

# Linear measuring technology

<b>Draw-wire encoder B80</b>	<b>Performance-Line</b>	<b>Measuring length max. 3 m</b>
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The draw-wire mechanics B80 can be used up to a measuring length of 3 meters.

These draw-wire mechanics may be combined with the proven Kübler Sendix encoders with incremental or absolute interface, as well as with analog sensors.



Max. acceleration 140 m/s <sup>2</sup>	Long service life	Wide temperature range	High protection level IP	Reverse polarity protection	Integrated swivel	Interchangeable installation

## Robust

- The titanium-anodized aluminum housing and the stainless steel wires allow for using the mechanics even in harsh conditions.
- Wear-free wire exit thanks to special plain bearing guide.
- Various wire types and wire fastenings.

## Versatile

- High traverse speed, up to 10 m/s.
- High acceleration, up to 140 m/s<sup>2</sup>.
- Quick fastening by means of 2 screws.
- Various connection possibilities available.
- Interchangeable encoders (Interchangeable installation).

## Order code with encoder (incremental, absolute)

D8.XB1.XXXX.XXXX.XXXX

a
b
c
d
e
f

- |  |  |  |   |
|--|--|--|---|
| <p><b>a</b> <i>Mechanics</i><br/>2 = interchangeable installation <sup>1)</sup><br/>4 = fixed installation <sup>2)</sup></p> <p><b>b</b> <i>Measuring range</i><br/>0100 = 1000 mm<br/>0200 = 2000 mm<br/>0300 = 3000 mm</p> | <p><b>c</b> <i>Encoder used</i><br/>00 = Sendix 5000, incremental<br/>M3 = Sendix M5863, absolute<br/>F3 = Sendix F5863, absolute<br/>63 = Sendix 5863, absolute<br/>M8 = Sendix M5868, absolute<br/>F8 = Sendix F5868 absolute<br/>68 = Sendix 5868, absolute</p> | <p><b>d</b> <i>Output circuit</i><br/>depends on the encoder used</p> <p><b>e</b> <i>Type of connection</i><br/>depends on the encoder used</p> <p><b>f</b> <i>Resolution / Protocol / Options</i><br/>depends on the encoder used</p> | <p><i>Optional on request</i></p> <ul style="list-style-type: none"> <li>- Other measuring ranges</li> <li>- Cable diameter 1 mm</li> <li>- Other wire fastening (wire clip = standard): eyelet, M4 thread or carabiner ring</li> <li>- Modified cable outlet direction</li> <li>- Sensor protection level IP67</li> <li>- Improved linearity (0.02 %)</li> </ul> |
|--|--|--|---|

Standard resolutions for draw-wire with incremental encoder Sendix 5000			
Drum circumference [mm]	200	200	200
Pulses / revolution [ppr]	200	2000	4000
Pulses / mm	1	10	20
Resolution [mm]	1	0.1	0.05

Standard resolutions for draw-wire with absolute encoder Sendix M5863 (12 bit ST) or M5868 (12 bit ST, programmable via bus)	
Drum circumference [mm]	200
Pulses / revolution [ppr]	4096
Pulses / mm	20.5
Resolution [mm]	0.05

1) Draw-wire mechanics with standard flange. The encoder can be replaced by the customer.  
2) The encoder can only be replaced at the factory.

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## Draw-wire encoder B80

## Performance-Line

## Measuring length max. 3 m

### Recommended standard variants (with incremental, absolute encoder)

Order no. draw-wire encoder	Mounted encoder	Interface	Power supply	Type of connection	Resolution / Protocol	Option
D8.xB1.xxxx.0054.2000	Sendix 5000 (8.5000.8354.2000)	Push-pull with inverted signal	10 ... 30 V DC	1 x radial M12 connector	2000 ppr	-
D8.xB1.xxxx.M324.G222	Sendix M5863 (8.M5863.3524.G222)	SSI	10 ... 30 V DC	1 x radial M12 connector	4096 ppr / SSI-Gray-Code	-
D8.xB1.xxxx.M824.2122	Sendix M5868 (8.M5868.3524.2122)	CANopen	10 ... 30 V DC	1 x radial M12 connector	CANopen encoder profile DS406 V4.0	-

