

# Linear measuring technology

<b>Measuring wheel system</b>	<b>MWE02</b>	<b>Compact</b>
-------------------------------	--------------	----------------



The MWE02 measuring wheel system is the ideal solution for reliable speed, position and distance measurement in applications with linear movements. These are recorded rotationally via the measuring wheel with attached encoder and converted into measurement data.

An integrated spring ensures the contact pressure of the measuring wheel on the measuring surface required for reliable measured value acquisition. Due to its compact design, the system is also suitable for the tightest installation spaces and can be installed quickly and easily horizontally, vertically or overhead.



## Features

- Compact measuring system with flexible mounting options: vertical, horizontal or overhead. Encoder can be mounted on both sides in 30° steps on the encoder spring arm.
- Integrated spring for optimum contact pressure of the measuring wheel on the measuring surface and as compensation for unevenness.
- Robust incremental Sendix encoder with max. resolution up to 2500 pulses/revolution and max. speed up to 4500 min<sup>-1</sup>.
- Measuring wheels for different measuring surfaces: Available with O-ring NBR70, smooth plastic (polyurethane) or diamond knurled (aluminum) coating in 200 mm and 6" circumferences.
- Integrated mechanical spring travel limitation.

## Benefits

- Simple and fast mounting even for the tightest installation spaces.
- Direct and reliable measurement on the measuring surface for precise speed, position and distance measurement.
- Accurate measurement values for efficient production operation.
- Matching measuring wheels for any measuring surface.
- Spring overload protection ensures long service life.

## Single components

Encoder spring arm



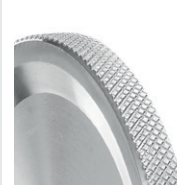
Encoder Sendix Base KIS40



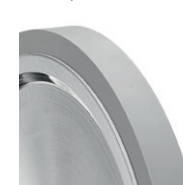
Measuring wheels with circumference 200 mm and 6"

The right measuring wheel coating for every surface of the material to be measured:

Diamond knurl



Plastic, smooth



O-ring



# Linear measuring technology

<b>Measuring wheel system</b>	<b>MWE02</b>	<b>Compact</b>
-------------------------------	--------------	----------------

<b>Order code</b>	8.MWE02 . 121 . 3 X X 5 . 40 X X . XXXX
	<div style="display: flex; justify-content: space-around; font-size: small;"> <span>Type</span> <span>a</span> <span>b</span> <span>c</span> <span>d</span> <span>e</span> <span>f</span> </div>

**a** *Circumference measuring wheel*

- 2 = 200 mm
- 6 = 6"

**b** *Measuring wheel coating*

- 1 = diamond knurl (aluminum)
- 4 = plastic (polyurethane) smooth
- 7 = O-ring, NBR70

**c** *Mounted encoder*

- 40 = Sendix Base KIS40, incremental  
(Other encoders on request. In addition to incremental encoders, absolute encoders, e.g. with IO-Link interface, can also be mounted.)

**d** *Output circuit / supply voltage*

- 3 = open collector NPN (with inverted signal) / 10 ... 30 V DC
- 4 = push-pull (with inverted signal) / 10 ... 30 V DC
- 6 = RS422 (with inverted signal) / 5 V DC
- 7 = open collector NPN (without inverted signal) / 10 ... 30 V DC
- 8 = push-pull (without inverted signal) / 10 ... 30 V DC
- A = open collector NPN (with inverted signal) / 5 ... 30 V DC
- B = push-pull (with inverted signal) / 5 ... 30 V DC
- C = RS422 (with inverted signal) / 5 ... 30 V DC

**e** *Type of connection*

- 1 = axial cable, 2 m [6.56'] PVC
- 2 = radial cable, 2 m [6.56'] PVC
- A = axial cable, special length PVC \*)
- B = radial cable, special length PVC \*)

