

EMSC/LMSC 1/3

Magnetic Length Measuring System with Sine/Cosine Outputs



- Magnetic incremental measuring systems in two designs
 - EMSC1/LMSC1: Small sensor with external evaluation electronics
 - EMSC3/LMSC3: Big sensor with integrated evaluation electronics
- With speed proportional 1 Vpp sine/cosine outputs :
 - EMSC: 2 mm measurement movement \cong 1 signal period
 - LMSC: 5 mm measurement movement \cong 1 signal period
- Contactless and wear-free magnetic measuring principle
- Suitable for linear and radial measurement applications
- Power supply voltage 10 ... 30 VDC or 5 VDC
- Quick and easy installation

EMSC/LMSC - Magnetic Linear Measuring System with Sin/Cos Outputs

General:

The series EMSC/LMSC are magnetic length measuring systems with 1 Vpp sine/cosine outputs. The sensor systems and evaluation electronics of the LMSC1 and EMSC1 series are divided in two separate housings. In the larger LMSC3 and EMSC3 sensor designs, both components are integrated in the same housing.

Depending on order information 10 ... 30 VDC or 5 VDC are available as supply voltage.

The magnetic tape required for the measurement is glued onto a flat surface with the supplied adhesive tape.

Depending on the version, a mounting distance of the sensor of max. 0.8 mm (EMSC) resp. max. 2.0 mm (LMSC) to the magnetic tape must be observed.

Magnetic Tape Variants:

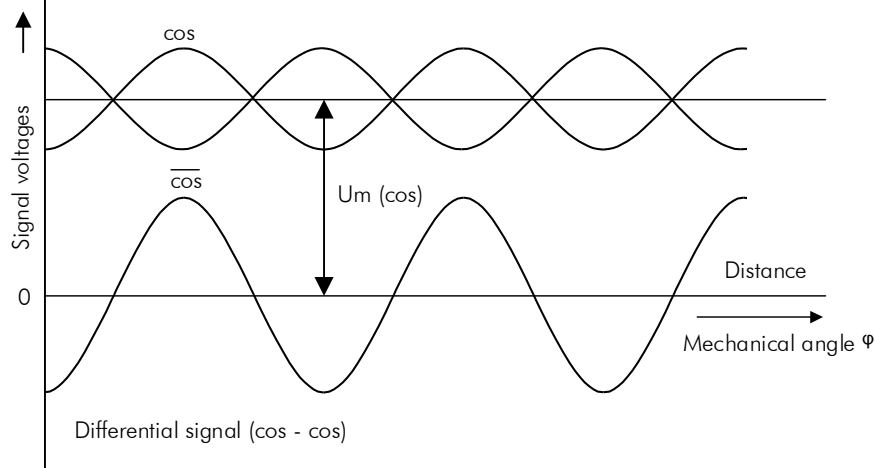
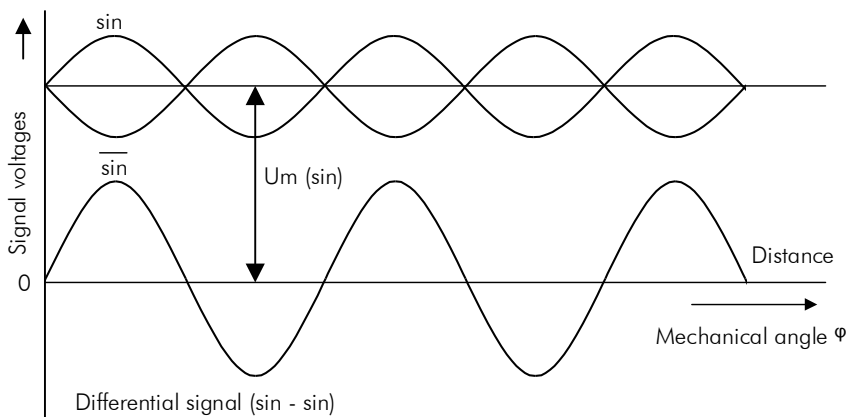
Depending on the selected measuring system (LMSC2 or EMSC2) different ELGO magnetic tapes must be used:

- The LMSC variant uses the ELGO magnetic tape type MB20-50-10-1-R with 5 mm pole pitch.
- For the EMSC, however, the magnetic tape type MB20-20-10-1-R with 2 mm pole pitch must be used. If the interpolation rates are higher than 200 when using the EMSC, we recommend using the high-precision magnetic tape MB20-20-10-1-R-HG, which is available at an extra charge (see also "Accessories" on the last page).

Application Area and Installation:

The mounting of the sensor head is very simple. For this purpose the sensor is equipped with 2 drill holes for M3 screws. The center of the EMSC or LMSC sensor must be aligned with the center of the magnetic tape. The exact installation and mounting tolerances to be observed are described in the corresponding EMSC/LMSC 1/3 operating manual.