### Other variants (with absolute encoder)

Order no. draw-wire encoder	Mounted encoder	Interface	Power supply	Type of connection	Resolution / Protocol	Option
D8.xB1.xxxx.F326.G223	Sendix F5863 (8.F5863.1226.G223)	SSI	10 ... 30 V DC	1 x radial M12 connector	4096 ppr / SSI-Gray-Code	SET button + status LED
D8.xB1.xxxx.6326.G223	Sendix 5863 (8.5863.1226.G223)	SSI	10 ... 30 V DC	1 x radial M12 connector	4096 ppr / SSI-Gray-Code	SET button + status LED
D8.xB1.xxxx.F82E.2123	Sendix F5868 (8.F5868.122E.2123)	CANopen	10 ... 30 V DC	1 x radial M12 connector	CANopen encoder profile DS406 V3.2	SET button
D8.xB1.xxxx.6822.2123	Sendix 5868 (8.5868.1222.2123)	CANopen	10 ... 30 V DC	2 x radial M12 connector	CANopen encoder profile DS406 V3.2	SET button
D8.xB1.xxxx.M834.3222	Sendix M5868 (8.M5868.3534.3222)	SAE J1939	10 ... 30 V DC	1 x radial M12 connector	SAE J1939	-
D8.xB1.xxxx.M844.4122	Sendix M5868 (8.M5868.3544.4122)	IO-Link	18 ... 30 V DC	1 x radial M12 connector	IO-Link	-
D8.xB1.xxxx.6832.3113	Sendix 5868 (8.5868.1232.3113)	PROFIBUS	10 ... 30 V DC	3 x radial M12 connector	Profibus-DP V0 encoder profile Class 2	SET button
D8.xB1.xxxx.68B2.B212	Sendix 5868 (8.5868.12B2.B212)	EtherCAT	10 ... 30 V DC	3 x radial M12 connector	EtherCAT with CoE 3.2.10	-
D8.xB1.xxxx.F8CN.C122	Sendix F5868 (8.F5868.12CN.C122)	PROFINET IO	10 ... 30 V DC	3 x axial M12 connector	PROFINET encoder profile version 4.2	-
D8.xB1.xxxx.F8AN.A222	Sendix F5868 (8.F5868.12AN.A222)	EtherNet/IP	10 ... 30 V DC	3 x axial M12 connector	EtherNet/IP	-

### Order code with encoder (analog, scalable with limit switch function)

D8.XB1.XXXX.M1XX.XXXX  
a b c d e f

#### **a** Mechanics

2 = interchangeable installation <sup>1)</sup>  
 4 = fixed installation <sup>2)</sup>

#### **b** Measuring range

0100 = 1000 mm  
 0200 = 2000 mm  
 0300 = 3000 mm

#### **c** Encoder used

M1 = Sendix M5861, absolute <sup>3)</sup>

#### **d** Output circuit

depends on the encoder used

#### **e** Type of connection

depends on the encoder used

#### **f** Resolution / Protocol / Options

depends on the encoder used

#### Optional on request

- Other measuring ranges
- Cable diameter 1 mm
- Other wire fastening (wire clip = standard): eyelet, M4 thread or carabiner ring
- Modified cable and/or connector orientation
- Modified cable outlet direction
- Sensor protection level IP67

### Recommended standard variants (with encoder analog, scalable with limit switch function)

Order no. draw-wire encoder	Mounted encoder	Interface	Power supply	Type of connection	Resolution / Protocol	Option
D8.xB1.xxxx.M134.3612	Sendix M5861 (8.M5861.3534.3612)	Analog, 4 ... 20 mA	10 ... 30 V DC	radial M12 connector	12 Bit / 4 ... 20 mA	scalable without limit switch function <sup>4)</sup>
D8.xB1.xxxx.M144.4612	Sendix M5861 (8.M5861.3544.4612)	Analog, 0 ... 10 V	15 ... 30 V DC	radial M12 connector	12 Bit / 0 ... 10 V	scalable without limit switch function <sup>4)</sup>
D8.xB1.xxxx.M134.3512	Sendix M5861 (8.M5861.3534.3512)	Analog, 4 ... 20 mA	10 ... 30 V DC	radial M12 connector	12 Bit / 4 ... 20 mA	scalable with limit switch function <sup>5)</sup>
D8.xB1.xxxx.M144.4512	Sendix M5861 (8.M5861.3544.4512)	Analog, 0 ... 10 V	15 ... 30 V DC	radial M12 connector	12 Bit / 0 ... 10 V	scalable with limit switch function <sup>5)</sup>

1) Draw-wire mechanics with standard flange. The encoder can be replaced by the customer.

