

AKP18

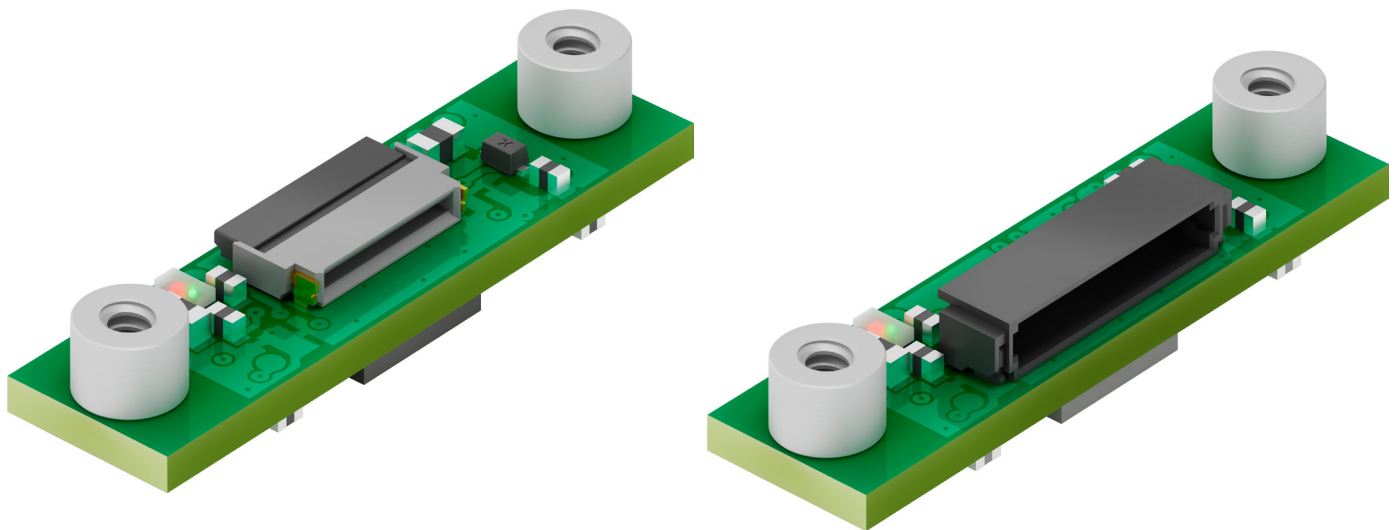
Absolute Magnetic Sensing Head

With the combination of AKP18 and magnetic scales, BOGEN offers cost-efficient solutions for linear and rotational absolute magnetic measurement. The AKP18 is extremely compact and fits even smallest installation space. It is available in nine different standard sizes and enables linear measurements up to 256 mm and rotary solutions, both radial and axial. The AKP18 offers both BISS-C and SSI output options. Thanks to its 18 - 20 bit resolution, this hollow shaft encoder outperforms typical shaft end products.

Absolute
Measuring

Rotary
Linear
Applications

ALWAYS
ABSOLUTE



Features and Benefits

- 18 to 20 bit absolute resolution
- for linear or rotary applications
- no wear from use
- applicable for smallest installation spaces
- designed especially for multiple axis robotic and automation applications
- accuracy information

Features

absolute resolution*	18 bit/19 bit/20 bit	
rotation speed	resolution	rotation speed
	18 bit	up to 24000 rpm
	19 bit	up to 12000 rpm
	20 bit	up to 6000 rpm
linear speed	pole pitch	linear speed
	1.28 mm	17 m/s
	1.5 mm	20 m/s
	2.0 mm	25 m/s
multiple encoder use	up to 7 encoders in daisy chain	
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 % (UB = 5,0 V)	
LED	- green LED = device on - red LED = bad set up (adjustment required)	
operating temperature	- 40 to + 100 °C	
storage temperature	- 40 to + 80 °C	



