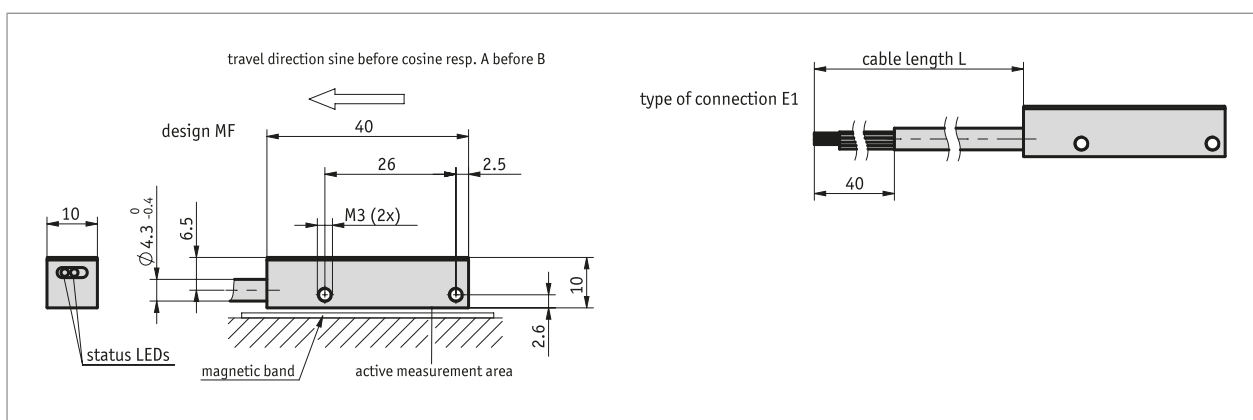


Profile

- Repeat accuracy max. $\pm 1 \mu\text{m}$
- Max. resolution $0.1 \mu\text{m}$ (LD output circuit)
- Reading distance $0.1 \dots 0.8 \text{ mm}$
- Works with MB160 magnetic tape
- Signal period $1600 \mu\text{m}$
- Output circuit sin/cos or LD
- Function and status display LEDs



Mechanical data

Feature	Technical data	Additional information
Housing	zinc die-cast	
Sensor/band reading distance	$0.1 \dots 0.8 \text{ mm}$ $0.1 \dots 0.5 \text{ mm}$ $0.4 \dots 0.6 \text{ mm}$	0, I reference signals R reference signal FR reference signal
Cable sheath	PUR, suitable for drag-chain use	8-core $\varnothing 4.3_{-0.4} \text{ mm}$
Cable bending radius	5x cable diameter 10x cable diameter	static dynamic
Weight	$< 0.03 \text{ kg}$	(without cable), cable 0.028 kg/m

Electrical data

■ Sin/cos output

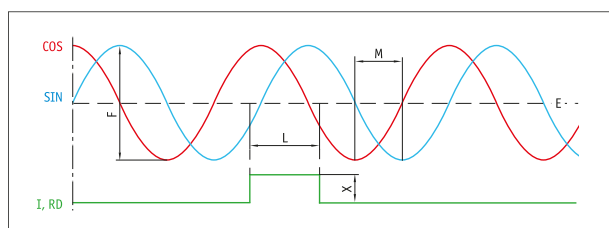
Feature	Technical data	Additional information
Operating voltage	$5 \text{ V DC} \pm 5 \%$	
Current consumption	$< 35 \text{ mA}$ $< 50 \text{ mA}$	unloaded loaded
Status display	2 LEDs, (yellow, green)	
Output signals	sin, /sin, cos, /cos, index, /index	
Output voltage	$1 V_{PP} \pm 10 \%$ at $0 \dots 70 \text{ }^\circ\text{C}$	120Ω terminal resistance
Signal period	$1600 \mu\text{m}$	
Offset voltage	$U_B/2 \pm 100 \text{ mV}$	sine/cosine mean to GND (5 V DC)
Phasing	$90^\circ \pm 1^\circ, \pm 3^\circ$ (20 kHz) 45° 135°	sin/cos sin (reference signal) cos (reference signal)
Pulse width of reference signal	$180^\circ \pm 40^\circ$	
Real-time requirement	speed-proportional signal output	
Type of connection	open cable end	

LD output circuit

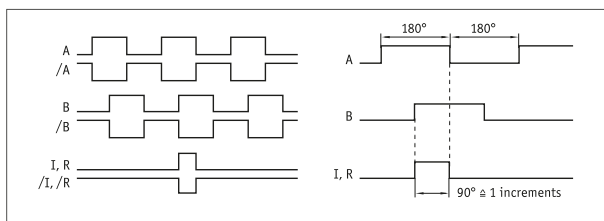
Feature	Technical data	Additional information
Operating voltage	5 V DC $\pm 5\%$	
Current consumption	<50 mA	unloaded
	<120 mA	loaded
Status display	2 LEDs, (yellow, green)	
Output circuit	LD (RS422)	
Output signals	A, /A, B, /B, I, /I, R, /R, FR, /FR	
Output signal level high	>2.5 V	
Output signal level low	<0.5 V	
Latency	1.5 μ s	
Pulse width of reference signal	1, 2, 4 Increment(s)	
Type of connection	open cable end	

Signal pattern, Sin/Cos output

E: reference voltage 2.5 V
 F: $1 V_{SS} \pm 10\%$
 L: $180^\circ \pm 40\%$
 M: $90^\circ \pm 1.0^\circ / \pm 3^\circ$ (25 kHz)
 X: $1 V_{SS}$



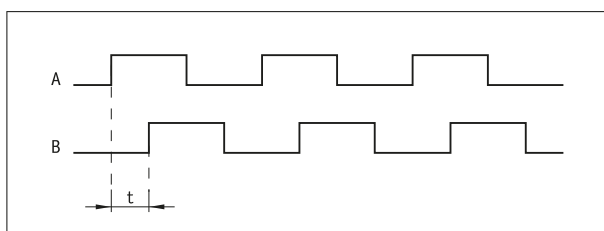
Signal pattern, LD output circuit



! The logic status of signals A and B is not defined regarding the reference signal FR. It may deviate from the signal pattern.

