

AKS17

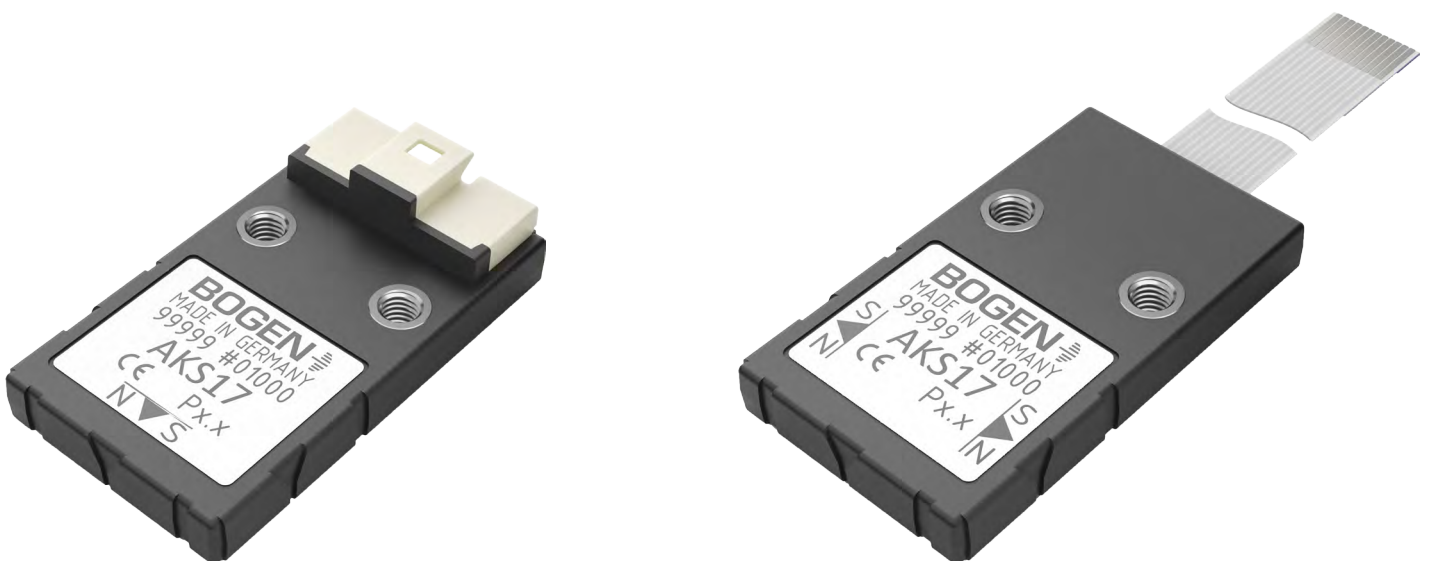
Absolute Magnetic Sensing Head

With the AKS17 and associated scales, BOGEN offers cost-efficient absolute magnetic measuring solutions for all industrial applications where movements have to be measured. AKS17 can be used for linear measurements up to 3 m in length and for rotary measurements - radial and axial - from 102 mm up to 988 mm in diameter. The sensing head offers BISS-C or SSI as output as well as a parallel incremental signal output. With a linear resolution of up to 156 nm and a rotary resolution of up to 24 bit, this hollow shaft encoder outperforms typical shaft end applications many times over. With dimensions of 28 mm length, 16 mm width and a height of 6.6 mm (Molex version) or 3.4 mm (FFC version), the AKS17 is very compact. IP67 protection class enables use even in harsh environments.

