For dynamic applications
1- and 2-axis measurement

IN51 | **Analog**



Fast measurement results with high accuracy.
Sensor fusion consisting of an acceleration and rotation rate measuring cells (gyroscope) minimizes the effects of vibrations and interference accelerations.

Analog Output | Analog Output

Order code 1-axis measurement

8.IN51 . 1 X X X . 1 1 X . XXXX
Type | a | b | c | d | f | g

a *Measurement axes*
1 = 1-axis
vertical mounting



b *Measuring range*
7 = 0° ... 360° (±180°)
8 = 0° ... 180° (±90°)

c *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 *Filter*
S = slow
M = medium
F = fast (recommendation)
V = very fast

f *Type of connection*
1 = M12 connector, 8-pin
2 = M12 connector, 5-pin
4 = cable 5-core, open ended, 1 m
B = cable 5-core, open ended, special lengths

g *Special lengths*
only for type of connection f = B
(other lengths on request)
0050 = 5 m
0100 = 10 m

Stock types
8.IN51.171F.112

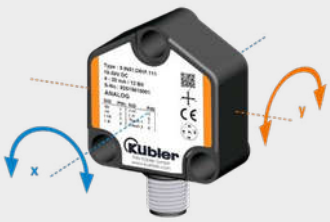
Order code 2-axis measurement

8.IN51 . X X X X . 1 1 X . XXXX
Type | a | b | c | d | f | g

a *Measurement axes*
2 = 2-axis
horizontal mounting



D = 2-axis
vertical mounting



b *Measuring range*
1 = ±10°
2 = ±15°
3 = ±30°
4 = ±45°
5 = ±60°
6 = ±85°

c *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 *Filter*
S = slow
M = medium
F = fast (recommendation)
V = very fast

f *Type of connection*
1 = M12 connector, 8-pin
2 = M12 connector, 5-pin
4 = cable 5-core, open ended, 1 m
B = cable 5-core, open ended, special lengths

g *Special lengths*
only for type of connection f = B
(other lengths on request)
0050 = 5 m
0100 = 10 m

Stock types
8.IN51.261F.112
8.IN51.241F.112

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For dynamic applications 1- and 2-axis measurement	IN51	Analog

Accessories		Order no.
Teach adapter	Teach adapter, 5-pin	**05.TX40.1**
	Teach adapter, 8-pin	**8.0010.9000.0017**
EMC shield terminal	shield diameter 3.0 ... 12.0 mm	**8.0000.4G06.0312**

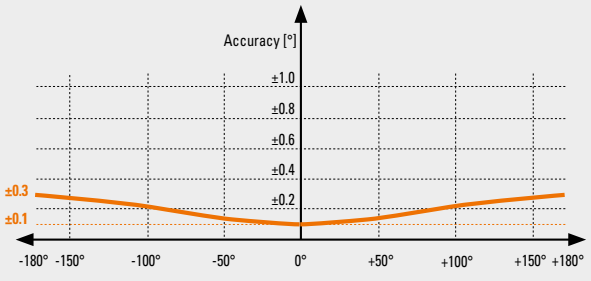
Cables and connectors		Order no.
Preassembled cables	M12 female connector with coupling nut, 5-pin, A coded, straight single ended 2 m [6.56'] PVC cable	**05.00.6081.2211.002M**
	M12 female connector with coupling nut, 8-pin, A coded, straight single ended 2 m [6.56'] PVC cable	**05.00.6041.8211.005M**
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

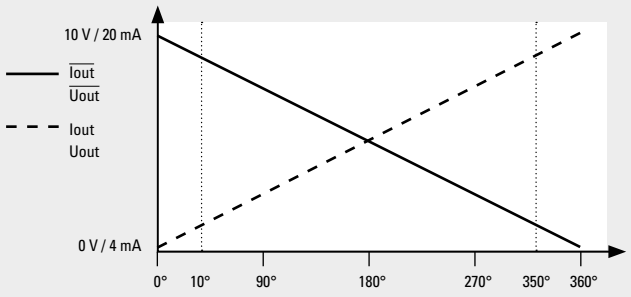
Technical data

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	≤ 0.1°	
Linearity deviation	≤ ±0.3°	
Temperature drift	≤ ±0.005 %/K	
Accuracy (at 25°C)	±0.1 ... ±0.3° depending on the measuring range	