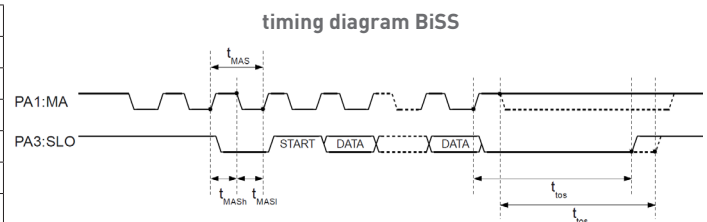
Sensing heads and magnetic scales can be damaged by magnetic fields!
Apply only demagnetized tools for assembly and maintenance.



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.

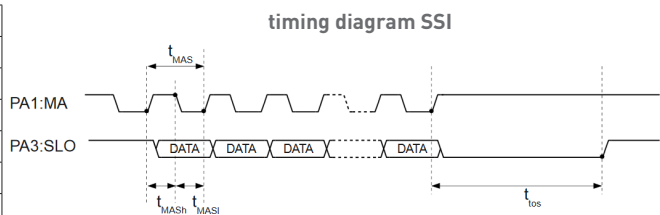
Signals BiSS

signals	clock (MA+, MA-)
	data (SLO+, SLO-)
signal amplitude (without load)	RS422 ($\pm$ 5 V)
protocol	BiSS-C BP3 encoder profile
t_tos (timeout)	150-380 ns
t_MAS (permissible clock period)	up to 5 MHz (200 ns)
t_MASh (clock signal high level duration)	100 ns up to timeout
t_MASl (clock signal low level duration)	100 ns



Signals SSI

signals	clock (MA+, MA-)
	data (SLO+, SLO-)
signal amplitude (without load)	RS422 ($\pm$ 5 V)
t_tos (timeout)	375-605 ns
t_MAS (permissible clock period)	up to 4 MHz (250 ns)
t_MASh (clock signal high level duration)	125 ns up to timeout
t_MASl (clock signal low level duration)	125 ns



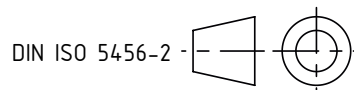
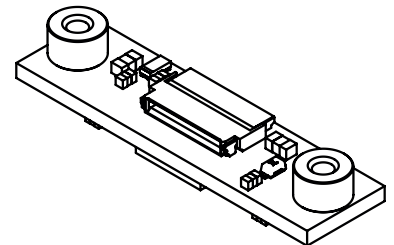
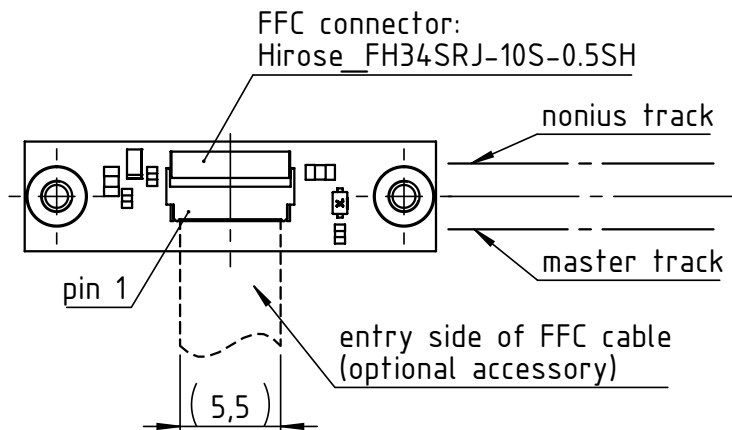
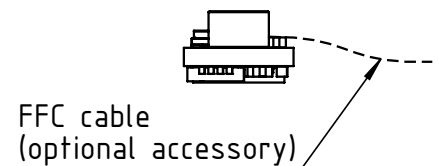
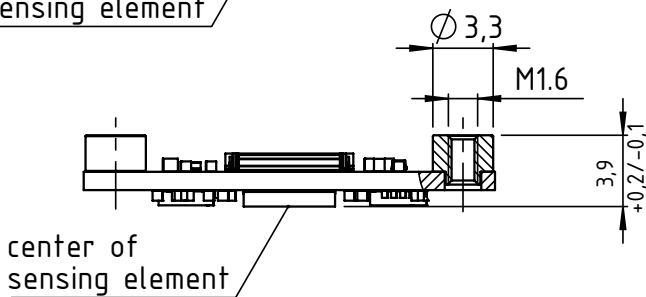
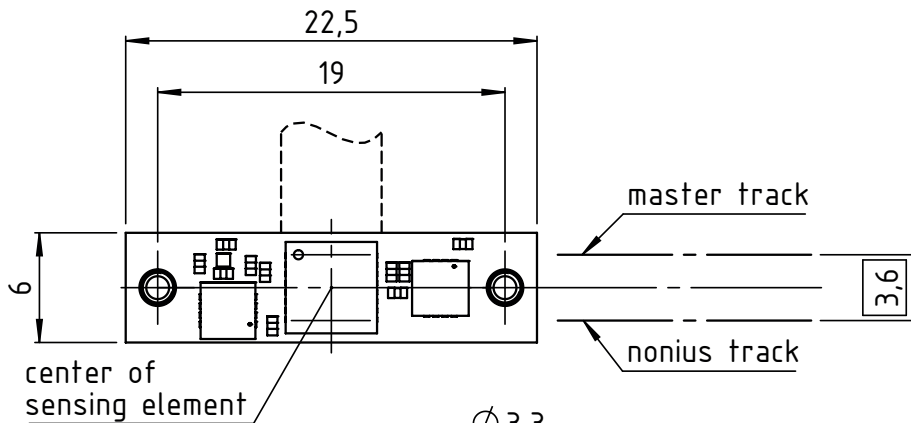
Pin Assignment

