

# SmCo Pole Ring

## Magnetic Pole Ring with SmCo Coating

The pole rings are based on a stainless steel carrier which is sputtered with a hard magnetic SmCo layer.

The rings in the product family are available in different outer diameters. The gradation of the outer diameters results mainly from the dependence of the pole length, as well as the number of poles and the measuring distance of the sensor. Different inner diameters are also available for the rings.

The SmCo coating has a very high coercivity, which makes the rings robust against remagnetization in stray fields. The remanence of the rings was optimized by the coating process in such a way that high resulting field strengths are achieved even with a low coating thickness.

The pole rings MIBA POLE WHEELS® were developed in a joint project between MIBA and Sensitec.

Other geometries (diameter or height) of the ring carriers and magnetization patterns on request.



### Product Overview

Article name	D <sub>o</sub> [mm]	D <sub>i</sub> [mm]	H [mm]	Number of poles	Pole length [mm]
MWI0052SAC-UU	32.0	20 H7	10	52	2
MWI0072SAC-UU	44.1	35 H7	10	72	2
MWI0030SAE-UU <sup>1)</sup>	44.1	35 H7	10	30	5
MWI0094SAC-UU	57.4	45 H7	10	94	2
MWI0038SAE-UU <sup>1)</sup>	57.4	45 H7	10	38	5
MWI0128SAC-UU	78.5	62 H7	10	128	2

Additional products with different geometry and magnetization pattern on request

<sup>1)</sup> ask for availability

### Quick Overview

Parameter	Value	Unit
Coating material	Co <sub>5</sub> Sm, Co <sub>17</sub> Sm <sub>2</sub>	-
Carrier material specification	1.4305/ 1.4057	-
Density	8.0	kg/dm <sup>3</sup>
Brinell hardness	≤ 215	HB
Youngs modulus	200	GPa
Tensile strength R <sub>m</sub>	500-700	N/mm <sup>2</sup>
Yield strength R <sub>p0.2</sub>	≥ 200	N/mm <sup>2</sup>
Minimum field strength	10	mT
Temperature range	-40 ... +320	°C

### Features

- Wide temperature range from -40°C up to +320°C
- Long term stability against oils (e.g. cutting oil)
- Fully metal ring with SmCo layer for magnetic tracks

### Advantages

- Ideally suited for harsh environments
- No corrosion
- No damage at high rotational speed up to 100.000 rpm

### Applications

- Off-axis encoder
- Incremental encoders
- High frequency spindles



### Performance Data

$T_{amb} = +25^{\circ}\text{C}$ , **Da = 44 mm**, **MWI0072SAC-UU**, 2 mm Pole length, measured with AL796 FixPitch sensor; all sensor parameter are optimized (e.g. offset and amplitude correction).

Symbol	Parameter	Conditions	min.	typ.	max.	Unit
$R_{\uparrow\downarrow}$	Unidirectional Repeatability		-	0.004	0.013	deg
R	Bidirectional Repeatability		-	0.007	0.015	deg
B	Hysteresis		-	0.003	0.008	deg
A	Absolute Accuracy		-	0.1	0.12	deg

$T_{amb} = +25^{\circ}\text{C}$ , **Da = 57 mm**, **MWI0094SAC-UU**, 2 mm Pole length, measured with AL796 FixPitch sensor; all sensor parameter are optimized (e.g. offset and amplitude correction).

Symbol	Parameter	Conditions	min.	typ.	max.	Unit
$R_{\uparrow\downarrow}$	Unidirectional Repeatability		-	0.004	0.008	deg
R	Bidirectional Repeatability		-	0.005	0.010	deg
B	Hysteresis		-	0.0008	0.004	deg
A	Absolute Accuracy		-	0.1	0.12	deg

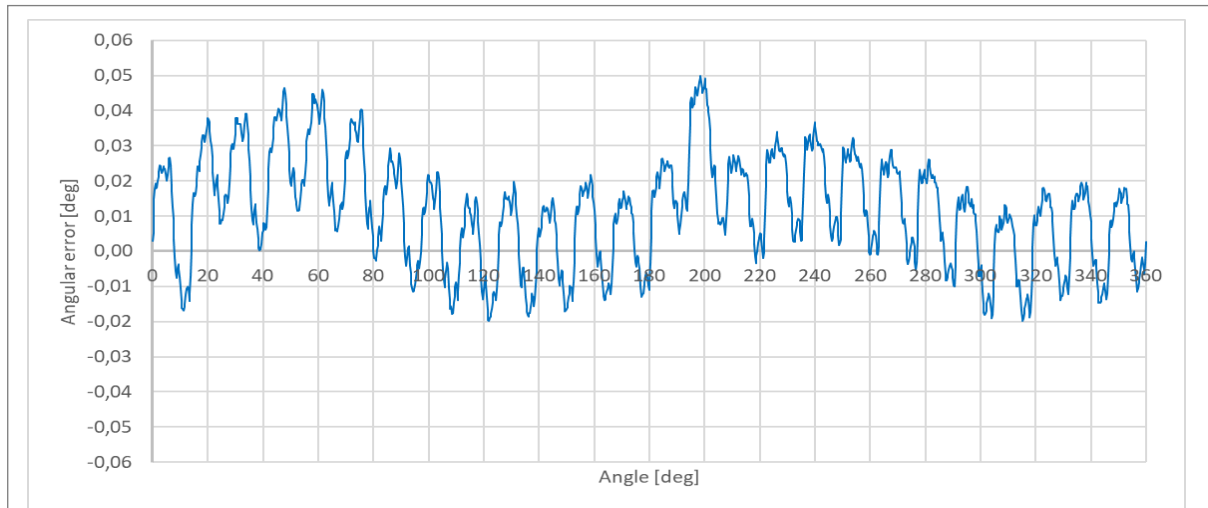


Fig. 1: Typical error curve MWI0052SAC-UU (32 mm outer diameter, 2 mm pole length)

