



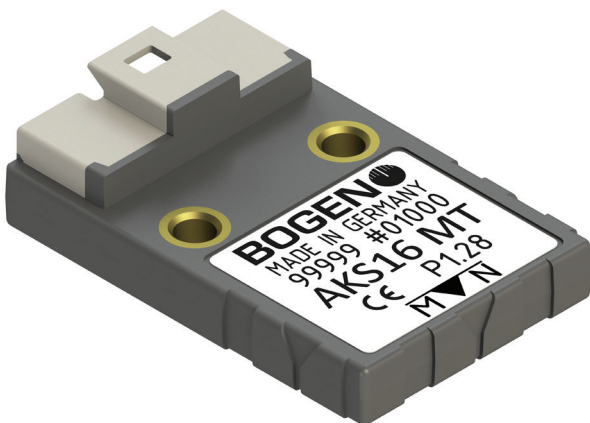
Measuring



Positioning

## AKS16-MT Multi-Turn Absolute Encoder

- For rotary-radial applications
- For 2 track magnetic scales
- Battery backed



### Features

- 19 to 20 Bit single-turn resolution
- Battery backed for temporary autarkic power supply
- Small dimensions for space-saving implementation
- Resistant against contamination, vibrations, temperature fluctuations, humidity
- No wear from usage
- Corresponding scales in various designs

### Motion control with AKS16-MT: accurate - reliable - flexible

With the AKS16-MT and the corresponding scales BOGEN offers cost-efficient absolute magnetic measurement solutions for many industrial applications where movements have to be measured. The AKS16-MT can be used for rotary-radial measurements up to 59 mm in diameter. The encoder provides both BISS-C or SSI as output. With a resolution of 19 - 20 bits this hollow shaft encoder surpasses typical shaft end applications many times over. With dimensions of 24.2 mm in length, 16 mm width and a height of 6.6 mm the AKS16-MT is very compact. The power supply of an external battery ensures that manual movements of the scale are still detected and position data is counted even when the system voltage has been switched off.

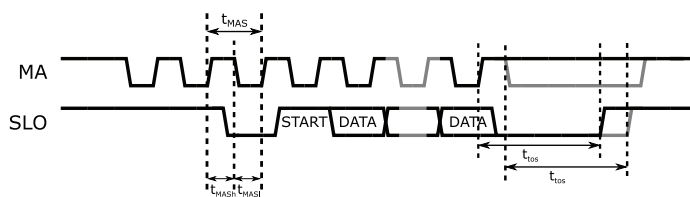
**Features**

Single-turn resolution *	19 Bit/20 Bit
Multi-turn	Up to 18 Bit of revolution counting
Rotation speed	19 Bit up to 12 000 rpm 20 Bit up to 6 000 rpm
Optimal distance: magnetic target ↔ sensing head	pole pitch distance
	1.28 mm 0.4 mm 1.50 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 % (UB = 5,0 V)
Storage temperature	-40 to +80 °C
Rev-counter	Up to 262144 (2 <sup>18</sup> )
Weight	ca. 2.5 g
Pole pitch	1.28 mm or 1.50 mm

**Signals BISS**

Signals	Clock (MA+, MA-) Data (SLO+, SLO-)
Signal amplitude (without load)	RS422 (± 5 V)
Protocol	BISS-C BP3 encoder profile
Timeout (t <sub>tos</sub> )	150-380 ns
Permissible clock period (t <sub>MAS</sub> )	100 ns up to 2 x timeout
Clock signal hi level duration (t <sub>MASH</sub> )	50 ns up to t <sub>tos</sub>
Clock signal lo level duration (t <sub>MASL</sub> )	50 ns

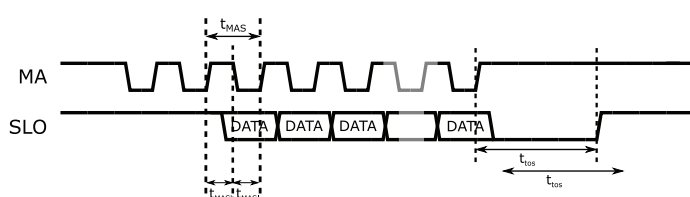
**Timing Diagram BISS**



**Signals SSI**

Signals	Clock (MA+, MA-) Data (SLO+, SLO-)
Signal amplitude (without load)	RS422 (± 5 V)
Timeout (t <sub>tos</sub> )	375-605 ns
Permissible clock period (t <sub>MAS</sub> )	250 ns up to 2 x timeout
Clock signal hi level duration (t <sub>MASH</sub> )	125 ns up to t <sub>tos</sub>
Clock signal lo level duration (t <sub>MASL</sub> )	125 ns

