

# Linear measuring technology

**Draw-wire mechanics with encoder or analog sensor**

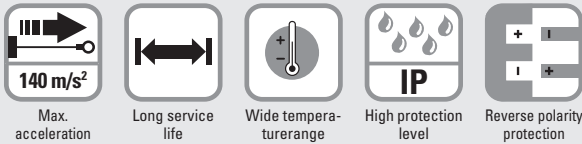
**Draw-wire encoder B80**

**Measuring length max. 3 m  
Traverse speed max. 10 m/s**



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.



## 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** 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
- Eyelet or M4 wire fastening instead of wire clip
- Modified cable and/or connector orientation
- 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 mechanics with encoder or analog sensor</b>	<b>Draw-wire encoder B80</b>	<b>Measuring length max. 3 m Traverse speed max. 10 m/s</b>
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### 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	radial M12 connector	2000 ppr	-
D8.xB1.xxxx.M324.G222	Sendix M5863 (8.M5863.3524.G222)	SSI	10 ... 30 V DC	radial M12 connector	4096 ppr / SSI-Gray-Code	-
D8.xB1.xxxx.M824.2122	Sendix M5868 (8.M5868.3524.2122)	CANopen	10 ... 30 V DC	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.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
- Eyelet or M4 wire fastening instead of wire clip
- 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>

### Order code with analog sensor (scaled to measuring range)

D8.3B1.XXXX.XXX.X.0000

a
b
c

**a** *Measuring range*  
0100 = 1000 mm  
0200 = 2000 mm  
0300 = 3000 mm

**b** *Analog sensor output / power supply*  
A11 = 4 ... 20 mA / 12 ... 30 V DC  
A22 = 0 ... 10 V / 12 ... 30 V DC  
A33 = potentiometer 1 kΩ / max. 30 V DC

**c** *Type of connection*  
1 = axial cable, 2 m PVC  
3 = axial M12 connector, 4-pin

#### Optional on request

- Other measuring ranges
- Cable diameter 1 mm
- Eyelet or M4 wire fastening instead of wire clip
- Modified cable and/or connector orientation
- Modified cable outlet direction
- Sensor protection level IP67
- Improved linearity (0.02 %)
- Increased temperature range -40°C ... +85°C and -20°C ... +120°C

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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**Draw-wire mechanics with encoder or analog sensor**

**Draw-wire encoder B80**

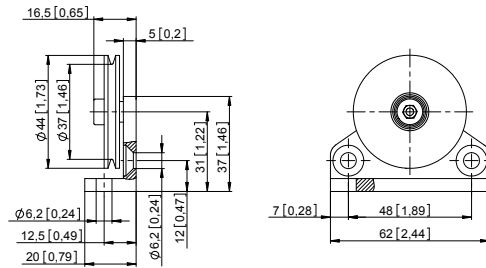
**Measuring length max. 3 m  
Traverse speed max. 10 m/s**

**Accessories for draw-wire encoder**

Dimensions in mm [inch]

Order no.

**Guide pulley**



Technical data:  
 - mounting bracket (anodized alum.)  
 - guide pulley (plastic POM)  
 - ball bearing (type 696-2R5)

Scope of delivery:  
 - 2 x countersunk screws for lateral fixing  
 - 2 x hexagonal screws for fixing on a flat surface

**8.0000.7000.0045**

**Connection technology for analog sensor**

Order no.

**Cordset, pre-assembled**

M12 female connector with coupling nut, 5-pin  
 2 m [6.56'] PVC cable

**05.00.6081.2211.002M**

M12 male connector with external thread, 4-pin  
 2 m [6.56'] PVC cable

**05.00.6031.4411.002M**

**Connector, self-assembly (straight)**

M12 female connector with coupling nut, housing metal, 5-pin

**8.0000.5116.0000**

M12 female connector with coupling nut, housing metal/plastic, 5-pin

**05.B-8151-0/9**

**Connector, self-assembly (right-angle)**

M12 female connector with coupling nut, housing plastic, 5-pin

**05.B-8251-0/9**

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

**Technical data**

**Mechanical characteristics (draw-wire mechanics)**

Measuring range	1000 mm	2000 mm	3000 mm	
Extension force	$F_{min}$	6.9 N	6.4 N	6.9 N
	$F_{max}$	8.3 N	7.8 N	9.8 N
Max. speed	10 m/s	10 m/s	10 m/s	
Max. acceleration	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 $\varnothing$ 0.5 mm $\varnothing$ 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.

