

Incremental magnetic rings



Magnetic rings for use in harsh environments

The robust RLS magnetic rings consist of a vulcanised elastoferite layer securely attached to a steel hub. The elastoferite layer is magnetised with 2 mm or 5 mm long alternating magnetic poles which form an incremental magnetic pattern.

Additionally, reference mark magnetic signature can be added to incremental magnetic pattern. Unique, multiple or distance coded reference marks are available optionally.

Compatible with RLS readheads

Magnetic incremental rings are compatible with RLS standard LM family or component level RoLin readheads, which bring reliable operation due to non-contact design. Industry standard incremental or analogue output types are available.

Improved safety and reliability

To assure safety and reliability at high speeds and temperatures the rings can optionally be covered with a protective stainless steel foil. This protective layer also minimises the influence of ageing and possible chemical degradation of the ring's elastoferite layer.

Easy installation for various shaft diameters

Various diameters are supported ranging from 30 mm to 406 mm for radial rings and from 26 mm to 80 mm for axial rings.

Radial rings allow heating up to 160 °C, which makes them ideal for shrink fit installation. Due to high precision machining, the rings can also be press-fitted.

Applications

The magnetic incremental rings bring reliable solutions to tough, hard-working applications including spindles, lathes and other machine tool applications.

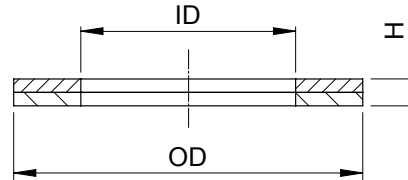
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Axial ring selection guide

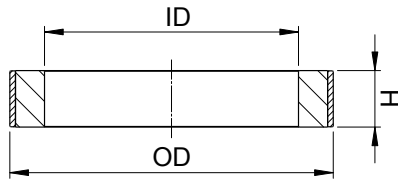


Ring	Outer diameter (OD)	Inner diameter (ID)	Height (H)	Pole length	Number of poles	Compatible with ...							Page
						LM10	LM13	RLB	RLM	RLC2HD	RLC2IC	LM15	
MR026C	26 ± 0.1	16 ± 0.1	2 ± 0.1	2	36	✓ -	✓ -	✓ -	✓	✓ -	✓	-	14
MR049N	49 ± 0.1	25 ± 0.1	2 ± 0.1	2	72	✓ -	✓ -	✓ -	✓	✓ -	✓	-	16
MR050C	50 ± 0.02	40 ± 0.02	2 ± 0.1	2	72	✓ -	✓ -	✓ -	✓	✓ -	✓	-	18
MR061C	61.3 ± 0.1	51.3 ± 0.1	2 ± 0.1	2	90	✓ -	✓ -	✓ -	✓	✓ -	✓	-	20
					92	✓ -	✓ -	✓ -	✓ **	✓ -	✓ **	-	
MR080N	80 ± 0.1	55 ± 0.1	2 ± 0.1	2	122	✓ -	✓ -	✓ -	✓	✓ -	✓	-	23

* Reference mark option (including DCRM) not available.

** DCRM not available.

Radial ring selection guide

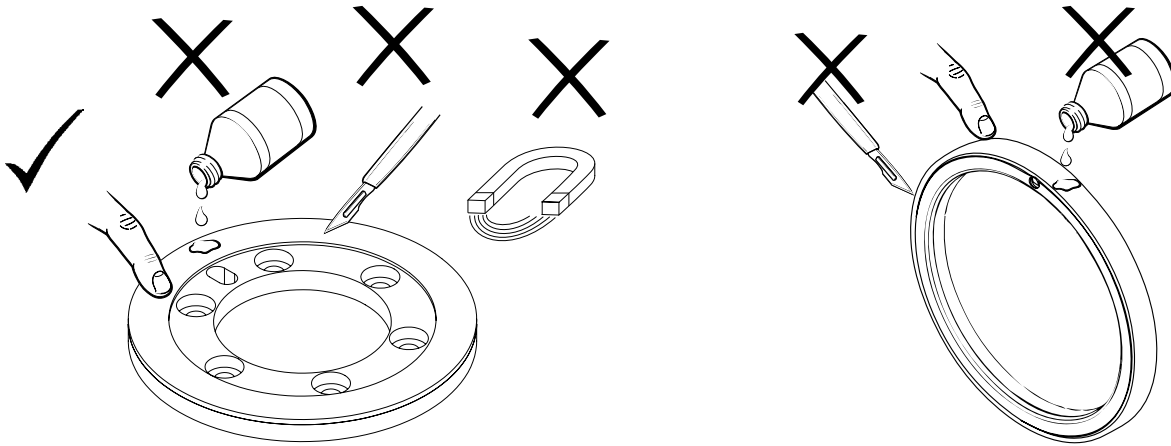


Ring	Outer diameter (OD)	Inner diameter (ID)	Height (H)	Pole length	Number of poles	Compatible with ...							Page
						LM10	LM13	RLB	RLM	RLC2HD	RLC2IC	LM15	
MR031E	31.85 ± 0.1	20 H7	10 ± 0.1	2	50	✓**	✓**	✓*	✓**	✓*	✓**	-	32
				5	20	-	-	-	-	-	-	✓**	
MR031G	31.85 ± 0.1	20 H7	8 ± 0.1	2	50	✓**	✓**	✓*	✓**	✓*	✓**	-	36
				5	20	-	-	-	-	-	-	✓**	
MR040E	40.8 ± 0.1	30 H7	10 ± 0.1	2	64	✓	✓	✓*	✓	✓*	✓	-	40
				5	26	-	-	-	-	-	-	✓	
MR040G	40.8 ± 0.1	30 H7	8 ± 0.1	2	64	✓	✓	✓*	✓	✓*	✓	-	44
MR047B	47.5 ± 0.1	40 ± 0.1	5.5 ± 0.1	2	76	✓**	✓**	✓*	✓**	✓*	✓**	-	48
MR050E	50.1 ± 0.1	40 H7	10 ± 0.1	2	80	✓**	✓**	✓*	✓**	✓*	✓**	-	52
				5	32	-	-	-	-	-	-	✓**	
MR057E	57.3 ± 0.1	45 H7	10 ± 0.1	2	90	✓	✓	✓*	✓	✓*	✓	-	56
				5	36	-	-	-	-	-	-	✓	
MR075E	75.4 ± 0.1	60 H7	10 ± 0.1	2	120	✓	✓	✓*	✓	✓*	✓	-	60
				5	48	-	-	-	-	-	-	✓	
MR100F	100.5 ± 0.1	84.77 ± 0.05	8.65 ± 0.1	2	160	✓	✓	✓*	✓	✓*	✓	-	64
MR122E	122 ± 0.1	90 H7	10 ± 0.1	2	194	✓	✓	✓*	✓	✓*	✓	-	67
MR324E	324.8 ± 0.1	240 ± 0.1	10 ± 0.1	2	512	✓	✓	-	-	-	-	-	70
MR406E	406.2 ± 0.1	360 H7	10 ± 0.1	2	640	✓	✓	-	-	-	-	-	72

* Reference mark option (including DCRM) not available.

** DCRM not available.

Storage and handling



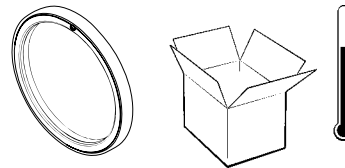
WARNING!

Magnetic rings should not be exposed to magnetic field densities higher than 50 mT on its surface. Magnetic fields higher than 50 mT can damage the ring.

Chemical resistance

	Ring material	
	NBR	HNBR
✓ = resistant x = not resistant		
acetone	x	x
brake fluid (based on mineral oil)	✓	✓
diesel	✓	✓
ethanol	✓	✓
gasoline	✓	✓
heptane	✓	✓
hexane	✓	✓
hydrochloric acid	x	x
methylene chloride	x	x
mineral oil	✓	✓
ozone	x	✓
sea water	✓	✓
sodium hydroxide	✓	✓
toluene	x	x
UV - radiation	✓	✓
water (up to +80 °C)	✓	✓
xilene	x	x

Temperature and humidity



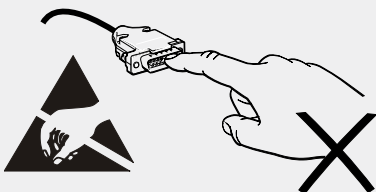
Operating and storage

HNBR -40 °C to +160 °C

NBR -40 °C to +105 °C



Up to 100 % RH










WARNING!

ESD protection

Readhead is ESD sensitive - handle with care. Do not touch electronic circuit, wires or sensor area without proper ESD protection or outside of ESD controlled environment.

Technical specifications

System data		 LM10	 LM13	 LM15
Pole length		2 mm		5 mm
Available resolutions (for maximum speed tables go to appropriate ring page)		For analogue voltage output type: NA For digital output type: 250 µm, 125 µm, 62.5 µm, 50 µm, 31.25 µm, 25 µm, 20 µm, 15.625 µm, 12.5 µm, 10 µm, ≈7.812 µm, 6.25 µm, 5 µm, 4 µm, ≈3.906 µm, 2.5 µm, 2 µm, ≈1.953 µm, 1.25 µm, 1 µm, ≈0.976 µm, ≈0.488 µm, ≈0.244 µm		≈0.61 µm, ≈1.22 µm, ≈2.441 µm, 2.5 µm, 3.125 µm, ≈4.882 µm, 5 µm, 6.25 µm, ≈9.765 µm, 10 µm, 12.5 µm, 15.625 µm, ≈19.531 µm, 25 µm, 31.25 µm, 39.0625 µm, 50 µm, 62.5 µm, 78.125 µm, 125 µm, 156.25 µm, 312.5 µm, 625 µm
Available output types		Analogue: Sine/Cosine, 1 Vpp Digital ABZ: Differential RS422, 5–30 V Push-Pull differential, 5–30 V Open Collector		
Repeatability		Better than unit of resolution for movement in the same direction		
Hysteresis		< 4 µm up to 0.5 mm ride height	< 3 µm up to 0.5 mm ride height	±15 µm for 2 mm ride height
Mass (for details on ring mass see appropriate ring page)		Readhead (1 m cable, no connector) 57 g Cable (1 m) 34 g	Readhead (1 m cable, no connector) 79.6 g Cable (1 m) 34 g	Readhead (1 m cable, no connector) 57 g Cable (1 m) 34 g
Cable data				
Voltage drop over cable		13 mV/m – without load 54 mV/m – with 120 Ω load		
Cable		Ø4.2 ± 0.2 mm, PUR high flexible cable, drag-chain compatible, double-shielded 8 × 0.05 mm ² ; durability: 20 million cycles at 20 mm bend radius		
Environmental conditions				
Temperature	Readhead	Operating	–10 °C to +80 °C (cable under non-dynamic conditions: –20 °C to +85 °C)	
		Storage	–40 °C to +85 °C	
	Ring	Operating and storage	HNBR: –40 °C to +160 °C NBR: –40 °C to +105 °C	
Environmental sealing			IP68 (according to IEC 60529)	
EMC Immunity			IEC 61000-6-2 (particularly: ESD: IEC 61000-4-2; EM fields: IEC 61000-4-3; Burst: IEC 61000-4-4; Surge: IEC 61000-4-5; Conducted disturbances: IEC 61000-4-6; Power frequency magnet fields: IEC 61000-4-8; Pulse magnetic fields: IEC 61000-4-9)	
EMC Interference			IEC 61000-6-4 (for industrial, scientific and medical equipment: IEC 55011)	
Vibrations (55 Hz to 2000 Hz)			300 m/s ² (IEC 60068-2-6)	
Shocks (11 ms)			300 m/s ² (IEC 60068-2-27)	
RoHS			Compliant with EU Directive 2002/95/EC	

System data		 RLM	 RLC2IC	 RLC2HD	 RLB	
Pole length		2 mm				
Available resolutions (for maximum speed tables go to appropriate ring page)		For analogue voltage output type: NA For digital output type: 250 µm, 125 µm, 62.5 µm, 50 µm, 31.25 µm, 25 µm, 20 µm, 15.625 µm, 12.5 µm, 10 µm, ≈7.812 µm, 6.25 µm, 5 µm, 4 µm, ≈3.906 µm, 2.5 µm, 2 µm, ≈1.953 µm, 1.25 µm, 1 µm, ≈0.976 µm, ≈0.488 µm, ≈0.244 µm				
Available output types		Digital ABZ: Differential RS422, Single ended TTL		Digital ABZ: Single ended TTL		
Repeatability		Better than unit of resolution for movement in the same direction				
Hysteresis		< 3 µm up to 0.2 mm ride height	< 2 µm up to 0.2 mm ride height			
Mass (for details on ring mass see appropriate ring page)		Readhead (without flex) 1.4 g Readhead (with flex) 1.6 g	Readhead 1.25 g	Readhead 1.25 g	Readhead 0.46 g	
Environmental conditions						
Temperature	Readhead	Operating	–40 °C to +85 °C			–20 °C to +85 °C
		Storage				–40 °C to +85 °C
	Ring	Operating and storage	HNBR: –40 °C to +160 °C NBR: –40 °C to +105 °C			
Environmental sealing			NA			
EMC Immunity			IEC 61000-6-2 (particularly: ESD: IEC 61000-4-2; EM fields: IEC 61000-4-3; Burst: IEC 61000-4-4; Surge: IEC 61000-4-5; Conducted disturbances: IEC 61000-4-6; Power frequency magnet fields: IEC 61000-4-8; Pulse magnetic fields: IEC 61000-4-9)			
EMC Interference			IEC 61000-6-4 (for industrial, scientific and medical equipment: IEC 55011)			
Vibrations (55 Hz to 2000 Hz)			300 m/s ² (IEC 60068-2-6)			
Shocks (11 ms)			300 m/s ² (IEC 60068-2-27)			
RoHS			Compliant with EU Directive 2002/95/EC			
Moisture level		–	–	MSL6 (IPC/JEDEC-J_STD_020)	–	

Accuracy of ring encoder systems

The accuracy of the ring encoder measurement is influenced by **encoder-specific errors** and **installation-dependent error**. In order to evaluate the total accuracy, each of the significant errors must be considered. Image 1 shows a typical accuracy error plot with marked particular influences.

1. Encoder-specific error

Magnetisation error

The magnetisation error is caused by imperfections in the elastoferrite materials used and possible deviations resulting from the magnetisation process. The following factors influence the result:

- the magnetic nonhomogeneity of the elastoferrite layer,
- the ring installation tolerances during the magnetisation process,
- the accuracy of used measuring system during the magnetisation process,
- the quality of the magnetisation system.

The magnetisation accuracy can be calculated by the following formula:

$$A_M = \pm \frac{4.6}{D}$$

where:

A_M ... Magnetisation accuracy (°)

D ... Outer ring diameter (mm)

D (mm)	Magnetisation accuracy
20	±0.229°
40	±0.115°
60	±0.076°

Sub divisional error (SDE) or interpolation error

The sub divisional error or interpolation error is a periodical accuracy error, caused by imperfections in the length of poles. It is influenced by the following factors:

- the length of poles,
- the homogeneity and cycle definition of magnetic poles,
- the sensing distance (ride height) of the installed readhead,
- the quality of signal processing,
- the characteristics of internal AMR sensor.

The SDE leads to speed ripples in applications where encoder is used as speed feedback, eg. in speed control loops.

The SDE can be calculated by the following formula:

$$SDE = \pm \frac{0.58}{D}$$

where:

SDE ... Sub divisional error (°)

D ... Outer ring diameter (mm)

D (mm)	SDE
20	±0.029°
40	±0.014°
60	±0.009°

For radial rings, SDE is strongly influenced by sensing distance (ride height) which is illustrated on Image 2. For axial rings, radial offset of readheads has a bigger influence on SDE than axial offset (see Images 3 and 4).

Image 1: Typical accuracy error plot

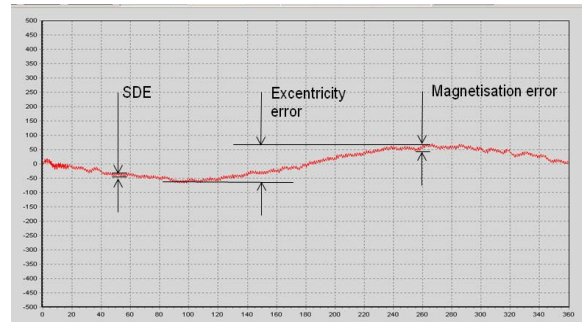


Image 2: Example of SDE error vs. radial offset for radial ring MR075E

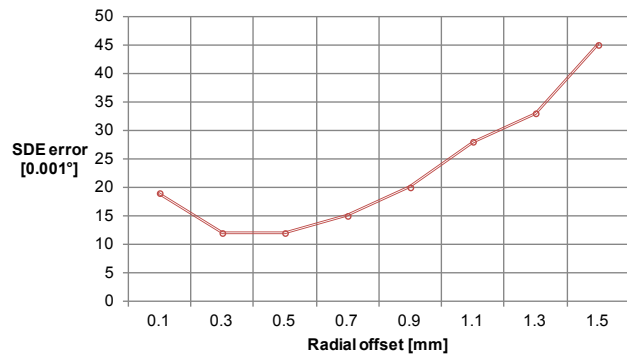


Image 3: Example of SDE error vs. axial offset for axial ring MR061C

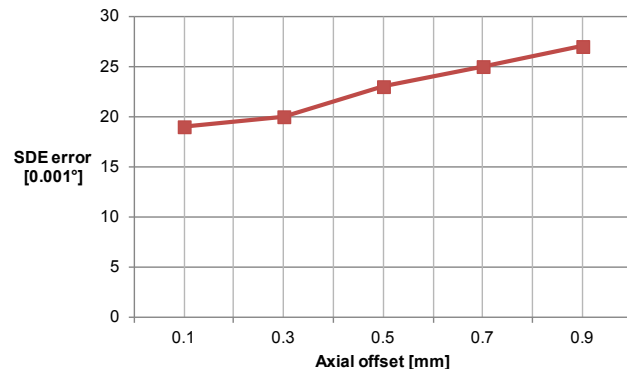
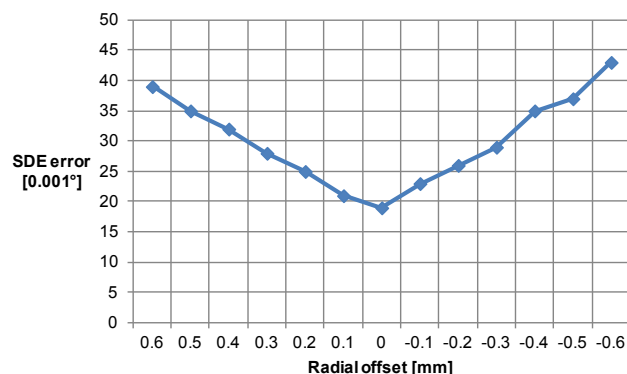


Image 4: Example of radial offset vs. SDE error for axial ring MR061C



Accuracy of ring encoder systems continued

Hysteresis

Hysteresis is the difference in result of measurement of the same point approaching it from different directions.

The ferromagnetic materials are known to maintain their magnetised state in response to external fields, trying to change their direction.

Hysteresis in encoder systems depends on the strength of the magnetic field. Increasing the magnetic field leads to decreasing the hysteresis and vice versa. Therefore, hysteresis is strongly influenced by the sensing distance at which the readhead is installed (Image 2).

2. Installation-dependent error

Installation and adjustment of the ring and the readhead, in addition to the given encoder-specific error, normally have a significant effect on the system's overall accuracy. Of particular importance are the installation eccentricity and the effect of deformations resulting from the ring installation.

Installation eccentricity

Eccentricity can be caused by the misalignment of the ring's center towards the rotational axis.

The error caused by eccentricity can be calculated by the following formula:

$$E_{\text{accuracy}} = \pm 0.114 \frac{e}{D}$$

where:

E_{accuracy} ... Eccentricity error (°)

e ... Misalignment of ring's center towards the rotational axis (µm)

D ... Outer ring diameter (mm)

Deformations of the ring during installation

By installing a ring to a not-ideally circular shaft, possible deformations can occur. These can have a significant influence on the system accuracy error.

Image 5: Hysteresis vs. ride height
(for encoder systems with 2 mm pole length)

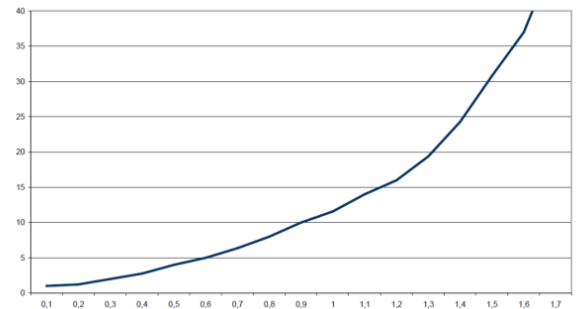
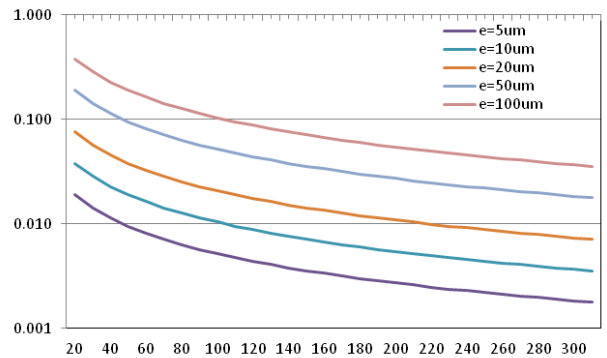


Image 6: Eccentricity influence on accuracy error



Axial rings



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Mounting instructions for axial rings

Machine the mounting shaft according to the dimensions given in the table below:

Axial ring	OD (mm)		ID (mm)		Ds (mm)	
MR026C	26	+0.1	16	+0.1	15.9	-0.1
		-0.1		-0.1		
MR049N	49	+0.1	25H7	+0.021	25f7	-0.02
		-0.1		0		-0.041
MR050C	50	+0.1	40	+0.02	39.9	+0.05
		-0.1		-0.02		0
MR061C	61.3	+0.1	51.3	+0.1	51.2	-0.1
		-0.1		-0.1		-0.1
MR080N	80H7	+0.03	55H7	+0.03	55f7	-0.03
		0		0		-0.06

OD ... Outer ring diameter in mm

ID ... Inner ring diameter in mm

Ds ... Installation (shaft) diameter in mm

Installation with adhesive tape

Axial rings are standardly equipped with VHB back adhesive tape. Most substrates are best prepared by cleaning with a 50 : 50 mixture of isopropyl alcohol and water prior to applying magnetic ring.

Exceptions to the general procedure that may require additional surface preparation include:

- Heavy Oils: A degreaser or solvent-based cleaner may be required to remove heavy oil or grease from a surface and should be followed by cleaning with IPA/water.
- Abrasion: Abrading a surface, followed by cleaning with IPA/ water, can remove heavy dirt or oxidation and can increase surface area to improve adhesion.
- Adhesion Promoters: Priming a surface can significantly improve initial and ultimate adhesion to many materials such as plastics and paints.
- Porous surfaces: Most porous and fibered materials such as wood, particleboard, concrete, etc. need to be sealed to provide a unified surface.
- Unique Materials: Special surface preparation may be needed for glass and glass-like materials, copper and copper containing metals, and plastics or rubber that contain components that migrate (e.g. plasticizers).

Refer to 3M Technical Bulletin "Surface Preparation for 3M™ VHB™ Tape Applications" for additional information.

Application

Good surface contact can be attained by applying enough pressure to insure that the tape experiences approximately 100 kPa pressure.

At room temperature approximately 50 % of ultimate bond strength will be achieved after 20 minutes, 90 % after 24 hours and 100% after 72 hours.

Dynamic overlap shear (Peak force to separate is measured after 72 hours dwelling): 830 kPa

Installation by gluing

Recommended glue: UHU plus schnellfest (two-component adhesive)

Application

The surfaces to be stuck together must be cleaned very thoroughly before the adhesive is applied. It is worth first using abrasive cloth (abrasive rating 150-200) then degreasing using cellulose moistened with a grease solvent.

The adhesive should be applied to the parts to be stuck together as soon as possible after mixing, to ensure the best possible bond. The parts to be assembled usually need to be fixed under pressure. It is not necessary to apply extreme pressure.

At temperatures below room temperature, the hardening process takes somewhat longer. After the parts to be stuck together have been prepared, the adhesive is dosed. The adhesive should be very thoroughly mixed.

At room temperature UHU plus schnellfest hardens so that the join is firm within 25 to 30 minutes at the most; after 60 minutes approximately half the final bond strength is reached, and after 72 hours the final bond strength is reached. The application of heat speeds up the hardening process.

For more information see adhesive manufacturer's datasheet.

Installation with fasteners

Installation with fasteners is possible for rings MR049N and MR080N.

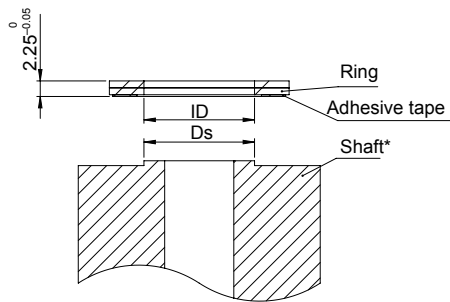
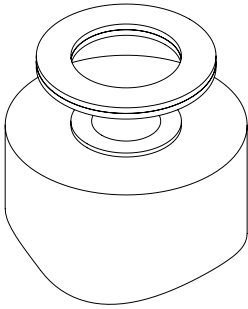
Make sure the installation surface is clean and free of debris. Rings need to be attached with fasteners as per the installation drawings (see appropriate ring page).

Recommended attachment torque:

- fasteners M2.5: 0.5 Nm

Mounting instructions for axial rings continued

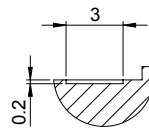
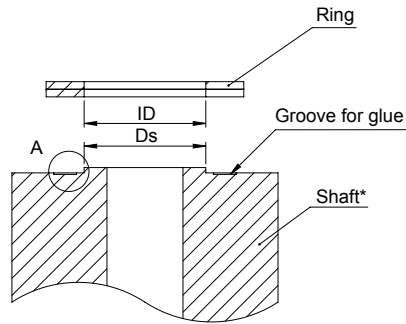
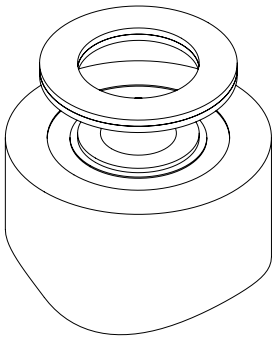
Method 1: Installation with adhesive tape



Tape: VHB 4914 (Thickness 0.25 mm)

* Not provided.

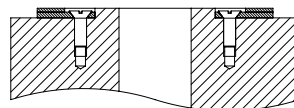
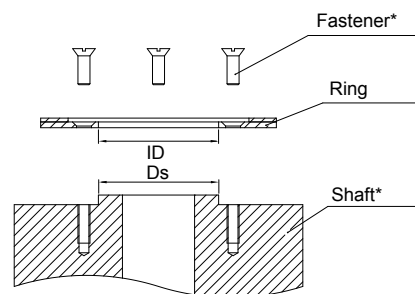
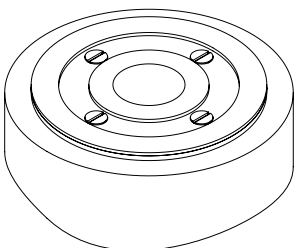
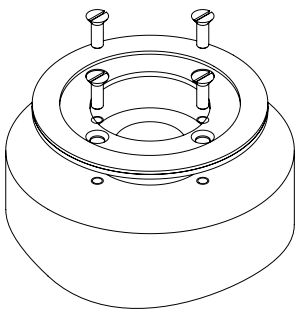
Method 2: Installation by gluing



Recommended dimensions.
A (5 : 1)

* Not provided.

Method 3: Installation with fasteners (for rings MR049N and MR080N)



* Not provided.

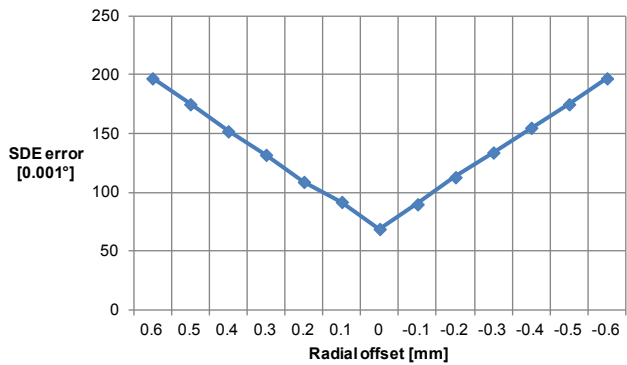
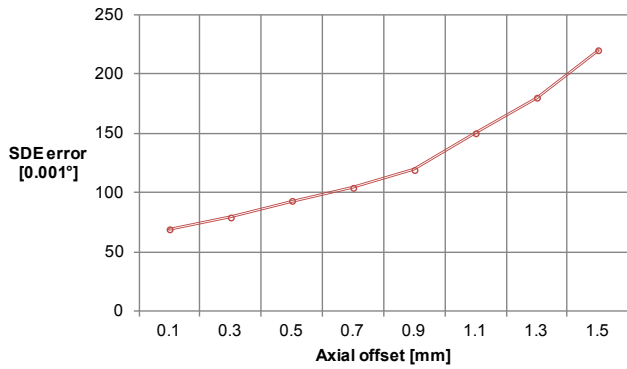
MR026C

Features and compatibility

Outer diameter	26 ± 0.1 mm
Inner diameter	16 ± 0.1 mm
Height	2 ± 0.1 mm
Mass	4 g
Pole length	2 mm
Number of poles	36
Moment of inertia	450 gmm ²
Material of magnetic layer	HNBR + ferrite
Hub material	EN1.4305 / AISI 303
Hub thermal expansion coefficient (CTE)	16 × 10 ⁻⁶ K ⁻¹
Type of reference	Unique*
Compatibility	
LM10, LM13, RLM, RLC2IC, RLC2HD, RLB	Yes
LM15	No

* Reference mark option only available with RLM and RLC2IC readheads.

