

## AKS16-MT

### Absolute Multi-Turn Magnetic Sensing Head

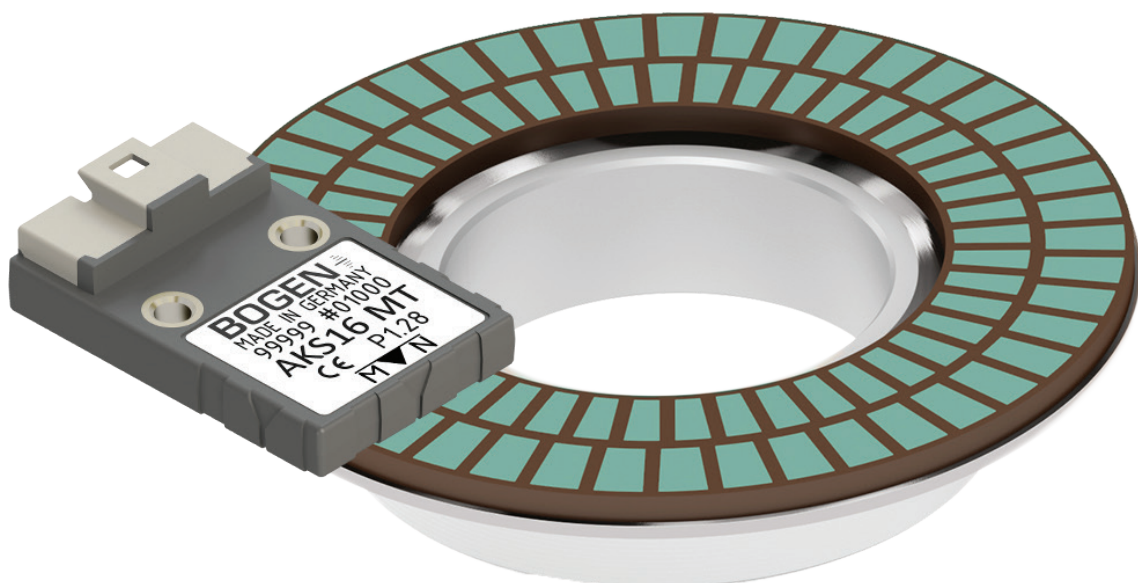
Combining AKS16-MT and BOGEN rotary scales offer cost-efficient absolute magnetic measurement solutions for many industrial applications where movements have to be measured. AKS16-MT is the perfect fit for rotary and radial measurements up to 59mm in diameter. The encoder provides both BISS-C or SSI outputs. This hollow shaft encoder's resolution of 19 to 20 bits exceeds typical shaft end applications many times over. AKS16-MT is very compact in size and fits assembly even in confined spaces. An external battery power supply ensures that manual movements of the scale are still detected and position data is counted even when the system voltage has been switched off.

rotary  
radial and axial  
applications

for  
2-track  
magnetic  
scales

battery-backed

ALWAYS  
ABSOLUTE



### Features and Benefits

- 19 to 20 bit single-turn resolution
- battery-backed for temporary self-sufficient power supply
- small dimensions for space-saving implementation
- resistant against contamination, vibrations, temperature, fluctuations, humidity
- no wear from use
- suitable scales in various designs available

