

Inclinometers

**For static applications
1- and 2-axis measurement**

IN41

Analog



Compact. Precise. Versatile.

The IN41 series of inclinometers can reliably detect 2-axis inclinations in a measuring range of $\pm 85^\circ$ or 1-axis inclinations up to 360° . Thanks to their compact housing and high protection class of up to IP68/IP69K, they are also suitable for use in demanding environments. Optionally selectable measuring ranges, integrated filter functions, and various analog interfaces enable flexible adaptation to different applications.



--- Analog Output --- Analog Output

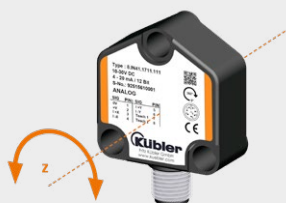
Features and benefits

- **Analog sensor for reliable inclination measurements**
 - 2-axis measurement up to $\pm 85^\circ$ or 1-axis measurement up to 360°
 - Accurate measurement performance across the entire measuring range (up to max. 0.1°)
- **For applications with limited installation space**
 - Economically viable solution with small size
- **Flexible adaptation to versatile applications**
 - Optional selectable measuring ranges and filter functions
 - Various analog interfaces
- **Easy commissioning and diagnostics**
 - LED display for a quick overview of the operating status
 - Individual "Easy-Teach" settings via teach adapter
 - Define preset (zero point/center position)
 - Scaling of the analog measuring range (start/end position)
 - Adjusting the sensor filter
 - Resetting to factory settings
- **For use in harsh environmental conditions**
 - IP68/IP69k protection rating for use in demanding environments
 - Protection against salt spray and rapid temperature changes

Order code 1-axis

8.IN41.1.X.X.1.11.X
Type a b c d

- a** Measuring range
7 = $0^\circ \dots 360^\circ (\pm 180^\circ)$
8 = $0^\circ \dots 180^\circ (\pm 90^\circ)$



- b** Analog interface
1 = 4 ... 20 mA
2 = 0.1 ... 4.9 V
3 = 0.5 ... 4.5 V
4 = 0 ... 5 V
5 = 0 ... 10 V

- d** Type of connection
1 = M12 connector, 8-pin
2 = M12 connector, 5-pin
3 = cable 8-core, 1 m
4 = cable 5-core, 1 m
A = cable 8-core, special lengths
B = cable 5-core, special lengths

- c** Filter
1 = no filter
Preset filter functions up to 10 Hz available on request

Order code 2-axis

8.IN41.2.X.X.1.11.X
Type a b c d

- a** Measuring range
1 = $\pm 10^\circ$
2 = $\pm 15^\circ$
3 = $\pm 30^\circ$
4 = $\pm 45^\circ$
5 = $\pm 60^\circ$
6 = $\pm 85^\circ$



- b** Analog interface
1 = 4 ... 20 mA
2 = 0.1 ... 4.9 V
3 = 0.5 ... 4.5 V
4 = 0 ... 5 V
5 = 0 ... 10 V

- d** Type of connection
1 = M12 connector, 8-pin
2 = M12 connector, 5-pin
3 = cable 8-core, 1 m
4 = cable 5-core, 1 m
A = cable 8-core, special lengths
B = cable 5-core, special lengths

- c** Filter
1 = no filter
Preset filter functions up to 10 Hz available on request

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Accessories			Order no.
Teach adapter  	for activating the control inputs for the following functions: - Reset to factory setting - Center point of the measurement - Scaling of the analog measuring range (start/end position) - Setting the sensor filter		
	Teach adapter, 5-pin Teach adapter, 8-pin		05.TX40.1 8.0010.9000.0017
EMC shield terminal 	For an EMC-compliant installation of the cable - top-hat rail mounting - spring steel, galvanized - shield diameter 3.0 ... 12.0 mm		8.0000.4G06.0312
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, 5-pin, A coded, straight DT04 connector, male contacts, 6-pin, straight 2 m [6.56'] PVC cable		05.00.6091.22C7.002M
	M12 female connector with coupling nut, 5-pin, A coded, straight single ended 2 m [6.56'] PUR cable		05.00.60F1.2211.002M
	M12 female connector with coupling nut, 8-pin, A coded, straight single ended 2 m [6.56'] PVC cable		05.00.6041.8211.005M
	M12 female connector with coupling nut, 8-pin, A coded, straight single ended 2 m [6.56'] PUR cable		05.00.6051.8211.002M
Connectors	M12 female connector with coupling nut, 8-pin, A coded, straight (metal)		05.CMB 8181-0
	M12 female connector with coupling nut, 5-pin, A coded, straight (metal)		8.0000.5116.0000