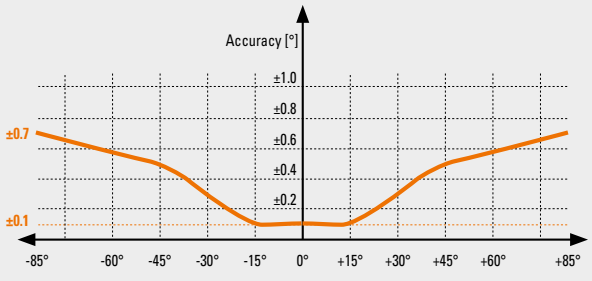


Course of the output signal – factory setting

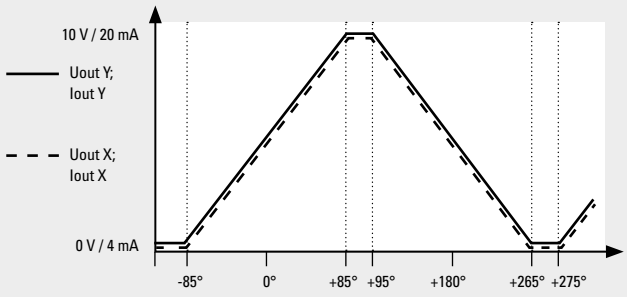


General data 2-axis measurement

Measuring range	-85° ... +85°	
Resolution		
current interface	0.01°	internal sensor
	12 bit	D/A converter
voltage interface	12 bit	
Repeat accuracy	≤ 0.1°	
Linearity deviation	≤ ±0.2°	
Temperature drift	≤ ±0.005 %/K	
Accuracy (at 25°C)	≤ ±0.1 ... ±0.7° depending on the measuring range	



Course of the output signal – factory setting



For dynamic applications
1- and 2-axis measurement

IN51 | **Analog**

Electrical characteristics current interface

Supply voltage	4 ... 20 mA	10 ... 30 V DC
Current consumption		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 Ohm, 25 °C)
Sampling rate		500 Hz (20 ms)
Limit frequency	with Butterworth filter	1 ... 20 Hz, 8th order

Electrical characteristics voltage interface

Supply voltage	0,1 ... 4,9 V / 0,5 ... 4,5 V / 0 ... 5 V 0 ... 10 V	10 ... 30 V 15 ... 30 V
Current consumption		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 Ohm, 25 °C)
Sampling rate		500 Hz (20 ms)
Limit frequency	with Butterworth filter	1 ... 20 Hz, 8th order

Mechanical characteristics

Electrical connection		M12 connector, 8-pin M12 connector, 5-pin cable, 5-core
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/s², 10 ... 2000 Hz
Vibration resistance acc. to EN 60068-2-6		1000 m/s², 6 ms
Dimensions		44.5 x 42.5 x 20 mm [1.75 x 1.67 x 0.79“]

EMC

Relevant standards	EN 61326-1	Electrical equipment for measurement, control and laboratory use
	EN 55011 Klasse B, EN 61000-6-3	Emitted interferences for residential environments

Approvals

UL compliant in accordance with		File no. E224618
CE compliant in accordance with		
	EMC Directive	2014/30/EU
	RoHS Directive	2011/65/EU

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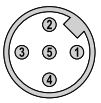
For dynamic applications 1- and 2-axis measurement | IN51 | Analog

Terminal assignment, 1-axis

Type of connection	M12 connector, 8-pin								
1	Signal – Interface 1 (current):	0 V	+V	Iout+	Iout-	$\overline{\text{Iout+}}$	$\overline{\text{Iout-}}$	Teach 1	Teach 2
	Signal – Interface 2, 3, 4, 5 (voltage):	0 V	+V	Uout+	Uout-	$\overline{\text{Uout+}}$	$\overline{\text{Uout-}}$	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	$\overline{\text{Iout+}}$	0 V	Iout+	Teach
	Signal – Interface 2, 3, 4, 5 (voltage):	+V	$\overline{\text{Uout+}}$	0 V	Uout+	Teach
	Pin:	1	2	3	4	5



