Magnetic measurement system | Limes LI20 / B1 | Resolution min. 10 µm

The incremental magnetic linear measurement system LI20 / B1 - made up of the sensor head LI20 and of the magnetic band B1 - reaches a resolution up to 10 µm with a maximum distance of 1 mm between the sensor and the band.

Temperature | High IP value | Shock / vibration resistant | Reverse polarity protection

Robust

- Sturdy housing with IP67 protection
- Non-contact measuring technology – thus no wear
- Masking tape protecting the magnetic band

Easy installation

- Simple glued assembly of the magnetic band
- Large mounting tolerances
- Warning signals via LED if the magnetic field is too weak

Order code Magnetic sensor Limes LI20

8.LI20	.	1	1	X	1	.	2	XXX
Type		a	b	c	d		e	f

a *Model*
1 = Standard

b *Pulse edge interval*
1 = Standard

c *Output circuit / Power supply*
1 = RS422 / 4.8 ... 26 V DC
2 = Push-Pull / 4.8 ... 30 V DC

d *Type of connection*
1 = cable PUR, 2 m length

e *Reference signal*
2 = index periodic

f *Code (resolution)* [1)]
005 = 100 µm
020 = 25 µm
050 = 10 µm

Standard stock types:
8.LI20.1111.2005
8.LI20.1111.2020
8.LI20.1111.2050
8.LI20.1121.2005
8.LI20.1121.2020
8.LI20.1121.2050

Order code Magnetic band Limes B1

8.B1	.	10	.	010	.	XXXX
Type		a				b

a *Width*
10 = 10 mm

b *Length*
0010 = 1 m
0020 = 2 m
0040 = 4 m
0050 = 5 m
0060 = 6 m
0100 = 10 m
0200 = 20 m
Other lengths up to 50 m on request

Standard stock types:
8.B1.10.010.0010
8.B1.10.010.0020
8.B1.10.010.0050
8.B1.10.010.0100

1) With quadruple evaluation (only connected with magnetic band Limes B1)

Magnetic measurement system | Limes LI20 / B1 | Resolution min. 10 µm

Display Type 572 for LIMES LI20

Counter series for demanding applications, with two individually scalable encoder inputs. HTL or TTL in each case A, A, B, B for count frequencies up to 1 MHz per channel. Operating modes can be selected for position or event counter, total counter, difference counter, cut-to-length display, diameter calculator, batch counter and more.

- 2 separate freely scalable count inputs - HTL or TTL; also with inverted inputs
- Max. input frequency 1 MHz/ channel (at TTL-input)
- 4 freely programmable fast solid-state outputs, each with 350 mA output current
- Step or tracking preset
- AC and DC supply voltage
- Can be used as a counter or position display with limit values
- Monitoring function, where 2 values are monitored or calculated with respect to each other
- 4 fast programmable inputs with various functions such as reset, gate, display memory, reference input or switching between the display values.
- Optional scalable analogue output 0/4 ... 20 mA, +/-10 V or 0 ... 10 V
- 2 auxiliary power supplies for sensors: 5.2 V DC and 24 V DC
- Standard interface RS 232

Position display, 6-digit with 4 fast switch outputs and serial interface:	**6.572.0116.D05**
with 4 fast switch outputs and serial interface and scalable analogue output	**6.572.0116.D95**
Position display, 8-digit with 4 fast switch outputs and serial interface:	**6.572.0118.D05**
with 4 fast switch outputs and serial interface and scalable analogue output	**6.572.0118.D95**

Technical data – Magnetic sensor Limes LI20

Output circuit	Push-Pull	RS422
Supply voltage	4.8 ... 30 V DC	4.8 ... 26 V DC
Permissible load / channel	±20 mA	120 Ohm
Max cable length	max. 30 m	RS422 Standard
Power consumption (no load)	typ. 25 mA, max. 60 mA	
Short circuit proof [1]	yes	yes [2]
Min. pulse edge interval	1 µs (edge interval) corresponds to 4 ms/cycle (see signal figures below)	
Output signal	A, $\overline{A}$, B, $\overline{B}$, I, $\overline{I}$	
Reference signal	index periodical	

Accuracy

System Accuracy:	typ. +200 µm, max. ± (0.04 + 0.04 x L) mm, (L in [m], up to L = 50 m, at T = 20°C)
Repeat accuracy	±1 increment
Resolution and speed [3]	100 µm (quadruple), max. 25 m/s 25 µm (quadruple), max. 4 m/s 10 µm (quadruple), max. 6.5 m/s

Permissible alignment tolerance (see draft „Mounting tolerances“)

Gap sensor / magnetic band	0.1 ... 1.0 mm (recommended 0.4 mm)
Offset	max. ±1 mm
Tilting	max. 3°
Torsion	max. 3°

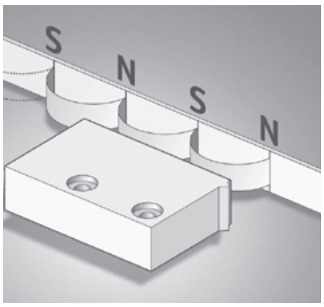
General data

Working temperature	-20°C ... +80°C
Shock resistance	500 g/1 ms
Vibration strength	30 g/10 ... 2000 Hz
Protection	IP67 acc. to DIN 60 529 (housing)
Humidity	100 %, condensation possible
Housing	Zinc die-cast
Cable	2 m long, PUR 8 x 0.14 mm², shielded, may be used in trailing cable installations
Status LED Green	pulse-index
Red	Error; Speed too high or magnetic fields too weak (8.LI20.XXXX.X020 and 8.LI20.XXXX.X050)
CE compliant acc. to	EN 61 000-6-2, EN 61 000-6-4 and EN 61 000-6-3
RoHS compliant acc. to	EG guideline 2002/95/EG

Technical data – Magnetic band Limes B1

Pole gap	2 mm from pole to pole
Dimensions	width: 10 mm, Thickness: 1.7 mm incl. masking tape
Temperature coefficient	(11 ±1) x 10^{-6}/K
Working temperature	-20°C ... +80°C
Storage temperature	-40°C ... +80°C
Mounting	adhesive joint
Measuring	0.1 m (to receive an optimal result of measurement, the magnetic band should be ca. 0.1 m longer than the desired measuring length)
Bending radius	≥ 50 mm

Function principle

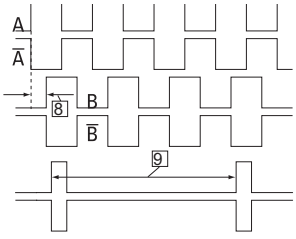


Signal figures

For a rotation of the magnetic ring in the CW direction (see the Mounting Tolerances drawing)

9 Periodic index signal (every 2 mm); the logical assignment A, B and I-Signal can change

8 Pulse edge interval: Pay attention to the instructions in the technical data



1) If supply voltage correctly applied
2) Only one channel allowed to be shorted-out
If U_B = 5 V, short-circuit to channel, 0 V, or +U_B is permitted
If U_B = 5 ... 30 V, short-circuit to channel or 0 V is permitted
3) At the listed rotational speed the min. pulse edge interval is 1 µs, this corresponds to 250 kHz. For the max. rotational speed range a counter with a count input frequency of not less then 250 kHz should be provided.

