

Энкодеры с тросовым барабаном Performance Line, Robust Line, Compact Line, Base Line

Технические характеристики

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Draw-wire encoder C60

Robust-Line

Measuring length max. 4 m



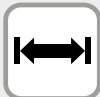
With its extremely robust design, the high protection class IP69k and the wide temperature range up to -40 °C ... $+85\text{ °C}$ the draw-wire encoders C60 are specially developed for outdoor applications.

Their flexibility and adaptability reflects in the wide range of housing and wire types, the long measuring range and the various interfaces. The possibility of redundancy must be particularly pointed out.



Analog
output

CANopen



Long service
life



Wide tempera-
ture range



High protection
level



Redundancy



V4A



Integrated
swivel



For outdoor
applications



3 housing
types

Robust

- Protection level up to IP69k and wide temperature range up to -40 °C ... $+85\text{ °C}$.
- The titanium-anodized aluminum housing and the stainless steel wires allow using the mechanics even in harsh conditions.
- Wire diameter (stainless steel V4A, plastic coated) up to $\varnothing 1\text{ mm}$ - ideal for outdoor applications.

Versatile

- Measuring length up to 4 m.
- Redundant outputs (mA, V, R, CANopen).
- The right measuring wire and the right wire fastening for every application.
- Linearity up to $\pm 0.1\%$ of the measuring range.
- Various constructions: open, closed housing or housing with perforated plate cover.

Linear measuring technology

Draw-wire encoder C60	Robust-Line	Measuring length max. 4 m
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Order code	D8.C60 Type	. XXXXX . XXX X . 0000 . XXXX
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a Measuring length

- 2 = 1.0 m
- 3 = 1.5 m
- 4 = 2.0 m
- 5 = 2.5 m
- 6 = 3.0 m
- 7 = 3.5 m
- 8 = 4.0 m

b Wire types (stainless steel V4A, plastic coated)

- 1 = ø 0.5 mm
- 2 = ø 0.7 mm
- 3 = ø 1.0 mm (not for measuring length 3.5 ... 4 m)

c Linearity

- 1 = standard linearity 0.5 %
- 2 = improved linearity 0.25 %
- 3 = improved linearity 0.1 %

d Housing

- 1 = open housing
- 3 = housing with perforated plate cover
- 6 = closed housing

e Single sensor / supply voltage

- A11 = 4 ... 20 mA / 12 ... 30 V DC
- A22 = 0 ... 10 V / 12 ... 30 V DC
- A33 = 1 kΩ / max. 30 V DC
- A44 = 0.5 ... 4.5 V / 8 ... 30 V DC
- A55 = 0 ... 5 V / 8 ... 30 V DC
- CC1 = CANopen / 8 ... 30 V DC

Redundant sensor / supply voltage

- R11 = 2 x 4 ... 20 mA / 12 ... 30 V DC
- R22 = 2 x 0 ... 10 V / 12 ... 30 V DC
- R33 = 2 x 1 kΩ / max. 30 V DC
- R44 = 2 x 0.5 ... 4.5 V / 8 ... 30 V DC
- R55 = 2 x 0 ... 5 V / 8 ... 30 V DC
- RC1 = 2 x CANopen / 8 ... 30 V DC

f Type of connection / protection level sensor

Cable connection, standard lengths ¹⁾

- 1 = axial cable, 2 m [6.56'] TPE / IP69k
- 2 = axial cable, 2 m [6.56'] TPE / IP67
- C = axial cable, 5 m [16.40'] TPE / IP69k
- E = axial cable, 5 m [16.40'] TPE / IP67
- D = axial cable, 10 m [32.81'] TPE / IP69k
- F = axial cable, 10 m [32.81'] TPE / IP67

Connector

- 3 = axial M12 connector / IP67
- 4-pin for sensor type A11 ... A55
- 5-pin for sensor type CC1 ... RC1
- 8-pin for sensor type R11 ... R55

g Extended order options (optional)

Wire fastenings (standard = carabiner ring)

- V001 = M4 thread
- V002 = eyelet
- V007 = clip

Extended temperature range -40 °C ... +85 °C

(only in combination with the standard linearity 0.5 %, **c** = 1)

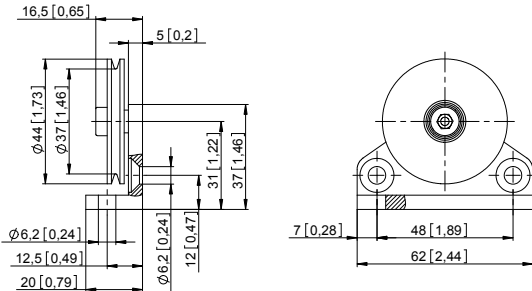
- V003 = with carabiner ring
- V004 = with M4 thread
- V005 = with eyelet
- V008 = with clip

Relationship measuring length – wire types – linearity

Measuring length [m]	1.0			1.5			2.0			2.5			3.0			3.5		4.0	
order code a	2			3			4			5			6			7		8	
Wire type ø [mm]	0.5	0.7	1.0	0.5	0.7	1.0	0.5	0.7	1.0	0.5	0.7	1.0	0.5	0.7	1.0	0.5	0.7	0.5	0.7
order code b	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	1	2
Standard linearity ± 0.5 %	order code c = 1			±0.5 %			±0.5 %			±1 %			±0.5 %			±1 %		±0.5 %	
Improved linearity ±0.25 %	order code c = 2			✓	✓	✓	✓	✓	–	✓	–	–	✓	–	–	–	–	–	–
Improved linearity ±0.1 %	order code c = 3			✓	✓	✓	✓	✓	–	✓	–	–	✓	–	–	–	–	–	–

✓ feasible / – not feasible

Linear measuring technology

Draw-wire encoder C60		Robust-Line	Measuring length max. 4 m	
Accessories for draw-wire encoder		Dimensions in mm [inch]		Order no.
Guide pulley for wire type 1 (0.5 mm)		Technical data:	Scope of delivery:	8.0000.7000.0045 ¹⁾
		- mounting bracket (anodized alum.) - guide pulley (plastic POM) - ball bearing (type 696-2R5)	- 2 x countersunk screws for lateral fixing - 2 x hexagonal screws for fixing on a flat surface	
				
Extension cable (further on request)		0.5 m with clip		8.0000.7000.0051
		1.0 m with clip		8.0000.7000.0052
		2.0 m with clip		8.0000.7000.0054
Cables and connectors		Order no.		
Preamsembled cables	M12 female connector with coupling nut, 4-pin, A coded, straight single ended 2 m [6.56'] PUR cable			05.00.6061.6211.002M
	M12 female connector with coupling nut, 5-pin, A coded, straight single ended 2 m [6.56'] PVC cable			05.00.6081.2211.002M
	M12 female connector with coupling nut, 8-pin, A coded, straight single ended 2 m [6.56'] PVC cable			05.00.6041.8211.002M
Connectors	M12 female connector with coupling nut, 4-pin, A coded, straight (plastic)			05.B8141-0
	M12 female connector with coupling nut, 5-pin, A coded, straight (metal/plastic)			05.B-8151-0/9
	M12 female connector with coupling nut, 8-pin, A coded, straight (metal)			05.CMB 8181-0

1) Stock types.

Linear measuring technology

Draw-wire encoder C60	Robust-Line	Measuring length max. 4 m
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Technical data

General technical data			Interface characteristics CANopen – Sensor type CC1, RC1	
Standard linearity	±0.5 %		CAN specification	Full CAN 2.0B (ISO11898)
Improved linearity	±0.25 % or ±0.1 %		Communication profile	CANopen CiA 301 V 4.2.0
Resolution	see electrical characteristics		Device profile	encoder, absolute linear; CiA 406 V 3.2.0
Sensor element	potentiometer		Error monitoring	Producer Heartbeat, Emergency Message, Node Guarding
Output signal (others on request)	4 ... 20 mA 0 ... 10 V, 0.5 ... 4.5 V, 0 ... 5 V Potentiometer CANopen		Node ID	default: 7, adjustable via SDO
Connection	axial M12 connector or axial cable outlet (TPE cable), standard length 2, 5, 10 m		PDO	1 x TPDO, static mapping
Protection	M12 connector	IP67 IP67, IP69k	PDO functions	event-triggered, time-triggered, Sync-cyclic, Sync-acyclic
Humidity	max. 90 % relative, no condensing		Transmission rate	Default 250 kbit/s, 1 Mbps, 800, 500, 250, 125, 50, 20 kbps adjustable via SDO
Working temperature	standard	-20 °C ... +85 °C [-4 °F ... +185 °F] as extended order option (s.page 6)	Bus connection	M12 connector, 5-pin or axial cable outlet (TPE cable), standard length 2 m
Speed max.	3.0 m/s		Integrated bus terminating resistor	120 ohms ready-to-activate via SDO
Acceleration max.	50 m/s ²		Bus, galvanic isolation	no
Weight	up to approx. 420 g [14.82 oz] depending on measuring range and measuring wire diameter		Supply voltage	8 ... 30 V DC
Housing	aluminum, spring housing PA6		Current consumption	typ. 10 mA at 24 V, typ. 20 mA at 12 V
Spring force	min. 4 N / max. 6 N ¹⁾		Measuring rate	1 kHz with 16 bit resolution
			Resolution	0.002 % of the measuring range
			Electrical protection	Reverse polarity protection

Electrical characteristics (analog sensor, scaled to measuring range)					
Sensor type	A11 / R11 Current output	A22, R22	A44, R44 Voltage outputs	A55, R55	A33 / R33 Potentiometer
Output	4 ... 20 mA	0 ... 10 V	0.5 ... 4.5 V	0 ... 5 V	1 kΩ
Supply voltage	12 ... 30 V DC	12 ... 30 V DC	8 ... 30 V DC	8 ... 30 V DC	max. 30 V DC
Recommended slider current	—	—	—	—	< 1 µA
Current consumption	—	—	25 mA (non load)	—	—
Output current	max. 50 mA in case of a failure	max. 10 mA, min. load 10 kΩ	—	—	—
Response time	< 1 ms from 0 ... 100 % and 100 ... 0 %	< 3 ms from 0 ... 100 % and 100 ... 0 %	—	—	—
Resolution	theoretically unlimited, limited by the noise				
Noise	1.6 mA _{eff}	—	0.5 mV _{eff}	—	depending on the supply voltage
Reverse polarity protection	—	—	yes	—	—
Short circuit proof	—	—	yes	—	—
Temperature coefficient	0.0079 %/K	—	0.0037 %/K	—	±0.0025 %/K

Characteristics measuring wire			Approvals	
Material	stainless steel V4A (1.4401), plastic coated		Electromagnetic compatibility	acc. to EN 61326-1, EN 61326-3-1
Measuring range	ø 0.5 mm 1 ... 4 m ø 0.7 mm 1 ... 4 m ø 1.0 mm 1 ... 3 m		CE compliant in accordance with	
Breaking force	ø 0.5 mm 130 N ø 0.7 mm 216 N ø 1.0 mm 478 N		EMC Directive	2014/30/EU
Temperature coefficient	16 x 10 ⁻⁶ K ⁻¹		RoHS Directive	2011/65/EU

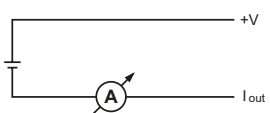
1) Depends on the measuring length.

Linear measuring technology

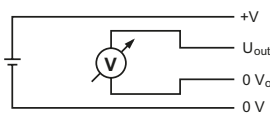
Draw-wire encoder C60	Robust-Line	Measuring length max. 4 m
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Terminal assignment

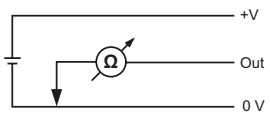
Analog sensor A11 (4 ... 20 mA)	Cable ¹⁾ M12 connector, 4-pin	Signal:	R/I converter							
			+V	n.c.	I _{out}	n.c.				
		Core color:	BN	WH	BU	BK				
Analog sensor redundant R11 (2 x 4 ... 20 mA)	Cable ¹⁾ M12 connector, 8-pin	Signal:	R/I-Wandler 1		R/I-Wandler 2					
			+V ₁	I _{out 1}	+V ₂	I _{out 2}	n.c.	n.c.	n.c.	n.c.
		Core color:	WH	GN	GY	BU	BN	YE	PK	RD
	M12 connector, 8-pin	Pin:	1	3	5	7	2	4	6	8



Analog sensor A22 (0 ... 10 V DC) A44 (0.5 ... 4.5 V) A55 (0 ... 5 V)	Cable ¹⁾ M12 connector, 4-pin	Signal:	R/U converter							
			+V	U _{out}	0 V	0 V _{out}				
		Core color:	BN	WH	BU	BK				
Analog sensor redundant R22 (2 x 0 ... 10 V DC) R44 (2 x 0.5 ... 4.5 V) R55 (2 x 0 ... 5 V)	Cable ¹⁾ M12 connector, 8-pin	Signal:	R/U converter 1				R/U converter 2			
			+V ₁	U _{out 1}	0 V ₁	0 V _{out 1}	+V ₂	U _{out 2}	0 V ₂	0 V _{out 2}
		Core color:	WH	BN	GN	YE	GY	PK	BU	RD
	M12 connector, 8-pin	Pin:	1	2	3	4	5	6	7	8

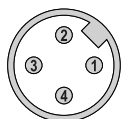


Analog sensor A33 (potentiometer 1 kΩ)	Cable ¹⁾ M12 connector, 4-pin	Signal:	Potentiometer							
			+V	Out	0 V	n.c.				
		Core color:	BN	WH	BU	BK				
Analog sensor redundant R33 (2 x potentiometer 1 kΩ)	Cable ¹⁾ M12 connector, 8-pin	Signal:	Potentiometer 1				Potentiometer 2			
			+V ₁	Out ₁	0 V ₁	n.c.	+V ₂	Out ₂	0 V ₂	n.c.
		Core color:	WH	BN	GN	YE	GY	PK	BU	RD
	M12 connector, 8-pin	Pin:	1	2	3	4	5	6	7	8

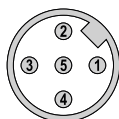


Digital sensor CC1 (CANopen)	Cable ¹⁾ M12 connector, 5-pin	Signal:	CANopen							
			+V	0 V	CAN_GND	CAN_H	CAN_L			
		Core color:	WH	BU	BN	BK	GY			
Digital sensor redundant RC1 (2 x CANopen)	Cable ¹⁾ M12 connector, 5-pin	Signal:	CANopen 1 + CANopen 2							
			+V	0 V	CAN_GND	CAN_H	CAN_L			
		Core color:	WH	BU	BN	BK	GY			
	M12 connector, 5-pin	Pin:	2	3	1	4	5			

Top view of mating side, male contact base



M12 connector, 4-pin



M12 connector, 5-pin



M12 connector, 8-pin

Linear measuring technology

Draw-wire encoder C60

Robust-Line

Measuring length max. 4 m

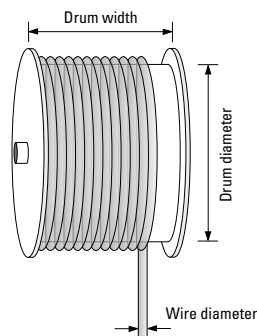
Technology in detail

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. A specific feature of Kübler draw-wire mechanics is the single-layer wire winding (for short wire lengths) to ensure best possible linearity.

Depending on the required linearity, a multi-layer winding may however be accepted for the C60 draw-wire encoder.



Note

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

In addition, snapping of the cable during installation must imperatively be avoided, as this can also lead to damages.

Wire fastenings

Carabiner ring
D8.C60...xxxx.xxx.xxx

M4 thread
D8.C60...xxxx.xxx.xxx.V001

Eyelet
D8.C60...xxxx.xxx.xxx.V002

Clip
D8.C60...xxxx.xxx.xxx.V007



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

rubber stopper

measuring wire

Wire types

- Stainless steel V4A, plastic coated, $\varnothing$ 0.5 mm, order option **b** = 1
- Stainless steel V4A, plastic coated, $\varnothing$ 0.7 mm, order option **b** = 2
- Stainless steel V4A, plastic coated, $\varnothing$ 1.0 mm, order option **b** = 3

Ideally suited for long-term outdoor use.

The plastic coating has a dirt-repellent effect and has in the same time optimum sliding properties.



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 (options A11 ... A55 and R11 ... R55).



Linear measuring technology

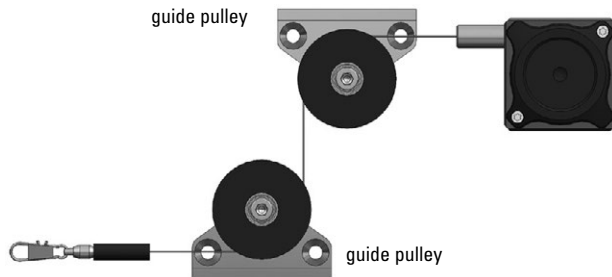
Draw-wire encoder C60

Robust-Line

Measuring length max. 4 m

Technology in detail

Application-specific installation possibilities



Extended temperature range -40 °C ... +85 °C

(only in combination with the standard linearity 0.5 %, **C** = 1)

By using special components.

Order code extensions for the extended temperature range:

With carabiner ring: D8.C60.xxxx.xxxx.xxxx.V003

With M4 thread: D8.C60.xxxx.xxxx.xxxx.V004

With eyelet: D8.C60.xxxx.xxxx.xxxx.V005

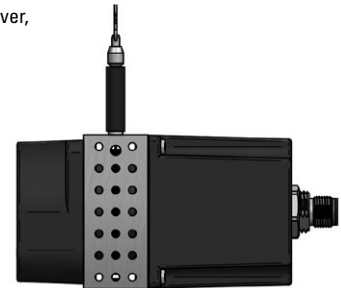
With clip: D8.C60.xxxx.xxxx.xxxx.V008

Housing types (the suitable housing type for every application)

Open housing,
order option **U** = 1



Housing with perforated plate cover,
order option **U** = 3



Closed housing,
order option **U** = 6



Linear measuring technology

Draw-wire encoder C60

Robust-Line

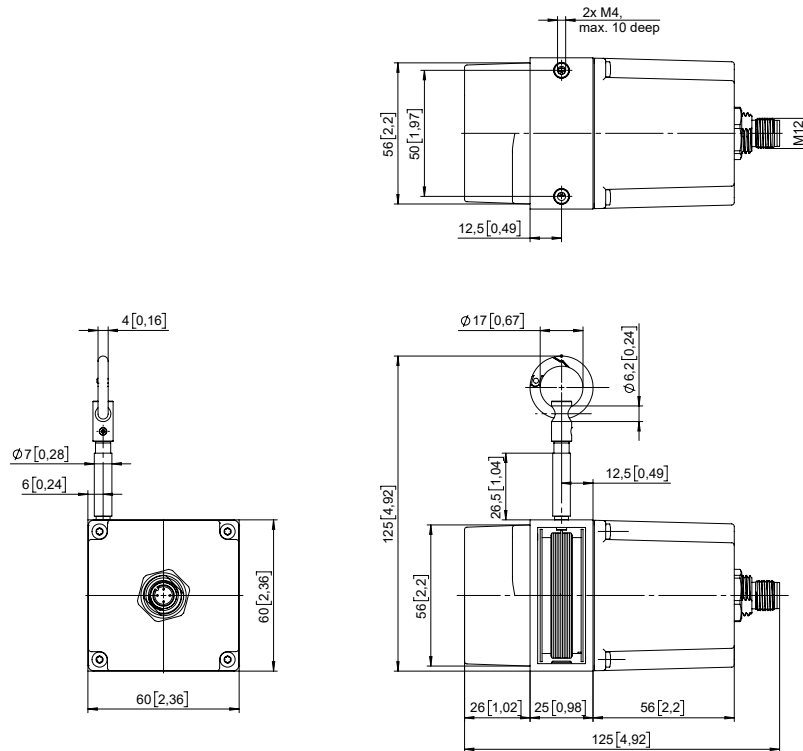
Measuring length max. 4 m

Dimensions

Dimensions in mm [inch]

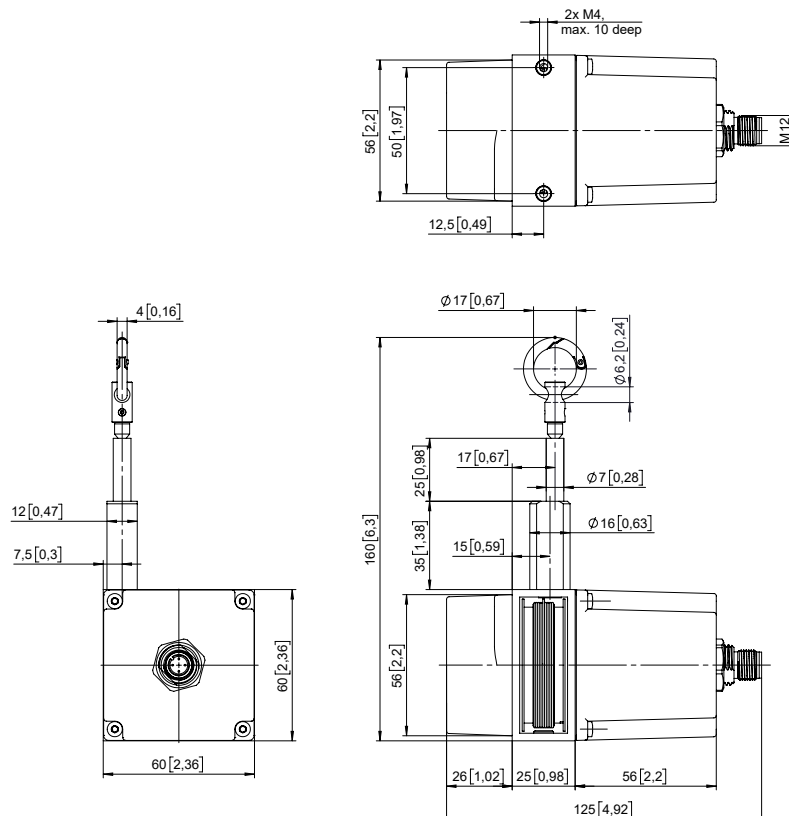
With standard linearity (without wire guide)

order option **C** = 1



With improved linearity (with wire guide)

order option **C** = 2, 3



Draw-wire encoder C100

Base-Line

Measuring length max. 5 m

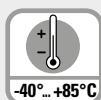


The draw wire system C100 is more than a sensor for determining length-related position data. Variants with integrated inclinometer and redundant interfaces offer versatile application possibilities. The contactless magnetic position scanning, a high IP67 protection level and the wider temperature range round off the product.



Analog
output

CANopen



Wide temperature range



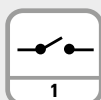
High protection level



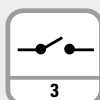
Shock / vibration resistant



Redundancy



Relay output



Switching outputs

Characteristics

- Measuring length up to 5 m.
- Integrated inclinometer.
- Redundant sensors.
- Different types of sensors (analog, incremental, CANopen, relay output, switch output).
- Linearity up to $\pm 0.1\%$ of the measuring range.
- High protection level IP67 and wide temperature range from $-40\text{ }^{\circ}\text{C}$... $+85\text{ }^{\circ}\text{C}$.

Advantages

- The suitable measuring length for every application.
- Cost, space and installation work saving.
- For even higher plant availability.
- Simple selection and fast installation.
- High accuracy at economic prices.
- Reliability and long service life for outdoor applications.

Order code with analog sensor

D8. C100 . XXXX . XXX 1 . 1 000

a Measuring length

0100 = 1 m
0200 = 2 m
0300 = 3 m
0400 = 4 m
0500 = 5 m

b Single sensor

A11 = 4 ... 20 mA
A22 = 0 ... 10 V
A44 = 0.5 ... 4.5 V

Redundant sensor

R11 = 2 x 4 ... 20 mA
R22 = 2 x 0 ... 10 V
R44 = 2 x 0.5 ... 4.5 V

Crossed signals

R1C = 4 ... 20 mA / 20 ... 4 mA
R2C = 0 ... 10 V / 10 ... 0 V
R4C = 0.5 ... 4.5 V / 4.5 ... 0.5 V

c Type of connection

1 = M12 connector, 5-pin

Order code with CANopen and inclinometer

D8. C100 . XXXX . XXX 1 . 1 X 00

a Measuring length

0100 = 1 m
0200 = 2 m
0300 = 3 m
0400 = 4 m
0500 = 5 m

b Sensor type

RC1 = CANopen redundant
RCT = CANopen redundant,
with termination resistor 120 Ω

c Type of connection

1 = M12 connector, 5-pin

d Inclinometers

0 = none
1 = 1 inclinometer
2 = 2 inclinometers

Stock types

D8.C100.0500.RC11.1000

Linear measuring technology

Draw-wire encoder C100	Base-Line	Measuring length max. 5 m
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Order code with incremental output	D8.	C100.	XXXX.	XXX	X.	1	000
			a	b	c		
a Measuring length	b Sensor type	c Type of connection					
0100 = 1 m	I11 = incremental AB, 512 ppr	1 = M12 connector, 5-pin					
0200 = 2 m	I12 = incremental ABZ, 512 ppr	3 = radial cable, 2 m [6.56']					
0300 = 3 m	I21 = incremental AB, 1024 ppr						
0400 = 4 m	I22 = incremental ABZ, 1024 ppr						
0500 = 5 m							

Order code with relais output	D8.	C100.	XXXX.	RL1	1.	1	000
			a	b	c		
a Measuring length	b Sensor type	c Type of connection					
0100 = 1 m	RL1 = relay output	1 = M12 connector, 5-pin					
0200 = 2 m							
0300 = 3 m							
0400 = 4 m							
0500 = 5 m							

Order code with switch output	D8.	C100.	XXXX.	SW3	4.	1	000
			a	b	c		
a Measuring length	b Sensor type	c Type of connection					
0100 = 1 m	SW3 = 3 switch outputs	4 = M12 connector, 12-pin					
0200 = 2 m							
0300 = 3 m							
0400 = 4 m							
0500 = 5 m							

Accessories relais output		Order no.
Teach adapter (for sensor type RL1)	M12 connector, 5-pin adapter with button	D8.C100.RL1.TEACH
Accessories switch output		Order no.
Visualization adapter (for sensor type SW3)	M12 connector, 12-pin	D8.C100.SW3.VISUAL
Cables and connectors		Order no.
Preassembled cables	M12 female connector with coupling nut, 5-pin, A coded, straight single ended 2 m [6.56'] PVC cable	05.00.6081.2211.002M
	M12 female connector with coupling nut, 12-pin, A coded, straight single ended 2 m [6.56'] PVC cable	05.00.60B1.B211.002M
Connectors	M12 female connector with coupling nut, 5-pin, A coded, straight (metal/plastic)	05.B-8151-0/9
	M12 female connector with coupling nut, 5-pin, A coded, right-angle (plastic)	05.B-8251-0/9
	M12 female connector with coupling nut, 12-pin, A coded, straight (metal)	8.0000.5162.0000

Linear measuring technology

Draw-wire encoder C100	Base-Line	Measuring length max. 5 m
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Technical data

Mechanical characteristics (draw-wire mechanics)

Measuring range	1.0 ... 5.0 m
Measuring wire	material AISI304 steel wire Nylon coated diameter $\varnothing$ 0.9 mm $\varnothing$ 0.61 mm (ABZ Incremental)
Wire fastening	eyelet internal diameter $\varnothing$ 8 mm outer diameter $\varnothing$ 15 mm height 2 mm
Speed max.	1 m/s
Acceleration max.	10 m/s ²
Linearity (whole measuring range)	analog ± 0.8 % incremental (≤ 2 m) ± 0.1 % incremental (> 2 m) ± 0.3 % CANopen / relay ± 0.5 %
Repetition accuracy (whole measuring range)	analog ± 0.3 % incremental (≤ 2 m) ± 0.1 % incremental (> 2 m) ± 0.3 % CANopen / relay ± 0.3 %
Pull-back force	typ. 2 N ¹⁾
Pull-out force	typ. 8 N
Drum circumference	245 mm
Type of connection	M12 connector, 5-pin cable, 2 m [6.56'] (only incremental)
Housing	polycarbonate reinforced with glass fibers
Protection	IP67
Temperature range	-40 °C ... +85 °C [-40 °F ... +185 °F]
Weight	approx. 0.5 kg [17.67 oz]
Shock resistance acc. to EN 60068-2-27	300 m/s ² , 11 ms
Vibration resistance acc. to EN 60068-2-6	100 m/s ² , 10 ... 500 Hz

Electrical characteristics

Supply voltage

Sensor type:

A11, A22, R11, R22, R1C, R2C	12 ... 30 V DC
A44, R44, R4C	9 ... 30 V DC
RC1, RCT	9 ... 30 V DC
RL1, SW3	9 ... 30 V DC
I11, I12, I21, I22	9 ... 30 V DC

Analog sensor

Output signal	analog
Resolution	12 bit

Incremental output

Output signal	AB (Z optional)
Resolution	512 / 1024 ppr
Current consumption (non load)	max. 100 mA
Output current	max. 50 mA
Circuit	TTL

CANopen

Output signal	CANopen (DS301)
Resolution	14 bit
Resolution inclinometer	0.1°
Accuracy inclinometer	$\pm 0.6^\circ$
Temperature drift inclinometer	± 0.01 % / °C

Relay output

Output signal	1x relay (Normally Open)
Maximum current	50 mA
Hysteresis	20 mm (factory setting)

Switch output

Output signal	switch
Maximum current	0.5 A

Mechanical service life

without load	min. 1,000,000 switching operations (60 switching operations/ min.)
under load	min. 30,000 switching operations (30 switching operations/ min.)