SDE error

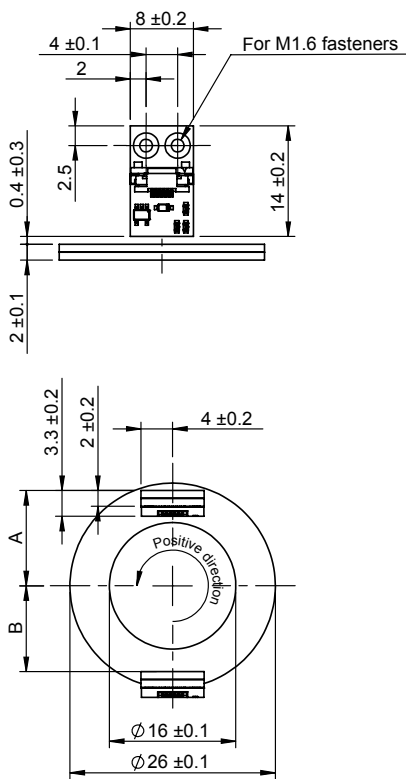


Dimensions and installation tolerance

Dimensions and tolerances in mm.

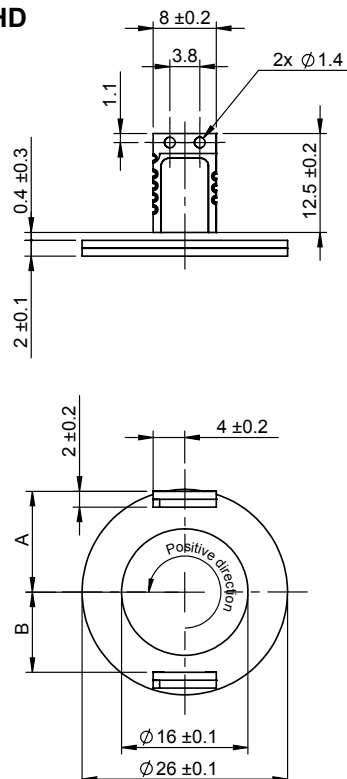
For maximum speed tables please go to www.rls.si/mr026_max_speed_table

RLB



Mounting options	CCW (+) ring rotation
A	12.1 ± 0.2 mm positive counting
B	10.9 ± 0.2 mm negative counting

RLC2HD



Mounting options	CCW (+) ring rotation
A	12.8 ± 0.2 mm positive counting
B	10.2 ± 0.2 mm negative counting

Dimensions and installation tolerance

Dimensions and tolerances in mm.

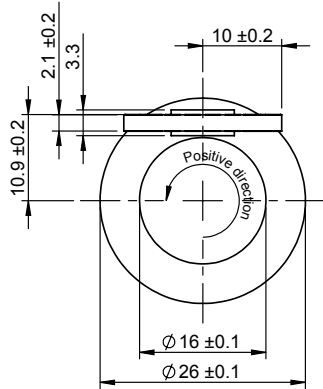
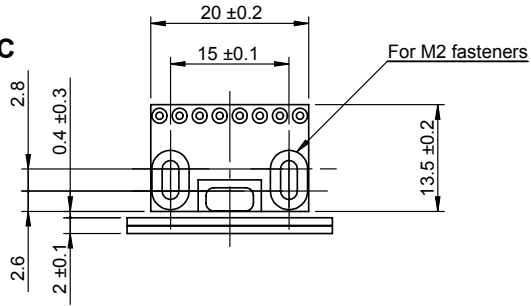
MR026C

Outer diameter: 26 ± 0.1 mm

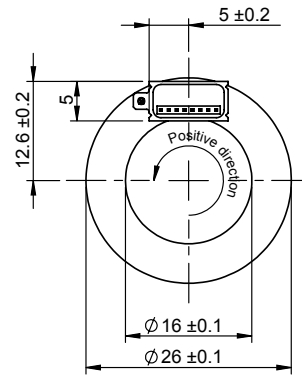
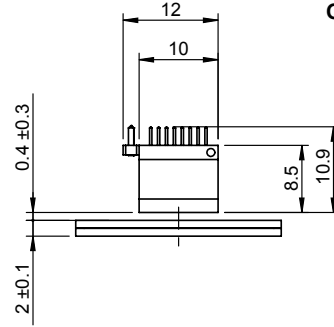
Inner diameter: 16 ± 0.1 mm

Number of poles: 36

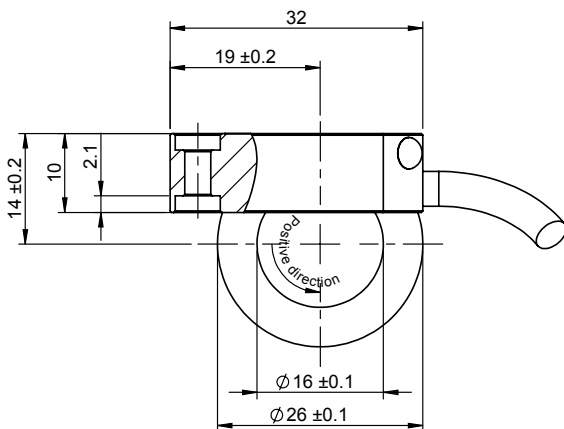
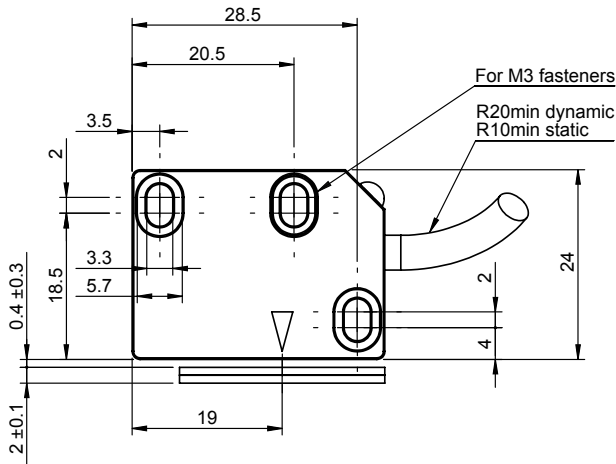
RLC2IC



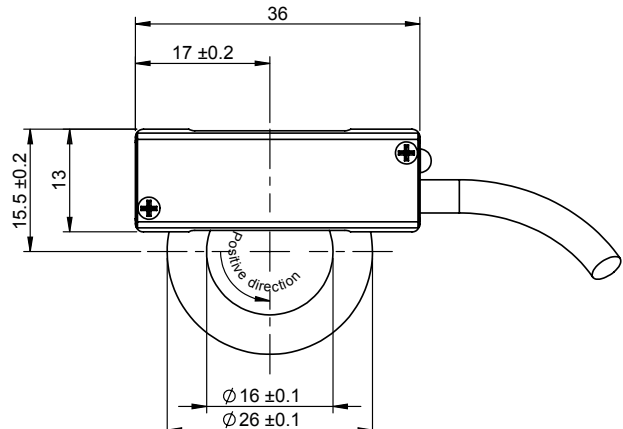
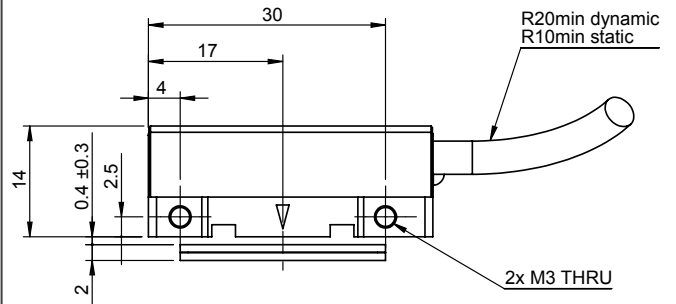
RLM



LM10



LM13



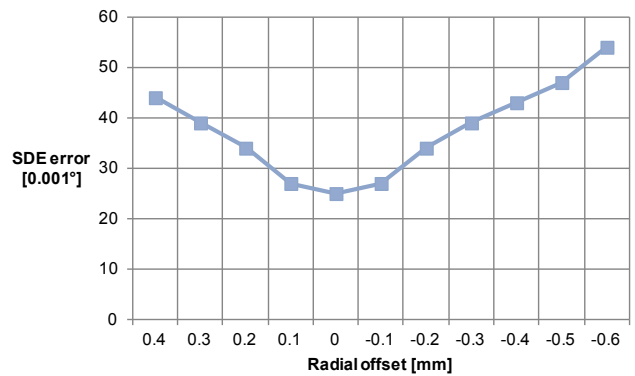
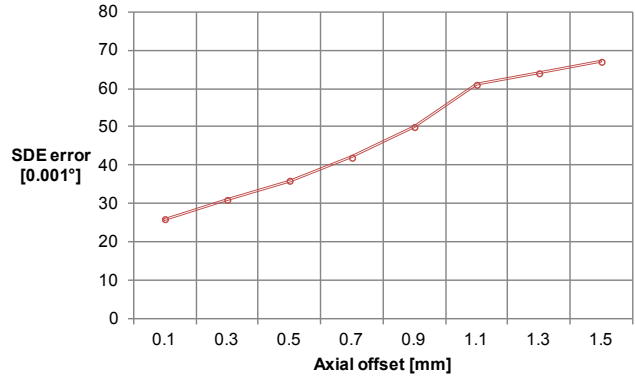
MR049N

Features and compatibility

Outer diameter	49 ± 0.1 mm
Inner diameter	25 ± 0.1 mm
Height	2 ± 0.1 mm
Pole length	2 mm
Number of poles	72
Mass	15 g
Moment of inertia	5,660 gmm ²
Material of magnetic layer	NBR + ferrite
Hub material	EN 1.4016 / AISI 430
Hub thermal expansion coefficient (CTE)	10 × 10 ⁻⁶ K ⁻¹
Type of reference	Unique or DCRM*
Basic increment of distance coded reference mark	36 mm / 90°
Compatibility	
LM10, LM13, RLM, RLC2HD, RLC2IC, RLB	Yes
LM15	No

* Reference mark option only available with RLM and RLC2IC readheads.

SDE error

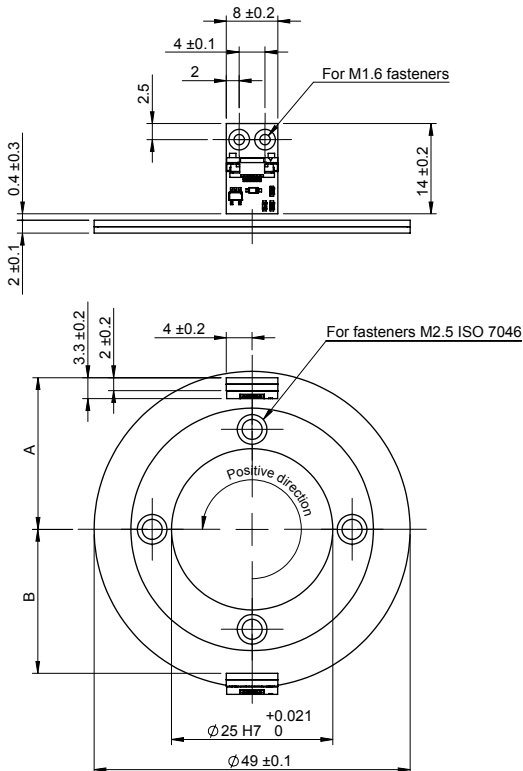


For maximum speed tables please go to www.rls.si/mr049_axial_max_speed_72_poles

Dimensions and installation tolerance

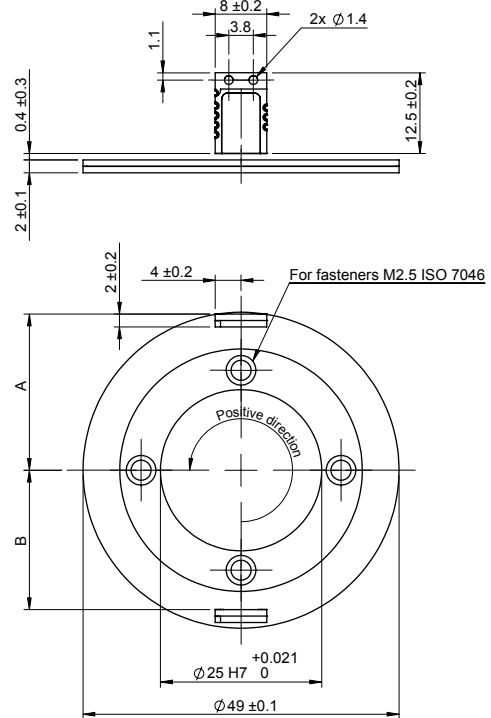
Dimensions and tolerances in mm.

RLB



Mounting options	CCW (+) ring rotation
A	23.5 ± 0.2 mm positive counting
B	22.3 ± 0.2 mm negative counting

RLC2HD



Mounting options	CCW (+) ring rotation
A	24.2 ± 0.2 mm positive counting
B	21.6 ± 0.2 mm negative counting

MR049N

Outer diameter: 49 ± 0.1 mm

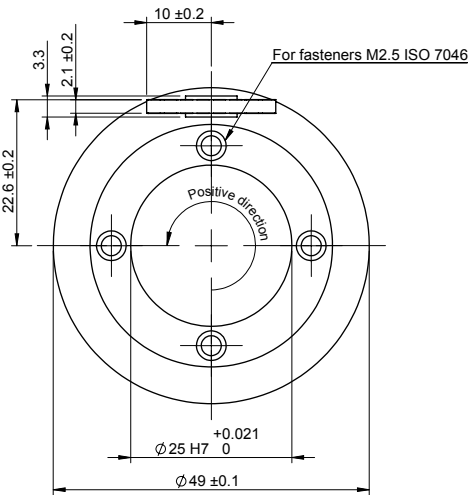
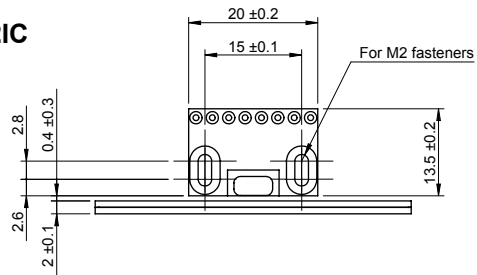
Inner diameter: 25 ± 0.1 mm

Number of poles: 72

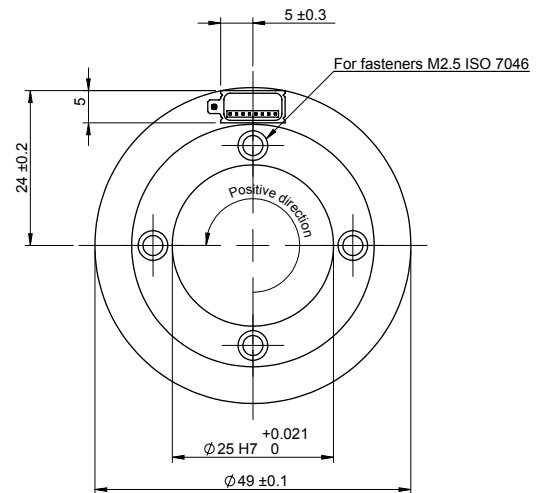
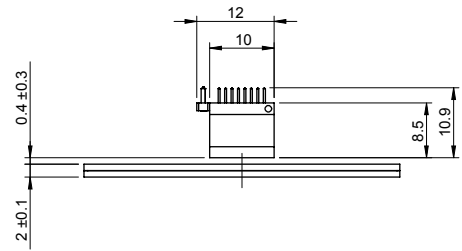
Dimensions and installation tolerance

Dimensions and tolerances in mm.

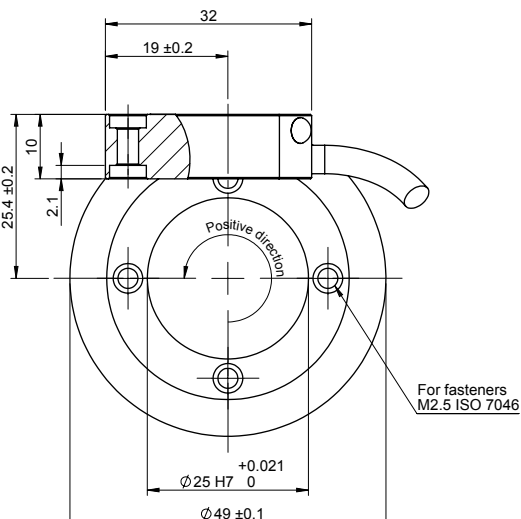
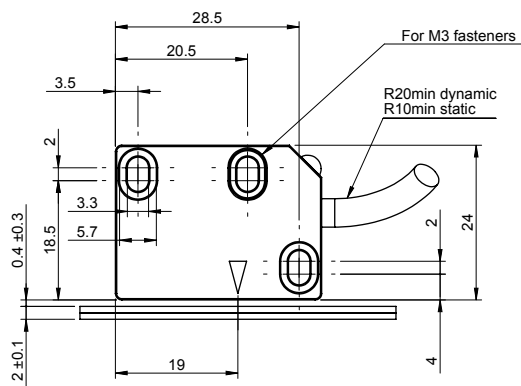
RLC2IC



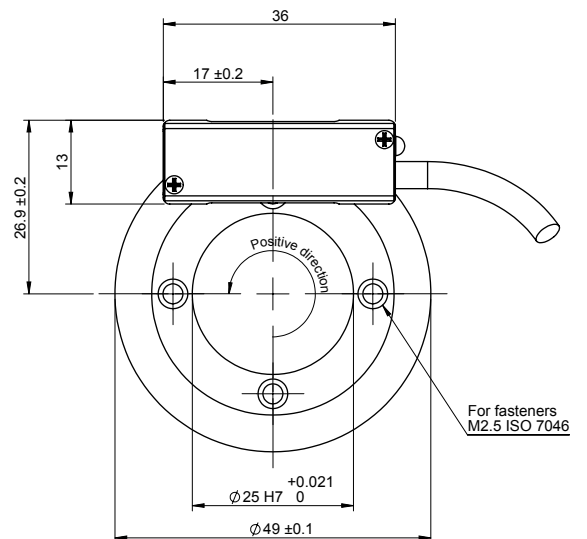
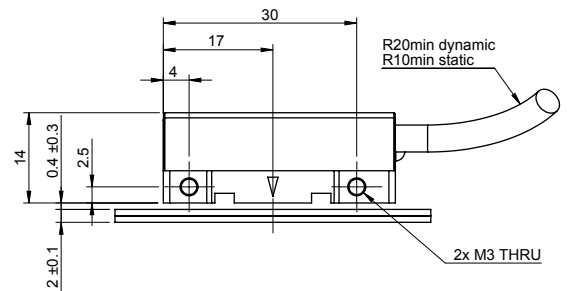
RLM



LM10



LM13



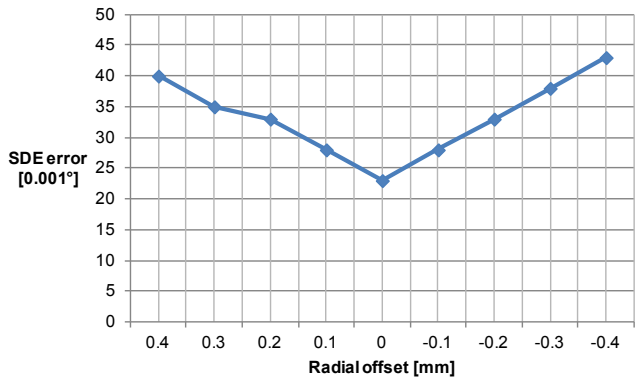
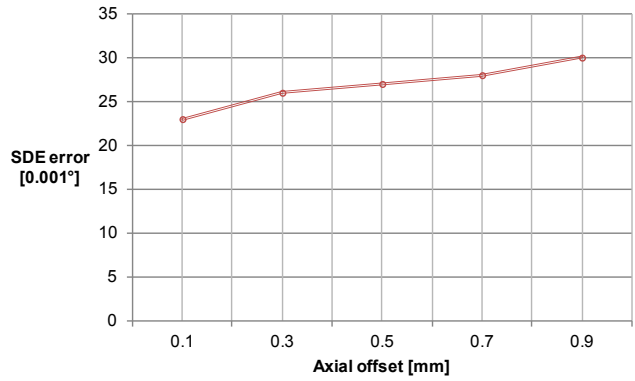
MR050C

Features and compatibility

Outer diameter	50 ± 0.1 mm
Inner diameter	40 ± 0.1 mm
Height	2 ± 0.1 mm
Pole length	2 mm
Number of poles	72
Mass	8 g
Moment of inertia	3,880 gmm ²
Material of magnetic layer	HNBR + ferrite
Hub material	EN 1.4104 / AISI 340F
Hub thermal expansion coefficient (CTE)	10 × 10 ⁻⁶ K ⁻¹
Type of reference	Unique or DCRM*
Basic increment of distance coded reference mark	36 mm / 90°
Compatibility	
LM10, LM13, RLM, RLC2HD, RLC2IC, RLB	Yes
LM15	No

* Reference mark option only available with RLM and RLC2IC readheads.

SDE error

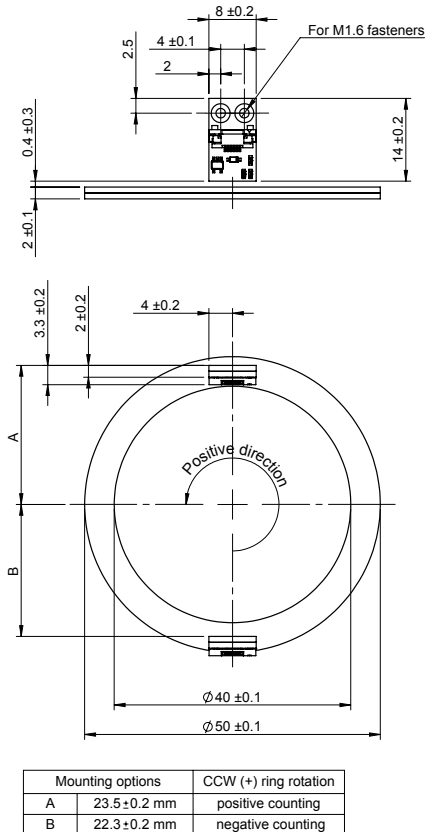


For maximum speed tables please go to www.rls.si/mr050_axial_max_speed_table

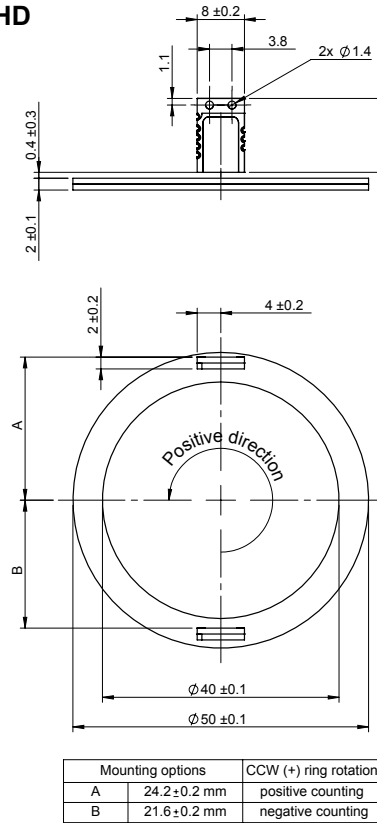
Dimensions and installation tolerance

Dimensions and tolerances in mm.

RLB



RLC2HD



MR050C

Outer diameter: 50 ± 0.1 mm

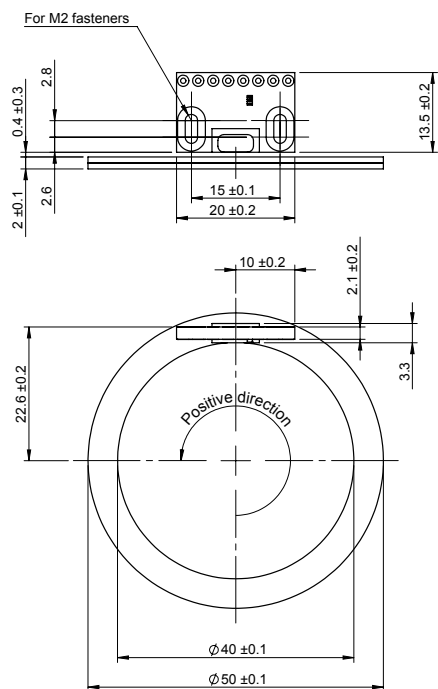
Inner diameter: 40 ± 0.1 mm

Number of poles: 72

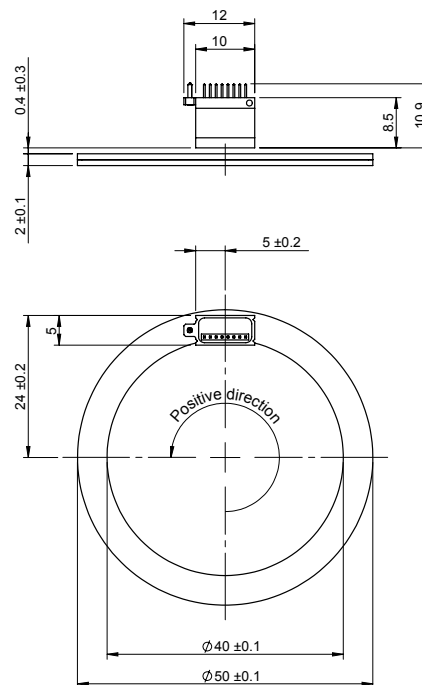
Dimensions and installation tolerance

Dimensions and tolerances in mm.

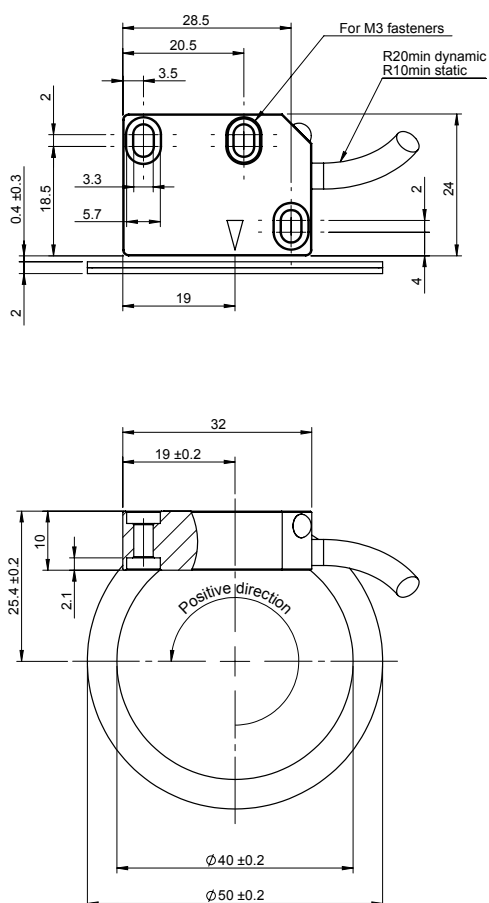
RLC2IC



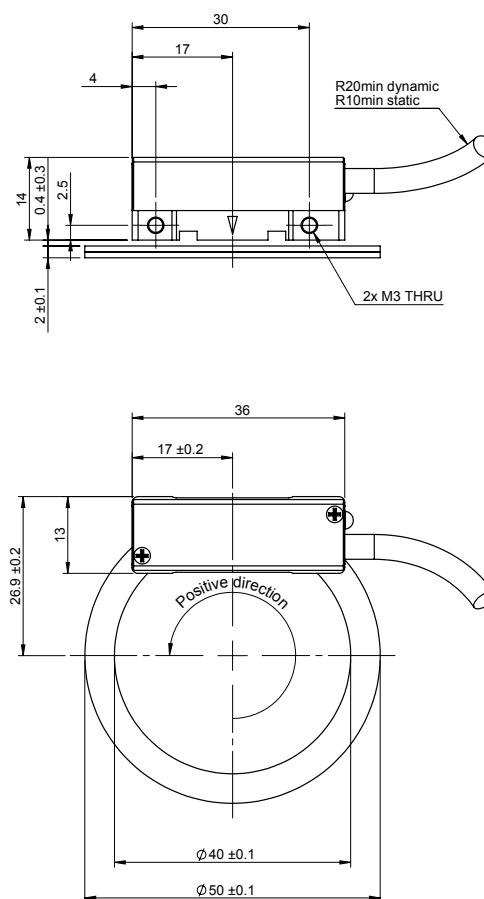
RLM



LM10



LM13



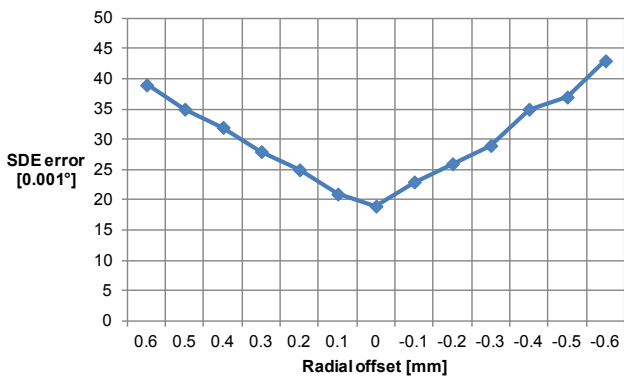
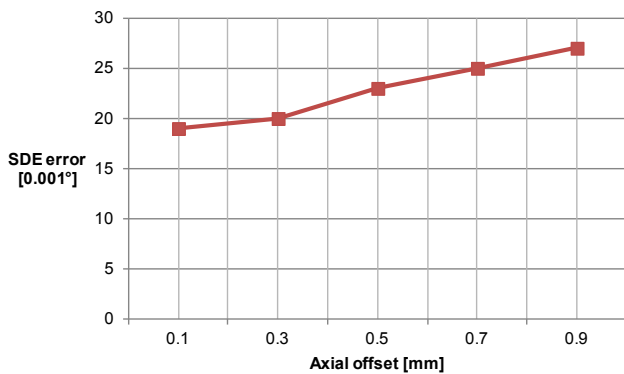
MR061C

Features and compatibility

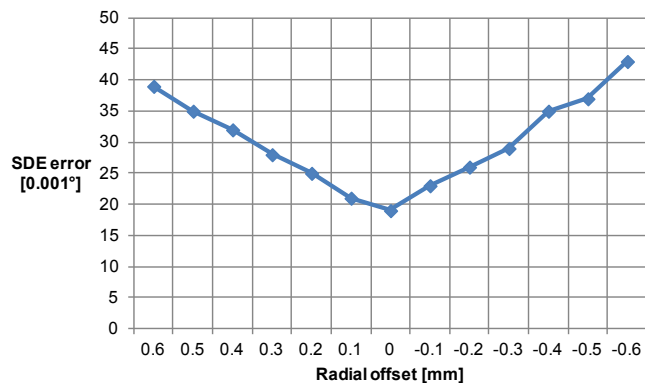
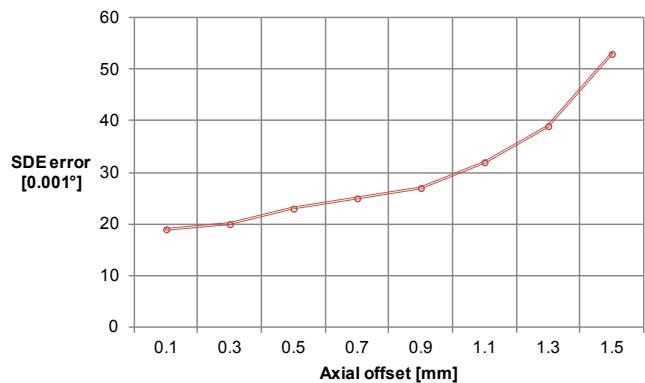
Outer diameter	61.3 ± 0.1 mm	
Inner diameter	51.3 ± 0.1 mm	
Height	2 ± 0.1 mm	
Pole length	2 mm	
Number of poles	90	92
Mass	10 g	
Moment of inertia	7,560 gmm ²	
Material of magnetic layer	HNBR + ferrite	
Hub material	EN 1.4016 / AISI 430	
Hub thermal expansion coefficient (CTE)	10 × 10 ⁻⁶ K ⁻¹	
Type of reference	Unique or DCRM*	
Basic increment of distance coded reference mark	36 mm / 72°	NA
Compatibility		
LM10, LM13, RLM, RLC2HD, RLC2IC, RLB	Yes	Yes
LM15	No	No

* Reference mark option only available with RLM and RLC2IC readheads.

