

# Linear measuring technology

<b>Draw wire mechanics with redundant sensors</b>	<b>Draw wire encoder C100</b>	<b>Measuring length up to 5 m integrated inclinometer</b>
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Thanks to its robust design and its high IP67 protection level, the draw wire encoder C100 reliably provides accurate length measurement. Its simple and optimal integration in the application is a particular highlight of this product. Many additional options, ranging from the integrated inclinometer up to the relay output, are available.

To increase plant availability, this draw wire encoder allows combining a redundant system in a very compact housing.



Analog output

CANopen



Wide temperature range



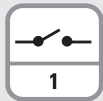
High protection level



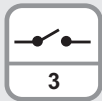
Shock / vibration resistant



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  $-40^\circ\text{C}$  ...  $+85^\circ\text{C}$ .

## 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 . X 000

- a** Measuring length
- 0100 = 1 m
  - 0200 = 2 m
  - 0300 = 3 m
  - 0400 = 4 m
  - 0500 = 5 m

- b** Sensor type
- A22 = 0 ... 10 V<sup>1)</sup>
  - A44 = 0.5 ... 4.5 V
  - R22 = 0 ... 10 V, redundant<sup>1)</sup>
  - R44 = 0.5 ... 4.5 V, redundant

- c** Type of connection
- 1 = M12 connector, 5-pin

- d** Power supply
- 1 = 9 ... 30 V DC
  - 2 = 5 V DC<sup>2)</sup>

### Order code with CANopen and inclinometer

D8 . C100 . XXXX . RC1 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

- c** Type of connection
- 1 = M12 connector, 5-pin

- d** Power supply
- 1 = 9 ... 30 V DC

- e** Inclinometers
- 0 = none
  - 1 = 1 inclinometer
  - 2 = 2 inclinometers

1) Available from 09/2017.  
2) Only in conjunction with type of sensor A44 and R44.

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<b>Order code with incremental output</b>	D8. C100 . XXXX . XXXX . 1 000
<b>a</b> <i>Measuring length</i> 0100 = 1 m 0200 = 2 m 0300 = 3 m 0400 = 4 m 0500 = 5 m	<b>b</b> <i>Sensor type</i> I11 = incremental AB, 512 ppr I12 = incremental ABZ, 512 ppr I21 = incremental AB, 1024 ppr I22 = incremental ABZ, 1024 ppr
<b>c</b> <i>Type of connection</i> 1 = M12 connector, 5-pin 3 = radial cable, 2 m [6.56']	
<b>d</b> <i>Power supply</i> 1 = 9 ... 30 V DC	

<b>Order code with relais output</b>	D8. C100 . XXXX . RL1 1 . 1 000
<b>a</b> <i>Measuring length</i> 0100 = 1 m 0200 = 2 m 0300 = 3 m 0400 = 4 m 0500 = 5 m	<b>b</b> <i>Sensor type</i> RL1 = relay output
<b>c</b> <i>Type of connection</i> 1 = M12 connector, 5-pin	
<b>d</b> <i>Power supply</i> 1 = 9 ... 30 V DC	

<b>Order code with switch output</b>	D8. C100 . XXXX . SW3 4 . 1 000
<b>a</b> <i>Measuring length</i> 0100 = 1 m 0200 = 2 m 0300 = 3 m 0400 = 4 m 0500 = 5 m	<b>b</b> <i>Sensor type</i> SW3 = 3 switch outputs
<b>c</b> <i>Type of connection</i> 4 = M12 connector, 12-pin	
<b>d</b> <i>Power supply</i> 1 = 9 ... 30 V DC	

Connection technology for analog sensor		Order no.
<b>Cordset, pre-assembled</b>	M12 female connector with coupling nut, 5-pin 2 m [6.56'] PVC cable	<b>05.00.6081.2211.002M</b>
<b>Connector, self-assembly (straight)</b>	M12 female connector with coupling nut, 5-pin	<b>8.0000.5116.0000</b>

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## Technical data

Mechanical characteristics (draw wire mechanics)	
<b>Measuring range</b>	1.0 ... 5.0 m
<b>Measuring wire</b>	material AISI304 steel wire Nylon coated diameter $\varnothing$ 0.9 mm $\varnothing$ 0.61 mm (ABZ Incremental)
<b>Wire fastening</b>	eyelet internal diameter $\varnothing$ 8 mm outer diameter $\varnothing$ 15 mm height 2 mm
<b>Wire pull-out speed max.</b>	max. 1 m/s
<b>Acceleration</b>	max. 10 m/s <sup>2</sup>
<b>Linearity (whole measuring range)</b>	analog $\pm$ 0.8 % incremental (1 - 2 m) $\pm$ 0.1 % incremental (3 - 5 m) $\pm$ 0.3 % CANopen / relay $\pm$ 0.5 %
<b>Repetition accuracy (whole measuring range)</b>	analog $\pm$ 0.1 % incremental (1, 2 m) $\pm$ 0.1 % incremental (3 - 5 m) $\pm$ 0.15 % CANopen / relay $\pm$ 0.1 %
<b>Pull-back force</b>	typ. 2 N <sup>1)</sup>
<b>Pull-out force</b>	typ. 8 N
<b>Drum circumference</b>	245 mm
<b>Type of connection</b>	M12 connector, 5-pin cable, 2 m [6.56'] (only incremental)
<b>Housing</b>	polycarbonate reinforced with glass fibers
<b>Protection</b>	IP67
<b>Temperature range</b>	-40°C ... +85°C [-40°F ... +185°F]
<b>Weight</b>	approx. 0.5 kg [17.67 oz]
<b>Shock resistance acc. to EN 60068-2-27</b>	300 m/s <sup>2</sup> , 11 ms
<b>Vibration resistance acc. to EN 60068-2-6</b>	100 m/s <sup>2</sup> , 10 ... 500 Hz

Analog sensor	
<b>Output signal</b>	analog
<b>Resolution</b>	12 bit

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

CANopen	
<b>Output signal</b>	CANopen (DS301)
<b>Resolution</b>	0.3 mm
<b>Resolution inclinometer</b>	0.1°
<b>Accuracy inclinometer</b>	$\pm$ 0.6°
<b>Temperature drift inclinometer</b>	$\pm$ 0.01 % / °C

Electrical characteristics	
<b>Power supply</b>	9 ... 30 V DC 5 V DC $\pm$ 10 % <sup>2)</sup>
<b>Electromagnetic compatibility</b>	acc. to EN 61326-1, EN 61326-3-1
<b>CE compliant acc. to</b>	EMC guideline 2014/30/EU RoHS guideline 2011/65/EU

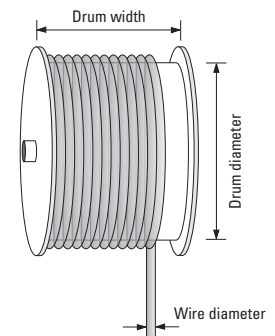
### Operating principle

#### 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.



Relay output	
<b>Output signal</b>	1x relay (Normally Open)
<b>Maximum current</b>	50 mA
<b>Hysteresis</b>	20 mm (factory setting)

Switch output	
<b>Output signal</b>	switch
<b>Maximum current</b>	0.5 A
<b>Mechanical service life</b>	without load min. 1,000,000 switching operations (60 switching operations/ min.) under load min. 30,000 switching operations (30 switching operations/ min.)

1) May be lower at low temperatures.

2) Only in conjunction with type of sensor A44 and R44.

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**Draw wire mechanics  
with redundant sensors**

**Draw wire encoder C100**

**Measuring length up to 5 m  
integrated inclinometer**

## Terminal assignment

Sensor type	Type of connection	M12 connector, 5-pin					
A22, A44, R22, R44 (analog sensor)	1	Signal:	+V	n.c.	0 V	U <sub>out 1</sub>	U <sub>out 2</sub>
		Pin:	1	2	3	4	5

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

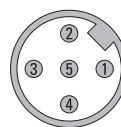
Sensor type	Type of connection	M12 connector, 5-pin					
RC1 (CANopen)	1	Signal:	0 V	+V	CAN-GND	CAN-H	CAN-L
		Pin:	3	2	1	4	5