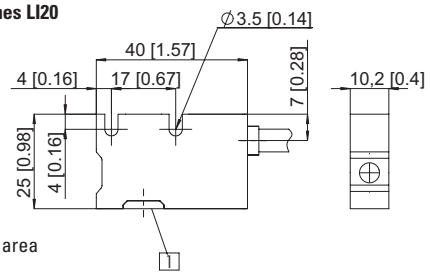
Magnetic measurement system | Limes LI20 / B1 | Resolution min. 10 µm

Terminal assignment

Signal	0 V GND	U_B	A	$\overline{A}$	B	$\overline{B}$	I	$\overline{I}$	shield
Cable colour	WH	BN	GN	YE	GY	PK	BU	RD	shield is on the housing

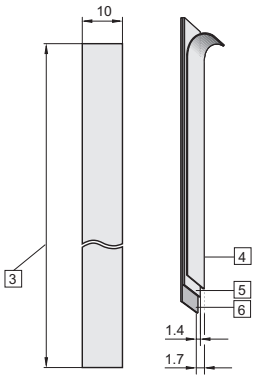
Dimensions

Magnetic sensor Limes LI20



1 active measuring area

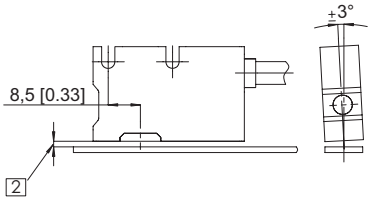
Magnetic band Limes B1



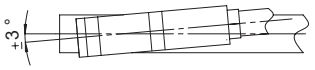
3 length L, max. 50 m
4 masking tape
5 magnetic band
6 carrier band

Permissible Mounting tolerances

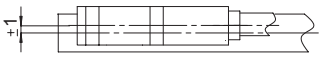
Tilting



Torsion



Offset



2 Distance Sensor / Magnetic band:
0.1 ... 1.0 mm (0.4 mm recommended)

Magnetic measurement system | Limes LI50 / B2 | Resolution min. 5 µm

The incremental magnetic linear measurement system LI50 / B2 - made up of the sensor head LI50 and of the magnetic band B2 - reaches a resolution up to 5 µm with a maximum distance of 2 mm between the sensor and the band.

Temperature

High IP value


Shock / vibration resistant


Reverse polarity protection

Robust

- Sturdy housing with IP67 protection
- Non-contact measuring technology – thus no wear
- Masking tape protecting the magnetic band

Easy installation

- Simple glued assembly of the magnetic tape
- Large mounting tolerances
- Warning signals via Status LED if the magnetic field is too weak

Order code Magnetic sensor Limes LI50

8.LI50	.	1	1	X	1	.	2	XXX
Type		a	b	c	d		e	f

a *Model*
1 = Standard

b *Pulse edge interval*
1 = Standard

c *Output circuit / Power supply*
1 = RS422 / 4.8 ... 26 V DC
2 = Push-Pull / 4.8 ... 30 V DC

d *Type of connection*
1 = cable PUR, 2 m length

e *Reference signal*
2 = index periodic

f *Code (resolution)* [1)]
050 = 25 µm
250 = 5 µm

Standard stock types
8.LI50.1111.2050
8.LI50.1111.2250
8.LI50.1121.2050
8.LI50.1121.2250

Order code Magnetic band Limes B2

8.B2	.	10	.	010	.	XXXX
Type		a				b

a *Width*
10 = 10 mm

b *Length*
0010 = 1 m
0020 = 2 m
0040 = 4 m
0050 = 5 m
0060 = 6 m
0100 = 10 m
0200 = 20 m
Other lengths up to 50 m on request

Standard stock types
8.B2.10.010.0010
8.B2.10.010.0020
8.B2.10.010.0050
8.B2.10.010.0100

1) With quadruple evaluation (only connected with magnetic band Limes B2)

Magnetic measurement system | Limes LI50 / B2 | Resolution min. 5 µm

Display Type 572 for LIMES LI50

Counter series for demanding applications, with two individually scalable encoder inputs. HTL or TTL in each case A, A, B, B for count frequencies up to 1 MHz per channel. Operating modes can be selected for position or event counter, total counter, difference counter, cut-to-length display, diameter calculator, batch counter and more.

- 2 separate freely scalable count inputs - HTL or TTL; also with inverted inputs
- Max. input frequency 1 MHz/ channel (at TTL-input)
- 4 freely programmable fast solid-state outputs, each with 350 mA output current
- Step or tracking preset
- AC and DC supply voltage
- Can be used as a counter or position display with limit values
- Monitoring function, where 2 values are monitored or calculated with respect to each other
- 4 fast programmable inputs with various functions such as reset, gate, display memory, reference input or switching between the display values.
- Optional scalable analogue output 0/4 ... 20 mA, +/-10 V or 0 ... 10 V
- 2 auxiliary power supplies for sensors: 5.2 V DC and 24 V DC
- Standard interface RS 232

Position display, 6-digit with 4 fast switch outputs and serial interface:	**6.572.0116.D05**
with 4 fast switch outputs and serial interface and scalable analogue output	**6.572.0116.D95**
Position display, 8-digit with 4 fast switch outputs and serial interface:	**6.572.0118.D05**
with 4 fast switch outputs and serial interface and scalable analogue output	**6.572.0118.D95**

Technical data – Magnetic sensor Limes LI50

Output circuit	Push-Pull	RS422
Supply voltage	4.8 ... 30 V DC	4.8 ... 26 V DC
Permissible load / channel	±20 mA	120 Ohm
Max cable length	max. 30 m	RS422 Standard
Power consumption (no load)	typ. 25 mA, max. 60 mA	
Short circuit proof [1]	yes	yes [2]
Min. pulse edge interval	1 µs (edge interval) corresponds to 4 ms/cycle (see signal figures below)	
Output signal	A, $\overline{A}$, B, $\overline{B}$, I, $\overline{I}$	
Reference signal	index periodical	

Accuracy

System Accuracy	typ. +200 µm, max. ± (0.04 + 0.04 x L) mm, (L in [m], up to L = 50 m, at T = 20°C)
Repeat accuracy	±1 increment
Resolution and speed [3]	25 µm (quadruple), max. 16.25 m/s 5 µm (quadruple), max. 3.25 m/s