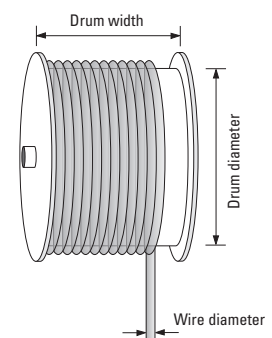
**Operating principle**

**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.



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, F8, F8, F8** in combination with interchangeable installation (order code **ⓐ** = 2)

# Linear measuring technology

<b>Draw-wire mechanics with encoder or analog sensor</b>	<b>Draw-wire encoder B80</b>	<b>Measuring length max. 3 m Traverse speed max. 10 m/s</b>
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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>Power supply</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 [-40°F ... +185°F] -40°C ... +85°C [-40°F ... +185°F] <sup>1)</sup>	-20°C ... +85°C [-40°F ... +185°F] -40°C ... +85°C [-40°F ... +185°F] <sup>1)</sup>	-20°C ... +85°C [-40°F ... +185°F] -40°C ... +85°C [-40°F ... +185°F] <sup>1)</sup> -20°C ... +120°C [-4°F ... +248°F] <sup>1)</sup>
<b>Connection diagrams</b>			
<b>CE compliant acc. to</b>	EMC guideline 2014/30/EU RoHS guideline 2011/65/EU		

## Technology in detail

**Various wire types and wire fastenings**

Wire types:

- 0.5 mm (V2A) <sup>2)</sup>
- 0.51 mm (V4A)
- 1.0 mm plastic-coated (V4A = 0.81 mm, plastic 0.19 mm)
- 0.6 mm (Coramid)

Wire fastenings:

- Clip <sup>2)</sup>
- M4 thread
- Eyelet

**Individual wire outlet and cable / connector orientation**

**Extension wire**

**Application-specific installation possibilities**

1) Optional on request.  
2) Standard.

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**Draw-wire mechanics with encoder or analog sensor**

**Draw-wire encoder B80**

**Measuring length max. 3 m  
Traverse speed max. 10 m/s**

## Dimensions

Dimensions in mm [inch]

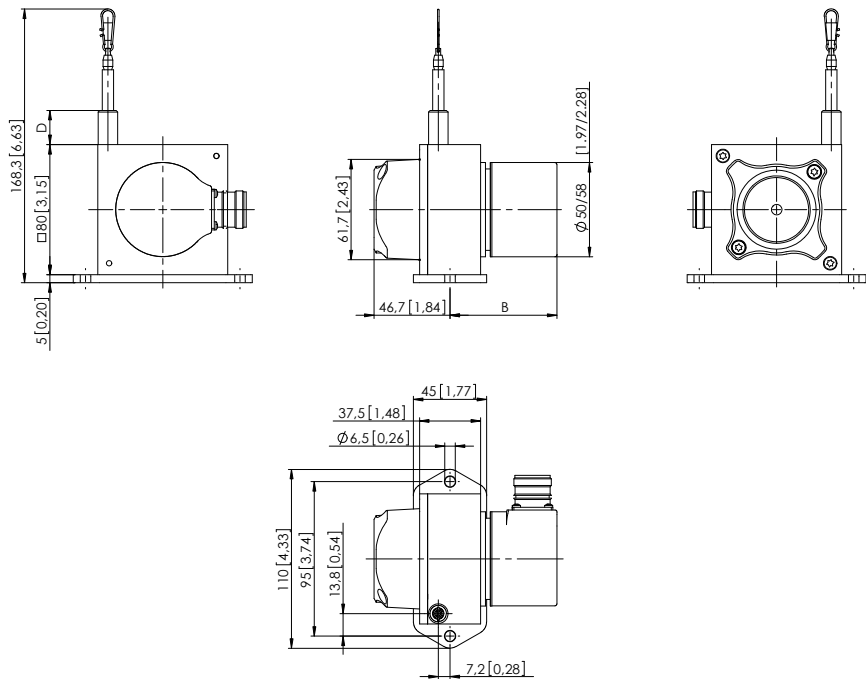
### Draw-wire mechanics with encoder Fixed installation

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]