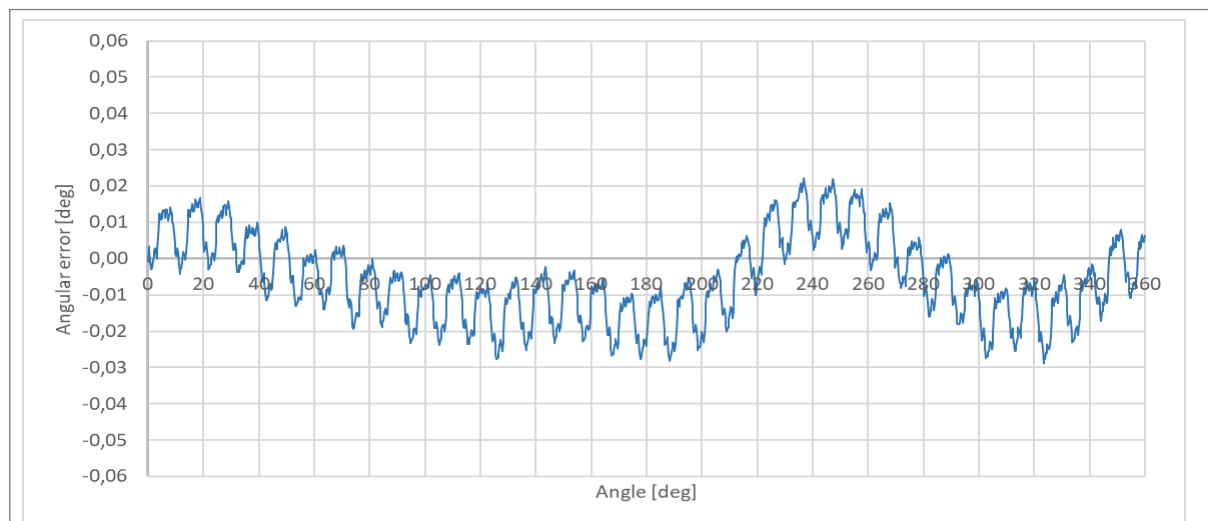


Fig. 2: Typical error curve MWI0072SAC-UU (44 mm outer diameter, 2 mm pole length)

Performance Data

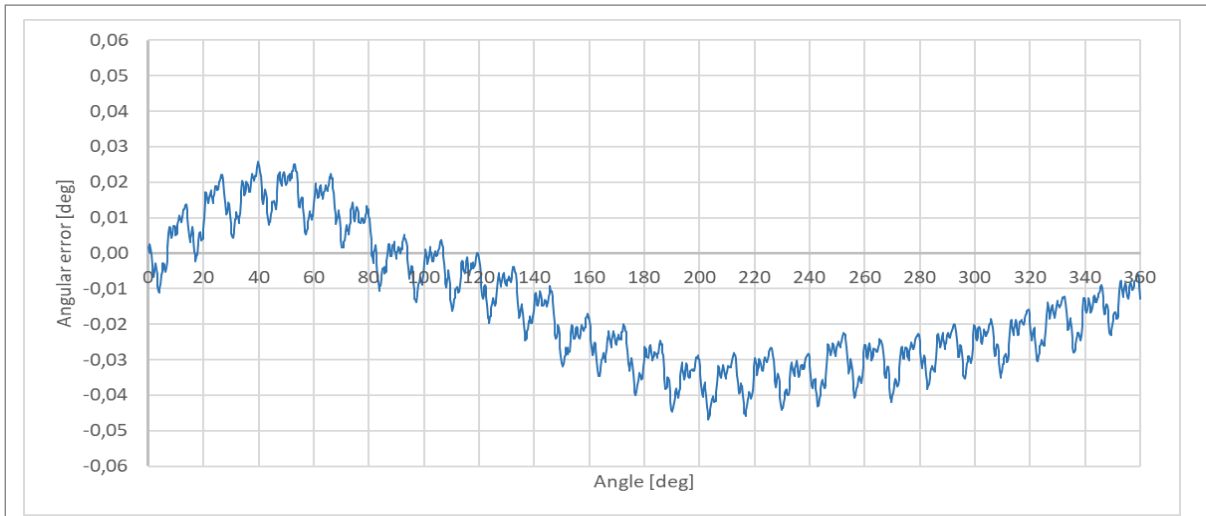


Fig. 3: Typical error curve MWI0094SAC-UU (57 mm outer diameter, 2 mm pole length)