\*) Available special lengths (connection types A, B):  
 3, 5, 8, 10, 15 m [9.84, 16.40, 26.25, 32.80, 49.21']  
 order code expansion .XXXX = length in dm  
 e.g.: 8.MWE02.121.3215.403A.1024.0050 (for cable length 5 m)

**f** *Pulse rate*

- 25, 50, 60, 100, 200, 360, 500, 512, 600, 1000, 1024, 2000, 2048, 2500  
(e.g. 500 pulses => 0500)

Preferred numbers of pulses in relation to the measuring wheel circumference 200 mm

Pulse rate	Resolution	Measurement steps
200 ppr	1 pulse / mm	1 mm / pulse
500 ppr	2.5 pulses / mm	0.4 mm / pulse
1000 ppr	5 pulses / mm	0.2 mm / pulse
2000 ppr	10 pulses / mm	0.1 mm / pulse


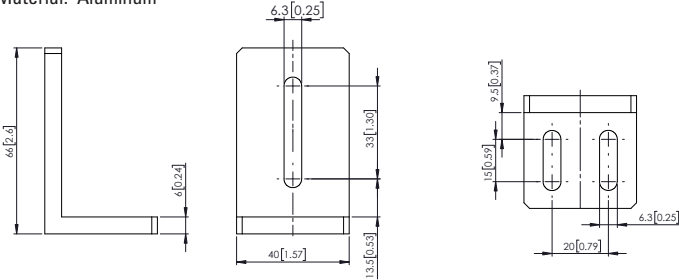

Preferred numbers of pulses in relation to the measuring wheel circumference 6"

Pulse rate	Resolution	Measurement steps
600 ppr	100 pulses / inch	0.01 inch / pulse

*Stock types*

- 8.MWE02.121.3225.4042.2000 = measuring wheel circumf. 200 mm, PU
- 8.MWE02.121.3275.4042.2000 = measuring wheel circumf. 200 mm, O-ring
- 8.MWE02.121.3625.4042.0600 = measuring wheel circumf. 6", PU
- 8.MWE02.121.3675.4042.0600 = measuring wheel circumf. 6", O-ring

# Linear measuring technology

Measuring wheel system		MWE02	Compact
<b>Mounting accessories</b>			Order no.
<b>Mounting bracket</b>	Material: Aluminum	 	<b>8.0000.7000.0065</b>
<b>Single components</b> (included in scope of delivery)			Order no.
<b>Encoder spring arm</b>		can be combined with encoder Sendix Base KIS40	<b>8.MWE02.121.0000.0000.0000</b>
<b>Measuring wheels</b>		circumference / coating: 200 mm / diamond knurl (aluminum) 200 mm / plastic, smooth (PU) 200 mm / O-ring (NBR70) 6" / diamond knurl (aluminum) 6" / plastic, smooth (PU) 6" / O-ring (NBR70)	<b>8.0000.3215.0006</b> <b>8.0000.3245.0006</b> <b>8.0000.3275.0006</b> <b>8.0000.3615.0006</b> <b>8.0000.3645.0006</b> <b>8.0000.3675.0006</b>
<b>O-rings</b>		for measuring wheel circumf. 200 mm for measuring wheel circumf. 6"	<b>8.0000.7000.0067</b> <b>8.0000.7000.0066</b>
<b>Evaluation</b>			Order no.
<b>Preset counter Codix 924</b>	Multifunction device: - Tachometer with limit values - Position display with limit values - Time preset counter		<b>6.924.01XX.XXX</b>
<b>Connection technology</b>			Order no.
<b>Connector, self-assembly</b>	M12 male connector with external thread, 8 pin, A coded, straight (metal)		<b>05.CMBS 8181-0</b>

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

# Linear measuring technology

<b>Measuring wheel system</b>	<b>MWE02</b>	<b>Compact</b>
-------------------------------	--------------	----------------