SDE error 90 poles



SDE error 92 poles



For maximum speed tables please go to www.rls.si/mr061-axial-max-speed-table-90-poles

For maximum speed tables please go to www.rls.si/mr061-axial-max-speed-table-92-poles

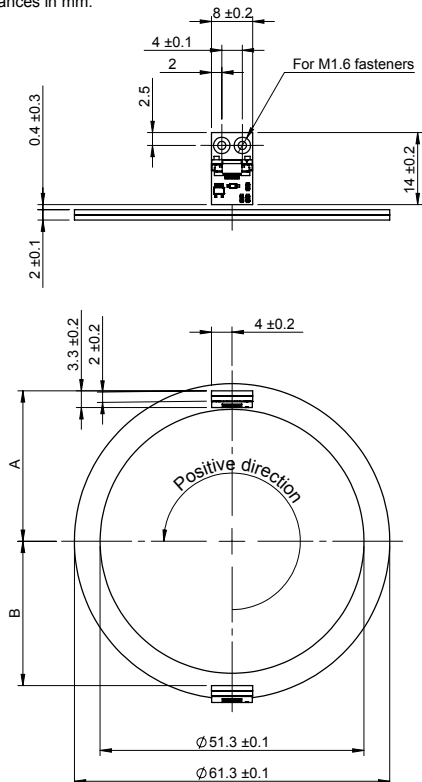
MR061C

Outer diameter: 61.3 ± 0.1 mm
 Inner diameter: 51.3 ± 0.1 mm
 Number of poles: 90 or 92

Dimensions and installation tolerance

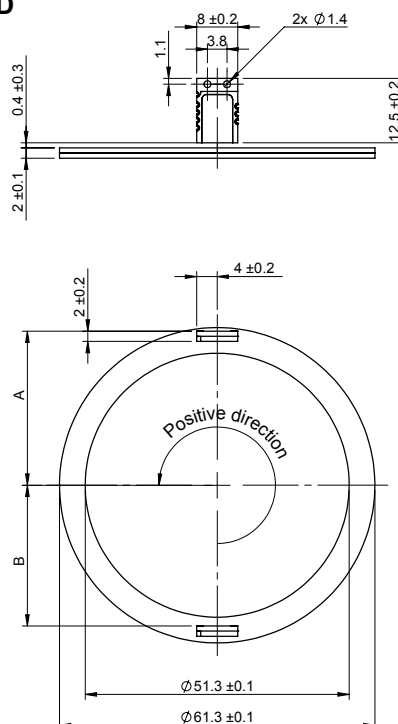
Dimensions and tolerances in mm.

RLB



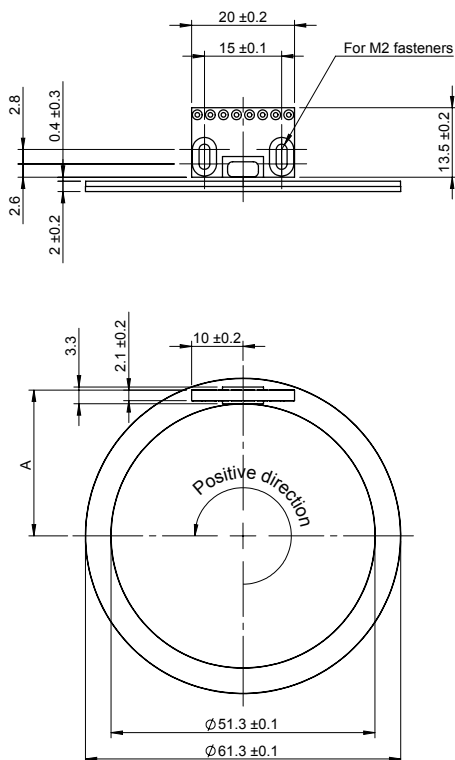
Mounting options			CCW (+) ring rotation
A	90 poles	29.3 ± 0.2 mm	positive counting
	92 poles	29.9 ± 0.2 mm	positive counting
B	90 poles	28.1 ± 0.2 mm	negative counting
	92 poles	28.7 ± 0.2 mm	negative counting

RLC2HD



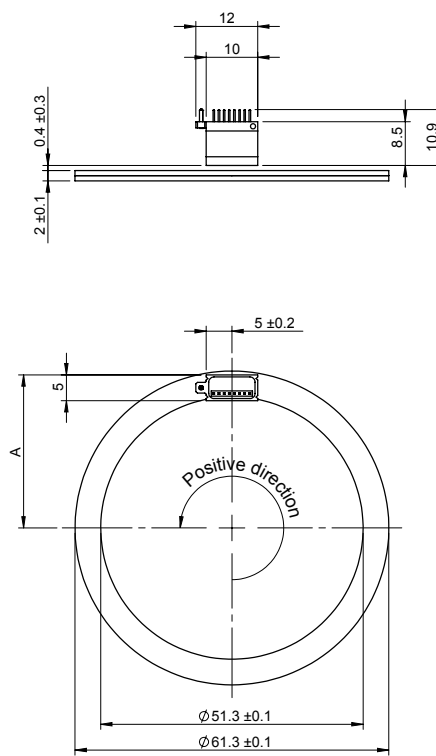
Mounting options			
A	90 poles	30.0 ± 0.2 mm	positive counting
	92 poles	30.6 ± 0.2 mm	positive counting
B	90 poles	27.4 ± 0.2 mm	negative counting
	92 poles	28.0 ± 0.2 mm	negative counting

RLC2IC



Mounting option		
A	90 poles	28.4 ± 0.2 mm
	92 poles	29.0 ± 0.2 mm

RLM



Mounting option		
A	90 poles	29.8 ± 0.2 mm
	92 poles	30.4 ± 0.2 mm

MR061C

Outer diameter: 61.3 ± 0.1 mm

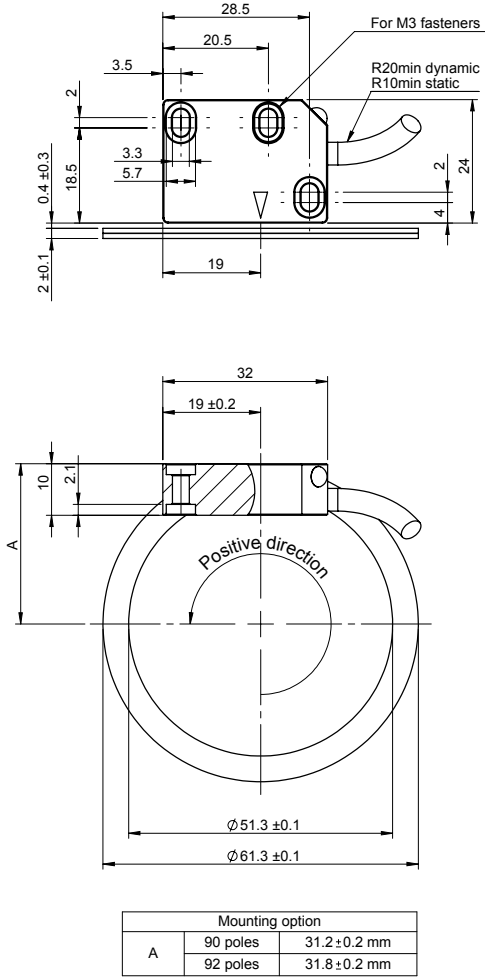
Inner diameter: 51.3 ± 0.1 mm

Number of poles: 90 or 92

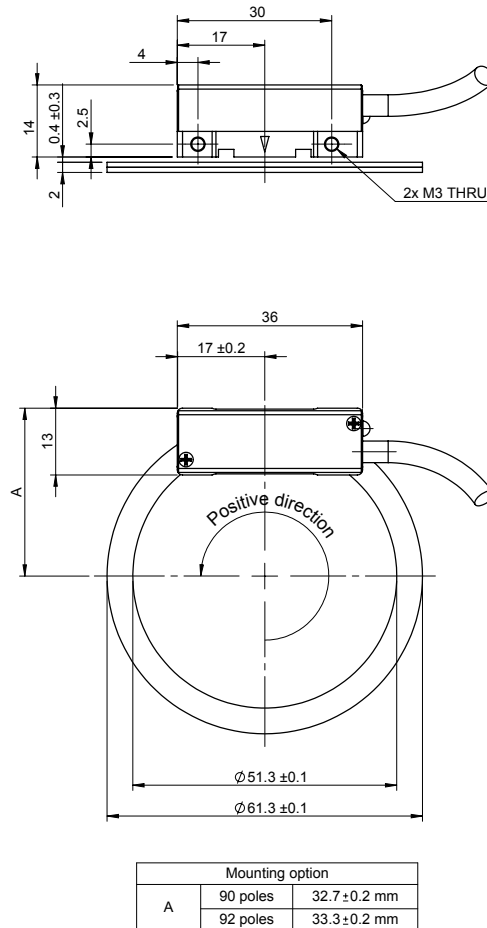
Dimensions and installation tolerance

Dimensions and tolerances in mm.

LM10



LM13



MR080N

Features and compatibility

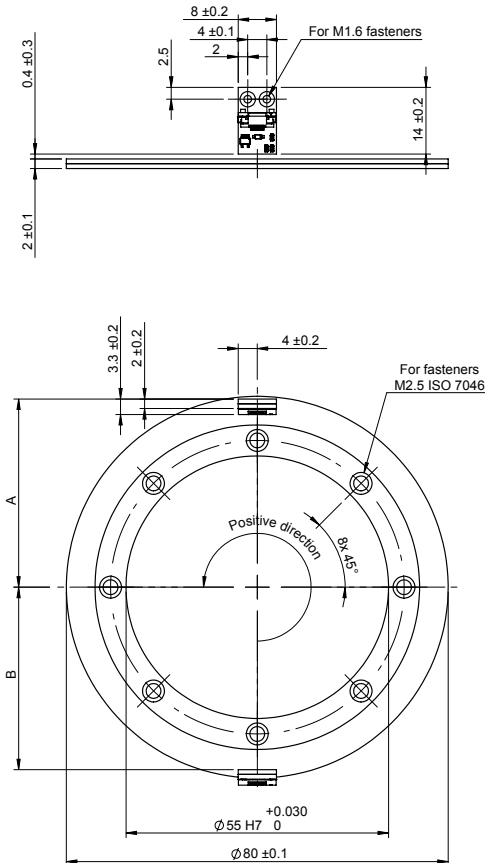
Outer diameter	80 ± 0.1 mm
Inner diameter	55 ± 0.1 mm
Height	2 ± 0.1 mm
Pole length	2 mm
Number of poles	122
Mass	28 g
Moment of inertia	32,700 gmm ²
Material of magnetic layer	NBR + ferrite
Hub material	EN 1.4016 / AISI 430
Hub thermal expansion coefficient (CTE)	10 × 10 ⁻⁶ K ⁻¹
Type of reference	Unique or DCRM*
Basic increment of distance coded reference mark	64 mm / 90°
Compatibility	
LM10, LM13, RLM, RLC2HD, RLC2IC, RLB	Yes
LM15	No

* Reference mark option only available with RLM and RLC2IC readheads.

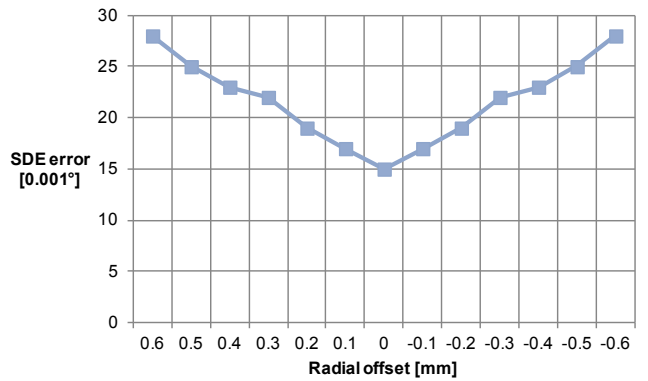
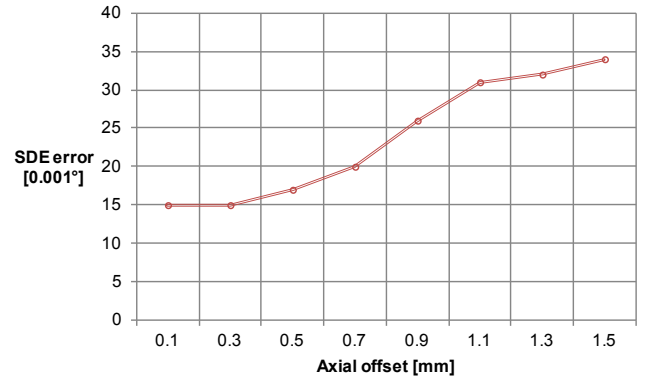
Dimensions and installation tolerance

Dimensions and tolerances in mm.

RLB

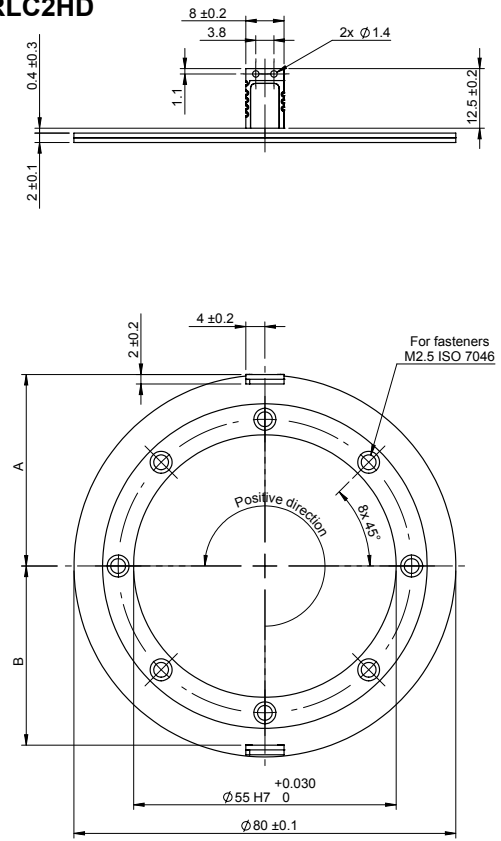


SDE error



For maximum speed tables please go to www.rls.si/mr080-axial-max-speed-table-122-poles

RLC2HD



MR080N

Dimensions and installation tolerance

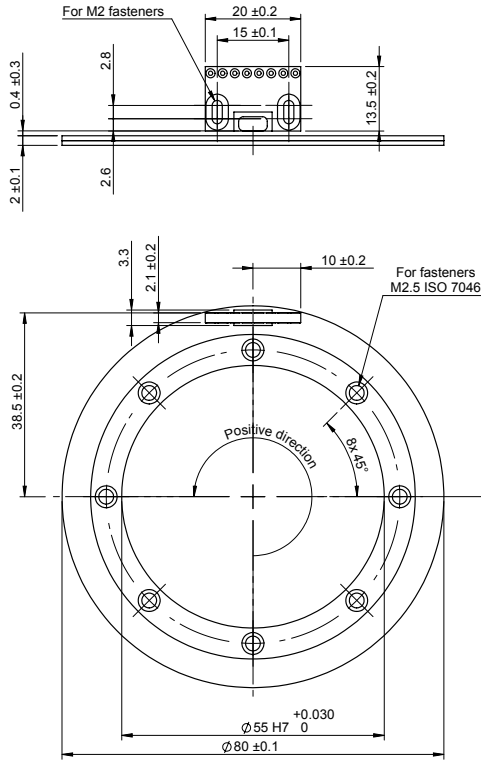
Dimensions and tolerances in mm.

Outer diameter: 80 ± 0.1 mm

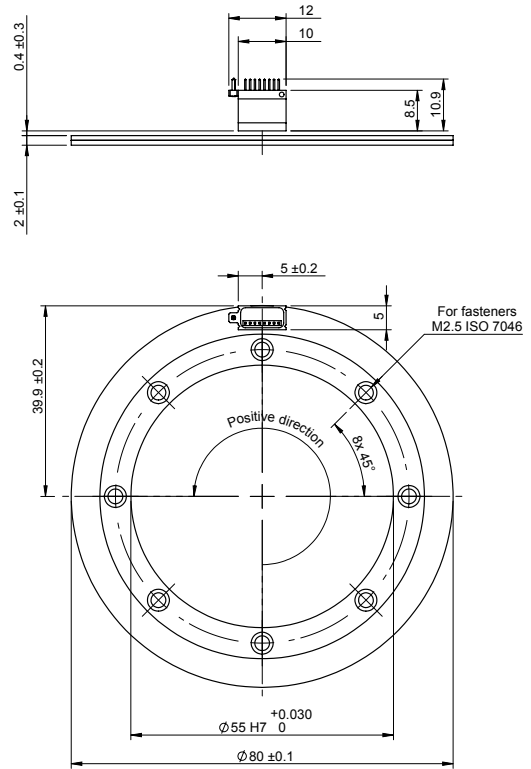
Inner diameter: 55 ± 0.1 mm

Number of poles: 128

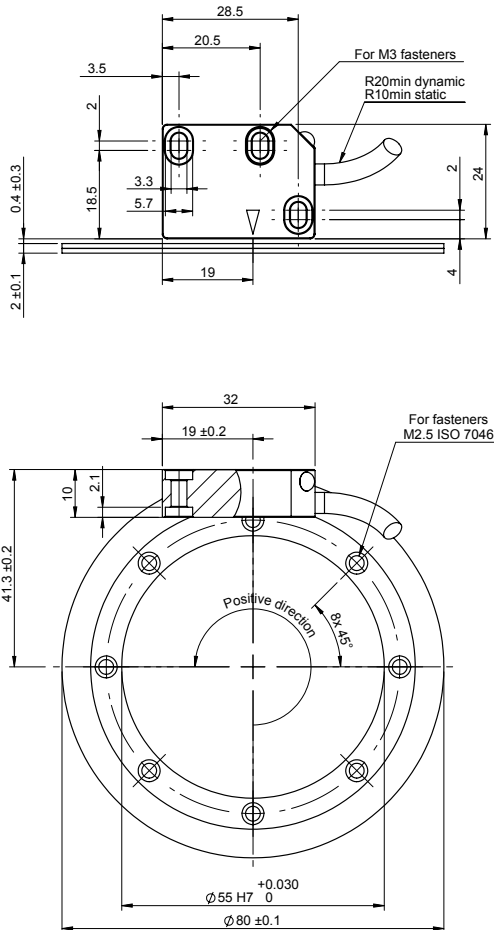
RLC2IC



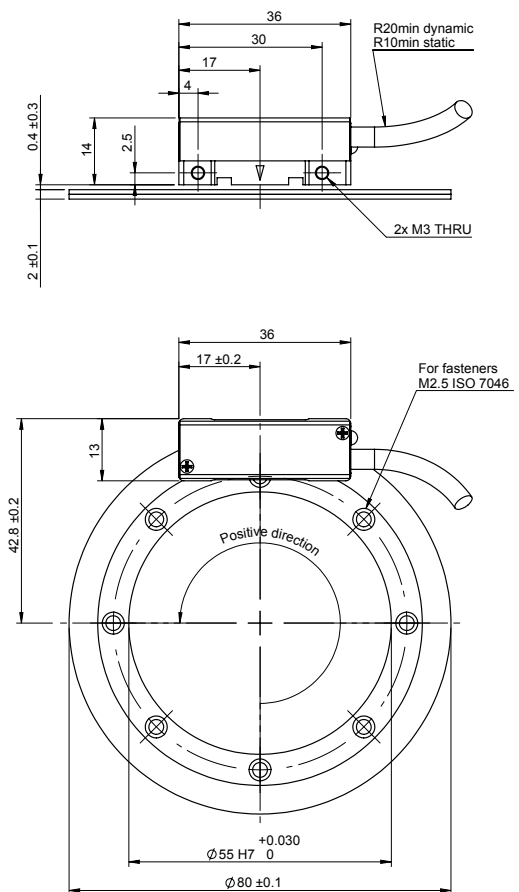
RLM



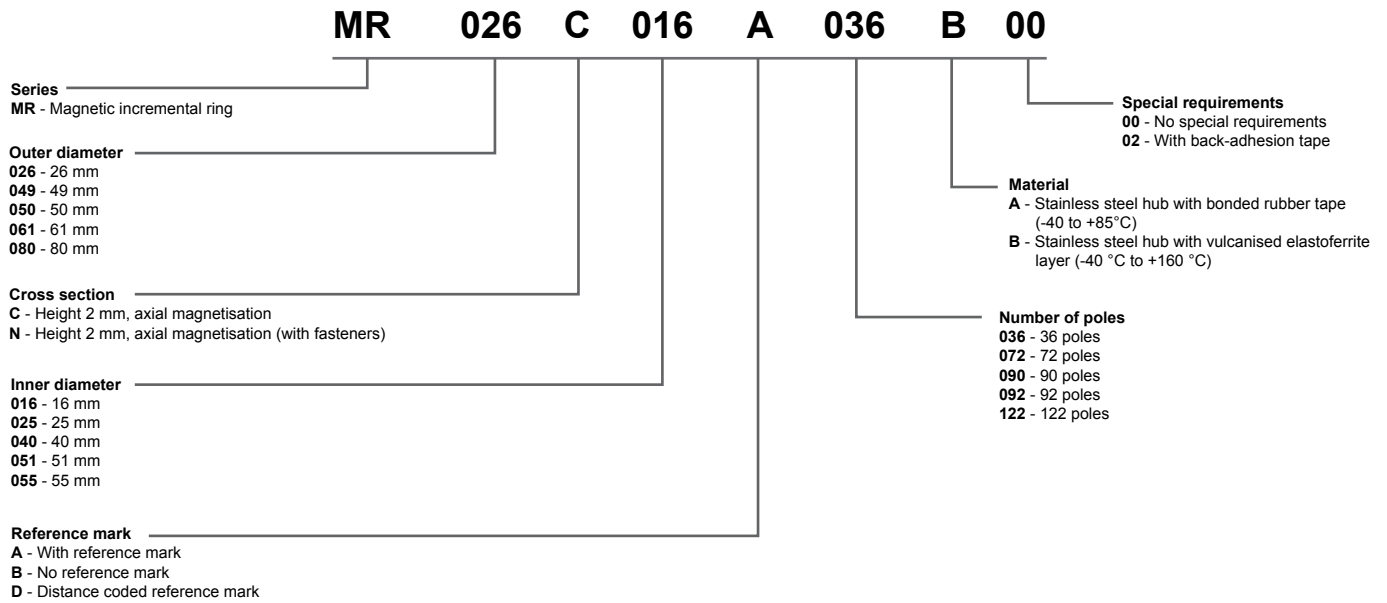
LM10



LM13



Axial magnetic ring ordering code



Please note!
Not all combinations are valid. The inner diameter of rings is related to the outer diameter and cannot be randomly selected. Please check below table for available options.

Series	Outer diameter	Cross section	Inner diameter	Reference mark	Number of poles	Material	Special requirements	
MR	026	C	016	A	036	B	00 / 02	
				B				
	050		040	A	072			
				B				
	061		051	A	090 / 092			
				B	090			
	049	N	025	A	072	A	00	
				B				
	080			055	A			122
					B			

Radial rings



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MR031E	32
MR031G	36
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MR040G	44
MR047B	48
MR050E	52
MR057E	56
MR075E	60
MR100F	64
MR122	67
MR324	70
MR406	72
Ordering code	74

Mounting instructions for radial rings

Machine the mounting shaft according to the dimensions given in the table below:

Radial ring	OD (mm)	ID (mm)
MR031E	31.85 ± 0.10	20 H7
MR031G	31.85 ± 0.10	20 H7
MR040E	40.8 ± 0.1	30 H7
MR040G	40.8 ± 0.1	30 H7
MR047B	47.5 ± 0.1	40 ± 0.1
MR050E	50.1 ± 0.1	40 H7
MR057E	57.3 ± 0.1	45 H7
MR075E	75.4 ± 0.1	60 H7
MR100F	100.5 ± 0.1	84.77 ± 0.05
MR122E	122 ± 0.1	90 H7
MR324E	324.8 ± 0.2	240 ± 0.1
MR406E	406.2 ± 0.1	360 H7

OD ... Outer ring diameter (mm)

ID ... Inner ring diameter (mm)

Use clearance fit for installation by gluing and installation with fasteners.

Installation by press-fit

Slip the ring onto the mating shaft applying equal or uniform force along the whole ring circumference. Shaft dimension and tolerances need to be calculated for each ring. Calculation should consider CTE of the shaft and the ring according to best engineering practice.

Installation by shrink-fit

1) Heat the ring to 160 °C for 30 minutes.

2) Slip the ring onto the mating shaft.

Shaft dimension and tolerances need to be calculated for each ring. Calculation should consider CTE of the shaft and the ring according to best engineering practice.

Installation by gluing

Recommended glue: UHU plus schnellfest (two-component adhesive)

Application

The surfaces to be stuck together must be cleaned very thoroughly before the adhesive is applied. It is worth first using abrasive cloth (abrasive rating 150-200) then degreasing using cellulose moistened with a grease solvent.

The adhesive should be applied to the parts to be stuck together as soon as possible after mixing, to ensure the best possible bond. The parts to be assembled usually need to be fixed under pressure. It is not necessary to apply extreme pressure.

At temperatures below room temperature, the hardening process

takes somewhat longer. After the parts to be stuck together have been prepared, the adhesive is dosed. The adhesive should be very thoroughly mixed.

At room temperature UHU plus schnellfest hardens so that the joint is firm within 25 to 30 minutes at the most; after 60 minutes approximately half the final bond strength is reached, and after 72 hours the final bond strength is reached. The application of heat speeds up the hardening process.

For more information see adhesive manufacturer's datasheet.

Installation with fasteners

Installation with fasteners is possible for rings MR122E, MR324E and MR406E.

Make sure the installation surface is clean and free of debris. Rings need to be attached with fasteners as per the installation drawings (see appropriate ring page).

Recommended attachment torque:

- fasteners M3: 1 Nm

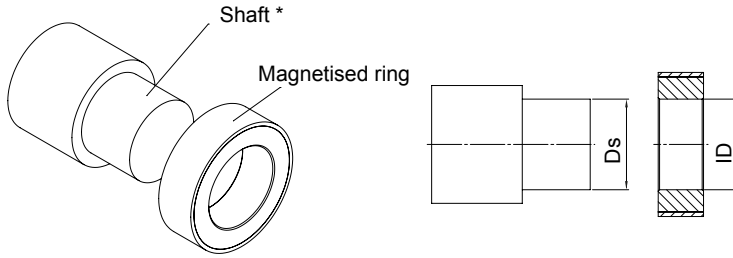
- fasteners M6: 8 Nm

Secure the fasteners with Loctite 222.

Mounting instructions for radial rings continued

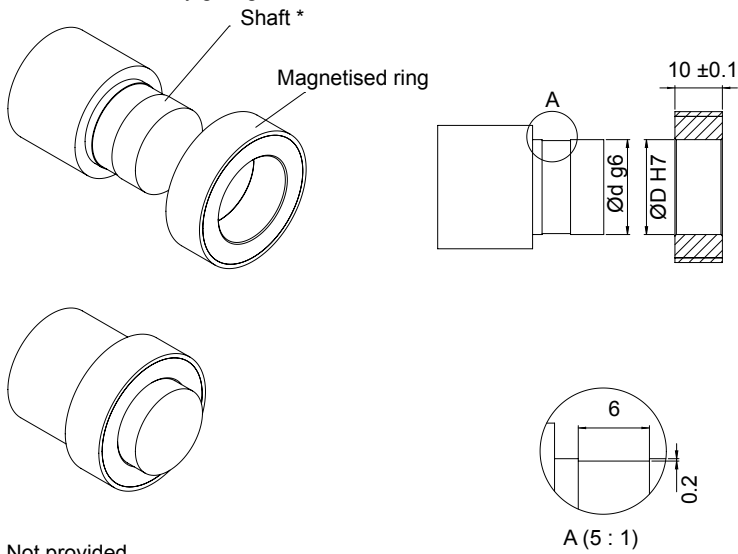
For all radial rings (except MR047B and MR100F)

Method 1: Installation by press-fit



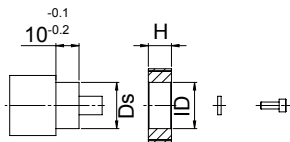
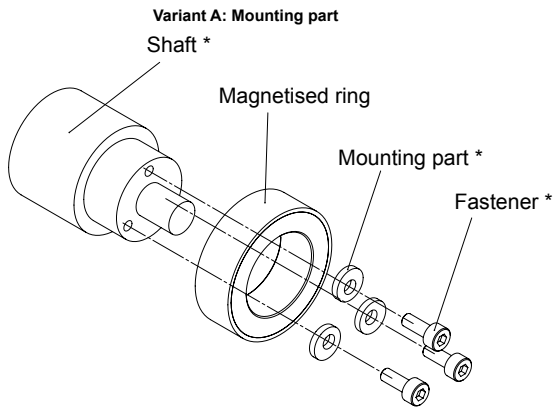
* Not provided.