2) The encoder can only be replaced at the factory.

3) With ccw option.

4) Delivery condition: scaled to measuring range.

Description for scaling and limit switch function see data sheet M5861.


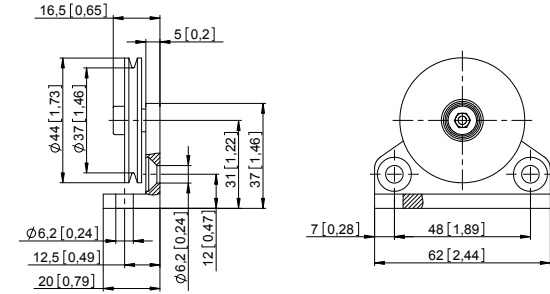

5) Delivery condition: unscaled.

Description for scaling and limit switch function see data sheet M3661.

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<b>Order code with analog sensor (scaled to measuring range)</b>	<b>D8.3B1 . XXXX . XXX X . 0000</b>
	Type      a      b      c
<b>a Measuring range</b> 0100 = 1000 mm 0200 = 2000 mm 0300 = 3000 mm	<b>b Analog sensor output / supply voltage</b> A11 = 4 ... 20 mA / 12 ... 30 V DC A22 = 0 ... 10 V / 12 ... 30 V DC A33 = potentiometer 1 kΩ / max. 30 V DC  <b>c Type of connection</b> 1 = axial cable, 2 m PVC 3 = axial M12 connector, 4-pin
<b>Optional on request</b> - Other measuring ranges - Cable diameter 1 mm - Other wire fastening (wire clip = standard): eyelet, M4 thread or carabiner ring - Modified cable and/or connector orientation - Modified cable outlet direction - Sensor protection level IP67 - Increased temperature range -40 °C ... +85 °C and -20 °C ... +120 °C	

Accessories for draw-wire encoder	Dimensions in mm [inch]	Order no.
<b>Guide pulley</b> 	<b>Technical data:</b> - mounting bracket (anodized alum.) - guide pulley (plastic POM) - ball bearing (type 696-2R5)	<b>Scope of delivery:</b> - 2 x countersunk screws for lateral fixing - 2 x hexagonal screws for fixing on a flat surface
		<b>8.0000.7000.0045</b>
<b>Extension cable</b> (further on request) 	0.5 m with clip 1.0 m with clip 2.0 m with clip	<b>8.0000.7000.0051</b> <b>8.0000.7000.0052</b> <b>8.0000.7000.0054</b>
<b>Cables and connectors</b>		Order no.
<b>Preassembled cables</b>	M12 female connector with coupling nut, 5-pin, A coded, straight single ended 2 m [6.56'] PVC cable	<b>05.00.6081.2211.002M</b>
	M12 male connector with external thread, 4-pin, D coded, straight single ended 2 m [6.56'] PUR cable	<b>05.00.6031.4411.002M</b>
<b>Connectors</b>	M12 female connector with coupling nut, 5-pin, A coded, straight (metal) M12 female connector with coupling nut, 5-pin, A coded, straight (metal/plastic) M12 female connector with coupling nut, 5-pin, A coded, right-angle (plastic)	<b>8.0000.5116.0000</b> <b>05.B-8151-0/9</b> <b>05.B-8251-0/9</b>

Further Kübler cables and connectors can be found at: [kuebler.com/connection-technology](http://kuebler.com/connection-technology)

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## Technical data

Mechanical characteristics (draw-wire mechanics)				
<b>Measuring range</b>	1000 mm	2000 mm	3000 mm	
<b>Extension force</b>	$F_{min}$	6.9 N	6.4 N	6.9 N
	$F_{max}$	8.3 N	7.8 N	9.8 N
<b>Speed max.</b>	10 m/s	10 m/s	10 m/s	
<b>Acceleration max.</b>	140 m/s <sup>2</sup>	140 m/s <sup>2</sup>	140 m/s <sup>2</sup>	
<b>Linearity</b> (of the measuring range)	with analog sensor	±0.15 %	±0.1 %	±0.1 %
	with encoder	±0.05 %	±0.05 %	±0.05 %
		±0.02 % <sup>1)</sup>	±0.02 % <sup>1)</sup>	±0.02 % <sup>1)</sup>
<b>Weight</b>	approx. 750 g [26.45 oz] (dep. on the sensor/encoder used)			
<b>Material</b>	housing	titanium-anodized aluminum		
	wire	stainless steel ø 0.5 mm ø 1 mm can be supplied as a special up to measuring range 1500 mm (other wire types on request)		
<b>Protection</b> acc. to EN 60529	IP65 (sensor)			

Electrical characteristics (digital output)
The electrical characteristics of the draw-wire mechanics with digital output can be found in the data sheets of the encoders.