## Technical data

Mechanical characteristics encoder spring arm		
<b>Materials</b>	spring spring arm	spring steel aluminum
<b>Weight</b>	37 g	
<b>Total deflection</b>	16 mm	
<b>Recommended preload</b>	5 N (approx. 6,5 mm spring deflection)	
<b>Recommended operating travel (continuous)</b>	±4 mm <sup>1)</sup> (from the recommended preload)	
<b>Spring load max.</b>	20 N	
<b>Spring operating life</b>	2.0 Mio. cycles <sup>2)</sup>	

Mechanical characteristics measuring wheel				
<b>Materials</b>	measuring wheel coating	aluminum diam. knurl: aluminum	plastic: PU	O-ring: NBR70
<b>Bore diameter</b>		6 mm	6 mm	6 mm
<b>Wide</b>		5,5 mm	6,5 mm	5,5 mm
<b>Weight</b>	circumference 200 mm	38,5 g	41,5 g	36,0 g
	circumference 6"	25,0 g	23,5 g	21,5 g

Mechanical characteristics encoder Sendix Base KIS40		
<b>Flange</b>	clamping-synchro flange, ø 40 mm	
<b>Shaft</b>	ø 6 x 12.5 mm, with flat	
<b>Maximum speed</b>	4500 min <sup>-1</sup>	
<b>Starting torque – at 20 °C [68 °F]</b>	< 0.05 Nm	
<b>Mass moment of inertia</b>	approx. 0.2 x 10 <sup>-6</sup> kgm <sup>2</sup>	
<b>Shaft load capacity</b>	radial	40 N
	axial	20 N
<b>Weight</b>	approx. 0.17 kg [6.00 oz]	
<b>Protection acc. to EN 60529</b>	IP64	
<b>Working temperature range</b>	-20 °C ... +70 °C [-4 °F ... +158 °F]	
<b>Materials</b>	shaft	stainless steel
	flange	aluminum
	housing	aluminum
	cable	PVC
<b>Shock resistance acc. to EN 60068-2-27</b>	1000 m/s <sup>2</sup> , 6 ms	
<b>Vibration resistance acc. to EN 60068-2-6</b>	100 m/s <sup>2</sup> , 55 ... 2000 Hz	

Electrical characteristics encoder Sendix Base KIS40				
<b>Output circuit</b>	<b>RS422</b> (TTL comp.)	<b>Push-pull</b> <sup>3)</sup> (7272 comp.)	<b>Open collector NPN</b> (7273)	
<b>Supply voltage</b>	5 V DC (±5 %) / 5 ... 30 V DC	10 ... 30 V DC / 5 ... 30 V DC	10 ... 30 V DC / 5 ... 30 V DC	
<b>Power consumption with inverted signal (no load)</b>	typ. 40 mA max. 90 mA / max. 165 mA	typ. 50 mA max. 100 mA	100 mA	
<b>Permissible load / channel</b>	max. +/- 20 mA	max. +/- 20 mA	20 mA sink at 30 V DC	
<b>Pulse frequency</b>	max. 250 kHz	max. 250 kHz	max. 250 kHz	
<b>Signal level</b>	HIGH	min. 2.5 V	min. +V - 2.0 V	
	LOW	max. 0.5 V	max. 0.5 V	
<b>Rising edge time t<sub>r</sub></b>	max. 200 ns	max. 1 µs		
<b>Falling edge time t<sub>f</sub></b>	max. 200 ns	max. 1 µs		
<b>Short circuit proof outputs</b> <sup>4)</sup>	yes <sup>5)</sup>	yes	yes	
<b>Reverse polarity protection of the supply voltage</b>	no/yes	yes	yes	
<b>UL approval</b>	file no. E224618			
<b>CE compliant acc. to</b>	EMC guideline 2014/30/EU – RoHS guideline 2011/65/EU			

1) Operating deflection is measured after preload applied and with/for continuous operations.

2) Life of spring is measured with operating deflection at 1 Hz.

3) Max. recommended cable length 30 m [98.43'].

4) If supply voltage correctly applied.

