

# Linear measuring technology

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



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.

Analog output

SSI

PROFI BUS

PROFI NET

EtherCAT  
Conformance tested



CANopen

SAE J1939

EtherNet/IP

IO-Link



Max. acceleration



Long service life



Wide temperature range



High protection level



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/s².
- 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 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

- 00 = Sendix 5000, incremental
- M3 = Sendix M5863, absolute
- F3 = Sendix F5863, absolute
- 63 = Sendix 5863, absolute
- M8 = Sendix M5868, absolute
- F8 = Sendix F5868, absolute
- 68 = Sendix 5868, absolute

### 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 outlet direction
- Sensor protection level IP67
- Improved linearity (0.02 %)

### 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.

# Linear measuring technology

<b>Draw-wire encoder B80</b>	<b>Performance-Line</b>	<b>Measuring length max. 3 m</b>
------------------------------	-------------------------	----------------------------------

## 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.68C2.C212	Sendix 5868 (8.5868.12C2.C212)	PROFINET IO	10 ... 30 V DC	3 x radial M12 connector	PROFINET encoder profile version 4.1	-
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.


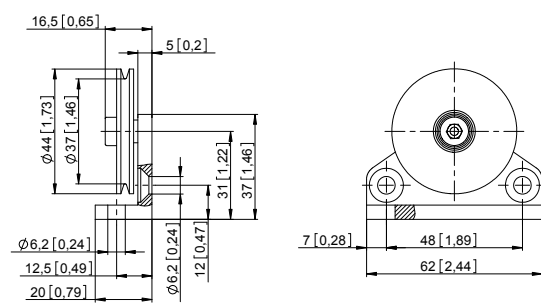

5) Delivery condition: unscaled.

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

# Linear measuring technology

<b>Draw-wire encoder B80</b>	<b>Performance-Line</b>	<b>Measuring length max. 3 m</b>
------------------------------	-------------------------	----------------------------------

<b>Order code with analog sensor (scaled to measuring range)</b>		<b>D8.3B1</b>	<b>. XXXX</b>	<b>. XXX X</b>	<b>. 0000</b>
		Type	<b>a</b>	<b>b</b>	<b>c</b>
<b>a</b> <i>Measuring range</i> 0100 = 1000 mm 0200 = 2000 mm 0300 = 3000 mm	<b>b</b> <i>Analog sensor output / supply voltage</i> A11 = 4 ... 20 mA / 12 ... 30 V DC A22 = 0 ... 10 V / 12 ... 30 V DC A33 = potentiometer 1 kΩ / max. 30 V DC	<i>Optional on request</i> - 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			
<b>c</b> <i>Type of connection</i> 1 = axial cable, 2 m PVC 3 = axial M12 connector, 4-pin					

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>
Connection technology		Order no.
<b>Cordset, pre-assembled</b>	M12 female connector with coupling nut, 5-pin, A coded, straight single ended 2 m [6.56'] PVC cable M12 male connector with external thread, 4-pin, D coded, straight single ended 2 m [6.56'] PUR cable	<b>05.00.6081.2211.002M</b> <b>05.00.6031.4411.002M</b>
<b>Connector, self-assembly</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>

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).

# Linear measuring technology

<b>Draw-wire encoder B80</b>	<b>Performance-Line</b>	<b>Measuring length max. 3 m</b>
------------------------------	-------------------------	----------------------------------

## Technical data

### Mechanical characteristics (draw-wire mechanics)

Measuring range		1000 mm	2000 mm	3000 mm
Extension force	F <sub>min</sub>	6.9 N	6.4 N	6.9 N
	F <sub>max</sub>	8.3 N	7.8 N	9.8 N
Speed max.		10 m/s	10 m/s	10 m/s
Acceleration max.		140 m/s <sup>2</sup>	140 m/s <sup>2</sup>	140 m/s <sup>2</sup>
Linearity (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>
Weight		approx. 750 g [26.45 oz] (dep. on the sensor/encoder used)		
Material	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)		
Protection 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.