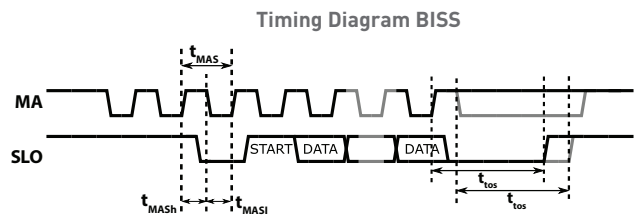
## Features

single-turn resolution*	19 bit/20 bit	
multi-turn	up to 18 bit of revolution counting (up to 262144 [2 <sup>18</sup> ])	
rotation speed	resolution	rotation speed
	19 bit 20 bit	up to 12 000 rpm up to 6 000 rpm
linear speed	pole pitch	linear speed
	1.28 mm 1.50 mm	17 m/s 20 m/s
optimal distance: magnetic target ←→ sensing head	pole pitch	distance
	1.28 mm 1.50 mm	0.4 mm 0.5 mm
supply voltage	5 V ± 5 %	
battery voltage	3.0 V to 5.5 V (common 3.6 V)	
maximum output load	50 mA per channel	
current consumption in battery mode	typ. 10 µA (max. 800 µA)	
energy consumption (without load)	< 80 mA ± 5 % (V+ = 5.0 V)	
storage temperature	- 40 to + 80 °C	
weight	ca. 2.5 g	
pole pitch	1.28 mm or 1.50 mm	

\* resolution depends on the diameter of the rotary scale

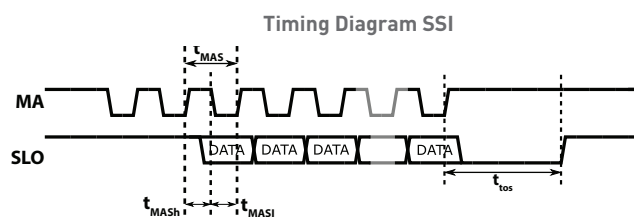
## Signals BiSS

signals	clock (MA+, MA-) data (SLO+, SLO-)
protocol	BiSS-C BP3 encoder profile
timeout (t <sub>tos</sub> )	150-380 ns
permissible clock period (t <sup>MAS</sup> )	up to 5 MHz (200 ns)
clock signal hi level duration (t <sup>MASH</sup> )	100 ns up to timeout
clock signal lo level duration (t <sup>MASI</sup> )	100 ns



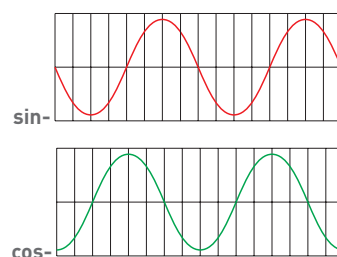
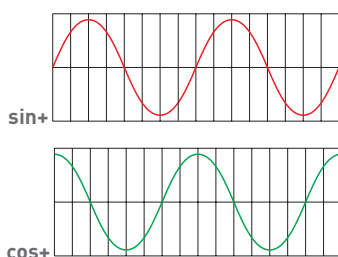
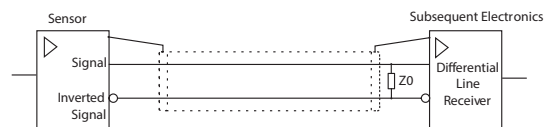
## Signals SSI

signals	clock (MA+, MA-) data (SLO+, SLO-)
timeout (t <sub>tos</sub> )	375-605 ns
permissible clock period (t <sup>MAS</sup> )	up to 4 MHz (250 ns)
clock signal hi level duration (t <sup>MASH</sup> )	125 ns up to timeout
clock signal lo level duration (t <sup>MASI</sup> )	125 ns



## Signals sin/cos

signals	sin/cos 1 Vpp
signals level	1 Vpp
signal period	one period per master track pole pair



## 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 to high</li> <li>• magnetic field not strong enough</li> </ul>



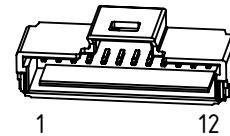
- follow standard ESD precautions!
- turn power off before connecting the sensor.
- do not touch the electrical pins without static protection such as a grounded wrist strap

## Pin Assignment

pinout	signal
1	GND
2	VBat
3	COS-
4	SLO-
5	SLO+
6	GND
7	V+
8	MA-
9	MA+
10	COS+
11	SIN-
12	SIN+

### connector C1

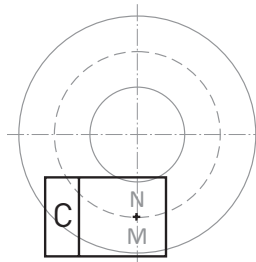
Molex 501568-1207; 12 pin male connector; mating cycles: 30