Approvals

Electromagnetic compatibility	acc. to EN 61326-1, EN 61326-3-1
CE compliant in accordance with	
EMC Directive	2014/30/EU
RoHS Directive	2011/65/EU

1) May be lower at low temperatures.

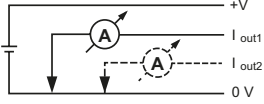
Linear measuring technology

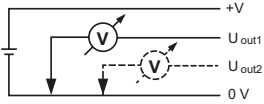
Draw-wire encoder C100

Base-Line

Measuring length max. 5 m

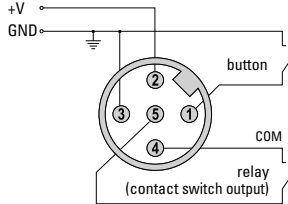
Terminal assignment

Sensor type	Interface	Type of connection	M12 connector, 5-pin						
Analog sensor A11, R11, R1C	(2x) 4 ... 20 mA	1	Signal:	+V	0 V	Iout 1	Iout 2 ¹⁾	n.c.	
			Pin:	1	2	3	4	5	

Sensor type	Interface	Type of connection	M12 connector, 5-pin						
Analog sensor A22, R22, R2C A44, R44, R4C	(2x) 0 ... 10 V (2x) 0.5 ... 4.5 V	1	Signal:	+V	0 V	Uout 1	Uout 2 ¹⁾	n.c.	
			Pin:	1	2	3	4	5	

Sensor type	Interface	Type of connection	M12 connector, 5-pin					
I11, I12, I21, I22	incremental output	1	Signal:	+V	0 V	A	B	0
			Pin:	1	2	3	4	5

Sensor type	Interface	Type of connection	M12 connector, 5-pin					
RC1, RCT	CANopen	1	Signal:	+V	0 V	CAN-GND	CAN-H	CAN-L
			Pin:	2	3	1	4	5

Sensor type	Interface	Type of connection	M12 connector, 5-pin					
RL1	relay	1	Signal:	+V	0 V	Teach	CAN-H	NO
			Pin:	2	3	1	4	5
			The switching point of the relay can be set by means of a button connected to pin 1 (Teach). To do so, position the draw-wire mechanic at the desired switching point and then press the button once. 					

Sensor type	Interface	Type of connection	Cable (isolate unused cores individually before initial start-up)					
I11, I12, I21, I22	incremental output	3	Signal:	+V	0 V	A	B	0
			Core color:	WH	YE	BN	GN	GY

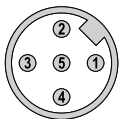
Sensor type	Interface	Type of connection	M12 connector, 12-pin												
SW3	switching output	4	Signal:	NC 1	NO 1	C 1	NC 2	NO 2	C 2	NC 3	NO 3	C 3	n.c.	n.c.	n.c.
			Pin:	1	2	3	4	5	6	7	8	9	10	11	12

+V : Supply voltage +V DC
 0 V : Supply voltage GND (0V)
 Iout 1 : Current output 1
 Iout 2 : Current output 2
 Uout 1 : Voltage output 1
 Uout 2 : Voltage output 2
 A : Incremental output channel A
 B : Incremental output channel B
 0 : Reference signal

Teach : Teach function input
 C : Relay contact C
 NO : Relay contact N.O.
 n.c. : not connected
 AGND : Analog Ground

C 1 : Switching contact C.1
 C 2 : Switching contact C.2
 C 3 : Switching contact C.3
 NO 1 : Switching contact N.O.1
 NO 2 : Switching contact N.O.2
 NO 3 : Switching contact N.O.3
 NC 1 : Switching contact N.C.1
 NC 2 : Switching contact N.C.2
 NC 3 : Switching contact N.C.3

Top view of mating side, male contact base



M12 connector, 5-pin



M12 connector, 12-pin

¹⁾ Only in case of redundant ordering option sensor type R11, R1C, R22, R2C, R44, R4C (otherwise n.c.).

Linear measuring technology

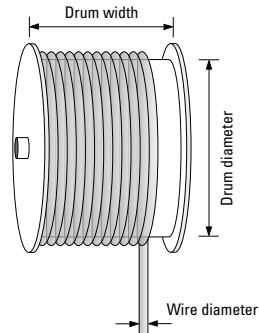
Draw-wire encoder C100	Base-Line	Measuring length max. 5 m
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Technology in detail

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.

Inclinometer with option RC1

Setting possibility 360°



Setting possibility $\pm 180^\circ$



Redundant signals possible.

Setting possibilities:

- Switching between setting possibilities 180° and 360°.
- Switching between synchronous and asynchronous output.
- Change of direction of rotation (cw/ccw).
- Setting and resetting an offset.

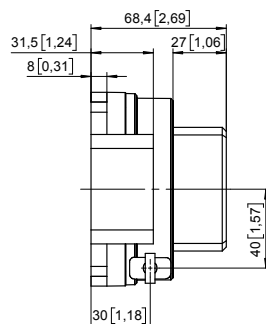
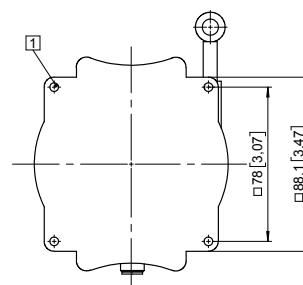
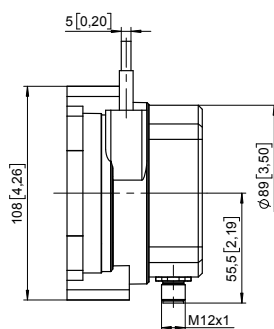
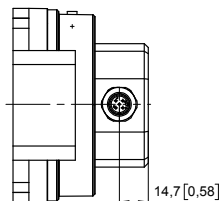
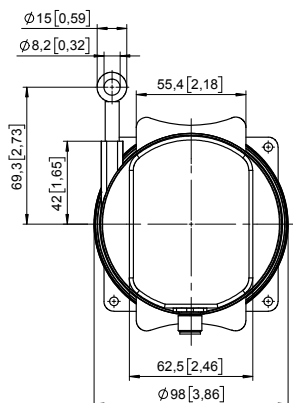
Draw-wire encoder C100

Base-Line

Measuring length max. 5 m

Dimensions

Dimensions in mm [inch]



① 4 x Ø 4.4 [0.17]

Linear measuring technology

Draw-wire encoder D120

Robust-Line

Measuring length max. 10 m



With their extremely robust construction, their high IP69k protection level and their wide temperature range up to -40 °C ... +85 °C the D120 draw-wire encoders are specially developed for outdoor applications.

Their flexibility and adaptability reflects in the wide range of housing and wire types, the long measuring range and the various interfaces. The possibility of redundancy must be particularly pointed out.



Analog
output

CANopen



Long service
life



-40 °C ... +85 °C



IP69k



Redundancy



V4A



Integrated
swivel



For outdoor
applications



3 housing
types

Robust

- Protection level up to IP69k and wide temperature range up to -40 °C ... +85 °C.
- The titanium-anodized aluminum housing and the stainless steel wires allow using the mechanics even in harsh conditions.
- Wire diameter (stainless steel, V4A) up to $\varnothing$ 1.5 mm - ideal for outdoor applications.

Versatile

- Measuring length up to 10 m.
- Redundant outputs (mA, V, R, CANopen).
- The right measuring wire and the right wire fastening for every application.
- Linearity up to ± 0.1 % of the measuring range.
- Various constructions: open, closed housing or housing with perforated plate cover.

Linear measuring technology

Draw-wire encoder D120	Robust-Line	Measuring length max. 10 m
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Order code	D8.D120	. XXXXX . XXXX . 0000 . XXXX
	Type	a b c d e f g

a Measuring length

3 = 3 m
4 = 4 m
5 = 5 m
6 = 6 m
7 = 7 m
8 = 8 m
9 = 9 m
A = 10 m

b Wire types (stainless steel V4A)

1 = ø 0.5 mm
2 = ø 1.0 mm (not for measuring length 9 ... 10 m)
3 = ø 1.5 mm (not for measuring length 7 ... 10 m)

c Linearity

1 = standard linearity 0.5 %
2 = improved linearity 0.25 %
3 = improved linearity 0.1 %

d Housing

1 = open housing, open wire guide
3 = with perforated plate cover, open wire guide
4 = with perforated plate cover, closed wire guide
6 = closed housing, closed wire guide

e Single sensor / supply voltage

A11 = 4 ... 20 mA / 12 ... 30 V DC
A22 = 0 ... 10 V / 12 ... 30 V DC
A33 = 1 kΩ / max. 30 V DC
A44 = 0.5 ... 4.5 V / 8 ... 30 V DC
A55 = 0 ... 5 V / 8 ... 30 V DC
CC1 = CANopen / 8 ... 30 V DC

Redundant sensor / supply voltage

R11 = 2 x 4 ... 20 mA / 12 ... 30 V DC
R22 = 2 x 0 ... 10 V / 12 ... 30 V DC
R33 = 2 x 1 kΩ / max. 30 V DC
R44 = 2 x 0.5 ... 4.5 V / 8 ... 30 V DC
R55 = 2 x 0 ... 5 V / 8 ... 30 V DC
RC1 = 2 x CANopen / 8 ... 30 V DC

f Type of connection / protection level sensor

Cable connection, standard lengths ¹⁾

1 = radial cable, 2 m [6.56'] TPE / IP69k
2 = radial cable, 2 m [6.56'] TPE / IP67
C = radial cable, 5 m [16.40'] TPE / IP69k
E = radial cable, 5 m [16.40'] TPE / IP67
D = radial cable, 10 m [32.81'] TPE / IP69k
F = radial cable, 10 m [32.81'] TPE / IP67

Connector

3 = radial M12 connector / IP67
4-pin for sensor type A11 ... A55
5-pin for sensor type CC1 ... RC1
8-pin for sensor type R11 ... R55

g Extended order options (optional)

Wire fastenings (standard = carabiner ring)

V001 = M4 thread ²⁾
V002 = eyelet
V007 = clip

Extended temperature range -40 °C ... +85 °C

(only in combination with the standard linearity 0.5 %, **c** = 1)

V003 = with carabiner ring
V004 = with M4 thread ²⁾
V005 = with eyelet
V008 = with clip

Relationship measuring length – wire types – linearity

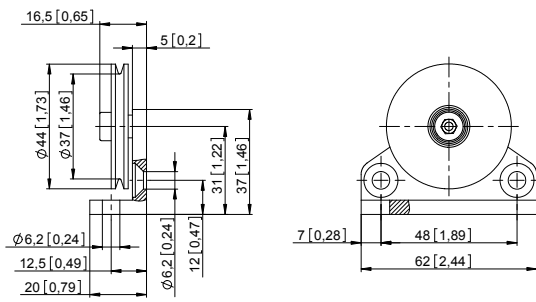
Measuring length	[m]	3 / 4 / 5 / 6			7 / 8			9 / 10			
	order code a	3	4	5	6	7	8	9	A		
Wire type	ø [mm]	0.5	1.0	1.5		0.5	1.0	1.5	0.5	1.0	1.5
	order code b	1	2	3		1	2	—	1	—	—
Standard linearity ±0.5 %	order code c = 1	✓	✓	✓		✓	✓	—	✓	—	—
Improved linearity ±0.25 %	order code c = 2	✓	✓	✓		✓	✓	—	✓	—	—
Improved linearity ±0.1 %	order code c = 3	✓	✓	✓		✓	✓	—	✓	—	—

✓ feasible / – not feasible

1) Other cable length on request.

2) Not available with wire type V4A ø 1.5 mm – order option = 3.

Linear measuring technology

Draw-wire encoder D120		Robust-Line	Measuring length max. 10 m		
Accessories for draw-wire encoder		Dimensions in mm [inch]		Order no.	
Guide pulley for wire type 1 (0.5 mm)		Technical data:		Scope of delivery: - 2 x countersunk screws for lateral fixing - 2 x hexagonal screws for fixing on a flat surface	8.0000.7000.0045 ¹⁾
		- mounting bracket (anodized alum.) - guide pulley (plastic POM) - ball bearing (type 696-2R5)			
					
Extension cable (further on request)		0.5 m with clip 1.0 m with clip 2.0 m with clip		8.0000.7000.0051 8.0000.7000.0052 8.0000.7000.0054	
					
Cables and connectors		Order no.			
Preamsembled cables	M12 female connector with coupling nut, 4-pin, A coded, straight single ended 2 m [6.56'] PUR cable		05.00.6061.6211.002M		
	M12 female connector with coupling nut, 5-pin, A coded, straight single ended 2 m [6.56'] PVC cable		05.00.6081.2211.002M		
	M12 female connector with coupling nut, 8-pin, A coded, straight single ended 2 m [6.56'] PVC cable		05.00.6041.8211.002M		
Connectors	M12 female connector with coupling nut, 4-pin, A coded, straight (plastic)		05.B8141-0		
	M12 female connector with coupling nut, 5-pin, A coded, straight (metal/plastic)		05.B-8151-0/9		
	M12 female connector with coupling nut, 8-pin, A coded, straight (metal)		05.CMB 8181-0		

1) Stock types.

Linear measuring technology

Draw-wire encoder D120	Robust-Line	Measuring length max. 10 m
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Technical data

General technical data			Interface characteristics CANopen – Sensor type CC1, RC1	
Linearity		±0.5 %	CAN specification	Full CAN 2.0B (ISO11898)
Improved linearity		±0.25 % or ±0.1 %	Communication profile	CANopen CiA 301 V 4.2.0
Resolution		see electrical characteristics	Device profile	encoder, absolute linear; CiA 406 V 3.2.0
Sensor element		potentiometer	Error monitoring	Producer Heartbeat, Emergency Message, Node Guarding
Output signal (others on request)		4 ... 20 mA 0 ... 10 V, 0.5 ... 4.5 V, 0 ... 5 V Potentiometer CANopen	Node ID	default: 7, adjustable via SDO
Connection		radial M12 connector or radial cable outlet (TPE cable), standard length 2, 5, 10 m	PDO	1 x TPDO, static mapping
Protection	M12 connector cable	IP67 IP67, IP69k	PDO functions	event-triggered, time-triggered, Sync-cyclic, Sync-acyclic
Humidity		max. 90 % relative, no condensing	Transmission rate	Default 250 kbit/s, 1 Mbps, 800, 500, 250, 125, 50, 20 kbps adjustable via SDO
Working temperature	standard as extended order option (s.page 6)	-20 °C ... +85 °C [-4 °F ... +185 °F] -40 °C ... +85 °C [-40 °F ... +185 °F]	Bus connection	M12 connector, 5-pin or axial cable outlet (TPE cable), standard length 2 m
Speed max.		3.0 m/s	Integrated bus terminating resistor	120 ohms ready-to-activate via SDO
Acceleration max.		50 m/s ²	Bus, galvanic isolation	no
Weight		1300 ... 1600 g [45.87 ... 56.44 oz] depending on measuring range	Supply voltage	8 ... 30 V DC
Housing		aluminum, spring housing PA6	Current consumption	typ. 10 mA at 24 V, typ. 20 mA at 12 V
Spring force		min. 7 N / max. 13 N ¹⁾	Measuring rate	1 kHz with 16 bit resolution
			Resolution	0.002 % of the measuring range
			Electrical protection	reverse polarity protection

Electrical characteristics (analog sensor, scaled to measuring range)					
Sensor type	A11 / R11 Current output	A22, R22	A44, R44 Voltage outputs	A55, R55	A33 / R33 Potentiometer
Output	4 ... 20 mA	0 ... 10 V	0.5 ... 4.5 V	0 ... 5 V	1 kΩ
Supply voltage	12 ... 30 V DC	12 ... 30 V DC	8 ... 30 V DC	8 ... 30 V DC	max. 30 V DC
Recommended slider current	—		—		< 1 μA
Current consumption	—		25 mA (non load)		—
Output current	max. 50 mA in case of a failure		max. 10 mA, min. load 10 kΩ		—
Response time	< 1 ms from 0 ... 100 % and 100 ... 0 %		< 3 ms from 0 ... 100 % and 100 ... 0 %		—
Resolution		theoretically unlimited, limited by the noise			
Noise	1.6 mA _{eff}		0.5 mV _{eff}		depending on the supply voltage
Reverse polarity protection	—		ja		—
Short circuit proof	—		ja		—
Temperature coefficient	0.0079 %/K		0.0037 %/K		±0.0025 %/K

Characteristics measuring wire		
Material		stainless steel V4A (1.4401)
Measuring range	ø 0.5 mm 3 ... 10 m ø 1.0 mm 3 ... 8 m ø 1.5 mm 3 ... 6 m	
Breaking force	ø 0.5 mm 262 N ø 1.0 mm 942 N ø 1.5 mm 1.890 N	
Temperature coefficient		16 x 10 ⁻⁶ K ⁻¹

Approvals	
Electromagnetic compatibility	acc. to EN 61326-1, EN 61326-3-1
CE compliant in accordance with	
EMC Directive	2014/30/EU
RoHS Directive	2011/65/EU

1) Depends on the measuring length.

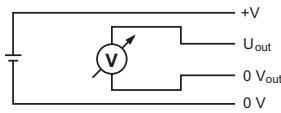
Linear measuring technology

Draw-wire encoder D120	Robust-Line	Measuring length max. 10 m
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Terminal assignment

Analog sensor A11 (4 ... 20 mA)			R/I converter							
		Signal:	+V	n.c.	I _{out}	n.c.				
	Cable ¹⁾	Core color:	BN	WH	BU	BK				
	M12 connector, 4-pin	Pin:	1	2	3	4				
Analog sensor redundant R11 (2 x 4 ... 20 mA)			R/I converter 1		R/I converter 2					
		Signal:	+V 1	I _{out} 1	+V 2	I _{out} 2	n.c.	n.c.	n.c.	n.c.
	Cable ¹⁾	Core color:	WH	GN	GY	BU	BN	YE	PK	RD
	M12 connector, 8-pin	Pin:	1	3	5	7	2	4	6	8

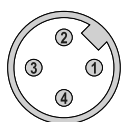
Analog sensor A22 (0 ... 10 V DC) A44 (0.5 ... 4.5 V) A55 (0 ... 5 V)			R/U converter							
		Signal:	+V	U _{out}	0 V	0 V _{out}				
	Cable ¹⁾	Core color:	BN	WH	BU	BK				
	M12 connector, 4-pin	Pin:	1	2	3	4				
Analog sensor redundant R22 (2 x 0 ... 10 V DC) R44 (2 x 0.5 ... 4.5 V) R55 (2 x 0 ... 5 V)			R/U converter 1				R/U converter 2			
		Signal:	+V ₁	U _{out 1}	0 V ₁	0 V _{out 1}	+V ₂	U _{out 2}	0 V ₂	0 V _{out 2}
	Cable ¹⁾	Core color:	WH	BN	GN	YE	GY	PK	BU	RD
	M12 connector, 8-pin	Pin:	1	2	3	4	5	6	7	8



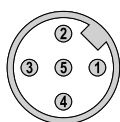
Analog sensor A33 (potentiometer 1 kΩ)			Potentiometer							
		Signal:	+V	Out	0 V	n.c.				
	Cable ¹⁾	Core color:	BN	WH	BU	BK				
	M12 connector, 4-pin	Pin:	1	2	3	4				
Analog sensor redundant R33 (2 x potentiometer 1 kΩ)			Potentiometer 1				Potentiometer 2			
		Signal:	+V ₁	Out ₁	0 V ₁	n.c.	+V ₂	Out ₂	0 V ₂	n.c.
	Cable ¹⁾	Core color:	WH	BN	GN	YE	GY	PK	BU	RD
	M12 connector, 8-pin	Pin:	1	2	3	4	5	6	7	8

Digital sensor CC1 (CANopen)			CANopen					
		Signal:	+V	0 V	CAN_GND	CAN_H	CAN_L	
	Cable ¹⁾	Core color:	WH	BU	BN	BK	GY	
	M12 connector, 5-pin	Pin:	2	3	1	4	5	
Digital sensor redundant RC1 (2 x CANopen)			CANopen 1 + CANopen 2					
		Signal:	+V	0 V	CAN_GND	CAN_H	CAN_L	
	Cable ¹⁾	Core color:	WH	BU	BN	BK	GY	
	M12 connector, 5-pin	Pin:	2	3	1	4	5	

Top view of mating side, male contact base



M12 connector, 4-pin



M12 connector, 5-pin



M12 connector, 8-pin

1) Isolate unused cores individually before initial start-up.

Linear measuring technology

Draw-wire encoder D120

Robust-Line

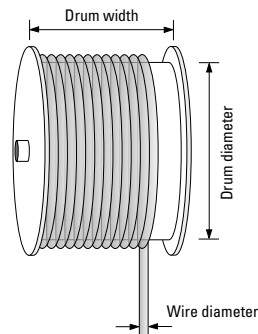
Measuring length max. 10 m

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. The single-layer wire winding ensuring the best linearity possible is a specific feature of Kübler draw-wire encoders.



Note

Exceeding the maximum extension length of the draw-wire will lead to damage to the wire and the mechanics. In addition, snapping of the cable during installation must imperatively be avoided, as this can also lead to damages.

Wire fastenings

Carabiner ring
D8.D120...xxx.xxx.V000

M4 thread ¹⁾
D8.D120...xxx.xxx.V001

Eyelet
D8.D120...xxx.xxx.V002

Clip
D8.D120...xxx.xxx.V007



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

rubber stopper

measuring wire

Wire types

- Stainless steel V4A, $\varnothing$ 0.5 mm, order option **b** = 1
- Stainless steel V4A, $\varnothing$ 1.0 mm, order option **b** = 2
- Stainless steel V4A, $\varnothing$ 1.5 mm, order option **b** = 3



Ideally suited for long-term outdoor use.

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 (options A11 ... A55 and R11 ... R55).



Extended temperature range -40 °C ... +85 °C

(only in combination with the standard linearity 0.5 %, **c** = 1)

By using special components.

Order code extensions for the extended temperature range:

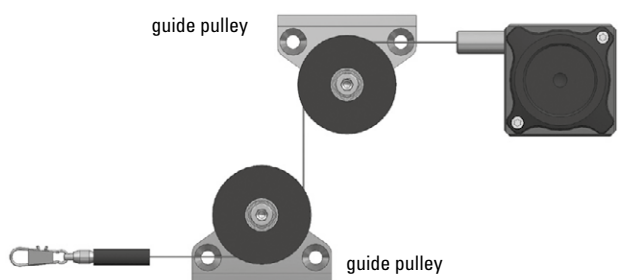
With carabiner ring: D8.D120...xxx.xxx.V003

With M4 thread ¹⁾: D8.D120...xxx.xxx.V004

With eyelet: D8.D120...xxx.xxx.V005

With clip: D8.D120...xxx.xxx.V008

Application-specific installation possibilities



¹⁾ Not available with wire type V4A, $\varnothing$ 1.5 mm – order option **b** = 3.

Linear measuring technology

Draw-wire encoder D120

Robust-Line

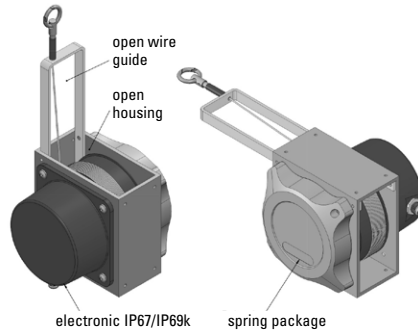
Measuring length max. 10 m

Technology in detail

Housing types (the suitable housing type for every application)

Open housing, open wire guide

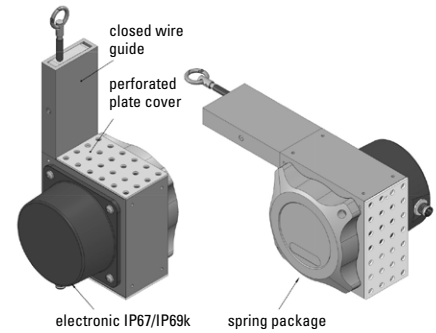
For use in the presence of fine dust and liquids.



Housing with perforated plate cover, closed wire guide

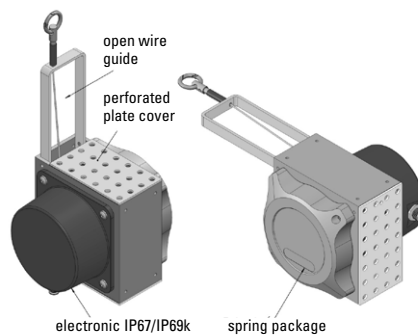
For use in the presence of dirt, particles size > 2 mm and liquids.

Shock protection, wire cleaning device (in preparation).



Housing with perforated plate cover, open wire guide

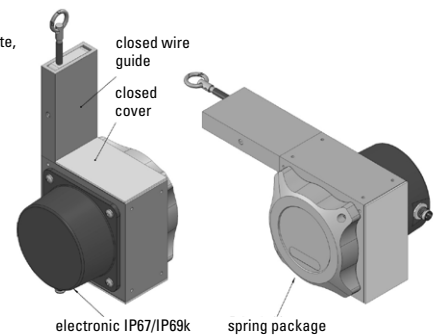
For use in the presence of dirt, particles size > 2 mm and liquids



Closed housing, closed wire guide

For use in the presence of sticky dust, cement, concrete, clay.

Shock protection, wire cleaning device (in preparation).



