

# Series **EMSC2/LMSC2**

Magnetic Length Measuring System with Sine/Cosine Outputs



- Compact incremental measuring system with integrated evaluation circuit and 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
- Suitable for linear and radial measurement applications
- Mounting position horizontal or vertical (with option L)
- Contactless and wear-free measuring principle
- Insensitive against dust, dirt and water
- Quick and easy installation

# EMSC2/LMSC2 - Magnetic Length Measuring System with Sin/Cos Outputs

## General:

The EMSC2/LMSC2 series are incremental magnetic length measuring systems with 1 Vpp sine/cosine outputs. The sensor technology and evaluation electronics are located in a compact housing, which can be mounted horizontally or (if option L is ordered) vertically to the magnetic tape.

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:

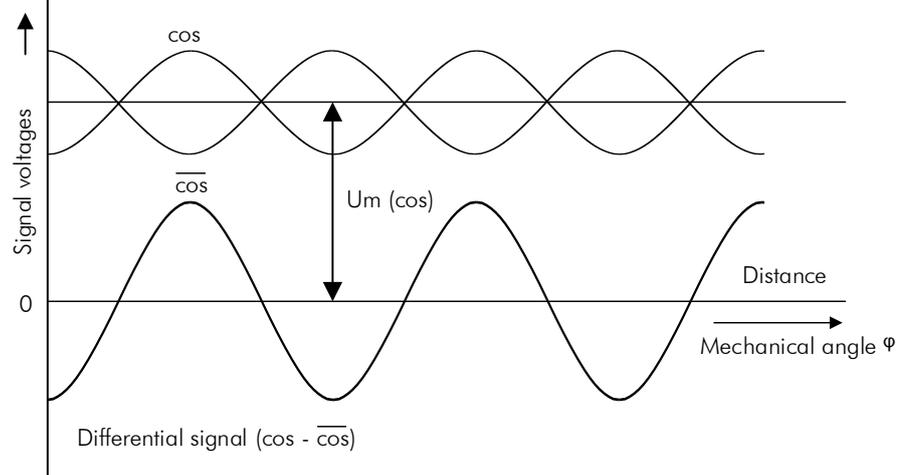
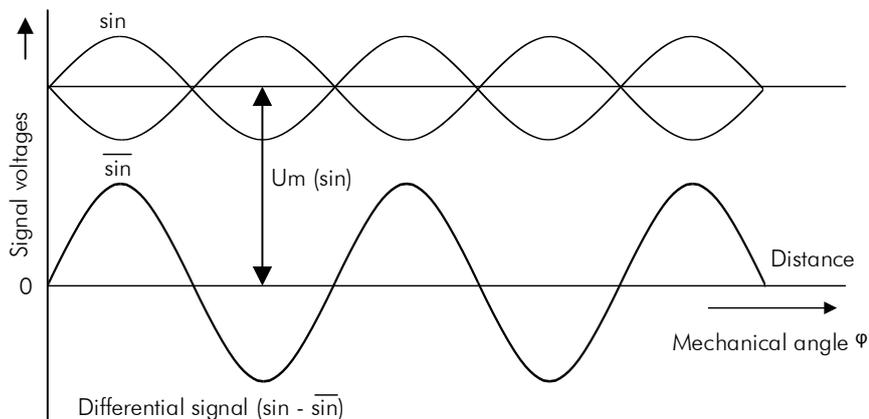
Depending on the selected measuring system (LMSC2 or EMSC2) different ELGO magnetic tapes must be used:

- 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:

Thanks to their compact design, the EMSC2 and LMSC2 sensors can be easily integrated into existing or new constructions. Due to the high IP67 protection class, the sensors are ideally protected against dust, dirt and water. Die Montage The sensor head is mounted quickly and easily via 2 drill holes for M3 screws.

## Representation of the Waveforms:



## Connections:

Open cable ends (standard)

Color	Function
white	0 V / GND
brown	+ 5 VDC / VCC
green*	SIN+
violet*	SIN-
black*	COS+
grey*	COS-
yellow	N.C.
orange	N.C.
blank	PE

9-pin D-SUB (option D1)

Pin	Function
1	0 V / GND
2	+ 5 VDC / VCC
3*	SIN+
6*	SIN-
8*	COS+
9*	COS-
4	N.C.
5	N.C.
7	N.C.
Housing	PE

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

# EMSC2/LMSC2 - Magnetic Length Measuring System with Sin/Cos Outputs

## Technical Data:

Mechanical Data	
Measuring principle	incremental
Repeat accuracy	depending on evaluation electronics
System accuracy in $\mu\text{m}$ at $20^\circ\text{C}$ (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 housing dimensions	L x W x H = 30 x 12.5 x 25 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	standard: open cable ends optional: 9-pin D-SUB connector
Sensor cable length	standard: 1.5 m (others on request)
Weight (approximately)	35 g without cable; cable 60 g/m

Electrical Data	
Power supply voltage	5 VDC $\pm$ 25 mV
Current consumption	max. 120 mA
Output signals	SIN+, COS+, SIN-, COS-
Output levels	1 V <sub>ss</sub>
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 $\cong$ 1 signal period LMSC: 5 mm $\cong$ 1 signal period
Operating speed	max. 10 m/s