Typical Application



Fig. 4: Typical application; sensor-pole ring arrangement

### Dimensions

MWI0052SAC-UU	Value	Unit
Outer diameter	32 ± 0.1	mm
Inner Diameter	20H7	mm
Height	10 ± 0.1	mm
Magnetization type	ROnl	-
Pole length	2	mm
Number of poles	52	-
Flux density (typical)	Tbd.	mT
Tracks	1	-
Track width	10	mm
Magnetic working distance	0,28	mm

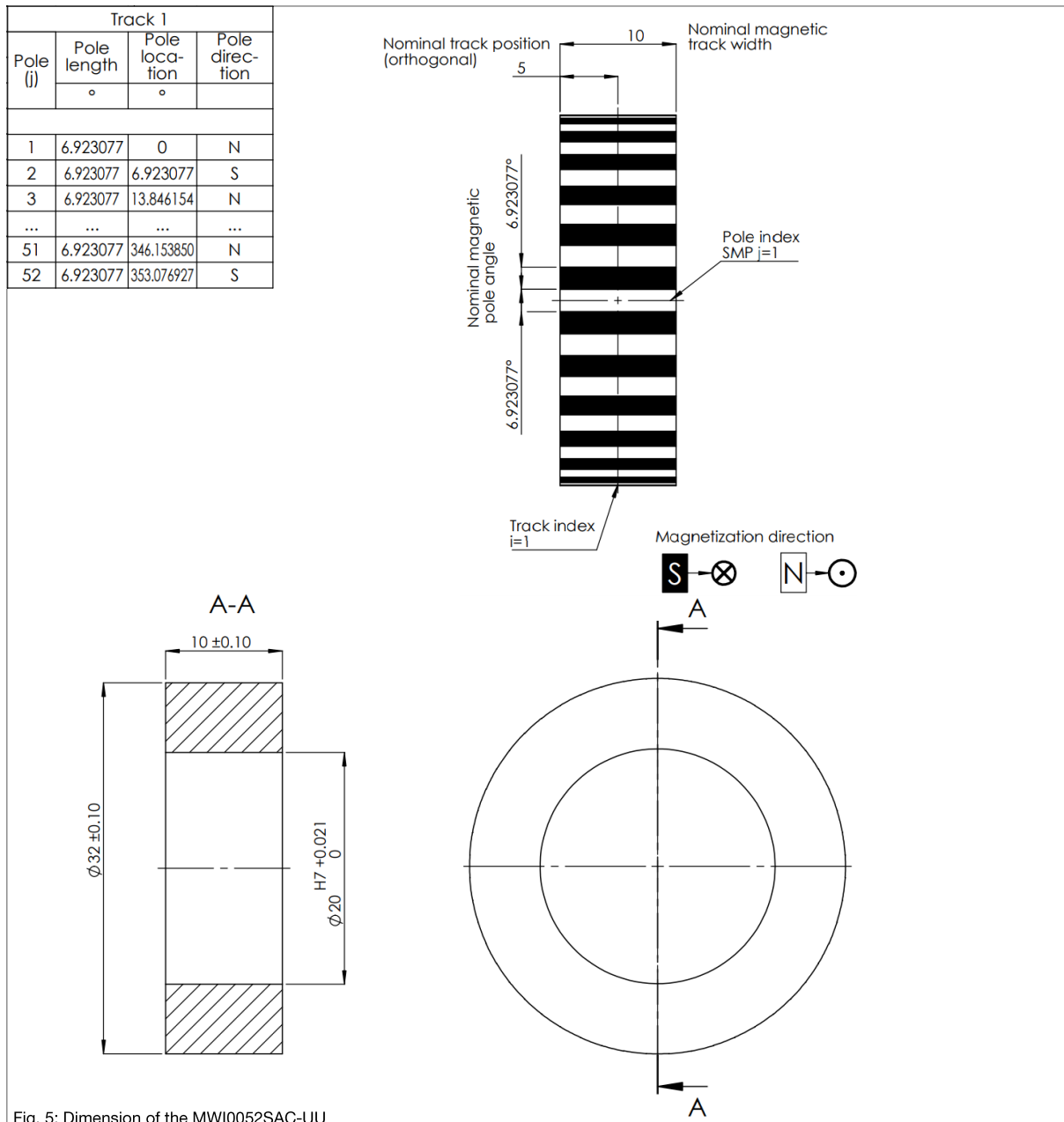
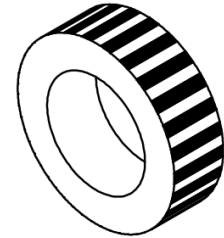


Fig. 5: Dimension of the MWI0052SAC-UU

### Dimensions

MWI0072SAC-UU	Value	Unit
Outer diameter	44.1 ± 0.1	mm
Inner Diameter	35H7	mm
Height	10 ± 0.1	mm
Magnetization type	ROnl	-
Pole length	2	mm
Number of poles	72	-
Flux density (typical)	Tbd.	mT
Tracks	1	-
Track width	10	mm
Magnetic working distance	0.60	mm