Linear measuring technology

Draw-wire encoder D120

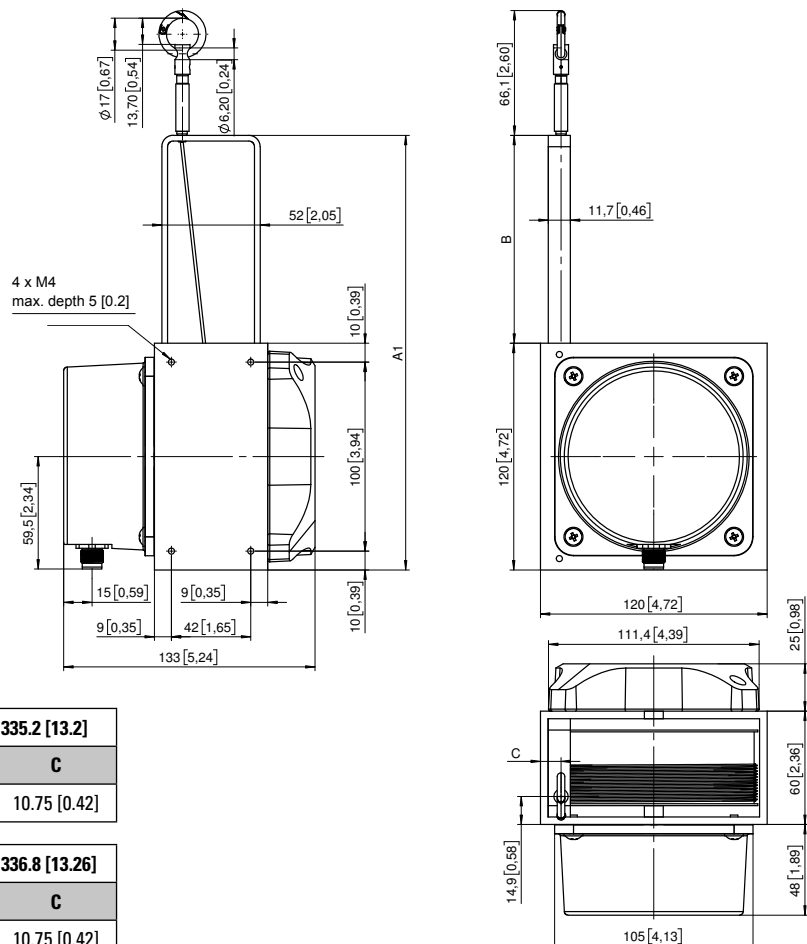
Robust-Line

Measuring length max. 10 m

Dimensions

Dimensions in mm [inch]

Open housing,
open wire guide



Wire diameter $\varnothing$ 0.5 mm – drum pitch circumference: 335.2 [13.2]

Measuring length	A1	B	C
3 ... 10 m	230 [9.06]	110 [4.33]	10.75 [0.42]

Wire diameter $\varnothing$ 1.0 mm – drum pitch circumference: 336.8 [13.26]

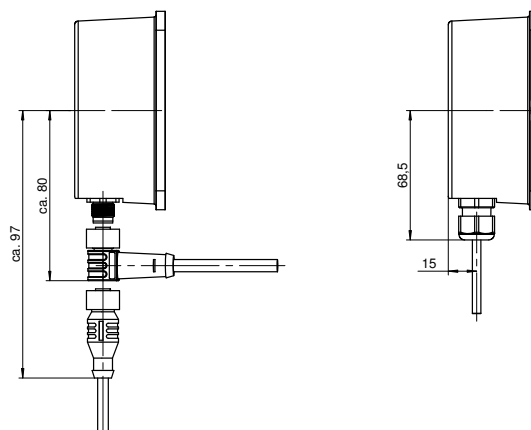
Measuring length	A1	B	C
3 ... 5 m	230 [9.06]	110 [4.33]	10.75 [0.42]
6 ... 8 m	320 [12.6]	200 [7.87]	12.25 [0.48]

Wire diameter $\varnothing$ 1.5 mm – drum pitch circumference: 338.3 [13.32]

Measuring length	A1	B	C
3 ... 4 m	230 [9.06]	110 [4.33]	10.75 [0.42]
5 ... 6 m	320 [12.6]	200 [7.87]	12.25 [0.48]

Connector output / Cable outlet

The cable must be protected in case of steam and high-pressure cleaning.



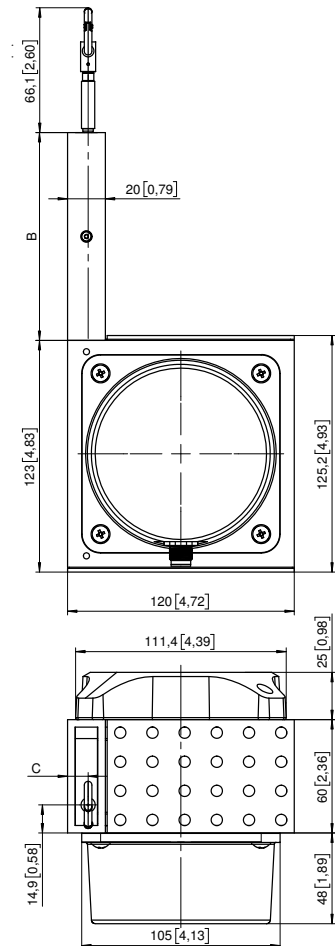
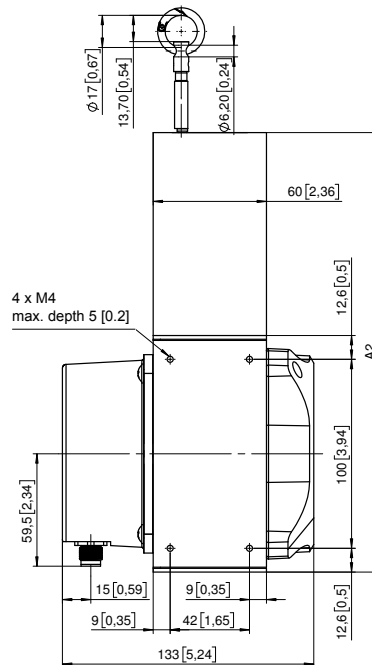
Linear measuring technology

Draw-wire encoder D120	Robust-Line	Measuring length max. 10 m
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Dimensions

Dimensions in mm [inch]

Housing with perforated plate cover,
closed wire guide



Wire diameter $\varnothing 0.5$ mm – drum pitch circumference: 335.2 [13.2]			
Measuring length	A2	B	C
3 ... 10 m	233 [9.17]	110 [4.33]	10.75 [0.42]

Wire diameter $\varnothing 1.0$ mm – drum pitch circumference: 336.8 [13.26]			
Measuring length	A2	B	C
3 ... 5 m	233 [9.17]	110 [4.33]	10.75 [0.42]
6 ... 8 m	323 [12.7]	200 [7.87]	12.25 [0.48]

Wire diameter $\varnothing 1.5$ mm – drum pitch circumference: 338.3 [13.32]			
Measuring length	A2	B	C
3 ... 4 m	233 [9.17]	110 [4.33]	10.75 [0.42]
5 ... 6 m	323 [12.7]	200 [7.87]	12.25 [0.48]

Linear measuring technology

Draw-wire encoder A30	Compact-Line	Measuring length max. 0.6 m
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The draw-wire mechanics A30 with analog output stands out with its miniaturized design. It is available with potentiometer, voltage or current output.



Analog output



Wide temperature range



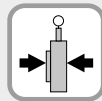
High protection level



Reverse polarity protection



Easy mounting



Compact design

Miniaturized and simple

- Measuring length up to 600 mm.
- For applications with a low traversing speed.
- Easy to install.
- Housing of reinforced plastic.

Order code
draw-wire encoder

D5.350X.AXXX.0000
Type **a** **b** **c**

a Measuring range
A = 300 mm ¹⁾
B = 600 mm

b Output circuit
11 = analog output 4 ... 20 mA
22 = analog output 0 ... 10 V DC
supply voltage 15 ... 28 V DC
33 = potentiometer output 10 kΩ

c Type of connection
4 = radial cable, 0.5 m [1.64']

Stock types
D5.350B.A114.0000

Accessories for draw-wire encoder Dimensions in mm [inch]

Order no.

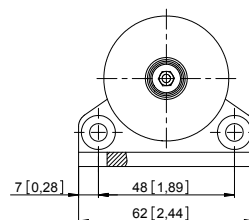
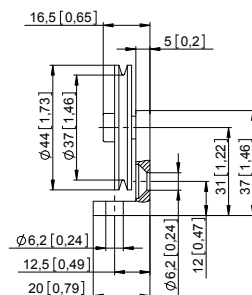
Guide pulley



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 ²⁾



1) Not suitable for potentiometer output / order code **b** output circuit = 33.

2) Stock types.

Linear measuring technology

Draw-wire encoder A30	Compact-Line	Measuring length max. 0.6 m
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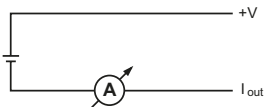
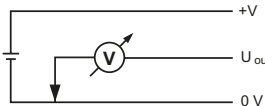
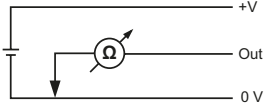
Technical data

Mechanical characteristics (draw-wire mechanics)			
Speed max.	0.8 m/s		
Acceleration max.	32.3 m/s ²		
Working temperature	-10 °C ... +80 °C [+14 °F ... +176 °F]		
Protection acc. to EN 60529	IP50		
Weight	approx. 60 g [2.12 oz]		
Extension force F_{min}	3 N		
Repeat accuracy	±0.15 mm		
Linearity	±0.35 %		
Material	housing	plastic	
	wire	stainless-steel ø 0.4 mm	
		plastic-coated	

Approvals		
CE compliant in accordance with		
EMC Directive	2014/30/EU	
RoHS Directive	2011/65/EU	

Electrical characteristics			
Analog output	0 ... 10 V DC	4 ... 20 mA	potentiometer 10 kΩ
Supply voltage	15 ... 28 V DC	—	—
Operating range	—	15 ... 28 V DC	max. 48 V DC
Max. load current	15 mA	—	—
Load	—	max. 500 Ω	—

Terminal assignment (analog output)

Analog sensor A11 (4 ... 20 mA)			R/I converter				
		Signal:	+V	I _{out}	n.c.		
	Cable	Core color:	BN	WH	GN		
Analog sensor A22 (0 ... 10 V DC)			R/U converter				
		Signal:	+V	0 V	U _{out}		
	Cable	Core color:	BN	WH	GN		
Analog sensor A33 (Potentiometer 10 kΩ)			Potentiometer				
		Signal:	+V	0 V	Out		
	Cable	Core color:	BN	WH	GN		

Linear measuring technology

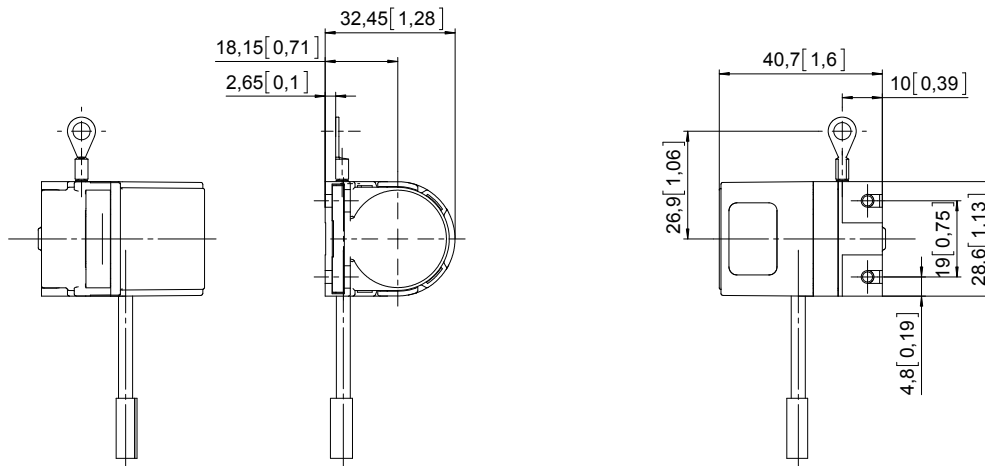
Draw-wire encoder A30

Compact-Line

Measuring length max. 0.6 m

Dimensions

Dimensions in mm [inch]



Linear measuring technology

Draw-wire encoder A40	Compact-Line	Measuring length max. 2 m
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Technical data

Mechanical characteristics (draw-wire mechanics)

Measuring range	up to 2000 mm
Absolute accuracy	±0.1 % for the whole measuring range
Repetition accuracy	±0.15 mm per direction of travel
Resolution (incremental)	0.1 mm standard encoder with 1000 ppr
Speed max.	800 mm/s
Acceleration max.	43 m/s ²
Required force	approx. 10 N (on wire)
Material	housing reinforced plastic wire stainless steel ø 0.45 mm
Weight	approx. 210 g [7.41 oz]

Electrical characteristics (encoder)

Output circuits	Push-pull	Push-pull
Supply voltage	5 ... 24 V DC	8 ... 30 V DC
Current consumption (no load)	max. 50 mA	max. 50 mA
Permissible load / channel	max. +/- 50 mA	max. +/- 50 mA
Pulse rate	max. 160 kHz	max. 160 kHz
Switching level	HIGH min. +V - 2.5 V LOW max. 0.5 V	min. +V - 3.0 V max. 2.5 V
Rising edge time t_r	max. 1 µs	max. 1 µs
Falling edge time t_f	max. 1 µs	max. 1 µs
Short-circuit protected outputs	yes	yes

Approvals

CE compliant in accordance with	
EMC Directive	2014/30/EU
RoHS Directive	2011/65/EU

Mechanical characteristics (encoder)

Protection acc. to EN 60529	IP54
Working temperature	-20 °C ... +85 °C [-4 °F ... +185 °F]
Shock resistance acc. to EN 60068-2-27	1000 m/s ² , 6 ms
Vibration resistance acc. to EN 60068-2-6	100 m/s ² , 55 ... 2000 Hz

Description of the incremental encoder (connected on load side)

- Compensation for temperature and ageing
- Short-circuit protected outputs
- Reverse polarity protected supply voltage input
- Push-pull output

Terminal assignment of the encoder

Signal	0 V	+V	A	$\bar{A}$	B	$\bar{B}$	0	$\bar{0}$
Core color	WH	BN	GN	YE	GY	PK	BU	RD

Isolate unused outputs before initial start-up.

Linear measuring technology

Draw-wire encoder A40

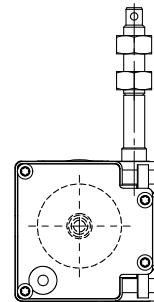
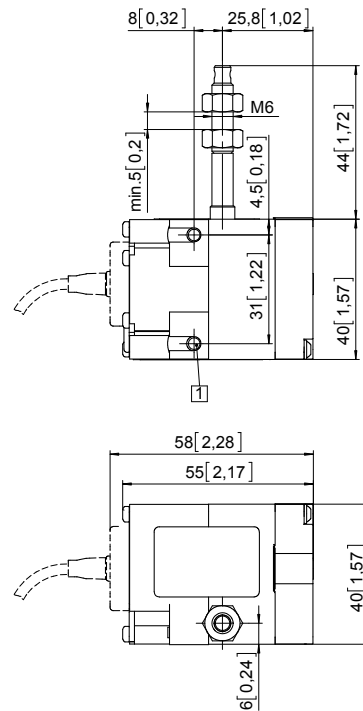
Compact-Line

Measuring length max. 2 m

Dimensions

Dimensions in mm [inch]

1 2 x M4, max. screw-in depth 8 mm [0.32"]



Linear measuring technology

Draw-wire encoder A40 / A41	Compact-Line	Measuring length A40 max. 1 m Measuring length A41 max. 2 m
------------------------------------	---------------------	--



The draw-wire encoders A40 and A41 with analog output is characterized by its compact design. They are available with a potentiometer, voltage or current output.



Analog
output



Wide temperature range



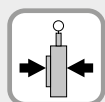
High protection level



Reverse polarity protection



Easy mounting



Compact design

Compact and simple

- Measuring length up to 2000 mm.
- For applications with a low traversing speed.
- Easy to install.
- Robust zinc die-cast housing.

Order code
draw-wire encoder

D5.350X . AXX . 0000
Type **a** **b** **c**

a Measuring range

- 1 = 1000 mm
- 2 = 2000 mm

b Output circuit

- 11 = analog output 4 ... 20 mA
- 22 = analog output 0 ... 10 V DC
- supply voltage 15 ... 28 V DC
- 33 = potentiometer output 10 kΩ

c Type of connection

- 1 = cable 2 m [6.56'] for measuring range 1000 mm: axial
for measuring range 2000 mm: radial
- 2 = radial M12 connector, 4-pin
(only available for measuring range 2000 mm)

Stock types

D5.3501.A111.0000
D5.3502.A111.0000

Accessories for draw-wire encoder

Dimensions in mm [inch]

Order no.

Guide pulley



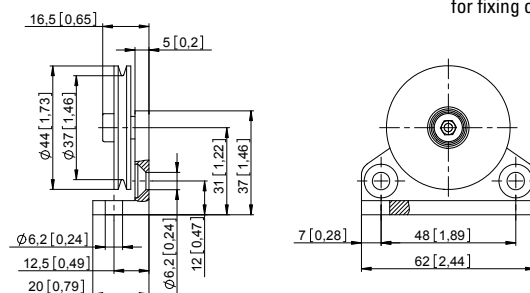
Technical data:

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

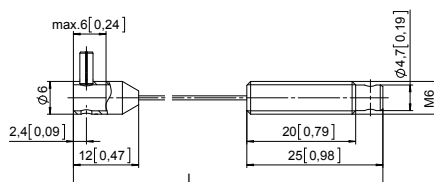
Scope of delivery:

- 2 x countersunk screws
for lateral fixing
- 2 x hexagonal screws
for fixing on a flat surface

8.0000.7000.0045¹⁾



Extension cable (further on request)



- Steel wire 2 m [6.56']
- Steel wire 5 m [16.40']
- Steel wire 10 m [32.81']
- Paraleine 2 m [6.56']

8.0000.7000.0033
8.0000.7000.0034
8.0000.7000.0035
8.0000.7000.0032

1) Stock types

Linear measuring technology

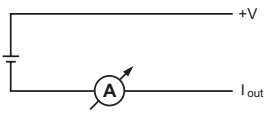
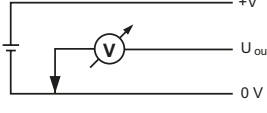
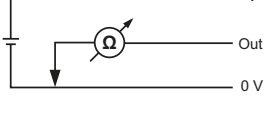
Draw-wire encoder A40 / A41	Compact-Line	Measuring length A40 max. 1 m Measuring length A41 max. 2 m
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Cables and connectors		Order no.
Preassembled cables	M12 female connector with coupling nut, 4-pin, A coded, straight single ended 2 m [6.56'] PUR cable	05.00.6061.6211.002M
Connector, self-assem	M12 female connector with coupling nut, 4-pin, A coded, straight (plastic)	05.B8141-0
Connectors bly	M12 male connector with external thread, 4-pin, A coded, straight (metal/plastic)	05.BS8141-0
	M12 female connector with coupling nut, 4-pin, A coded, right-angle (plastic)	05.B8241-0

Technical data

Mechanical characteristics (draw-wire mechanics)				Electrical characteristics			
Measuring range	1000 mm (A40)	2000 mm (A41)		Analog output	0 ... 10 V	4 ... 20 mA	potentiometer 10 kΩ
Speed max.	0.8 m/s	1 m/s		Supply voltage	15 ... 28 V DC	—	—
Acceleration max.	43.1 m/s ²	43.1 m/s ²		Operating range	—	15 ... 28 V DC	max. 48 V DC
Working temperature	0 °C ... 50 °C [+32 °F ... +122 °F]	-10 °C ... +80 °C [+14 °F ... +176 °F]		Temperature range	0 °C ... 50 °C [+32 °F ... +122 °F]	0 °C ... 50 °C [+32 °F ... +122 °F]	0 °C ... 50 °C [+32 °F ... +122 °F]
Protection (sensor) acc. to EN 60529	IP50	IP65		Load	max. 500 Ω	max. 500 Ω	—
Weight	approx. 200 g [7.06 oz]	approx. 320 g [11.29 oz]		Approvals CE compliant in accordance with EMC Directive 2014/30/EU RoHS Directive 2011/65/EU			
Extension force F_{min}	2 N						
Repeat accuracy	±0.15 mm						
Linearity	±0.35 %						
Material	housing plastic / zinc die-cast wire stainless-steel ø 0.45 mm plastic-coated						

Terminal assignment

Analog sensor A11 (4 ... 20 mA)			R/I converter				
		Signal:	+V	I _{out}	n.c.	n.c.	
	Cable	Core color:	BN	WH	GN		
	M12 connector, 4-pin	Pin:	1	2	3	4	
Analog sensor A22 (0 ... 10 V DC)			R/U converter				
		Signal:	+V	0 V	U _{out}	n.c.	
	Cable	Core color:	BN	WH	GN		
	M12 connector, 4-pin	Pin:	1	2	3	4	
Analog sensor A33 (Potentiometer 10 kΩ)			Potentiometer				
		Signal:	+V	0 V	Out	n.c.	
	Cable	Core color:	BN	WH	GN		
	M12 connector, 4-pin	Pin:	1	2	3	4	

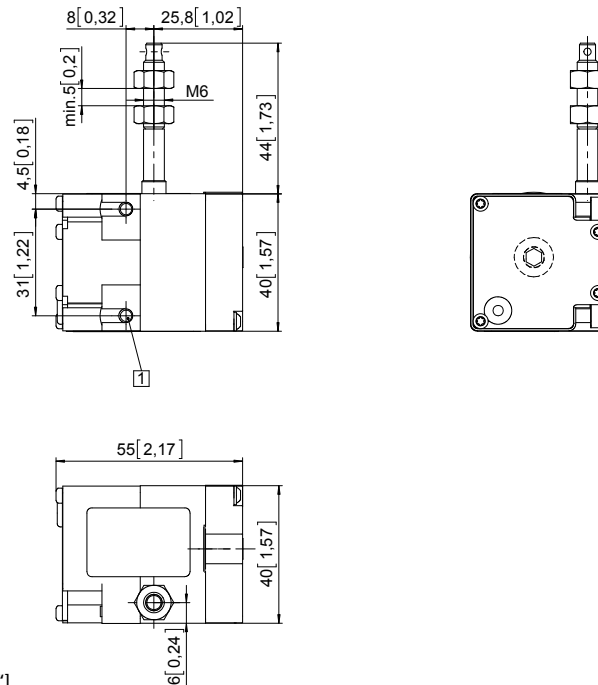
Linear measuring technology

Draw-wire encoder A40 / A41	Compact-Line	Measuring length A40 max. 1 m Measuring length A41 max. 2 m
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Dimensions

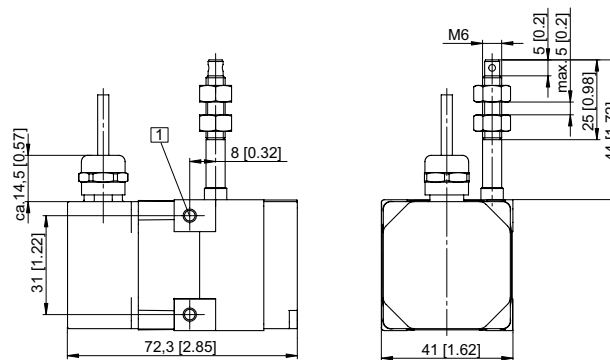
Dimensions in mm [inch]

for measuring range 1000 mm

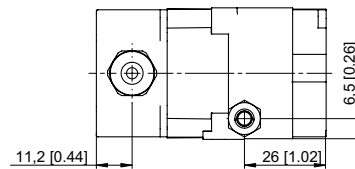


1 2 x M4, max. screw-in depth 8 mm [0.32"]

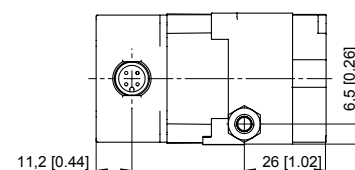
for measuring range 2000 mm



cable connection



M12 connector



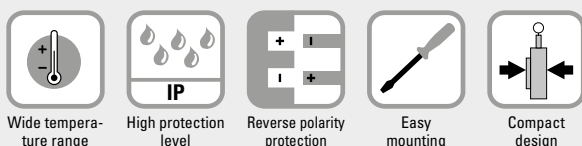
Linear measuring technology

Draw-wire encoder A41	Compact-Line	Measuring length max. 2 m
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The draw-wire mechanics A41 with absolute encoder excels with its compact construction.

These draw-wire mechanics can be equipped with multiturn encoders of the F366x and M366x series. The maximum measuring length is 2 meters.



Compact and simple

- Measuring length up to 2000 mm.
- Scalable analog output with limit switch function.
- For applications with low traverse speeds.
- Easy mounting.
- Robust zinc die-cast housing.

Order code with encoder (absolute)

D5.55 **02** . **XX****XX** . **XXXX**
Type a b c d e

- a** Measuring range
02 = 2000 mm
- b** Encoder used
M3 = Sendix M3663, absolute, SSI
F3 = Sendix F3663, absolute, SSI
M8 = Sendix M3668, absolute, CANopen
Sendix M3668, absolute, SAE J1939
Sendix M3668, absolute, IO-Link
F8 = Sendix F3668, absolute, CANopen
- c** Output circuit
depends on the encoder used
- d** Type of connection
depends on the encoder used
- e** Resolution / Protocol / Options
depends on the encoder used

Standard resolutions for draw-wire with absolute encoder Sendix F3663/M3663 (12 bit ST) or F3668/M3668 (12 bit ST, programmable via bus)

Drum circumference [mm]	100
Pulses / revolution [ppr]	4096
Pulses / mm	41
Resolution [mm]	0.02

Recommended standard variants (with absolute encoder)

Order no. draw-wire encoder	Mounted encoder	Interface	Power supply	Type of connection	Resolution / Protocol	Option
D5.5502.M324.G222	Sendix M3663 (8.M3663.4124.G222)	SSI	10 ... 30 V DC	radial M12 connector	4096 ppr / SSI-Gray-Code	-
D5.5502.M824.2122	Sendix M3668 (8.M3668.4124.2122)	CANopen	10 ... 30 V DC	radial M12 connector	CANopen encoder profile DS406 V4.0	-
D5.5502.M834.3222	Sendix M3668 (8.M3668.4134.3222)	SAE J1939	10 ... 30 V DC	radial M12 connector	SAE J1939	-
D5.5502.M844.4122	Sendix M3668 (8.M3668.4144.4122)	IO-Link	18 ... 30 V DC	radial M12 connector	IO-Link	-
D5.5502.F321.G222	Sendix F3663 (8.F3663.4121.G222)	SSI	10 ... 30 V DC	tangential cable, 1 m	4096 ppr / SSI-Gray-Code	-
D5.5502.F821.2122	Sendix F3668 (8.F3668.4121.2122)	CANopen	10 ... 30 V DC	tangential cable, 1 m	CANopen encoder profile DS406 V3.2	-

Linear measuring technology

Draw-wire encoder A41	Compact-Line	Measuring length max. 2 m
------------------------------	---------------------	----------------------------------

Order code with encoder (analog, scalable with limit switch function)		D5.5502.M1XX.XXXX Typea.b.c.d.e						
a <i>Measuring range</i> 02 = 2000 mm	b <i>Encoder used</i> M1 = Sendix M3661, absolute, analog ¹⁾	c <i>Output circuit</i> depends on the encoder used				e <i>Resolution / Protocol / Options</i> depends on the encoder used		
		d <i>Type of connection</i> depends on the encoder used						

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
D5.5502.M134.3512	Sendix M3661 (8.M3661.4134.3512)	Analog, 4 ... 20 mA	10 ... 30 V DC	radial M12 connector	12 Bit / 4 ... 20 mA	scalable with limit switch function ²⁾
D5.5502.M144.4512	Sendix M3661 (8.M3661.4144.4512)	Analog, 0 ... 10 V	15 ... 30 V DC	radial M12 connector	12 Bit / 0 ... 10 V	scalable with limit switch function ²⁾
D5.5502.M134.3612	Sendix M3661 (8.M3661.4134.3612)	Analog, 4 ... 20 mA	10 ... 30 V DC	radial M12 connector	12 Bit / 4 ... 20 mA	scalable without limit switch function ²⁾
D5.5502.M144.4612	Sendix M3661 (8.M3661.4144.4612)	Analog, 0 ... 10 V	15 ... 30 V DC	radial M12 connector	12 Bit / 0 ... 10 V	scalable without limit switch function ²⁾

Accessories for draw-wire encoder	Dimensions in mm [inch]	Order no.
-----------------------------------	-------------------------	-----------

Guide pulley



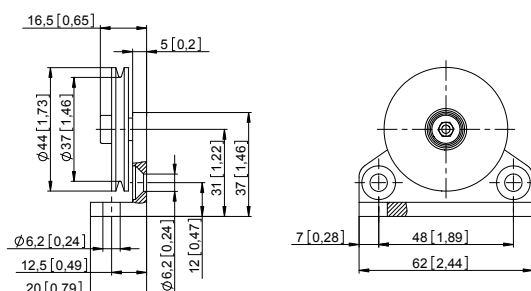
Technical data:

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

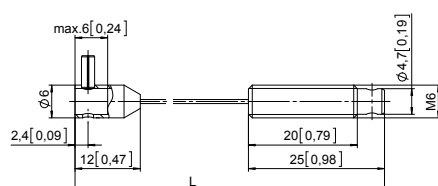
Scope of delivery:

- 2 x countersunk screws for lateral fixing
- 2 x hexagonal screws for fixing on a flat surface

8.0000.7000.0045 ³⁾



Extension cable (further on request)



- Steel wire 2 m [6.56']
- Steel wire 5 m [16.40']
- Steel wire 10 m [32.81']
- Paraleine 2 m [6.56']

8.0000.7000.0033
8.0000.7000.0034
8.0000.7000.0035
8.0000.7000.0032

Cables and connectors	Order no.
-----------------------	-----------

Preassembled cables	M12 female connector with coupling nut, 5-pin, A coded, straight single ended 2 m [6.56'] PVC cable	05.00.6081.2211.002M
Connectors	M12 female connector with coupling nut, 5-pin, A coded, straight (metal)	8.0000.5116.0000
	M12 female connector with coupling nut, 5-pin, A coded, straight (metal/plastic)	05.B-8151-0/9
	M12 female connector with coupling nut, 5-pin, A coded, right-angle (plastic)	05.B-8251-0/9

1) With ccw option.

