

# Linear measuring technology

<b>Absolute magnetic measurement system sensor head, magnetic</b>	<b>Limes LA10 / BA1</b>	<b>Measuring length max. 8 m Resolution min. 1 µm</b>
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The non-contact absolute magnetic linear measurement system Limes LA10 / BA1 - made up of the sensor head LA10 and of the magnetic band BA1 - reaches a resolution up to 1 µm with a maximum distance of 0.2 mm between the sensor and the band (incl. masking tape).

The additional SinCos interface makes the measurement system LA10 / BA1 the optimal equipment for use in the linear drive technology.



<b>DC</b> 10 ... 30 V	<b>8 m</b> Max. measuring length	<b>0,2 mm</b> Max. distance to measuring tape	<b>10 m/s</b> Max. speed	<b>1 µm</b> High resolution	<b>IP64</b> Protection	<b>Reverse polarity protection</b>	<b>Shock / vibration resistant</b>	<b>-10°...+70°C</b> Temperature range	<b>SinCos</b>
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### Robust and versatile

- High resolution - 1µm / measuring length max. 8 m.
- Non-contact magnetic absolute measuring technology – therefore no wear – no referencing movement required.
- Sturdy housing with IP64 protection.
- For highly dynamic control.
- Optional SinCos signal (1 Vpp) for dynamic movement control with 1 mm pole pitch.
- Masking tape protecting the magnetic band.

### Easy installation

- Simple glued assembly of the magnetic band.
- Requires very little installation space.
- Robust measuring principle – insensitive to dirt, smoke and humidity.

### Order code sensor head Limes LA10

**8.LA10** . **12X2**  
Type                      a b c d

- |  |  |
|--|--|
| <p><b>a Model</b><br/>1 = IP64, standard</p> <p><b>b baud rate</b><br/>2 = standard<br/>(CANopen, 250 k)</p> | <p><b>c Output circuit / Supply voltage</b><br/>1 = SSI, 25 bit Gray-Code / 10 ... 30 V DC<br/>2 = SSI, 25 bit Gray-Code, SinCos 1 Vpp / 10 ... 30 V DC<br/>3 = CANopen, without bus terminating resistor / 10 ... 30 V DC<br/>4 = CANopen, with bus terminating resistor / 10 ... 30 V DC<br/>5 = CANopen, SinCos 1 Vpp, without bus terminating resistor / 10 ... 30 V DC<br/>6 = CANopen, SinCos 1 Vpp, with bus terminating resistor / 10 ... 30 V DC</p> <p><b>d Type of connection</b><br/>2 = standard, M12 connector, 12 pin</p> |
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*Scope of delivery*  
sensor head + spacing template

*Optional on request*  
- other baud rate

### Order code magnetic band Limes BA1

**8.BA1** . **10** . **010** . **XXXX**  
Type                      a                      b

- |                                      |   |   |
|--------------------------------------|---|---|
| <p><b>a Width</b><br/>10 = 10 mm</p> | <p><b>b Length (measuring range = length - 0.1 m)</b><br/>0005 = 0.5 m      0040 = 4 m<br/>0010 = 1 m        0060 = 6 m<br/>0020 = 2 m        0080 = 8 m<br/>0030 = 3 m</p> | <p><i>Optional on request</i><br/>- other lengths</p> |
|--------------------------------------|---|---|

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Accessories		Order no.
<b>SSI display type 570T</b> Position display, 8-digit	with 2 relay outputs and serial interface DC supply voltage	<b>6.570T.010.300</b>
	with 4 fast switch outputs and serial interface AC/DC supply voltage	<b>6.570T.012.E01</b>
	with 4 fast switch outputs, serial interface and scalable analog output AC/DC supply voltage	<b>6.570T.012.E02</b>
	with 4 fast switch outputs and RS485 interface AC/DC supply voltage	<b>6.570T.012.E03</b>
Connection technology		Order no.
<b>Connector, self-assembly (straight)</b>	M12 female connector with coupling nut, 12 pin, A coded	<b>8.0000.5162.0000</b>
<b>Cordset, pre-assembled</b>	M12 female connector with coupling nut, 12 pin, 5 m [16.4'] PUR cable 6 x 2 x 0.14 mm <sup>2</sup> [AWG 26]	<b>05.00.60B1.B211.005M</b>
<b>Unprepared cable, cut to length</b>	6 x 2 x 0.14 mm <sup>2</sup> [AWG 26] PVC cable	<b>8.0000.6900.XXXX</b> <sup>1)</sup>
	6 x 2 x 0.14 mm <sup>2</sup> [AWG 26] PUR cable	<b>8.0000.6Y00.XXXX</b> <sup>1)</sup>
	5 x 2 x 0.14 mm <sup>2</sup> [AWG 26] PVC cable	<b>8.0000.6Z00.XXXX</b> <sup>1)</sup>

Further accessories can be found in the accessories section or in the accessories area of our website at: [www.kuebler.com/accessories](http://www.kuebler.com/accessories).  
Additional connectors can be found in the connection technology section or in the connection technology area of our website at: [www.kuebler.com/connection\\_technology](http://www.kuebler.com/connection_technology).