Approvals		
<b>CE compliant</b> in accordance with	EMC Directive	2014/30/EU
	RoHS Directive	2011/65/EU
<b>UKCA compliant</b> in accordance with	EMC Regulations	S.I. 2016/1091
	RoHS Regulations	S.I. 2012/3032

Electrical characteristics (analog sensor, scaled to measuring range)			
Version	A22	A11	A33
<b>Analog output</b>	0 ... 10 V	4 ... 20 mA	potentiometer
<b>Output</b>	0 ... 10 V / galv. isolated, 4 conductors	4 ... 20 mA / 2 conductors	1 kΩ
<b>Supply voltage</b>	12 ... 30 V DC	12 ... 30 V DC	max. 30 V DC
<b>Recommended slider current</b>	–	–	< 1 μA
<b>Max. current consumption</b>	22.5 mA (no load)	50 mA	–
<b>Reverse polarity protection</b>	yes	yes	–
<b>Working temperature</b>	-20 °C ... +85 °C [-4 °F ... +185 °F]	-20 °C ... +85 °C [-4 °F ... +185 °F]	-20 °C ... +85 °C [-4 °F ... +185 °F]
	-40 °C ... +85 °C [-40 °F ... +185 °F] <sup>2)</sup>	-40 °C ... +85 °C [-40 °F ... +185 °F] <sup>2)</sup>	-40 °C ... +85 °C [-40 °F ... +185 °F] <sup>2)</sup>
			-20 °C ... +120 °C [-4 °F ... +248 °F] <sup>2)</sup>

1) On request for encoder version (see order code **Ⓒ**):  
**00** in combination with interchangeable installation (order code **Ⓐ** = 2) or fixed installation (order code **Ⓐ** = 4)  
**F3, F3, F8, F8** in combination with interchangeable installation (order code **Ⓐ** = 2)  
 2) Optional on request.

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## Terminal assignment (analog sensor)

Analog sensor <b>A11</b> (4 ... 20 mA)			R/I converter					
			Signal:	+V	n.c.	I <sub>out</sub>		n.c.
			Cable <sup>1)</sup>	Core color:	BN	WH		BU
	M12 connector, 4-pin	Pin:	1	2	3	4		

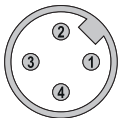
  

Analog sensor <b>A22</b> (0 ... 10 V DC)			R/U converter					
			Signal:	+V	U <sub>out</sub>	0 V		0 V <sub>out</sub>
			Cable <sup>1)</sup>	Core color:	BN	WH		BU
	M12 connector, 4-pin	Pin:	1	2	3	4		

Analog sensor <b>A33</b> (Potentiometer 10 kΩ)			Potentiometer					
			Signal:	+V	Out	0 V		n.c.
			Cable <sup>1)</sup>	Core color:	BN	WH		BU
	M12 connector, 4-pin	Pin:	1	2	3	4		

## Top view of mating side, male contact base



M12 connector, 4-pin

1) Isolate unused cores individually before initial start-up

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## Technology in detail

**Operating principle**

**Construction**  
The core of a draw-wire device is a drum mounted on bearings, onto which a wire is wound. Winding takes place via a spring-loaded device.

**Note**  
Exceeding the maximum extension length of the draw-wire will lead to damage to the wire and the mechanics.

**Wire fastenings**

<p>Clip D8.xx1.xxxx.xxxx</p>	<p>M4 thread D8.xxA.xxxx.xxxx</p>	<p>Eyelet D8.xxJ.xxxx.xxxx</p>	<p>Carabiner ring D8.xxM.xxxx.xxxx</p>	
				<p>ball-bearing swivel (no torsion of the measuring wire during installation)</p> <p>rubber stopper</p> <p>measuring wire</p>

**Wire types**

- V2A,  $\varnothing$  0.5 mm (standard)

Optional on request:

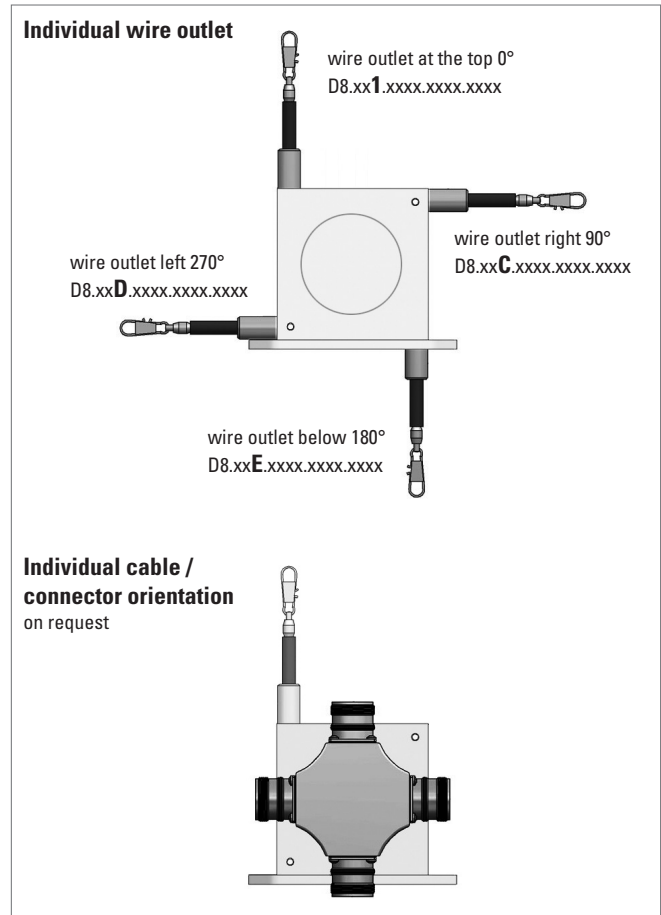
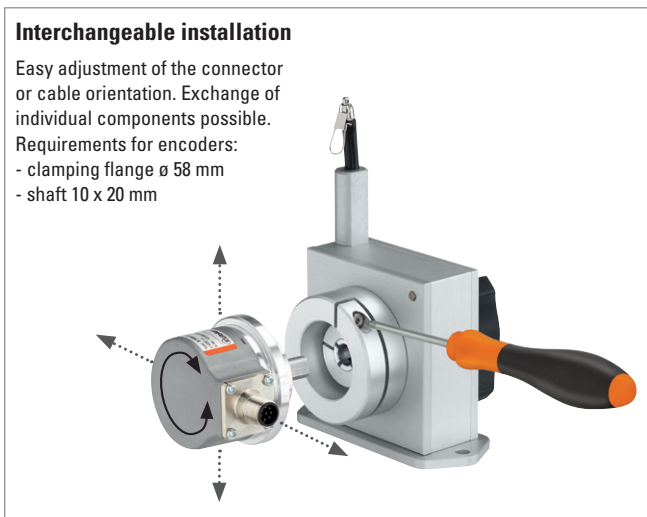
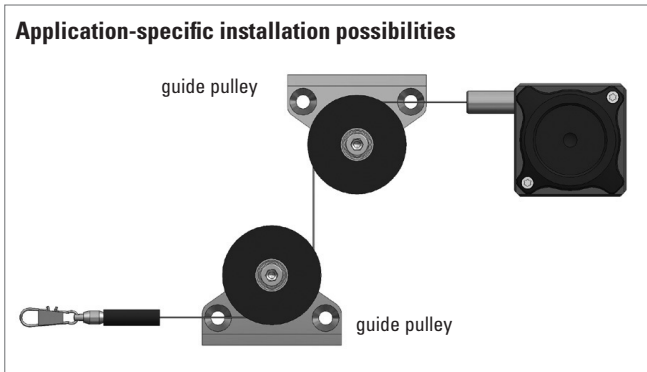
- V4A,  $\varnothing$  0.51 mm
- Coramid,  $\varnothing$  0.6 mm
- V4A plastic coated, 1.0 mm (V4A =  $\varnothing$  0.81 mm)

**Extension wire**

For optimum use of the measuring range by extending the wire length, e. g. to allow realizing a pre-extension in the application. Especially combined with analog interfaces.