! Reference or index signal with 4 increments (360°) signal length is only valid from the 5th counting step onwards. A corresponding delay should be taken into consideration after switching on the operating voltage.

Pulse interval, LD output circuit



Example: Pulse interval $t = 1 \mu$ s
 (i. e., the downstream unit must be able to process 250 kHz)

$$\text{Formula for counting frequency} = \frac{1}{1 \mu\text{s} \times 4} = 250 \text{ kHz}$$

System data

Feature	Technical data	Additional information
Resolution	0.1, 0.2, 0.5, 1, 2, 5, 10 μ m	LD output circuit
Linearity deviation	$\pm 3 \mu$ m	
Repeat accuracy	$\pm 1 \mu$ m	0.3 mm reading distance
Measuring range	∞	
Travel speed	≤ 25 m/s	sin/cos output, referencing speed ≤ 5 m/s
	≤ 25 m/s	LD output circuit, see table, referencing speed ≤ 5 m/s

Travel speed

	Travel speed Vmax [m/s]						
Resolution [μm]	0.1	0.80	0.40	0.32	0.16	0.08	0.04
	0.2	1.60	0.80	0.64	0.32	0.16	0.08
	0.5	4.00	2.00	1.60	0.80	0.40	0.20
	1	8.00	4.00	3.20	1.60	0.80	0.40
	2	16.00	8.00	6.40	3.20	1.60	0.80
	5	25.00	20.00	16.00	8.00	4.00	2.00
	10	25.00	25.00	25.00	16.00	8.00	4.00
Pulse interval [μs]	0.10	0.20	0.25	0.50	1.00	2.00	
Counting frequency [kHz]	2500.00	1250.00	1000.00	500.00	250.00	125.00	

Ambient conditions

Feature	Technical data	Additional information
Ambient temperature	-40 ... 85 °C	
Storage temperature	-40 ... 85 °C	
Relative humidity	100 %	condensation admissible
EMC	EN 61326-1 EN 61000-6-2	immunity requirement of industry class B emission limit
Protection category	IP60	EN 60529
Shock resistance	≤500 m/s ² , 11 ms	EN 60068-2-27, half-sine, 3 axes (+/-), each 3 shocks
Vibration resistance	≤100 m/s ² , 10 Hz ... 2000 Hz	EN 60068-2-6, 3 axes, each 10 cycles

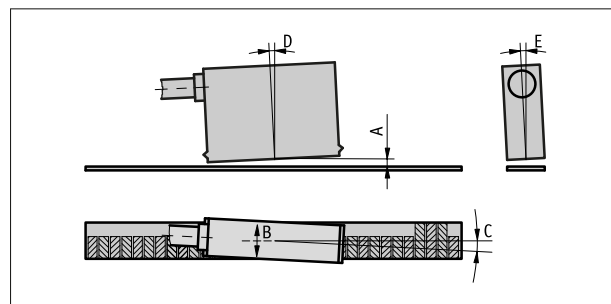
pin assignment

Signal Sin/Cos	"Signal LD"	Cable color
sin	A	red
cos	/A	yellow
FR	FR	blue
+UB	+UB	brown
GND	GND	black
/sin	B	orange
/cos	/B	green
/FR	/FR	violet

Hint for mounting

For systems with reference points on the magnetic tape please take care that sensor and strip are correctly aligned (see picture).

Reference signal	FR	R	O, I
A, Sensor/tape reading distance	0.4 ... 0.6 mm	0.1 ... 0.5 mm	0.1 ... 0.8 mm
B, Lateral offset	±0.5 mm	±0.5 mm	±0.5 mm
C, Alignment error	±3°	±3°	±3°
D, Longitudinal inclination	±1°	±1°	±1°
E, Lateral inclination	±3°	±3°	±3°



Symbolic representation

Order

Ordering information

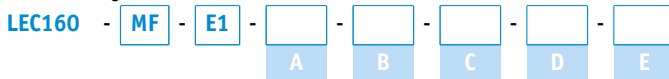
One or more system components are required:
Magnetic tape MB160

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Ordering table

Feature	Ordering data	Spezifikation	Additional information
Cable length	A ...	01.0, 02.0, 03.0 in m	
Output circuit	B 1V _{SS} LD	Sin/Cos, 1 V _{SS} Line Driver	
reference signal	C 0 FR	without flexible reference	
Resolution	D ...	no information required 0.1, 0.2, 0.5, 1, 10, 2, 5 in μm	only with 1V _{SS} output circuit
Pulse interval	E ...	no information required 0.1, 0.2, 0.5 in μs	only with 1V _{SS} output circuit

Order key



	Scope of delivery: LEC160, Quick Start Guide
	Accessories you can find: Flexible reference mark

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