Permissible alignment tolerance (see draft „Mounting tolerances“)

Gap sensor / magnetic band	0.1 ... 2.0 mm (1.0 mm recommended)
Offset	max. ±1 mm
Tilting	max. 3°
Torsion	max. 3°

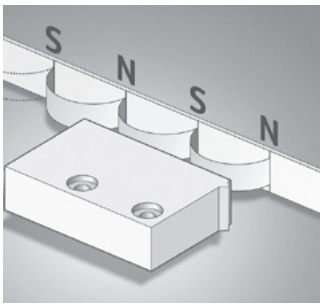
General data

Working temperature	-20°C ... +80°C
Shock resistance	500 g/1 ms
Vibration strength	30 g/10 ... 2000 Hz
Protection	IP67 acc. to DIN 60 529 (housing)
Humidity	100 %, condensation possible
Housing	zinc die-cast
Cable	2 m long, PUR 8 x 0.14 mm², shielded, may be used in trailing cable installations
Status-LED: Green	pulse-index
Red	Error; Speed too high or magnetic fields too weak (8.LI50.XXXX.X050 and 8.LI50.XXXX.X250)
CE compliant acc. to	EN 61 000-6-2, EN 61 000-6-4 and EN 61 000-6-3
RoHS compliant acc. to	EG guideline 2002/95/EG

Technical data – Magnetic band Limes B2

Pole gap	5 mm from pole to pole
Dimensions	width: 10 mm, Thickness: 1.7 mm incl. masking tape
Temperature coefficient	(11 ±1) x 10^{-6}/K
Working temperature	-20°C ... +80°C
Storage temperature	-40°C ... +80°C
Mounting	adhesive joint
Measuring	0.1 m (to receive an optimal result of measurement, the magnetic band should be ca. 0.1 m longer than the desired measuring length)
Bending radius	≥ 50 mm

Function principle

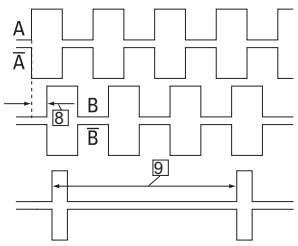


Signal figures

For a rotation of the magnetic ring in the cw direction (see the Mounting Tolerances drawing)

9 Periodic index signal (every 2 mm); the logical assignment A, B and I-Signal can change

8 Pulse edge interval: Pay attention to the instructions in the technical data



1) If supply voltage correctly applied
2) Only one channel allowed to be shorted-out
If U_B = 5 V, short-circuit to channel, 0 V, or +U_B is permitted
If U_B = 5 ... 30 V, short-circuit to channel or 0 V is permitted
3) At the listed rotational speed the min. pulse edge interval is 1 µs, this corresponds to 250 kHz. For the max. rotational speed range a counter with a count input frequency of not less then 250 kHz should be provided.

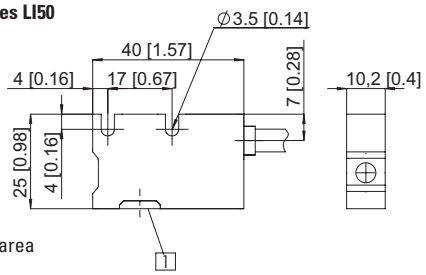
Magnetic measurement system | Limes LI50 / B2 | Resolution min. 5 µm

Terminal assignment

Signal	0 V GND	U_B	A	$\overline{A}$	B	$\overline{B}$	I	$\overline{I}$	shield
Cable colour	WH	BN	GN	YE	GY	PK	BU	RD	shield is on the housing

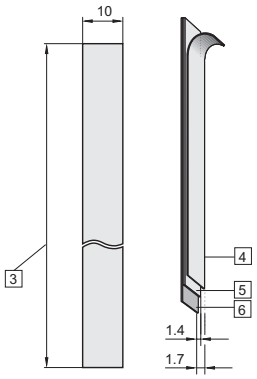
Dimensions

Magnetic sensor Limes LI50



1 active measuring area

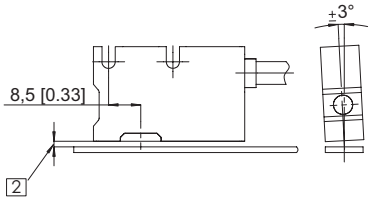
Magnetic band Limes B2



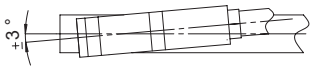
3 length L, max. 50 m
4 masking tape
5 magnetic band
6 carrier band

Permissible Mounting tolerances

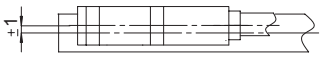
Tilting



Torsion



Offset



2 Distance Sensor / Magnetic band:
0.1 ... 2.0 mm (1.0 mm recommended)

Absolute magnetic measurement system sensor head, magnetic

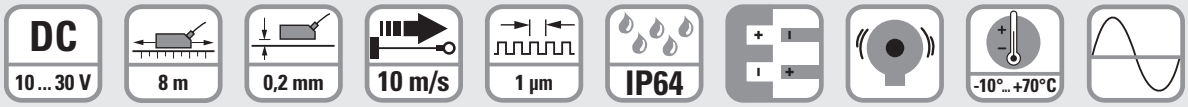
Limes LA10 / BA1

Measuring length max. 8 m
Resolution min. 1 µm

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.

RoHS SSI CANopen



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	.	1	2	X	2
Type		a	b	c	d

a *Model*
1 = IP64, standard

b *baud rate*
2 = standard (CANopen, 250 k)

c *Output circuit / Power supply*
1 = SSI, 25 bit Gray-Code / 10 ... 30 V DC
2 = SSI, 25 bit Gray-Code, SinCos 1 Vpp / 10 ... 30 V DC
3 = CANopen, without bus terminating resistor / 10 ... 30 V DC
4 = CANopen, with bus terminating resistor / 10 ... 30 V DC
5 = CANopen, SinCos 1 Vpp, without bus terminating resistor / 10 ... 30 V DC
6 = CANopen, SinCos 1 Vpp, with bus terminating resistor / 10 ... 30 V DC

d *Type of connection*
2 = standard, M12 connector, 12 pin

Stock types
8.LA10.1212 8.LA10.1232
8.LA10.1242

Scope of delivery
sensor head + spacing template

Order code magnetic band Limes BA1

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

a *Width*
10 = 10 mm

b *Length (measuring range = length - 0.1 m)*
0005 = 0.5 m
0010 = 1 m
0020 = 2 m
0030 = 3 m
0040 = 4 m
0060 = 6 m
0080 = 8 m

Optional on request
- other lengths

Stock types
8.BA11.10.010.0080

Absolute magnetic measurement system sensor head, magnetic band	Limes LA10 / BA1	Measuring length max. 8 m Resolution min. 1 µm