	for FFC connector	wire to board connector
Pin No.	signal	signal
1	+V5	+V5
2	GND	GND
3	MA+	MA+
4	MA-	MA-
5	SLO+	SLO+
6	SLO-	SLO-
7	SLI+	SLI+
8	SLI-	SLI-
9	GND	GND
10	+V5	+V5

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

Dimensions for 1.28 mm and 1.50 mm Pole Pitch

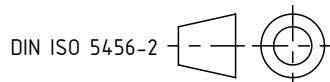
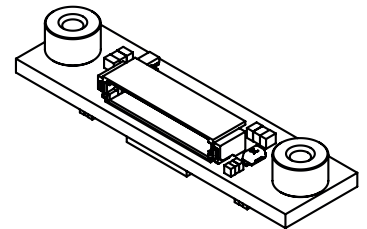
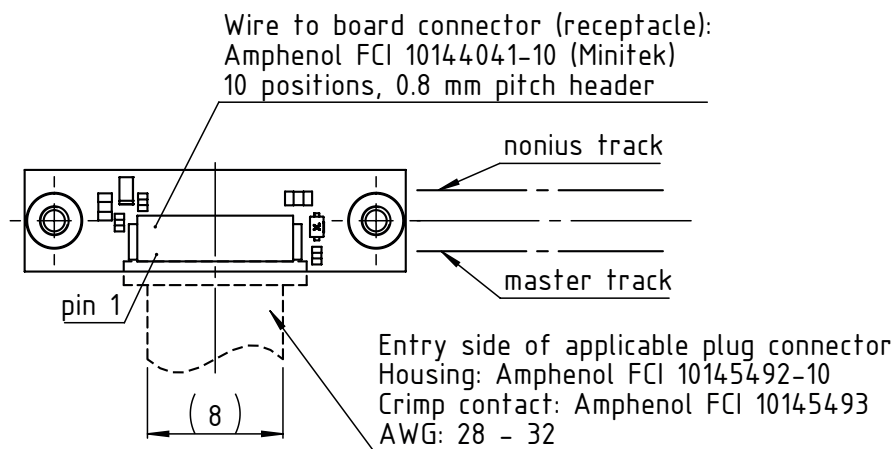
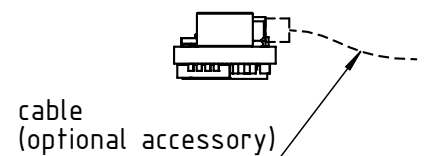
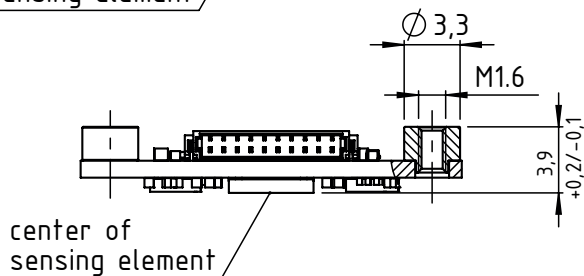
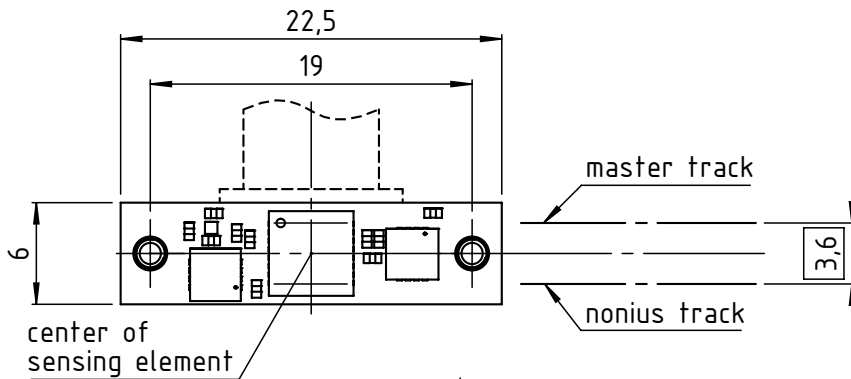
including FFC connector