5) Only one channel allowed to be shorted-out:  
at +V= 5 V DC, short-circuit to channel, 0 V, or +V is permitted.  
at +V= 5 ... 30 V DC, short-circuit to channel or 0 V is permitted.

# Linear measuring technology

<b>Measuring wheel system</b>	<b>MWE02</b>	<b>Compact</b>
-------------------------------	--------------	----------------

## Terminal assignment

Output circuit	Type of connection	Cable (isolate unused cores individually before initial start-up)								
3, 4, 6, A, B, C with inv. signal	1, 2, A, B	Signal:	0 V	+V	A	$\bar{A}$	B	$\bar{B}$	0	$\bar{0}$
		Core color:	WH	BN	GN	YE	GY	PK	BU	RD

Output circuit	Type of connection	Cable (isolate unused cores individually before initial start-up)								
7, 8 without inv. signal	1, 2, A, B	Signal:	0 V	+V	A	-	B	-	0	-
		Core color:	WH	BN	GN	-	GY	-	BU	-

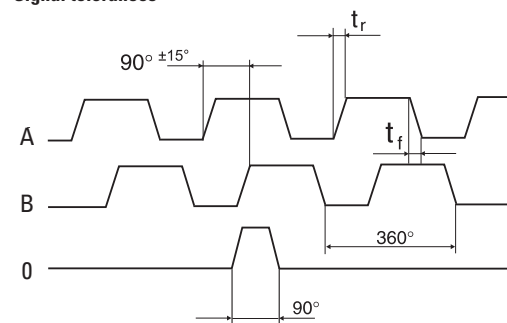
- +V: Supply voltage encoder +V DC
- 0 V: Supply voltage encoder ground GND (0 V)
- A,  $\bar{A}$ : Incremental output channel A
- B,  $\bar{B}$ : Incremental output channel B
- 0,  $\bar{0}$ : Reference signal

## Output signal formats

All Kübler encoders come standard with six channels where A leads B in the clockwise direction and the standard index is gated with A & B. The tolerance of the wave form affects the control and, in some cases, may affect the smoothness of system operation.

<b>A leads B</b>		
when the shaft is rotated in the clockwise direction viewing the shaft or collet end. This is the Kübler standard. This format applies to the pin key codes listed below.		
standard	0 gated with A & B. This is the Kübler standard. 0 is 90° wide.	
on request	0 ungated. 0 is 330° to 360° wide.	

### Signal tolerances



$t_r$  = rising edge time  
 $t_f$  = falling edge time

# Linear measuring technology

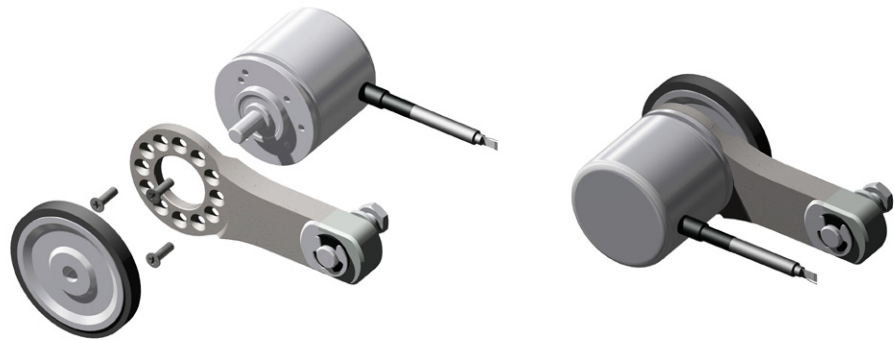
<b>Measuring wheel system</b>	<b>MWE02</b>	<b>Compact</b>
-------------------------------	--------------	----------------