Sensor type	Type of connection	M12 connector, 5-pin					
RL1 (relay)	1	Signal:	Teach	+V	0 V	C	NO
		Pin:	1	2	3	4	5
		<p>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.</p>					

Sensor type	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: Power supply +V DC
- 0 V: Power supply GND (0V)
- U<sub>out 1</sub>: Voltage output 1
- U<sub>out 2</sub>: 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.
- 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

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## Technology in detail

**Inclinometer with option RC1**

**Setting possibility 360°**



**Setting possibility ±180°**



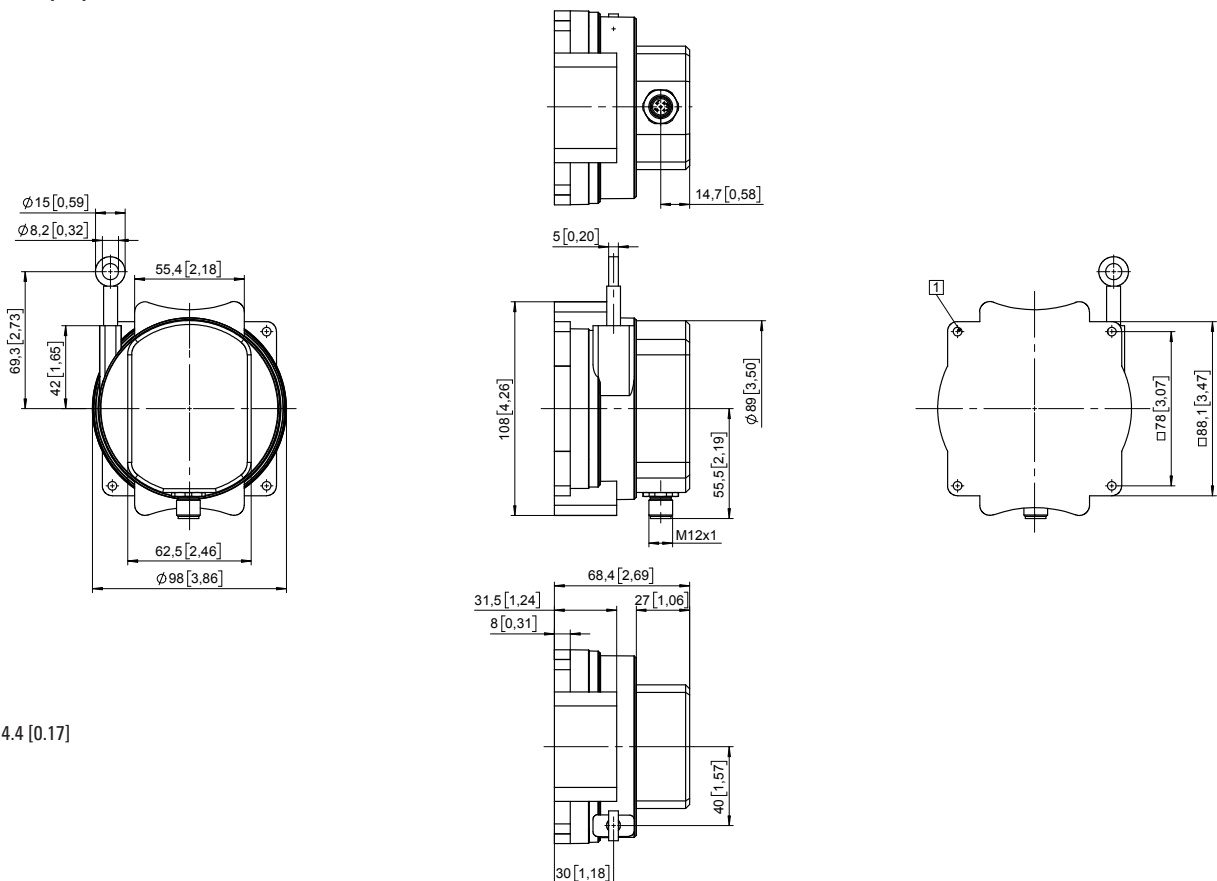
Redundant signals possible.

**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.

### Dimensions

Dimensions in mm [inch]



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