dimensions without tolerances according to DIN ISO 2768 m

Dimensions for 1.28 mm and 1.50 mm Pole Pitch

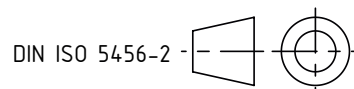
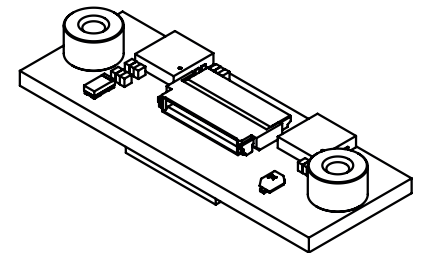
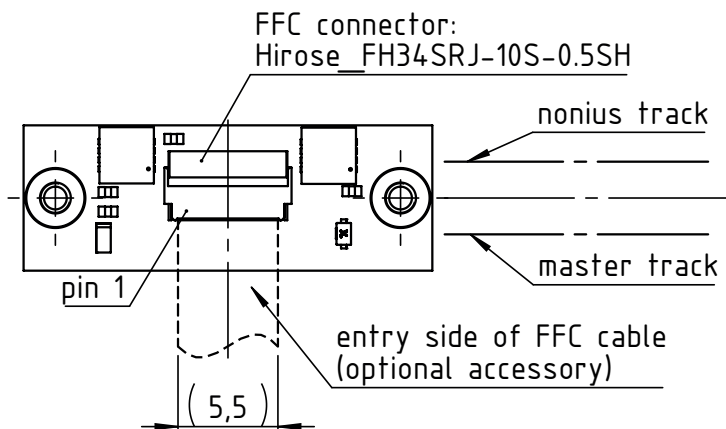
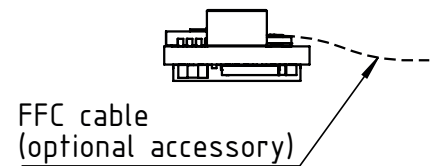
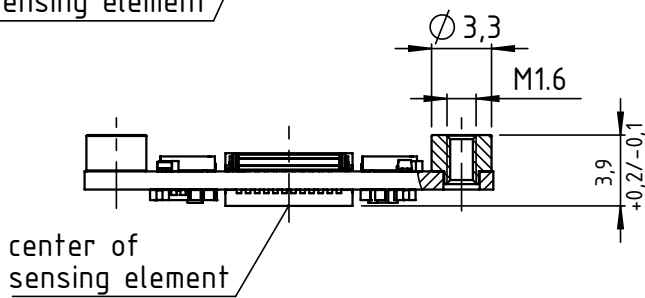