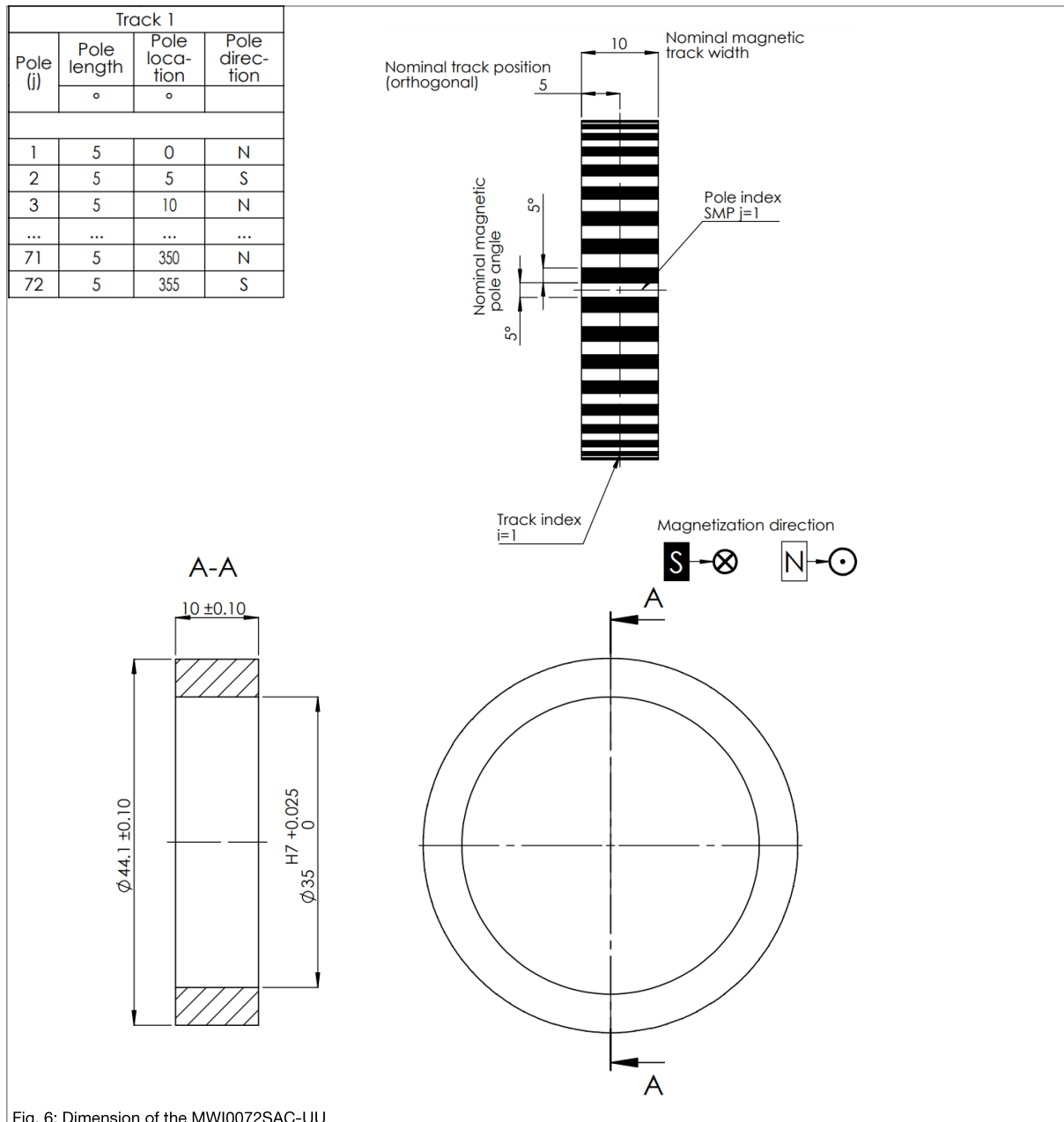
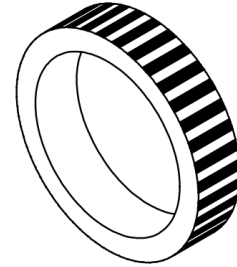
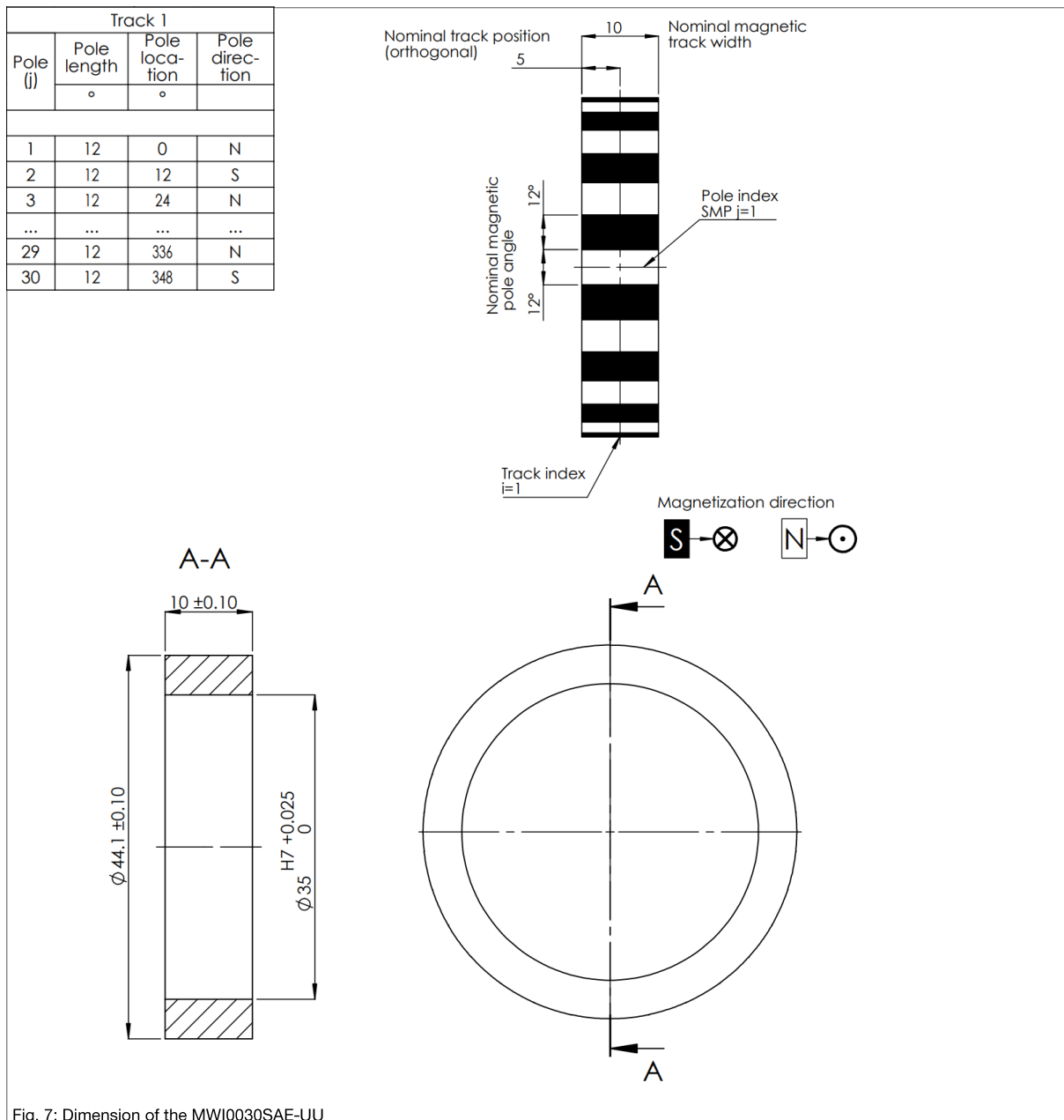


