

## AKS16

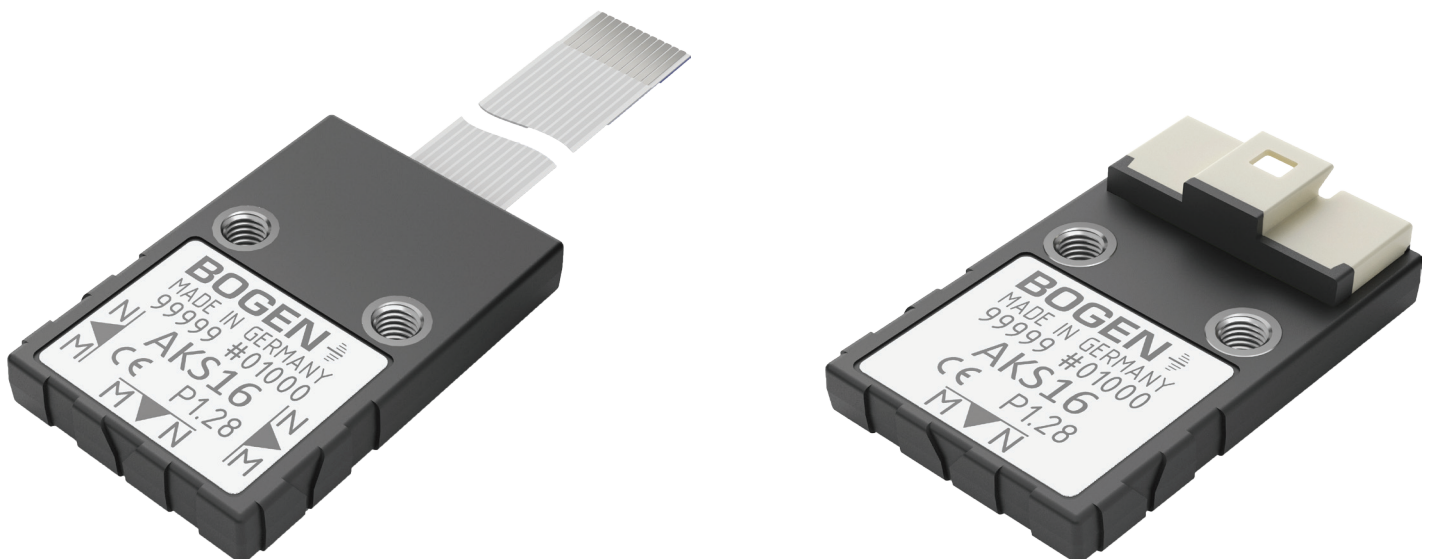
### Absolute Magnetic Sensing Head

AKS16 can be used for linear measurements up to 256 mm in length and rotary measurements - radial and axial - up to 79 mm in diameter. The encoder provides both BISS-C or SSI as output plus incremental signal output in parallel. With a resolution of 18-20 bits this hollow shaft encoder surpasses typical shaft end applications many times over. With dimensions of 24.2 mm or 28 mm in length, 16 mm width and a height of 6.6 mm (Molex version) or 3.4 mm (FFC version) the AKS16 is very compact.

Absolute  
Measuring

Rotary  
Linear  
Applications

ALWAYS  
ABSOLUTE



### Features and Benefits

- 18 to 20 bit absolute resolution
- 18 bit incremental resolution
- small dimensions for space-saving implementation
- resistant against contamination, vibrations, temperature, fluctuations, humidity
- no wear from usage
- corresponding scales in various diameters and lengths