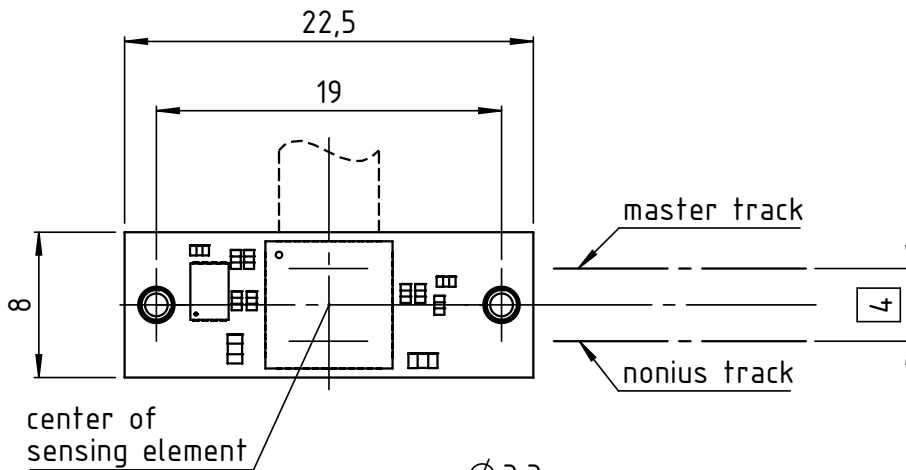
including wire to board connector



dimensions without tolerances according to DIN ISO 2768 m

Dimensions for 2.00 mm Pole Pitch

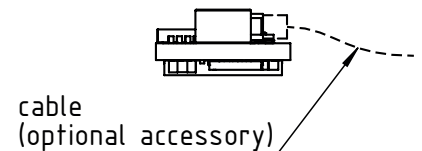
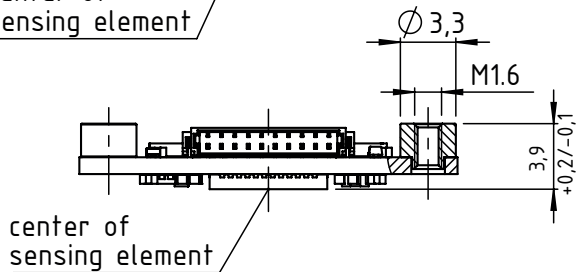
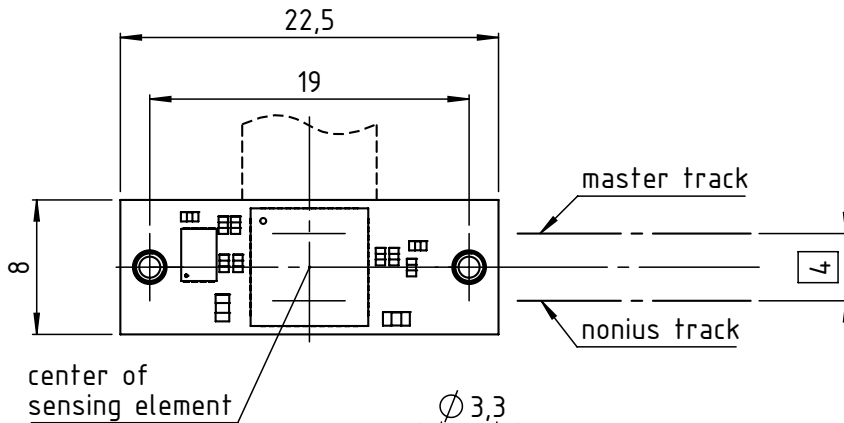
including FFC connector



