

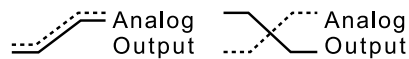
Inclinometers

For static applications 1- and 2-axis measurement	IN41	Analog
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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.



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	8.IN41.1.XX1.11X
1-axis	Type a b c d

a Measuring range

7 = 0° ... 360° ($\pm 180^\circ$)

8 = 0° ... 180° ($\pm 90^\circ$)

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	8.IN41.2.XX1.11X
2-axis	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		05.TX40.1
	Teach adapter, 8-pin		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

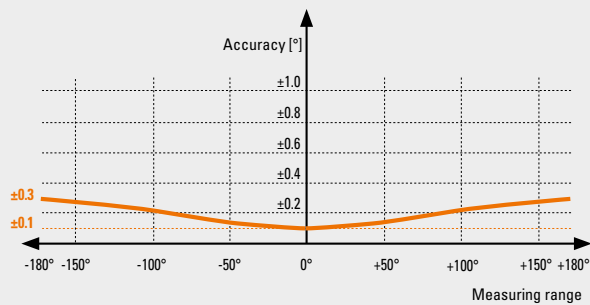
Inclinometers

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1- and 2-axis measurement** **IN41** **Analog**

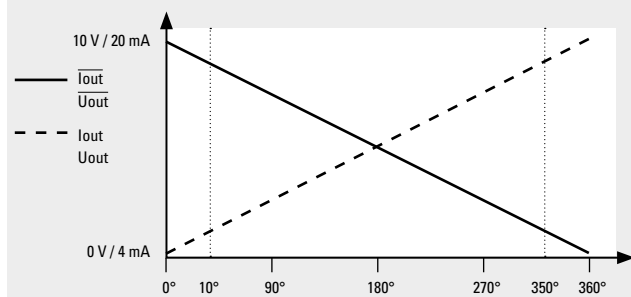
Technical data

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

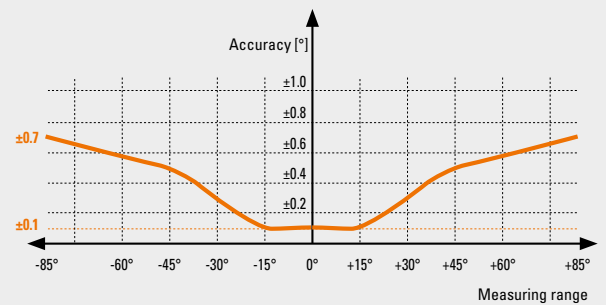


Course of the output signal – factory setting

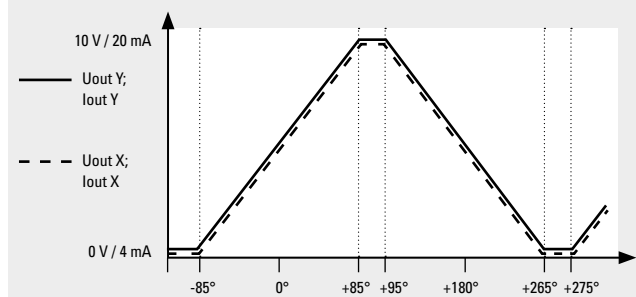


General data 2-axis measurement

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



Inclinometers

For static applications 1- and 2-axis measurement

IN41

Analog

Electrical characteristics current interface

Supply voltage	10 ... 30 V DC	
Current consumption (no load)	max. 40 mA	
Reverse polarity protection of the supply voltage	yes	
PowerON Time (PowerOn until valid output value)	< 0.5 s	
Output load	at 10 VDC at 24 VDC at 30 VDC	max. 200 Ohm max. 900 Ohm max. 1200 Ohm
Setting time	< 1 ms ($R_{load} = 900 \text{ Ohm}$, 25 °C)	
Sampling rate	50 Hz (20 ms)	
Limit frequency with Butterworth filter	0.1 ... 10 Hz, 8th order	

Mechanical characteristics

Electrical connection	M12 connector, 8-pin M12 connector, 5-pin cable, 8-pin cable, 5-pin	
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"]	

Electrical characteristics voltage interface

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	
Reverse polarity protection of the supply voltage	yes	
PowerON Time (PowerOn until valid output value)	< 0.5 s	
Output load	max. 10 mA	
Setting time	< 1 ms ($R_{load} = 1000 \text{ Ohm}$, 25 °C)	
Sampling rate	50 Hz (20 ms)	
Limit frequency with Butterworth filter	0.1 ... 10 Hz, 8th order	

Approvals

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

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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

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
 Uout+ Voltage output
 Uout- Voltage output GND
 Uout+ Inverted voltage output
 Uout- Inverted voltage output GND

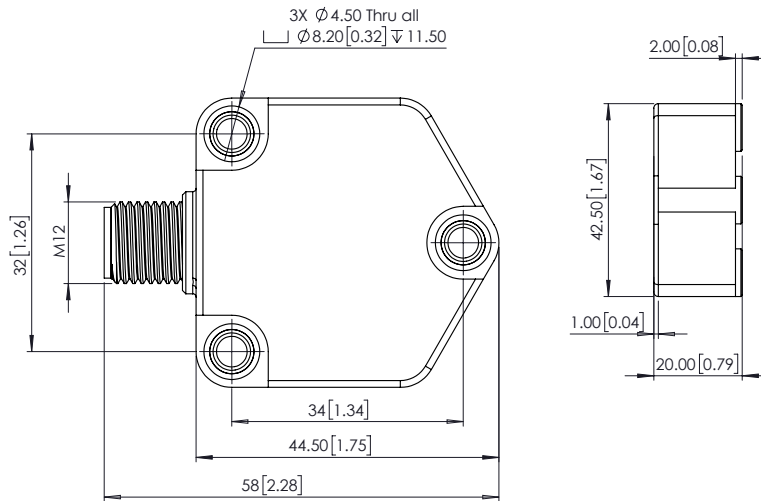
1-axis version
 Iout+ Current output
 Iout- Current output GND
 Iout+ Inverted current output
 Iout- Inverted current output GND

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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