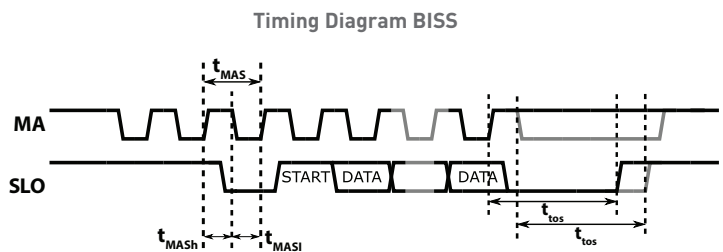
## Features

absolute resolution*	18 bit/19 Bit/20 Bit
commutation signal	value between 1 and 16 pole pairs (UVW)
rotation speed	resolution 18 Bit: up to 24,000 rpm resolution 19 Bit: up to 12,000 rpm resolution 20 Bit: up to 6,000 rpm
optimal distance:magnetic target $\leftrightarrow$ sensing head	pole pitch    distance 1.28 mm    0.4 mm 1.50 mm    0.5 mm 2.00 mm    0.6 mm
supply voltage	5 V $\pm$ 5 %
maximum output load	50 mA per channel
energy consumption (without load)	< 60 mA $\pm$ 5 % (V+ = 5.0 V)
operating temperature	- 40 to + 100 °C
storage temperature	- 40 to + 80 °C
protection class	IP67 (with FFC connector)
output signals	ABZ, UZW, STEP, CW/CCW
signal levels	RS422 ( $\pm$ 5 V)
ABZ incremental resolution	value between 4 and 262144 in steps of four; ABZ signal length Z: 90°
weight	ca. 2.4 g
pole pitch	1.28 mm, 1.50 mm or 2.00 mm

\* resolution depends on the diameter/length of the scale

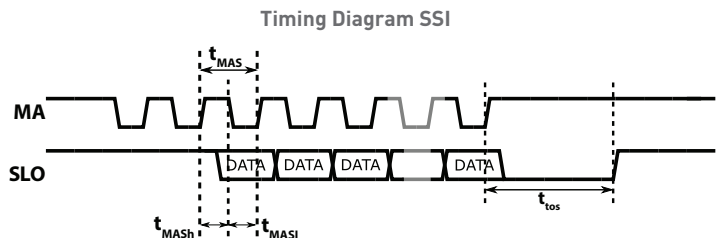
## Signals BISS

signals	clock (MA+, MA-) data (SLO+, SLO-)
protocol	BISS-C BP3 encoder profile
multiturn	on special request; please contact our sales staff
timeout $t_{tos}$	150-380 ns
permissible clock period $t_{MAS}$	100 ns up to 2 * timeout
clock signal hi level duration $t_{MASH}$	50 ns up to timeout
clock signal lo level duration $t_{MASL}$	50 ns



## Signals SSI

signals	clock (MA+, MA-) data (SLO+, SLO-)
multiturn	in special request; please contact our sales staff
timeout $t_{tos}$	375-605 ns
permissible clock period $t_{MAS}$	250 ns up to 2 * timeout
clock signal hi level duration $t_{MASH}$	125 ns up to timeout
clock signal lo level duration $t_{MASL}$	125 ns