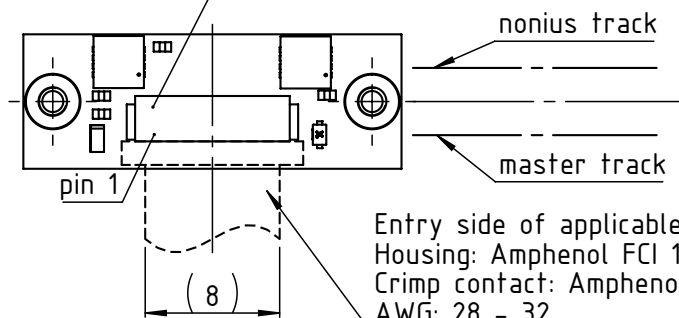
dimensions without tolerances according to DIN ISO 2768 m

Dimensions for 2.00 mm Pole Pitch

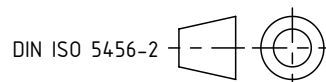
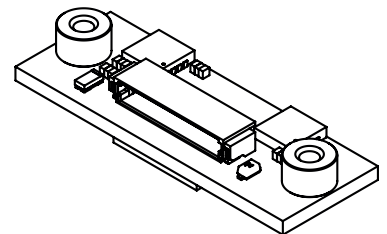
including wire to board connector



Wire to board connector (receptacle):
Amphenol FCI 10144041-10 (Minitex)
10 positions, 0.8 mm pitch header



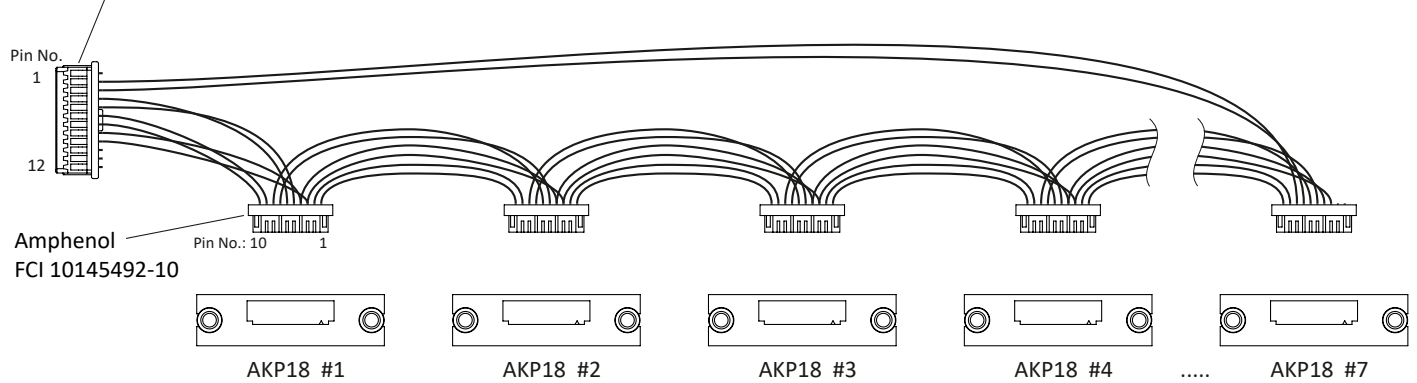
Entry side of applicable plug connector
Housing: Amphenol FCI 10145492-10
Crimp contact: Amphenol FCI 10145493
AWG: 28 - 32



dimensions without tolerances according to DIN ISO 2768 m

Daisy Chain Arrangement

Molex Pico-Clasp 12-pin
Part No.: 501330-1200



It is possible to install up to seven AKP18 sensing heads with wire to board connector in a daisy chain. For easy installation and reliable use we recommend the connectors named in the drawing.