Absolute
Measuring

Rotary
Linear
Applications

ALWAYS
ABSOLUTE



Features and Benefits

- 21 to 24 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

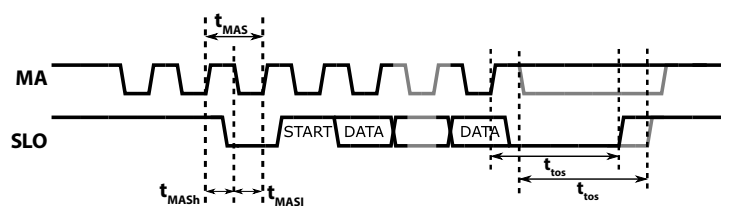
Features

absolute resolution single turn	21 /22/23/24 bit, depending on diameter and nonius code		
commutation signal	value between 1 and 16 pole pairs (UVW)		
rotation speed	resolution (bit)	rpm	
	21	up to 3,000	
	22	up to 1,500	
	23	up to 750	
	24	up to 375	
linear speed and linear resolution	pole pitch	linear speed	linear resolution
	1.28 mm	17 m/s	156 nm
	1.5 mm	20 m/s	183 nm
optimal distance: magnetic target ←→sensing head	pole pitch (mm)	distance (mm)	
	1.28	0.4	
	1.50	0.5	
supply voltage	5 V ± 5 %		
maximum output load	50 mA per channel		
energy consumption (without load)	< 120 mA ± 5 % (V+ = 5,0 V)		
LED	green LED = device on red LED = bad set up (adjustment required)		
operating temperature	- 40 to + 80 °C		
storage temperature	- 40 to + 80 °C		
protection class	IP67 (with FFC connector)		
output signals	ABZ, UVW, STEP, CW/CCW		
signal levels	RS422 (± 5 V)		
ABZ Incremental resolution	value between 4 and 262144 in steps of 4; ABZ signal period length Z: 90°		
weight	ca. 2.8 g		
pole pitch	1.28 or 1.50 mm		

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}	up to 5 MHz (200 ns)
clock signal hi level duration t_{MASH}	100 ns up to timeout
clock signal lo level duration t_{MASL}	100 ns