2) Delivery condition: unscaled.

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

3) Stock types.

Linear measuring technology

Draw-wire encoder A41	Compact-Line	Measuring length max. 2 m
------------------------------	---------------------	----------------------------------

Technical data

Mechanical characteristics (draw-wire mechanics)

Measuring range	up to 2000 mm
Speed max.	1000 mm/s
Acceleration max.	43,1 m/s ² (9,8 m/s ² at -40 °C ... +80 °C)
Working temperature	-10 °C ... +80 °C [+14 °F ... +176 °F] on request -40 °C ... +80 °C [-40 °F ... +176 °F]
Weight	approx. 200 g [7.06 oz]
Required force	≥ 2 N (on wire)
Linearity	±0.35 % for the whole measuring range
Repetition accuracy	±0.15 mm per direction of travel
Material	housing zinc die-cast wire stainless steel ø 0.45 mm

Electrical characteristics (encoder)

The electrical characteristics can be found in the data sheets of the encoders.

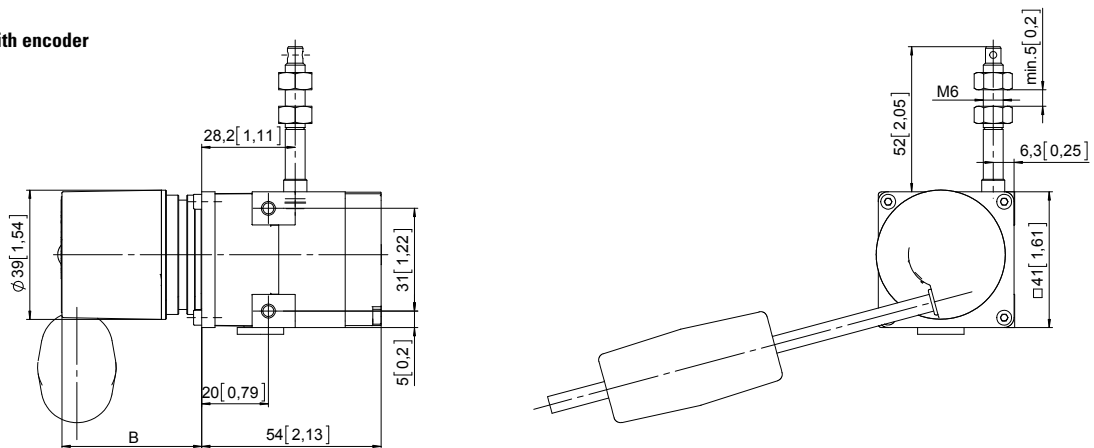
Approvals

CE compliant in accordance with	
EMC Directive	2014/30/EU
RoHS Directive	2011/65/EU

Dimensions

Dimensions in mm [inch]

Draw-wire mechanics with encoder (tangential cable)



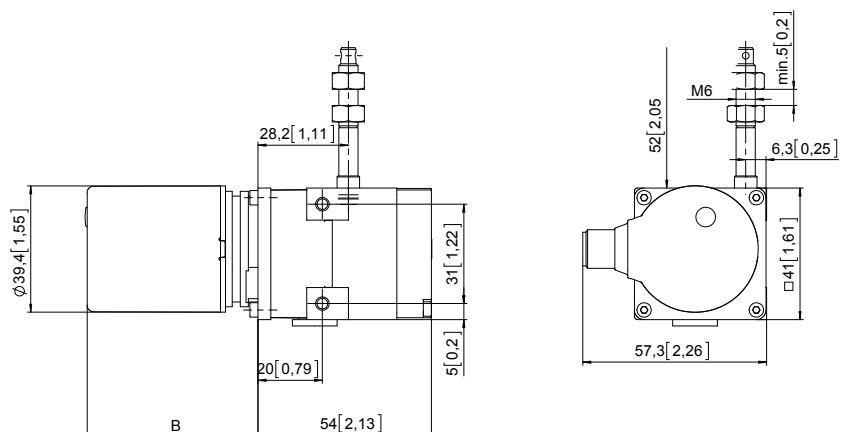
Dimension B depends on the encoder used

Encoder	B
Sendix absolute (M366x) D5.5502.Mxxx.xxxx	50.25 [1.98]
Sendix absolute (F366x) D5.5502.Fxxx.xxxx	39.70 [1.56]

Draw-wire mechanics with encoder (M12 connector)

Dimension B depends on the encoder used

Encoder	B
Sendix absolute (F3663, SSI) D5.5502.Fxxx.xxxx	42.20 [1.66]
Sendix absolute (F3668, CANopen) D5.5502.Fxxx.xxxx	42.20 [1.66]
Sendix absolute (M3661, analog) D5.5502.Mxxx.xxxx	53.25 [2.10]



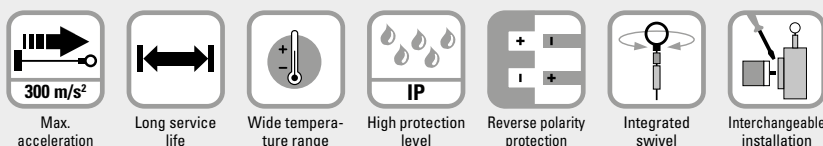
Linear measuring technology

Draw-wire encoder A50	Performance-Line	Measuring length max. 1.25 m
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The draw-wire mechanics A50 boast both a compact design and high dynamics.

The draw-wire mechanics may be equipped with encoders with an analog, incremental or absolute output. The maximum measuring length is 1.25 m.



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 300 m/s².
- Quick fastening by means of 2 screws.
- Various connection possibilities available.
- Scalable analog output with limit switch function.
- Interchangeable encoders (Interchangeable installation).

Order code with encoder (incremental, absolute)

D8.XA1.XXXX.XXXX.XXXX

a <i>Mechanics</i> 2 = interchangeable installation ¹⁾ 6 = fixed installation ²⁾	c <i>Encoder used</i> 36 = Sendix 3610, incremental M3 = Sendix M3663, absolute, SSI F3 = Sendix F3663, absolute, SSI M8 = Sendix M3668, absolute, CANopen Sendix M3668, absolute, SAE J1939 Sendix M3668, absolute, IO-Link F8 = Sendix F3668, absolute, CANopen	d <i>Output circuit</i> depends on the encoder used	e <i>Type of connection</i> depends on the encoder used	f <i>Resolution / Protocol / Options</i> depends on the encoder used	<i>Optional on request</i> - Other measuring ranges - Other wire fastening: M4 thread, eyelet or carabiner ring - 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 3610

Drum circumference [mm]	125	125	125
Pulses / revolution [ppr]	125	1250	2500
Pulses / mm	1	10	20
Resolution [mm]	1	0.1	0.05

Standard resolutions for draw-wire with absolute encoder Sendix F3663/M3663 (12 bit ST) or F3668/M3668 (12 bit ST, programmable via bus)

Drum circumference [mm]	125
Pulses / revolution [ppr]	4096
Pulses / mm	32.8
Resolution [mm]	0.03

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

Draw-wire encoder A50	Performance-Line	Measuring length max. 1.25 m
------------------------------	-------------------------	-------------------------------------

Recommended standard variants (with incremental, absolute encoder)

Order no. draw-wire encoder	Mounted encoder	Interface	Power supply	Type of connection	Resolution / Protocol	Option
D8.6A1.xxxx.3642.1250	3610 (8.3610.4342.1250)	Push-pull with inverted signal	8 ... 30 V DC	radial cable, 2 m	1250 ppr	-
D8.6A1.xxxx.M324.G222	Sendix M3663 (8.M3663.4124.G222)	SSI	10 ... 30 V DC	radial M12 connector	4096 ppr / SSI-Gray-Code	-
D8.6A1.xxxx.M824.2122	Sendix M3668 (8.M3668.4124.2122)	CANopen	10 ... 30 V DC	radial M12 connector	CANopen encoder profile DS406 V4.0	-
D8.6A1.xxxx.M834.3222	Sendix M3668 (8.M3668.4134.3222)	SAE J1939	10 ... 30 V DC	radial M12 connector	SAE J1939	-
D8.6A1.xxxx.M844.4122	Sendix M3668 (8.M3668.4144.4122)	IO-Link	18 ... 30 V DC	radial M12 connector	IO-Link	-

Other variants (with absolute encoder)

Order no. draw-wire encoder	Mounted encoder	Interface	Power supply	Type of connection	Resolution / Protocol	Option
D8.6A1.xxxx.F321.G222	Sendix F3663 (8.F3663.4121.G222)	SSI	10 ... 30 V DC	tangential cable, 1 m	4096 ppr / SSI-Gray-Code	-
D8.6A1.xxxx.F821.2122	Sendix F3668 (8.F3668.4121.2122)	CANopen	10 ... 30 V DC	tangential cable, 1 m	CANopen encoder profile DS406 V3.2	-

Order code with encoder

(analog, scalable with limit switch function)

D8.	X	A1	.	XXXX	.	M1	X	X	.	XXXX
	a			b		c	d	e		f

a Mechanics

2 = interchangeable installation ¹⁾
6 = fixed installation ²⁾

b Measuring range

0025 = 250 mm
0050 = 500 mm
0100 = 1000 mm
0125 = 1250 mm

c Encoder used

M1 = Sendix M3661, absolute ³⁾

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
- Other wire fastening:
M4 thread, eyelet or carabiner ring
- Modified cable and/or connector orientation
- Modified cable outlet direction
- Sensor protection level IP67
- Improved linearity (0.02 %)

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

Order no. draw-wire encoder	Mounted encoder	Interface	Power supply	Type of connection	Resolution / Protocol	Option
D8.6A1.xxxx.M134.3612	Sendix M3661 (8.M3661.4134.3612)	Analog, 4 ... 20 mA	10 ... 30 V DC	M12-Stecker radial	12 Bit / 4 ... 20 mA	scalable without limit switch function ⁴⁾
D8.6A1.xxxx.M144.4612	Sendix M3661 (8.M3661.4144.4612)	Analog, 0 ... 10 V	15 ... 30 V DC	M12-Stecker radial	12 Bit / 0 ... 10 V	scalable without limit switch function ⁴⁾
D8.6A1.xxxx.M134.3512	Sendix M3661 (8.M3661.4134.3512)	Analog, 4 ... 20 mA	10 ... 30 V DC	M12-Stecker radial	12 Bit / 4 ... 20 mA	scalable with limit switch function ⁵⁾
D8.6A1.xxxx.M144.4512	Sendix M3661 (8.M3661.4144.4512)	Analog, 0 ... 10 V	15 ... 30 V DC	M12-Stecker radial	12 Bit / 0 ... 10 V	scalable with limit switch function ⁵⁾

Order code with analog sensor

(scaled to measuring range)

D8.	3	A1	.	XXXX	.	XXX	X	.	0000
				b		c	d		

b Measuring range

0025 = 250 mm
0050 = 500 mm
0100 = 1000 mm
0125 = 1250 mm

c Analog sensor output / supply voltage

A11 = 4 ... 20 mA / 12 ... 30 V DC
A22 = 0 ... 10 V / 12 ... 30 V DC
A33 = potentiometer 1 kΩ / max. 30 V DC

d Type of connection

1 = axial cable, 2 m PVC
3 = axial M12 connector, 4-pin

Optional on request

- Other measuring ranges
- Other wire fastening:
M4 thread, eyelet 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

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.

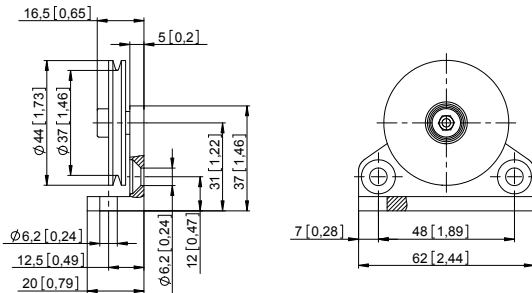
4) Delivery condition: scaled to measuring range.

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

5) Delivery condition: unscaled.

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

Linear measuring technology

Draw-wire encoder A50		Performance-Line	Measuring length max. 1.25 m
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 ¹⁾
			
Extension cable (further on request) 	0.5 m with clip 1.0 m with clip 2.0 m with clip	8.0000.7000.0051 8.0000.7000.0052 8.0000.7000.0054	
Cables and connectors		Order no.	
Preassembled cables	M12 female connector with coupling nut, 5-pin, A coded, straight single ended 2 m [6.56'] PVC cable	05.00.6081.2211.002M	
Connectors	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)	8.0000.5116.0000 05.B-8151-0/9 05.B-8251-0/9	

1) Stock types.

Linear measuring technology

Draw-wire encoder A50	Performance-Line	Measuring length max. 1.25 m
------------------------------	-------------------------	-------------------------------------

Technical data

Mechanical characteristics (draw-wire mechanics)

Measuring range		250 mm	500 mm	1250 mm
Extension force	F_{min}	6.8 N	3.4 N	4.1 N
	F_{max}	7.9 N	4.0 N	5.4 N
Speed max.		8 m/s	8 m/s	10 m/s
Acceleration max.		200 m/s ²	200 m/s ²	300 m/s ²
Linearity (of the measuring range)				
with analog sensor		±0.15 %	±0.1 %	±0.1 %
with encoder		±0.05 %	±0.05 %	±0.05 %
		±0.02 % ¹⁾	±0.02 % ¹⁾	±0.02 % ¹⁾
Weight		approx. 330 g [11.64 oz] (depending on the sensor / encoder used)		
Material	housing	titanium-anodized aluminum		
	wire	stainless steel ø 0.5 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.

Approvals

CE compliant in accordance with

EMC Directive	2014/30/EU
RoHS Directive	2011/65/EU

Electrical characteristics (analog sensor, scaled to measuring range)

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

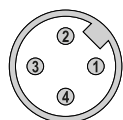
Terminal assignment (analog sensor)

Analog sensor A11 (4 ... 20 mA)			R/I converter				
		Signal:	+V	n.c.	I _{out}	n.c.	
	Cable ¹⁾	Core color:	BN	WH	BU	BK	
	M12 connector, 4-pin	Pin:	1	2	3	4	

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

Analog sensor A33 (Potentiometer 1 kΩ)			Potentiometer				
		Signal:	+V	Out	0 V	n.c.	
	Cable ¹⁾	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) On request for encoder version: **36** (see order code **b**).
2) Optional on request.

Linear measuring technology

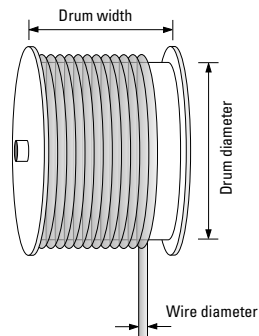
Draw-wire encoder A50	Performance-Line	Measuring length max. 1.25 m
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Technology in detail

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

Clip
D8.xx**1**.xxxx.xxxx



M4 thread
D8.xx**A**.xxxx.xxxx



Eyelet
D8.xx**J**.xxxx.xxxx



Carabiner ring
D8.xx**M**.xxxx.xxxx



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

rubber stopper

measuring wire

Linear measuring technology

Draw-wire encoder A50

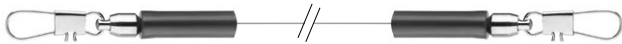
Performance-Line

Measuring length max. 1.25 m

Technology in detail

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.

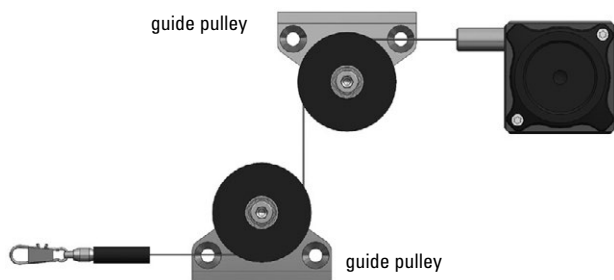


Wire types

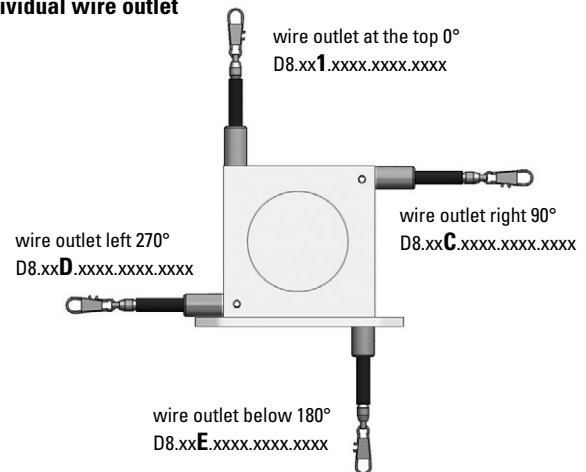
- V2A, $\varnothing$ 0.5 mm (standard)
- Optional on request:
 - V4A, $\varnothing$ 0.51 mm
 - Coramid, $\varnothing$ 0.6 mm
 - V4A plastic coated, 1.0 mm (V4A = $\varnothing$ 0.81 mm)



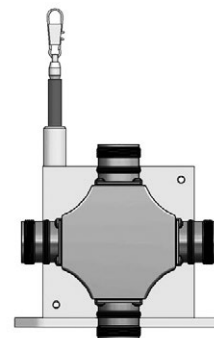
Application-specific installation possibilities



Individual wire outlet



Individual cable / connector orientation on request



Draw-wire encoder C120

Performance-Line

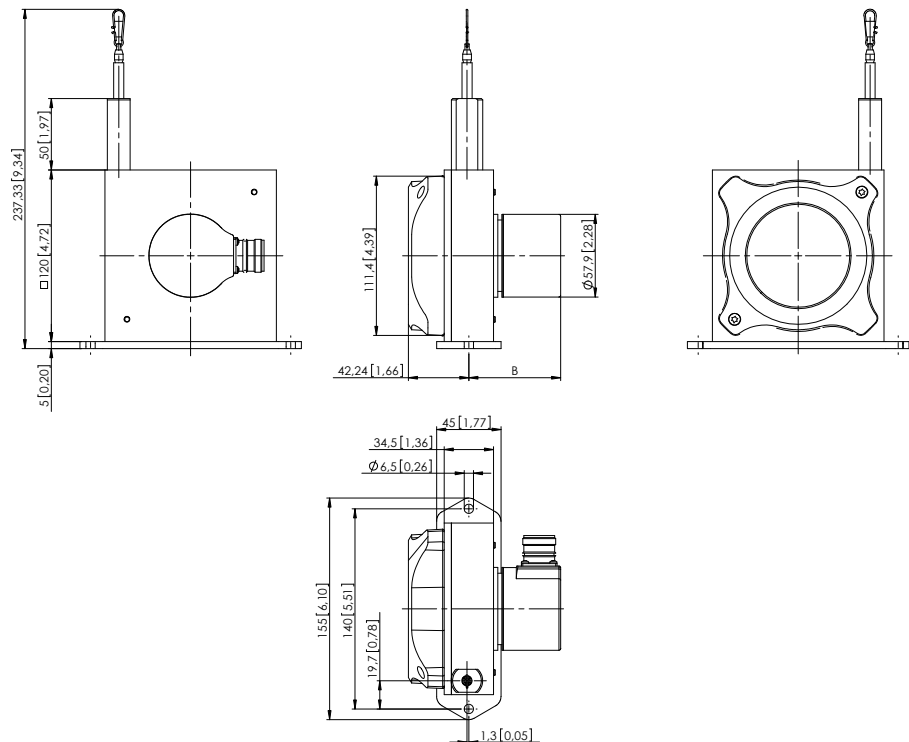
Measuring length max. 6 m

Dimensions

Dimensions in mm [inch]

Draw-wire mechanics with encoder Fixed installation

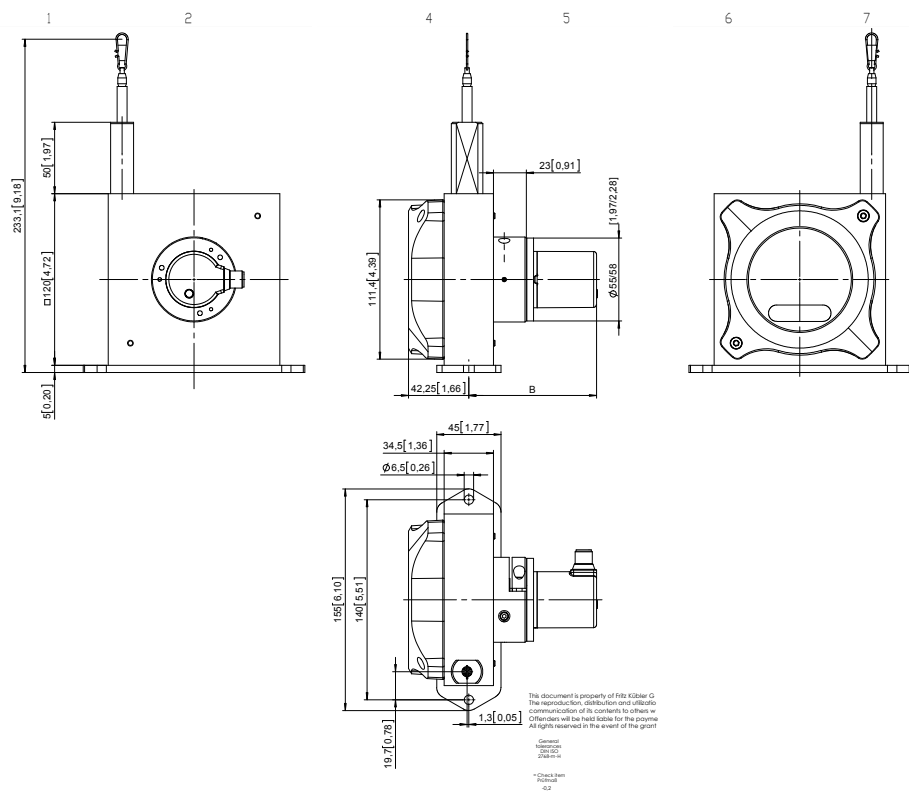
Dimension B depends on the encoder used	
Encoder	B
Sendix incremental (5000) D8.4C1.xxxx.00xx.xxxx	54.25 [2.14]
Sendix absolute (F5863) D8.4C1.xxxx.F3xx.xxxx	66.75 [2.63]
Sendix absolute (5863) D8.4C1.xxxx.63xx.xxxx	66.75 [2.63]
Sendix absolute (F5868, CANopen) D8.4C1.xxxx.F8xx.21xx	88.25 [3.47]
Sendix absolute (F5868, EtherNet/IP) D8.4C1.xxxx.F8xx.A2xx	76.75 [3.02]
Sendix absolute (5868) D8.4C1.xxxx.68xx.xxxx	67.35 [2.65]
Sendix absolute (M586x) D8.4C1.xxxx.Mxxx.xxxx	67.05 [2.64]



Draw-wire mechanics with encoder

Interchangeable installation, clamping flange

Dimension B depends on the encoder used	
Encoder	B
Sendix incremental (5000) D8.2C1.xxxx.00xx.xxxx	77.25 [3.04]
Sendix absolute (F5863) D8.2C1.xxxx.F3xx.xxxx	89.75 [3.53]
Sendix absolute (5863) D8.2C1.xxxx.63xx.xxxx	89.75 [3.53]
Sendix absolute (F5868, CANopen) D8.2C1.xxxx.F8xx.21xx	111.25 [4.38]
Sendix absolute (F5868, EtherNet/IP) D8.2C1.xxxx.F8xx.A2xx	99.75 [1.69]
Sendix absolute (5868) D8.2C1.xxxx.68xx.xxxx	90.35 [3.93]
Sendix absolute (M586x) D8.2C1.xxxx.Mxxx.xxxx	90.05 [3.54]



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10-1
10-2
10-3

Draw-wire encoder A50

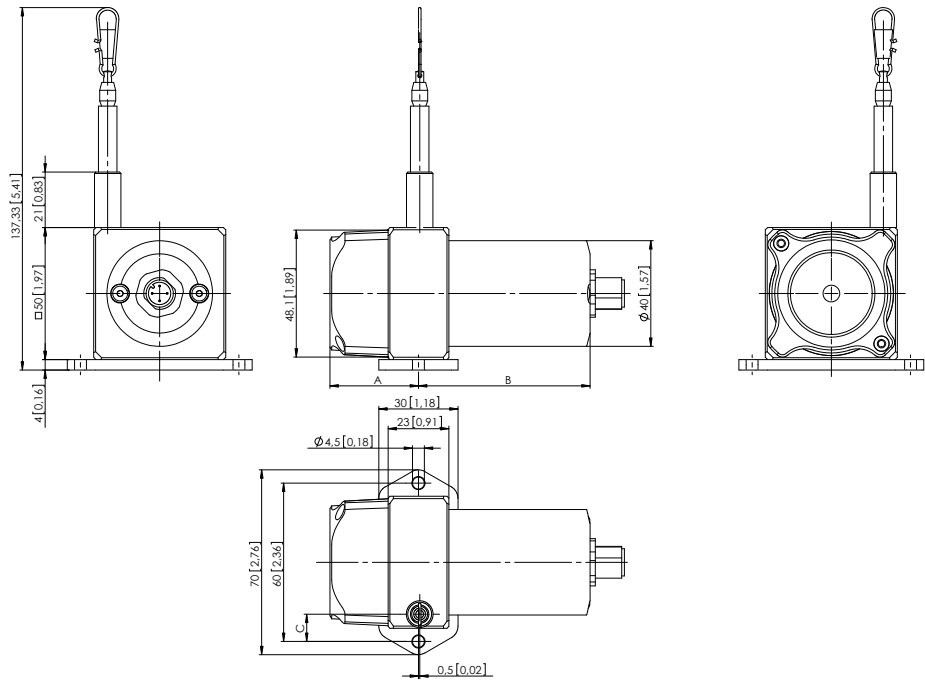
Performance-Line

Measuring length max. 1.25 m

Dimensions

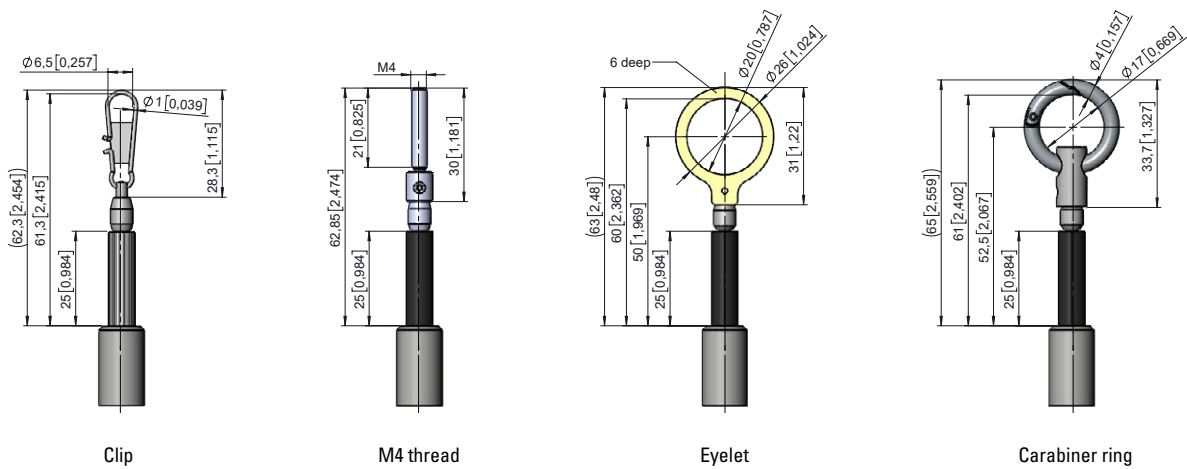
Dimensions in mm [inch]

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



Sensor type	Measuring length	A	B	C
Potentiometer	250 mm	26.5 [1.04]	65 [2.56]	21.30 [0.84]
	500 mm	26.5 [1.04]	65 [2.56]	12.75 [0.50]
	1250 mm	33.5 [1.32]	65 [2.56]	10.30 [0.41]

Wire fastenings

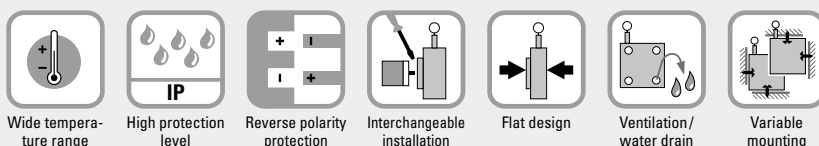


Draw-wire encoder B75	Compact-Line	Measuring length max. 3 m
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The draw-wire mechanics B75 can be used up to a measuring length of 3 meters.