## Technology in detail

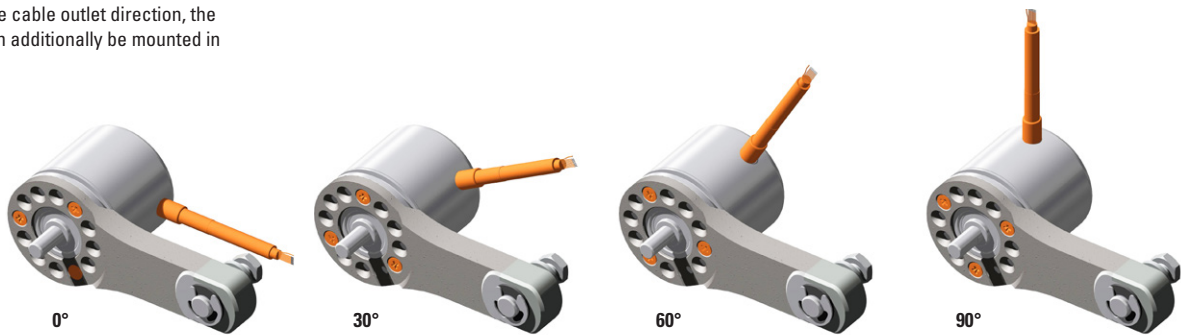
### Mounting options encoder on encoder spring arm

The encoder is attached to the encoder spring arm with 3 screws.

The fastening points are designed in such a way that mounting on both sides of the encoder spring arm is possible.

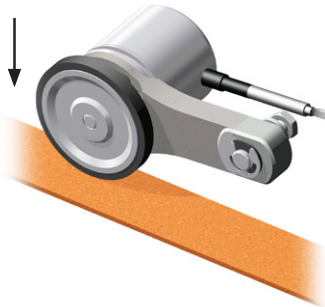


For a flexible cable outlet direction, the encoder can additionally be mounted in 30° steps.



### Various mounting options

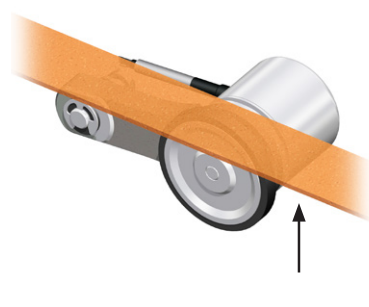
downwards



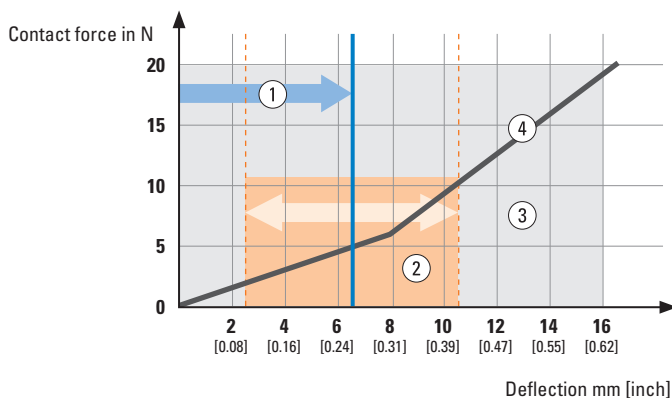
sideways



upwards (overhead)



### Contact force of the measuring wheel on the material to be measured



- 1 Recommended preload: 5 N (approx. 6,5 mm deflection)
- 2 Rec. operating travel: ± 4 mm (from the rec. preload)
- 3 Maximum spring deflection: 0 ... 16 mm
- 4 Contact force in relation to spring deflection (Functional principle based on 2 integrated springs)

# Linear measuring technology

## Measuring wheel system MWE02 Compact

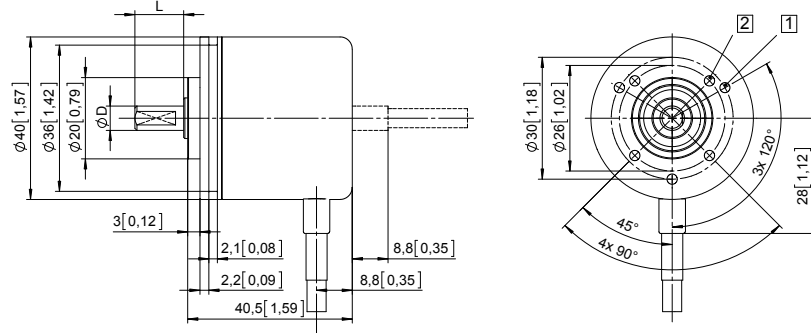
### Dimensions

Dimensions in mm [inch]