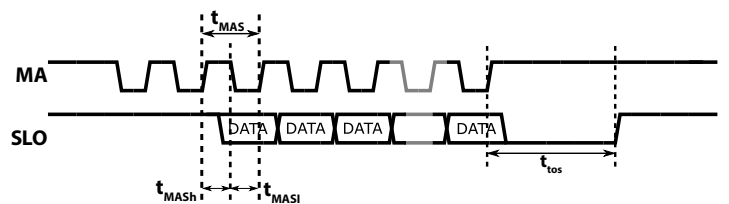
Timing Diagram BiSS



Signals SSI

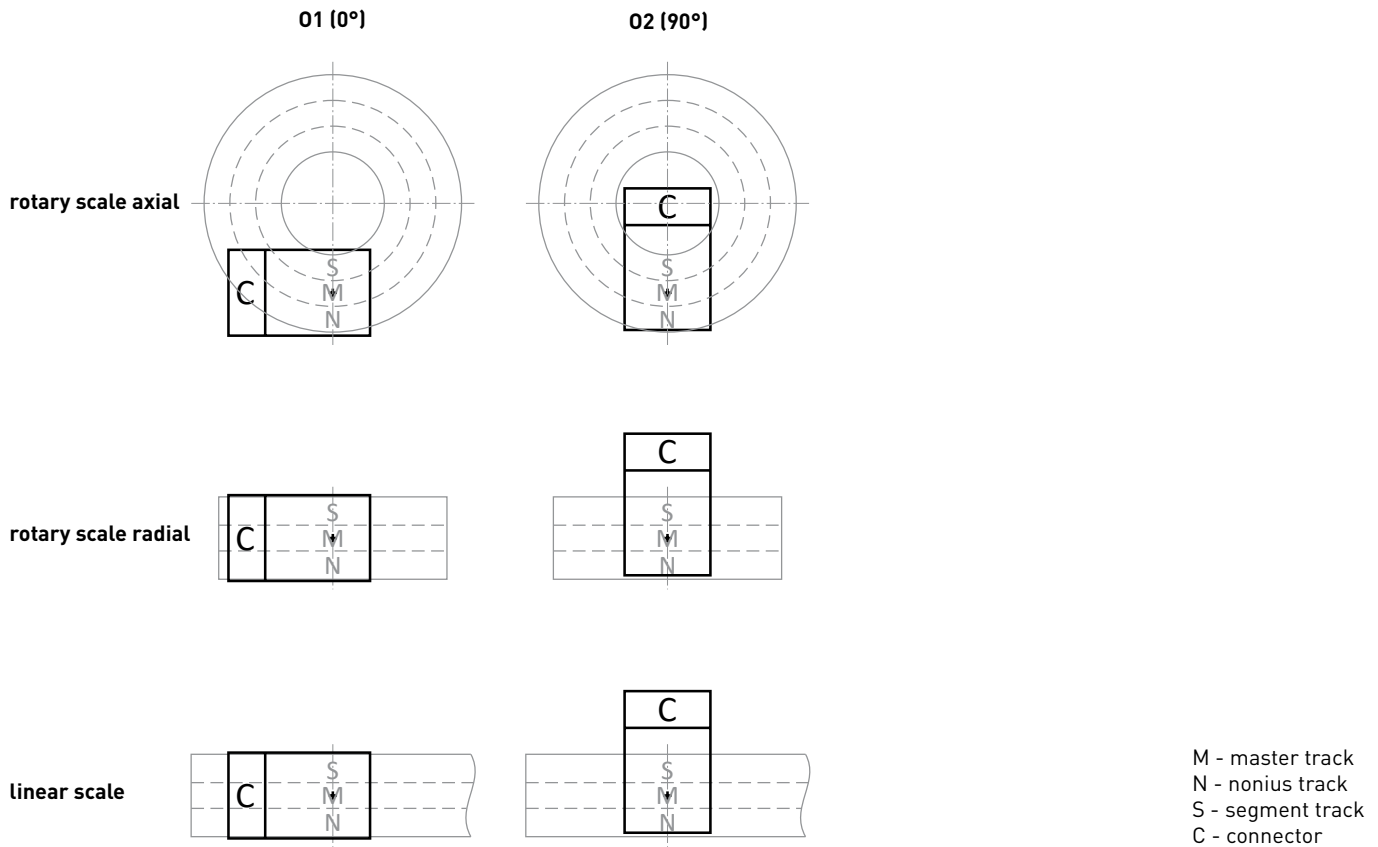
signals	clock (MA+, MA-)
	data (SLO+, SLO-)
multiturn	on special request; please contact our sales staff;
timeout t_{tos}	375-605 ns
permissible clock period t_{MAS}	up to 4 MHz (250 ns)
clock signal hi level duration t_{MASH}	125 ns up to timeout
clock signal lo level duration t_{MASL}	125 ns

