ 0.01/ 0.1/ 1
Repeat accuracy		± 1 digit	
System accuracy		$\pm(0.01 + 0.01 \times L)$ mm [L in m]	at $T_U = 20^\circ\text{C}$; for magnetic strip type MB100 (10 μm precision)
Protection class/ Test mark		3, according to IEC 801	CE
Signal input		reference switch	
Temperature ranges		working temperature: 0 ... $+50^\circ\text{C}$	storage temperature: $-20 \dots +80^\circ\text{C}$
Type of protection		IP 40 acc. to DIN 40050 for whole unit	IP 60 acc. to DIN 40050 for control panel inclusion
Humidity		95% rH	condensation not permitted

Your order:

MA100/2 - - - - -

Magnetic Sensor MSK100

Contactless measuring sensor unit with integrated translation module and digital signal output.
In combination with the MB 100 magnetic strip, the magnetic sensor forms an open, robust and linear measuring system.



Sensor / Strip assignment for R reference signal

Features:

- easy mounting
- insensitive to dust, shavings, humidity
- max. resolution 1 μm
- system accuracy $\pm 0.01 \text{ mm}$
- real-time data processing
- protection class IP67
- resolution/pulse interval set by manufacturer

Resolution	Travel speed v_{max} [m/s]			
	0.3	0.6	1.3	2.7
1	0.3	0.6	1.3	2.7
2	0.6	1.3	2.9	5
5	1.8	3.6	5	5
Pulse interval [μs]	2	1	0.5	0.25

The travel speed results from the selected pulse interval and the corresponding resolution.

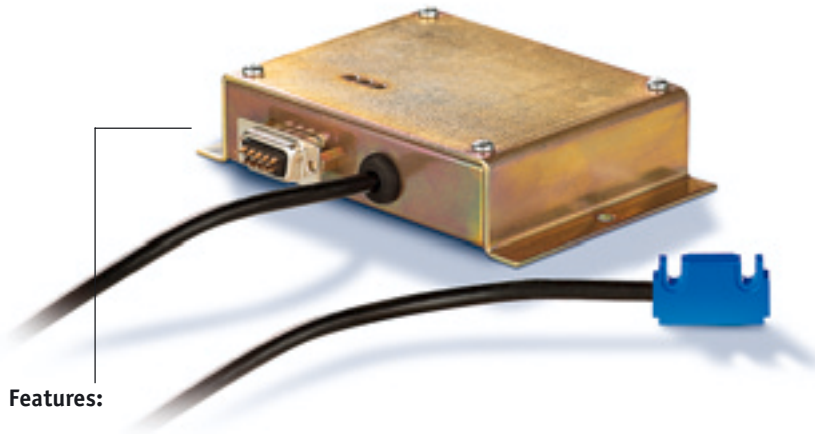
Feature	Ordering data	Technical data	Additional information
Operating voltage	4	24 V DC $\pm 20 \%$	standard, with polarity protection
	5	5 V DC $\pm 5 \%$	
Connection	E1	flying leads	standard
	E6, E8	E6, circular plug	E8, D-SUB 9-pin
Cable length	2.0	2.0 m	standard, max. 20 m
Reference signal	0	without	standard
	I	index periodical	
	R	fixed, digital reference signal	
Resolution	1	1 μm	standard, option 2/ 5
Pulse interval	1	1 μs	standard, option 2/ 0.5/ 0.25
Power consumption		max. 70 mA	@ 24 V DC unloaded
Output circuit		LD	line driver RS422
Output signals		A, / A, B, / B, I, / I, R, / R	square signal
Gap magnetic strip/ sensor		0.1 – 0.4 mm, reference signal R < 0.2 mm	without cover strip
Parallel offset sensor/ strip		$\pm 0.5 \text{ mm}$	angle offset $\pm 3^\circ$ ($\pm 1^\circ$ with R)
System accuracy		$\pm(0.01 + 0.01 \times L) \text{ mm}$ [L in m]	repeat accuracy ± 1 increment (MB100 with 10 μm)
Travel speed		see table	depending on resolution and pulse interval
Interference protection class		3, according to IEC 801	humidity: 100 % rH, condensation permissible
Temperature ranges		working temperature: $-10 \dots +70 \text{ }^\circ\text{C}$	storage temperature: $-30 \dots +80 \text{ }^\circ\text{C}$
Protection class		IP67 according to DIN 40050 (housing)	test mark CE
Housing/ Cable		blue plastic/ PUR	

Note: The internal translation module can generate rapid counting pulses whose length is limited by the pulse interval. The follower electronics must be adjusted accordingly. If necessary select the pulse interval in advance. For supply voltage 4, it is necessary to use a terminating resistor of $\geq 470 \text{ Ohm}$ to prevent thermal stress.