These draw-wire mechanics may be combined with the proven Kübler Sendix encoders with incremental or absolute interface, as well as with analog sensors, which are also available in redundant version.



Compact and versatile

- Compact housing.
- Variable mounting possibilities.
- Low-wear wire exit.
- Closable ventilation and water drain holes.
- Scalable analog interface with limit switch function.
- Various fieldbus interfaces.
- Redundant Sensors.

Order code with encoder (incremental, absolute)

D8.15 **03** . **XXXX** . **XXXX**
Type **a** **b** **c** **d** **e**

a Measuring range
03 = 3000 mm

b Encoder used
2Z = 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

c Output circuit
depends on the encoder used

d Type of connection
depends on the encoder used

e Resolution / Protocol / Options
depends on the encoder used

Optional on request
- Other measuring ranges

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 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

Recommended standard variants (with incremental, absolute encoder)

Order no. draw-wire encoder	Mounted encoder	Interface	Power supply	Type of connection	Resolution / Protocol	Option
D8.1503.2Z54.2000	Sendix 5000 (8.5000.B154.2000)	Push-pull with inverted signal	10 ... 30 V DC	radial M12 connector	2000 ppr	-
D8.1503.M324.G222	Sendix M5863 (8.M5863.4124.G222)	SSI	10 ... 30 V DC	radial M12 connector	4096 ppr / SSI-Gray-Code	-
D8.1503.M824.2122	Sendix M5868 (8.M5868.4124.2122)	CANopen	10 ... 30 V DC	radial M12 connector	CANopen encoder profile DS406 V4.0	-

Linear measuring technology

Draw-wire encoder B75	Compact-Line	Measuring length max. 3 m
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Other variants

Order no. draw-wire encoder	Mounted encoder	Interface	Power supply	Type of connection	Resolution / Protocol	Option
D8.1503.F326.G223	Sendix F5863 (8.F5863.2126.G223)	SSI	10 ... 30 V DC	1 x radial M12 connector	4096 ppr / SSI-Gray-Code	SET button + status LED
D8.1503.6326.G223	Sendix 5863 (8.5863.2126.G223)	SSI	10 ... 30 V DC	1 x radial M12 connector	4096 ppr / SSI-Gray-Code	SET button + status LED
D8.1503.F82E.2123	Sendix F5868 (8.F5868.212E.2123)	CANopen	10 ... 30 V DC	1 x radial M12 connector	CANopen encoder profile DS406 V3.2	SET button
D8.1503.682E.2123	Sendix 5868 (8.5868.212E.2123)	CANopen	10 ... 30 V DC	2 x radial M12 connector	CANopen encoder profile DS406 V3.2	SET button
D8.1503.M834.3222	Sendix M5868 (8.M5868.4134.3222)	SAE J1939	10 ... 30 V DC	1 x radial M12 connector	SAE J1939	-
D8.1503.M844.4122	Sendix M5868 (8.M5868.4144.4122)	IO-Link	18 ... 30 V DC	1 x radial M12 connector	IO-Link	-
D8.1503.6832.3113	Sendix 5868 (8.5868.2132.3113)	PROFIBUS	10 ... 30 V DC	3 x radial M12 connector	Profibus-DP V0 encoder profile Class 2	SET button
D8.1503.68B2.B212	Sendix 5868 (8.5868.21B2.B212)	EtherCAT	10 ... 30 V DC	3 x radial M12 connector	EtherCAT with CoE 3.2.10	-
D8.1503.F8CN.C122	Sendix F5868 (8.F5868.21CN.C122)	PROFINET IO	10 ... 30 V DC	3 x axial M12 connector	PROFINET Encoder-Profil Version 4.2	-
D8.1503.F8AN.A222	Sendix F5868 (8.F5868.21AN.A222)	EtherNet/IP	10 ... 30 V DC	3 x axial M12 connector	EtherNet/IP	-

Order code with encoder

(analog, scalable with limit switch function)

D8.15 **03** . **M1XX** . **XXXX**
Type **a** **b** **c** **d** **e**

a Measuring range
03 = 3000 mm

b Encoder used
M1 = Sendix M5861, absolute ¹⁾

c Output circuit
depends on the encoder used

e Resolution / Protocol / Options
depends on the encoder used

d Type of connection
depends on the encoder used

Optional on request
- Other measuring ranges

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
D8.1503.M134.3512	Sendix M5861 (8.M5861.4134.3512)	Analog, 4 ... 20 mA	10 ... 30 V DC	radial M12 connector	12 Bit / 4 ... 20 mA	scalable with limit switch function ²⁾
D8.1503.M144.4512	Sendix M5861 (8.M5861.4144.4512)	Analog, 0 ... 10 V	15 ... 30 V DC	radial M12 connector	12 Bit / 0 ... 10 V	scalable with limit switch function ²⁾
D8.1503.M134.3612	Sendix M5861 (8.M5861.4134.3612)	Analog, 4 ... 20 mA	10 ... 30 V DC	radial M12 connector	12 Bit / 4 ... 20 mA	scalable without limit switch function ²⁾
D8.1503.M144.4612	Sendix M5861 (8.M5861.4144.4612)	Analog, 0 ... 10 V	15 ... 30 V DC	radial M12 connector	12 Bit / 0 ... 10 V	scalable without limit switch function ²⁾

Order code with analog sensor (scaled to measuring range)

D8.35 **03** . **XXX** **2** . **0000**
Type **a** **b** **c**

a Measuring range
03 = 3000 mm

b Single sensor / Supply voltage
A11 = 4 ... 20 mA / 10 ... 30 V DC
A22 = 0 ... 10 V DC / 15 ... 28 V DC
A33 = potentiometer 10 kΩ / max. 30 V DC

Redundant sensors / Supply voltage
R11 = 2 x 4 ... 20 mA / 10 ... 30 V DC
R33 = 2 x potentiometer 10 kΩ / max. 30 V DC

c Type of connection
2 = radial M12 connector
(wire outlet direction)
4-pin for sensor type A11 ... A33
8-pin for sensor type R11 ... R33

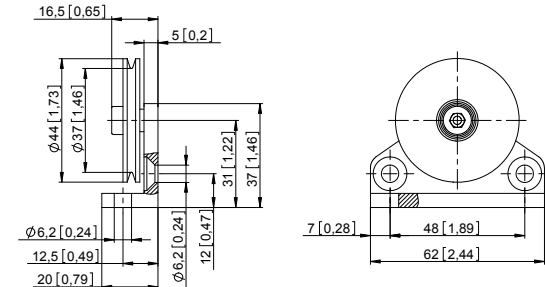
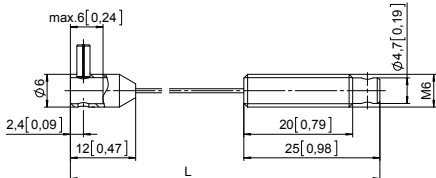
Optional on request
- Other measuring ranges

1) With ccw option.

2) Delivery condition: unscaled.

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

Linear measuring technology

Draw-wire encoder B75		Compact-Line	Measuring length max. 3 m		
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 ¹⁾	
					
Extension cable (further on request)				Steel wire 2 m [6.56'] Steel wire 5 m [16.40'] Steel wire 10 m [32.81'] Paraleine 2 m [6.56']	8.0000.7000.0033 8.0000.7000.0034 8.0000.7000.0035 8.0000.7000.0032
Cables and connectors				Order no.	
Preassembled cables		M12 female connector with coupling nut, 4-pin, A coded, straight single ended 2 m [6.56'] PUR cable 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 M12 female connector with coupling nut, 8-pin, A coded, straight single ended 2 m [6.56'] PVC cable		05.00.6061.6211.002M 05.00.6081.2211.002M 05.00.6031.4411.002M 05.00.6041.8211.002M	
Connectors		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)		8.0000.5116.0000 05.B-8151-0/9 05.B-8251-0/9	

1) Stock types

Draw-wire encoder B75

Compact-Line

Measuring length max. 3 m

Technical data

Mechanical characteristics (draw-wire mechanics)

Measuring range	3000 mm
Speed max.	0.8 m/s
Acceleration max.	10 m/s ²
Working temperature	-40 °C ... +80 °C [-40 °F ... +176 °F]
Protection acc. to EN 60529	IP65
Weight	approx. 500 g [17.67 oz]
Required force F_{min}	3 N
Linearity	±0.2 %
Repetition accuracy	±0.15 mm
Material	housing plastic / zinc die-cast wire stainless steel ø 0.9 mm, plastic-coated

Electrical characteristics

Analog output	0 ... 10 V DC	4 ... 20 mA	potentiometer 10 kΩ
Supply voltage	15 ... 28 V DC	–	–
Operating range	–	10 ... 30 V DC	max. 30 V DC
Load	max. 500 Ω	max. 500 Ω	–

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

CE compliant in accordance with	EMC Directive	2014/30/EU
	RoHS Directive	2011/65/EU

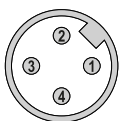
Terminal assignment (analog output)

Analog sensor A11 (4 ... 20 mA)			R/I converter								
	M12 connector, 4-pin	Signal:	+V	I _{out}	n.c.	n.c.					
Analog sensor R11 , redundant (2 x 4 ... 20 mA)			R/I converter 1		R/I converter 2						
		Signal:	+V 1	I _{out} 1	+V 2	I _{out} 2	n.c.	n.c.	n.c.	n.c.	
	M12 connector, 8-pin	Pin:	1	6	2	4	3	5	7	8	

Analog sensor A22 (0 ... 10 V DC)			R/U converter								
		Signal:	0 V	+V	U _{out}	n.c.					
	M12 connector, 4-pin	Pin:	1	2	3	4					

Analog sensor A33 (Potentiometer 1 kΩ)			Potentiometer								
	M12 connector, 4-pin	Signal:	+V	0 V	Out	n.c.					
Analog sensor R33 , redundant (2 x Potentiometer 1 kΩ)			Potentiometer 1		Potentiometer 2						
		Signal:	+V 1	0 V 1	Out 1	n.c.	+V 2	0 V 2	Out 2	n.c.	
	M12 connector, 8-pin	Pin:	1	6	7	8	2	4	3	5	

Top view of mating side, male contact base



M12 connector, 4-pin



M12 connector, 8-pin

Linear measuring technology

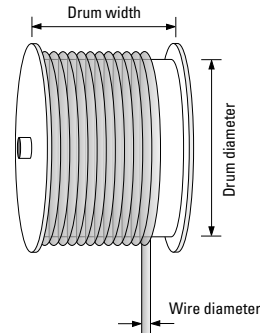
Draw-wire encoder B75	Compact-Line	Measuring length max. 3 m
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Technology in detail

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.



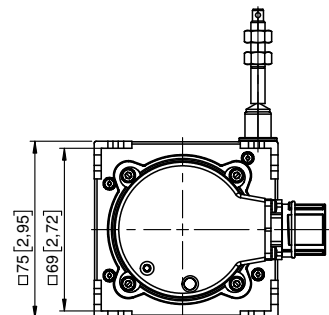
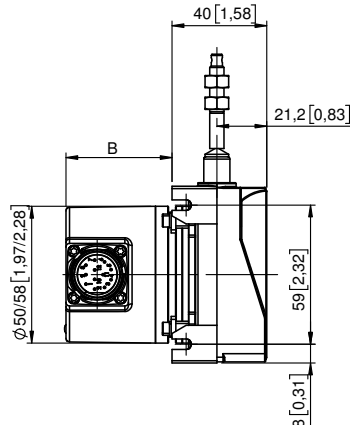
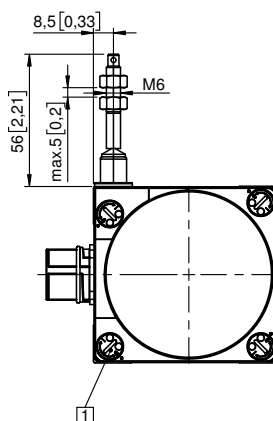
Note

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

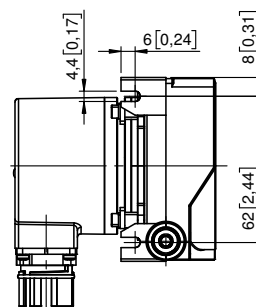
Dimensions

Dimensions in mm [inch]

Draw-wire mechanics with encoder



- 1 4 x closable ventilation and water drain holes



Dimension B depends on the encoder used	
Encoder	B
Sendix incremental (5000) D8.1503.xxxx.2Zxx.xxxx	43.00 [1.69]
Sendix absolute (F5863) D8.1503.xxxx.F3xx.xxxx	55.50 [2.19]
Sendix absolute (5863) D8.1503.xxxx.63xx.xxxx	55.50 [2.19]
Sendix absolute (F5868, CANopen) D8.1503.xxxx.F8xx.21xx	65.50 [2.58]
Sendix absolute (F5868, EtherNet/IP) D8.1503.xxxx.F8xx.A2xx	65.50 [2.58]
Sendix absolute (5868) D8.1503.xxxx.68xx.xxxx	83.20 [3.28]
Sendix absolute (M586x) D8.1503.xxxx.Mxxx.xxxx	50.55 [1.99]

Linear measuring technology

Draw-wire encoder B75

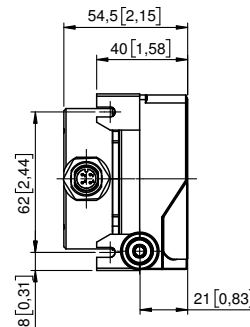
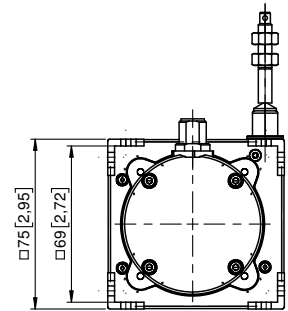
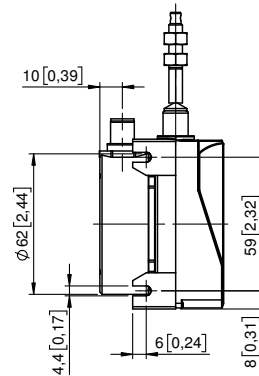
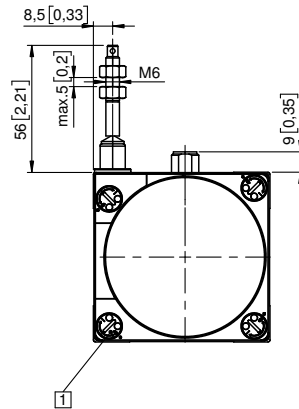
Compact-Line

Measuring length max. 3 m

Dimensions

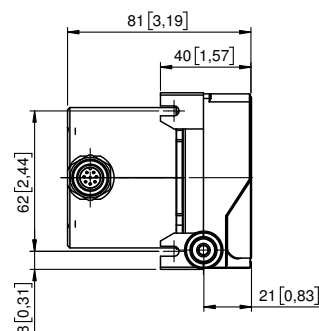
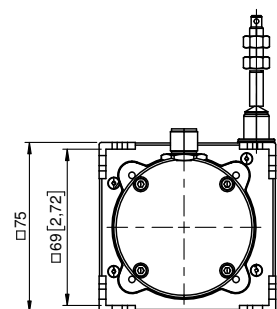
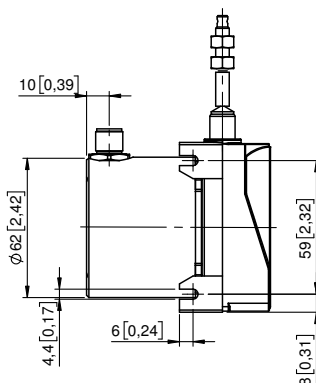
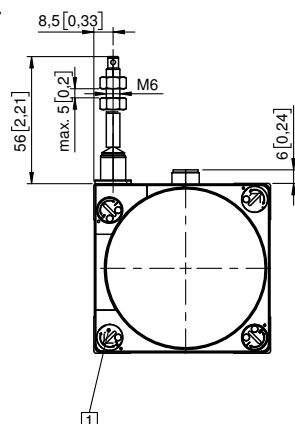
Dimensions in mm [inch]

**Draw-wire mechanics with analog sensor
(A11, A22, A33)
scaled on measuring range**



1 4 x closable ventilation and water
drain holes

**Draw-wire mechanics with analog sensor
(redundant – R11, R33)
scaled on measuring range**



1 4 x closable ventilation and water
drain holes

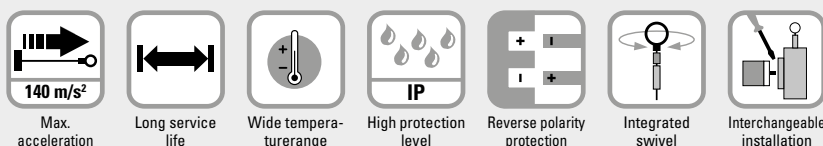
Linear measuring technology

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



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 <i>Mechanics</i> 2 = interchangeable installation ¹⁾ 4 = fixed installation ²⁾	c <i>Encoder used</i> 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 <i>Output circuit</i> depends on the encoder used	<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 outlet direction - Sensor protection level IP67 - Improved linearity (0.02 %)
b <i>Measuring range</i> 0100 = 1000 mm 0200 = 2000 mm 0300 = 3000 mm	e <i>Type of connection</i> depends on the encoder used	f <i>Resolution / Protocol / Options</i> depends on the encoder used	

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

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 Mechanics

2 = interchangeable installation ¹⁾
4 = fixed installation ²⁾

b Measuring range

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

c Encoder used

M1 = Sendix M5861, absolute ³⁾

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 ⁴⁾
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 ⁴⁾
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 ⁵⁾
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 ⁵⁾

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

Draw-wire encoder B80	Performance-Line	Measuring length max. 3 m
Order code with analog sensor (scaled to measuring range)		D8.3B1 . XXXX . XXX X . 0000
a Measuring range 0100 = 1000 mm 0200 = 2000 mm 0300 = 3000 mm		Type a b c
b Analog sensor output / supply voltage A11 = 4 ... 20 mA / 12 ... 30 V DC A22 = 0 ... 10 V / 12 ... 30 V DC A33 = potentiometer 1 kΩ / max. 30 V DC		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 - Increased temperature range -40 °C ... +85 °C and -20 °C ... +120 °C
c Type of connection 1 = axial cable, 2 m PVC 3 = axial M12 connector, 4-pin		

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 ¹⁾
Extension cable (further on request) 	0.5 m with clip 1.0 m with clip 2.0 m with clip	8.0000.7000.0051 8.0000.7000.0052 8.0000.7000.0054
Cables and connectors		Order no.
Preassembled cables	M12 female connector with coupling nut, 5-pin, A coded, straight single ended 2 m [6.56'] PVC cable	05.00.6081.2211.002M
	M12 male connector with external thread, 4-pin, D coded, straight single ended 2 m [6.56'] PUR cable	05.00.6031.4411.002M
Connectors	M12 female connector with coupling nut, 5-pin, A coded, straight (metal)	8.0000.5116.0000
	M12 female connector with coupling nut, 5-pin, A coded, straight (metal/plastic)	05.B-8151-0/9
	M12 female connector with coupling nut, 5-pin, A coded, right-angle (plastic)	05.B-8251-0/9

1) Stock types.

Linear measuring technology

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

Mechanical characteristics (draw-wire mechanics)

Measuring range		1000 mm	2000 mm	3000 mm
Extension force	F_{min}	4.2 N	5.0 N	5.0 N
	F_{max}	5.4 N	6.4 N	6.4 N
Speed max.		10 m/s	10 m/s	10 m/s
Acceleration max.		140 m/s ²	140 m/s ²	140 m/s ²
Linearity (of the measuring range)				
with analog sensor		±0.15 %	±0.1 %	±0.1 %
with encoder		±0.05 %	±0.05 %	±0.05 %
		±0.02 % ¹⁾	±0.02 % ¹⁾	±0.02 % ¹⁾
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.

Approvals

CE compliant in accordance with

EMC Directive	2014/30/EU
RoHS Directive	2011/65/EU

Electrical characteristics (analog sensor, scaled to measuring range)

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

1) On request for encoder version (see order code **Ⓐ**):

00 in combination with interchangeable installation (order code **Ⓐ** = 2) or fixed installation (order code **Ⓐ** = 4)

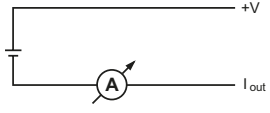
F3, 63, F8, 68 in combination with interchangeable installation (order code **Ⓐ** = 2)

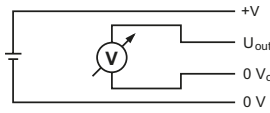
2) Optional on request.

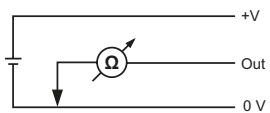
Linear measuring technology

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

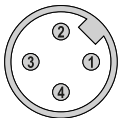
Terminal assignment (analog sensor)

Analog sensor A11 (4 ... 20 mA)			R/I converter				
		Signal:	+V	n.c.	I _{out}	n.c.	
	Cable ¹⁾	Core color:	BN	WH	BU	BK	
	M12 connector, 4-pin	Pin:	1	2	3	4	

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

Analog sensor A33 (Potentiometer 1 kΩ)			Potentiometer				
		Signal:	+V	Out	0 V	n.c.	
	Cable ¹⁾	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

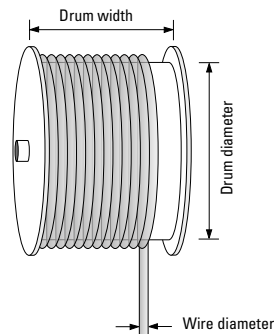
Measuring length max. 3 m

Technology in detail

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

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.

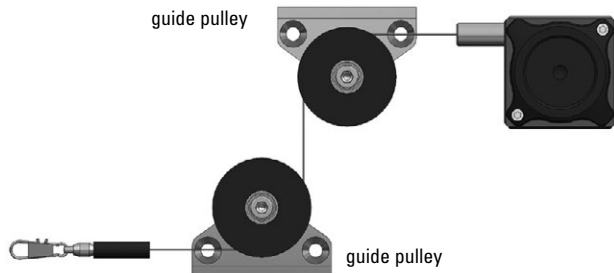


Draw-wire encoder B80

Performance-Line

Measuring length max. 3 m

Application-specific installation possibilities

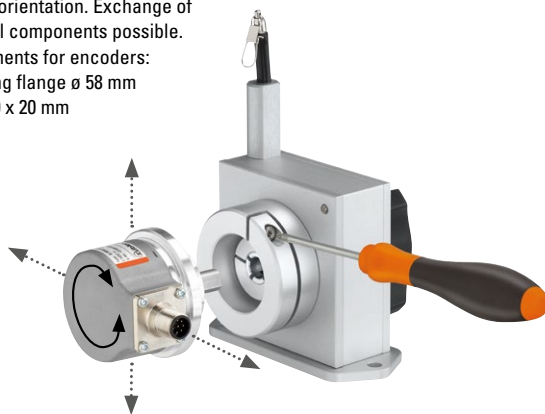


Interchangeable installation

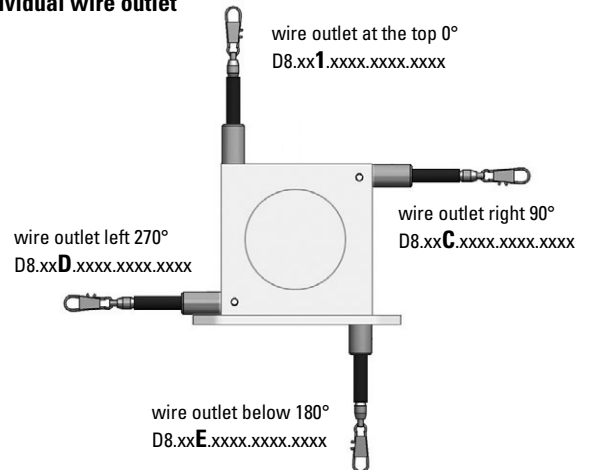
Easy adjustment of the connector or cable orientation. Exchange of individual components possible.