## Technical data

Mechanical characteristics	
<b>Weight</b>	approx. 0.1 kg [3.53 oz]
<b>Working temperature</b>	-10 °C ... +70 °C [+14 °F ... +158 °F] (non condensing)
<b>Storage temperature</b>	-25 °C ... +85 °C [-13 °F ... +185 °F]
<b>Protection acc. to EN 60529</b>	IP64
<b>Housing</b>	aluminum
<b>Max. traverse speed</b>	SinCos reading 10 m/s
	permanent absolute positions reading 1 m/s
<b>Shock resistance acc. to EN 60068-2-27</b>	5000 m/s <sup>2</sup> , 1 ms
<b>Vibration resistance acc. to EN 60068-2-6</b>	300 m/s <sup>2</sup> , 10 ... 2000 Hz
<b>Distance sensor head / magnetic band</b>	0.01 ... 0.2 mm incl. masking tape (recommended 0.2 mm)
<b>Measuring length</b>	max. 8 m
<b>Type of connection (standard)</b>	M12 connector, 12 pin

Electrical characteristics	
<b>Supply voltage</b>	10 ... 30 V DC ±10%
<b>Residual ripple</b>	< 10 %
<b>Current consumption</b>	max. 150 mA
<b>Reverse polarity protection</b>	yes
<b>Short circuit proof</b>	yes

Accuracy	
<b>Measuring principle</b>	absolute + incremental (option)
<b>System accuracy at 20 °C [+68 °F]</b>	max. ± (10 + 20 x L) µm L = measuring length in meters
<b>Repeat accuracy</b>	±1 increment
<b>Resolution</b>	0.001 mm
<b>LED, red</b>	lights up when distance too large

SSI interface	
<b>Output driver</b>	RS485 transceiver type
<b>Permissible load / channel</b>	max. ±20 mA
<b>Signal level</b>	HIGH typ. 3.8 V LOW at I <sub>Load</sub> = 20 mA typ. 1.3 V
<b>Clock rate</b>	25 bit (24 + 1 failurebit for distance)
<b>Code</b>	Gray
<b>SSI clock rate</b>	80 kHz ... 0.4 MHz
<b>Monoflop time</b>	≤ 40 µs
<b>Data refresh rate</b>	≤ 250 µs

CANopen interface	
<b>Interface</b>	CAN High-Speed acc. to ISO 11898, Basic and Full CAN, CAN specification 2.0 B
<b>Protocol</b>	CANopen
<b>Baud rate</b>	standard 250 kbit/s on request other baud rate (125 ... 1000 kbit/s)
<b>Termination</b>	selectable via order code
<b>Node address</b>	1 (standard); others on request

Option SinCos interface	
<b>Max. frequency -3dB</b>	400 kHz
<b>Signal level</b>	1 V <sub>pp</sub> (±10%)
<b>Short circuit proof</b>	yes
<b>Pulse rate</b>	1 SinCos per 1 mm pole

Approvals	
<b>CE compliant in accordance with</b>	
EMC Directive	2014/30/EU
RoHS Directive	2011/65/EU

1) XXXX = cable length in meters (e.g. 10 m = 0010).

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Magnetic band Limes BA1	
<b>Pole gap</b>	basic pole pitch 1 mm
<b>Dimensions</b>	width 10 mm
	thickness 1.97 mm incl. masking tape
<b>Relative linear expansion</b>	$\Delta L = L \times \alpha \times \Delta \delta$  L = measuring length in meters $\alpha = 16 \times 10^{-6} 1/K$ temperature coefficient $\Delta \delta$ = relative temperature change based on 20 °C [+68 °F] in °K

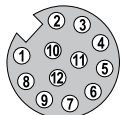
<b>Working temperature</b>	-20 °C ... +80 °C [-4 °F ... +176 °F] <sup>1)</sup>
<b>Mounting</b>	adhesive joint
<b>Additional length</b>	100 mm in order to obtain an optimal measuring result, the magnetic band should be about 0.1 m longer than the required measuring length
<b>Min. bending radius for storage</b>	≥ 150 mm
<b>Material metal tape</b>	precision steel strip 1.4404 acc. to EN 10088-3