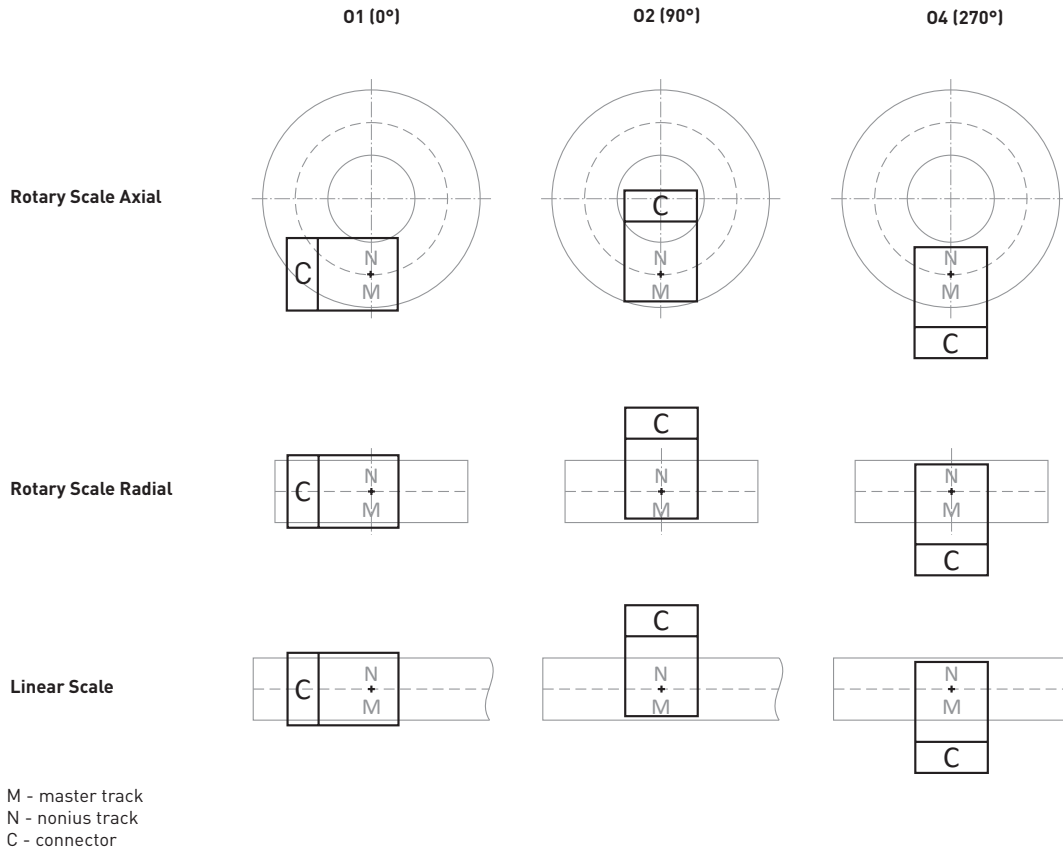
## Error and Warning Bit

error bit low - LED lights up red	<ul style="list-style-type: none"> <li>• bad alignment of sensor and scale</li> <li>• mechanical shift</li> </ul>
warning bit low	<ul style="list-style-type: none"> <li>• movement speed too high</li> <li>• magnetic field not strong enough</li> </ul>



- follow standard ESD precautions!
- turn power off before connecting the sensor.
- do not touch the electrical pins without static protection such as a grounded wrist strap

## Orientation Options

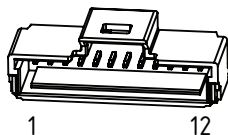


## Pin Assignment

Pin No.	output signals depending on selected interface incremental (D-parameter)			
	D2 - ABZ	D3 - UVW	D4 - STEP	D5 - CW/CCW
1	/Z	/W	/NCLR	/NCLR
2	Z	W	NCLR	NCLR
3	/B	/V	DIR	/CCW
4	SLO-	SLO-	SLO-	SLO-
5	SLO+	SLO+	SLO+	SLO+
6	V-	V-	V-	V-
7	V+	V+	V+	V+
8	MA-	MA-	MA-	MA-
9	MA+	MA+	MA+	MA+
10	B	V	DIR	CCW
11	/A	/U	/STEP	/CW
12	A	U	STEP	CW