Representation of the Waveforms:



Connections:

8-pin (female) M16 round connector

Pin	Color	Function
1	white	GND
2	brown	VCC
3*	green	SIN+
6*	violet	SIN-
5*	black	COS+
8*	grey	COS-
4	-	N.C.
7	-	N.C.
housing	blank	PE

*) Both channel pairs (SIN+ / SIN- and COS+ / COS-) must be terminated with 120 Ω on the customer side

Product Features:

- Speed proportional
- 1 Vpp sine/cosine outputs
- Contactless and wear-free magnetic measuring system
- EMSC: 2 mm \pm 1 signal period
- LMSC: 5 mm \pm 1 signal period
- Maximum distance to the tape: EMSC: 0.8 mm / LMSC: 2 mm
- Two different designs available



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Technical Data:

Mechanical Data

Measuring principle	incremental
Repeat accuracy	depending on evaluation electronics
Syst. accuracy in μm at 20°C (L = measuring length in m)	EMSC: $\pm (20 + 20 \times L)$ LMSC: $\pm (25 + 20 \times L)$
Distance sensor - tape	EMSC: max. 0.8 mm LMSC: max. 2.0 mm
Sensor housing material	zinc die cast
Sensor dimensions (L x W x H)	EMSC1 / LMSC1: 30 x 10 x 15 mm; ext. evaluation box: 72 x 48 x 24 mm EMSC3 / LMSC3: 72 x 48 x 24 mm
Required magnetic tape (accessory, see last page)	LMSC: MB20-50-10-1-R EMSC: MB20-20-10-1-R (for interpolation rates up to 200) or MB20-20-10-1-R-HG (recommended for interpolation rates >200)
Basic pole pitch	EMSC: 2 mm / LMSC: 5 mm
Maximum measuring length	theoretically unlimited
Connections	8-pol. M16 round connector
Sensor cable (EMSC1/LMSC1)	standard length: 1,5 m
Weight (without cable)	EMSC1 / LMSC1: Sensor: approx. 40 g, ext. evaluation box: approx. 150 g; EMSC3 / LMSC3: complete approx. 150 g; cable: approx. 60 g pro Meter

Electrical Data

Power supply voltage	10 ... 30 VDC or 5 VDC
Residual ripple	10 ... 30 VDC : 5 % 5 VDC: ± 25 mV
Current consumption	10 ... 30 VDC: max. 50 mA 5 VDC: max. 120 mA
Output signals	SIN+, COS+, SIN-, COS-
Output levels	1 V _{ss}
Output frequency per channel	EMSC: max. 10 kHz LMSC: max. 4 kHz
Output current per channel	max. 20 mA
Moving distance / Resolution	EMSC: 2 mm \pm 1 signal period LMSC: 5 mm \pm 1 signal period
Operating speed	max. 10 m/s

Environmental Conditions

Storage temperature	-10 ... +70° C
Operation temperature	-25 ... +85° C
Humidity	max. 80 %, non-condensing
Protection class	EMSC1/LMSC1: IP67 / ext. Box: IP40 EMSC3/LMSC3 complete system: IP40

Sine/Cosine Output Signals

Parameter	Designation	min.	typ.	max.	Unit
Medium voltage	U _m (sin), U _m (cos)	2.4	2.5	2.6	V
Amplitude	$\frac{\sin - \overline{\sin}}{\cos - \overline{\cos}}$	400	500	600	mV
Ratio	$\frac{(\sin - \overline{\sin})}{(\cos - \overline{\cos})}$	0.9	1.0	1.1	-
Phase shift	φ	89	90	91	° degrees
Distortion factor	K	-	-	2	%

Type Designation

For orders, please use the following order code:

EMSC1
LMSC1
EMSC3
LMSC3 - $\overline{\text{A}} \overline{\text{A}} \overline{\text{A}} - \overline{\text{B}} \overline{\text{B}} \overline{\text{B}} - \overline{\text{C}} \overline{\text{C}}$

A Version

000 = ELGO standard version
001 = first special version (etc.)

B Cable length (only EMSC1 / LMSC1)*

Example: 01.5 m = 1.5 meters (standard)
With power supply voltage „12“ max. 2.0 m
*) EMSC3 / LMSC3 always without cable
(SKA cable as accessory, see on last page)

C Power Supply Voltage / Output Levels

02 = 10 ... 30 VDC / 1 V_{ss}
12 = 5 VDC / 1 V_{ss}

Order examples:

EMSC1 - 000 - 01.5 - 12
A A A - B B . B - C C

Standard EMSC1 (small sensor / external evaluation box) for MB20-20 with 2 mm pole pitch, with 1.5 m standard cable, 5 VDC power supply and 1 V_{pp} output levels.

LMSC3 - 000 - 00.0 - 02
A A A - B B . B - C C

Standard LMSC3 (big sensor with integrated evaluation electronics) for MB20-50 with 5 mm pole pitch, without signal cable*, with 10 ... 30 VDC power supply and 1 V_{pp} output levels.