Method 2: Installation by gluing

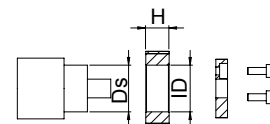
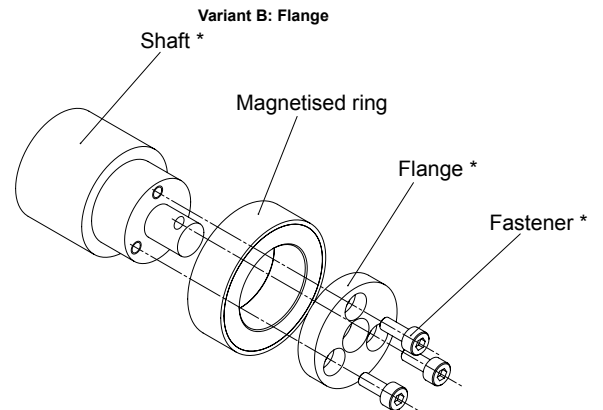


* Not provided.

Method 3: Installation with fasteners



* Not provided.

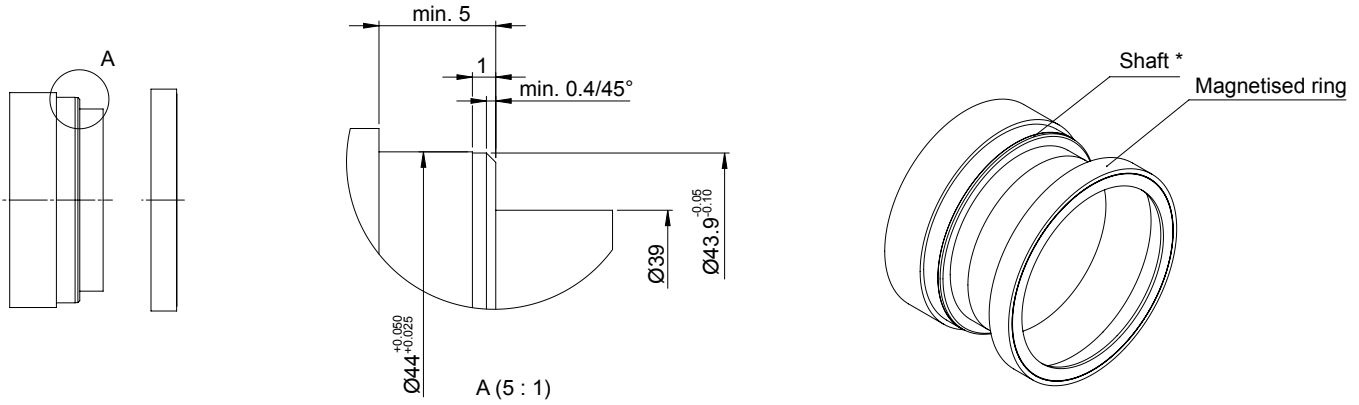


* Not provided.

For MR047B ring

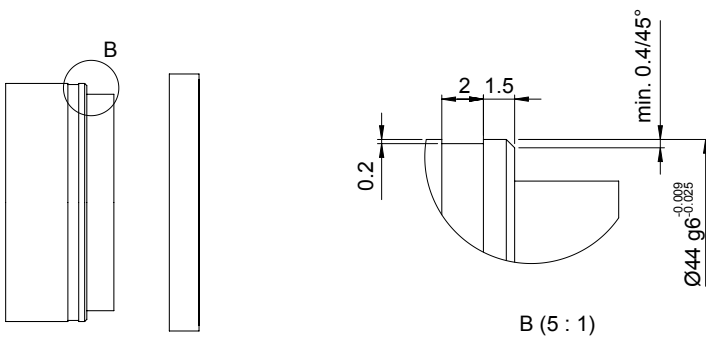
Method 1: Installation by press-fit

1. Slip the ring onto the mating shaft applying equal or uniform force along the whole ring circumference.



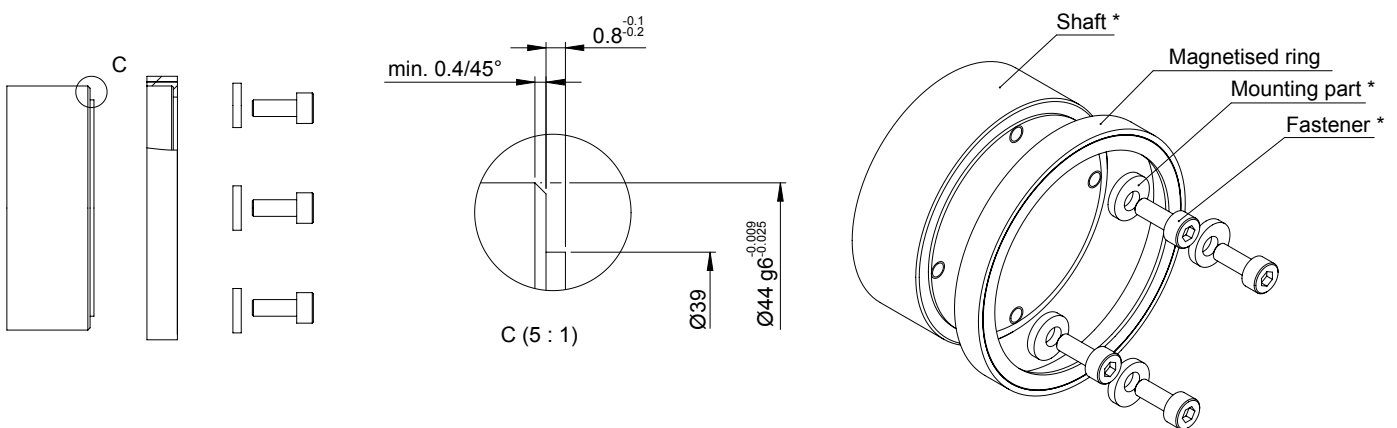
* Not provided.

Method 2: Installation by gluing



Method 3: Installation with fasteners

1. Slip the ring onto the mating shaft.
2. Attach the ring with appropriate fasteners.

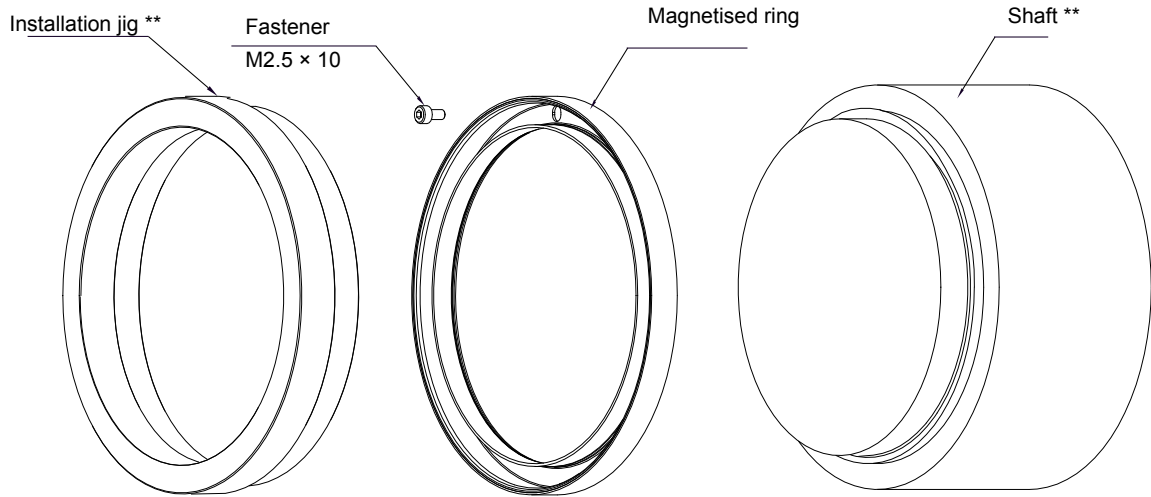


* Not provided.

For MR100F ring

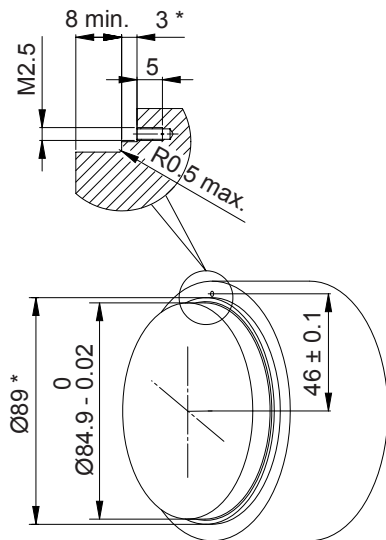
Method 1: Installation by press-fit

1. The inner diameter of the ring is slightly conical. Make sure that the ring is press fitted with the wider diameter first. Insert the M2.5 × 10 screw.
2. Attach the ring by press fitting.
3. During press fitting equal pressure must be applied round the whole circumference. (Use the installation jig. **)
4. Secure the ring by M2.5 × 10 screw. Tightening torque 0.5 Nm should be applied.

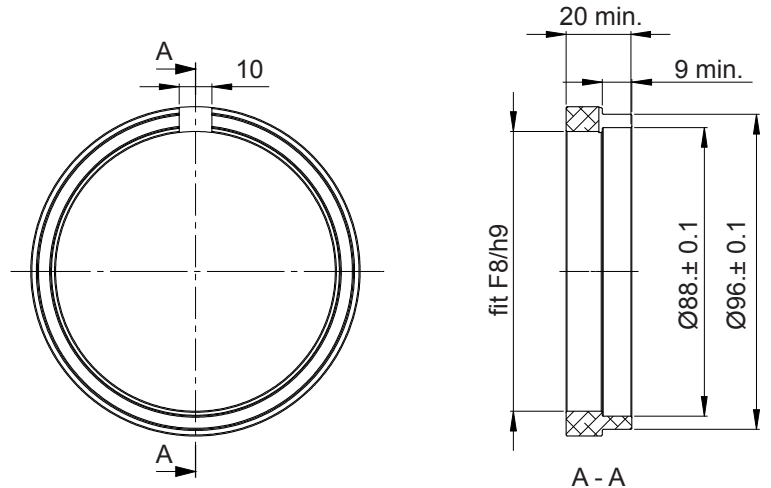


** Not provided.

Shaft dimensions



Recommendation for the installation jig **



* Recommended for replacement purpose.

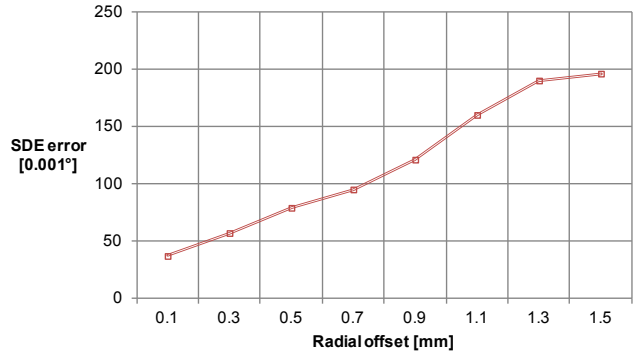
MR031E

Features and compatibility

Outer diameter	31.85 ± 0.10 mm	
Inner diameter	20 H7 mm	
Height	10 ± 0.1 mm	
Mass	33 g	
Pole length	2 mm	5 mm
Number of poles	50	20
Moment of inertia	5,485 gmm ²	
Material of magnetic layer	HNBR + ferrite	
Hub material	EN1.4021 / AISI 420	
Hub thermal expansion coefficient (CTE)	11 × 10 ⁻⁶ K ⁻¹	
Type of reference	Unique*	
Compatibility		
LM10, LM13, RLM, RLC2IC, RLC2HD, RLB	Yes	No
LM15	No	Yes
Protection cover option	Yes	

* Reference mark option not available with RLB and RLC2HD readheads.
DCRM not available with LM10/13/15, RLM and RLC2IC readheads.

SDE error 50 poles

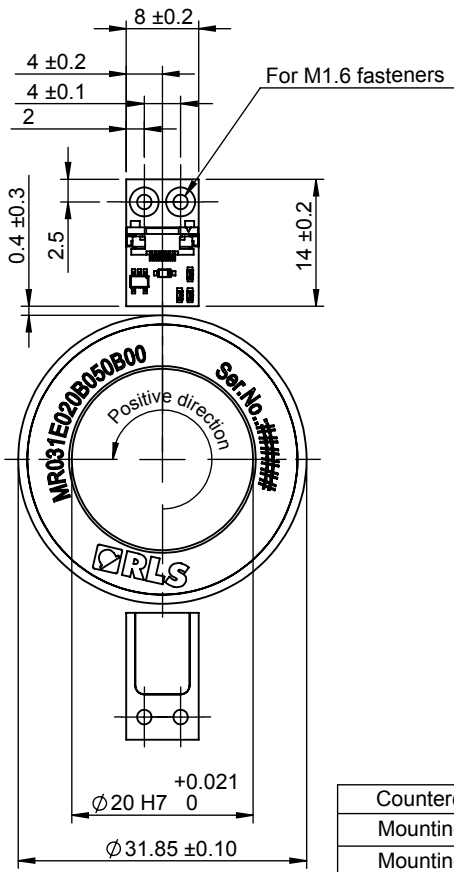


For maximum speed tables go to:

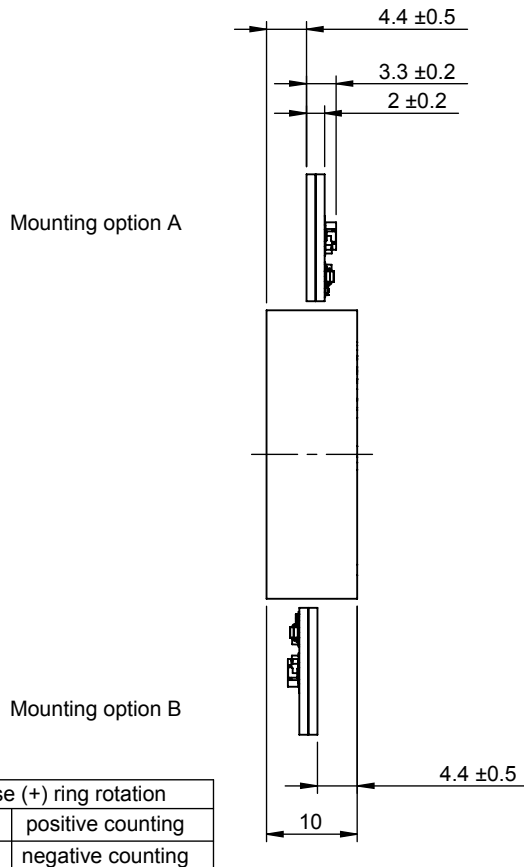
www.rls.si/mr031e-radial-max-speed-table-50-poles and
www.rls.si/mr031e-radial-max-speed-table-20-poles

Dimensions and installation tolerance

Dimensions and tolerances in mm.



RLB



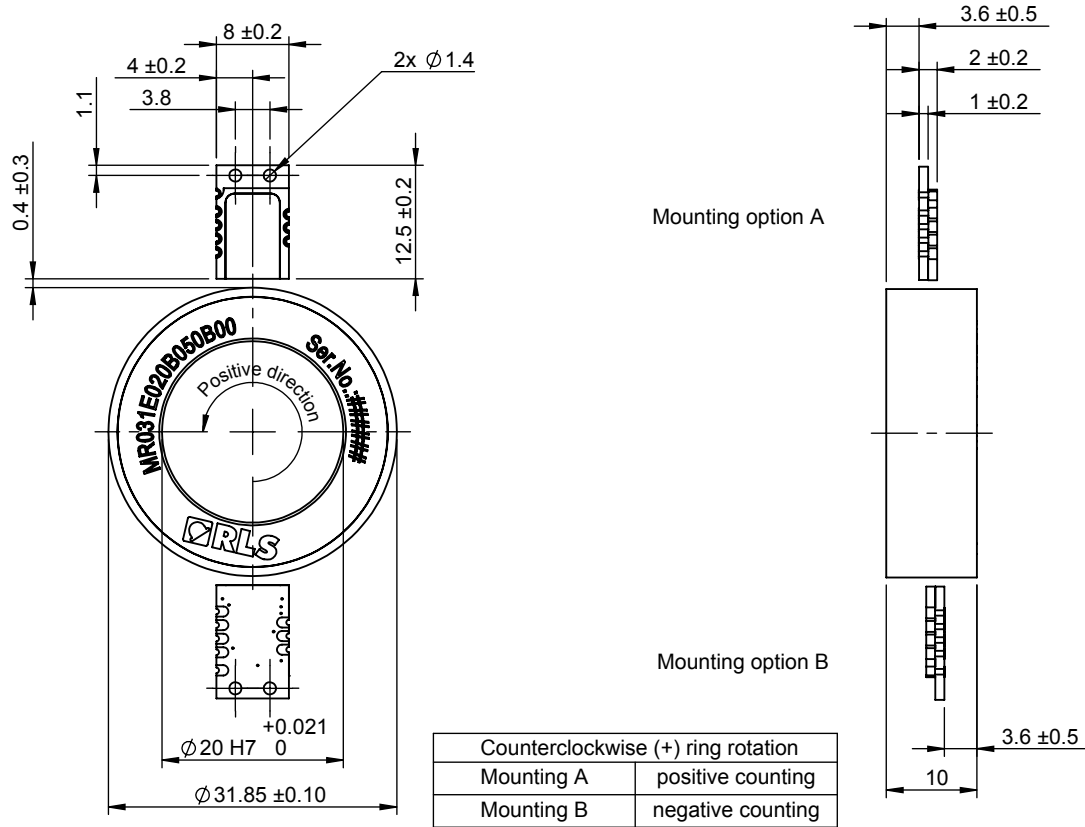
Outer diameter: 31.85 ± 0.1 mm
 Inner diameter: 20 H7 mm
 Number of poles: 50 / 20

MR031E

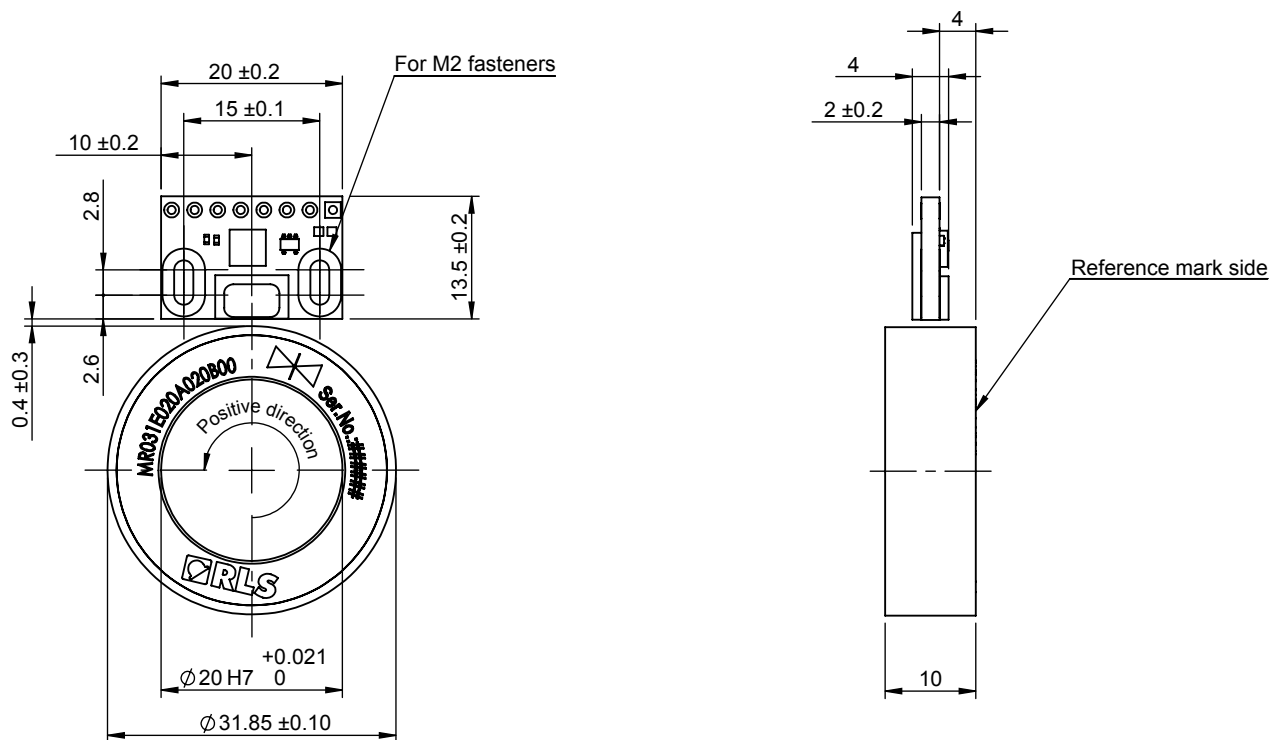
Dimensions and installation tolerance

Dimensions and tolerances in mm.

RLC2HD



RLC21C



MR031E

Outer diameter: 31.85 ± 0.1 mm

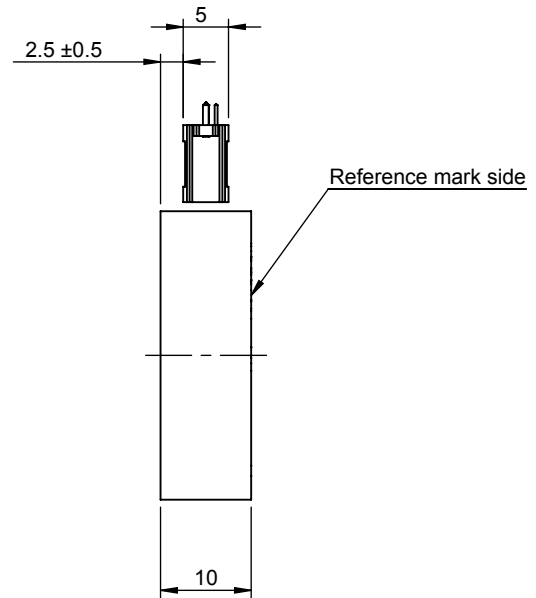
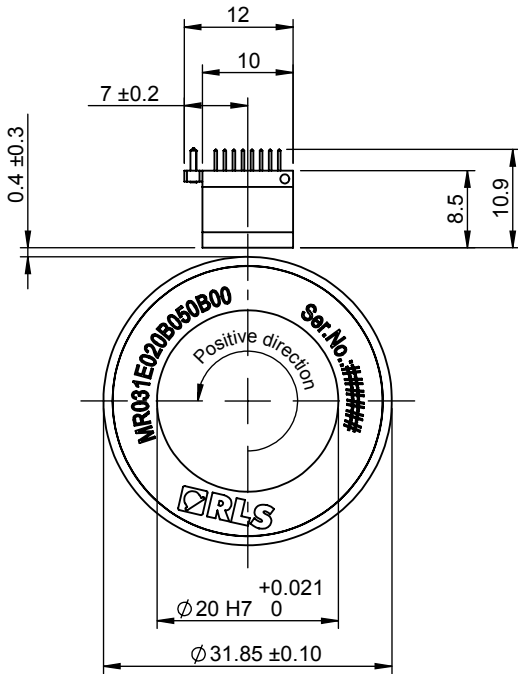
Inner diameter: 20 H7 mm

Number of poles: 50 / 20

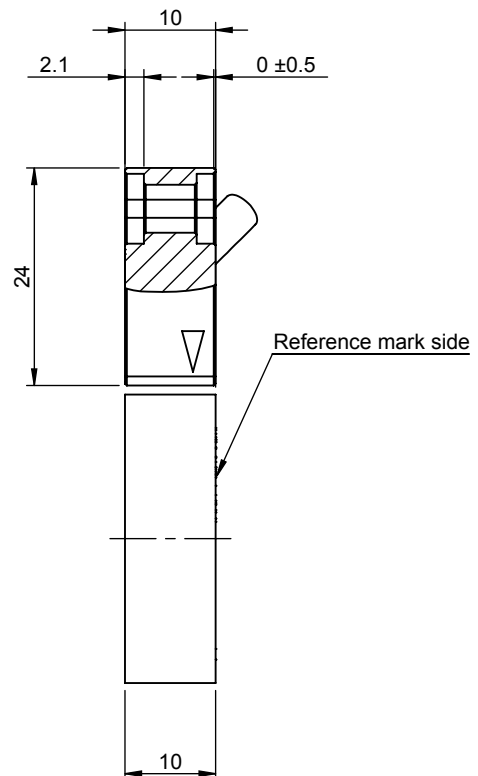
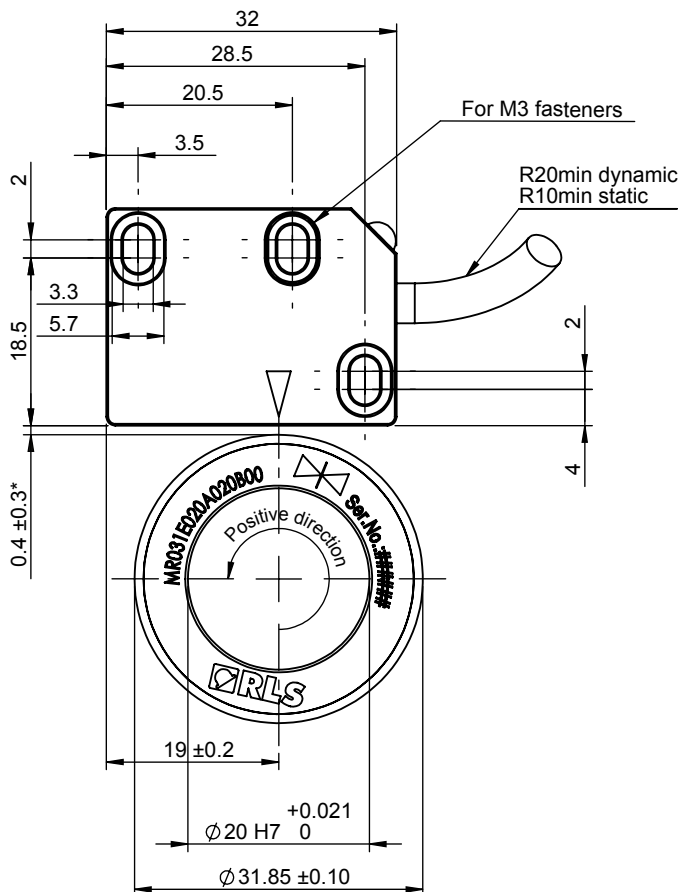
Dimensions and installation tolerance

Dimensions and tolerances in mm.

RLM



LM10/15



* For LM15: 0.1 - 4 mm

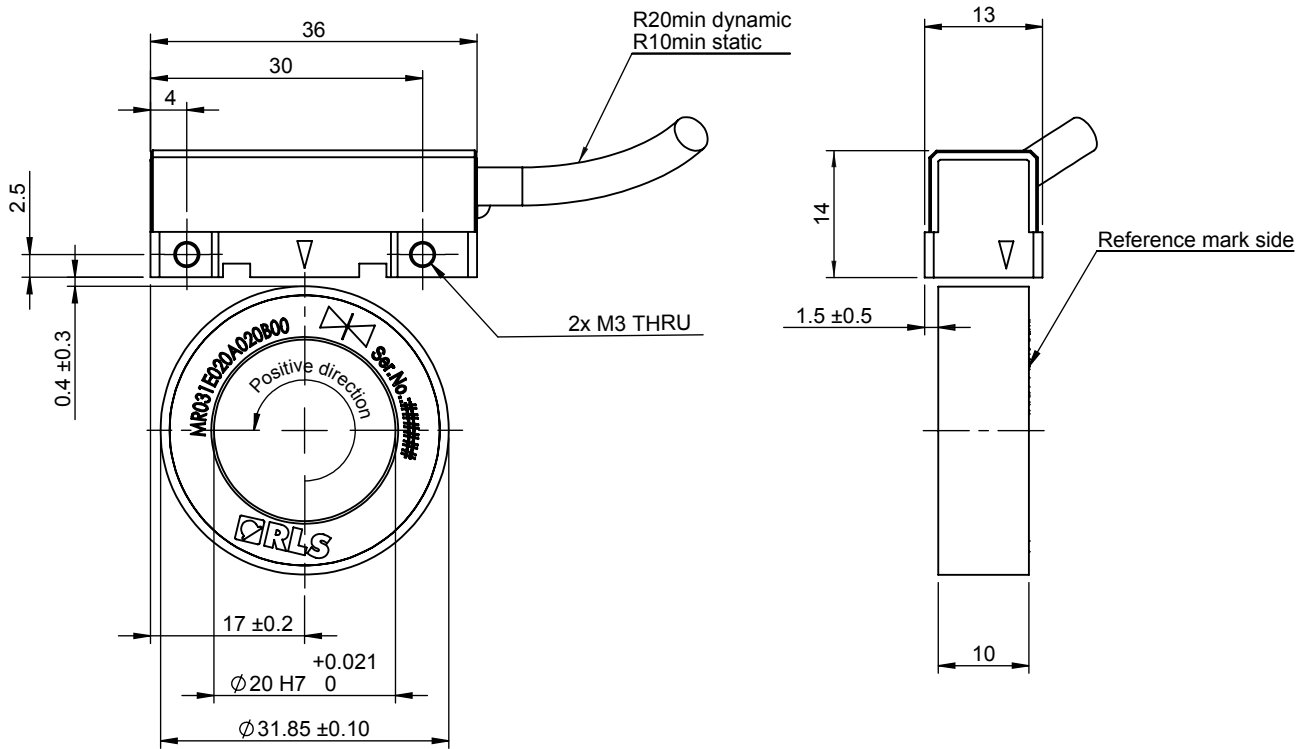
Outer diameter: 31.85 ± 0.1 mm
Inner diameter: 20 H7 mm
Number of poles: 50 / 20

MR031E

Dimensions and installation tolerance

Dimensions and tolerances in mm.