Fig. 6: Dimension of the MWI0072SAC-UU

MWI0030SAE-UU	Value	Unit
Outer diameter	44.1 ± 0.1	mm
Inner Diameter	35H7	mm
Height	10 ± 0.1	mm
Magnetization type	ROnl	-
Pole length	5	mm
Number of poles	30	-
Flux density (typical)	12 (@distance 0.75 mm)	mT
Tracks	1	-
Track width	10	mm
Magnetic working distance	1.48	mm



MWI0094SAC-UU	Value	Unit
Outer diameter	57.4 ± 0.1	mm
Inner Diameter	45H7	mm
Height	10 ± 0.1	mm
Magnetization type	ROnl	-
Pole length	2	mm
Number of poles	94	-
Flux density (typical)	13 (@distance 0.75 mm)	mT
Tracks	1	-
Track width	10	mm
Magnetic working distance	0.96	mm

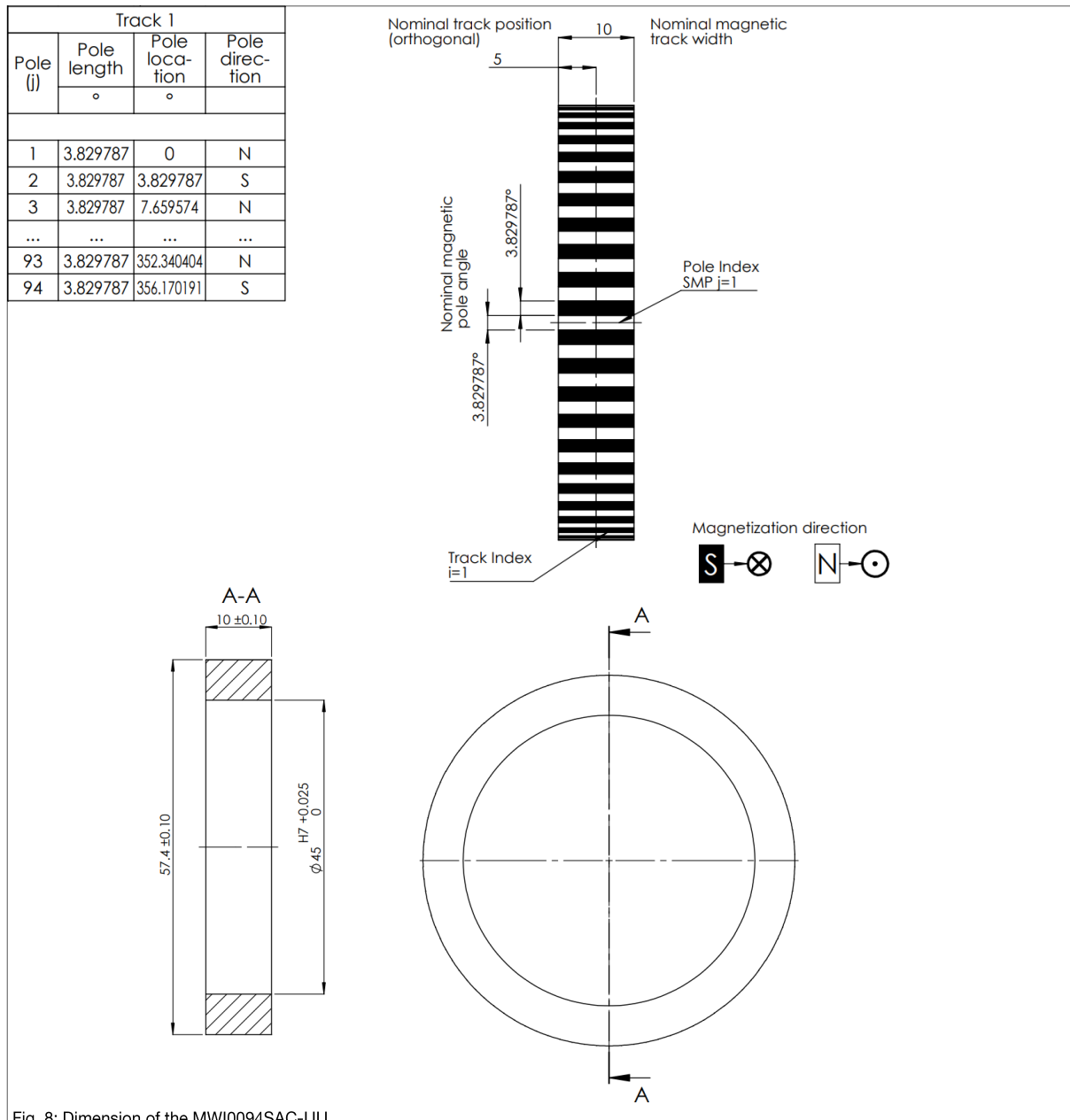
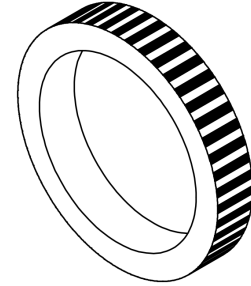
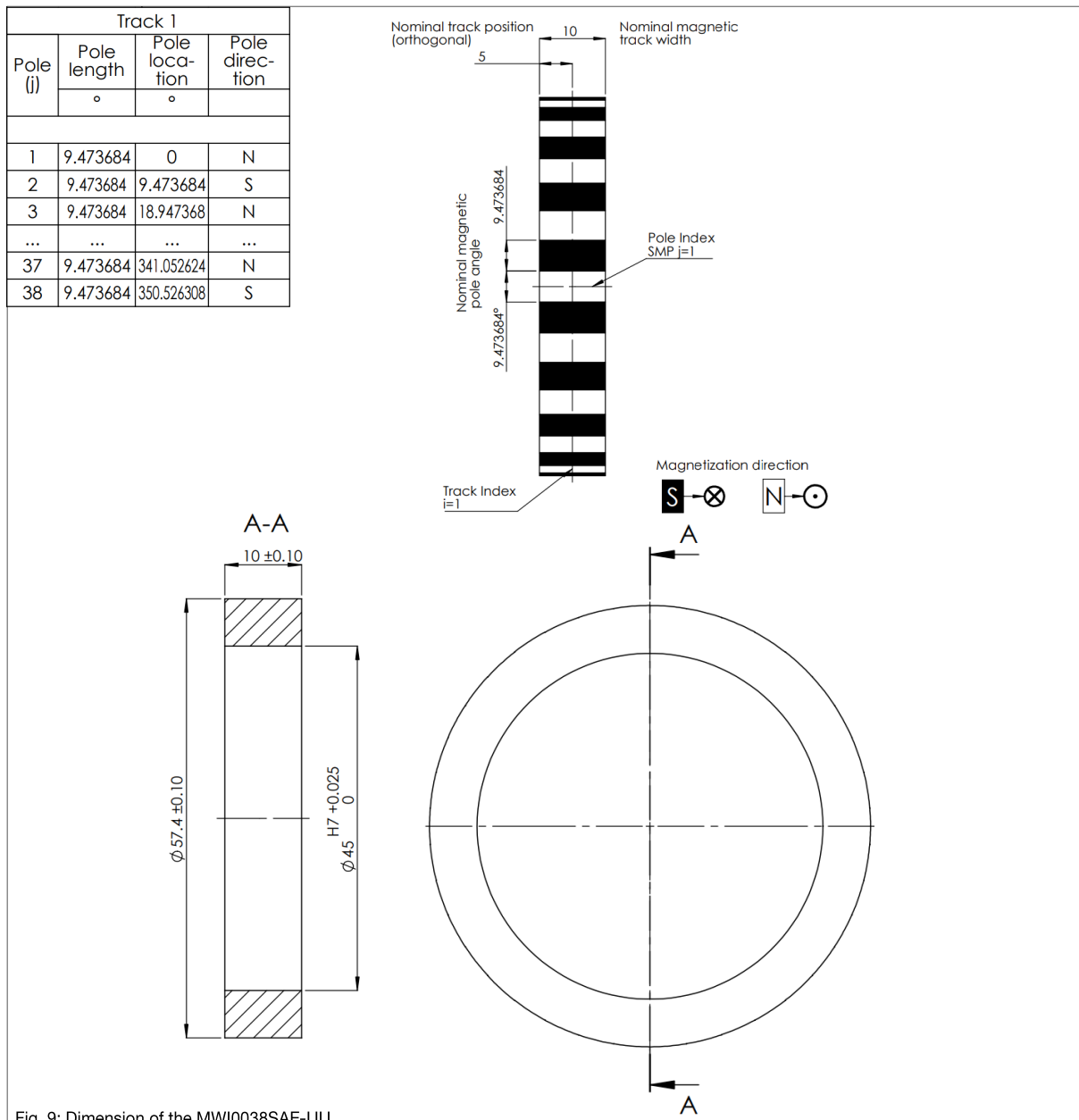
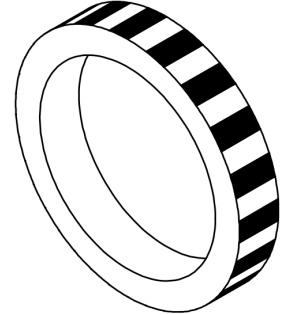