Your order: - - - - - -

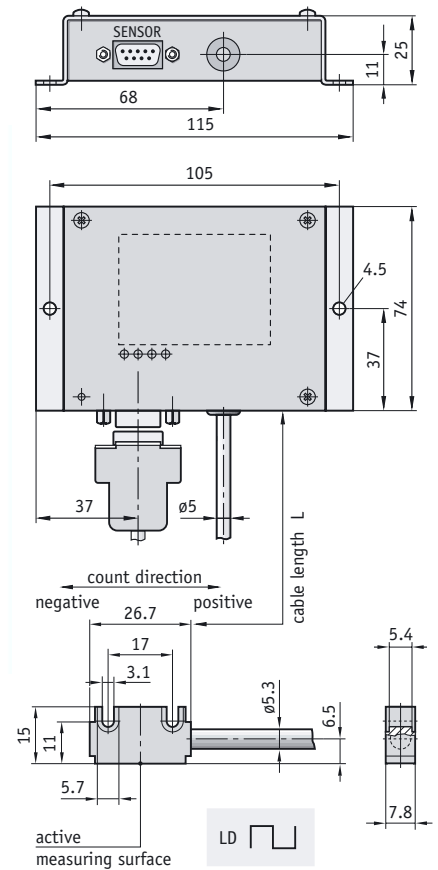
Translation Module AS100

High-resolution electronics with integral magnetic sensor. AS100 provides digital square signals with resolutions up to 1 μm after pulse quadruplication in the follower electronics.



Features:

- complete unit with sensor
- resolution up to 1 μm (digital)
- real-time data processing
- magnetic strip MB100
- periodical index



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Feature	Ordering data	Technical data	Additional information
Supply voltage	4	24 V DC $\pm 20\%$	standard
	5	5 V DC $\pm 5\%$	
Sensor type	L	typ L, varnished aluminium, blue color	standard
	B		
Cable length	...	to be indicated in meter, in steps of 1.0 m	2.0 m standard (available up to 10 m)
Cable sheath	PVC	oil-resistant	standard
	PUR		
Output circuit	LD	line-driver	standard (according to RS 422 A)
Resolution	1/ 2/ 5/ 10	1 μm , 2 μm , 5 μm , 10 μm	after pulse quadruplication (programmable), 1 μm = standard
Power consumption		< 120 mA	with polarity protection at 24 V DC
Output signals		A, /A, B, /B, I, /I	quadrature signal
Gap strip/ sensor		0.1 - 0.4 mm	over whole measuring length, without cover strip
System accuracy		$\pm(0.01 + 0.01 \times L)$ mm [L in m]	repeat accuracy ± 1 increment (MB100 with 10 μm)
Travel speed		max. 5 m/s (of the magnetic sensor)	
Interference protection class		3 according to IEC 801	
Temperature ranges		working temperature 0 ... +50 °C	storage temperature -20 ... +70 °C
Protection class		IP 40, sensor head IP 67	test mark CE
Housing		steel sheet	electrolytically zinc-plated
Connection		9-pole D-SUB	
Humidity		max. 98 % rH	condensation not permitted
Weight		approx. 400 g	total weight

Your order:

AS100



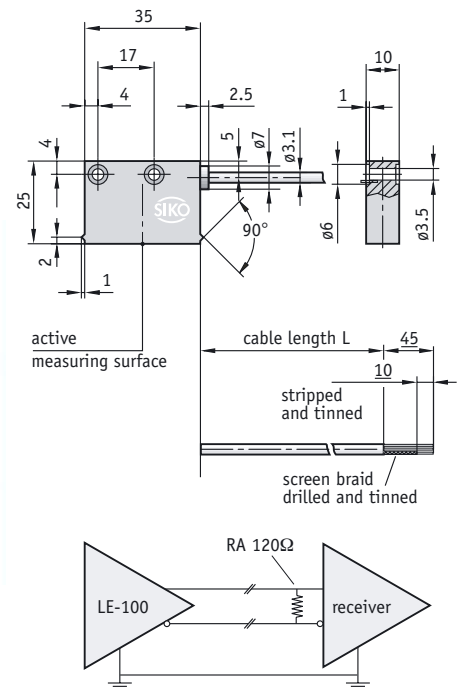
Linear Encoder LE100

Contactlessly measuring scanning unit with integrated analog signal output (sine 1 V_{ss}). Together with the magnetic scale MB100 and a follower interpolation electronics unit, the LE100 forms an open linear measuring system.