Accessories		Order no.
SSI display type 570 Position display, 6-digit	with 2 relay outputs and serial interface DC power supply	**0.570.010.305**
	with 2 fast switch outputs AC/DC power supply	**0.570.011.E00**
	with scalable analogue output AC/DC power supply	**0.570.012.E90**
	RS232 / RS485 interface AC/DC power supply	**0.570.012.E05**

Connection technology		Order no.
Connector, self-assembly (straight)	M12 female connector with coupling nut, 12 pin, A coded	**8.0000.5162.0000**
Cordset, pre-assembled	M12 female connector with coupling nut, 12 pin, 5 m [16.4'] PUR cable 6 x 2 x 0.14 mm² [AWG 26]	**05.00.60B1.B211.005M**
Unprepared cable, cut to length	6 x 2 x 0.14 mm² [AWG 26] PVC cable	**8.0000.6900.XXXX** 1)
	6 x 2 x 0.14 mm² [AWG 26] PUR cable	**8.0000.6Y00.XXXX** 1)
	5 x 2 x 0.14 mm² [AWG 26] PVC cable	**8.0000.6Z00.XXXX** 1)

Further accessories can be found in the accessories section or in the accessories area of our website at: 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.

Technical data

Mechanical characteristics

Weight	approx. 0.1 kg [3.53 oz]
Working temperature	-10°C ... +70°C [+14°F ... +158°F] (non condensing)
Storage temperature	-25°C ... +85°C [-13°F ... +185°F]
Protection acc. to EN 60529	IP64
Housing	aluminium
Max. traverse speed SinCos reading permanent absolute positions reading	 10 m/s 1 m/s
Shock resistance acc. to EN 60068-2-27	5000 m/s², 1 ms
Vibration resistance acc. to EN 60068-2-6	300 m/s², 10 ... 2000 Hz
Distance sensor head / magnetic band	0.01 ... 0.2 mm incl. masking tape (recommended 0.2 mm)
Measuring length	max. 8 m
Type of connection (standard)	M12 connector, 12 pin

Electrical characteristics

Power supply	10 ... 30 V DC ±10%
Residual ripple	< 10 %
Current consumption	max. 150 mA
Reverse polarity protection	yes
Short circuit proof	yes
CE compliant acc. to	EMC guideline 2014/30/EU RoHS guideline 2011/65/EU

Accuracy

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

SSI interface

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

CANopen interface

Interface	CAN High-Speed acc. to ISO 11898, Basic and Full CAN, CAN specification 2.0 B
Protocol	CANopen
Baud rate	250 kbit/s; 125 ... 1000 kbit/s configurable
Termination	yes via order code
Node address	1 (optional on request)

Option SinCos interface

Max. frequency -3dB	400 kHz
Signal level	1 Vpp (±10%)
Short circuit proof	yes
Pulse rate	1 SinCos per 1 mm pole

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

Absolute magnetic measurement system sensor head, magnetic band — Limes LA10 / BA1 — Measuring length max. 8 m Resolution min. 1 µm

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

Working temperature	-20°C ... +70°C [-4°F ... +158°F] (in case of mounting with adhesive tape only)
Storage temperature	-20°C ... +80°C [-4°F ... +176°F]
Mounting	adhesive joint
Additional length	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
Min. bending radius for storage	≥ 150 mm
Material metal tape	precision steel strip 1.4404 acc. to EN 10088-3

Terminal assignment

Output circuit	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

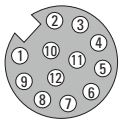
Output circuit	Type of connection	M12 connector, 12 pin											
2	2	Signal:	0 V	+V	C+	C-	D+	D-	A	$\overline{A}$	B	$\overline{B}$	–	–
		Pin:	1	2	3	4	5	6	7	8	9	10	11	12

Output circuit	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

Output circuit	Type of connection	M12 connector, 12 pin											
5, 6	2	Signal:	0 V	+V	CAN_L	CAN_H	–	–	A	$\overline{A}$	B	$\overline{B}$	–	–
		Pin:	1	2	3	4	5	6	7	8	9	10	11	12

+V: Encoder power supply +V DC
0 V: Encoder power supply ground GND (0 V)
C+, C-: Clock signal
D+, D-: Data signal
A, $\overline{A}$: Cosine signal
B, $\overline{B}$: Sine signal

Connection cable colour assignment with M12 female connector	Connection cable with M12 connector, 12 pin (accessory) – for example 05.00.60B1.B211.005M												
	Colour:	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

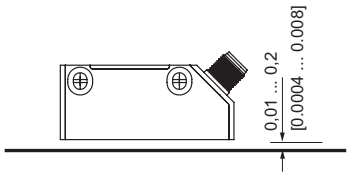


Absolute magnetic measurement system sensor head, magnetic band | **Limes LA10 / BA1** | **Measuring length max. 8 m Resolution min. 1 µm**

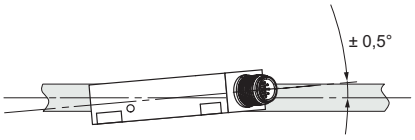
Permissible mounting tolerances

Dimensions in mm [inch]

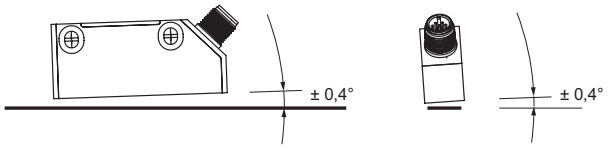
Distance sensor head / magnetic band (incl. masking tape)



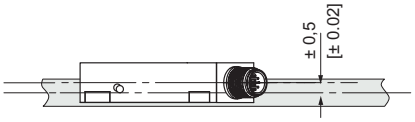
Torsion



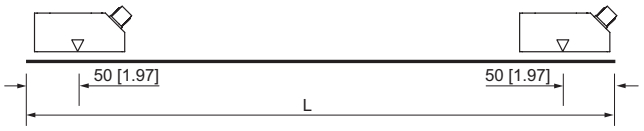
Tilting



Offset



Measuring range

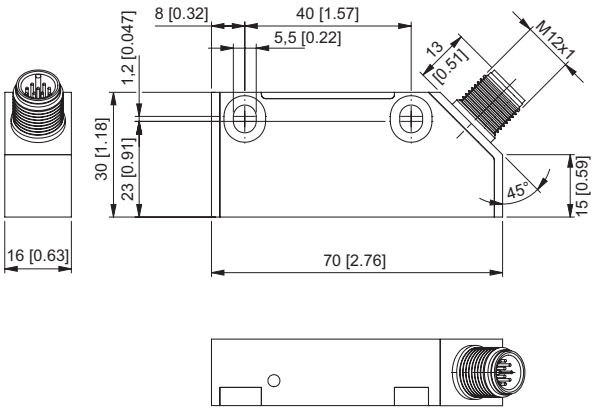


Observe mounting direction

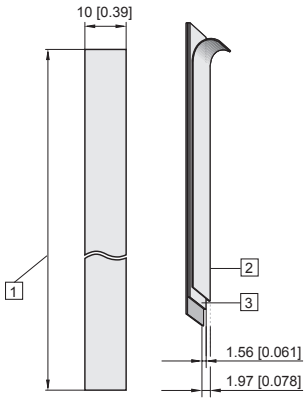
Dimensions

Dimensions in mm [inch]