Timing Diagram SSI



- 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

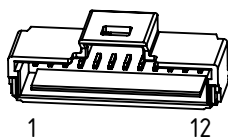


Pin Assignment

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

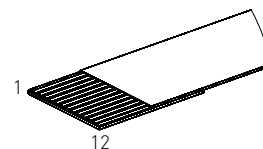
Connector C1

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



Connector C3

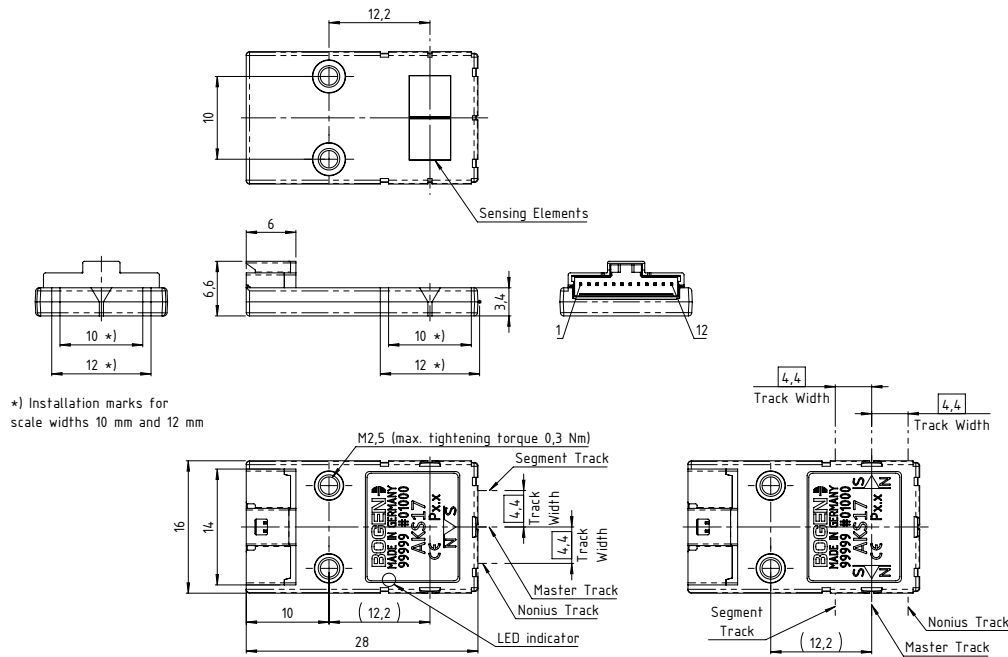
FFC (12 pin, 0.5 mm pitch); mating cycles: 20



Dimensions for C1 (1.28 and 1.50 mm Pole Pitch, Molex Connector)

01 (0°)

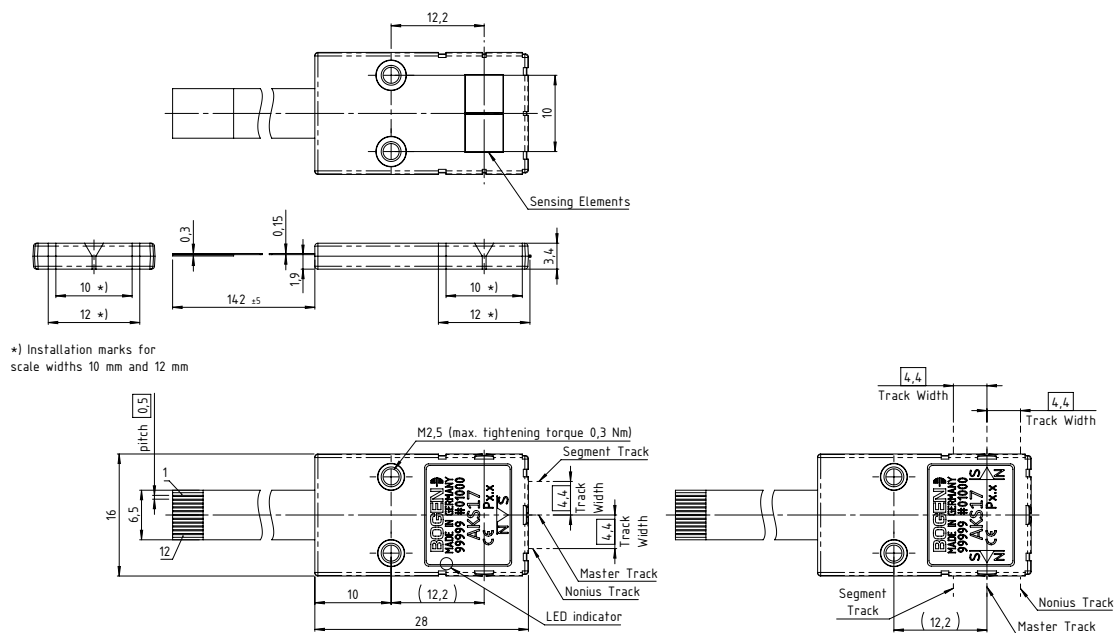
02 (90°)