Features:

- easy mounting
- insensitive to dust, shavings, humidity
- signal period 1000 µm (analog)
- output signals 1 V_{ss} nominal
- real-time data processing
- scale MB100
- reference track on request



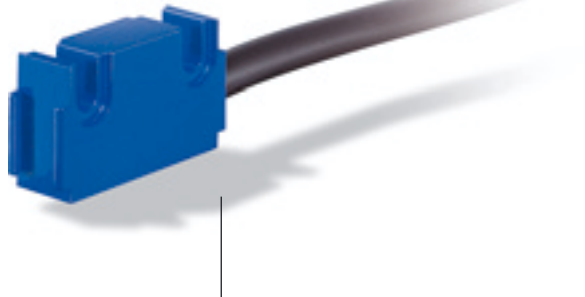
Feature	Ordering data	Technical data	Additional information
Operating voltage	4	24 V DC ±20%	standard, with polarity protection
	5	5 V DC ±5%	
Connection	E1	flying leads	standard
	E6	circular plug	
Cable length	2.0	in meter, available up to max. 20 m	standard, PUR oil-resistant
Reference signal	0	without	standard
	I	digital, period, index signal every 1 mm	RS422 (Line Driver)
	R	fix reference signal analog	see signals illustration in the appendix
Power consumption		approx. 30 mA, unloaded	with polarity protection at operating voltage 24 V DC
Output signals		Sin, Cos, /Sin, /Cos, I, /I, or R, /R	
Signal amplitude		1 V _{ss} ±10 %	with RA = 120 Ohm up to 1 kOhm
Sine/ Cosine offset		2.5 V ±0.5 %	
Offset		analog reference signal	see signals illustration in the appendix
Counting frequency		< 10 kHz	
Reference signal		digital, periodic: sin 0°/ cos -90°	see signals illustration in the appendix
		analog, fixed: sin 45°/ cos -135°	see signals illustration in the appendix
Real time requirements		real-time signal processing	
Signal period		1000 µm	
Travel speed		max. 10 m/s	with R: 5 m/s
System accuracy		max. 1 % related to dividing period	
Harmonic distortion		< 1%	
Gap strip/ sensor		0.1 - 0.4 mm, reference signal R < 0.2 mm	over whole measuring distance, without cover strip
Parallel sensor/ strip offset		±0.5 mm	angle offset ±3° (±1° with R)
Temperature range		working temperature: -20 ... +70 °C	storage temperature: -20 ... +85 °C
Interference protection class		3, according to IEC 801	test mark CE
Protection class		IP 67	according to DIN VDE 0470
Vibration resistance		[5... 2000 Hz] at 20 g	
Shock resistance		200 g at 11 ms	

Your order:

LE100 - - - -

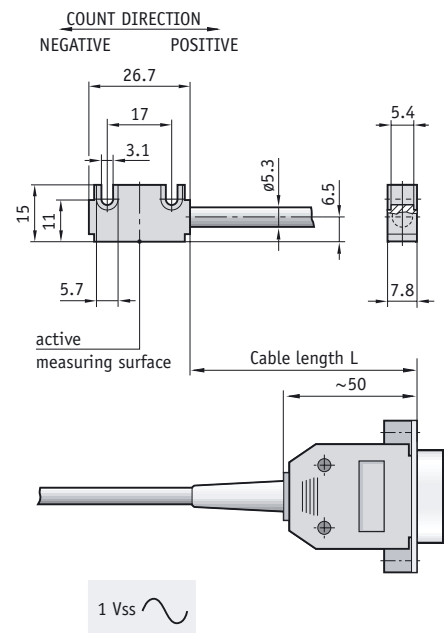
Linear Encoder LS100

Contactlessly measuring scanning unit with integrated analog signal output (sine 1 V_{ss}). Together with the magnetic scale MB100 and a follower interpolation electronics unit, the LS100 forms an open linear measuring system.