Requirements for encoders:

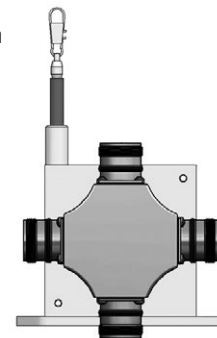
- clamping flange ø 58 mm
- shaft 10 x 20 mm



Individual wire outlet



Individual cable / connector orientation on request



Draw-wire encoder B80

Performance-Line

Measuring length max. 3 m

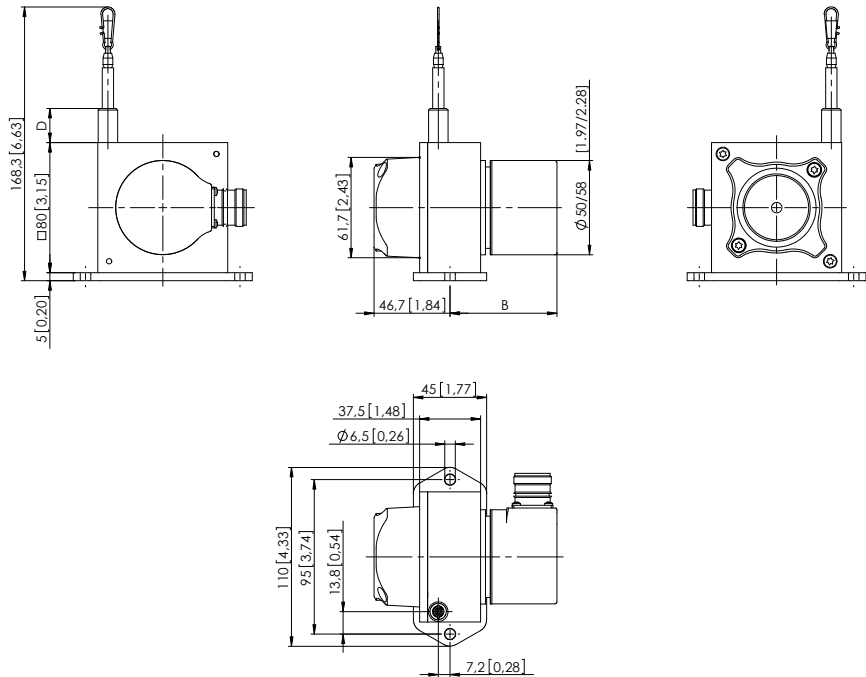
Dimensions

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]

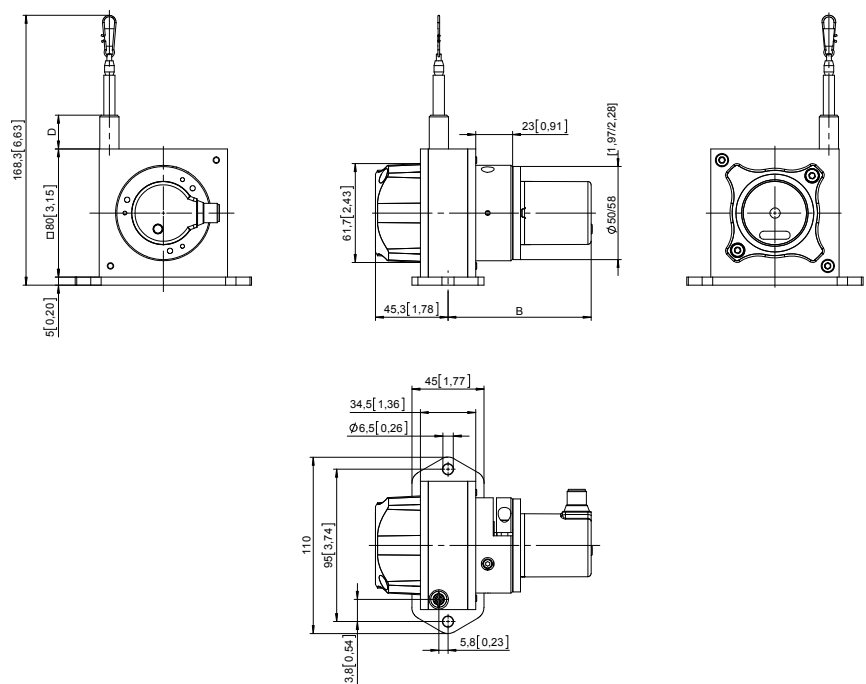
Dimension B depends on the encoder used	
Encoder	B
Sendix incremental (5000) D8.4B1.xxxx.00xx.xxxx	55.75 [2.19]
Sendix absolute (F5863) D8.4B1.xxxx.F3xx.xxxx	68.25 [2.69]
Sendix absolute (5863) D8.4B1.xxxx.63xx.xxxx	68.25 [2.69]
Sendix absolute (F5868, CANopen) D8.4B1.xxxx.F8xx.21xx	88.25 [3.47]
Sendix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

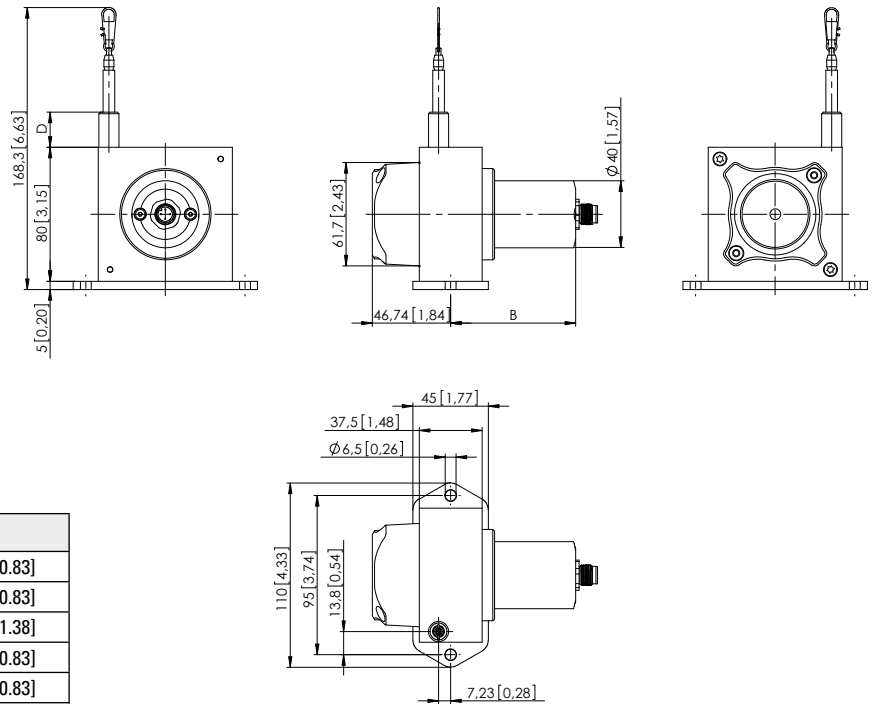
Performance-Line

Measuring length max. 3 m

Dimensions

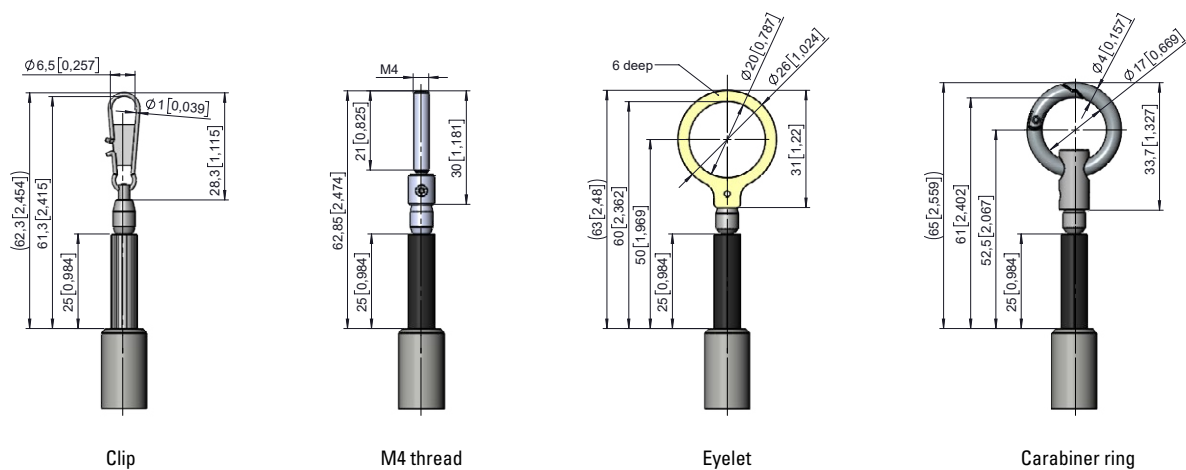
Dimensions in mm [inch]

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



Sensor 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]	35 [1.38]
4 ... 20 mA	1000 mm	87.5 [3.44]	21 [0.83]
	2000 mm	87.5 [3.44]	21 [0.83]
	3000 mm	102.3 [4.03]	35 [1.38]

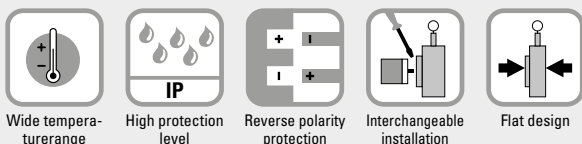
Wire fastenings



Draw-wire encoder C105	Compact-Line	Measuring length max. 6 m
-------------------------------	---------------------	----------------------------------



The draw-wire encoder C105 features a compact design. It is available with various wire types. All encoders with 58 mm synchro flange and 6 mm shaft, as well as analog sensors with redundant interfaces can be combined with this draw-wire mechanism. The cable and connector orientations of the encoder can easily be adapted to the position of the mechanism. A flexible wire outlet compensates mounting tolerances.



Flexible and compact

- Encoder replacement and connection technology adaptation possible by the user.
- Measuring lengths from 3 m to 6 m.
- Simple adaptation of the position for the connection technology.
- Flexible wire outlet and different wire types.
- Compact design.
- Simple installation.
- Scalable analog output with limit switch function.
- Redundant sensors.

Order code with encoder (incremental, absolute)

D8.1 **X****X****X** **.** **X****X****X****X** **.** **X****X****X****X**

Type **a** **b** **c** **d** **e** **f**

- a** Wire type
1 = steel wire
2 = Para-Line ¹⁾
5 = Steel wire, plastic coated
- b** Measuring range
A1 = 3 m
04 = 4 m
05 = 5 m
06 = 6 m ¹⁾

- c** Encoder used
2Z = 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

Draw-wire mechanism without encoder
write 0 in **c**, **d**, **e** + **f**
Example: D8.1106.0000.0000

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

Recommended standard variants (with incremental, absolute encoder)

Order no. draw-wire encoder	Mounted encoder	Interface	Power supply	Type of connection	Resolution / Protocol	Option
D8.1xxx.2254.2000	Sendix 5000 (8.5000.B154.2000)	Push-pull with inverted signal	10 ... 30 V DC	1 x radial M12 connector	2000 ppr	-
D8.1xxx.M324.G222	Sendix M5863 (8.M5863.4124.G222)	SSI	10 ... 30 V DC	1 x radial M12 connector	4096 ppr / SSI-Gray-Code	-
D8.1xxx.M824.2122	Sendix M5868 (8.M5868.4124.2122)	CANopen	10 ... 30 V DC	1 x radial M12 connector	CANopen encoderprofil DS406 V4.0	-

1) Wire type **a** = 2 (Para-Line) not available for measuring range 6 m.

Linear measuring technology

Draw-wire encoder C105	Compact-Line	Measuring length max. 6 m
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Other variants (with absolute encoder)

Order no. draw-wire encoder	Mounted encoder	Interface	Power supply	Type of connection	Resolution / Protocol	Option
D8.1xxx.F326.G223	Sendix F5863 (8.F5863.2126.G223)	SSI	10 ... 30 V DC	1 x radial M12 connector	4096 ppr / SSI-Gray-Code	SET button + status LED
D8.1xxx.6326.G223	Sendix 5863 (8.5863.2126.G223)	SSI	10 ... 30 V DC	1 x radial M12 connector	4096 ppr / SSI-Gray-Code	SET button + status LED
D8.1xxx.F82E.2123	Sendix F5868 (8.F5868.212E.2123)	CANopen	10 ... 30 V DC	1 x radial M12 connector	CANopen encoder profile DS406 V3.2	SET button
D8.1xxx.6822.2123	Sendix 5868 (8.5868.2122.2123)	CANopen	10 ... 30 V DC	2 x radial M12 connector	CANopen encoder profile DS406 V3.2	SET button
D8.1xxx.M834.3222	Sendix M5868 (8.M5868.4134.3222)	SAE J1939	10 ... 30 V DC	1 x radial M12 connector	SAE J1939	-
D8.1xxx.M844.4122	Sendix M5868 (8.M5868.4144.4122)	IO-Link	18 ... 30 V DC	1 x radial M12 connector	IO-Link	-
D8.1xxx.6832.3113	Sendix 5868 (8.5868.2132.3113)	PROFIBUS	10 ... 30 V DC	3 x radial M12 connector	Profibus-DP V0 encoder profile Class 2	SET button
D8.1xxx.68B2.B212	Sendix 5868 (8.5868.21B2.B212)	EtherCAT	10 ... 30 V DC	3 x radial M12 connector	EtherCAT with CoE 3.2.10	-
D8.1xxx.F8CN.C122	Sendix F5868 (8.F5868.21CN.C122)	PROFINET IO	10 ... 30 V DC	3 x axial M12 connector	PROFINET encoder profile version 4.2	-
D8.1xxx.F8AN.A222	Sendix F5868 (8.F5868.21AN.A222)	EtherNet/IP	10 ... 30 V DC	3 x axial M12 connector	EtherNet/IP	-

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

D8.1 **XXX** . **M1XX** . **XXXX**
Type **a** **b** **c** **d** **e** **f**

a Wire type
1 = steel wire
2 = Para-Line ¹⁾
5 = Steel wire, plastic coated

b Measuring range
A1 = 3 m
04 = 4 m
05 = 5 m
06 = 6 m ¹⁾

c Encoder used
M1 = Sendix M5861, absolute ²⁾

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

Draw-wire mechanism without encoder
write 0 in **c**, **d**, **e** + **f**
Example: D8.1106.0000.0000

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
D8.1xxx.M134.3512	Sendix M5861 (8.M5861.4134.3512)	Analog, 4 ... 20 mA	10 ... 30 V DC	radial M12 connector	12 Bit / 4 ... 20 mA	scalable with limit switch function ³⁾
D8.1xxx.M144.4512	Sendix M5861 (8.M5861.4144.4512)	Analog, 0 ... 10 V	15 ... 30 V DC	radial M12 connector	12 Bit / 0 ... 10 V	scalable with limit switch function ³⁾
D8.1xxx.M134.3612	Sendix M5861 (8.M5861.4134.3612)	Analog, 4 ... 20 mA	10 ... 30 V DC	radial M12 connector	12 Bit / 4 ... 20 mA	scalable without limit switch function ³⁾
D8.1xxx.M144.4612	Sendix M5861 (8.M5861.4144.4612)	Analog, 0 ... 10 V	15 ... 30 V DC	radial M12 connector	12 Bit / 0 ... 10 V	scalable without limit switch function ³⁾

Order code with analog sensor (scaled to measuring range)

D8.3 **1XX** . **XXX** **2** . **0000**
Typ **a** **b** **c** **d**

a Wire type
1 = steel wire (ø 0,6 mm)

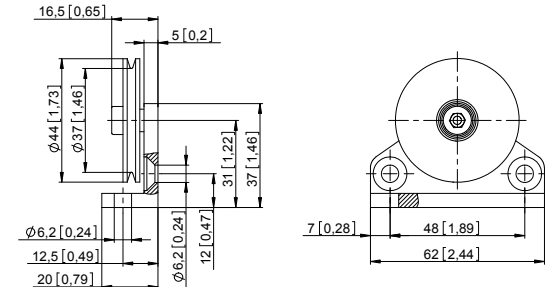
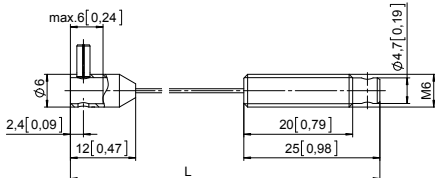
b Measuring range
05 = 5 m
06 = 6 m

c Redundant sensor / supply voltage
R11 = 2 x 4 ... 20 mA / 10 ... 30 V DC
R33 = 2 x potentiometer 10 kΩ / max. 30 V DC

d Type of connection
2 = radial M12 connector, 8-pin

1) Wire type **a** = 2 (Para-Line) not available for measuring range 6 m.
2) With ccw option.
3) Delivery condition: unscaled.
Description for scaling and limit switch function see data sheet M5861.

Linear measuring technology

Draw-wire encoder C105		Compact-Line	Measuring length max. 6 m	
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 ¹⁾
				
Extension cable (further on request) 			Steel wire 2 m [6.56']	8.0000.7000.0033
			Steel wire 5 m [16.40']	8.0000.7000.0034
			Steel wire 10 m [32.81']	8.0000.7000.0035
			Paraleine 2 m [6.56']	8.0000.7000.0032
Cables and connectors			Order no.	
Preassembled cables	M12 female connector with coupling nut, 4-pin, A coded, straight single ended 2 m [6.56'] PUR cable		05.00.6061.6211.002M	
	M12 female connector with coupling nut, 5-pin, A coded, straight single ended 2 m [6.56'] PVC cable		05.00.6081.2211.002M	
	M12 male connector with external thread, 4-pin, D coded, straight single ended 2 m [6.56'] PUR cable		05.00.6031.4411.002M	
	M12 female connector with coupling nut, 8-pin, A coded, straight single ended 2 m [6.56'] PVC cable		05.00.6041.8211.002M	
Connectors	M12 female connector with coupling nut, 5-pin, A coded, straight (metal)		8.0000.5116.0000	
	M12 female connector with coupling nut, 5-pin, A coded, straight (metal/plastic)		05.B-8151-0/9	
	M12 female connector with coupling nut, 5-pin, A coded, straight (metal, Ex approval)		8.0000.5121.0000.Ex	

1) Stock types.

Linear measuring technology

Draw-wire encoder C105	Compact-Line	Measuring length max. 6 m
-------------------------------	---------------------	----------------------------------

Technical data

Mechanical characteristics	
Measuring range	3000 ... 6000 mm
Speed max.	3000 mm/s
Acceleration max.	23.5 m/s ²
Extension force F_{min}	8 N
Repeat accuracy	±0.25 mm
Working temperature	with encoder -20 °C ... +80 °C [-4 °F ... +176 °F] -40 °C ... +80 °C [-40 °F ... +176 °F], optional on request, speed max. 800 mm/s with analog sensor -40 °C ... +80 °C [-40 °F ... +176 °F]
Weight	approx. 800 g [28.22 oz]
Drum circumference	200 mm
Wire	Para-Line ø 0,6 mm steel wire ø 0,6 mm

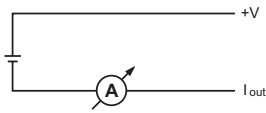
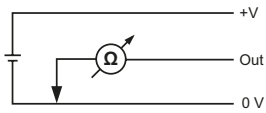
Electrical characteristics analog sensor R11	
Supply voltage	10 ... 30 V DC
Output current	4 ... 20 mA (2x) 20 ... 4 mA (2x) 4 ... 20 mA + 20 ... 4 mA

For the electrical characteristics as well as for the terminal assignment, please refer to the data sheet of the encoder used.

Electrical characteristics analog sensor R33	
Analog output	2 x potentiometer
Output	10 kΩ
Supply voltage	max. 30 V DC
Load capacity	2 W at 70 °C
Resistance tolerance	±5 %
Standard terminal resistance	0.5% or 1Ω
Linearity tolerance	±0.25 %

Approvals	
CE compliant in accordance with	
EMC Directive	2014/30/EU
RoHS Directive	2011/65/EU

Terminal assignment (analog output)

Analog sensor R11 , redundant (2 x 4 ... 20 mA)	M12 connector, 8 pin		R/I-converter 1		R/Iconverter 2						
		Signal:	+V 1	I _{out} 1	+V 2	I _{out} 2	n.c.	n.c.	n.c.	n.c.	
		Pin:	1	3	5	7	2	4	6	8	
Analog sensor R33 , redundant (2 x Potentiometer 1 kΩ)	M12 connector, 8 pin		Potentiometer 1				Potentiometer 2				
		Signal:	+V 1	Out 1	0 V 1	n.c.	+V 2	Out 2	0 V 2	n.c.	
		Pin:	1	2	3	4	5	6	7	8	

Top view of mating side, male contact base



M12 connector, 8-pin

Draw-wire encoder C105

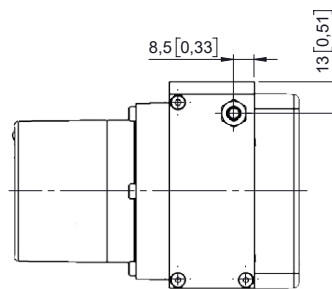
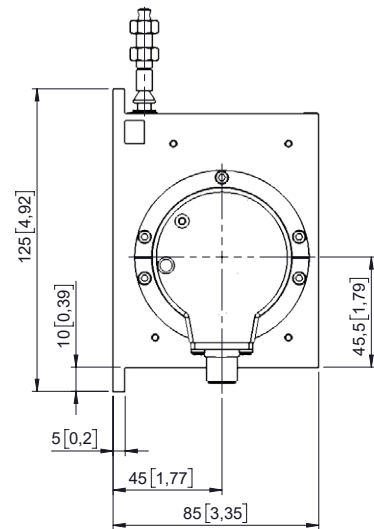
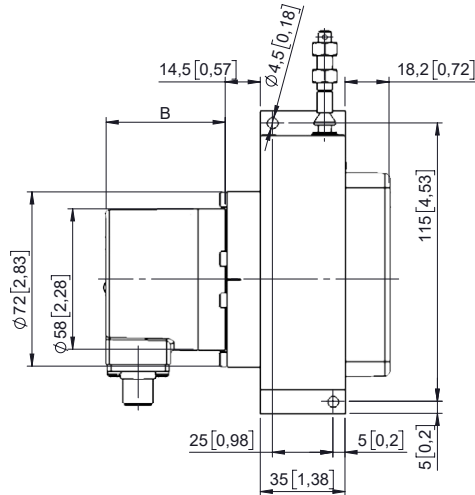
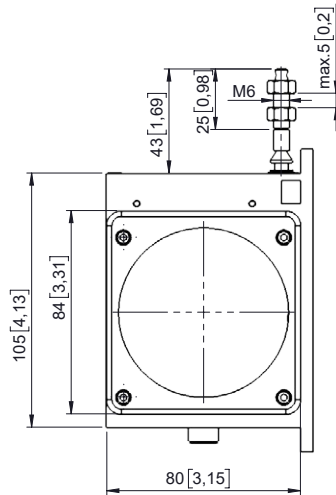
Compact-Line

Measuring length max. 6 m

Dimensions

Dimensions in mm [inch]

Draw-wire mechanics with encoder



Encoder	B
Sendix incremental (5000) D8.1xxx.2Zxx.xxxx	37.0 [1.46]
Sendix absolute (F5863) D8.1xxx.F3xx.xxxx”	49.5 [1.95]
Sendix absolute (5863) D8.1xxx.63xx.xxxx	49.5 [1.95]
Sendix absolute (F5868, CANopen) D8.1xxx.F8xx.21xx	70.0 [2.76]
Sendix absolute (F5868, EtherNet/IP) D8.1xxx.F8xx.A2xx	59.5 [2.34]
Sendix absolute (F5868, EtherNet/IP) D8.1xxx.68xx.A2xx	77.2 [3.04]
Sendix absolute (F5868, EtherNet/IP) D8.1xxx.Mxxx.xxxx	49.8 [1.96]

Linear measuring technology

Draw-wire encoder C105

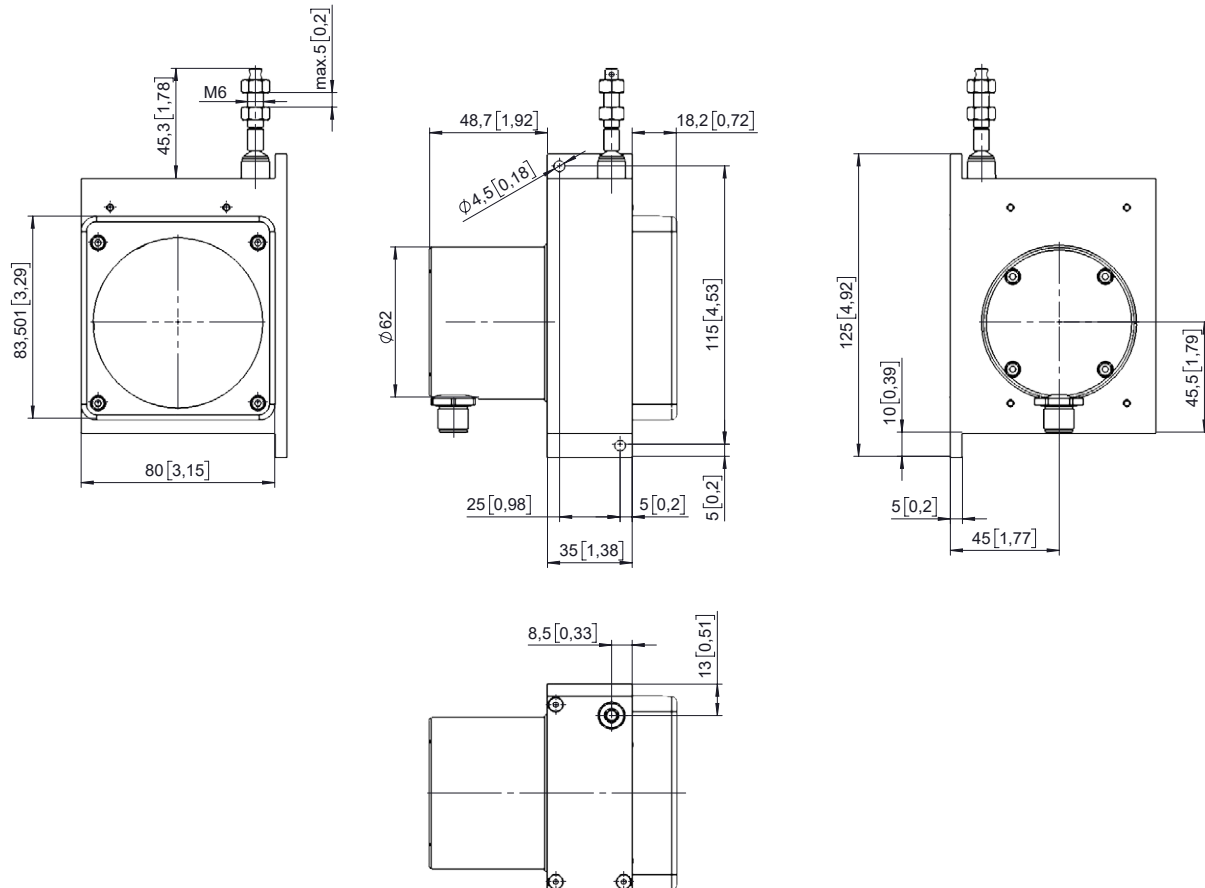
Compact-Line

Measuring length max. 6 m

Dimensions

Dimensions in mm [inch]

Draw-wire mechanics with encoder

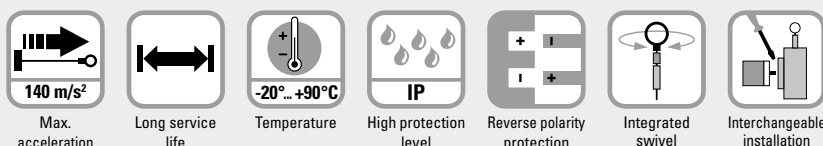


Draw-wire encoder D135	Performance-Line	Measuring length max. 42.5 m
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These draw-wire mechanics D135 can be used up to a measuring length of 42.5 meters. This draw-wire mechanics may be combined with the proven Kübler Sendix encoders with incremental or absolute interface, as well as with analog sensors.

With its compact construction, the D135 suits perfectly all measuring tasks from 8 up to 42.5 meters.



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 and high acceleration.
- Flexible mounting thanks to fastening tabs or fastening grooves.
- Various connection possibilities available.
- Interchangeable encoders (interchangeable installation).