Dimensions for C3 (1.28 and 1.50 mm Pole Pitch, FFC Connector)

01 (0°)

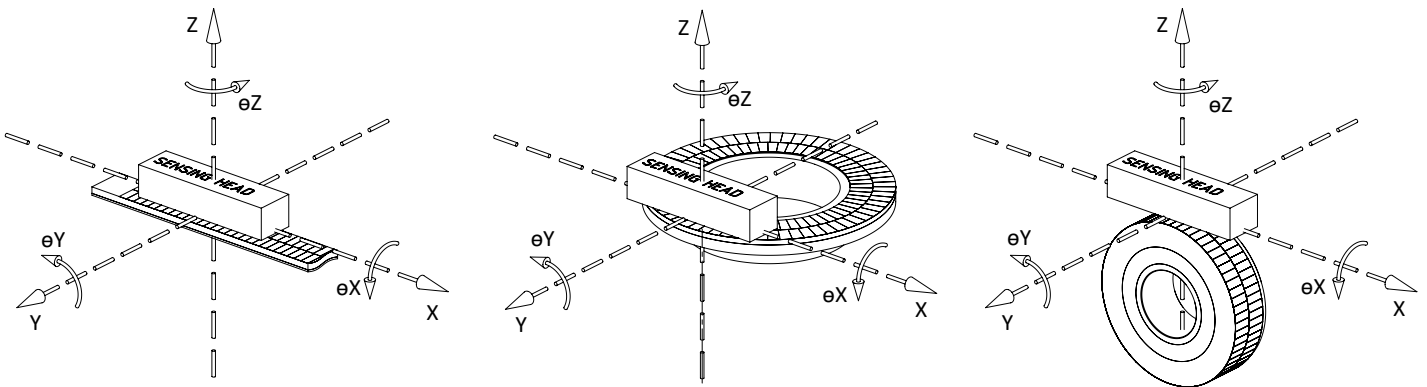
02 (90°)



Calibration

Each AKS17 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 AKS17 sensing head can be adapted for a successful calibration. The software sets the sensing head parameters for the correct master-nonius-segment periods (128-127-120, 256-255-240, 512-511-496, 1024-1023-992), 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
X [mm]	$\pm$ 0.5
Y [mm]	$\pm$ 0.5
θZ [°]	$\pm$ 1
θX [°]	$\pm$ 1
θY [°]	$\pm$ 1

Order Code

AKS17 - O - P - C - H

			code ⁽¹⁾	explanation ⁽¹⁾
parameter	O	orientation option	O1	angular position to the scale: 0°
			O2	angular position to the scale: 90°
	P	pole pitch [mm]	P1.28	1.28 mm
			P1.50	1.50 mm
	C	connector	C1	Molex 12 pin
			C3.142	FFC 12 pin, 0.5 mm pitch, length 142 mm ⁽²⁾
	H	interface	H0⁽³⁾	without linedriver
			H1	with linedriver

⁽¹⁾ standard parameters are bold

⁽²⁾ standard lengths, other lengths on request

⁽³⁾ for this linedriver option only absolute interfaces are available

Ordering Examples

AKS17-01-P1.28-C1-H0	AKS17 magnetic sensing head, orientation option parallel, 1.28 mm pole pitch, connector, Molex 12 pin, without linedriver
AKS17-02-P1.50-C1-H1	AKS17 magnetic sensing head, orientation option perpendicular, 1.50 mm pole pitch, connector Molex 12 pin, with linedriver
AKS17-01-P1.28-C3.142-H0	AKS17 magnetic sensing head, orientation option parallel, 1.28 mm pole pitch, connector 12 pin FFC, 0.5 mm pitch, length 142 mm, without linedriver