Pin Assignment Daisy Chain

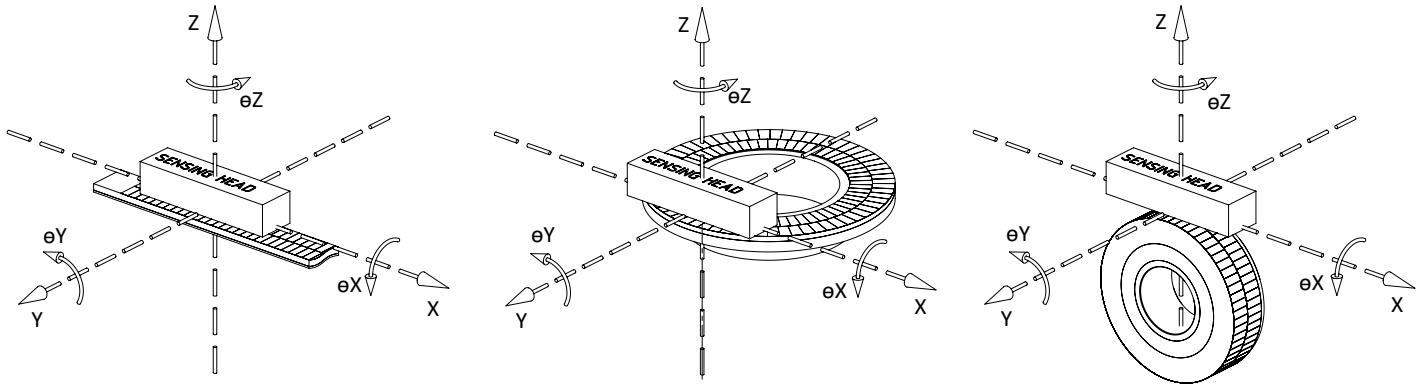
Molex Pico-Clasp 12-pin (part no. 501330-1200)	
pin no.	signal
1	-
2	MO-
3	MO+
4	SLO-
5	SLO+
6	GND
7	V+
8	MA-
9	MA+
10	-
11	-
12	-

Amphenol FCI 10145492-10	
pin no.	signal
1	V+
2	GND
3	MA+
4	MA-
5	SLO+
6	SLO-
7	SLI+
8	SLI-
9	GND
10	V+

Calibration

Each AKP18 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 AKP18 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.

Installation Tolerances



Note:

- for tolerance purposes, the bracket for mounting the AKP18 should have adjustment options
- maximum eccentricity of rotary scale must be $< 0.06 \text{ mm}$

Assembly Values and Tolerances

X [mm]	± 0.5
Y [mm]	± 0.5
Z [mm]	for 1.28 mm pole pitch: $0.4 \text{ mm} \pm 0.05$ for 1.50 mm pole pitch: $0.5 \text{ mm} \pm 0.05$ for 2.00 mm pole pitch: $0.6 \text{ mm} \pm 0.05$
$\theta X [^\circ]$	$\pm 1^\circ$
$\theta Y [^\circ]$	$\pm 1^\circ$
$\theta Z [^\circ]$	$\pm 1^\circ$