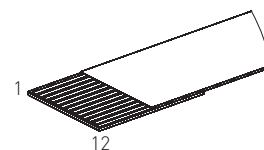
### Connector C1

Molex 501568-1207; 12 pin male connector; mating cycles: 30



### Connector C3

FFC (12 pin, 0.5 mm pitch); mating cycles: 20



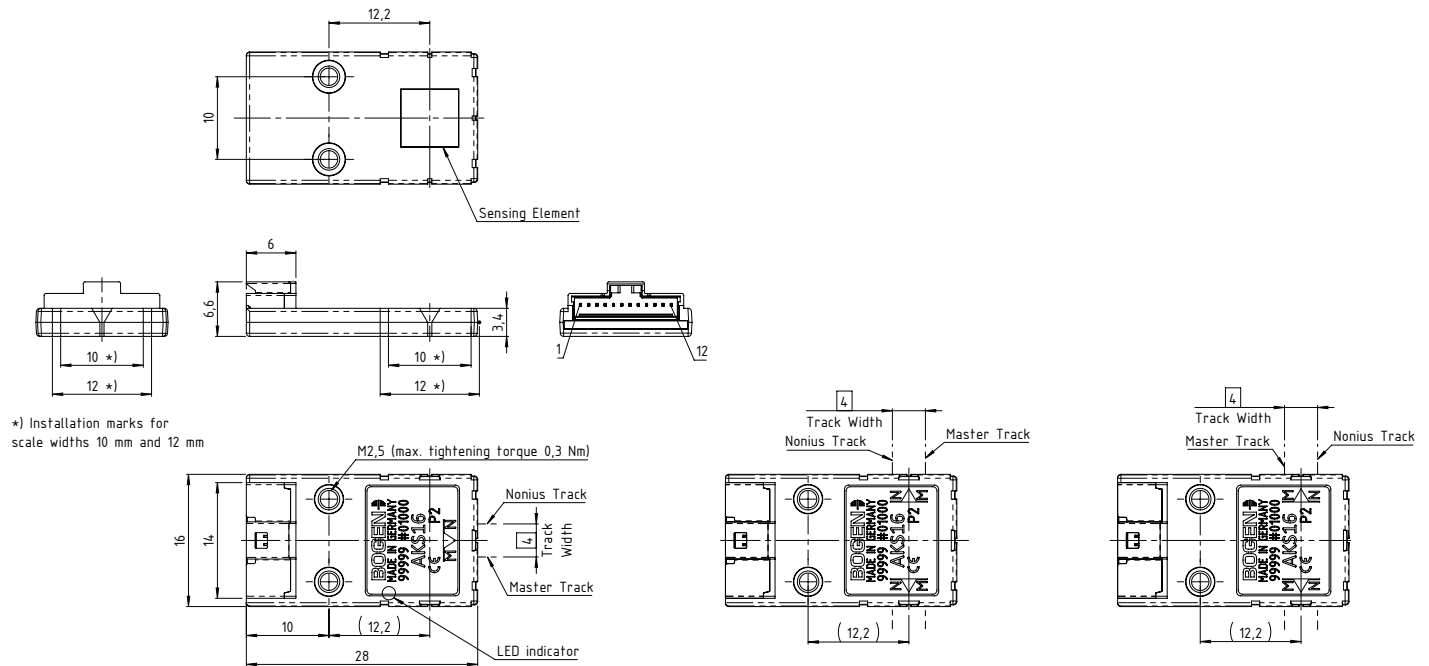


## Dimensions for C1 (2.00 mm Pole Pitch, Molex Connector)

01 (0°)

02 (90°)

04 (270°)