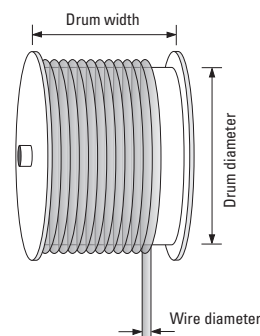
## Operating principle

### 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.



### Electrical characteristics (analog sensor, scaled to measuring range)

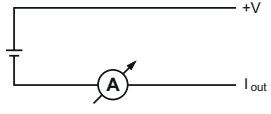
Version	A22	A11	A33
<b>Analog output</b>	0 ... 10 V	4 ... 20 mA	potentiometer
<b>Output</b>	0 ... 10 V / galv. isolated, 4 conductors	4 ... 20 mA / 2 conductors	1 kΩ
<b>Supply voltage</b>	12 ... 30 V DC	12 ... 30 V DC	max. 30 V DC
<b>Recommended slider current</b>	—	—	< 1 μA
<b>Max. current consumption</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] -40 °C ... +85 °C [-40 °F ... +185 °F] <sup>2)</sup>	-20 °C ... +85 °C [-4 °F ... +185 °F] -40 °C ... +85 °C [-40 °F ... +185 °F] <sup>2)</sup>	-20 °C ... +85 °C [-4 °F ... +185 °F] -40 °C ... +85 °C [-40 °F ... +185 °F] <sup>2)</sup> -20 °C ... +120 °C [-4 °F ... +248 °F] <sup>2)</sup>
<b>CE compliant</b> acc. to	EMC guideline 2014/30/EU RoHS guideline 2011/65/EU		

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, G3, F8, G8** in combination with interchangeable installation (order code **Ⓐ** = 2)  
2) Optional on request.

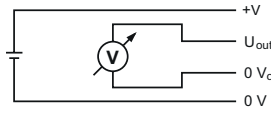
# Linear measuring technology

<b>Draw-wire encoder B80</b>	<b>Performance-Line</b>	<b>Measuring length max. 3 m</b>
------------------------------	-------------------------	----------------------------------

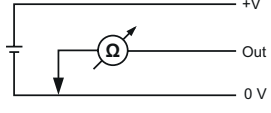
## Terminal assignment (analog sensor)

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	BK	
	M12 connector, 4-pin	Pin:	1	2	3	4	

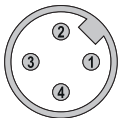
  

Analog sensor <b>A22</b> (0 ... 10 V DC)			R/U converter				
		Signal:	+V	U <sub>out</sub>	0 V	0 V <sub>out</sub>	
	Cable <sup>1)</sup>	Core color:	BN	WH	BU	BK	
	M12 connector, 4-pin	Pin:	1	2	3	4	

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	BK	
	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

# Linear measuring technology

## Draw-wire encoder B80

## Performance-Line

## Measuring length max. 3 m

### Technology in detail

#### Wire fastenings

Clip  
D8.xx1.xxxx.xxxx



M4 thread  
D8.xxA.xxxx.xxxx



Eyelet  
D8.xxJ.xxxx.xxxx



Carabiner ring  
D8.xxM.xxxx.xxxx



ball-bearing swivel  
(no torsion of the measuring wire  
during installation)

rubber stopper

measuring wire

#### 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)

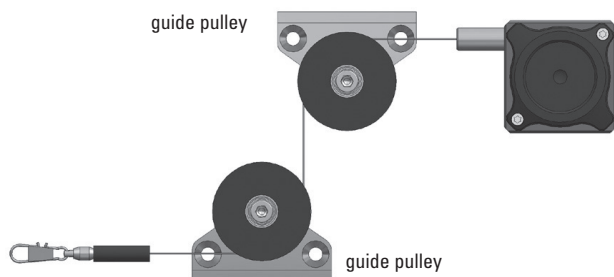


#### Extension wire

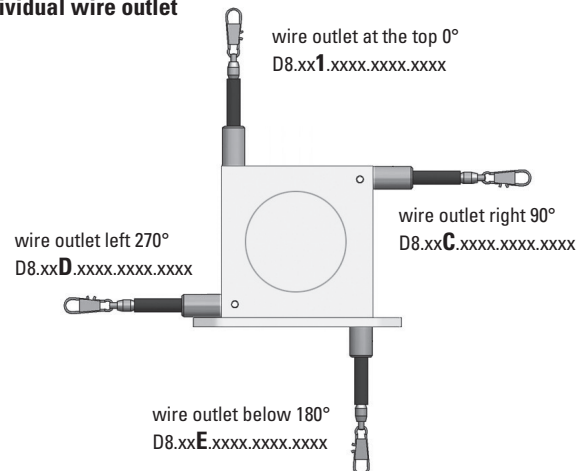
For optimum use of the measuring range by extending the wire length, e. g. to allow realizing a pre-extension in the application. Especially combined with analog interfaces.