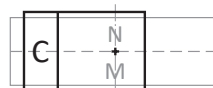
## Orientation Options

01 (0°)

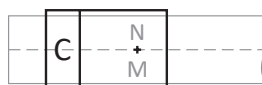
Rotary Scale Axial



Rotary Scale Radial

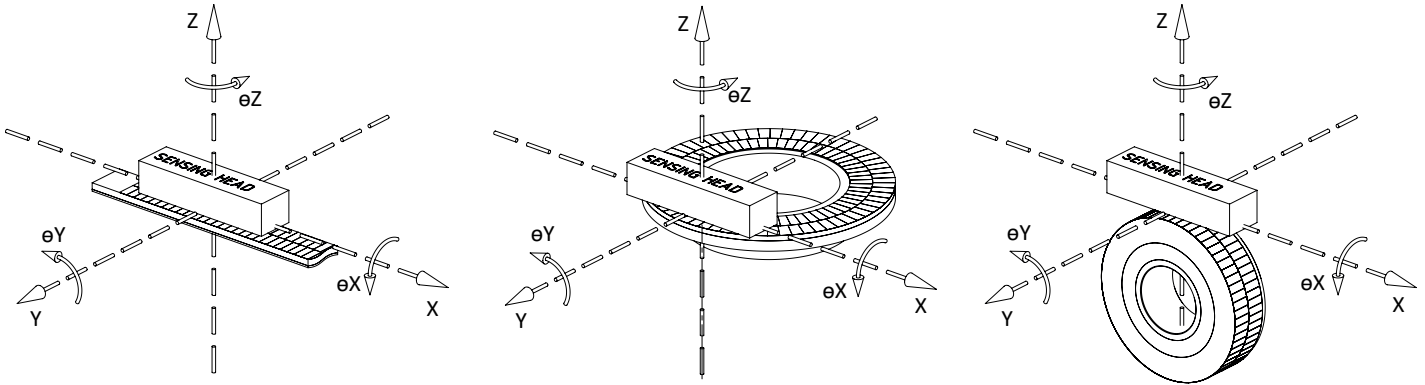


Linear Scale



M - master track  
N - nonius track  
C - connector

## Installation Tolerances

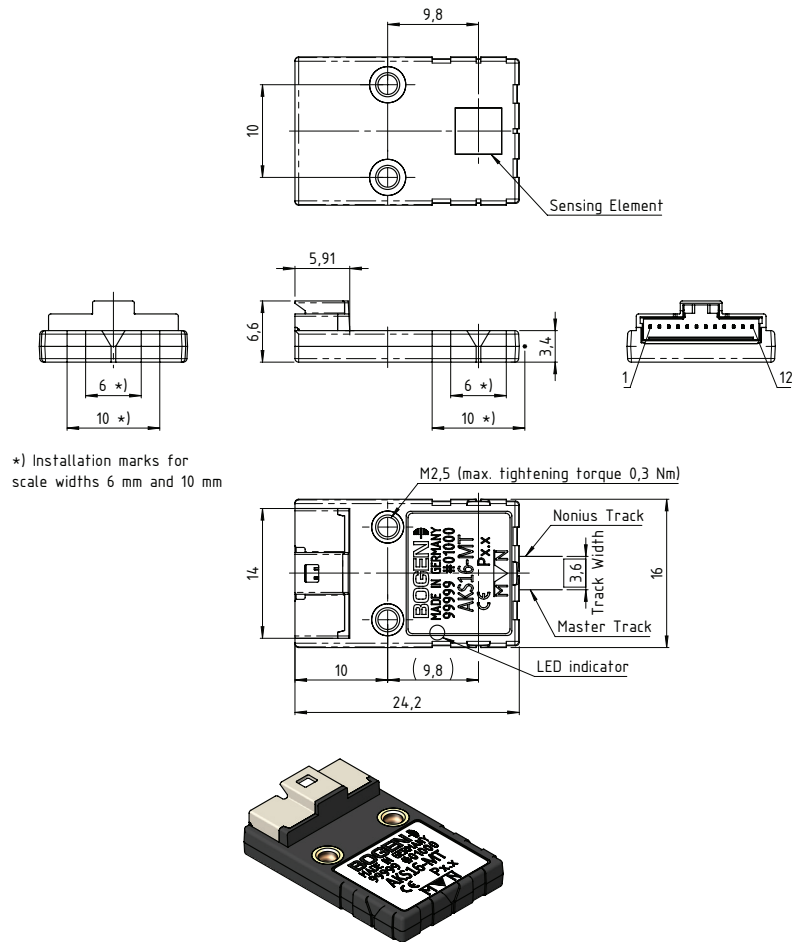


## Assembly Values and Tolerances

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

## Dimensions

01 (0°)



## Calibration / Programming

Each unit needs to be calibrated in final assembly with a nonius scale. For the calibration, the scale needs to be moved over the whole measuring length. For the use of the multi-turn function several parameters have to be programmed (e. g. pole pitch, number of master pole pairs etc.). For calibration and programming, the programming unit including cables and the BOGEN software will be needed. A PC is required for calibration and programming. The use of non-BOGEN approved software may result in reduced performance of the encoder!

## Order Code

### AKS16-MT - O - P - C - H

			code <sup>1)</sup>	explanation
parameters	<b>O</b>	orientation option	<b>O1</b>	angular position to the scale: 0°
	<b>P</b>	pole pitch [mm]	<b>P1.28</b>	1.28 mm
			P1.50	1.50 mm
	<b>C</b>	connector	<b>C1</b>	Molex 12 pin
	<b>H</b>	interface	<b>H0<sup>2)</sup></b>	without linedriver
			H1	with linedriver

<sup>1)</sup> standard parameters are bold

<sup>2)</sup> for this linedriver option only absolute interfaces are available