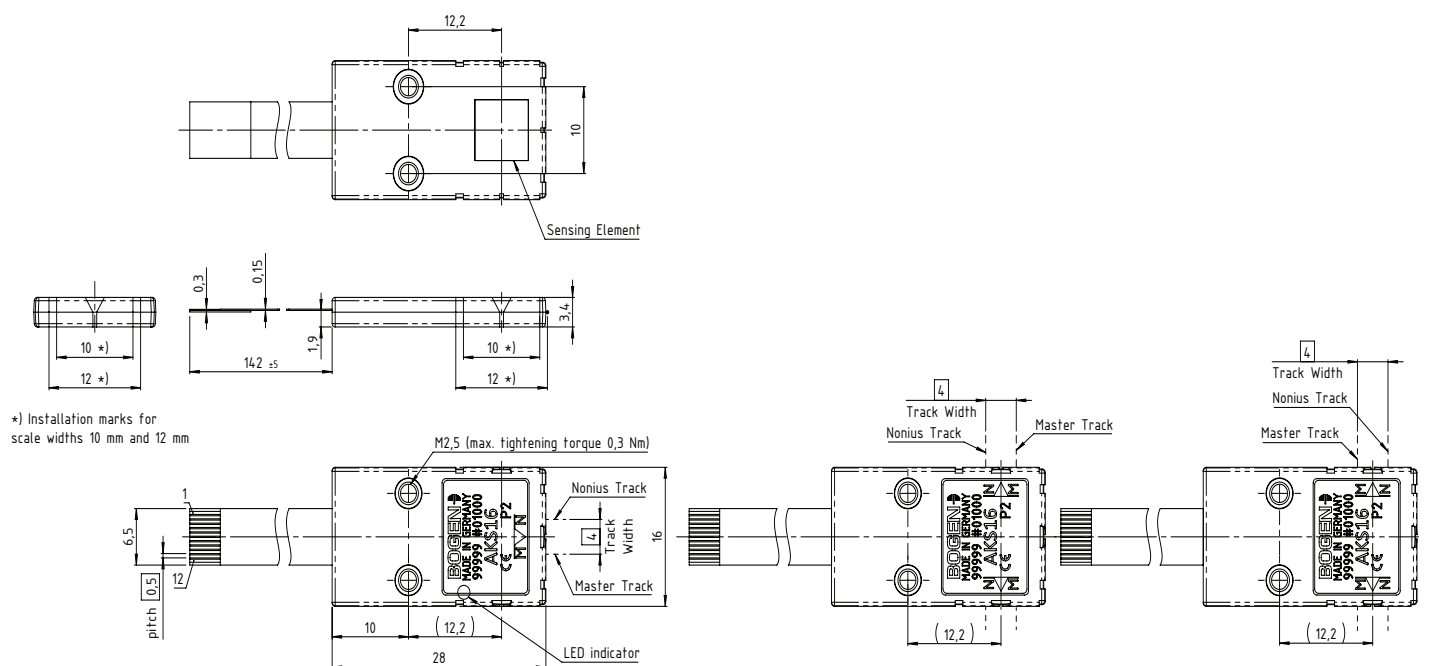


## Dimensions for C3 (2.00 mm Pole Pitch, FFC Connector)

01 (0°)

02 (90°)

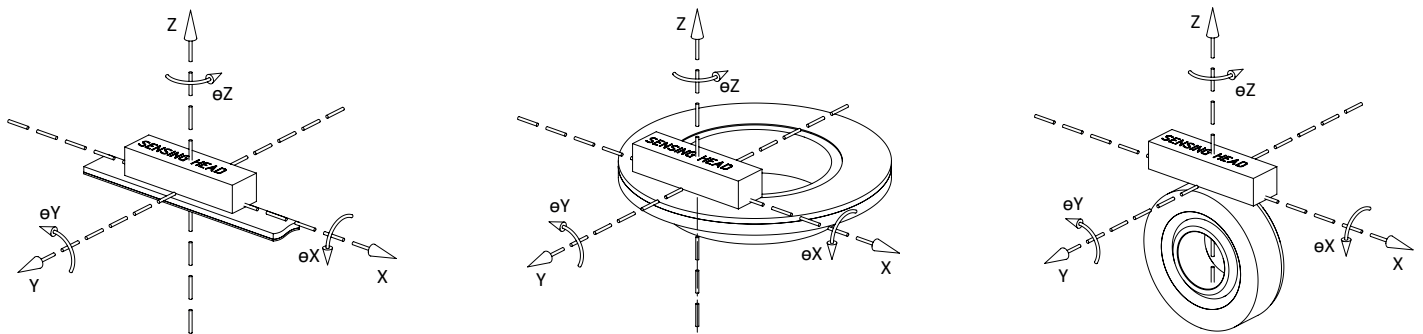
04 (270°)



## Calibration

Each AKS16 requires a calibration process in the final assembled state. It is recommended that the calibration is performed across the whole working range/measuring length of the magnetic scale. The calibration process consists of an analogue calibration, where the different sensors in the sensing head are being optimized for best performance and a nonius calibration where the sensing head is optimized over the scale/measuring length. With the programming software and hardware the parameters of an AKS16 sensing head can be adapted for a successful calibration. The software sets the sensing head parameters for the correct master-nonius periods (16/15, 32/31, 64/63), the operating measurement systems (linear, rotary radial, rotary axial) and the interface absolute and incremental.

## Installation Tolerances



## Assembly Values and Tolerances

Z [mm]	for 1.28 mm pole pitch: 0.4 mm $\pm$ 0.05 for 1.50 mm pole pitch: 0.5 mm $\pm$ 0.05 for 2.00 mm pole pitch: 0.6 mm $\pm$ 0.05
Y [mm]	$\pm$ 0.5
X [mm]	$\pm$ 0.5
$\theta Z$ [°]	$\pm$ 1
$\theta Y$ [°]	$\pm$ 1
$\theta X$ [°]	$\pm$ 1

note: for tolerance purposes the bracket for mounting the AKS16 should have adjustment options; maximum eccentricity of rotary scale must be < 0.06 mm; the installation tolerance is the same for both orientation options