**Timing Diagram SSI**



**Signals Sin/Cos**

Voltage peak-to-peak (V <sub>PP</sub> )	1 V
Signal periods per turn	equal to periods of master track

**Error and Warning Bit**

Error Bit low - LED lights up red	-Bad alignment of sensor and scale -Mechanical shift
Warning bit low	-Movement speed too high -Magnetic field not strong enough

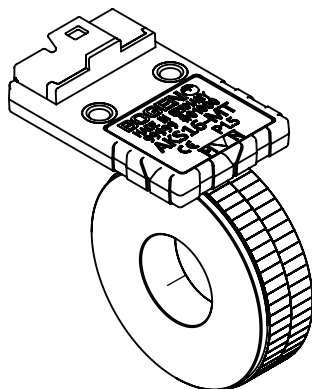


Follow standard ESD precautions!  
Turn power off before connecting the sensor.  
Do not touch the electrical pins without static protection such as a grounded wrist strap.

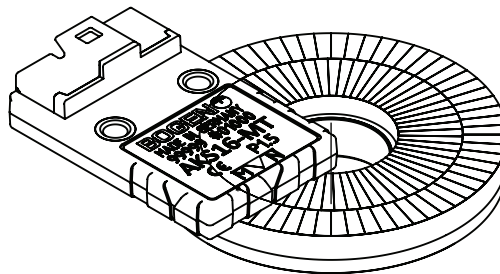
\* Resolution depends on diameter of the rotary scale.

Parallel Orientation

Radial rotary scale



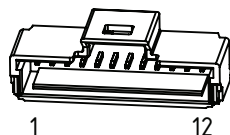
Axial rotary scale



PIN Assignment

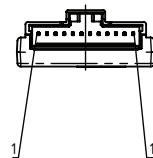
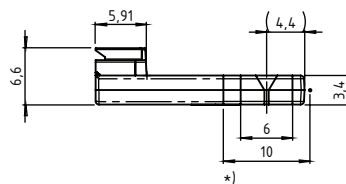
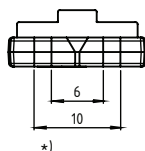
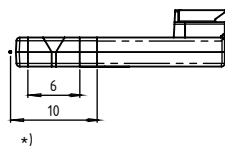
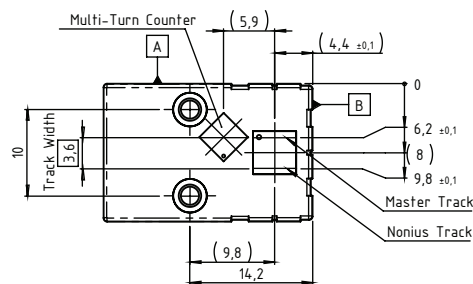
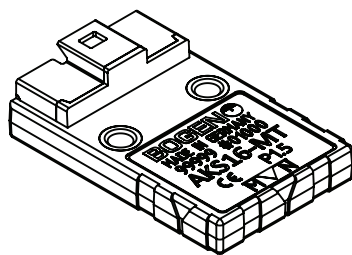
Pin no.	Signal
1	SLO+
2	SLO-
3	MA-
4	MA+
5	+5V
6	GND
7	GND
8	VBAT
9	Cos-
10	Cos+
11	Sin-
12	Sin+

Connector C1 (Molex)