Customer-Programmable Parameters⁽⁴⁾

			code ⁽⁵⁾	explanation ⁽⁵⁾			
parameters	Z	size		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
			Z4	128/127/120	21 bit	327,68 mm	384 mm
			Z5	256/255/240	22 bit	655,36 mm	768 mm
			Z6	512/511/496	23 bit	1310,72 mm	1536 mm
			Z7	1024/1023/992	24 bit	2621,44 mm	3072 mm
	A	absolute interface	A1	BiSS			
			A2	SSI			
	D	incremental interface	D1	none (available for linedriver options H0 and H1)			
			D2 <C>	ABZ [<C> counts of scale, value between 4 and 262144 in steps of 4, default is 16384] (available for linedriver option H1 only)			
			D3	BLDC motor commutation (UVW) (on request, available for linedriver option H1 only)			
			D4	step / direction (on request, available for linedriver option H1 only)			
			D5	CW / CCW incremental (on request, available for linedriver option H1 only)			

⁽⁴⁾ parameters have to be set by customer before calibration; programmable with programming unit (order no. 55040).

⁽⁵⁾ preset parameters are bold

Ordering Examples

AKS17-01-P1.5-C1-H0-Z1-A2-D1	AKS17 Magnetic Sensing Head, orientation option parallel, 1.5 mm pole pitch, connector Molex 12 pin, without linedriver, 16/15 nonius, SSI, no incremental interface
AKS17-01-P1.5-C1-H1-Z2-A1-D2.16384	AKS17 Magnetic Sensing Head, orientation option parallel, 1.50 mm pole pitch, connector Molex 12 pin, with linedriver, 32/31 nonius, BiSS, ABZ 16384 steps

Required Accessories

	programming unit (AKSZ-00004)*	programming unit (AKSZ-00002)**
for AKS17 with C1 connector	X	
for AKS17 with C3 connector		X

*) Consists of: programming adapter/box [AKSZ-00001], USB cable [LTKP-00032], Adapter cable from AKS to programming box [LTKP-00063], BOGEN magnetic viewer [MARK-00001]

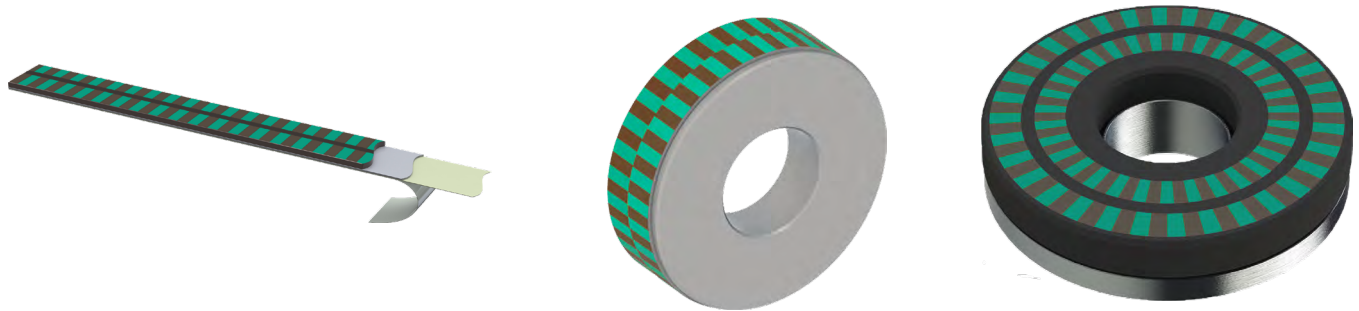
**) Consists of programming adapter/box [AKSZ-00001], USB cable [LTKP-00032], FFC-adaptor PCB/board [LPBG-00033], BOGEN magnetic viewer [MARK-00001]
Please order seperately for AKP18 FFC cable, 210mm [LTNG-00003]

Optional Accessories

	cable assembly (LTKP-00082)	cable assembly (LTKP-00083)
for AKS17 with C1 connector	length: 1 m connector 1: Molex PICO-CLASP 501330-1200 connector 2: flying leads	length: 3 m connector 1: Molex PICO-CLASP 501330-1200 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.



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