Features:

- easy mounting
- insensitive to dust, shavings, humidity
- signal period 1000 µm (analog)
- output signals 1 V_{ss} nominal
- real-time data processing



Feature	Ordering data	Technical data	Additional information
Operating voltage	4	24 V DC ±20 %	standard
	5	5 V DC ±5 %	
Connection	L	cable length L in meter	L=cable length in meter, available up to 10 m; standard 2.0 m 15-pin D-SUB connector
	B		
Cable length	PVC	oil-resistant	standard
	PUR		
Power consumption		approx. 30 mA unloaded	with polarity protection at operating voltage 24 V DC
Output signals		Sin, Cos, /Sin, /Cos	
Signal amplitude		1 V _{ss} ±10 %	with resistor R=120 Ω bis R=1 kΩ
Sine/ Cosine offset		2.5 V ±0.5 %	
Counting frequency		50 kHz	
Real time requirements		real-time signal processing	
Signal period		1000 µm	
Travel speed		max. 20 m/s	
System accuracy		max. 1 % related to dividing period	
Gap strip/ sensor		max. 0.4 mm	over whole measuring distance, without cover strip
Sensor temperature ranges		working temperature: -20 ... +70 °C	storage temperature: -20 ... +85 °C
Plug temperature ranges		working temperature: 0 ... +60 °C	
Interference protection class		3, according to IEC 801	test mark CE
Protection class		IP 67	according to DIN VDE 0470
Vibration resistance		[5... 2000 Hz] at 20 g	
Shock resistance		200 g at 11 ms	
Material of casing		aluminium, blue varnish	

Your order:

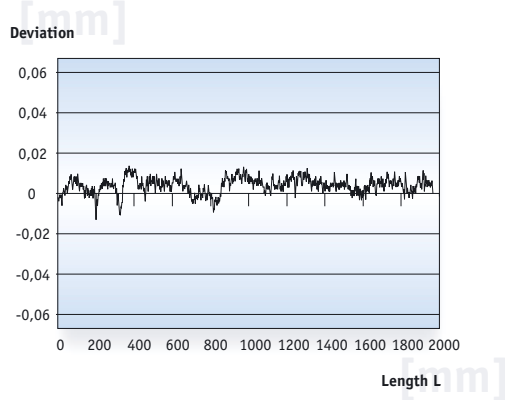
LS100 - - -

Appendix: Accuracy data, Signals illustration

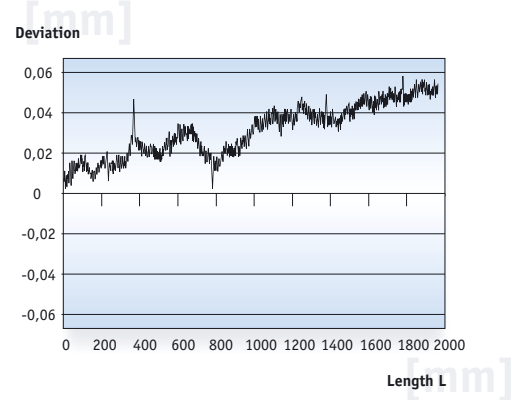
Typical Measuring Curves

Magnetic strip MB100, sensor system MA100/2 with MS100, width of measuring steps 1.1 mm

A Accuracy class: 10 μm



B Accuracy class: 50 μm

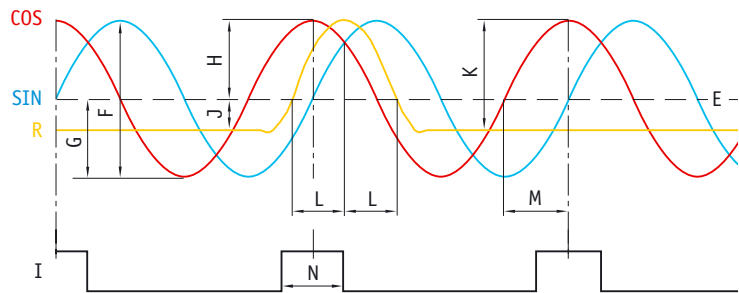


Signals LE100

Note: Signal illustration refers to difference measurement

- E: 0 V ± 20 mV (reference voltage 2.5 V)
- F: 1 Vss ± 10 %
- Relation of G to H: Offset ± 10 mV
- J: ≥ 0.2 V
- K: 0.7 V ± 10 %
- L: 60° ... 80°
- M: 90° $\pm 1.5^\circ$
- N: Pulse width
- N/2 = 20° ... 40°

with index and reference signals

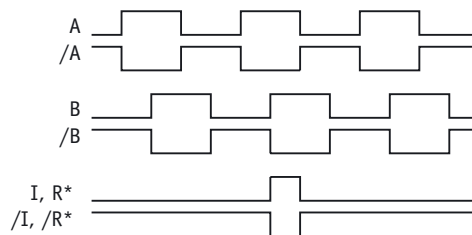


Signals MSK100, AS100

Note: With the MSK100 and AS100, the position of the index signal I/R with regard to signals A and B is not defined. The index signal length is 1 increment with the MSK100, and always 50 μs with the AS100.