Sensor head Limes LA10

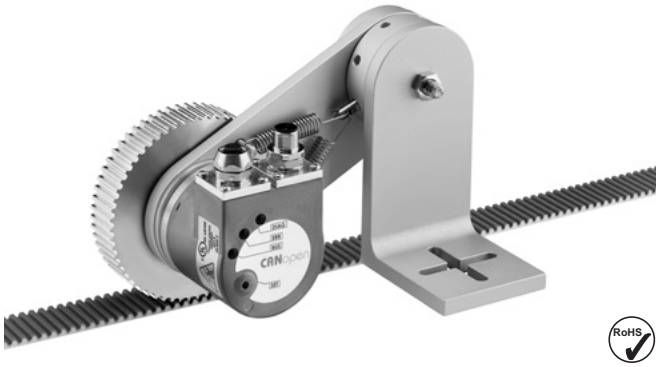


Magnetic band Limes BA1



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

Length measuring kit with spring encoder arm | **Limes Kit TB1** | **Standard measuring length up to 100 m [1] Application-specific adaptation**



Limes Kit TB is a flexible length measuring kit for the measurement of positions and speeds. The complete system is easy to mount and compensates unevennesses and mounting tolerances in the application.

The length measuring kit is available in many variants and can be adapted for the specific requirements of your application. Moreover, our Sendix encoder portfolio offers the suitable interface for every application. Both incremental and absolute encoders can be used.

Versatile

- Large measuring range (standard measuring length up to 100 m [1]).
- Usable for linear and rotary movements.
- Incremental or absolute measurement.
- All usual interfaces/field buses.
- Application-specific adaptation of the spring encoder arm (adjustable pressing force).
- Compensation of application tolerances.

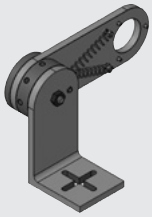
Robust and cost-efficient

- Simple mounting.
- Steel-reinforced plastic belt.
- Robust Sendix encoders.
- Wide temperature range of -25°C ... +80 °C.
- High traversing speed up to 5 m/s.

Single components Limes Kit TB1:

Spring encoder arm

8.0010 . 7000 . 0010



Encoder

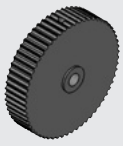
(See the table of recommended encoders)

All incremental or absolute Sendix encoders with clamping flange (centering collar 36 mm) and 10 mm shaft diameter (shaft 10x20 mm) can be used.

Pulley

8.0000 . A X X 1 . XXXX
(a) (b) (c)

Preferred types with short delivery time are shown in **bold underlined**



(a) *Material*
1 = aluminum
2 = plastic

(b) *Width*
1 = 10 mm [0.39"]
2 = 20 mm [0.79"]

(c) *Pitch circumference*
0360 = 360 mm

(c) *Other pitch circumferences on request*
0300 = 300 mm
0240 = 240 mm
0220 = 220 mm
0150 = 150 mm
0120 = 120 mm
0100 = 100 mm

Toothed belt

8.0000 . B 1 X 1 . XXXX
(a) (b)

Preferred types with short delivery time are shown in **bold underlined**

(a) *Width*
1 = 10 mm [0.39"]
3 = 25 mm [0.94"]
4 = 50 mm [1.97"]

(b) *Length [in dm] [1], ex.:*
0010 = 1 m [3.28´]
0020 = 2 m [6.56´]
...
1000 = 100 m [328´]

Optional on request:
length > 100 m

1) Yard ware (1 m, 2 m, ... 100 m), lengths > 100 m on request.

Length measuring kit with spring encoder arm | **Limes Kit TB1** | **Standard measuring length up to 100 m Application-specific adaptation**

Recommended encoders, incremental

Encoder	Interface	Power supply	Type of connection	Pulley circumference [mm]	Recommended encoder resolution (pulse number)	mm / pulse	Order no.
Sendix 5000	push-pull with inverted signal	10 ... 30 V DC	1 x radial M12 connector	360	3600	0.1	8.5000.8354.3600
				300	3000	0.1	8.5000.8354.3000
				240	240	1.0	8.5000.8354.0240
				220	2500	0.088	8.5000.8354.2500
				150	1500	0.1	8.5000.8354.1500
				120	1200	0.1	8.5000.8354.1200
				100	1000	0.1	8.5000.8354.1000

Recommended encoders, absolute

Encoder	Interface	Power supply	Type of connection	Resolution / Protocol	Option	Order no.
Sendix M5861	analog, 4 ... 20 mA	10 ... 30 V DC	1x radial M12 connector	12 bit (4096)	scalable with limit switch function	8.M5861.3534.3312
	analog, 0 ... 10 V	10 ... 30 V DC	1x radial M12 connector	12 bit (4096)	scalable with limit switch function	8.M5861.3544.4312
	analog, 0 ... 5 V	10 ... 30 V DC	1x radial M12 connector	11 bit (2048)	scalable with limit switch function	8.M5861.3544.5312
Sendix M5863	SSI	10 ... 30 V DC	1x radial M12 connector	4096 ppr / SSI Gray code	–	8.M5863.3524.G222
Sendix M5868	CANopen	10 ... 30 V DC	1x radial M12 connector	CANopen encoder profil DS406 V4.0	–	8.M5868.3524.2122

Further encoders, absolut

Encoder	Interface	Power supply	Type of connection	Resolution / Protocol	Option	Order no.
Sendix F5863	SSI	10 ... 30 V DC	1x radial M12 connector	4096ppr / SSI Gray code	SET button + status LED	8.F5863.1226.G223
Sendix 5863	SSI	10 ... 30 V DC	1x radial M12 connector	4096ppr / SSI Gray code	SET button + status LED	8.5863.1226.G233
Sendix F5868	CANopen	10 ... 30 V DC	1x radial M12 connector	CANopen encoder profil DS406 V3.2	SET button	8.F5868.122E.2123
Sendix 5868	CANopen	10 ... 30 V DC	2x radial M12 connector	CANopen encoder profil DS406 V3.2	SET button	8.5868.1222.2123
Sendix 5868	PROFIBUS	10 ... 30 V DC	3x radial M12 connector	Profibus-DP V0 encoder profil class 2	SET button	8.5868.1232.3113
Sendix 5868	EtherCAT	10 ... 30 V DC	3x radial M12 connector	EtherCAT with CoE 3.2.10	-	8.5868.12B2.B212
Sendix 5868	PROFINET IO	10 ... 30 V DC	3x radial M12 connector	PROFINET encoder profil version 4.1	-	8.5868.12C2.C212
Sendix F5868	EtherNet/IP	10 ... 30 V DC	3x radial M12 connector	EtherNet/IP	-	8.F5868.12AN.A222