*) EMSC3 / LMSC3 is always supplied without signal cable;
Accessorial cable „SKA1-XX.X“ (see on last page)

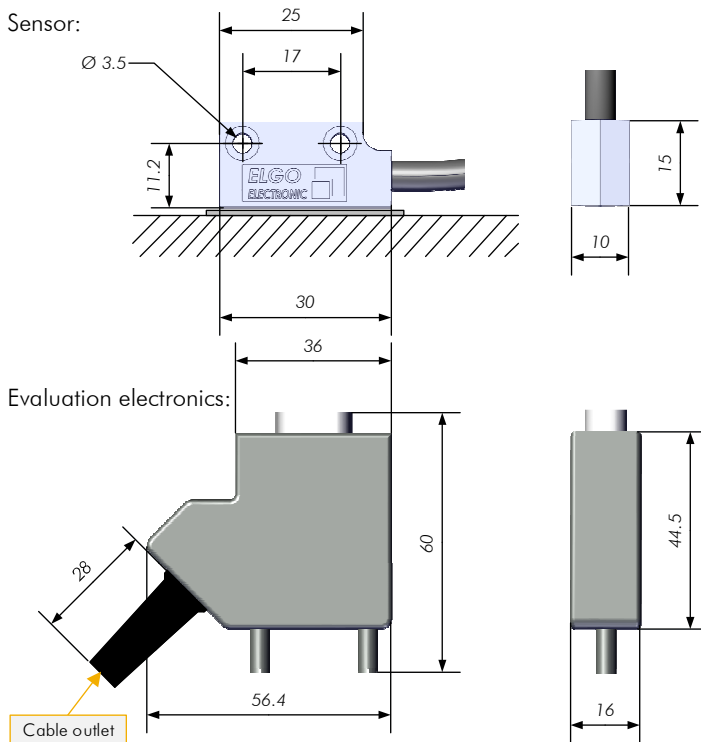
Your order:

EMSC1
LMSC1 - $\overline{\text{A}} \overline{\text{A}} \overline{\text{A}} - \overline{\text{B}} \overline{\text{B}} \overline{\text{B}} - \overline{\text{C}} \overline{\text{C}}$

EMSC3
LMSC3 - $\overline{\text{A}} \overline{\text{A}} \overline{\text{A}} - \overline{\text{B}} \overline{\text{B}} \overline{\text{B}} - \overline{\text{C}} \overline{\text{C}}$

* Accessorial cable „SKA1-XX.X“ (see on last page)

Dimensions EMSC1/LMSC1:

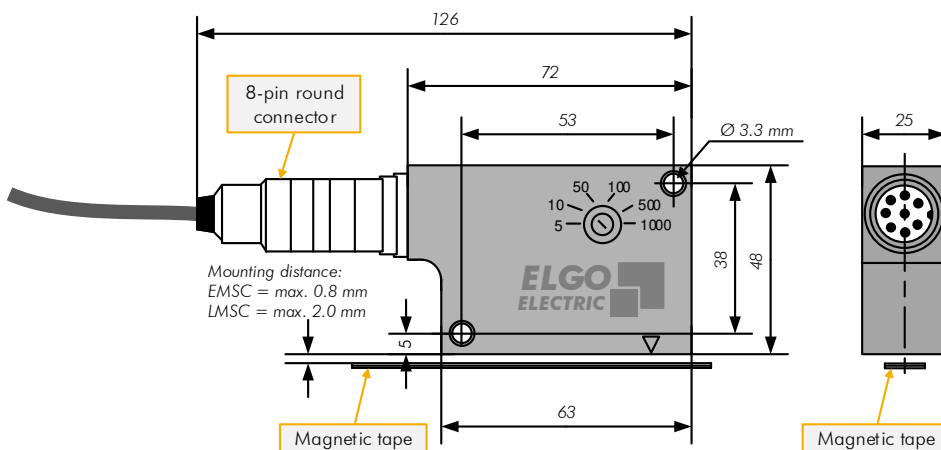


Applications:

- Handlings systems
- Material & storage technology
- Hydraulic press
- Punching machines
- Injection molding machines
- Linear guiding systems
- Linear drive mechanisms
- Pick & Place Systems

Dimensions EMSC3/LMSC3:

Sensor with integrated evaluation electronics:



Accessories:

Order Designation	Description
MB20-20-10-1-R-XX.X*	Magnetic tape with 2 mm pole pitch, suitable for EMSC (recommended for interpolation rates up to 200)
MB20-20-10-1-R-HG-XX.X*	High precision magnetic tape with 2 mm pole pitch, suitable for EMSC (against surcharge, recommended for interpolation rates > 200)
MB20-50-10-1-R-XX.X*	Magnetic tape with 5 mm pole pitch, suitable for LMSC
End cap set 10 mm	End cap set for fixing the magnetic tape
FS-XXXX	Guide rail for magnetic tape (FS-1500 for example corresponds to a rail length of 1.5 m). The rails are available up to 2.0 m length. For larger measuring distances the guide rails can be mounted end-to-end.
SKA1-XX.X*	Signal cable for the EMSC3 and LMSC3 round plug connection *) XX.X = cable length in m (max. 10 m), higher cable lengths on request (depending on the accuracy of the follow-up electronics)
FW2060	Guide carriage for EMSC1 or LMSC1 sensor head
AP1.0	Magnetic tape cover profile (aluminium, length = 1.0 m)

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