Order code with encoder (incremental, absolute)

D8.4D1 . XXXX . XXXX . XXXX
Type a b c d e

a Measuring range

0800 = 8 000 mm
1000 = 10 000 mm
1200 = 12 000 mm
1500 = 15 000 mm
2000 = 20 000 mm
2500 = 25 000 mm
3000 = 30 000 mm
3500 = 35 000 mm
4000 = 40 000 mm
4250 = 42 500 mm

b 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

c Output circuit

depends on the encoder used

d Type of connection

depends on the encoder used

e Resolution / Protocol / Options

depends on the encoder used

Optional on request

- Other measuring ranges
- Cable diameter 1 mm
- Other wire fastening
M4 thread, eyelet or carabiner ring
- 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]	333.33	333.33	333.33
Pulses / revolution [ppr]	1000	2000	4000
Pulses / mm	3	6	12
Resolution [mm]	0.33	0.17	0.08

Standard resolutions for draw-wire with absolute encoder Sendix M5863 (12 bit ST) or M5868 (12 bit ST, programmable via bus)

Drum circumference [mm]	333.33
Pulses / revolution [ppr]	4096
Pulses / mm	12.3
Resolution [mm]	0.08

Linear measuring technology

Draw-wire encoder D135	Performance-Line	Measuring length max. 42.5 m
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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.xD1.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.xD1.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.xD1.xxxx.M824.2122	Sendix M5868 (8.M5868.3524.2122)	CANopen	10 ... 30 V DC	1 x radial M12 connector	CANopen encoder profil 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.xD1.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.xD1.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.xD1.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.xD1.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.xD1.xxxx.M834.3222	Sendix M5868 (8.M5868.3534.3222)	SAE J1939	10 ... 30 V DC	1 x radial M12 connector	SAE J1939	-
D8.xD1.xxxx.M844.4122	Sendix M5868 (8.M5868.3544.4122)	IO-Link	18 ... 30 V DC	1 x radial M12 connector	IO-Link	-
D8.xD1.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.xD1.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.xD1.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.xD1.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)

D8.4D1	. XXXX	. M1XX	. XXXX
Type	a	b c d	e

a Measuring range

0800 = 8 000 mm
1000 = 10 000 mm
1200 = 12 000 mm
1500 = 15 000 mm
2000 = 20 000 mm
2500 = 25 000 mm
3000 = 30 000 mm
3500 = 35 000 mm
4000 = 40 000 mm
4250 = 42 500 mm

b Encoder used

M1 = Sendix M5861, absolute ¹⁾

c Output circuit

depends on the encoder used

d Type of connection

depends on the encoder used

e Resolution / Protocol / Options

depends on the encoder used

Optional on request

- Other measuring ranges
- Cable diameter 1 mm
- Other wire fastening
- 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.xD1.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 ²⁾
D8.xD1.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 ²⁾
D8.xD1.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 ³⁾
D8.xD1.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 ³⁾

1) With ccw option.

2) Delivery condition: scaled to measuring range.
Description for scaling and limit switch function see data sheet M5861.

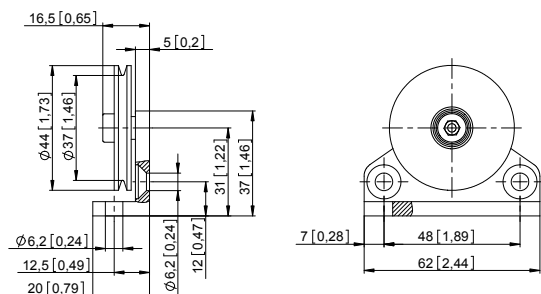
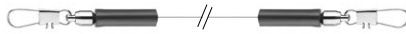
3) Delivery condition: unscaled.

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

Linear measuring technology

Draw-wire encoder D135	Performance-Line	Measuring length max. 42.5 m
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Order code with analog sensor (scaled to measuring range)		D8.3D1 . XXXX . XXX X . 0000
		Type a b c
a Measuring range 0800 = 8 000 mm 1000 = 10 000 mm 1200 = 12 000 mm 1500 = 15 000 mm 2000 = 20 000 mm 2500 = 25 000 mm 3000 = 30 000 mm 3500 = 35 000 mm 4000 = 40 000 mm 4250 = 42 500 mm	b Analog sensor output / supply voltage A11 = 4 ... 20 mA / 12 ... 30 V DC A22 = 0 ... 10 V / 12 ... 30 V DC A33 = potentiometer 1 kΩ / max. 30 V DC	Optional on request - Other measuring ranges - Cable diameter 1 mm - Other wire fastening M4 thread, eyelet 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
c Type of connection 1 = axial cable, 2 m [6.56'] PVC 3 = axial M12 connector, 4-pin		

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 ¹⁾
			
Extension cable (further on request) 	0.5 m with clip		8.0000.7000.0051
	1.0 m with clip		8.0000.7000.0052
	2.0 m with clip		8.0000.7000.0054
Cables and connectors			Order no.
Preassembled cables	M12 female connector with coupling nut, 5-pin, A coded, straight single ended 2 m [6.56'] PVC cable		05.00.6081.2211.002M
	M12 male connector with external thread, 4-pin, D coded, straight single ended 2 m [6.56'] PUR cable		05.00.6031.4411.002M
Connectors	M12 female connector with coupling nut, 5-pin, A coded, straight (metal)		8.0000.5116.0000
	M12 female connector with coupling nut, 5-pin, A coded, straight (metal/plastic)		05.B-8151-0/9
	M12 female connector with coupling nut, 5-pin, A coded, right-angle (plastic)		05.B-8251-0/9

1) Stock types.

Linear measuring technology

Draw-wire encoder D135	Performance-Line	Measuring length max. 42.5 m
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Technical data

Mechanical characteristics (draw-wire mechanics)						
Measuring range		8000 mm	10000 mm 12000 mm 15000 mm	20000 mm	25000 mm 30000 mm	35000 mm 40000 mm 42500 mm
Extension force	F _{min}	7.2 N	8.7 N	7.0 N	7.3 N	7.0 N
	F _{max}	16.0 N	16.9 N	12.4 N	15.7 N	14.1 N
Speed max.		10 m/s	6 m/s	5 m/s	5 m/s	5 m/s
Acceleration max.		140 m/s²	80 m/s²	60 m/s²	60 m/s²	60 m/s²
Linearity	with analog output	±0.1 % (of the measuring range)				
	with encoder	±0.05 % (of the measuring range)				
		±0.02 % (of the measuring range) ¹⁾				
Weight		depending on the measuring and 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 20000 mm)				
Protection acc. to EN 60529		IP65 (sensor)				

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

Electrical characteristics (digital output)	Approvals
The electrical characteristics of the draw-wire mechanics with digital output can be found in the data sheets of the encoders.	CE compliant in accordance with EMC Directive 2014/30/EU RoHS Directive 2011/65/EU

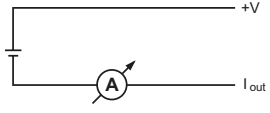
1) On request for encoder version: 00, F3, 63, F8, 68 (see order code ).

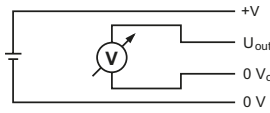
2) Optional on request

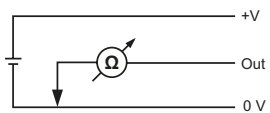
Linear measuring technology

Draw-wire encoder D135	Performance-Line	Measuring length max. 42.5 m
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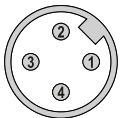
Terminal assignment (analog sensor)

Analog sensor A11 (4 ... 20 mA)			R/I converter				
		Signal:	+V	n.c.	I _{out}	n.c.	
	Cable ¹⁾	Core color:	BN	WH	BU	BK	
	M12 connector, 4-pin	Pin:	1	2	3	4	

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

Analog sensor A33 (Potentiometer 1 kΩ)			Potentiometer				
		Signal:	+V	Out	0 V	n.c.	
	Cable ¹⁾	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 D135

Performance-Line

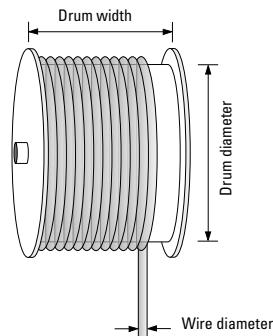
Measuring length max. 42.5 m

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

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)

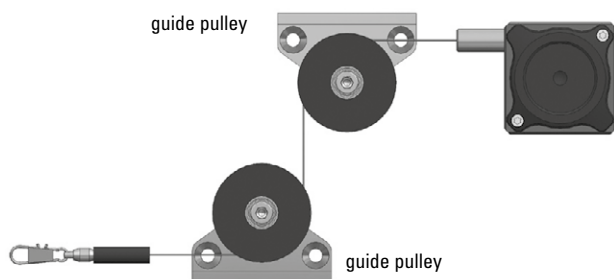


Extension wire

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



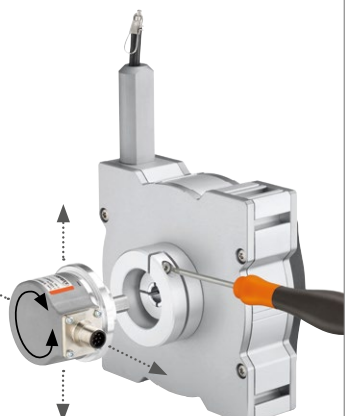
Interchangeable installation

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

All versions from measuring range 10 000 mm as interchangeable installation (D8.4Dx.xxxx.xxxx).
Version with measuring range 8 000 mm as interchangeable installation (D8.2Dx.0800.xxxx) and as fixed installation (D8.4Dx.0800.xxxx).



Draw-wire encoder D135

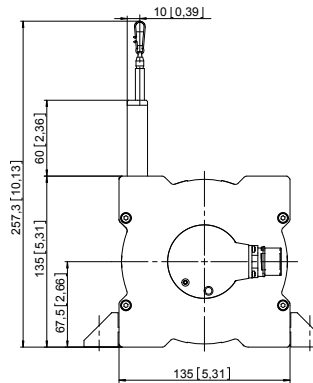
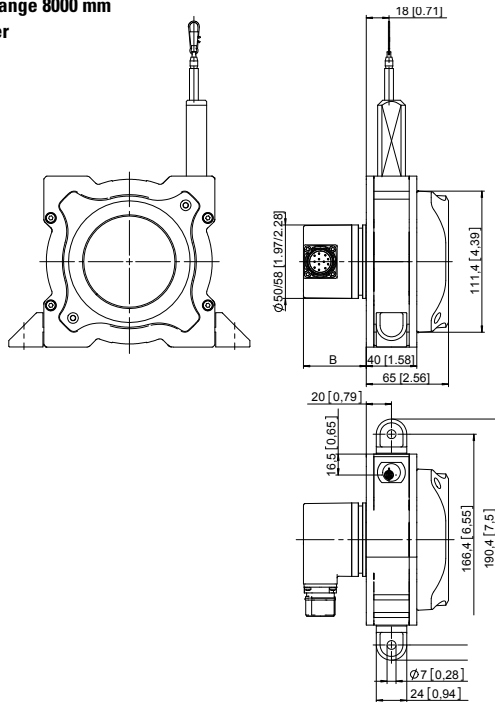
Performance-Line

Measuring length max. 42.5 m

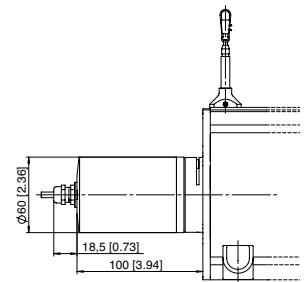
Dimensions

Dimensions in mm [inch]

Draw-wire mechanics,
measuring range 8000 mm
with encoder



with analog output



Dimension B depends on the encoder used

Encoder		B
Sendix incremental (5000)	D8.4D1.xxxx.00xx.xxxx	37.0 [1.46]
Sendix absolute (F5863)	D8.4D1.xxxx.F3xx.xxxx	49.5 [1.95]
Sendix absolute (5863)	D8.4D1.xxxx.63xx.xxxx	49.5 [1.95]
Sendix absolute (F5868, CANopen)	D8.4D1.xxxx.F8xx.21xx	70.0 [2.76]
Sendix absolute (F5868, EtherNet/IP)	D8.4D1.xxxx.F8xx.A2xx	59.5 [2.34]
Sendix absolute (5868)	D8.4D1.xxxx.68xx.xxxx	77.2 [3.04]
Sendix absolute (M586x)	D8.4D1.xxxx.Mxxx.xxxx	49.8 [1.96]

Linear measuring technology

Draw-wire encoder D135

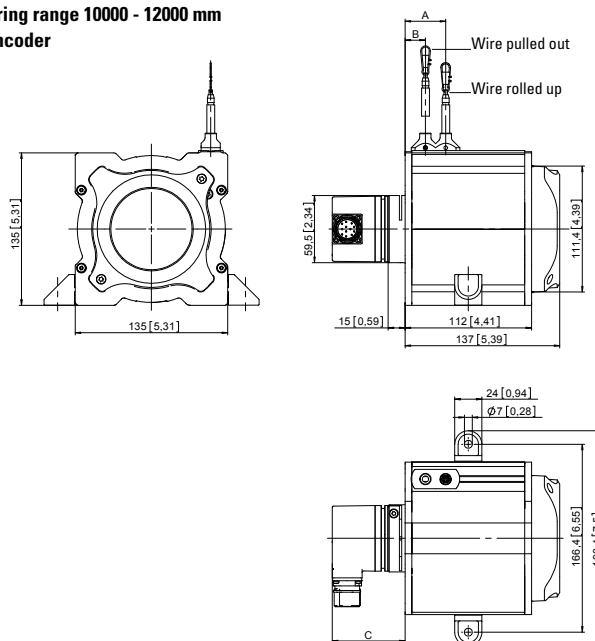
Performance-Line

Measuring length max. 42.5 m

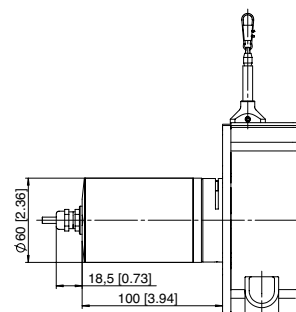
Dimensions

Dimensions in mm [inch]

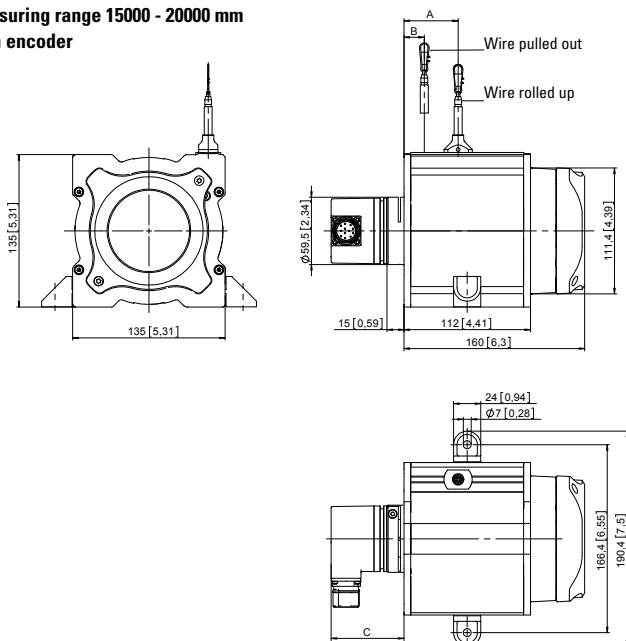
Draw-wire mechanics,
measuring range 10000 - 12000 mm
with encoder



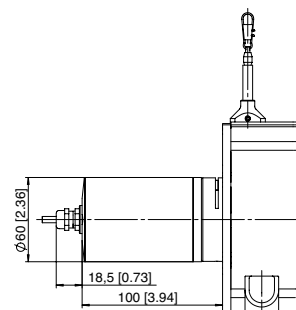
with analog output



Draw-wire mechanics,
measuring range 15000 - 20000 mm
with encoder



with analog output



Measuring range	A - Wire rolled up	B - Wire pulled out
10000 mm	33 [1.30]	18 [0.71]
12000 mm	36 [1.42]	18 [0.71]
15000 mm	41 [1.61]	18 [0.71]
20000 mm	48 [1.89]	18 [0.71]

Dimension C depends on the encoder used

Encoder	C
Sendix incremental (5000)	60.0 [2.36]
Sendix absolute (F5863)	72.5 [2.85]
Sendix absolute (5863)	72.5 [2.85]
Sendix absolute (F5868, CANopen)	93.0 [3.66]
Sendix absolute (F5868, EtherNet/IP)	82.5 [3.25]
Sendix absolute (5868)	100.2 [3.94]
Sendix absolute (M586x)	72.8 [2.87]

Draw-wire encoder D135

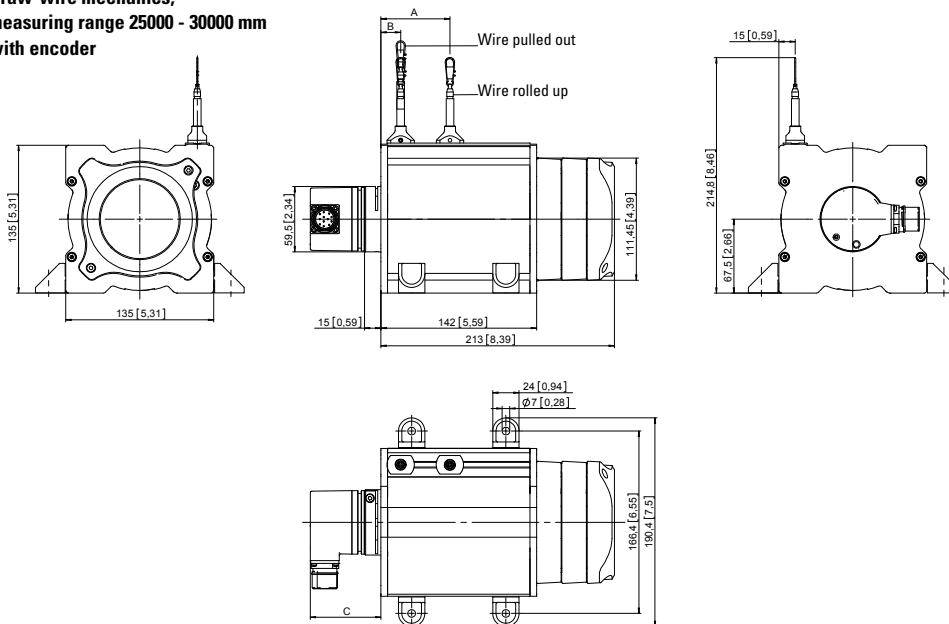
Performance-Line

Measuring length max. 42.5 m

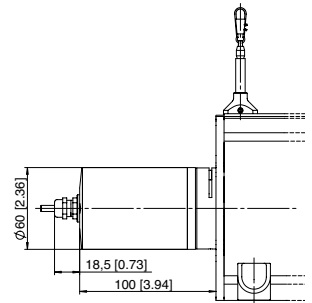
Dimensions

Dimensions in mm [inch]

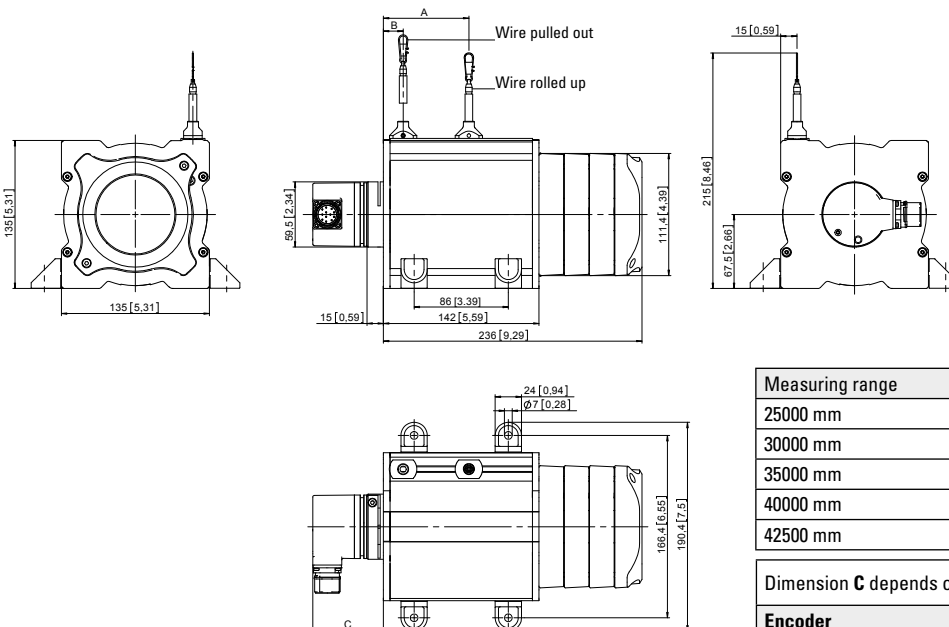
**Draw-wire mechanics,
measuring range 25000 - 30000 mm
with encoder**



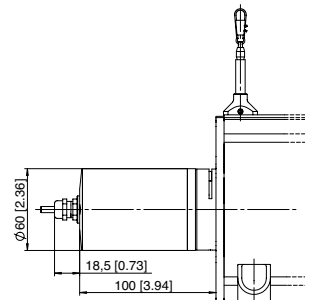
with analog output



**Draw-wire mechanics
measuring range 35000 - 42500 mm
with encoder**



with analog output



Measuring range	A - Wire rolled up	B - Wire pulled out
25000 mm	56 [2.02]	18 [0.71]
30000 mm	63 [2.48]	18 [0.71]
35000 mm	71 [2.80]	18 [0.71]
40000 mm	78 [3.07]	18 [0.71]
42500 mm	82 [3.23]	18 [0.71]

Dimension C depends on the encoder used

Encoder	C
Sendix incremental (5000)	D8.4D1.xxxx.00xx.xxxx 60.0 [2.36]
Sendix absolute (F5863)	D8.4D1.xxxx.F3xx.xxxx 72.5 [2.85]
Sendix absolute (5863)	D8.4D1.xxxx.63xx.xxxx 72.5 [2.85]
Sendix absolute (F5868, CANopen)	D8.4D1.xxxx.F8xx.21xx 93.0 [3.66]
Sendix absolute (F5868, EtherNet/IP)	D8.4D1.xxxx.F8xx.A2xx 82.5 [3.25]
Sendix absolute (5868)	D8.4D1.xxxx.68xx.xxxx 100.2 [3.94]
Sendix absolute (M586x)	D8.4D1.xxxx.Mxxx.xxxx 72.8 [2.87]

Linear measuring technology

Draw-wire encoder D135

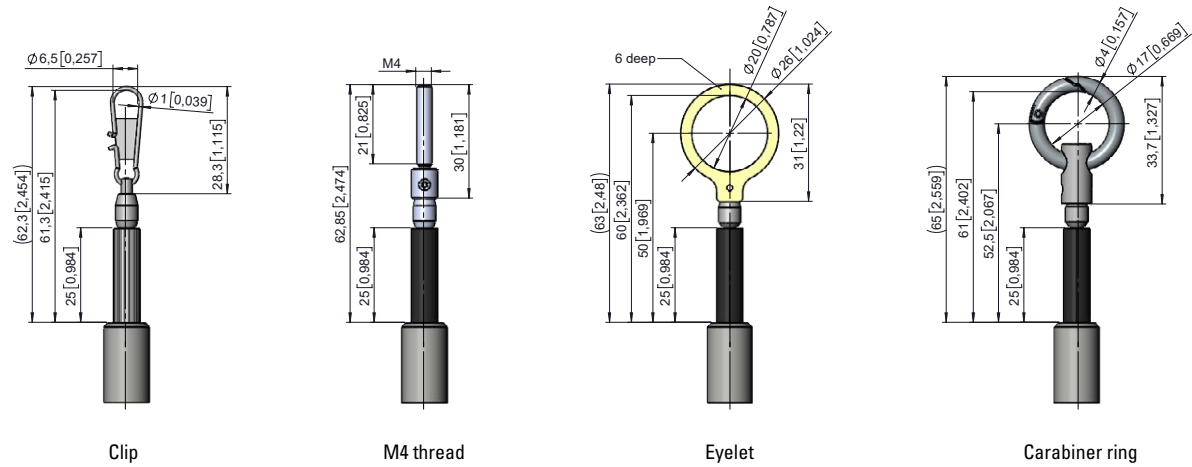
Performance-Line

Measuring length max. 42.5 m

Dimensions

Dimensions in mm [inch]

Wire fastenings



Linear measuring technology

Draw-wire encoder D125	Base-Line	Measuring length max. 10 m
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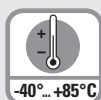


The draw wire system D125 is more than a sensor for determining length-related position data. Variants with integrated inclinometer and redundant interfaces offer versatile application possibilities. The contactless magnetic position scanning, a high IP67 protection level and the wider temperature range round off the product.



Analog
output

CANopen



Wide temperature range



High protection level



Shock / vibration resistant



Redundancy

Characteristics

- Measuring length 6 ... 10 m.
- Integrated inclinometer.
- Redundant sensors.
- Different types of sensors (analog, CANopen).
- Linearity up to $\pm 0.5\%$ of the measuring range.
- High protection level IP67 and wide temperature range from $-40\text{ }^{\circ}\text{C}$... $+85\text{ }^{\circ}\text{C}$.

Advantages

- The suitable measuring length for every application.
- Cost, space and installation work saving.
- For even higher plant availability.
- Simple selection and fast installation.
- High accuracy at economic prices.
- Reliability and long service life for outdoor applications.

Order code with analog sensor

D8. D125 . XXXX . XXX 1 . 1 000

a Measuring length

0600 = 6 m
0700 = 7 m
0800 = 8 m
0900 = 9 m
1000 = 10 m

b Single sensor

A11 = 4 ... 20 mA
A22 = 0 ... 10 V
A44 = 0.5 ... 4.5 V

Redundat sensor

R11 = 2 x 4 ... 20 mA
R22 = 2 x 0 ... 10 V
R44 = 2 x 0.5 ... 4.5 V

Crossed signals

R1C = 4 ... 20 mA / 20 ... 4 mA
R2C = 0 ... 10 V / 10 ... 0 V
R4C = 0.5 ... 4.5 V / 4.5 ... 0.5 V

c Type of connection

1 = M12 male connector, 5-pin

Order code with CANopen and inclinometer

D8. D125 . XXXX . XXX 1 . 1 X 00

a Measuring length

0600 = 6 m
0700 = 7 m
0800 = 8 m
0900 = 9 m
1000 = 10 m

b Sensor type

RC1 = CANopen redundant
RCT = CANopen redundant,
with termination resistor 120 Ω

c Type of connection

1 = M12 male connector, 5-pin

d Inclinometers

0 = none
1 = 1 inclinometer
2 = 2 inclinometers

Stock types

D8.D125.1000.RC11.1000

Linear measuring technology

Draw-wire encoder D125	Base-Line	Measuring length max. 10 m
Cables and connectors		Order no.
Preassembled cables	M12 female connector with coupling nut, 5-pin, A coded, straight single ended 2 m [6.56'] PVC cable	05.00.6081.2211.002M
Connectors	M12 female connector with coupling nut, 5-pin, A coded, straight (metal)	8.0000.5116.0000
	M12 female connector with coupling nut, 5-pin, A coded, straight (metal/plastic)	05.B-8151-0/9
	M12 female connector with coupling nut, 5-pin, A coded, right-angle (plastic)	05.B-8251-0/9

Technical data

Mechanical characteristics (draw-wire mechanics)		
Measuring range		6.0 ... 10.0 m
Measuring wire	material diameter	AISI304 steel wire Nylon coated ø 0.9 mm
Wire fastening	eyelet internal diameter outer diameter height	ø 8 mm ø 15 mm 2 mm
Speed max.		1 m/s
Acceleration max.		10 m/s ²
Linearity	analog (whole measuring range)	±1.0 % CANopen ±0.8 %
Repetition accuracy	analog (whole measuring range)	±0.5 % CANopen ±0.4 %
Pull-back force		typ. 4.5 N ¹⁾
Pull-out force		typ. 9 N
Type of connection		M12 connector, 5-pin
Housing		polycarbonate reinforced with glass fibers
Protection		IP67
Temperature range		-40 °C ... +85 °C [-40 °F ... +185 °F]
Weight		approx. 0.97 kg [34.2 oz]
Shock resistance acc. to EN 60068-2-27		300 m/s ² , 11 ms
Vibration resistance acc. to EN 60068-2-6		100 m/s ² , 10 ... 500 Hz

Electrical characteristics		
Supply voltage		
Sensor type:		
A11, A22, R11, R22, R1C, R2C		12 ... 30 V DC
A44, R44, R4C		9 ... 30 V DC
RC1, RCT		9 ... 30 V DC

Analog sensor	
Output signal	analog
Resolution	12 bit

CANopen	
Output signal	CANopen (DS301)
Resolution	14 bit
Resolution inclinometer	0.1°
Accuracy inclinometer	±0.6°
Temperature drift inclinometer	±0.01 % / °C

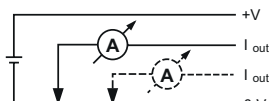
Approvals		
Electromagnetic compatibility		acc. to EN 61326-1, EN 61326-3-1
CE compliant in accordance with		
EMC Directive		2014/30/EU
RoHS Directive		2011/65/EU

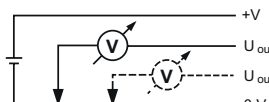
1) May be lower at low temperatures.