Length measuring kit with spring encoder arm | Limes Kit TB1 | Standard measuring length up to 100 m Application-specific adaptation

Technical data

Total system

Temperature range	-25°C ... +80°C [-13°F ... +176°F]
Max. traversing speed	5 m/s
IP protection	depends on the encoder used (refer to the encoder data sheet)

Spring encoder arm

Material	aluminum
Spring force = maximum pressing force on the toothed belt	max. 40 N
Minimum pressing force of the pulley on the toothed belt	min. 20 N (ca. 20 N = 1 notch/position)

Encoder

Technical data	depends on the encoder used (refer to the encoder data sheet)
Flange type	All encoders with clamping flange (centering collar 36 mm) and 10 mm shaft can be used

Pulley

Material	aluminum or plastic (POM-C)
Width	10 / 20 mm
Pitch circumference	100 ... 360 mm
Number of teeth	20 ... 72
Toothing type	HD60 – 5M
Pitch	5 mm

Toothed belt

Material		steel-reinforced PU with polyamide fabric on the teeth side
Adhesive basis		Modified acrylate
Toothing type		RTD 5M
Tooth strength		37.8 N/cm belt width
Bend radius		min. 30 mm
Width		10 mm, 25 mm, 50 mm (others on request)
Height		3.8 mm
Length tolerance		± 0.8 mm/m
Width tolerance		± 0.5 mm
Weight	10 mm width	40 g/m
	25 mm width	100 g/m
	50 mm width	195 g/m

Technic in detail

Overview belt pulley

Number of teeth	Pitch [mm]	Diameter in mm ["]	Pitch diameter [1] in mm ["] (pitch x no of teeth) / π	Pitch circumference in mm (pitch x no of teeth) or (Pitch diameter x π)	Order no. B = pulley width x = material (1 = aluminum, 2 = plastic)	
					B = 10 mm	B = 20 mm
72	5	113.45 [4.47]	114.59 [4.51]	360	8.000.Ax11.0360	8.000.Ax21.0360
60	5	94.35 [3.71]	95.49 [3.76]	300	8.000.Ax11.0300	8.000.Ax21.0300
48	5	75.25 [2.96]	76.39 [3.01]	240	8.000.Ax11.0240	8.000.Ax21.0240
44	5	68.89 [2.71]	70.03 [2.76]	220	8.000.Ax11.0220	8.000.Ax21.0220
30	5	46.61 [1.84]	47.75 [1.88]	150	8.000.Ax11.0150	8.000.Ax21.0150
24	5	37.06 [1.46]	38.19 [1.50]	120	8.000.Ax11.0120	8.000.Ax21.0120
20	5	30.69 [1.21]	31.83 [1.25]	100	8.000.Ax11.0100	8.000.Ax21.0100

Resolution examples with encoder (incremental / absolut)

Incremental encoder Sendix 5000		
Pitch circumference [mm]	360	360
Pulses / revolution [ppr]	360	3600
Pulses / mm	1	10
Resolution	1	0.1

Absolut encoder Sendix 5863 (12 bit ST) or M5868 (12 bit ST, programmable via bus)		
Pitch circumference [mm]	360	
Pulses / revolution [ppr]	4096	
Pulses / mm	~ 11.5	
Resolution	~ 0.088	

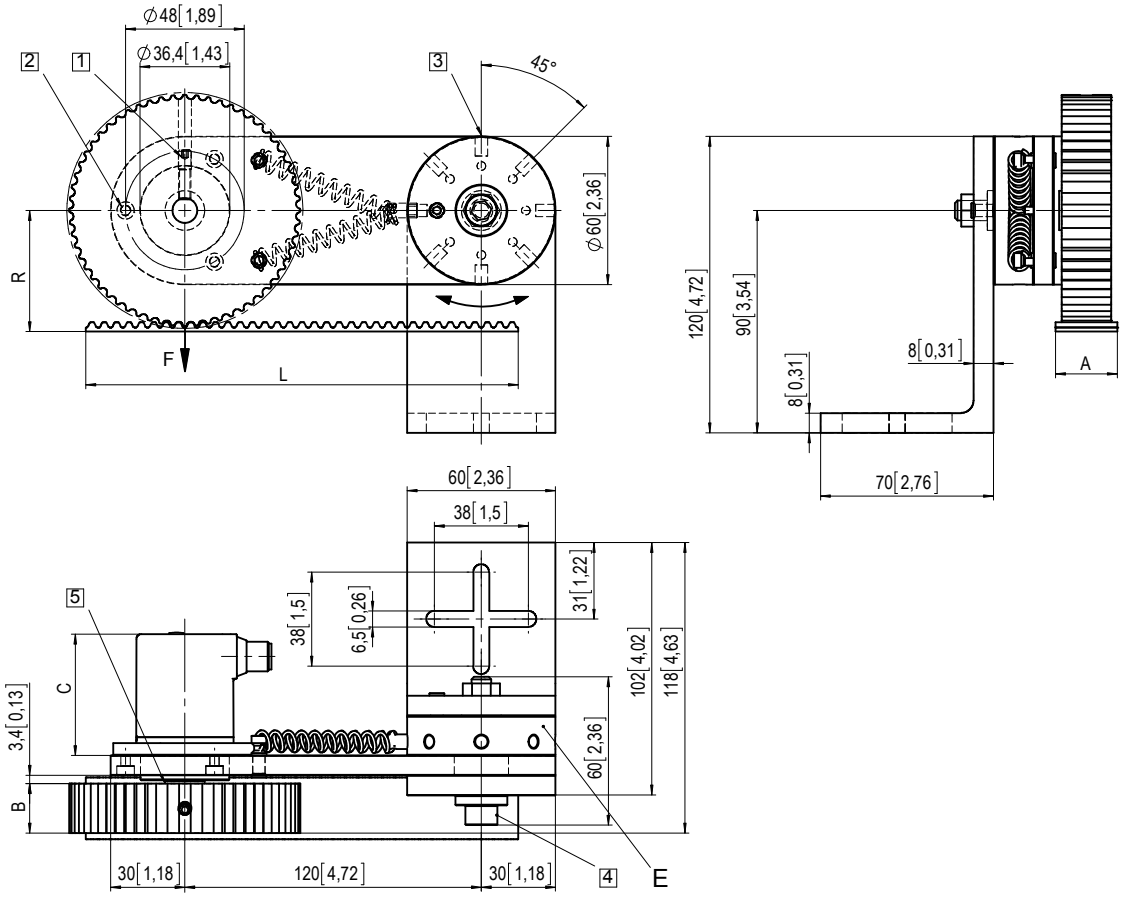
1) The pitch diameter of the pulley is always larger than the diameter of the pulley, as the height of the belt must be considered