## Terminal assignment

<i>Output circuit</i>	Type of connection	M12 connector, 12 pin													
1	2	Signal:	0 V	+V	C+	C-	D+	D-	-	-	-	-	-	-	-
		Pin:	1	2	3	4	5	6	7	8	9	10	11	12	
<i>Output circuit</i>	Type of connection	M12 connector, 12 pin													
2	2	Signal:	0 V	+V	C+	C-	D+	D-	A	$\bar{A}$	B	$\bar{B}$	-	-	
		Pin:	1	2	3	4	5	6	7	8	9	10	11	12	
<i>Output circuit</i>	Type of connection	M12 connector, 12 pin													
3, 4	2	Signal:	0 V	+V	CAN_L	CAN_H	-	-	-	-	-	-	-	-	
		Pin:	1	2	3	4	5	6	7	8	9	10	11	12	
<i>Output circuit</i>	Type of connection	M12 connector, 12 pin													
5, 6	2	Signal:	0 V	+V	CAN_L	CAN_H	-	-	A	$\bar{A}$	B	$\bar{B}$	-	-	
		Pin:	1	2	3	4	5	6	7	8	9	10	11	12	

- +V: Supply voltage encoder +V DC
- 0 V: Supply voltage encoder ground GND (0 V)
- C+, C-: Clock signal
- D+, D-: Data signal
- A,  $\bar{A}$ : Cosine signal
- B,  $\bar{B}$ : Sine signal

Connection cable color assignment with M12 female connector	Connection cable with M12 connector, 12 pin (accessory) – for example 05.00.60B1.B211.005M												
	Core color:	WH	BN	GN	YE	GY	PK	BU	RD	BK	VT	GY/PK	RD/BU
	Pin:	1	2	3	4	5	6	7	8	9	10	11	12



1) Magnetic band (ends) attached by screwing, clamping or equivalent.

# Linear measuring technology

**Absolute magnetic measurement system  
sensor head, magnetic band**

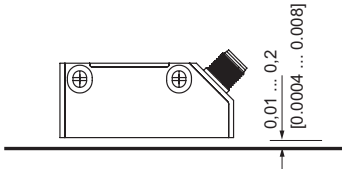
**Limes LA10 / BA1**

**Measuring length max. 8 m  
Resolution min. 1 µm**

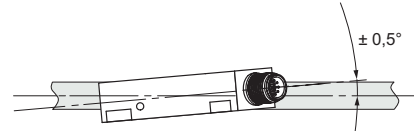
## Permissible mounting tolerances

Dimensions in mm [inch]

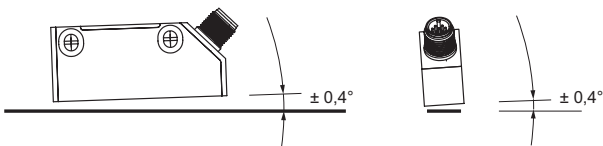
Distance sensor head / magnetic band (incl. masking tape)



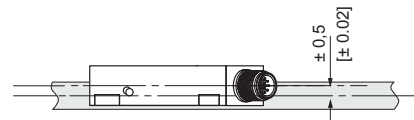
Torsion



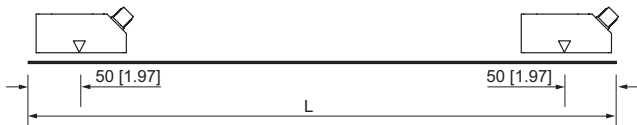
Tilting



Offset



Measuring range



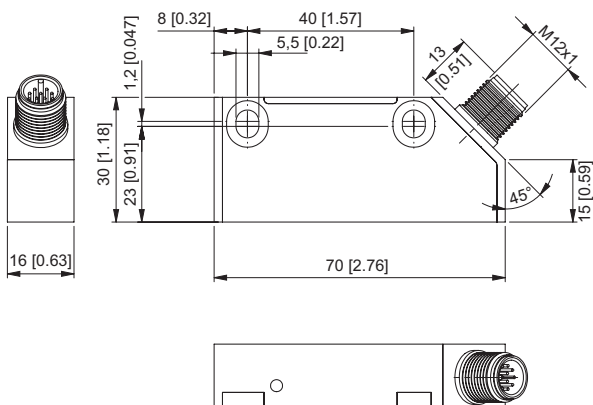
Observe mounting direction



## Dimensions

Dimensions in mm [inch]

**Sensor head Limes LA10**



**Magnetic band Limes BA1**

- 1 Length L, max. 8 m
- 2 Masking tape
- 3 Magnetic band