LM13



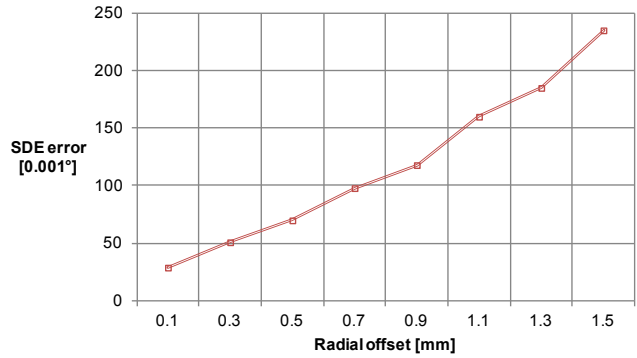
MR031G

Features and compatibility

Outer diameter	31.85 ± 0.10 mm	
Inner diameter	20 H7 mm	
Height	8 ± 0.1 mm	
Mass	26 g	
Pole length	2 mm	5 mm
Number of poles	50	20
Moment of inertia	4,250 gmm ²	
Material of magnetic layer	HNBR + ferrite	
Hub material	EN1.4021 / AISI 420	
Hub thermal expansion coefficient (CTE)	11 × 10 ⁻⁶ K ⁻¹	
Type of reference	Unique*	
Compatibility		
LM10, LM13, RLM, RLC2IC, RLC2HD, RLB	Yes	No
LM15	No	Yes
Protection cover option	No	

* Reference mark option not available with RLB and RLC2HD readheads.
DCRM not available with LM10/13/15, RLM and RLC2IC readheads.

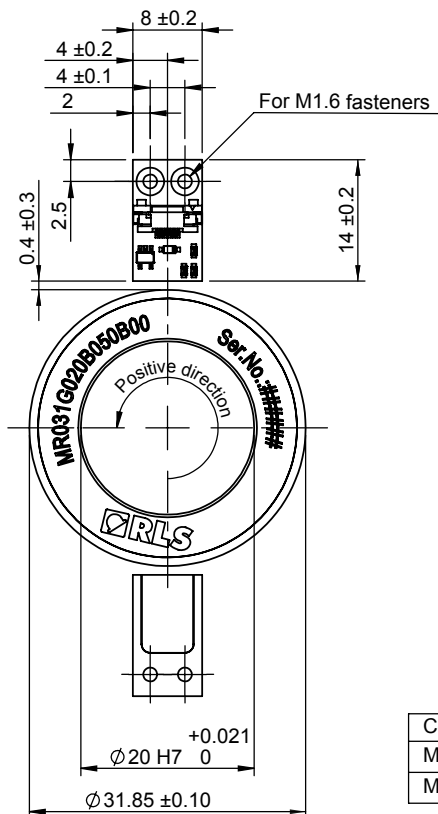
SDE error 50 poles



For maximum speed tables go to:
www.rls.si/mr031g-radial-max-speed-table-50-poles
www.rls.si/mr031g-radial-max-speed-table-20-poles

Dimensions and installation tolerance

Dimensions and tolerances in mm.

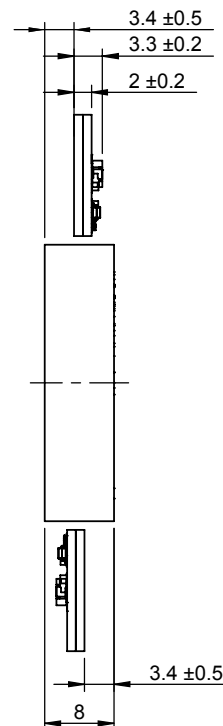


RLB

Mounting option A

Mounting option B

Counterclockwise (+) ring rotation	
Mounting option A	positive counting
Mounting option B	negative counting



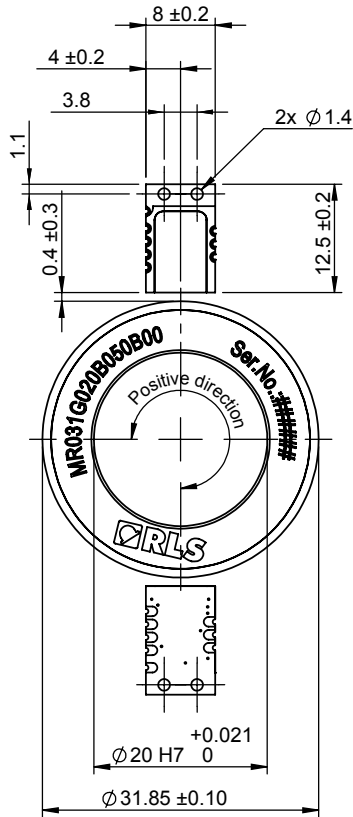
Outer diameter: 31.85 ± 0.10 mm
 Inner diameter: 20 H7 mm
 Number of poles: 50 / 20

MR031G

Dimensions and installation tolerance

Dimensions and tolerances in mm.

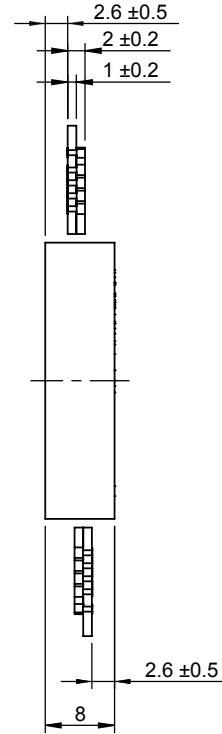
RLC2HD



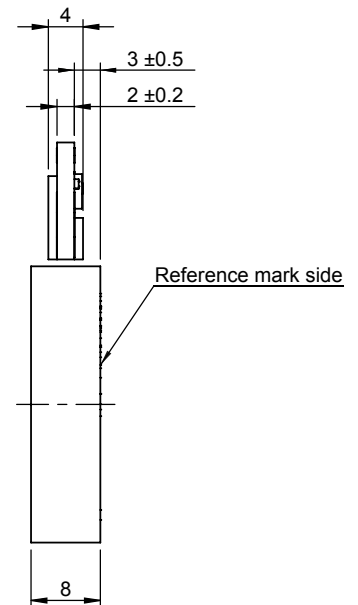
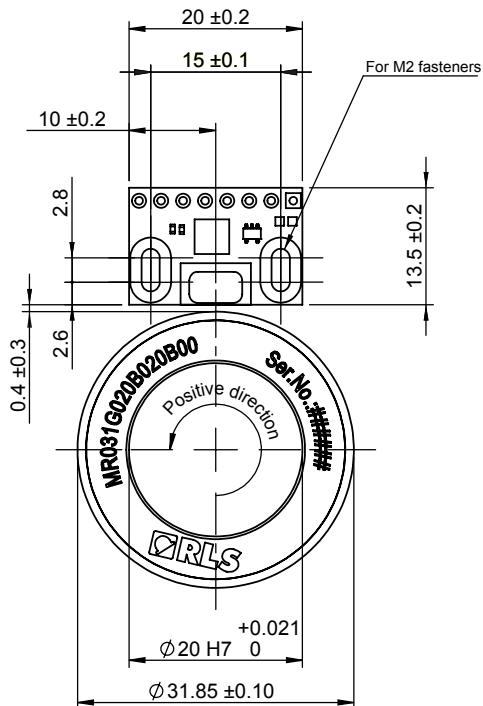
Mounting option A

Mounting option B

Counterclockwise (+) ring rotation	
Mounting option A	positive counting
Mounting option B	negative counting



RLC2IC



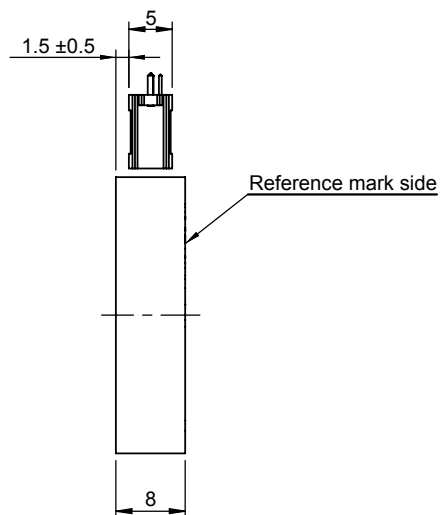
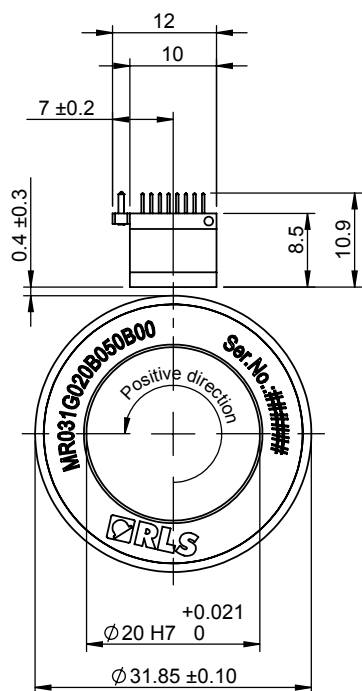
MR031G

Outer diameter: 31.85 ± 0.10 mm
Inner diameter: 20 H7 mm
Number of poles: 50 / 20

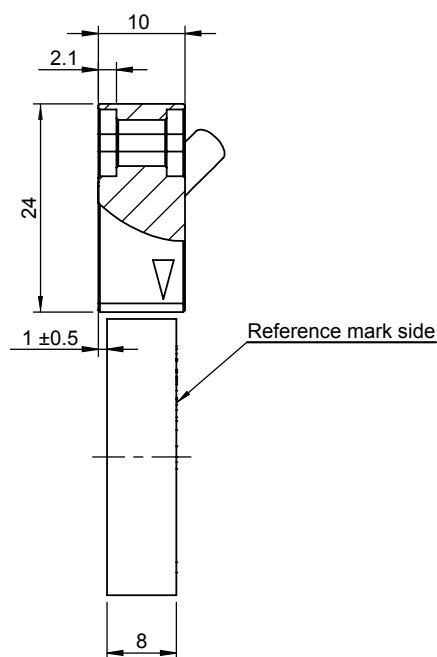
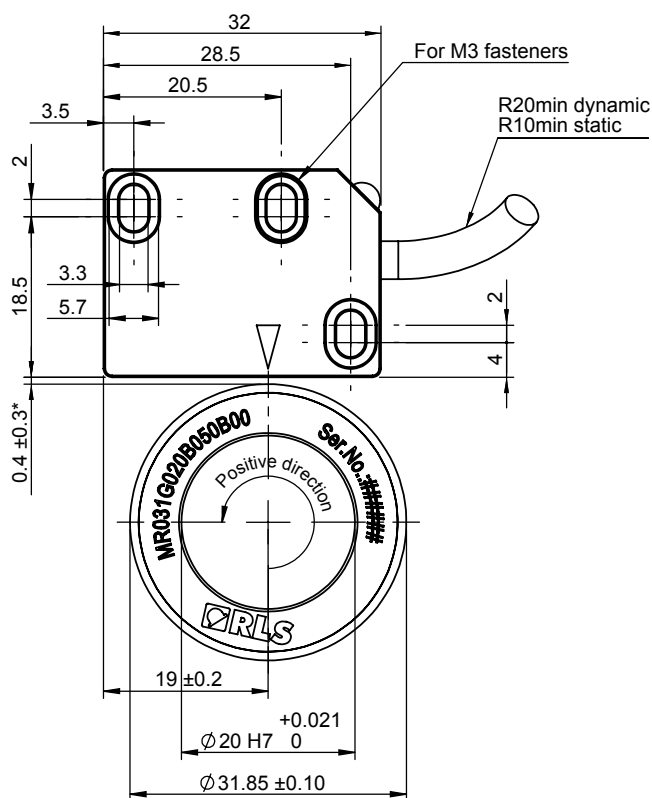
Dimensions and installation tolerance

Dimensions and tolerances in mm.

RLM



LM10/15



* For LM15: 0.1 - 4 mm

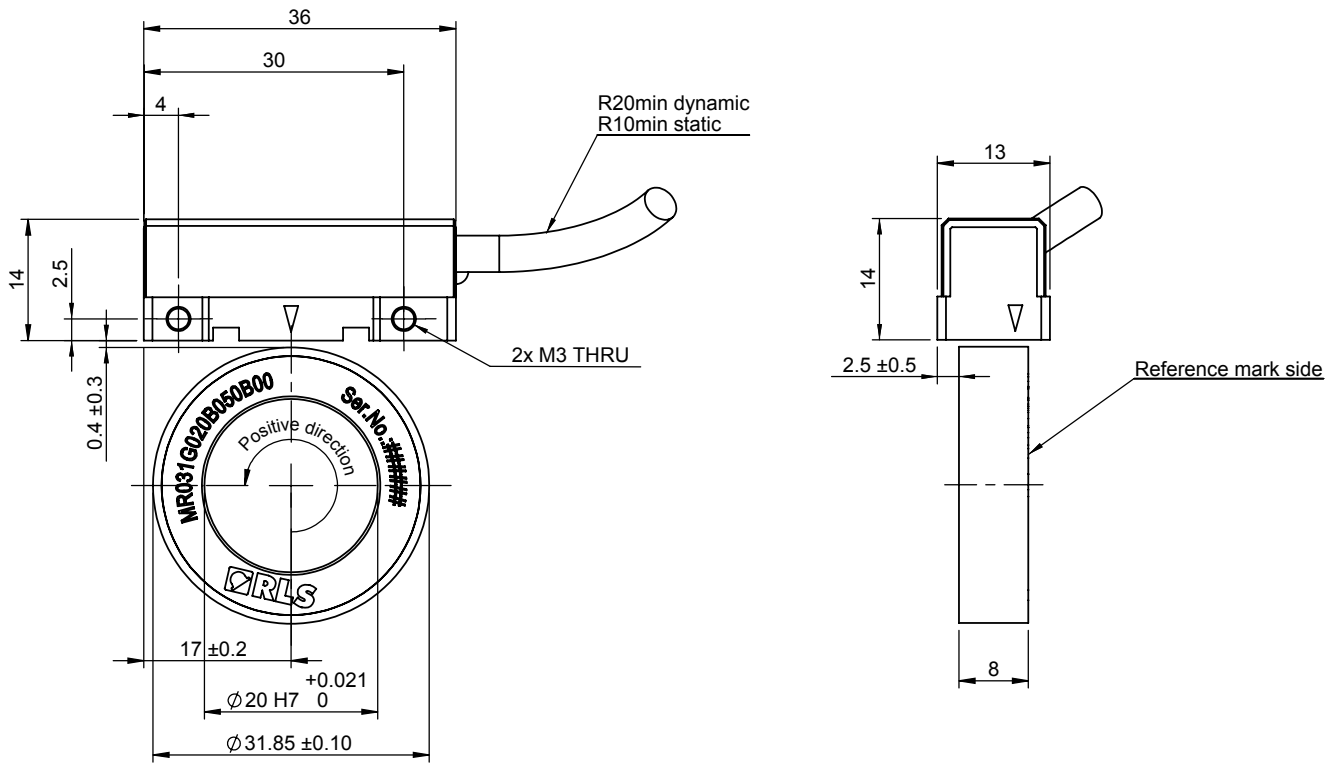
Outer diameter: 31.85 ± 0.10 mm
Inner diameter: 20 H7 mm
Number of poles: 50 / 20

MR031G

Dimensions and installation tolerance

Dimensions and tolerances in mm.

LM13



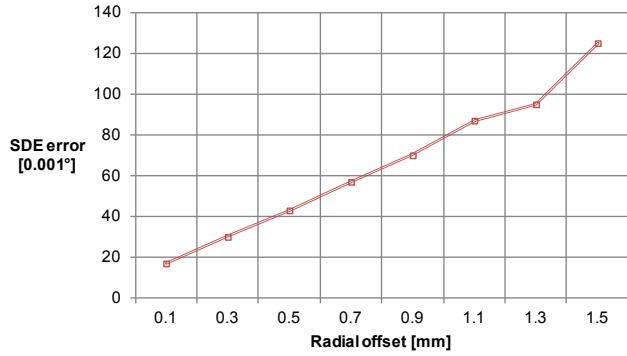
MR040E

Features and compatibility

Outer diameter	40.8 ± 0.1 mm	
Inner diameter	30 H7 mm	
Height	10 ± 0.1 mm	
Mass	40 g	
Pole length	2 mm	5 mm
Number of poles	64	26
Moment of inertia	11,850 gmm ²	
Material of magnetic layer	HNBR + ferrite	
Hub material	EN1.4005 / AISI 416	
Hub thermal expansion coefficient (CTE)	11 × 10 ⁻⁶ K ⁻¹	
Type of reference	Unique or DCRM*	
Basic increment of distance coded reference mark	32 mm / 90°	NA
Compatibility		
LM10, LM13, RLM, RLC2IC, RLC2HD, RLB	Yes	No
LM15	No	Yes
Protection cover option	Yes	

* Reference mark option (including DCRM) not available with RLB and RLC2HD readheads.

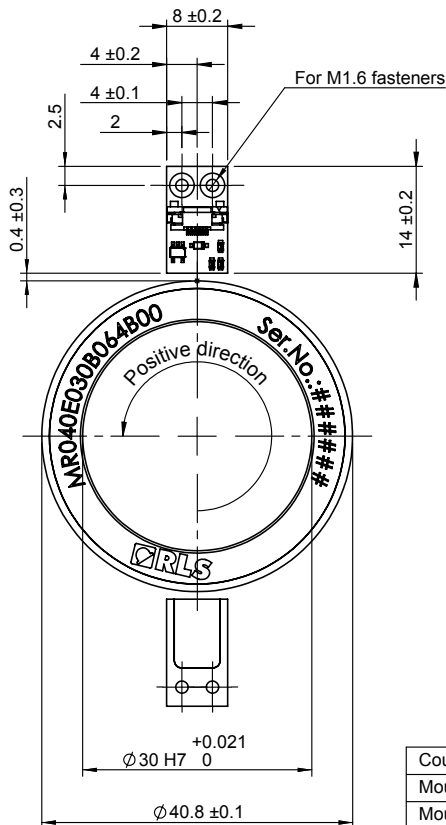
SDE error 64 poles



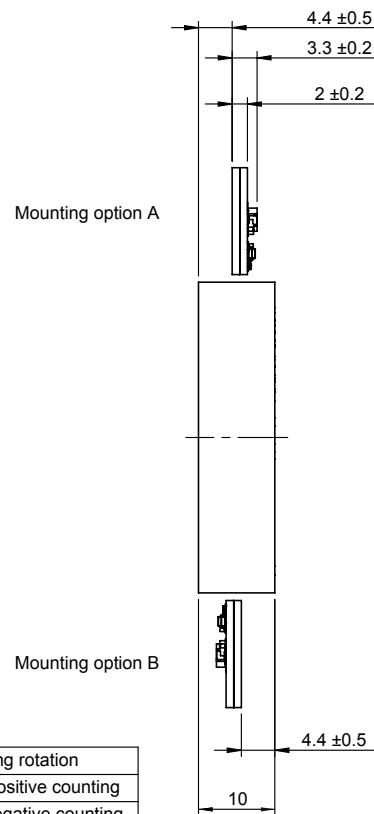
For maximum speed tables please go to
www.rls.si/mr040e-radial-max-speed-table-64-poles
www.rls.si/mr040e-radial-max-speed-table-26-poles

Dimensions and installation tolerance

Dimensions and tolerances in mm.



RLB



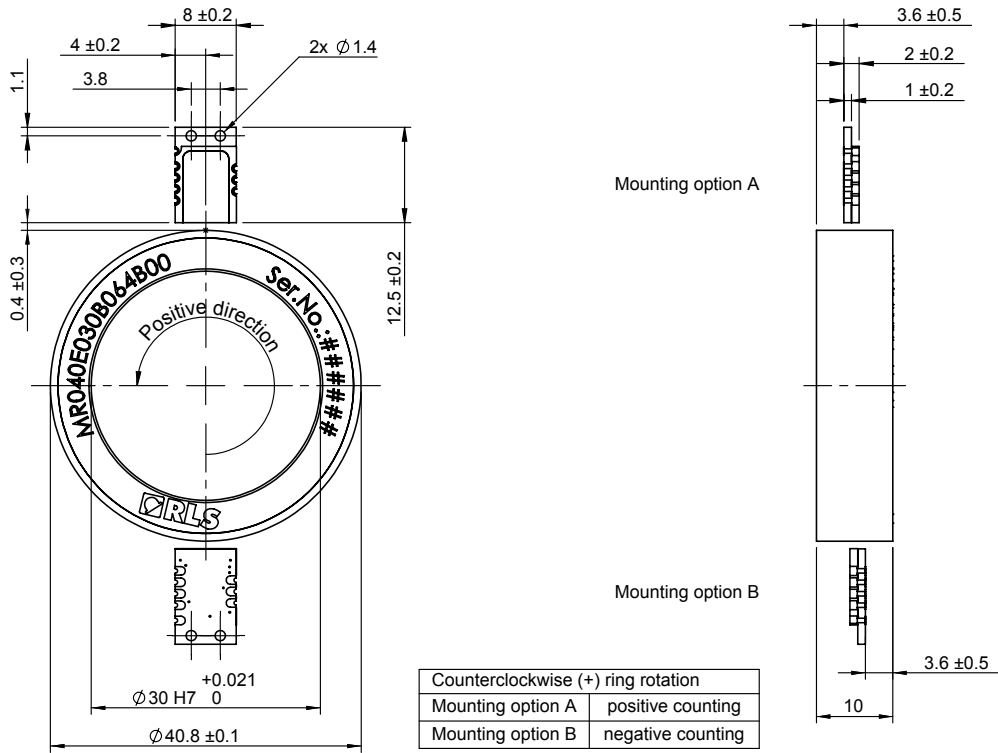
Outer diameter: 40.8 ± 0.1 mm
 Inner diameter: 30 H7 mm
 Number of poles: 64 / 26

MR040E

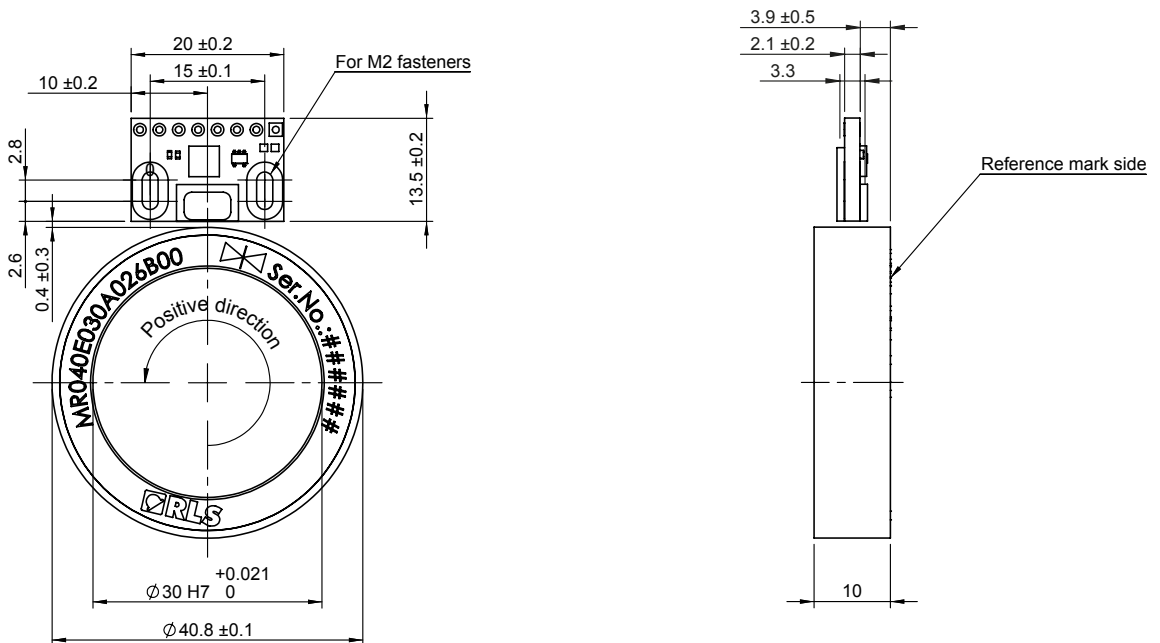
Dimensions and installation tolerance

Dimensions and tolerances in mm.

RLC2HD



RLC2IC



MR040E

Outer diameter: 40.8 ± 0.1 mm

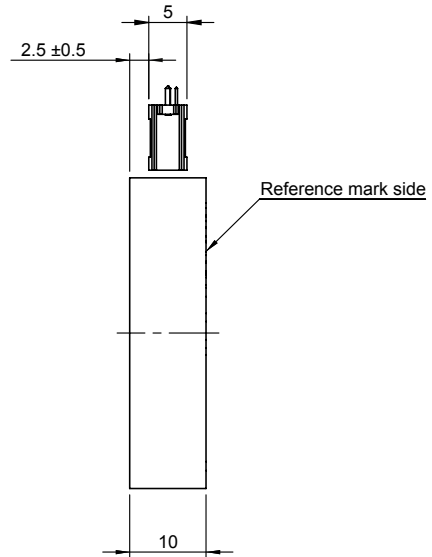
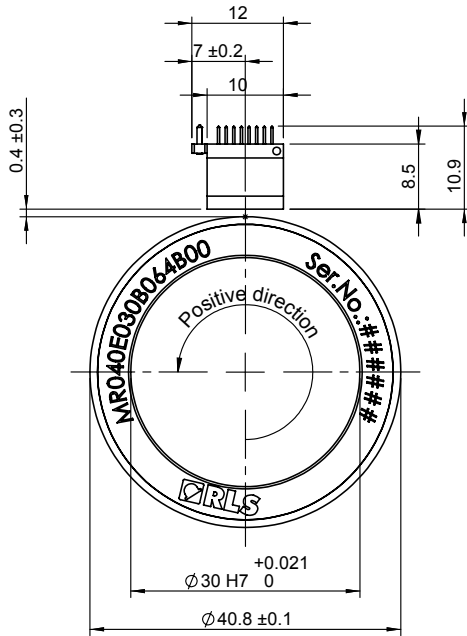
Inner diameter: 30 H7 mm

Number of poles: 64

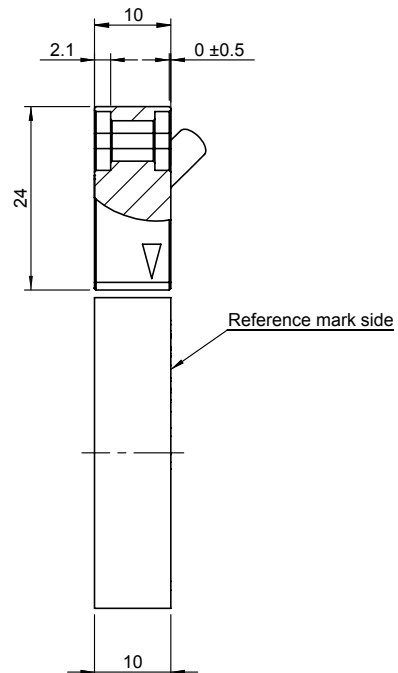
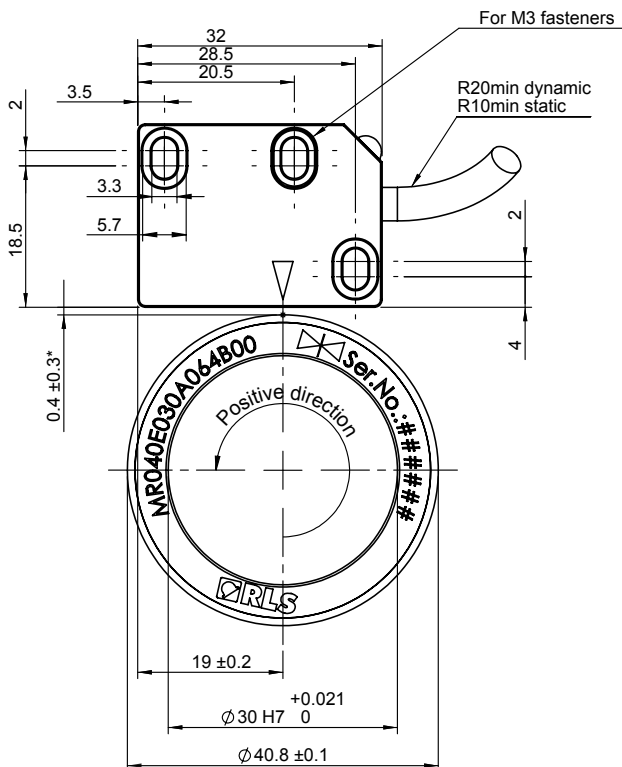
Dimensions and installation tolerance

Dimensions and tolerances in mm.

RLM



LM10/15



* For LM15: $0.1 - 4$ mm

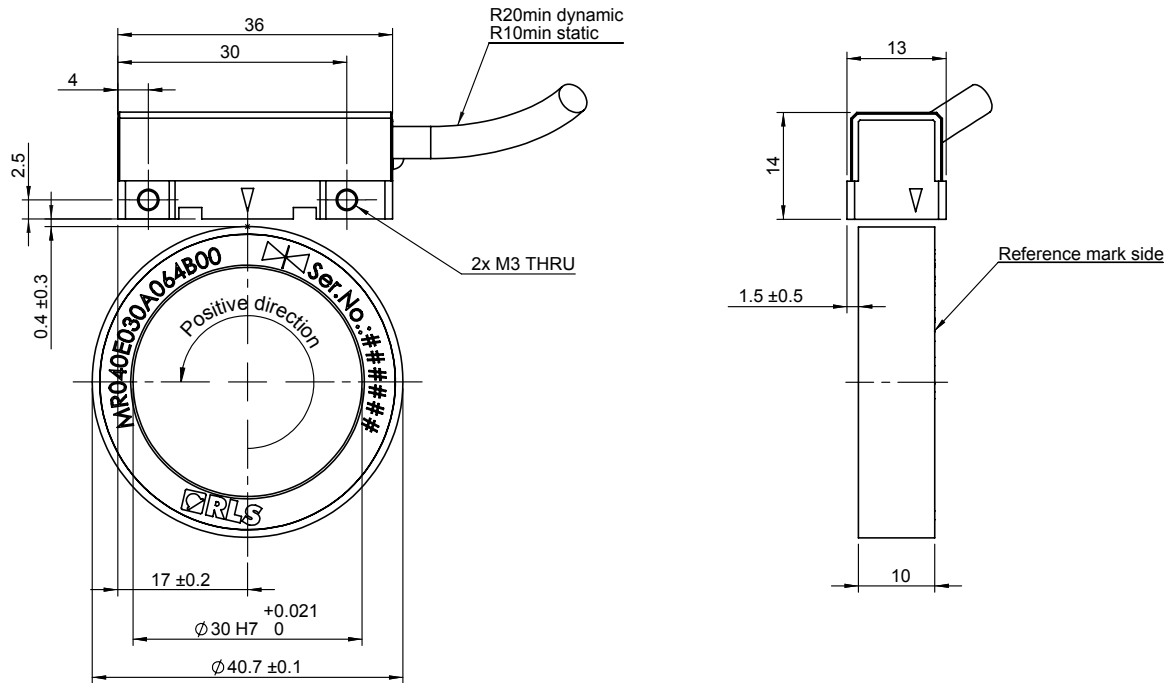
Outer diameter: 40.8 ± 0.1 mm
Inner diameter: 30 H7 mm
Number of poles: 64

MR040E

Dimensions and installation tolerance

Dimensions and tolerances in mm.