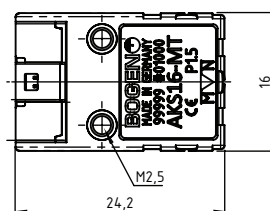


Molex 501568-1207  
 (12 pin male connector)  
 Maximum mating cycles: 30

Dimensions



\*) Installation marks for scale widths 6 mm and 10 mm

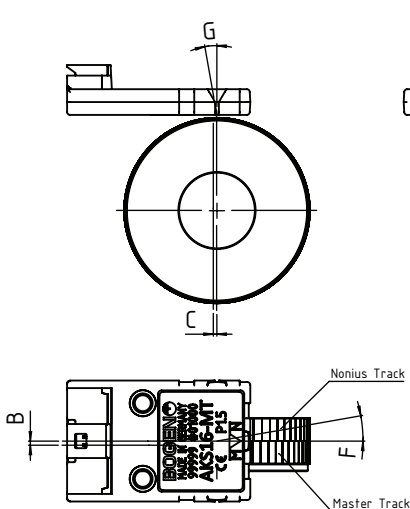


### Calibration / Programming

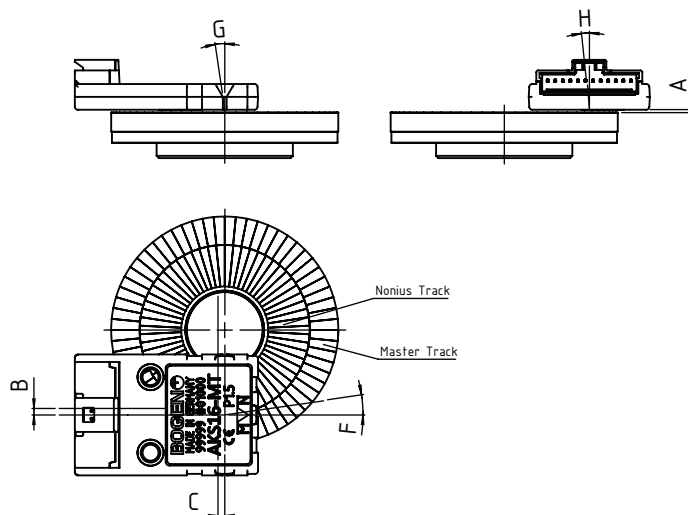
Each unit needs to be calibrated in final assembly with a nonius scale. For the calibration, the scale needs to be moved over the whole measuring length. For the use of the multi-turn function several parameters have to be programmed (e. g. pole pitch, number of master pole pairs etc.). For calibration 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 lesser performance or operation of the encoder!

### Installation Tolerances

Radial rotary scale



Axial rotary scale



### Assembly Values and Tolerances

<b>A [mm]</b>	for 1.28 mm pole pitch: 0.4 mm ± 0.05 for 1.50 mm pole pitch: 0.5 mm ± 0.05
<b>B [mm]</b>	±0.5
<b>C [mm]</b>	±0.5
<b>F [°]</b>	±1
<b>G [°]</b>	±1
<b>H [°]</b>	±1

Note:

- For tolerance purposes the bracket for mounting the AKS16-MT should have adjustment options.
- Maximum eccentricity of rotary scale must be < 0.06 mm.

## Order Code

### Parameters

AKS16-MT - 

O	P	C
---	---	---

		Code <sup>(1)</sup>	Explanation <sup>(1)</sup>
<b>Parameters</b>	<b>O</b>	<b>Orientation Option</b>	<b>O1</b> Parallel
	<b>P</b>	<b>Pole Pitch [mm]</b>	<b>P1.28</b> 1.28 mm
			P1.50 1.50 mm
<b>C</b>	<b>Connector</b>	<b>C1</b> Molex 12 pin	

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

<sup>(2)</sup> other lengths on request

## Ordering Example

AKS16-MT-01P1.28C1

AKS16-MT Magnetic Sensing Head, orientation option parallel, 1.28 mm pole pitch, connector Molex 12 pin

AKS16-MT-01P1.50C1

AKS16-MT Magnetic Sensing Head, orientation option parallel, 1.50 mm pole pitch, connector Molex 12 pin

## Parameters to be programmed by customer <sup>(3)</sup>

		Code <sup>(4)</sup>	Explanation <sup>(4)</sup>
<b>Parameters</b>	<b>Size</b>	<b>Z2</b>	<b>32/31 Nonius</b>
		Z3	64/63 Nonius
	<b>Interface Absolute</b>	<b>A1</b>	<b>BISS</b>
		A2	SSI
	<b>Analog Interface</b>	D1	None
		<b>D2</b>	<b>Sin/Cos of master track</b>

<sup>(3)</sup> Parameters have to be set by customer before calibration. Programmable with the programming unit (order no. 00052040).

<sup>(4)</sup> Preset parameters are bold.

## 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](#). For your special requests, [please click here to contact our application engineers](#).



### Optional Accessory

00052040: Programming unit (includes adapter and cable)