#### Application-specific installation possibilities



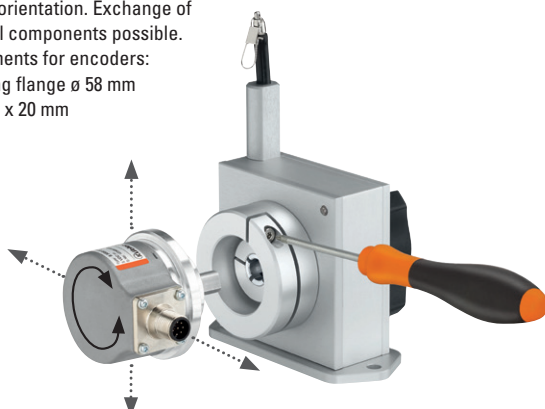
#### Individual wire outlet



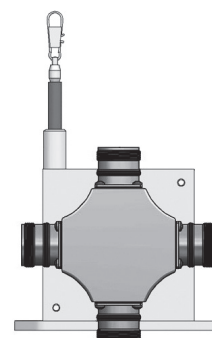
#### Interchangeable installation

Easy adjustment of the connector or cable orientation. Exchange of individual components possible.

- Requirements for encoders:
- clamping flange  $\varnothing$  58 mm
  - shaft 10 x 20 mm



#### Individual cable / connector orientation on request



# Linear measuring technology

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

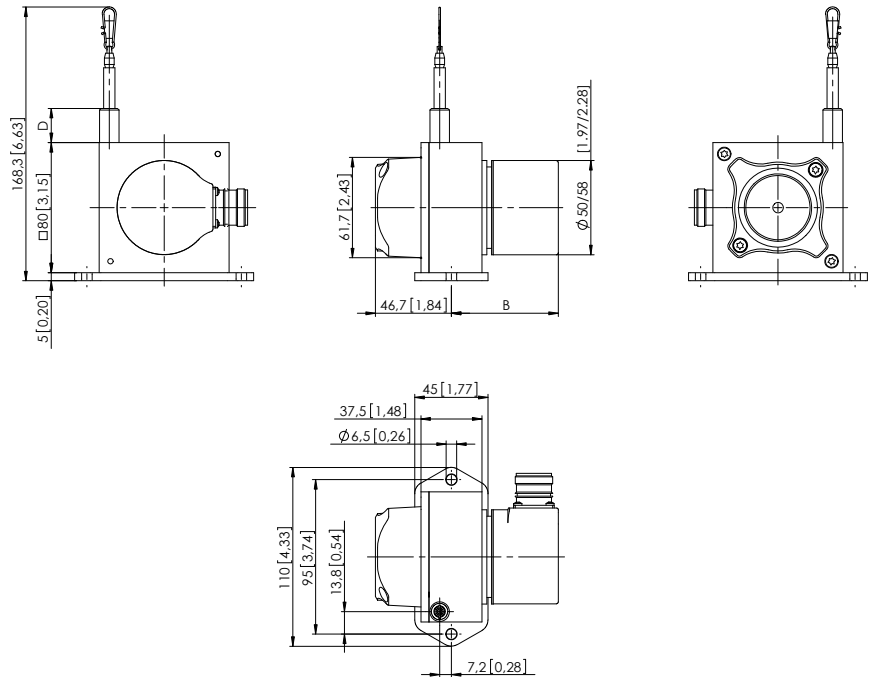
## Dimensions

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]