LM13



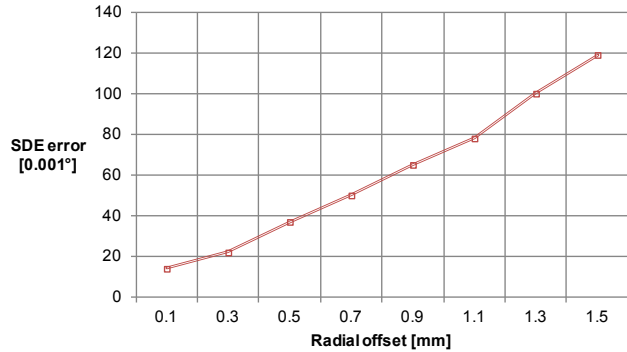
MR040G

Features and compatibility

Outer diameter	40.8 ± 0.1 mm
Inner diameter	30 H7 mm
Height	8 ± 0.1 mm
Mass	32 g
Pole length	2 mm
Number of poles	64
Moment of inertia	9,465 gmm ²
Material of magnetic layer	HNBR + ferrite
Hub material	EN1.4021 / AISI 420
Hub thermal expansion coefficient (CTE)	11 × 10 ⁻⁶ K ⁻¹
Type of reference	Unique or DCRM*
Basic increment of distance coded reference mark	32 mm / 90°
Compatibility	
LM10, LM13, RLM, RLC2IC, RLC2HD, RLB	Yes
LM15	No
Protection cover option	No

* Reference mark option (including DCRM) not available with RLB and RLC2HD readheads.

SDE error

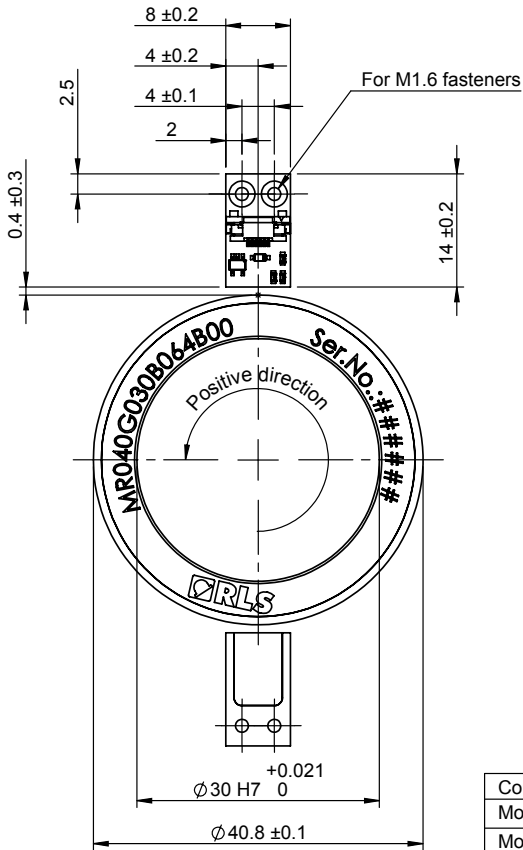


For maximum speed tables go to:
www.rls.si/mr040g-radial-max-speed-table-64-poles

Dimensions and installation tolerance

Dimensions and tolerances in mm.

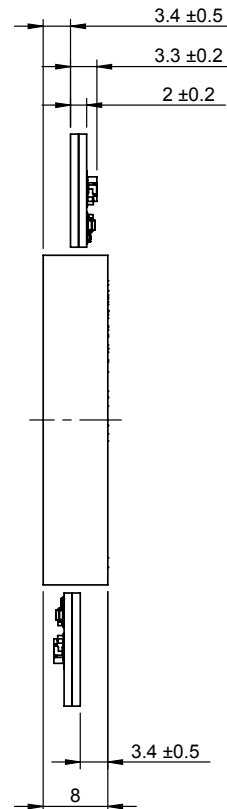
RLB



Mounting option A

Mounting option B

Counterclockwise (+) ring rotation	
Mounting option A	positive counting
Mounting option B	negative counting



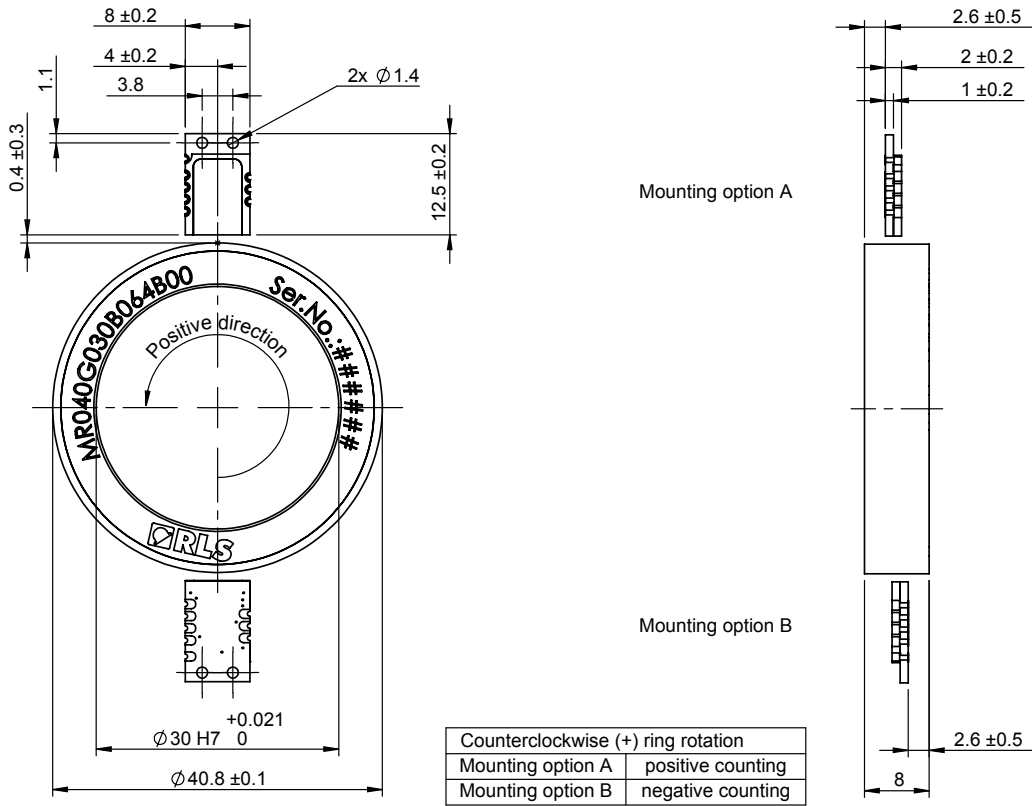
Outer diameter: 40.8 ± 0.1 mm
 Inner diameter: 30 H7 mm
 Number of poles: 64

MR040G

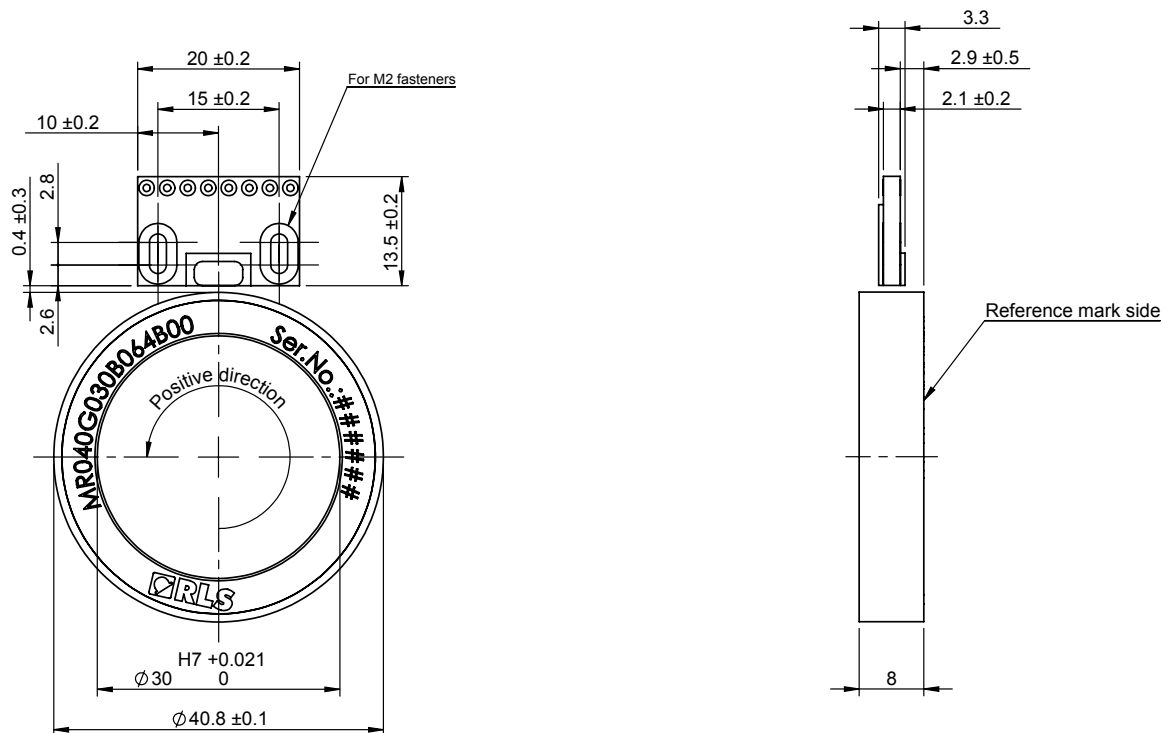
Dimensions and installation tolerance

Dimensions and tolerances in mm.

RLC2HD



RLC2IC



MR040G

Outer diameter: 40.8 ± 0.1 mm

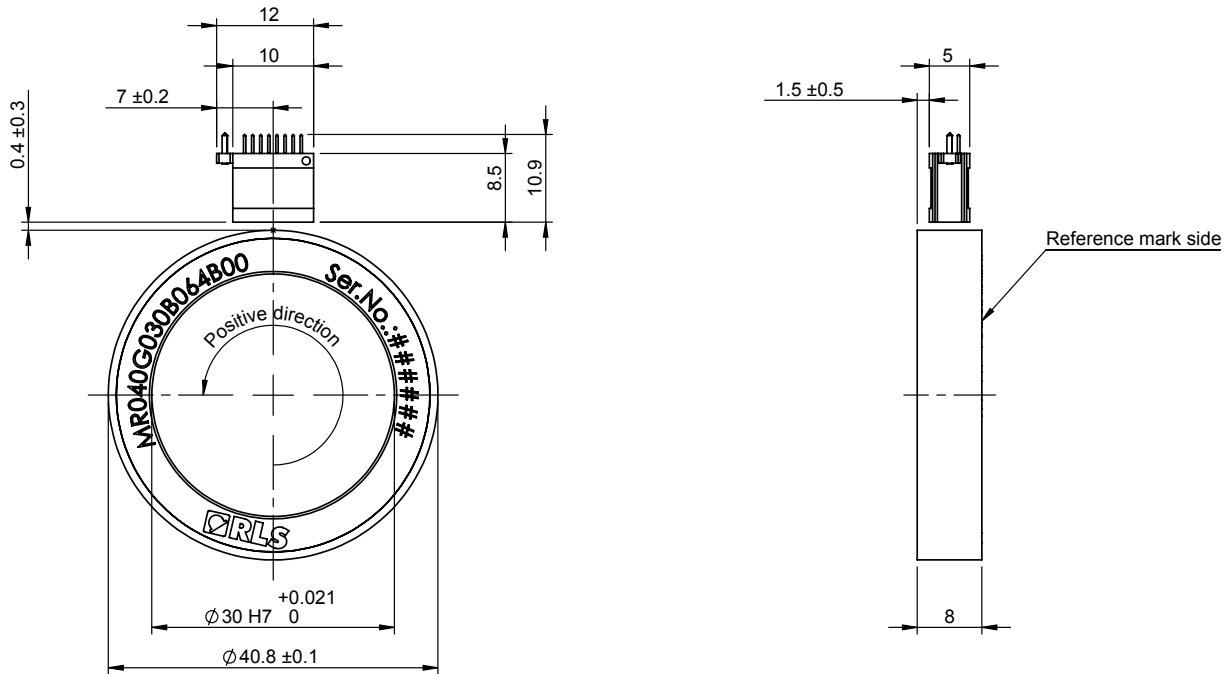
Inner diameter: 30 H7 mm

Number of poles: 64 / 26

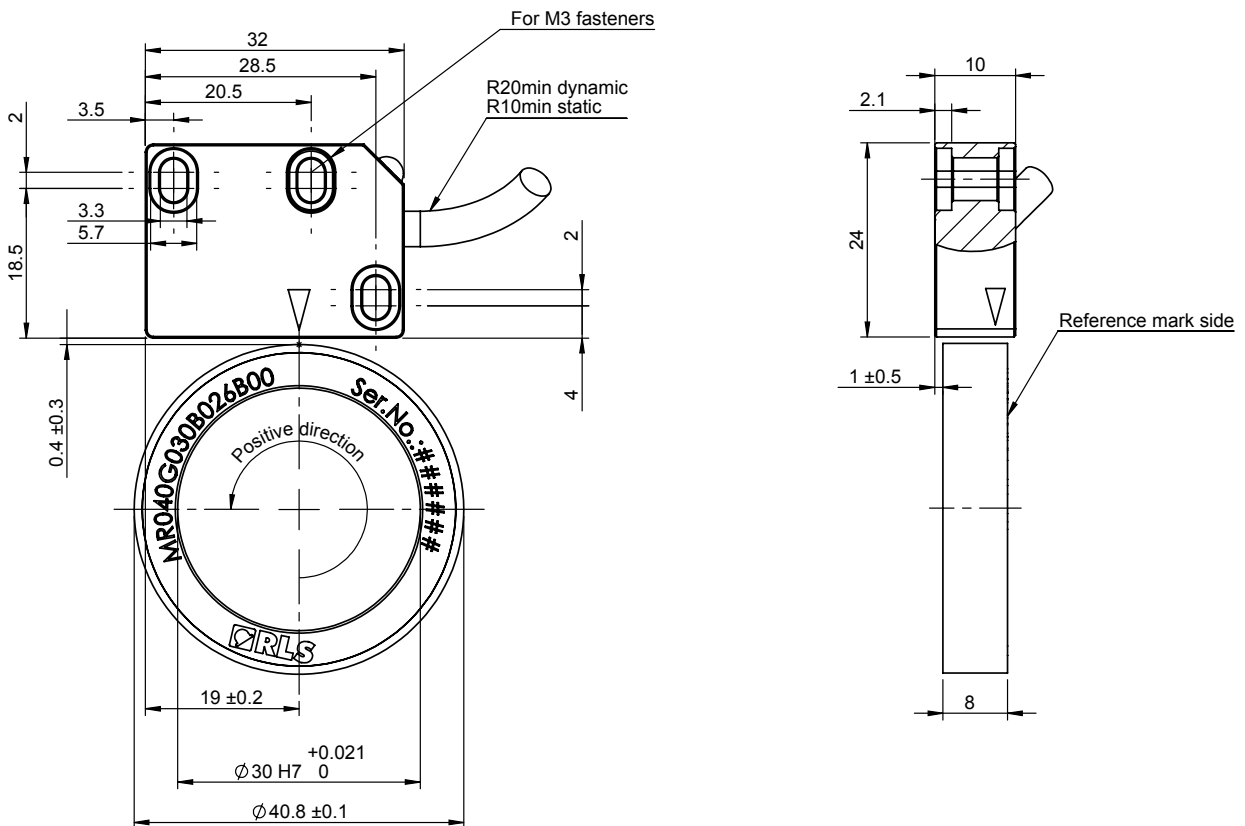
Dimensions and installation tolerance

Dimensions and tolerances in mm.

RLM



LM10



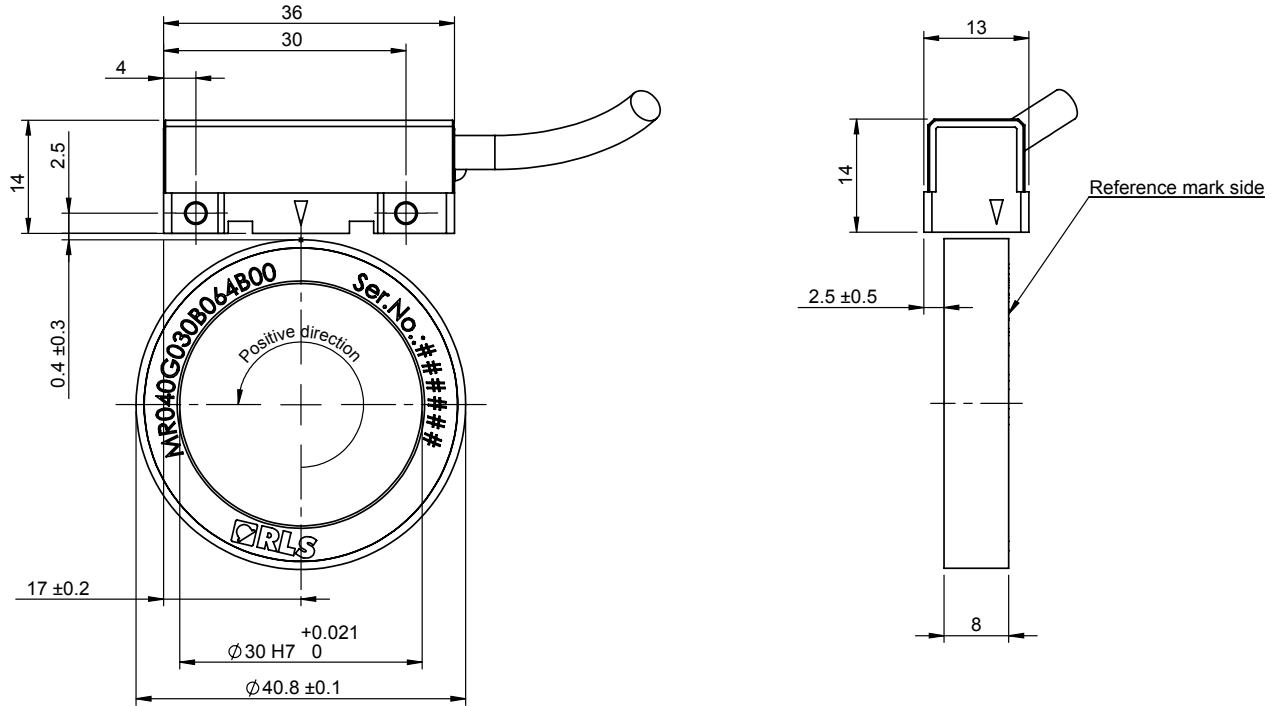
Outer diameter: 40.8 ± 0.1 mm
Inner diameter: 30 H7 mm
Number of poles: 64 / 26

MR040G

Dimensions and installation tolerance

Dimensions and tolerances in mm.

LM13



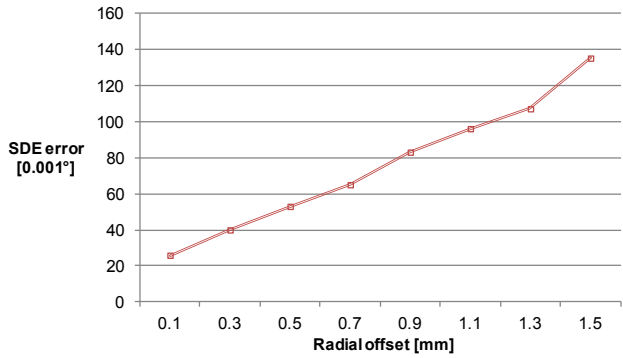
MR047B

Features and compatibility

Outer diameter	47.5 ± 0.1 mm
Inner diameter	40 ± 0.1 mm
Installation diameter	44 ± 0.02 mm
Height	5.5 ± 0.1 mm
Mass	10 g
Pole length	2 mm
Number of poles	76
Moment of inertia	4,500 gmm ²
Material of magnetic layer	HNBR + ferrite
Hub material	EN1.4016 / AISI 430
Hub thermal expansion coefficient (CTE)	10.4 × 10 ⁻⁶ K ⁻¹
Type of reference	Unique *
Compatibility	
LM10, LM13, RLM, RLC2IC, RLC2HD, RLB	Yes
LM15	No
Protection cover option	No

* Reference mark option (including DCRM) not available with RLB and RLC2HD readheads. DCRM not available with LM10/13/15, RLM and RLC2IC readheads.

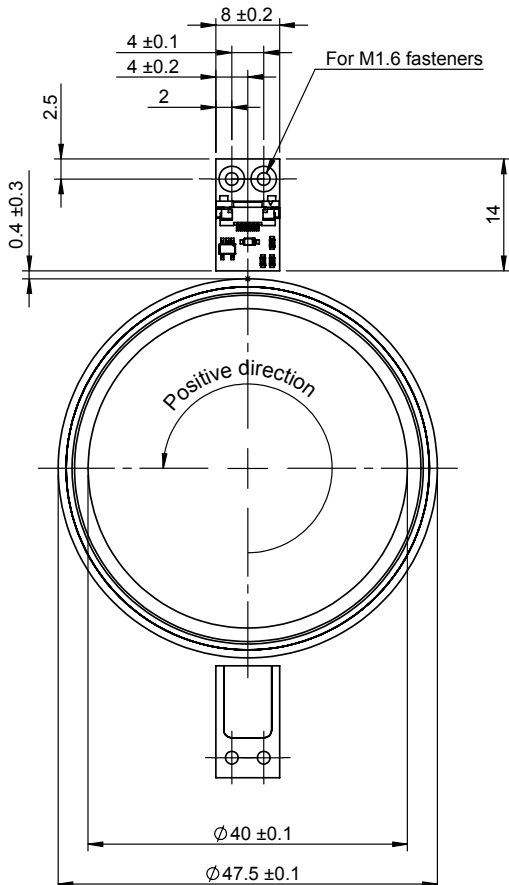
SDE error



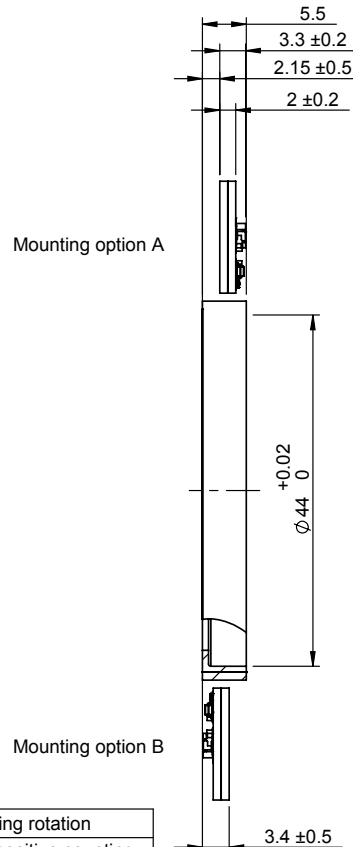
For maximum speed table go to:
www.rls.si/mr047b-radial-max-speed-table-76-poles

Dimensions and installation tolerance

Dimensions and tolerances in mm.



RLB



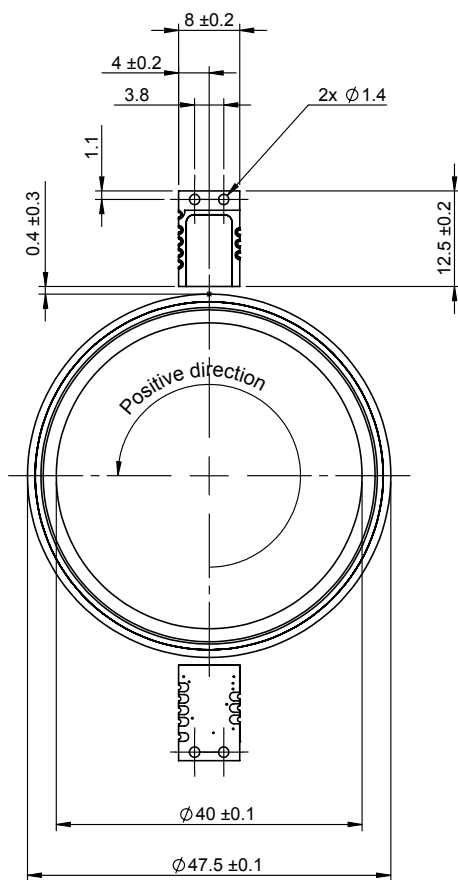
Counterclockwise (+) ring rotation	
Mounting option A	positive counting
Mounting option B	negative counting

Outer diameter: 47.5 ± 0.1 mm
 Inner diameter: 40 ± 0.1 mm
 Number of poles: 76

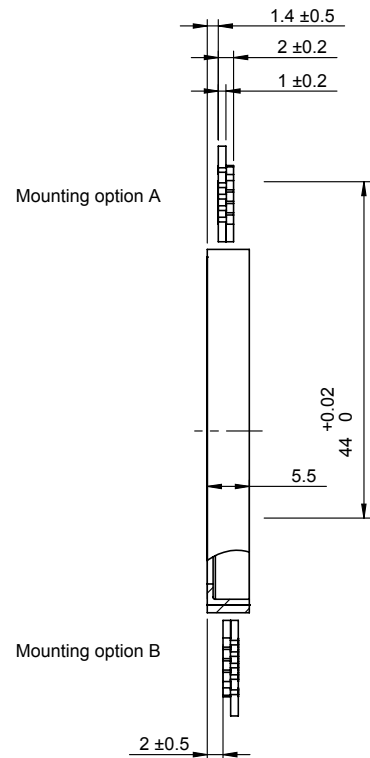
MR047B

Dimensions and installation tolerance

Dimensions and tolerances in mm.

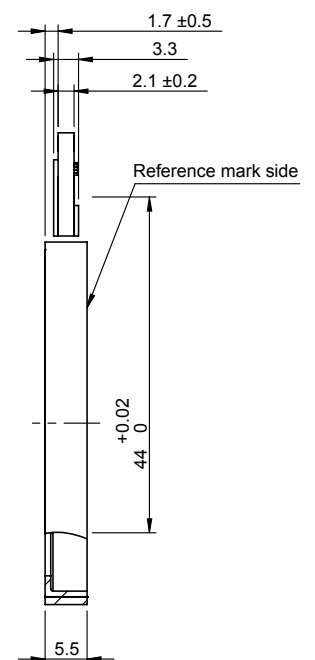
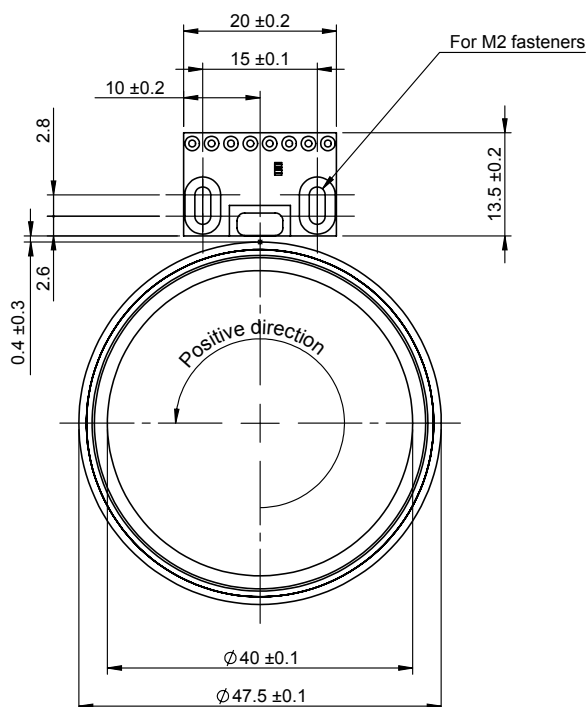


RLC2HD



Counterclockwise (+) ring rotation	
Mounting option A	positive counting
Mounting option B	negative counting

RLC2IC



MR047B

Dimensions and installation tolerance

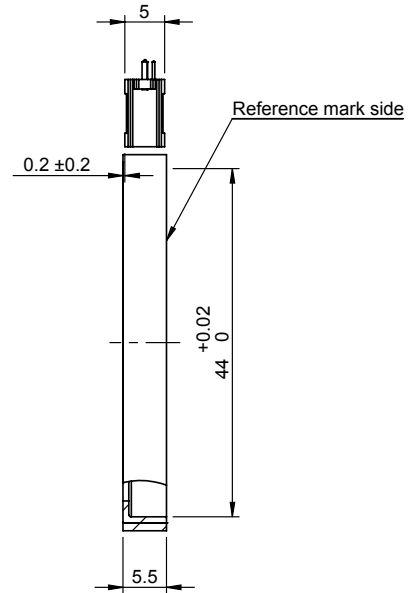
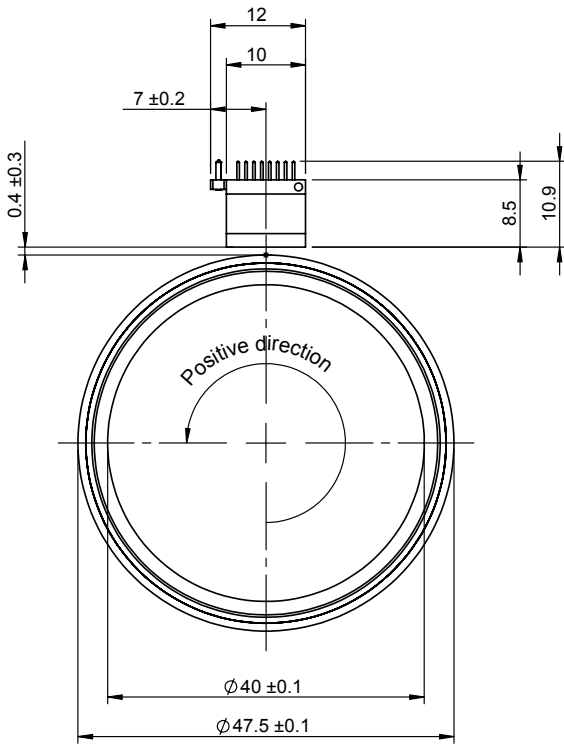
Dimensions and tolerances in mm.