Further Kübler accessories can be found at: kuebler.com/accessories

Further Kübler cables and connectors can be found at: kuebler.com/connection-technology

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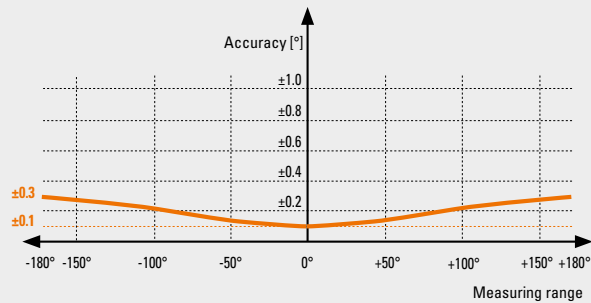
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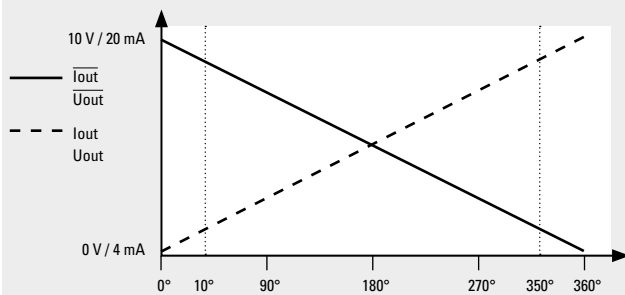
Technical data

General data 1-axis measurement

Measuring range	0 ... 360°
Resolution	current interface 0.01° internal sensor 12 bit D/A converter voltage interface 12 bit
Repeat accuracy	≤ 0,2°
Linearity deviation	±0,1°
Temperature drift	typ. ±0.006 %/K
Accuracy (at 25°C)	±0.1 ... ±0.3° depending on the measuring range

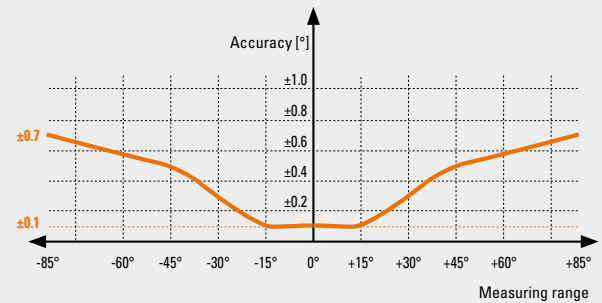


Course of the output signal – factory setting

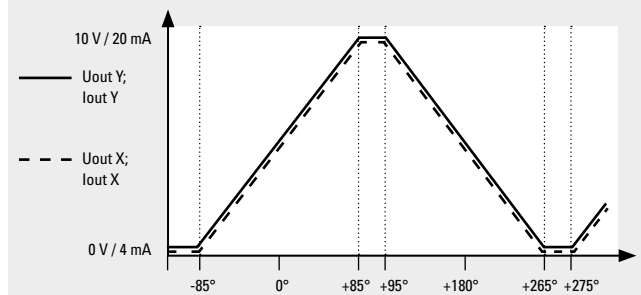


General data 2-axis measurement

Measuring range	-85° ... +85°
Resolution	current interface 0.01° internal sensor 12 bit D/A converter voltage interface 12 bit
Repeat accuracy	≤ 0,2°
Linearity deviation	±0,45°
Temperature drift	typ. ±0.006 %/K
Accuracy (at 25°C)	±0.1 ... ±0.7° depending on the measuring range