## Ordering Examples

AKS16-MT-01-P1.5-C1-H0	AKS16-MT Magnetic Sensing Head, orientation option parallel, 1.5 mm pole pitch, connector Molex 12 pin, without linedriver
AKS16-MT-01-P1.5-C1-H1	AKS16-MT Magnetic Sensing Head, orientation option parallel, 1.50 mm pole pitch, connector Molex 12 pin, with linedriver

## Customer-programmable Parameters

		code <sup>3)</sup>	explanation <sup>4)</sup>
parameters	size	Z1	16/15 nonius
		<b>Z2</b>	<b>32/31 nonius</b>
		Z3	64/63 nonius
	absolute interface	<b>A1</b>	<b>BiSS</b>
		A2	SSI
	incremental interface	<b>D1</b>	<b>none (available for linedriver options H0 and H1)</b>
		D7	sin/cos 1 Vpp

<sup>3)</sup> parameters have to be set by customer before calibration; programmable with the programming unit (order no. 00052040); must be ordered separately.

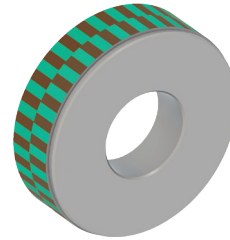
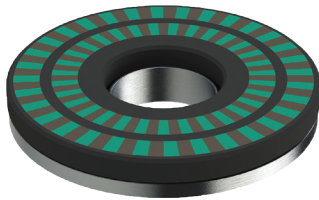
<sup>4)</sup> preset parameters are bold

## Ordering Example

AKS16-MT-01-P1.5-C1-H0-Z1-A2-D1	AKS16-MT Magnetic Sensing Head, orientation option parallel, 1.5 mm pole pitch, connector Molex 12 pin, without linedriver, 16/15 nonius, SSI, no incremental interface
AKS16-MT-01-P1.5-C1-H1-Z2-A1-D7	AKS16-MT Magnetic Sensing Head, orientation option parallel, 1.50 mm pole pitch, connector Molex 12 pin, with linedriver, 32/31 nonius, BiSS, sin/cos 1 Vpp

## Corresponding Rotary Magnetic Scales

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



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