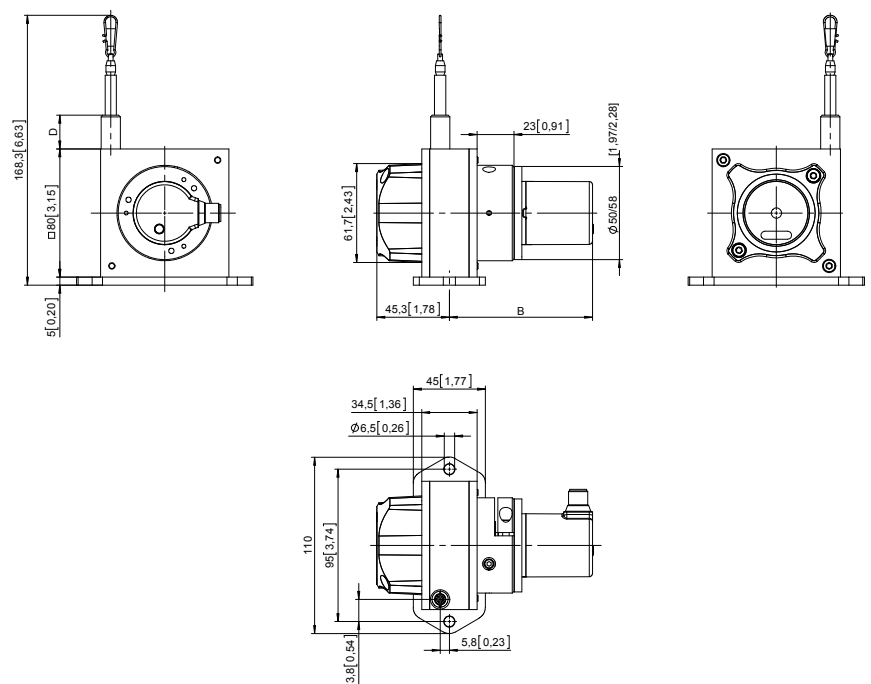
Dimension B depends on the encoder used	
Encoder	B
Sendix incremental (5000) D8.4B1.xxxx.00xx.xxxx	55.75 [2.19]
Sendix absolute (F5863) D8.4B1.xxxx.F3xx.xxxx	68.25 [2.69]
Sendix absolute (5863) D8.4B1.xxxx.63xx.xxxx	68.25 [2.69]
Sendix absolute (F5868, CANopen) D8.4B1.xxxx.F8xx.21xx	88.25 [3.47]
Sendix 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]



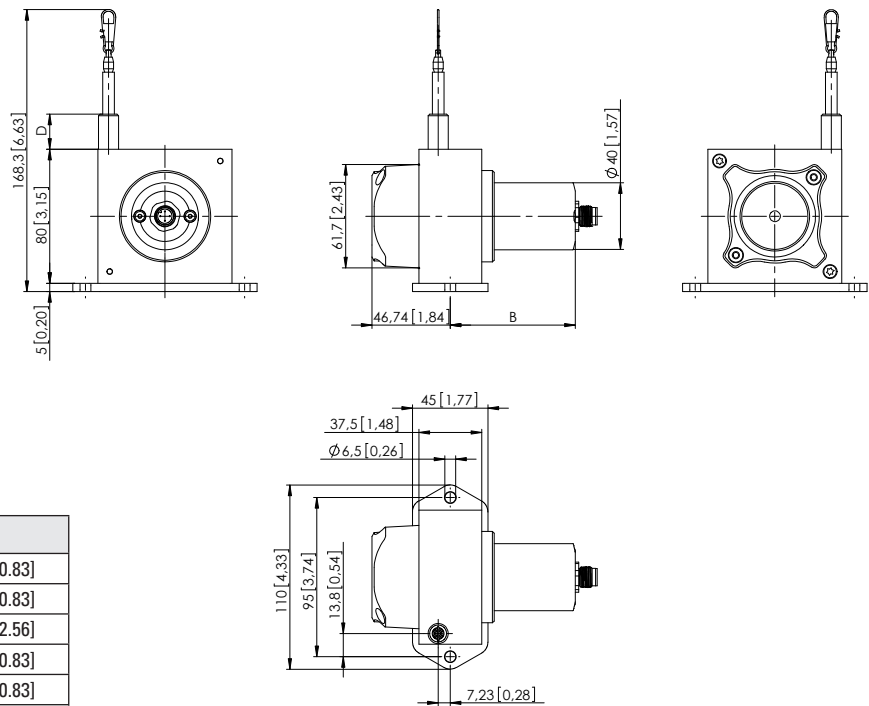
# Linear measuring technology

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

## 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 0 ... 10 V	1000 mm	87.5 [3.44]	21 [0.83]
	2000 mm	87.5 [3.44]	21 [0.83]
	3000 mm	102.3 [4.03]	78.5 [3.09]