Outer diameter: 47.5 ± 0.1 mm

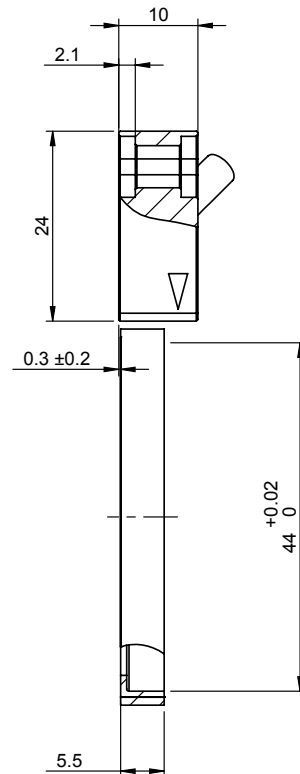
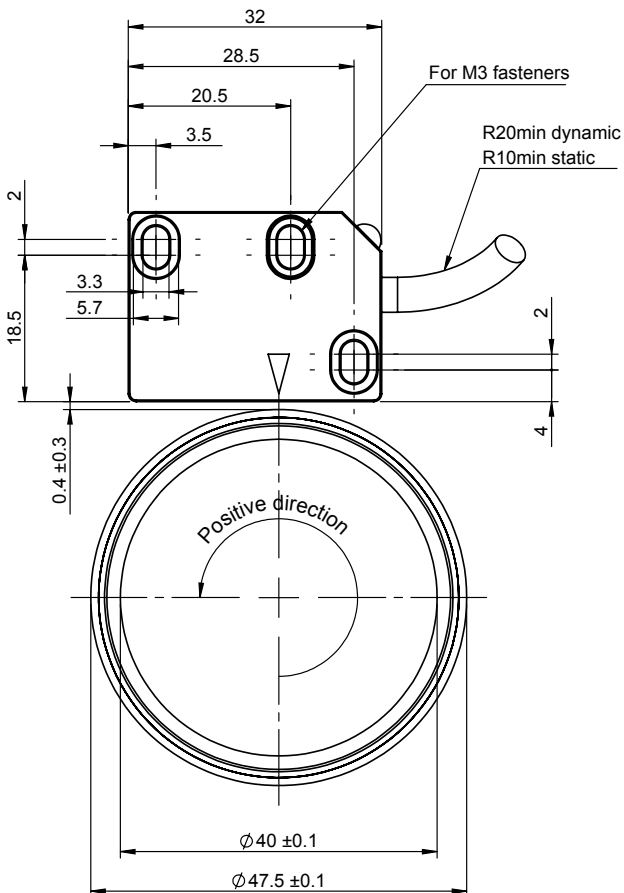
Inner diameter: 40 ± 0.1 mm

Number of poles: 76

RLM



LM10



Outer diameter: 47.5 ± 0.1 mm

Inner diameter: 40 ± 0.1 mm

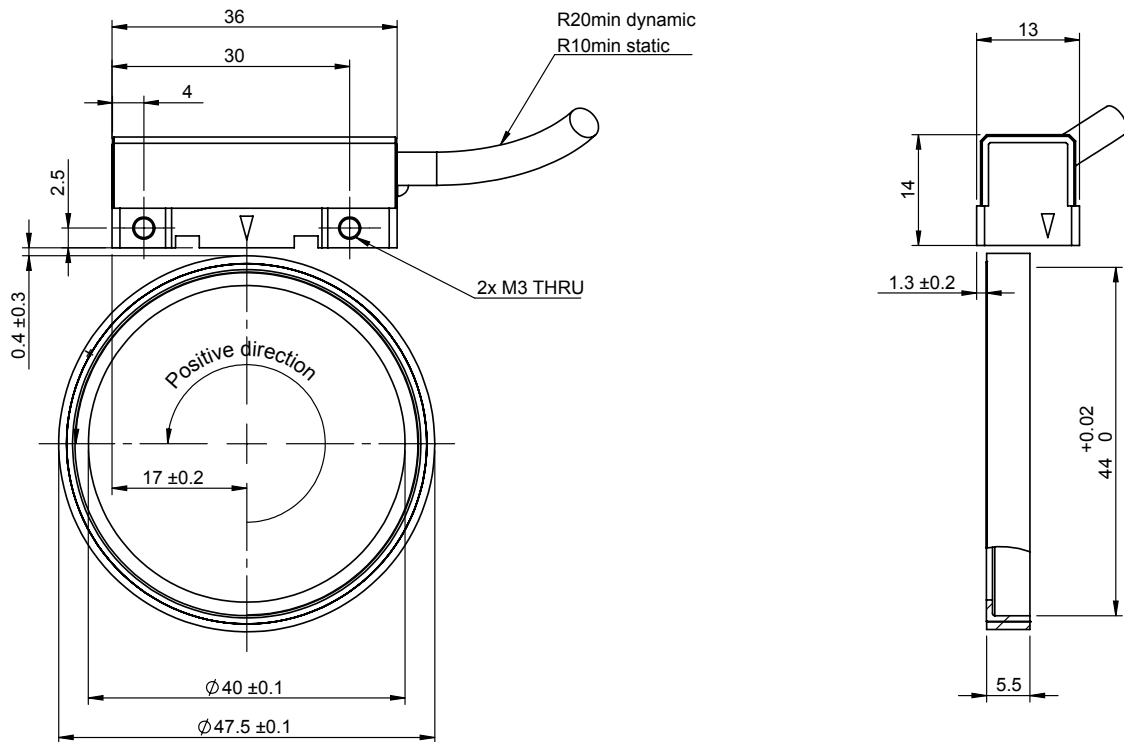
Number of poles: 76

MR047B

Dimensions and installation tolerance

Dimensions and tolerances in mm.

LM13



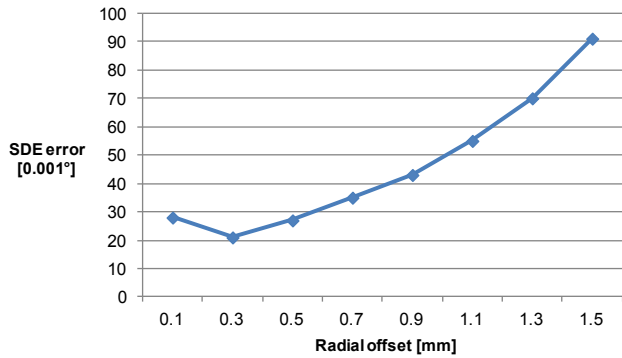
MR050E

Features and compatibility

Outer diameter	50.1 ± 0.1 mm	
Inner diameter	40 H7 mm	
Height	10 ± 0.1 mm	
Mass	50 g	
Pole length	2 mm	5 mm
Number of poles	80	32
Moment of inertia	23,890 gmm ²	
Material of magnetic layer	HNBR + ferrite	
Hub material	EN1.4021 / AISI 420	
Hub thermal expansion coefficient (CTE)	11 × 10 ⁻⁶ K ⁻¹	
Type of reference	Unique*	
Compatibility		
LM10, LM13, RLM, RLC2IC, RLC2HD, RLB	Yes	No
LM15	No	Yes
Protection cover option	Yes	

* Reference mark option not available with RLB and RLC2HD readheads.
DCRM not available with LM10/13/15, RLM and RLC2IC readheads.

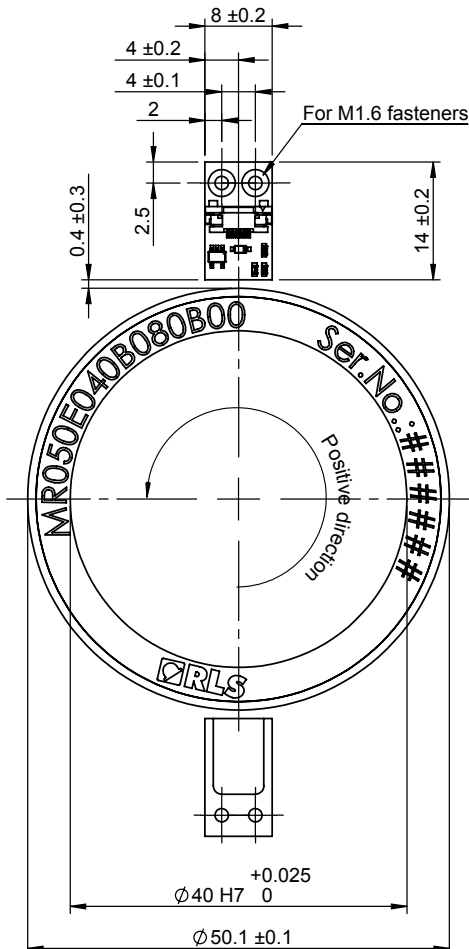
SDE error 80 poles



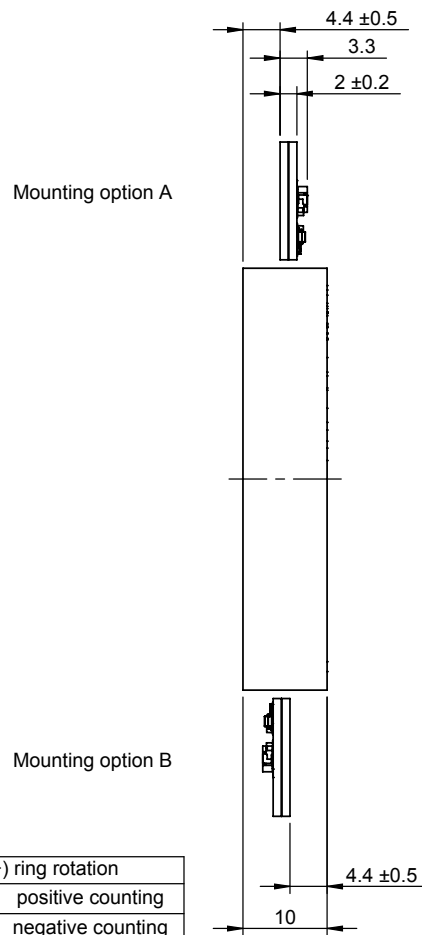
For maximum speed tables go to:
www.rls.si/mr050e-radial-max-speed-table-80-poles
www.rls.si/mr050e-radial-max-speed-table-32-poles

Dimensions and installation tolerance

Dimensions and tolerances in mm.



RLB



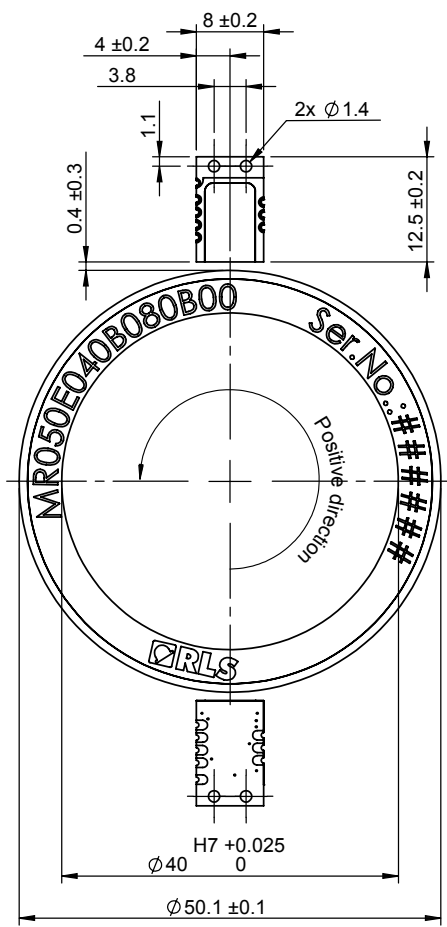
Outer diameter: 50.1 ± 0.1 mm
 Inner diameter: 40 H7 mm
 Number of poles: 80 / 32

MR050E

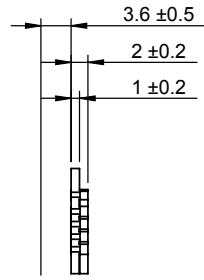
Dimensions and installation tolerance

Dimensions and tolerances in mm.

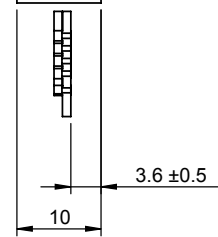
RLC2HD



Mounting option A

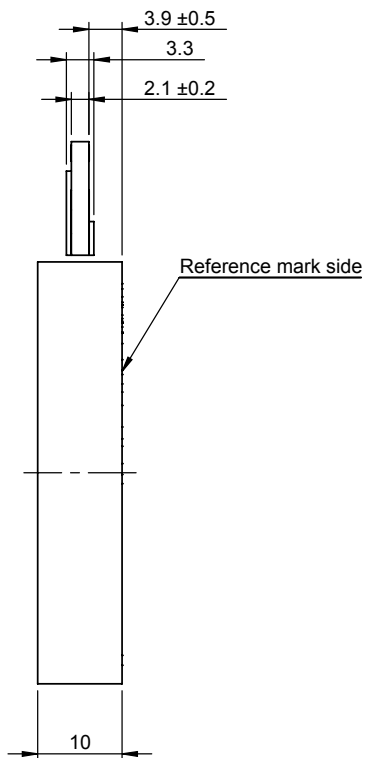
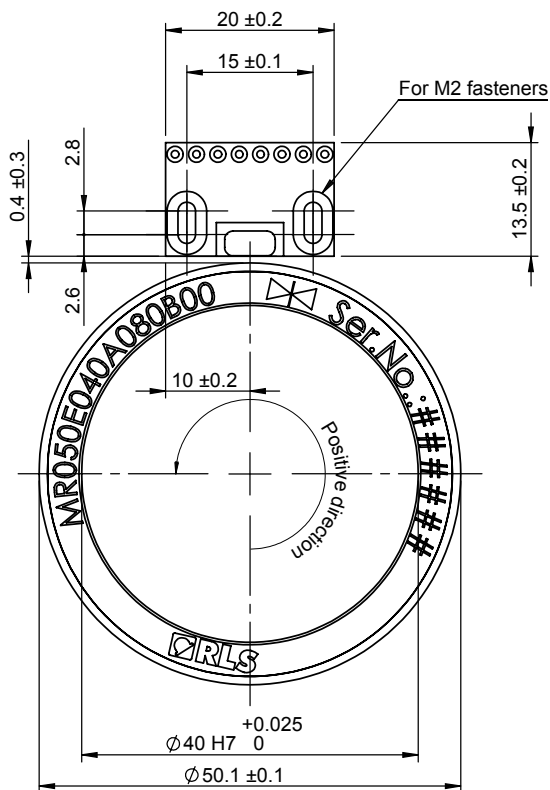


Mounting option B



Counterclockwise (+) ring rotation	
Mounting option A	positive counting
Mounting option B	negative counting

RLC2IC



MR050E

Outer diameter: 50.1 ± 0.1 mm

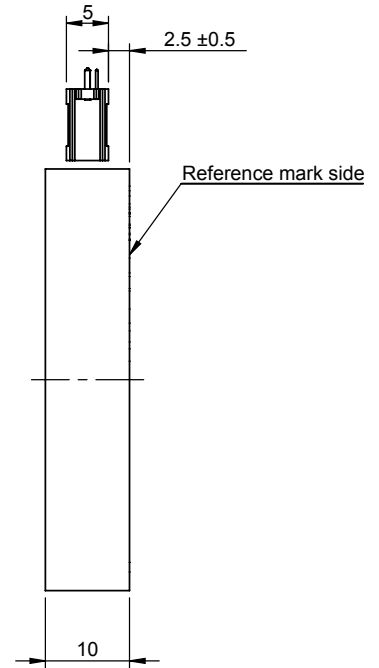
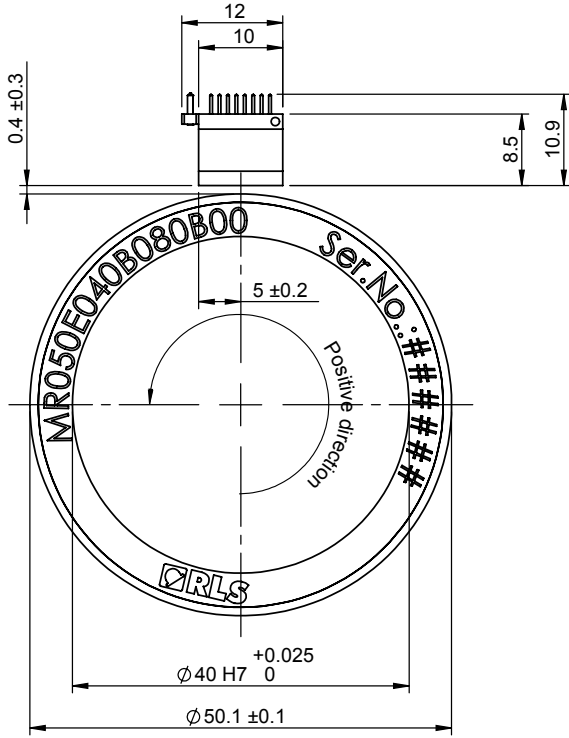
Inner diameter: 40 H7 mm

Number of poles: 80 / 32

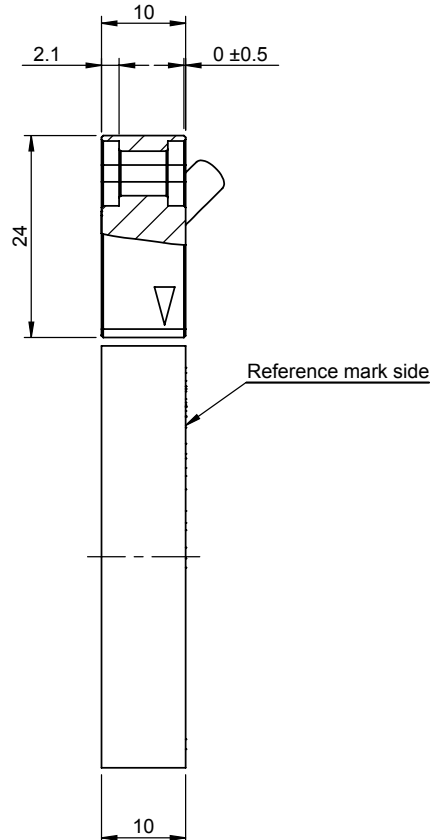
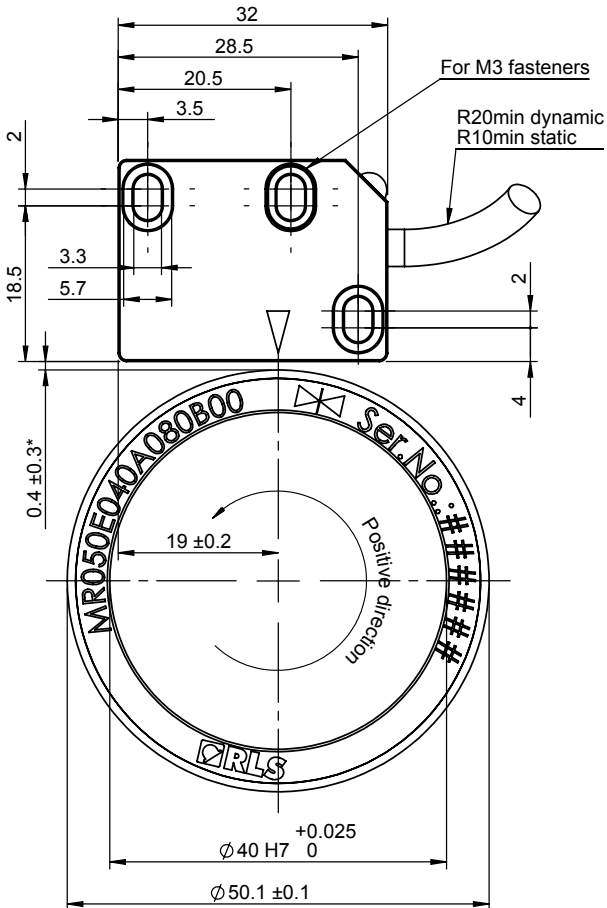
Dimensions and installation tolerance

Dimensions and tolerances in mm.

RLM



LM10/15



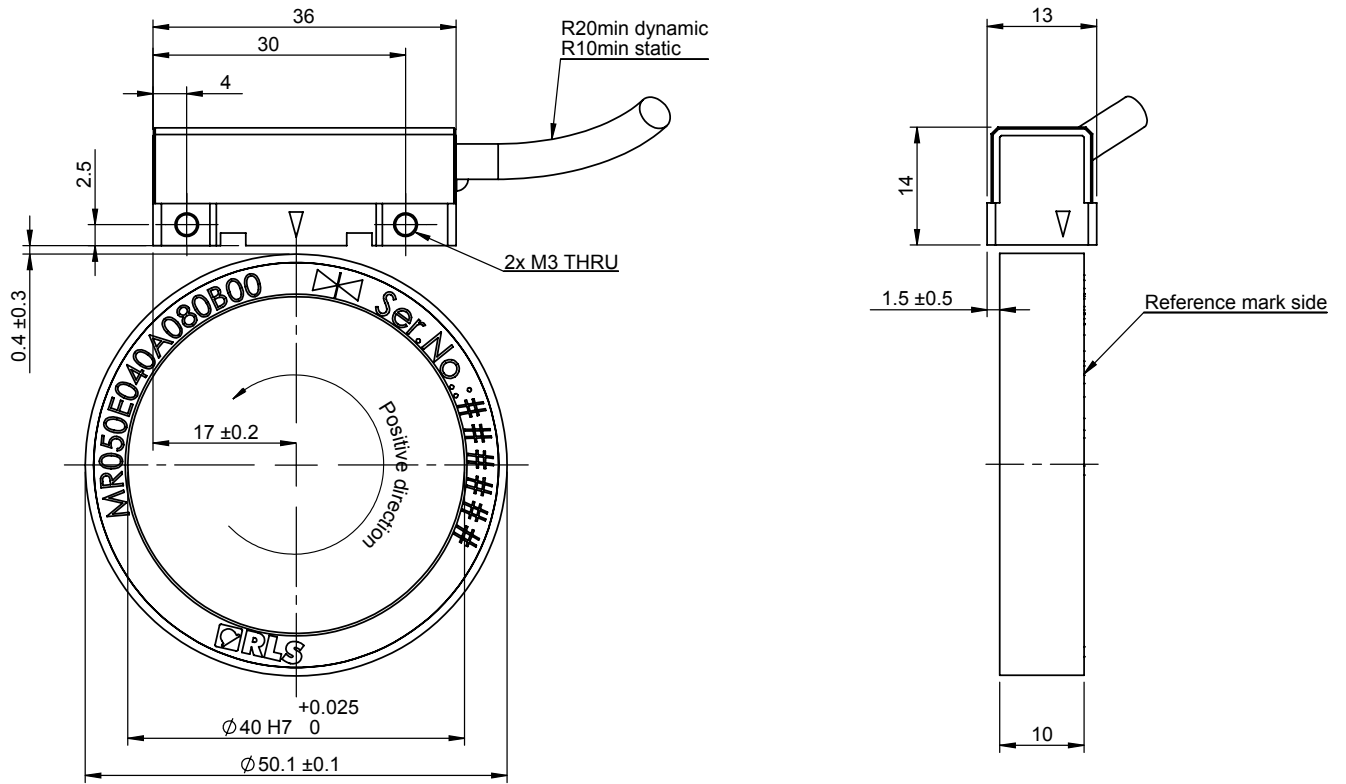
Outer diameter: 50.1 ± 0.1 mm
 Inner diameter: 40 H7 mm
 Number of poles: 80 / 32

MR050E

Dimensions and installation tolerance

Dimensions and tolerances in mm.

LM13



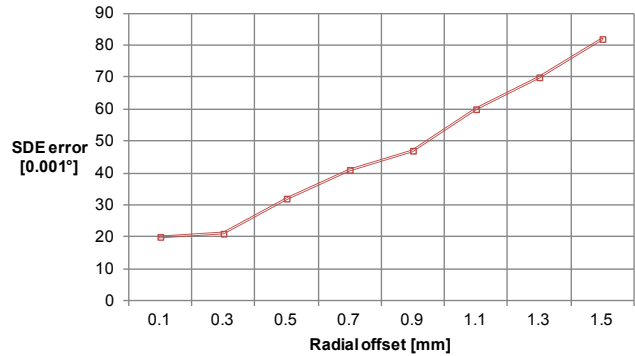
MR057E

Features and compatibility

Outer diameter	57.3 ± 0.1 mm	
Inner diameter	45 H7 mm	
Height	10 ± 0.1 mm	
Mass	68 g	
Pole length	2 mm	5 mm
Number of poles	90	36
Moment of inertia	43,860 gmm ²	
Material of magnetic layer	HNBR + ferrite	
Hub material	EN1.4021 / AISI 420	
Hub thermal expansion coefficient (CTE)	11 × 10 ⁻⁶ K ⁻¹	
Type of reference	Unique or DCRM*	
Basic increment of distance coded reference mark	36 mm / 72°	60 mm / 120°
Compatibility		
LM10, LM13, RLM, RLC2IC, RLC2HD, RLB	Yes	No
LM15	No	Yes
Protection cover option	Yes	

* Reference mark option (including DCRM) not available with RLB and RLC2HD readheads.

SDE error 90 poles



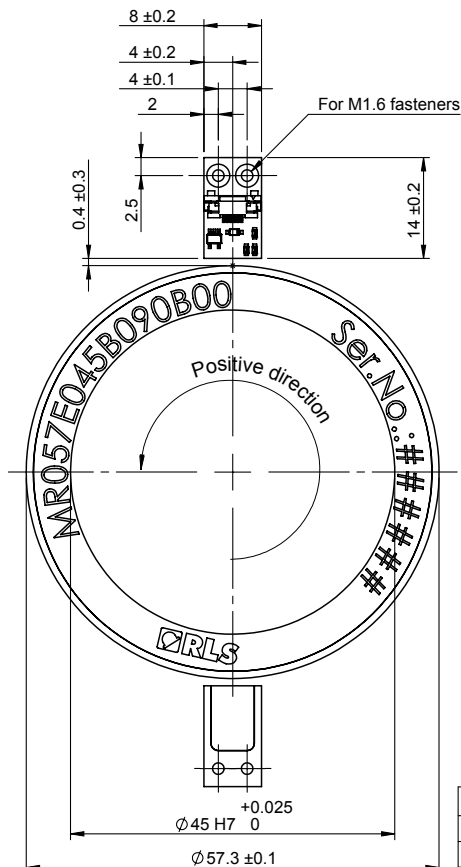
For maximum speed tables go to:

www.rls.si/mr057e-radial-max-speed-table-90-poles

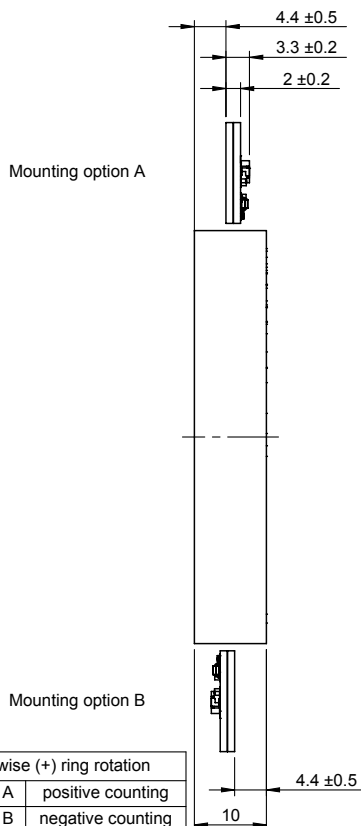
www.rls.si/mr057e-radial-max-speed-table-36-poles

Dimensions and installation tolerance

Dimensions and tolerances in mm.