* R not with AS100

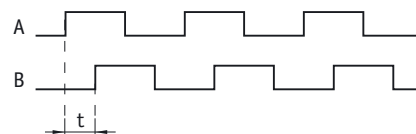
with index, reference signals and inverted signals



Pulse interval MSK100

The pulse distance "t" is the shortest time period which can occur between two signal edges when moving the magnetic sensor. Micro vibration can trigger it for example. It must be made sure that the follower electronics is able to correctly process the signals.

Pulse interval



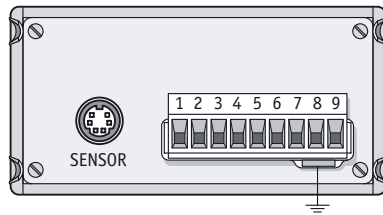
Example: pulse interval $t = 1 \mu\text{s}$

$$\text{input frequency} = \frac{1}{1 \mu\text{s} \cdot 4} = 250 \text{ kHz}$$

The follower electronics must be able to work with 250 kHz.

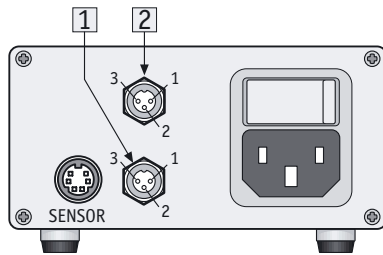
Appendix: Pin outs

MA100/2
Panel snap casing
(EG)



PIN	Terminal strip connections
1	RESET
2	+UB
3	GND
4	N.C.
5	Interface RS232 RXD
6	Interface RS232 TXD
7	PE
8	N (230/110 V AC), GND (24 V DC)
9	L (230/110 V AC), UB (24 V DC)

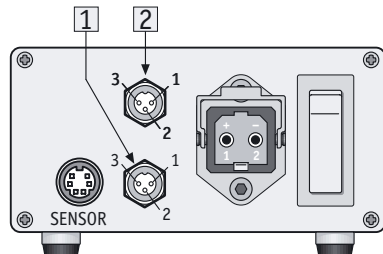
MA100/2
Bench top casing (TG)
230 V / 115 V



1	PIN	Reference switch connections
1	1	RFS
2	2	GND
3	3	+UB

2	PIN	Interface connections	Switching output
1	1	GND	GND
02	02	RXD	A2
03	03	TXD	A1

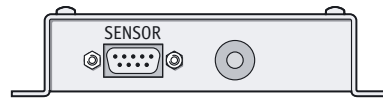
MA100/2
Bench top casing (TG)
24 V



1	PIN	Reference switch connections
1	1	RFS
2	2	GND
3	3	+UB

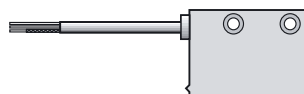
2	PIN	Interface connections	Switching output
1	1	GND	GND
02	02	RXD	A2
03	03	TXD	A1

AS100



PIN	Connection
1	channel A
2	channel /A
3	GND
4	channel B
5	channel /B
6	channel /0
7	channel 0
8	+UB
9	Ready

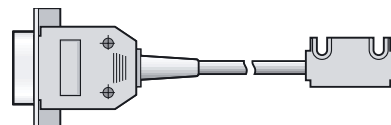
LE100/ MSK100
Connection E1/L



Color	Connection
black	GND
red	channel A
orange	channel /A
yellow	channel B
green	channel /B
brown	+UB

Color	Connection
black	GND
red	Kanal A
yellow	channel /A
orange	channel B
green	channel /B
brown	+UB

LS100



PIN	Connection
2	GND (0V)
5	/ B (COS-)
6	B (COS+)
7	A (SIN+)
8	/ A (SIN-)
10	GND (0V)
12	+UB
14	GND (0V)
1,3,4,9,	N.C.
11,13,15	Nblackblack.C.

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