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# Linear measuring technology

## Draw-wire encoder B80 Performance-Line Measuring length max. 3 m

### Dimensions

Dimensions in mm [inch]

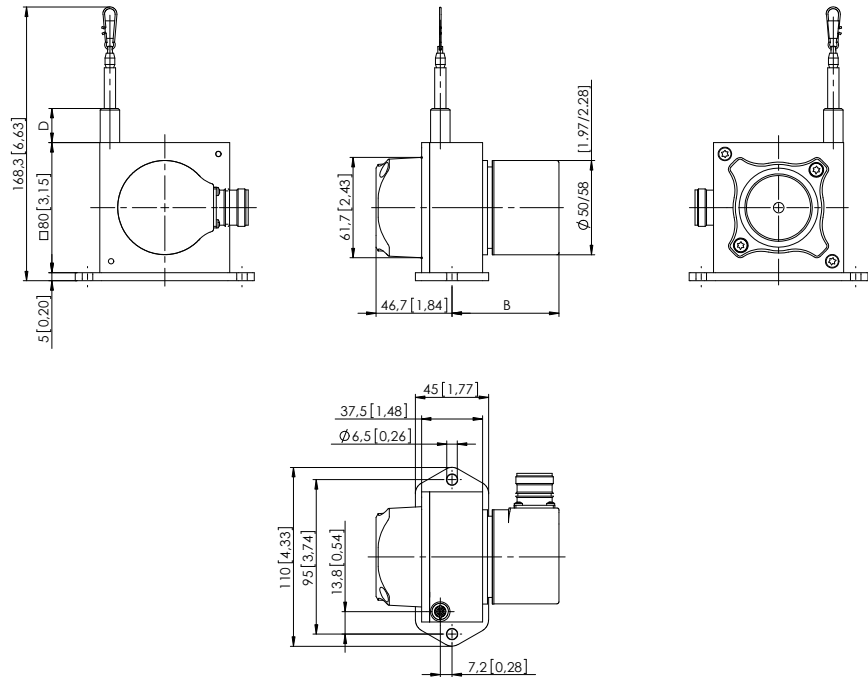
#### Draw-wire mechanics with encoder Fixed installation

Dimension D depends on the measuring range of the draw-wire

Measuring range	D
1000 mm	21 [0.83]
2000 mm	21 [0.83]
3000 mm	35 [1.38]

Dimension B depends on the encoder used

Encoder	B
Sendix incremental (5000) D8.4B1.xxxx.00xx.xxxx	55.75 [2.19]
Sendix absolute (F5863) D8.4B1.xxxx.F3xx.xxxx	68.25 [2.69]
Sendix absolute (5863) D8.4B1.xxxx.63xx.xxxx	68.25 [2.69]
Sendix absolute (F5868, CANopen) D8.4B1.xxxx.F8xx.21xx	88.25 [3.47]
Sendix absolute (F5868, EtherNet/IP) D8.4B1.xxxx.F8xx.A2xx	76.75 [3.02]
Sendix absolute (5868) D8.4B1.xxxx.68xx.xxxx	95.35 [3.75]
Sendix absolute (M586x) D8.4B1.xxxx.Mxxx.xxxx	68.45 [2.69]



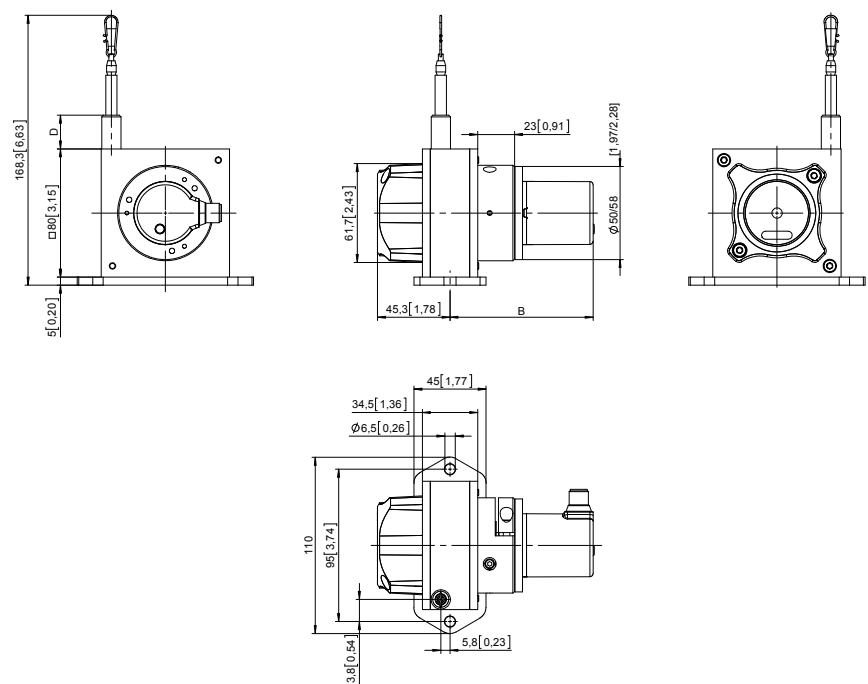
#### Draw-wire mechanics with encoder Interchangeable installation, clamping flange