Course of the output signal – factory setting



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For static applications 1- and 2-axis measurement		IN41	Analog
Electrical characteristics current interface		Electrical characteristics voltage interface	
Supply voltage	10 ... 30 V DC	Supply voltage 4 ... 20 mA / 0.1 ... 4.9 V / 0.5 ... 5 V / 0 ... 5 V 0 ... 10 V 10 ... 30 V 15 ... 30 V	
Current consumption (no load)	max. 40 mA	Current consumption (no load) max. 40 mA	
Reverse polarity protection of the supply voltage	yes	Reverse polarity protection of the supply voltage yes	
PowerON Time (PowerOn until valid output value)	< 0.5 s	PowerON Time (PowerOn until valid output value) < 0.5 s	
Output load	at 10 VDC max. 200 Ohm at 24 VDC max. 900 Ohm at 30 VDC max. 1200 Ohm	Output load max. 10 mA	
Setting time	< 1 ms ($R_{load} = 900 \text{ Ohm}$, 25 °C)	Setting time < 1 ms ($R_{load} = 1000 \text{ Ohm}$, 25 °C)	
Sampling rate	50 Hz (20 ms)	Sampling rate 50 Hz (20 ms)	
Limit frequency with Butterworth filter	0.1 ... 10 Hz, 8th order	Limit frequency with Butterworth filter 0.1 ... 10 Hz, 8th order	
Mechanical characteristics		Approvals	
Electrical connection	M12 connector, 8-pin M12 connector, 5-pin cable, 8-pin cable, 5-pin	CE compliant in accordance with EMV Directive 2014/30/EU RoHS Directive 2011/65/EU	
Weight	approx. 60 g [2.1 oz]		
Protection acc. to EN 60529	IP68/IP69k		
Working temperature range	-40 °C ... +85 °C [-40 °F ... +185 °F]		
Material housing	plastic, PC		
Shock resistance acc. to EN 60068-2-27	100 m/s ² , 10 ... 2000 Hz		
Vibration resistance acc. to EN 60068-2-6	1000 m/s ² , 6 ms		
Dimensions	44.5 x 42.5 x 20 mm [1.75 x 1.67 x 0.79"]		

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Terminal assignment, 1 dimensional

Type of connection	M12 connector, 8-pin									
1	Signal – Interface 1 (current):	0 V	+V	Iout+	Iout-	Iout+	Iout-	Teach 1	Teach 2	
	Signal – Interface 2, 3, 4, 5 (voltage):	0 V	+V	Uout+	Uout-	Uout+	Uout-	Teach 1	Teach 2	
	Pin:	1	2	3	4	5	6	7	8	
Type of connection	M12 connector, 5-pin									
2	Signal – Interface 1 (current):	+V	Iout+	0 V	Iout+	Teach				
	Signal – Interface 2, 3, 4, 5 (voltage):	+V	Uout+	0 V	Uout+	Teach				
	Pin:	1	2	3	4	5				
Type of connection	Cable, 8-pin									
3, A	Signal – Interface 1 (current):	0 V	+V	Iout+	Iout-	Iout+	Iout-	Teach 1	Teach 2	
	Signal – Interface 2, 3, 4, 5 (voltage):	0 V	+V	Uout+	Uout-	Uout+	Uout-	Teach 1	Teach 2	
	Core color:	WH	BN	GN	YE	GY	PK	BU	RD	
Type of connection	Cable, 5-pin									
4, B	Signal – Interface 1 (current):	+V	Iout+	0 V	Iout+	Teach				
	Signal – Interface 2, 3, 4, 5 (voltage):	+V	Uout+	0 V	Uout+	Teach				
	Core color:	BN	GY	WH	GN	BU				