#### Encoder

Clamping-synchro flange,  $\varnothing$  40 [1.57]

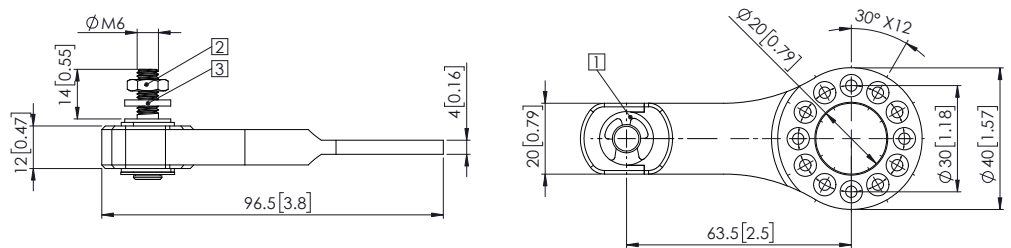
- 1 3 x M3, 4 [0.16] deep
- 2 4 x M3, 4 [0.16] deep



D	Fit	L
6 [0.24]	h7	12,5 [0.49]

#### Encoder spring arm

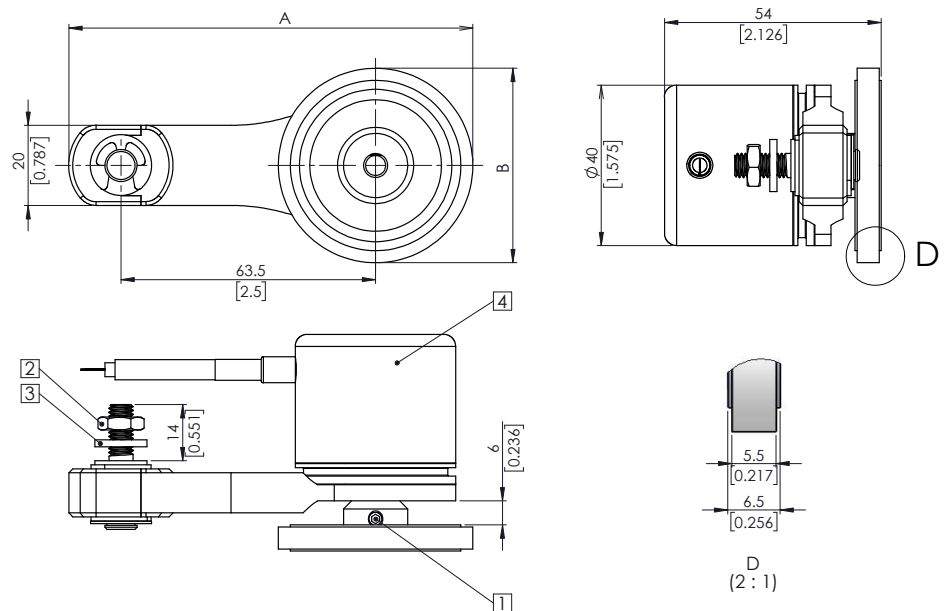
- 1 External retaining ring E type
- 2 Fixing nut M6
- 3 Toothed washer



#### MWE02 combination

- encoder spring arm
- measuring wheel
- encoder Sendix Base KIS40

- 1 Fixing screw M4 x 6 for meas. wheel
- 2 Hexagon nut M6
- 3 Toothed washer
- 4 Encoder



measuring wheel circumference	A	B
200 mm	108.4 [4.27]	63.7 [2.51]
6"	100.8 [3.97]	48.5 [1.91]

**D** for measuring wheel with coating:

