

Linear measuring technology

Draw wire mechanics with redundant sensors

Draw wire encoder C100

Measuring length up to 5 m integrated inclinometer



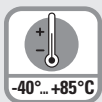
Thanks to its robust design and its high IP67 protection level, the draw wire encoder C100 reliably provides accurate length measurement. Its simple and optimal integration in the application is a particular highlight of this product. Many additional options, ranging from the integrated inclinometer 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



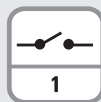
High protection level



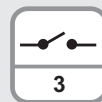
Shock / vibration resistant



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°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 . XXX1 . X 000

a Measuring length

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

b Sensor type

A11 = 4 ... 20 mA
A22 = 0 ... 10 V
A44 = 0.5 ... 4.5 V
R11 = 4 ... 20 mA, redundant
R22 = 0 ... 10 V, redundant
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 ¹⁾

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

Stock types

D8.C100.0500.RC11.1000

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

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Order code with incremental output	<table border="1" style="margin: auto; border-collapse: collapse;"> <tr> <td style="padding: 2px 5px;">D8</td> <td style="padding: 2px 5px;">. C100</td> <td style="padding: 2px 5px;">. XXXX</td> <td style="padding: 2px 5px;">. XXXX</td> <td style="padding: 2px 5px;">X</td> <td style="padding: 2px 5px;">. 1</td> <td style="padding: 2px 5px;">000</td> </tr> <tr> <td style="text-align: center; font-size: 8px;">a</td> <td></td> <td style="text-align: center; font-size: 8px;">b</td> <td style="text-align: center; font-size: 8px;">c</td> <td style="text-align: center; font-size: 8px;">d</td> <td></td> <td></td> </tr> </table>	D8	. C100	. XXXX	. XXXX	X	. 1	000	a		b	c	d		
D8	. C100	. XXXX	. XXXX	X	. 1	000									
a		b	c	d											
a Measuring length 0100 = 1 m 0200 = 2 m 0300 = 3 m 0400 = 4 m 0500 = 5 m	b Sensor type I11 = incremental AB, 512 ppr I12 = incremental ABZ, 512 ppr I21 = incremental AB, 1024 ppr I22 = incremental ABZ, 1024 ppr	c Type of connection 1 = M12 connector, 5-pin 3 = radial cable, 2 m [6.56'] d Output circuit / Power supply 1 = TTL / 9 ... 30 V DC													

Order code with relays output	<table border="1" style="margin: auto; border-collapse: collapse;"> <tr> <td style="padding: 2px 5px;">D8</td> <td style="padding: 2px 5px;">. C100</td> <td style="padding: 2px 5px;">. XXXX</td> <td style="padding: 2px 5px;">. RL1</td> <td style="padding: 2px 5px;">1</td> <td style="padding: 2px 5px;">. 1</td> <td style="padding: 2px 5px;">000</td> </tr> <tr> <td style="text-align: center; font-size: 8px;">a</td> <td></td> <td style="text-align: center; font-size: 8px;">b</td> <td style="text-align: center; font-size: 8px;">c</td> <td style="text-align: center; font-size: 8px;">d</td> <td></td> <td></td> </tr> </table>	D8	. C100	. XXXX	. RL1	1	. 1	000	a		b	c	d		
D8	. C100	. XXXX	. RL1	1	. 1	000									
a		b	c	d											
a Measuring length 0100 = 1 m 0200 = 2 m 0300 = 3 m 0400 = 4 m 0500 = 5 m	b Sensor type RL1 = relay output	c Type of connection 1 = M12 connector, 5-pin d Power supply 1 = 9 ... 30 V DC													

Order code with switch output	<table border="1" style="margin: auto; border-collapse: collapse;"> <tr> <td style="padding: 2px 5px;">D8</td> <td style="padding: 2px 5px;">. C100</td> <td style="padding: 2px 5px;">. XXXX</td> <td style="padding: 2px 5px;">. SW3</td> <td style="padding: 2px 5px;">4</td> <td style="padding: 2px 5px;">. 1</td> <td style="padding: 2px 5px;">000</td> </tr> <tr> <td style="text-align: center; font-size: 8px;">a</td> <td></td> <td style="text-align: center; font-size: 8px;">b</td> <td style="text-align: center; font-size: 8px;">c</td> <td style="text-align: center; font-size: 8px;">d</td> <td></td> <td></td> </tr> </table>	D8	. C100	. XXXX	. SW3	4	. 1	000	a		b	c	d		
D8	. C100	. XXXX	. SW3	4	. 1	000									
a		b	c	d											
a Measuring length 0100 = 1 m 0200 = 2 m 0300 = 3 m 0400 = 4 m 0500 = 5 m	b Sensor type SW3 = 3 switch outputs	c Type of connection 4 = M12 connector, 12-pin d Power supply 1 = 9 ... 30 V DC													