Terminal assignment, 2 dimensional

Type of connection	M12 connector, 8-pin									
1	Signal – Interface 1 (current):	0 V	+V	Iout+ X	Iout- X	Iout+ Y	Iout- Y	Teach 1	Teach 2	
	Signal – Interface 2, 3, 4, 5 (voltage):	0 V	+V	Uout+ X	Uout- X	Uout+ Y	Uout- Y	Teach 1	Teach 2	
	Pin:	1	2	3	4	5	6	7	8	
Type of connection	M12 connector, 5-pin									
2	Signal – Interface 1 (current):	+V	Iout+ Y	0 V	Iout+ X	Teach				
	Signal – Interface 2, 3, 4, 5 (voltage):	+V	Uout+ Y	0 V	Uout+ X	Teach				
	Pin:	1	2	3	4	5				
Type of connection	Cable, 8-pin									
3, A	Signal – Interface 1 (current):	0 V	+V	Iout+ X	Iout- X	Iout+ Y	Iout- Y	Teach 1	Teach 2	
	Signal – Interface 2, 3, 4, 5 (voltage):	0 V	+V	Uout+ X	Uout- X	Uout+ Y	Uout- Y	Teach 1	Teach 2	
	Core color:	WH	BN	GN	YE	GY	PK	BU	RD	
Type of connection	Cable, 5-pin									
4, B	Signal – Interface 1 (current):	+V	Iout+ Y	0 V	Iout+ X	Teach				
	Signal – Interface 2, 3, 4, 5 (voltage):	+V	Uout+ Y	0 V	Uout+ X	Teach				
	Core color:	BN	GY	WH	GN	BU				

+V Supply voltage +V DC
0V Supply voltage ground GND (0 V)

Teach 1 Input 1 for various teaching functions
Teach 2 Input 2 for various teaching functions

Uout+ X X axis voltage output
Uout- X X axis voltage output GND
Uout+ Y Y axis voltage output
Uout- Y Y axis voltage output GND

1-axis version
Uout+ Voltage output
Uout- Voltage output GND
Uout+ Inverted voltage output
Uout- Inverted voltage output GND

Iout+ X X axis current output
Iout- X X axis current output GND
Iout+ Y Y axis current output
Iout- Y Y axis current output GND

1-axis version
Iout+ Current output
Iout- Current output GND
Iout+ Inverted current output
Iout- Inverted current output GND

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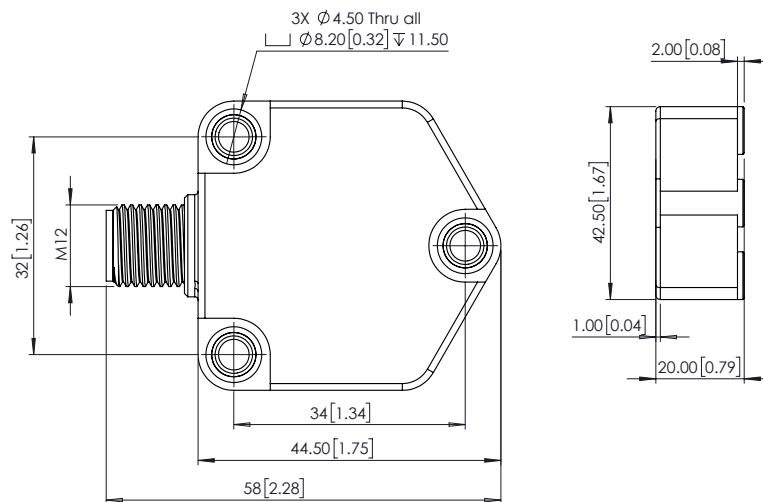
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Dimensions

Dimensions in mm [inch]



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Technology in detail

Quick setting options via the Easy-Teach function with teach adapter

Connection

The teach adapter **2** is connected between the sensor **1** and the connection cable to the application **4**.

Parameterization

The following settings can be made quickly and easily by pressing the toggle switch **3**:

- Reset to factory setting
- Start/end point of the measuring range
(for 1-axis measurement)
- Midpoint of the measuring range
- Setting the sensor filter:
no filter, 0.1 Hz, 0.3 Hz, 0.5 Hz, 1.0 Hz, 2.0 Hz, 5.0 Hz or 10.0 Hz