Length measuring kit with spring encoder arm	Limes Kit TB1	Standard measuring length up to 100 m Application-specific adaptation

Dimensions

Dimensions in mm [inch]

Spring encoder arm



1 Set screw M5 DIN913 (SW2,5)
recommended tightening torque 2.0 Nm

2 3 M3x8 DIN912 (SW2.5) screws
recommended tightening torque 2.0 Nm (attached)

3 Setting with a screwdriver
size 0 or 1

4 M8x60 DIN912 (SW6) screws

5 Spacer disk

Proceed as follows to adjust the required pressing force **F** (pulley / toothed belt):

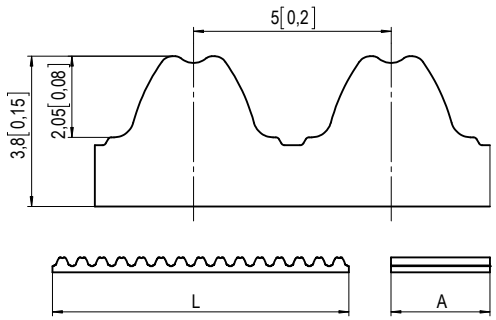
1. Loosen screw 4 (SW6) on the spring encoder arm.
2. Adjust the required angle of the spring encoder arm.
3. Turn adjusting wheel **E** to set the required pressing force **F** (max. 2 positions ≙ 40 N).
4. Tighten screw 4 (SW6) on the spring encoder arm (recommended torque 20 Nm).

Length measuring kit with spring encoder arm | **Limes Kit TB1** | **Standard measuring length up to 100 m Application-specific adaptation**

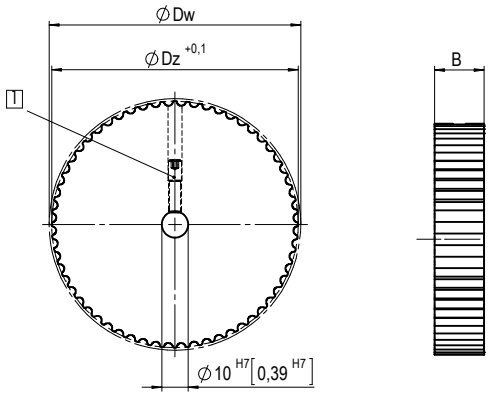
Dimensions

Dimensions in mm [inch]

Toothed belt



Pulley



1 Set screw M5 (SW.5)
recommended tightening torque 2.0 Nm

Width toothed belt A	Width pulley B	No of teeth	Pitch diameter ø Dw	Tooth geometry øDz +0,1	Distance to toothed belt R ±1
10 [0.39] 25 [0.98] 50 [1.97]	10 [0.39] 20 [0.79]	72	114.59 [4.51]	113.45 [4.47]	58.6 [2.31]
		60	95.49 [3.76]	94.35 [3.71]	49.0 [1.93]
		48	76.39 [3.01]	75.25 [2.96]	40.9 [1.61]
		44	70.03 [2.76]	68.89 [2.71]	36.3 [1.43]
		30	47.75 [1.88]	46.61 [1.84]	25.1 [0.99]
		24	38.19 [1.50]	37.06 [1.46]	20.4 [0.80]
		20	31.83 [1.25]	30.69 [1.21]	17.2 [0.68]

C = see encoder data sheet

L = yard ware (1 m, 2 m, ... 100 m)
other lengths > 100 m on request

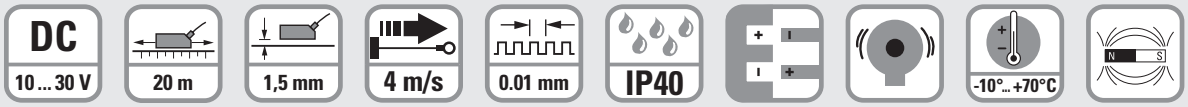
Absolute magnetic measurement system sensor head, magnetic band

Limes LA50 / BA5

Measuring length max. 20 m
Resolution min. 10 µm

The non-contact absolute magnetic linear measurement system Limes LA50 / BA5 - made up of the sensor head LA50 and of the magnetic band BA5 - reaches a resolution up to 10 µm with a maximum distance of 1.5 mm between the sensor and the band.

RoHS SSI CANopen



Robust and vesatile

- Resolution 0.01 mm / measuring lengths max. 20 m.
- Rugged die-cast zinc housing.
- Positions changes are also detected when de-energised no referencing movement required – no wear.
- Automatic distance detection in case of too high distance between the sensor and the magnetic band. ■
- Masking tape protecting the magnetic band.
- Address, baud rate, bus termination can be modified via microswitches.
- Interfaces: SSI, CANopen.

Easy installation

- Simple glued assembly of the magnetic band.
- Large mounting tolerances.
- Requires very little installation space.
- LED warning signals in case of too weak magnetic field.

■

Order code sensor head Limes LA50

8.LA50	.	1	2	X	1
Type		a	b	c	d

a *Model*
1 = IP40, standard

b *baud rate*
2 = standard (CANopen, 250 k)

c *Output circuit / power supply*
1 = SSI 25 bit / 10 ... 30 V DC
3 = CANopen / 10 ... 30 V DC

d *Type of connection*
1 = cable, 1.5 m PUR

Stock types
8.LA50.1211
8.LA50.1231

Order code magnetic band Limes BA5

8.BA5	.	20	.	010	.	XXXX
Type		a				b

a *Width*
20 = 20 mm

b *Length (measuring range = length - 0.1 m)*
0010 = 1 m
0020 = 2 m
0040 = 4 m
0050 = 5 m
0060 = 6 m
0100 = 10 m
0200 = 20 m

Stock types
8.BA5.20.010.0200

Absolute magnetic measurement system sensor head, magnetic band	Limes LA50 / BA5	Measuring length max. 20 m Resolution min. 10 µm

Accessories

		Order no.
SSI display type 570 Position display, 6-digit	with 2 relay outputs and serial interface DC power supply	**0.570.010.305**
	with 2 fast switch outputs AC/DC power supply	**0.570.011.E00**
	with scalable analogue output AC/DC power supply	**0.570.012.E90**
	RS232 / RS485 interface AC/DC power supply	**0.570.012.E05**

Further accessories can be found in the accessories section or in the accessories area of our website at: 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.