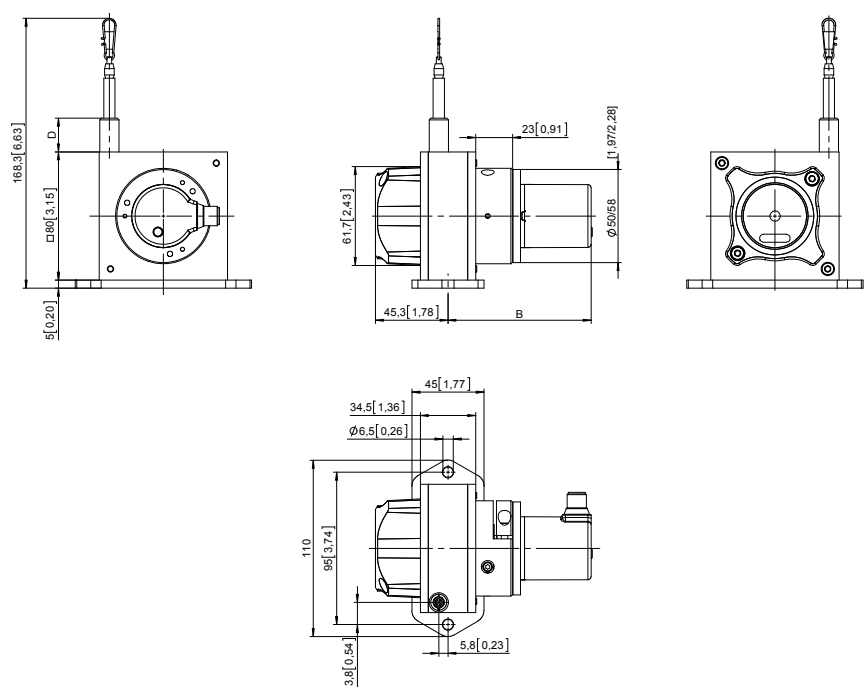
### Draw-wire mechanics with encoder Interchangeable installation, clamping flange

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]



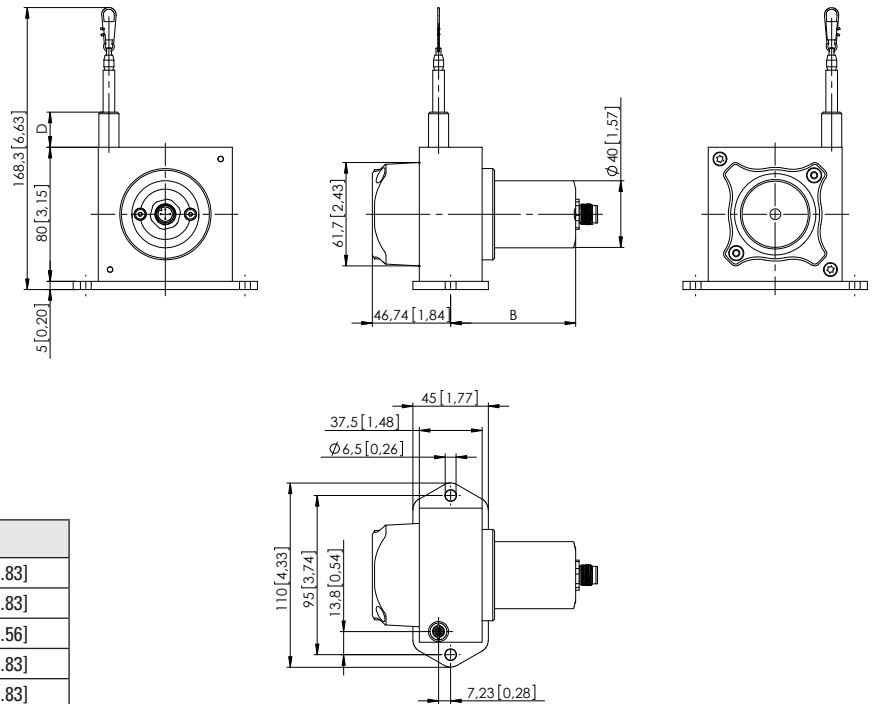
# Linear measuring technology

<b>Draw-wire mechanics with encoder or analog sensor</b>	<b>Draw-wire encoder B80</b>	<b>Measuring length max. 3 m</b> <b>Traverse speed max. 10 m/s</b>
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## Dimensions

Dimensions in mm [inch]

### Draw-wire mechanics with analog sensor (scaled on measuring range)

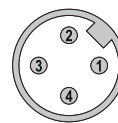


Sensor type	Measuring length	B	D
Potentiometer	1000 mm	74 [2.91]	21 [0.83]
	2000 mm	74 [2.91]	21 [0.83]
	3000 mm	102.5 [4.04]	65 [2.56]
4 ... 20 mA 0 ... 10 V	1000 mm	87.5 [3.44]	21 [0.83]
	2000 mm	87.5 [3.44]	21 [0.83]
	3000 mm	102.3 [4.03]	78.5 [3.09]

## Terminal assignment (analog sensor A11, A22, A33)

Pin	1	2	3	4
Core color	BN	WH	BU	BK
0 ... 10 V	+V	Signal	0 V	0 V Sig.
4 ... 20 mA	+V	n. c.	Signal	n. c.
1 kΩ	+V	Slider	0 V	n. c.

### Top view of mating side, male contact base



M12 connector, 4-pin