Environmental Conditions	
Storage temperature	-25 ... +85° C
Operation temperature	-10 ... +70° C (-25 ... +85° C on request)
Humidity	max. 95 %, non-condensing
Protection class	IP67

Sine/Cosine Output Signals					
Parameter	Designation	min.	typ.	max.	Unit
Medium voltage	U <sub>m</sub> (sin), U <sub>m</sub> (cos)	2.4	2.5	2.6	V
Amplitude	$\frac{\sin - \underline{\sin}}{\cos - \underline{\cos}}$	400	500	600	mV
Ratio	$\frac{(\sin - \underline{\sin})}{(\cos - \underline{\cos})}$	0.9	1.0	1.1	-
Phase shift	$\phi$	89	90	91	° degrees
Distortion factor	K	-	-	2	%

## Type Designation:

For orders please use the following code:

EMSC2  
LMSC2 -  $\overline{\text{A}}\overline{\text{A}}\overline{\text{A}} - \overline{\text{B}}\overline{\text{B}}.\overline{\text{B}} - \overline{\text{C}}\overline{\text{C}} - \overline{\text{D}}\overline{\text{D}}$

### A Version

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

### B Signal Cable Length in XX.X m

01.5 = standard length 1.5 m (others  
on request; max. 2 m available)

### C Power Supply Voltage / Output Levels

12 = 5 VDC supply / 1 V<sub>ss</sub> outputs

### D Options\*

D1 = with 9-pin D-SUB connector  
(ELGO standard assignment)  
L = vertical position  
(sensor chip & mounting position)

\*) Multiple indications possible

## Order examples:

EMSC2 - 000 - 01.5 - 12 - L  
A A A - B B.B - CC - DD

Standard EMSC2 for MB20-20 with 2 mm pole pitch, 1.5 m long standard cable, 5 VDC supply / 1 V<sub>pp</sub> outputs, connections via open cable ends and vertical sensor/mounting position.

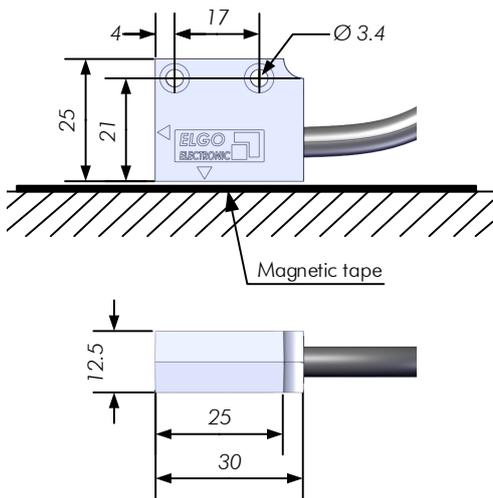
LMSC2 - 000 - 01.5 - 12 - D1  
A A A - B B.B - CC - DD

Standard LMSC2 for MB20-50 with 5 mm pole pitch, 1.5 m long standard cable, 5 VDC supply / 1 V<sub>pp</sub> outputs and connections via a 9-pin D-SUB connector.

## Advantages of EMSC2 / LMSC2:

- Measuring lengths are theoretically unlimited
- Resolution EMSC: 2 mm  $\cong$  1 signal period  
Resolution LMSC: 5 mm  $\cong$  1 signal period
- Suitable for linear & radial applications
- Wear-free and contactless measurement
- Very robust against contamination
- Mounting position horizontal or vertical  
(with option L) possible
- Compact design and easy to install

## Dimensions:

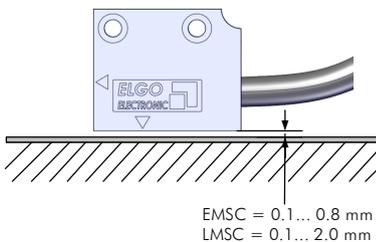


## Applications:

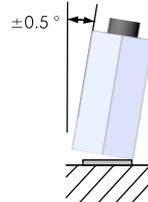
- Handlings systems
- Material & storage technology
- Hydraulic press
- Punching machines
- Injection molding machines
- Linear guiding systems
- Linear drive mechanisms
- Pick & Place Systems

## Mounting Tolerances:

### Sensor distance



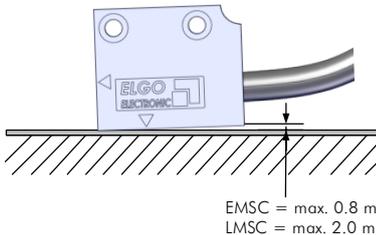
### Pitch (lateral)



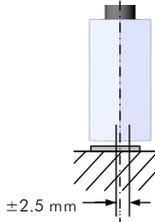
### Yaw angle



### Pitch (longitudinal)



### Offset (lateral)



## Accessories:

Order designation	Description
MB20-20-10-1-R-XX.X*	Magnetic tape with 2 mm pole pitch, suitable for EMSC2 (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 EMSC2 (against surcharge, recommended for interpolation rates > 200)
MB20-50-10-1-R-XX.X*	Magnetic tape with 5 mm pole pitch, suitable for LMSC2
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.
FW2070	Guide carriage for EMSC2/LMSC2
AP1.0	Magnetic tape cover profile (aluminium, length = 1.0 m)

\*) Please indicate the desired measuring length in XX.X meters