## Order Code

### AKS16 - O - P - C

			code <sup>(1)</sup>	explanation <sup>(1)</sup>
parameter	O	orientation option	<b>01</b>	<b>angular position to the scale: 0°</b>
			02	angular position to the scale: 90°
			04	angular position to the scale: 270°
	P	pole pitch [mm]	<b>P1.28</b>	<b>1.28 mm</b>
			P1.50	1.50 mm
			P2.00	2.00 mm
	C	connector	<b>C1</b>	<b>Molex 12 pin</b>
			C3.142	FFC 12 pin, 0.5 mm pitch, length 142 mm <sup>(2)</sup>

<sup>(1)</sup> standard parameters are marked in bold

<sup>(2)</sup> standard length, other lengths on request

## Ordering examples

AKS16-01-P1.28-C1	AKS16 Magnetic Sensing Head, orientation option parallel, 1.28 mm pole pitch, connector Molex 12 pin
AKS16-02-P1.28-C1	AKS16 Magnetic Sensing Head, orientation option perpendicular, 1.28 mm pole pitch, connector Molex 12 pin
AKS16-01-P1.28-C3.142	AKS16 Magnetic Sensing Head, orientation option parallel, 1.28 mm pole pitch, connector, 12 pin FFC, 0.5 mm pole pitch, length 142 mm

## Customer-Programmable Parameters <sup>(3)</sup>

		code <sup>(4)</sup>	explanation <sup>(4)</sup>
parameters	size	Z1	16/15 Nonius
		<b>Z2</b>	<b>32/31 Nonius</b>
		Z3	64/63 Nonius
	interface absolute	<b>A1</b>	<b>BISS</b>
		A2	SSI
	interface incremental	D1	none (on request)
		<b>D2.&lt;C&gt;</b>	<b>ABZ (&lt;C&gt; counts of scale, value between 4 and 262144 in steps of 4, default is 16384)</b>
		D3	BLDC motor commutation (UVW) (on request)
		D4	Step / direction (on request)
		D5	CW / CCW Incremental (on request)

<sup>(3)</sup> parameters have to be set by customer before calibration; programmable with programming unit (order no. 55040)

<sup>(4)</sup> preset parameters are bold

## Required Accessories

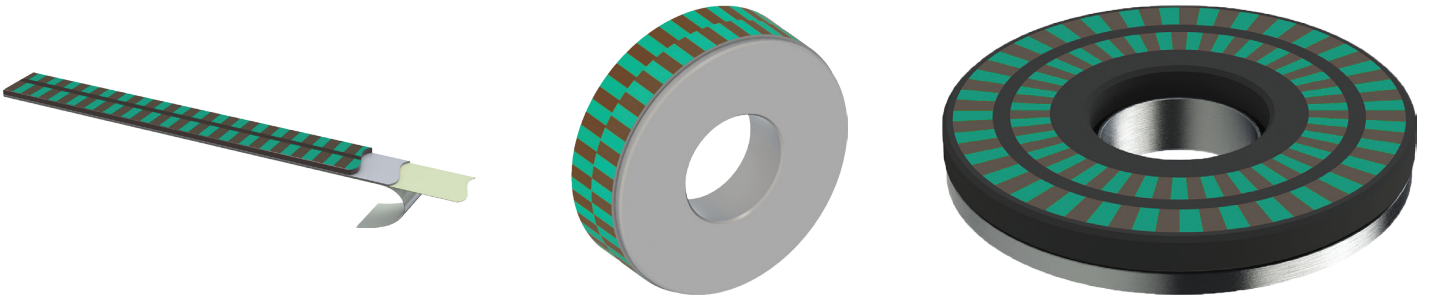
	programming unit (55030)*	programming unit (55040)**
for AKS16 with C1 connector	X	
for AKS16 with C3 connector		X

\*) includes programming adapter (52039), USB connector cable (53016), adapter cable Molex C1 (58276) and magnetic viewer

\*\*) includes programming adapter (52039), USB connector cable (53016), adapter PCB (55028) and magnetic viewer; please note: sensor is equipped with FFC cable, no additional adapter cable required

## Corresponding Linear and Rotary Magnetic Scales

BOGEN offers a comprehensive scope of standard and tailor-made scales in a variety of sizes and accuracy classes. For more information on our standard linear and rotary magnetic scales, please refer to our dedicated datasheets.



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