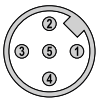
Type of connection	Cable, 5-core					
4, B	Signal – Interface 1 (current):	+V	$\overline{\text{Iout+}}$	0 V	Iout+	Teach
	Signal – Interface 2, 3, 4, 5 (voltage):	+V	$\overline{\text{Uout+}}$	0 V	Uout+	Teach
	Core color:	BN	GY	WH	GN	BU

Terminal assignment, 2-axis

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, 5-core					
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
$\overline{\text{Uout+}}$ Inverted voltage output
$\overline{\text{Uout-}}$ 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
$\overline{\text{Iout+}}$ Inverted current output
$\overline{\text{Iout-}}$ Inverted current output GND

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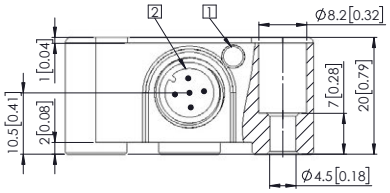
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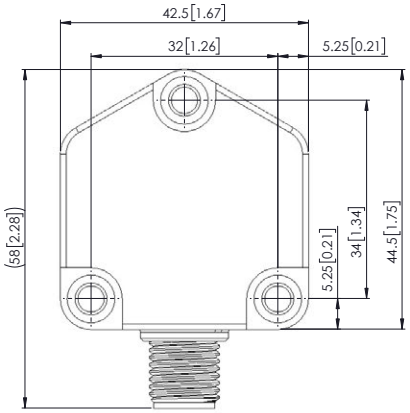
Dimensions

Dimensions in mm [inch]

Version with M12 connector

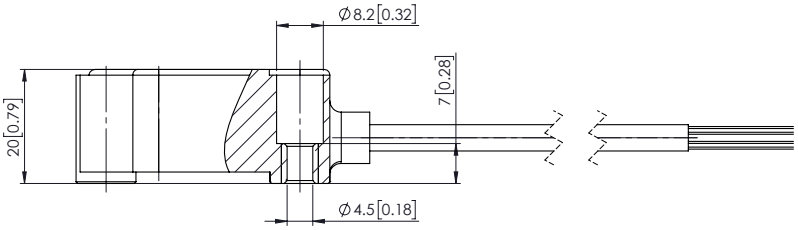
1 RGB LED status indicator
2 M12 connector

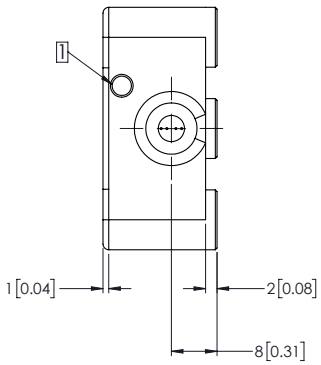


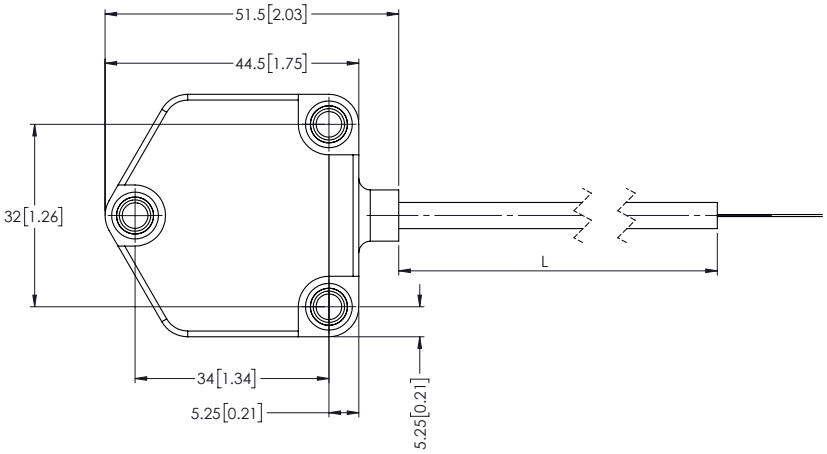


Version with cable

1 RGB LED status indicator







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