Dimension D depends on the measuring range of the draw-wire

Measuring range	D
1000 mm	21 [0.83]
2000 mm	21 [0.83]
3000 mm	35 [1.38]

Dimension B depends on the encoder used

Encoder	B
Sendix incremental (5000) D8.2B1.xxxx.00xx.xxxx	78.75 [3.10]
Sendix absolute (F5863) D8.2B1.xxxx.F3xx.xxxx	91.25 [3.59]
Sendix absolute (5863) D8.2B1.xxxx.63xx.xxxx	91.25 [3.59]
Sendix absolute (F5868, CANopen) D8.2B1.xxxx.F8xx.21xx	111.25 [4.40]
Sendix absolute (F5868, EtherNet/IP) D8.2B1.xxxx.F8xx.A2xx	99.75 [3.93]
Sendix absolute (5868) D8.2B1.xxxx.68xx.xxxx	118.35 [4.66]
Sendix absolute (M586x) D8.2B1.xxxx.Mxxx.xxxx	91.45 [3.60]





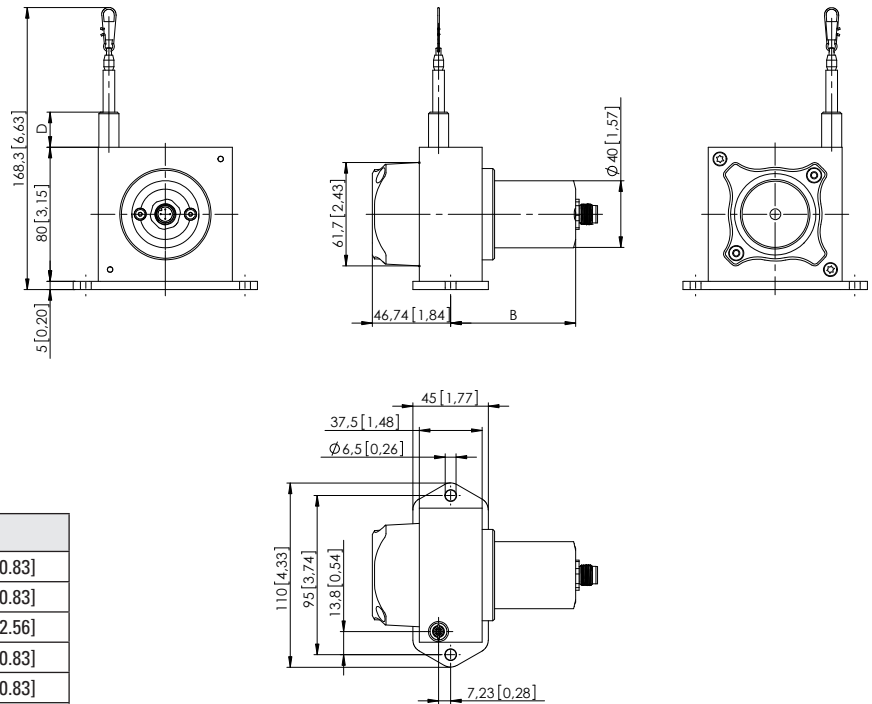
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## Dimensions

Dimensions in mm [inch]

**Draw-wire mechanics with analog sensor  
(scaled to measuring range)**



Sensor typ	Measuring length	B	D
Potentiometer	1000 mm	74 [2.91]	21 [0.83]
	2000 mm	74 [2.91]	21 [0.83]
	3000 mm	102.5 [4.04]	65 [2.56]
4 ... 20 mA	1000 mm	87.5 [3.44]	21 [0.83]
	2000 mm	87.5 [3.44]	21 [0.83]
0 ... 10 V	1000 mm	87.5 [3.44]	21 [0.83]
	2000 mm	102.3 [4.03]	78.5 [3.09]