Accessories relays 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
Connection technology for analog sensor	Order no.
Cordset, pre-assembled	M12 female connector with coupling nut, 5-pin 2 m [6.56'] PVC cable 05.00.6081.2211.002M M12 female connector with coupling nut, 12-pin 2 m [6.56'] PVC cable 05.00.60B1.B211.002M
Connector, self-assembly (straight)	M12 female connector with coupling nut, housing metal/plastic, 5-pin M12 female connector with coupling nut, housing metal, 12-pin 05.B-8151-0/9 8.0000.5162.0000
Connector, self-assembly (right-angle)	M12 female connector with coupling nut, housing plastic, 4-pin 05.B8241-0

Additional connectors can be found in the connection technology section or in the connection technology area of our website at: www.kuebler.com/connection_technology.

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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
Wire pull-out speed max.	max. 1 m/s
Acceleration	max. 10 m/s ²
Linearity (whole measuring range)	analog \pm 0.8 % incremental (1 - 2 m) \pm 0.1 % incremental (3 - 5 m) \pm 0.3 % CANopen / relay \pm 0.5 %
Repetition accuracy (whole measuring range)	analog \pm 0.1 % incremental (1, 2 m) \pm 0.1 % incremental (3 - 5 m) \pm 0.15 % CANopen / relay \pm 0.1 %
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

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

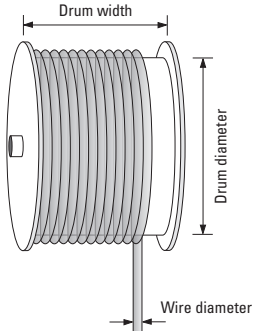
CANopen	
Output signal	CANopen (DS301)
Resolution	14 bit
Resolution inclinometer	0.1°
Accuracy inclinometer	\pm 0.6°
Temperature drift inclinometer	\pm 0.01 % / °C

Electrical characteristics	
Power supply	9 ... 30 V DC 5 V DC \pm 10 % ²⁾
Electromagnetic compatibility	EN 61326-1, EN 61326-3-1
CE compliant	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	
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.)

1) May be lower at low temperatures.
2) Only in conjunction with type of sensor A44 and R44.

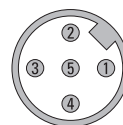
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Terminal assignment

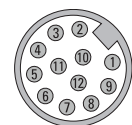
Sensor type	Interface	Type of connection	M12 connector, 5-pin												
A11, R11 (analog sensor)	current output	1	Signal:	+V	0 V	Iout 1	Iout 2 ¹⁾	n.c.							
			Pin:	1	2	3	4	5							
Sensor type	Interface	Type of connection	M12 connector, 5-pin												
A22, R22, A44, R44 (analog sensor)	voltage output	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	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							
			<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	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 : Power supply +V DC
- 0 V : Power supply 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.
- 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
- n.c. : not connected
- AGND : Analog Ground

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, R22, R44 (otherwise n.c.).

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Technology in detail

Inclinometer with option RC1

Setting possibility 360°



Setting possibility ±180°



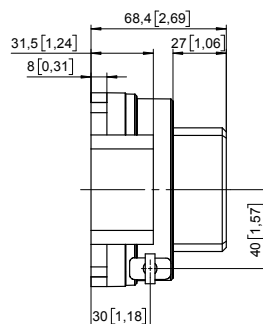
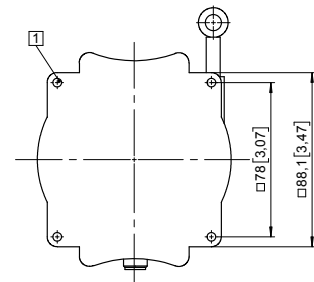
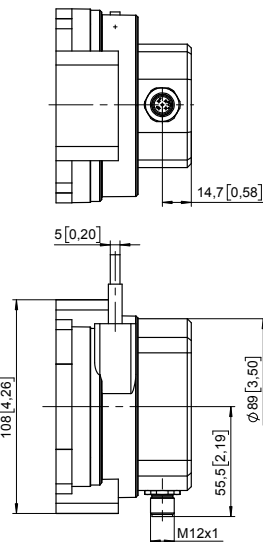
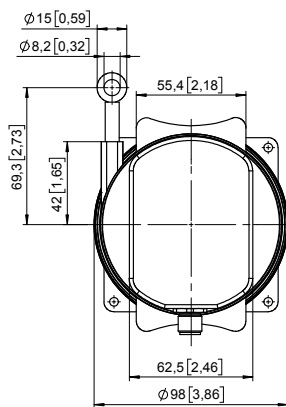
Redundant signals possible.

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]



1 4 x Ø 4.4 [0.17]