Linear measuring technology

Draw-wire encoder D125	Base-Line	Measuring length max. 10 m
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Terminal assignment

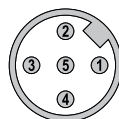
Sensor type	Interface	Type of connection	M12 connector, 5-pin						
analog sensor A11, R11, R1C	(2x) 4 ... 20 mA	1	Signal:	+V	0 V	Iout 1	Iout 2 ¹⁾	n.c.	
			Pin:	1	2	3	4	5	

Sensor type	Interface	Type of connection	M12 connector, 5-pin						
analog sensor A22, R22, R2C A44, R44, R4C	(2x) 0 ... 10 V (2x) 0.5 ... 4.5 V	1	Signal:	+V	0 V	U _{out 1}	U _{out 2} ¹⁾	n.c.	
			Pin:	1	2	3	4	5	

Sensor type	Interface	Type of connection	M12 connector, 5-pin					
RC1, RCT	CANopen	1	Signal:	+V	0 V	CAN-GND	CAN-H	CAN-L
			Pin:	2	3	1	4	5

+V : Supply voltage +V DC
 0 V : Supply voltage GND (0V)
 I_{out 1} : Current output 1
 I_{out 2} : Current output 2
 U_{out 1} : Voltage output 1
 U_{out 2} : Voltage output 2
 n.c. : not connected

Top view of mating side, male contact base



M12 connector, 5-pin

1) Only in case of redundant ordering option sensor type R11, R1C, R22, R2C, R44, R4C (otherwise n.c.).

Linear measuring technology

Draw-wire encoder D125

Base-Line

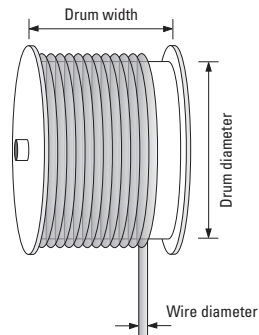
Measuring length max. 10 m

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.

Inclinometer with option RC1

Setting possibility 360°



Setting possibility $\pm 180^\circ$



Redundant signals possible.

Setting possibilities:

- Switching between setting possibilities 180° and 360°.
- Switching between synchronous and asynchronous output.
- Change of direction of rotation (cw/ccw).
- Setting and resetting an offset.

Linear measuring technology

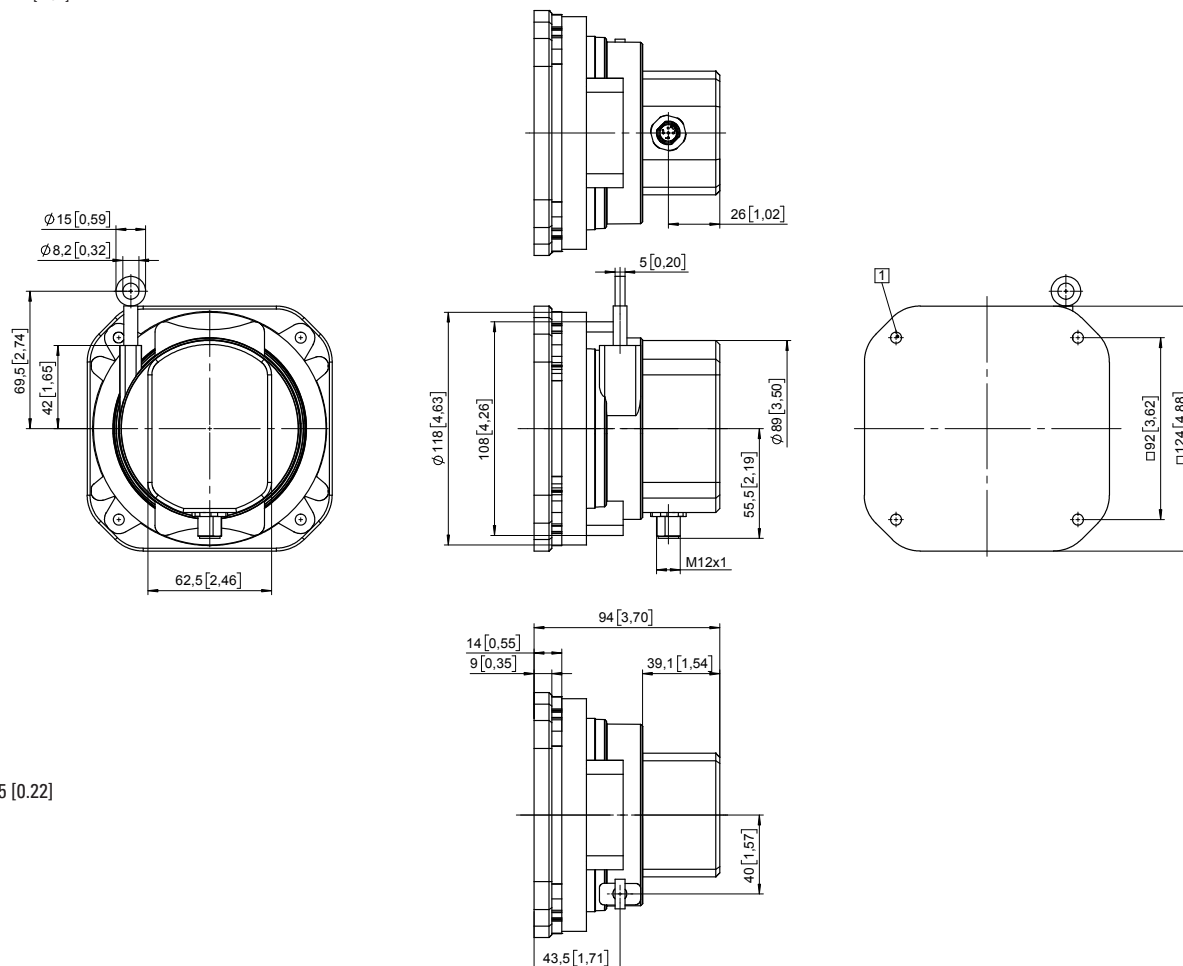
Draw-wire encoder D125

Base-Line

Measuring length max. 10 m

Dimensions

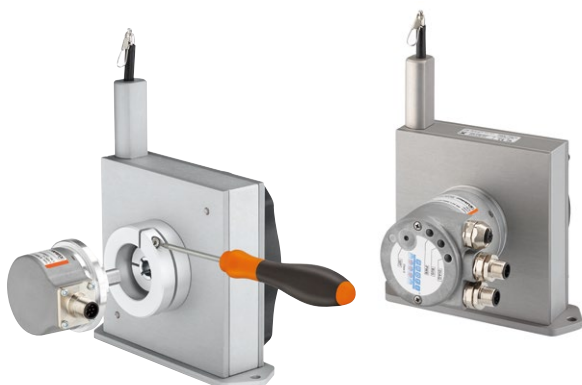
Dimensions in mm [inch]



1 4 x $\varnothing 5.5 [0.22]$

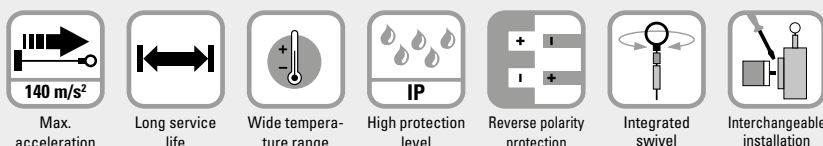
Linear measuring technology

Draw-wire encoder C120	Performance-Line	Measuring length max. 6 m
------------------------	------------------	---------------------------



These draw-wire mechanics C120 can be used up to a measuring length of 6 meters.

This 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 max. 10 m/s.
- High acceleration, up to max. 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.XC1.XXXX.XXXX.XXXX

a <i>Mechanics</i> 2 = interchangeable installation ¹⁾ 4 = fixed installation ²⁾	c <i>Encoder used</i> 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 <i>Output circuit</i> depends on the encoder used	e <i>Type of connection</i> depends on the encoder used	f <i>Resolution / Protocol / Options</i> depends on the encoder used	<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 - Improved linearity 0.02 %
---	--	---	---	--	--

Standard resolutions for draw-wire with incremental encoder Sendix 5000

Drum circumference [mm]	317.68	317.68	317.68
Pulses / revolution [ppr]	1000	2000	4000
Pulses / mm	3.1	6.3	12.6
Resolution [mm]	0.32	0.16	0.08

Standard resolutions for draw-wire with absolute encoder Sendix M5863 (12 bit ST) or M5868 (12 bit ST, programmable via bus)

Drum circumference [mm]	317.68
Pulses / revolution [ppr]	4096
Pulses / mm	12.9
Resolution [mm]	0.08

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

Draw-wire encoder C120	Performance-Line	Measuring length max. 6 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.xC1.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.xC1.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.xC1.xxxx.M824.2122	Sendix M5868 (8.M5868.3524.2122)	CANopen	10 ... 30 V DC	1 x radial M12 connector	CANopen encoderprofil 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.xC1.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.xC1.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.xC1.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.xC1.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.xC1.xxxx.M834.3222	Sendix M5868 (8.M5868.3534.3222)	SAE J1939	10 ... 30 V DC	1 x radial M12 connector	SAE J1939	-
D8.xC1.xxxx.M844.4122	Sendix M5868 (8.M5868.3544.4122)	IO-Link	18 ... 30 V DC	1 x radial M12 connector	IO-Link	-
D8.xC1.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.xC1.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.xC1.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.xC1.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.XC1.XXXX.M1XX.XXXX
a b c d e f

a Mechanics

- 2 = interchangeable installation ¹⁾
- 4 = fixed installation ²⁾

b Measuring range

- 0400 = 4000 mm
- 0500 = 5000 mm
- 0600 = 6000 mm

c Encoder used

- M1 = Sendix M5861, absolute ³⁾

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):
M4 thread, eyelet 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.xC1.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 ⁴⁾
D8.xC1.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 ⁴⁾
D8.xC1.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 ⁵⁾
D8.xC1.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 ⁵⁾

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.

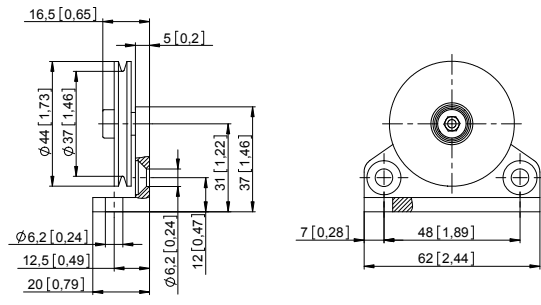
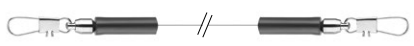
Description for scaling and limit switch function see data sheet M5861.

5) Delivery condition: unscaled.

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

Linear measuring technology

Draw-wire encoder C120	Performance-Line	Measuring length max. 6 m
Order code with analog sensor (scaled to measuring range)		
D8.3C1 . XXXX . XXX X . 0000		
a <i>Measuring range</i> 0400 = 4000 mm 0500 = 5000 mm 0600 = 6000 mm 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 c <i>Type of connection</i> 1 = axial cable, 2 m PVC 3 = axial M12 connector, 4-pin <i>Optional on request</i> - Other measuring ranges - Cable diameter 1 mm - Other wire fastening (wire clip = standard): M4 thread, eyelet 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.
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 ¹⁾
Extension cable (further on request) 	0.5 m with clip 1.0 m with clip 2.0 m with clip	8.0000.7000.0051 8.0000.7000.0052 8.0000.7000.0054
Cables and connectors		Order no.
Preassembled cables	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	05.00.6081.2211.002M 05.00.6031.4411.002M
Connectors	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)	8.0000.5116.0000 05.B-8151-0/9 05.B-8251-0/9

1) Stock types.

Linear measuring technology

Draw-wire encoder C120	Performance-Line	Measuring length max. 6 m
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Technical data

Mechanical characteristics (draw-wire mechanics)		Electrical characteristics (digital output)	
Measuring range	6000 mm	The electrical characteristics of the draw-wire mechanics with digital output can be found in the data sheets of the encoders	
Extension force	F_{min} 8.8 N F_{max} 12.3 N		
Speed max.	10 m/s	Approvals CE compliant in accordance with EMC Directive 2014/30/EU RoHS Directive 2011/65/EU	
Acceleration max.	140 m/s ²		
Linearity (of the measuring range)			
with analog sensor	±0.10 %		
with encoder	±0.05 %		
	±0.02 % ¹⁾		
Weight	approx. 1600 g [56.44 oz] (depending 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 3000 mm (other wire types on request)		
Protection acc. to EN 60529	IP65 (sensor)		

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

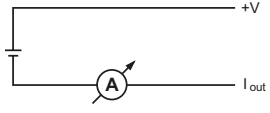
1) On request for encoder version (see order code **Ⓐ**):
00 in combination with interchangeable installation (order code **Ⓐ** = 2) or fixed installation (order code **Ⓐ** = 4)
F3, 63, F8, 68 in combination with interchangeable installation (order code **Ⓐ** = 2)

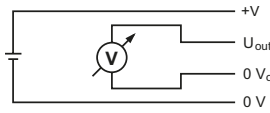
2) Optional on request.

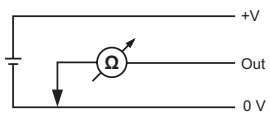
Linear measuring technology

Draw-wire encoder C120	Performance-Line	Measuring length max. 6 m
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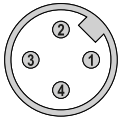
Terminal assignment (analog sensor)

Analog sensor A11 (4 ... 20 mA)			R/I converter				
		Signal:	+V	n.c.	I _{out}	n.c.	
	Cable ¹⁾	Core color:	BN	WH	BU	BK	
	M12 connector, 4-pin	Pin:	1	2	3	4	

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

Analog sensor A33 (Potentiometer 1 kΩ)			Potentiometer				
		Signal:	+V	Out	0 V	n.c.	
	Cable ¹⁾	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 C120

Performance-Line

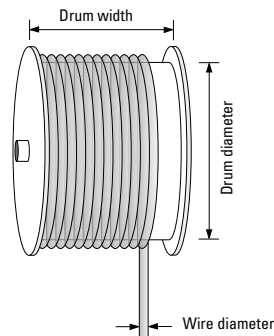
Measuring length max. 6 m

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

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.



Linear measuring technology

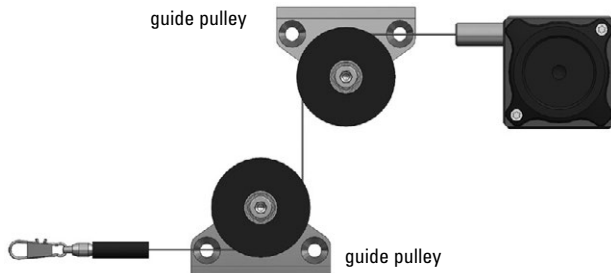
Draw-wire encoder C120

Performance-Line

Measuring length max. 6 m

Technology in detail

Application-specific installation possibilities

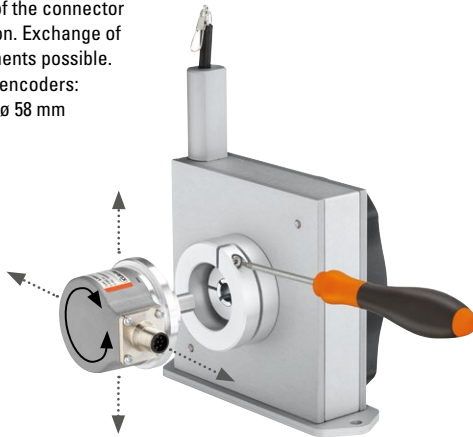


Interchangeable installation

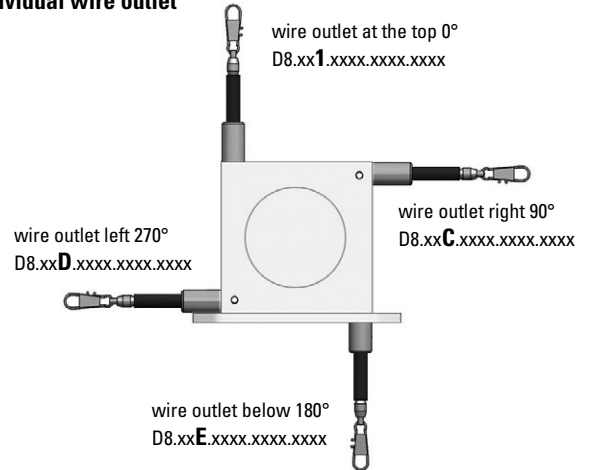
Easy adjustment of the connector or cable orientation. Exchange of individual components possible.

Requirements for encoders:

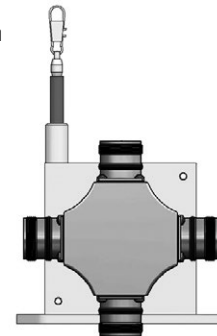
- clamping flange $\varnothing$ 58 mm
- shaft 10 x 20 mm



Individual wire outlet



Individual cable / connector orientation on request



Draw-wire encoder C120

Performance-Line

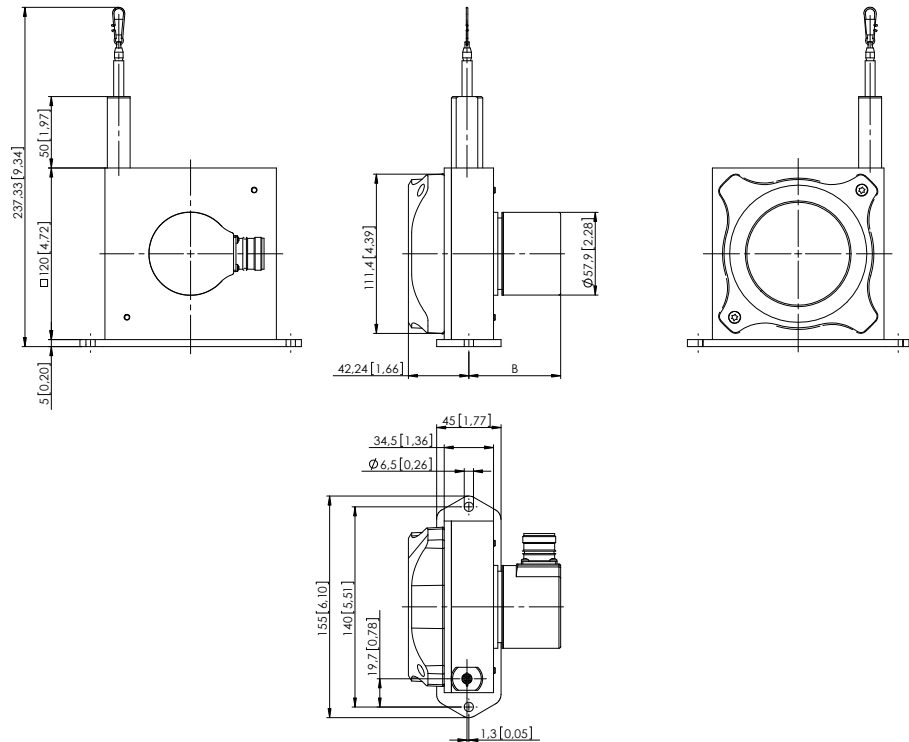
Measuring length max. 6 m

Dimensions

Dimensions in mm [inch]

Draw-wire mechanics with encoder Fixed installation

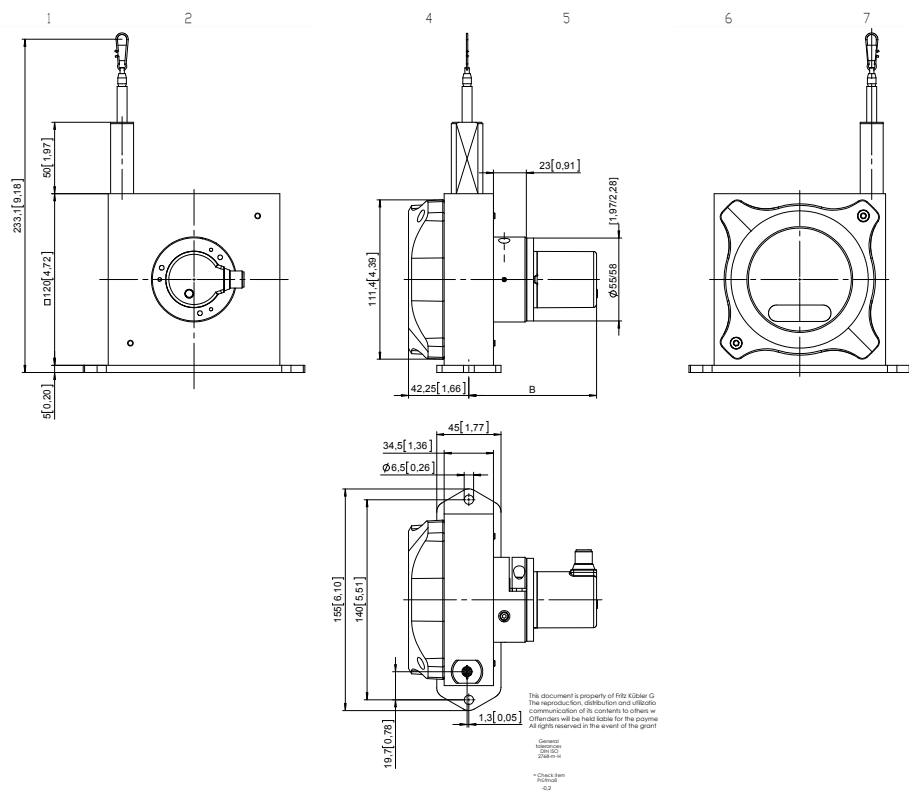
Dimension B depends on the encoder used	
Encoder	B
Sendix incremental (5000) D8.4C1.xxxx.00xx.xxxx	54.25 [2.14]
Sendix absolute (F5863) D8.4C1.xxxx.F3xx.xxxx	66.75 [2.63]
Sendix absolute (5863) D8.4C1.xxxx.63xx.xxxx	66.75 [2.63]
Sendix absolute (F5868, CANopen) D8.4C1.xxxx.F8xx.21xx	88.25 [3.47]
Sendix absolute (F5868, EtherNet/IP) D8.4C1.xxxx.F8xx.A2xx	76.75 [3.02]
Sendix absolute (5868) D8.4C1.xxxx.68xx.xxxx	67.35 [2.65]
Sendix absolute (M586x) D8.4C1.xxxx.Mxxx.xxxx	67.05 [2.64]



Draw-wire mechanics with encoder

Interchangeable installation, clamping flange

Dimension B depends on the encoder used	
Encoder	B
Sendix incremental (5000) D8.2C1.xxxx.00xx.xxxx	77.25 [3.04]
Sendix absolute (F5863) D8.2C1.xxxx.F3xx.xxxx	89.75 [3.53]
Sendix absolute (5863) D8.2C1.xxxx.63xx.xxxx	89.75 [3.53]
Sendix absolute (F5868, CANopen) D8.2C1.xxxx.F8xx.21xx	111.25 [4.38]
Sendix absolute (F5868, EtherNet/IP) D8.2C1.xxxx.F8xx.A2xx	99.75 [1.69]
Sendix absolute (5868) D8.2C1.xxxx.68xx.xxxx	90.35 [3.93]
Sendix absolute (M586x) D8.2C1.xxxx.Mxxx.xxxx	90.05 [3.54]



Draw-wire encoder C120

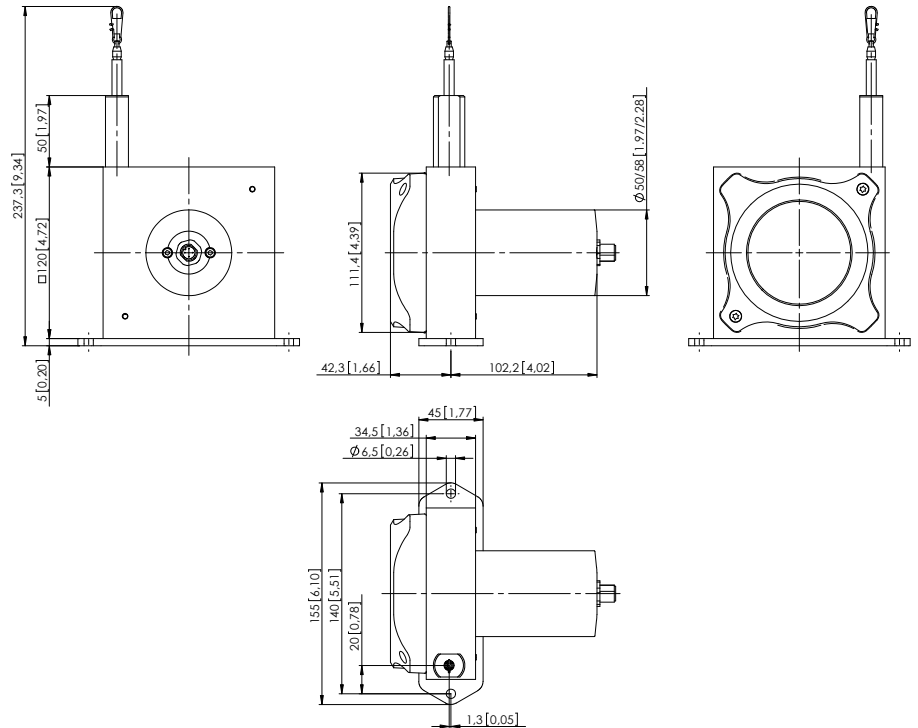
Performance-Line

Measuring length max. 6 m

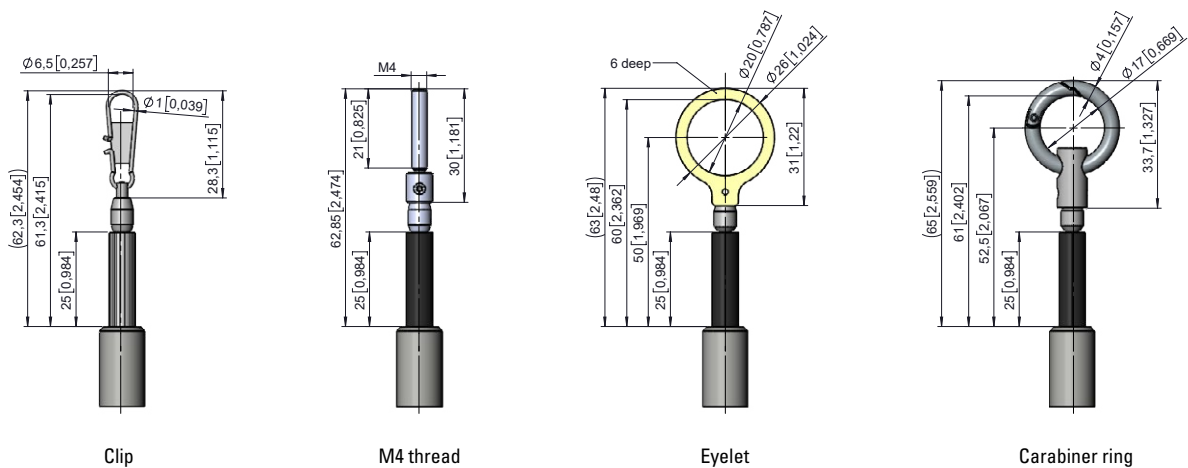
Dimensions

Dimensions in mm [inch]

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



Wire fastenings





По вопросам продаж и поддержки обращайтесь:

Алматы (727)345-47-04
Ангарск (3955)60-70-56
Архангельск (8182)63-90-72
Астрахань (8512)99-46-04
Барнаул (3852)73-04-60
Белгород (4722)40-23-64
Благовещенск (4162)22-76-07
Брянск (4832)59-03-52
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