Absolute Magnetic Sensing Head Order Code Parameters

art. no.	order code	pole pitch	connector
AKP18-00008	AKP18-P1.28-C1	1.28 mm	FFC 10 pin, 0.5 mm pitch
AKP18-00009	AKP18-P1.28-C3	1.28 mm	wire to board connector 10 pin, 0.8 mm pitch
AKP18-00012	AKP18-P1.50-C1	1.50 mm	FFC 10 pin, 0.5 mm pitch
AKP18-00010	AKP18-P1.50-C3	1.50 mm	wire to board connector 10 pin, 0.8 mm pitch
AKP18-00013	AKP18-P2.00-C1	2.00 mm	FFC 10 pin, 0.5 mm pitch
AKP18-00011	AKP18-P2.00-C3	2.00 mm	wire to board connector 10 pin, 0.8 mm pitch

Customer-Programmable Parameters^[2]

parameters	Z	size	code ^[3]	explanation ^[3]				
				pole pairs	resolution single turn	max. measuring length pole pitch: 1.28 mm linear resolution: 156 nm	max. measuring length pole pitch: 1.50 mm linear resolution: 183 nm	max. measuring length pole pitch: 2.00 mm linear resolution: 244 nm
			Z1	16/15	18 bit	40,96 mm	48 mm	64 mm
			Z2	32/31	19 bit	81,92 mm	96 mm	128 mm
			Z3	64/63	20 bit	163,84 mm	192 mm	256 mm
A	absolute interface		A1	BiSS				
			A2	SSI				

^[2] parameters have to be set by customer before calibration. Programmable with the programming unit (order no. 00055040).

^[3] preset parameters are bold.

Required Accessories (Programming/Calibration)

	programming unit (AKSZ-00002)*	programming unit (AKSZ-00005)**	FFC cable, 210mm [LTNG-00003]
for AKP18 with C1 connector	X		X
for AKP18 with C3 connector		X	

*) Consists of: programming adapter/box [AKSZ-00001], USB cable [LTKP-00032], FFC-adapter PCB/board [LPBG-00033], BOGEN magnetic viewer]

**) Consists of: programming adapter/box [AKSZ-00001], USB cable [LTKP-00032], adapter cable form AKP18-C3 to programming box [LTKP-00080], BOGEN magnetic viewer [MARK-00001]

Optional Accessories (Usage/Application)

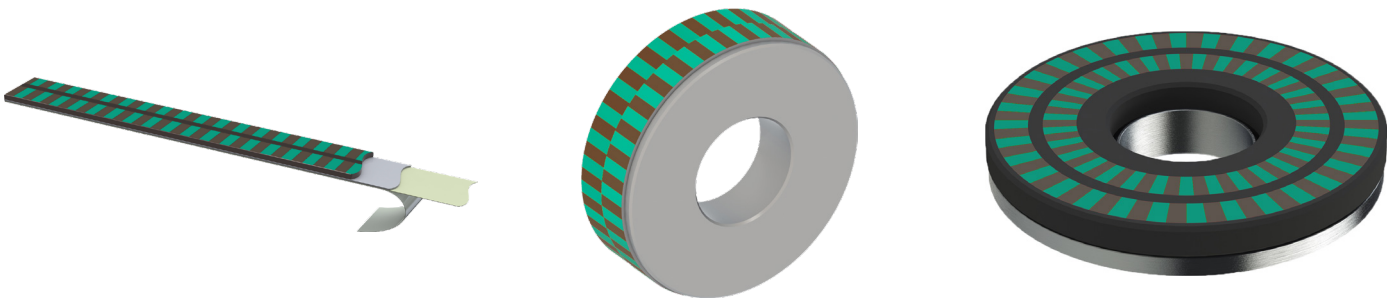
	cable assembly		cable assembly	
for AKP18 with C1 connector	(KABL-00013)	length: 100 mm FFC cable	(KABL-00014)	length: 300 mm FFC cable
for AKP18 with C3 connector	(LTKP-00070)	length: 0.5 m connector 1: Amphenol FCI 10145492-10 connector 2: flying leads	(LTKP-00154)	length: 1 m connector 1: Amphenol FCI 10145492-10 connector 2: flying leads

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](#).



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