Technical data

Mechanical characteristics

Weight	ca. 0.19 kg [6.70 oz]
Working temperature	-10°C ... +70°C [+14°F ... +158°F] (non condensing)
Storage temperature	-25°C ... +85°C [-13°F ... +185°F]
Protection acc. to EN 60529	IP40
Housing	zinc die-cast
Max. traverse speed permanent absolute positions reading	4 m/s
Shock resistance acc. to EN 60068-2-27	5000 m/s², 1 ms
Vibration resistance acc. to EN 60068-2-6	300 m/s², 10 ... 2000 Hz
Distance sensor head / magnetic band	0.1 ... 1.5 mm incl. masking tape (recommended 0.5 mm)
Measuring length	max. 20 m
Type of connection (standard)	cable, 1.5 m PUR, open cable ends

Electrical characteristics

Power supply	10 ... 30 V DC ±10%
Residual ripple	< 10 %
Current consumption	max. 150 mA
Reverse polarity protection	yes
Short circuit proof	yes
CE compliant acc. to	EMC guideline 2014/30/EU RoHS guideline 2011/65/EU

Accuracy

Measuring principle	absolute
System accuracy at 20°C [+68°F]	max. ± (150 + 20 x L) µm L = measuring length in meters
Repeat accuracy	±1 increment
Resolution	0.01 mm
LED, red	lights up when distance too large

SSI interface

Output driver		RS485 transceiver type
Permissible load / channel		max. ±20 mA
Signal level	HIGH	typ. 3.8 V
	LOW at I_{Load} = 20 mA	typ. 1.3 V
Clock rate		25 bit (24 + 1 failurebit for distance)
Code		binary / gray (default) switchable
SSI clock rate		80 kHz ... 0.4 MHz
Monoflop time		≤ 40 µs
Data refresh rate		≤ 250 µs

CANopen interface

Interface	CAN High-Speed acc. to ISO 11898, Basic and Full CAN, CAN specification 2.0 B
Protocol	CANopen
Baud rate	250 kbit/s; 125 ... 1000 kbit/s configurable
Termination	yes/no via rotary switch
Node address	1 ... 15 configurable (default 1)
LSS protocol	CIA LSS protocol DS305 global command support for node address and baud rate selective commands via attributes of the identity object

Absolute magnetic measurement system sensor head, magnetic band | Limes LA50 / BA5 | Measuring length max. 20 m Resolution min. 10 µm

Magnetic band Limes BA5		
Pole gap		basic pole pitch 5 mm
Dimensions	width	20 mm
	thickness	1.8 mm incl. masking tape
Relative linear expansion		$\Delta L = L \times \alpha \times \Delta\delta$ L = measuring length in meters α = 16×10^{-6} 1/K temperature coefficient $\Delta\delta$ = relative temperature change based on 20°C [+68°F] in °K

Working temperature	-20°C ... +70°C [-4°F ... +158°F]
Storage temperature	-20°C ... +80°C [-4°F ... +176°F]
Mounting	adhesive joint
Additional length	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
Min. bending radius for storage	≥ 150 mm
Material metal tape	precision steel strip 1.4404 acc. to EN 10088-3

Terminal assignment

Output circuit	Type of connection	Cable									
1 (SSI)	1	Signal:	0 V	+V	D+	D-	C+	C-	–	–	⏚
		Cable colour:	WH	BN	YE	OR	GN	PK	GY	BK	shield 1)

Output circuit	Type of connection	Cable									
3 (CANopen)	1	Signal:	0 V	+V	CAN_H	CAN_L	–	–	–	–	⏚
		Cable colour:	WH	BN	YE	OR	GN	PK	GY	BK	shield 1)

+V: Encoder power supply +V DC
0 V: Encoder power supply ground GND (0V)
C+, C-: Clock signal
D+, D-: Data signal

1) Connect shielding only machine side

Absolute magnetic measurement system
Sensor head, magnetic band

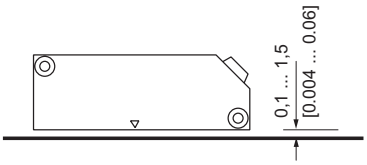
Limes LA50 / BA5

Measuring length max. 20 m
Resolution min. 10 µm

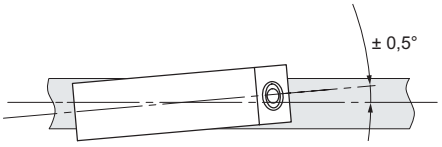
Permissible mounting tolerances

Dimensions in mm [inch]

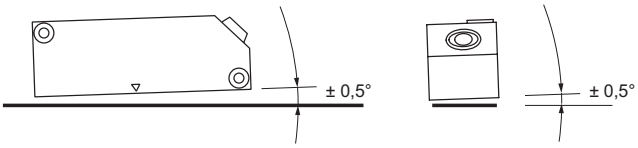
Distance sensor head / magnetic band (incl. masking tape)



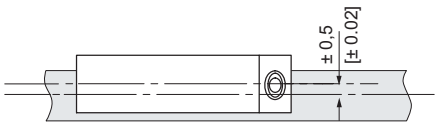
Torsion



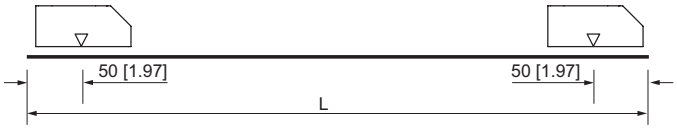
Tilting



Offset



Measuring range

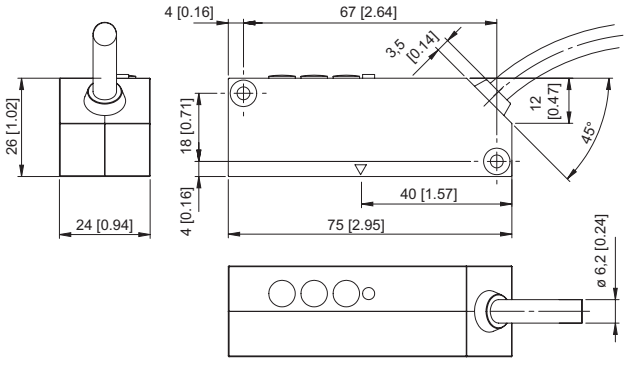


Observe mounting direction

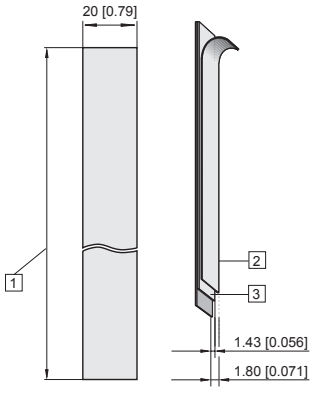
Dimensions

Dimensions in mm [inch]

Sensor head Limes LA50



Magnetic band Limes BA5



1 Length L, max. 20 m
2 Masking tape
3 Magnetic band