Fig. 8: Dimension of the MWI0094SAC-UU

MWI0038SAE-UU	Value	Unit
Outer diameter	57.4 ± 0.1	mm
Inner Diameter	45H7	mm
Height	10 ± 0.1	mm
Magnetization type	ROnl	-
Pole length	5	mm
Number of poles	38	-
Flux density (typical)	Tbd.	mT
Tracks	1	-
Track width	10	mm
Magnetic working distance	1.21	mm





MWI0128SAC-UU	Value	Unit
Outer diameter	78.5 ± 0.1	mm
Inner Diameter	62H7	mm
Height	10 ± 0.1	mm
Magnetization type	ROnI	-
Pole length	2	mm
Number of poles	128	-
Flux density (typical)	Tbd.	mT
Tracks	1	-
Track width	10	mm
Magnetic working distance	1,24	mm

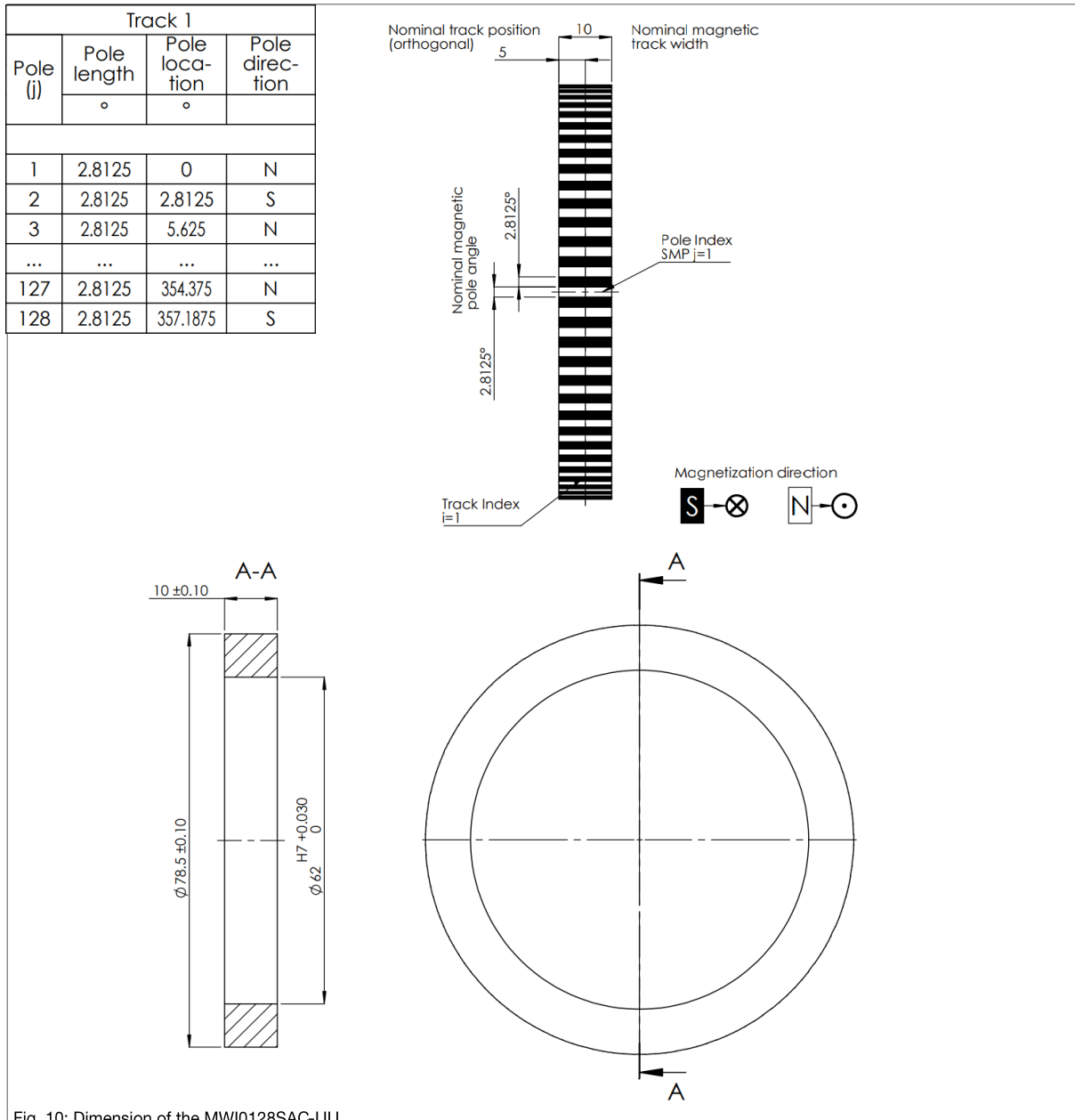
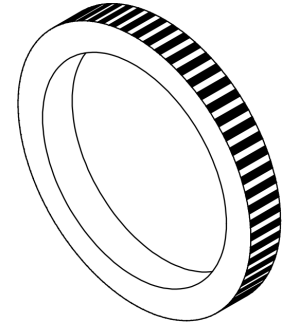
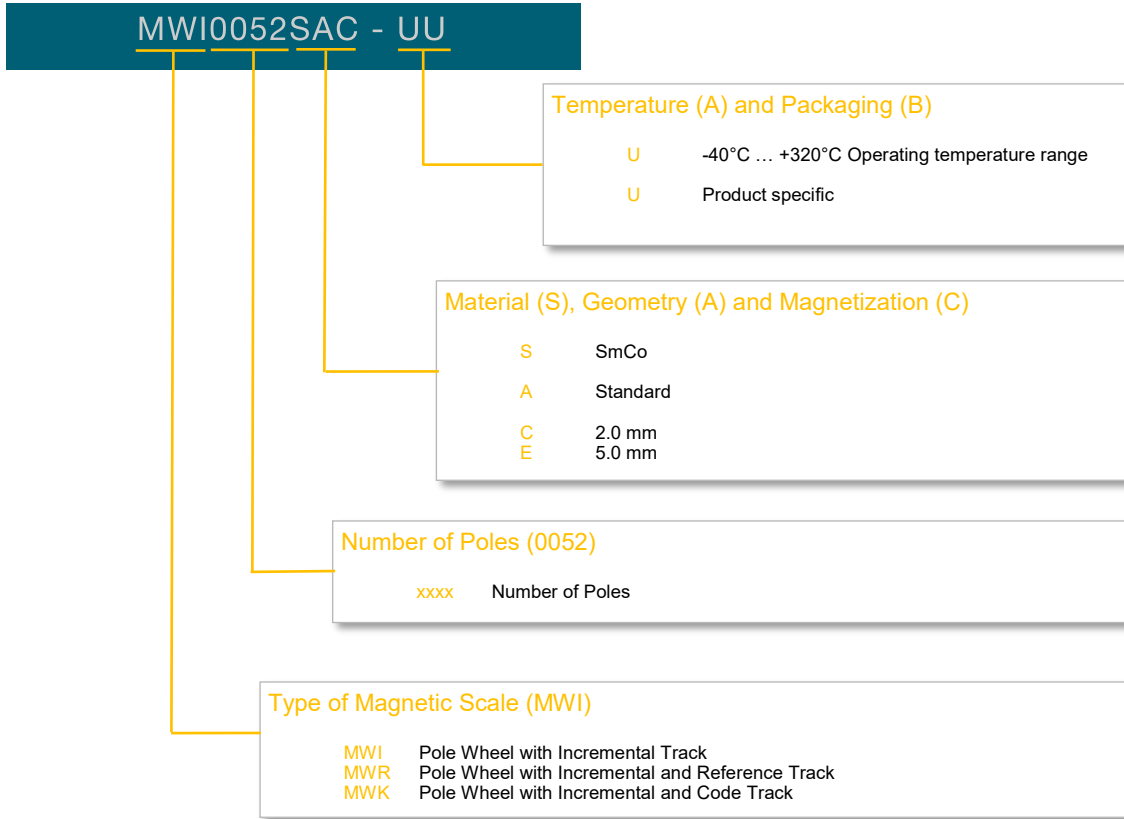


Fig. 10: Dimension of the MWI0128SAC-UU

Additional Information on Ordering Code



**General Information**

**Product Status**

Article	Status
MWI0052SAC-UU	The product is under development.
MWI0072SAC-UU	The product is under development.
MWI0030SAE-UU	The product is under development.
MWI0094SAC-UU	The product is under development.
MWI0038SAE-UU	The product is under development.
MWI0128SAC-UU	The product is under development.
<b>Note</b>	The status of the product may have changed since this data sheet was published. The latest information is available on the internet at <a href="http://www.sensitec.com">www.sensitec.com</a> .

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### Changelist

Version	Description of the Change	Date
SmCo_polering.DSE.00	Original (pp. 1-12)	04/2024

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