RLB



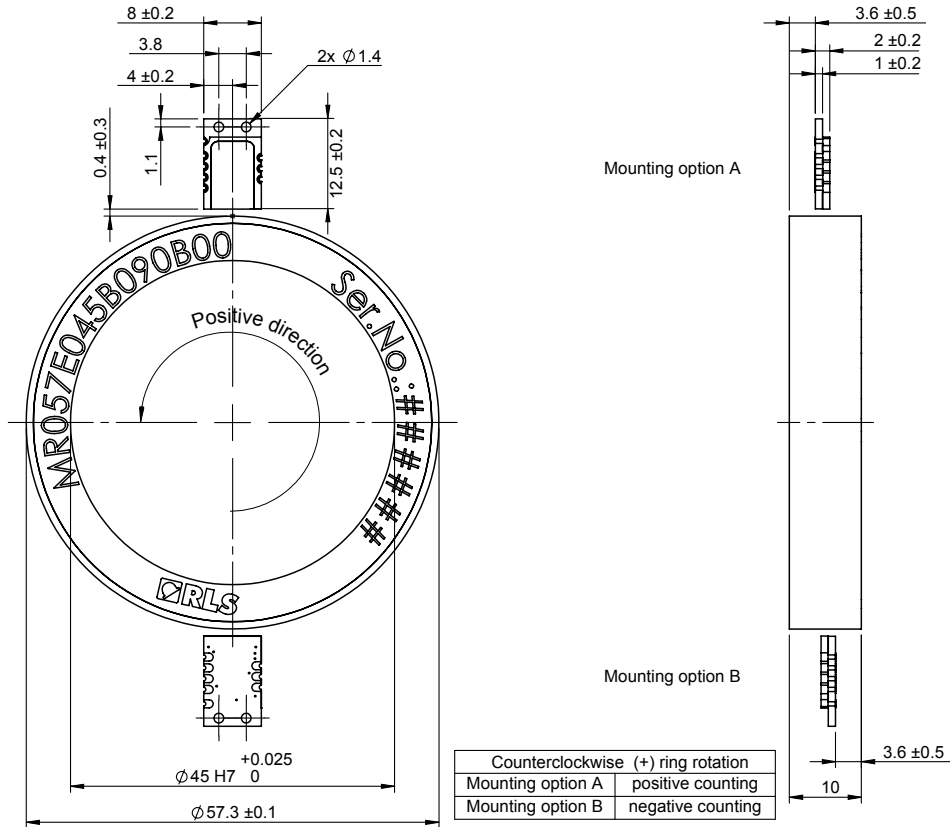
Outer diameter: 57.3 ± 0.1 mm
 Inner diameter: 45 H7 mm
 Number of poles: 90 / 36

MR057E

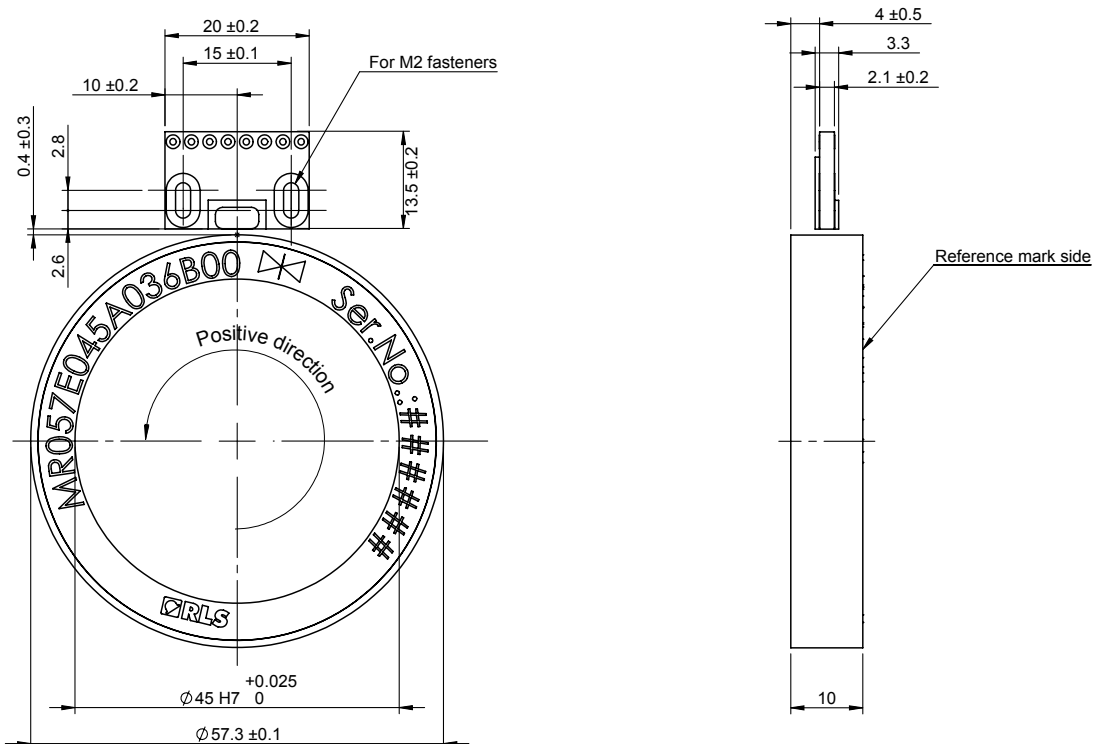
Dimensions and installation tolerance

Dimensions and tolerances in mm.

RLC2HD



RLC21C



MR057E

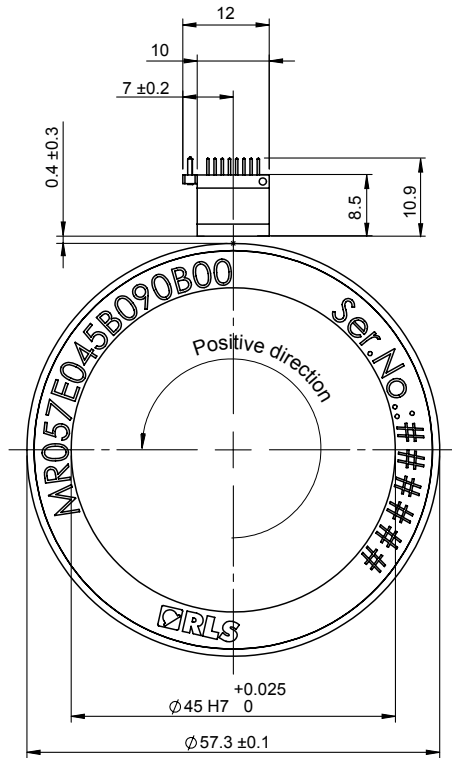
Outer diameter: 57.3 ± 0.1 mm

Inner diameter: 45 H7 mm

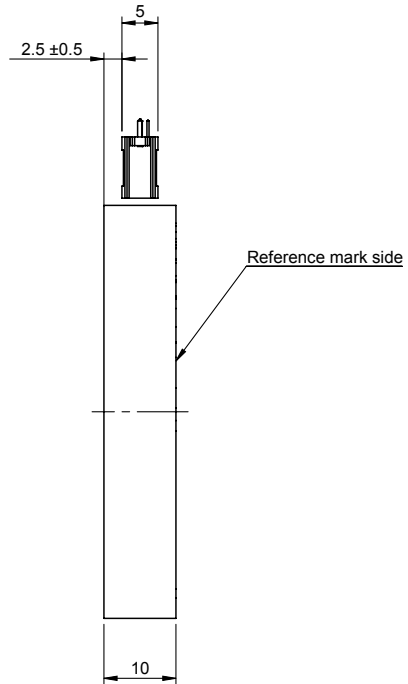
Number of poles: 90 / 36

Dimensions and installation tolerance

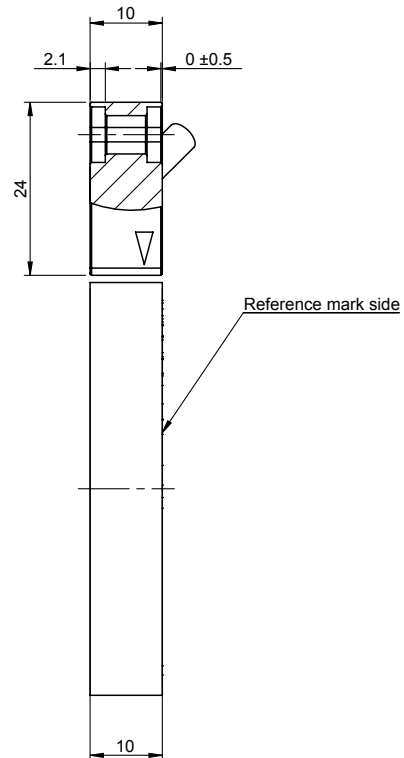
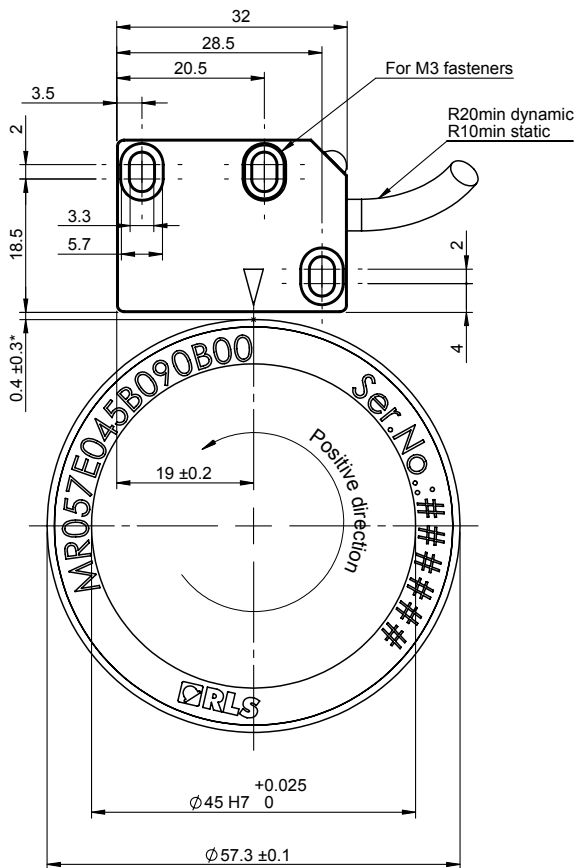
Dimensions and tolerances in mm.



RLM



LM10/15



* For LM15: 0.1 - 4 mm

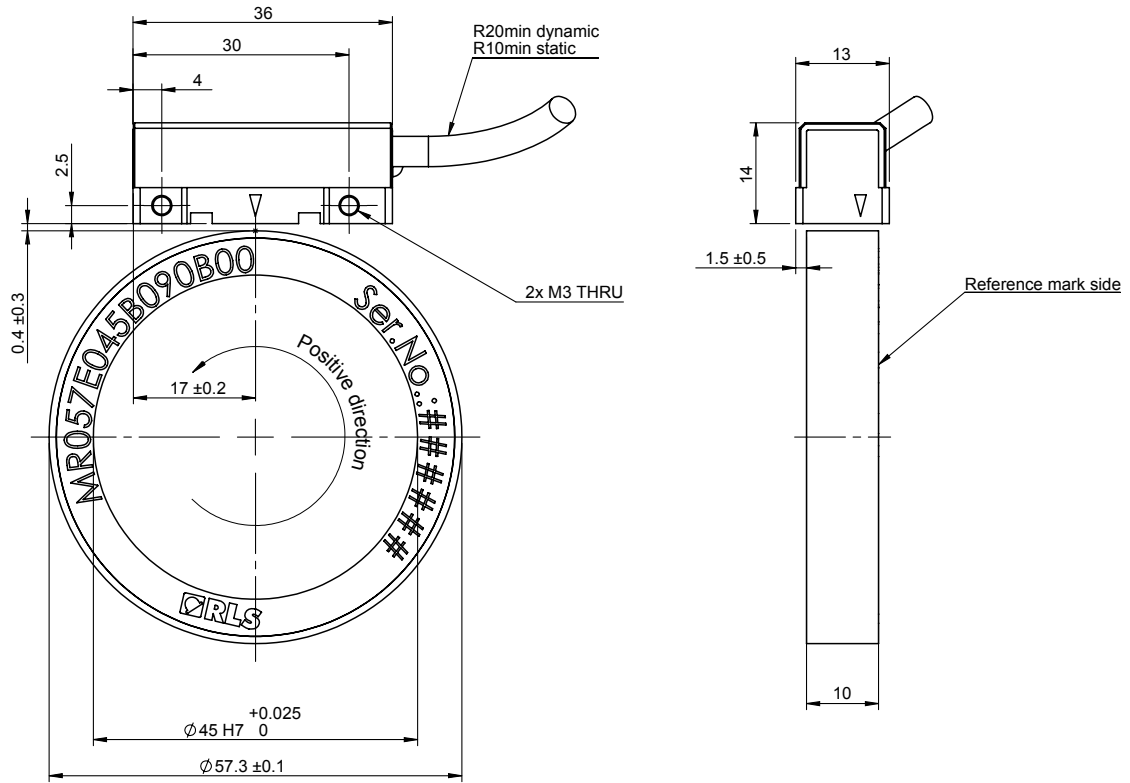
Outer diameter: 57.3 ± 0.1 mm
Inner diameter: 45 H7 mm
Number of poles: 90 / 36

MR057E

Dimensions and installation tolerance

Dimensions and tolerances in mm.

LM13



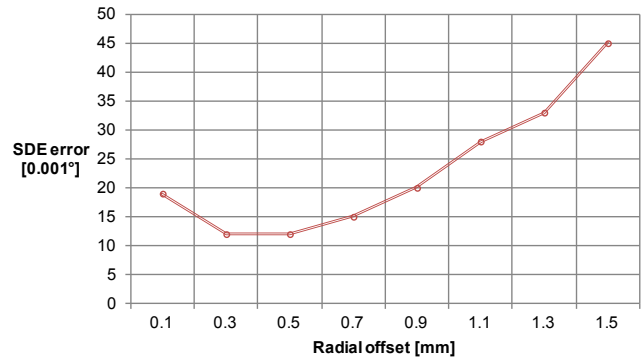
MR075E

Features and compatibility

Outer diameter	75.4 ± 0.1 mm	
Inner diameter	60 H7 mm	
Height	10 ± 0.1 mm	
Mass	120 g	
Pole length	2 mm	5 mm
Number of poles	120	48
Moment of inertia	132,250 gmm ²	
Material of magnetic layer	HNBR + ferrite	
Hub material	EN1.4021 / AISI 420	
Hub thermal expansion coefficient (CTE)	11 × 10 ⁻⁶ K ⁻¹	
Type of reference	Unique or DCRM*	
Basic increment of distance coded reference mark	92 mm / 140°	60 mm / 90°
Compatibility		
LM10, LM13, RLM, RLC2IC, RLC2HD, RLB	Yes	No
LM15	No	Yes
Protection cover option	Yes	

* Reference mark option (including DCRM) not available with RLB and RLC2HD readheads.

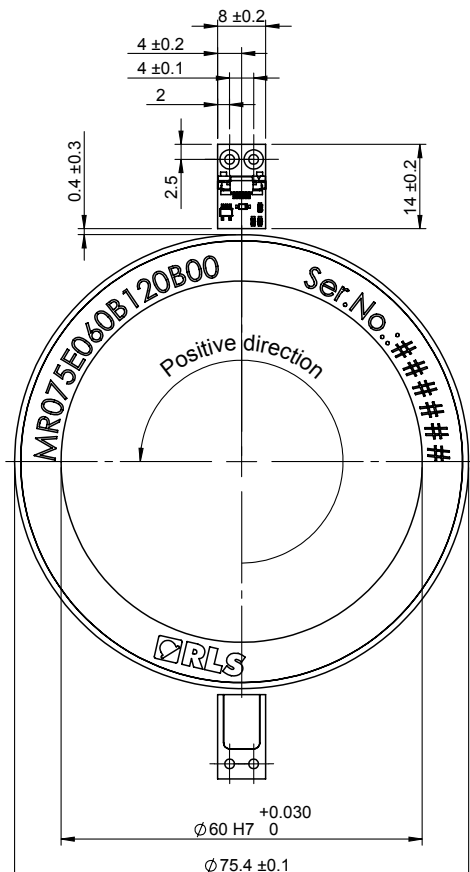
SDE error 120 poles



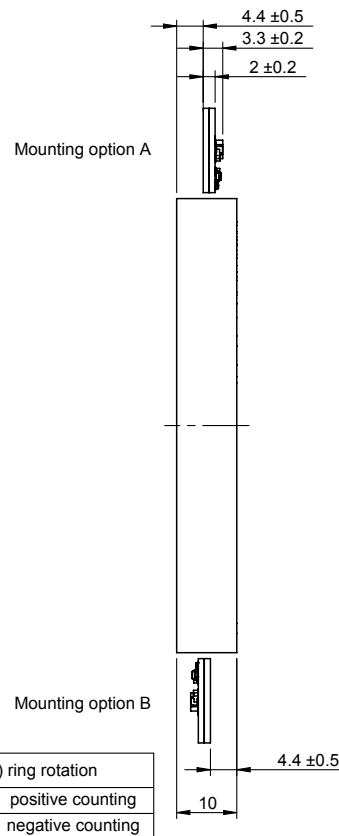
For maximum speed tables go to:
www.rls.si/mr075e-radial-max-speed-table-120-poles
www.rls.si/mr075e-radial-max-speed-table-48-poles

Dimensions and installation tolerance

Dimensions and tolerances in mm.



RLB



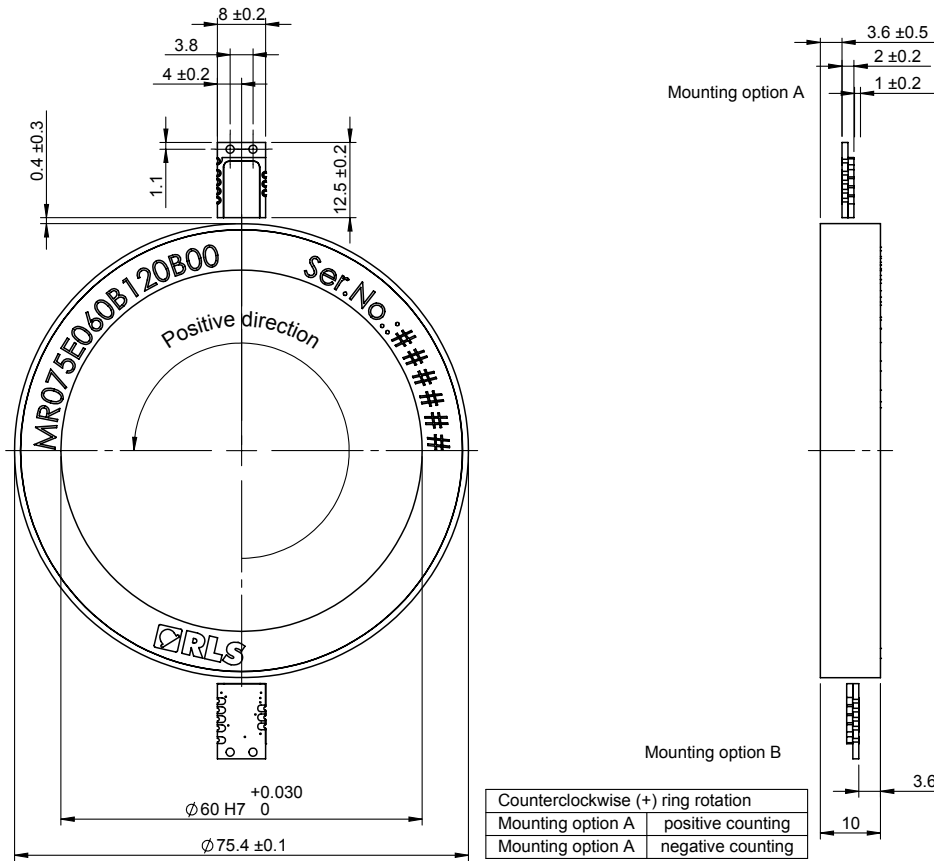
Outer diameter: 75.4 ± 0.1 mm
 Inner diameter: 60 H7 mm
 Number of poles: 120 / 48

MR075E

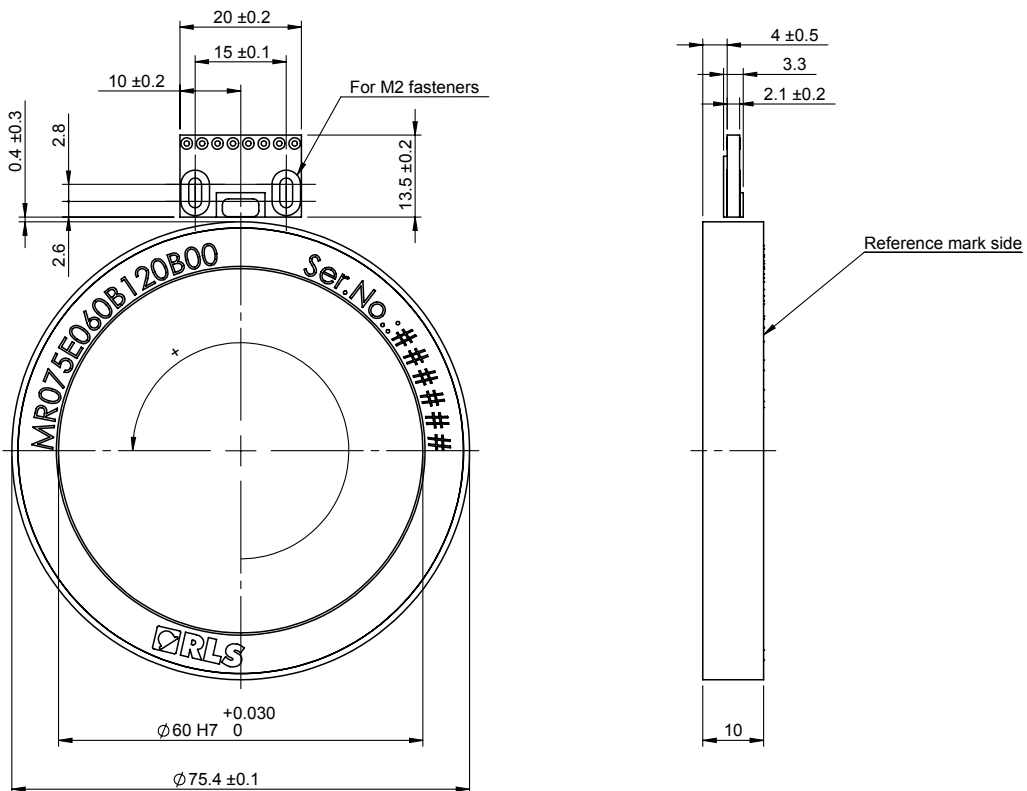
Dimensions and installation tolerance

Dimensions and tolerances in mm.

RLC2HD



RLC2IC



MR075E

Outer diameter: 75.4 ± 0.1 mm

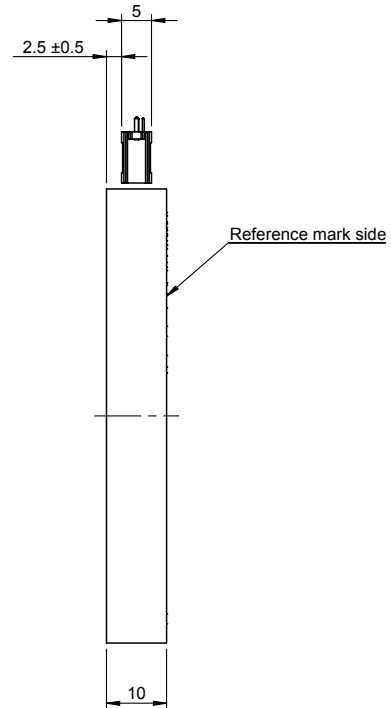
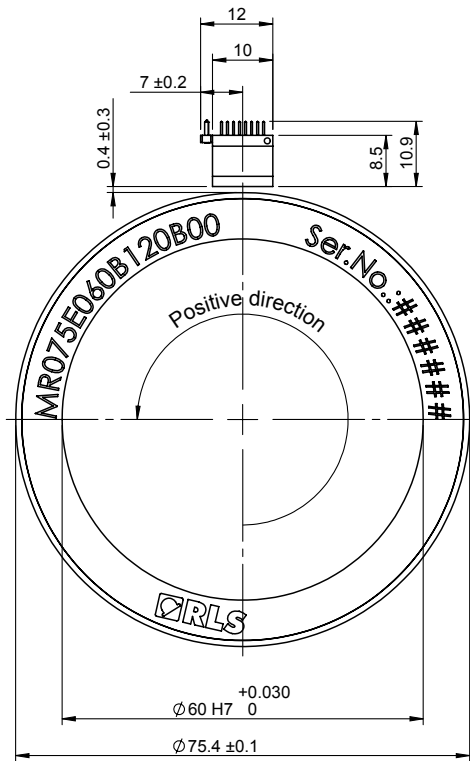
Inner diameter: 60 H7 mm

Number of poles: 120 / 48

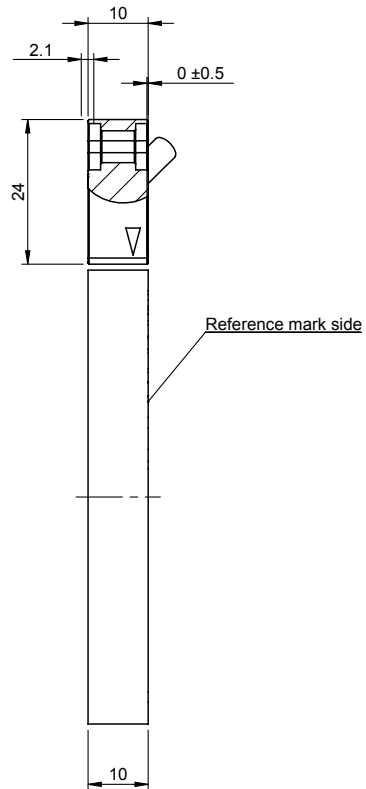
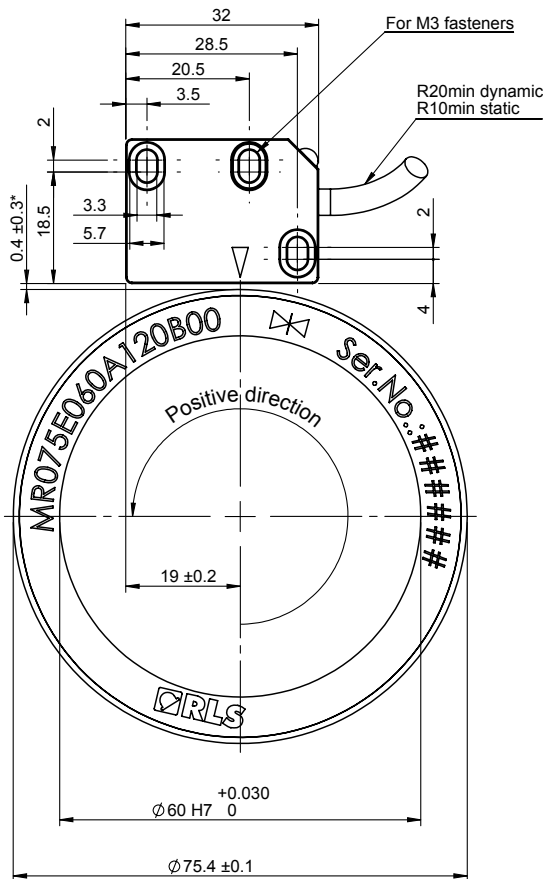
Dimensions and installation tolerance

Dimensions and tolerances in mm.

RLM



LM10/15



* For LM15: 0.1 - 4 mm

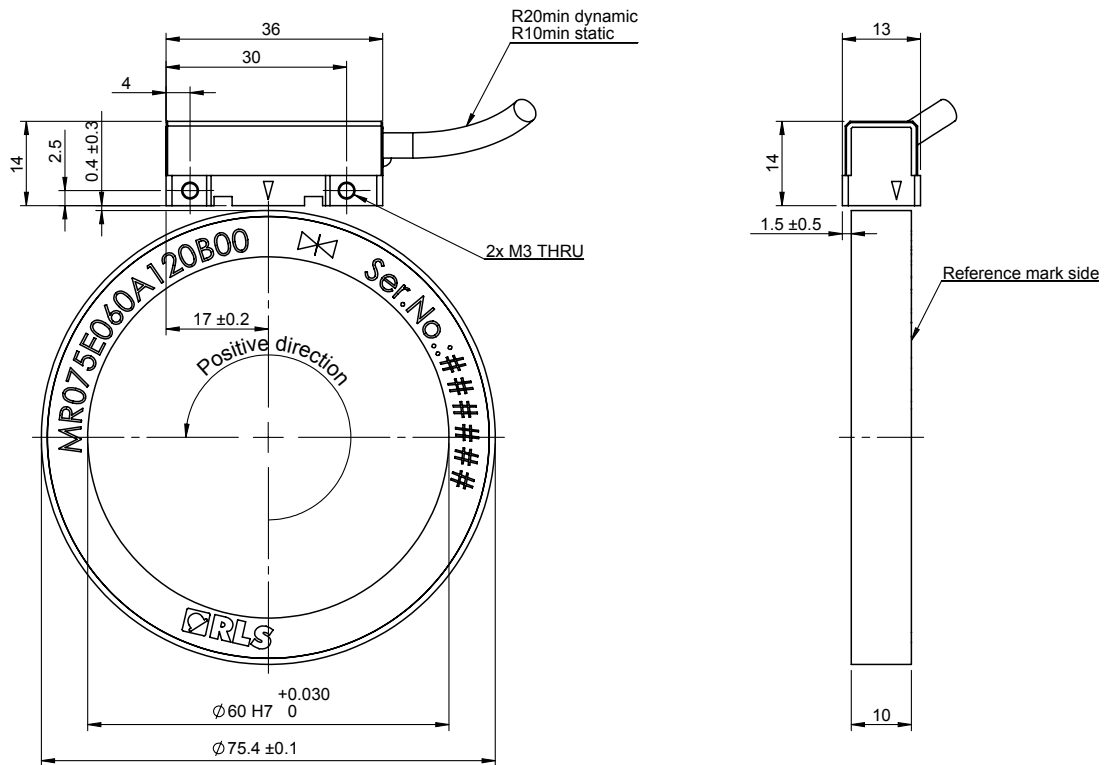
Outer diameter: 75.4 ± 0.1 mm
Inner diameter: 60 H7 mm
Number of poles: 120 / 48

MR075E

Dimensions and installation tolerance

Dimensions and tolerances in mm.

LM13

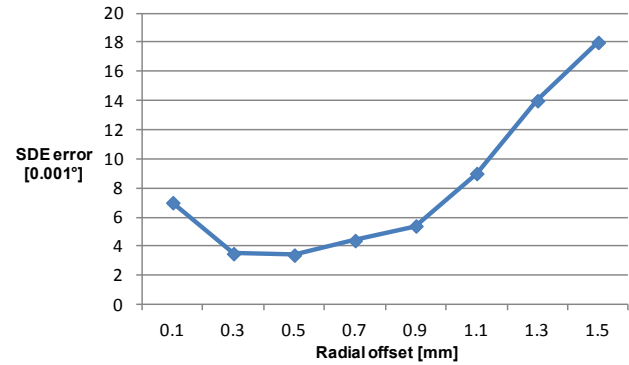


MR100F

Features and compatibility

Outer diameter	100.5 ± 0.1 mm
Inner diameter	84.77 ± 0.05 mm
Height	8.65 ± 0.1 mm
Mass	40 g
Pole length	2 mm
Number of poles	160
Moment of inertia	90,760 gmm ²
Material of magnetic layer	HNBR + ferrite
Hub material	EN1.0312 + Zn 4 µm
Hub thermal expansion coefficient (CTE)	11 × 10 ⁻⁶ K ⁻¹
Type of reference	Unique or DCRM*
Basic increment of distance coded reference mark	40 mm / 45°
Compatibility	
LM10, LM13, RLM, RLC2IC, RLC2HD, RLB	Yes
LM15	No
Protection cover option	No

SDE error

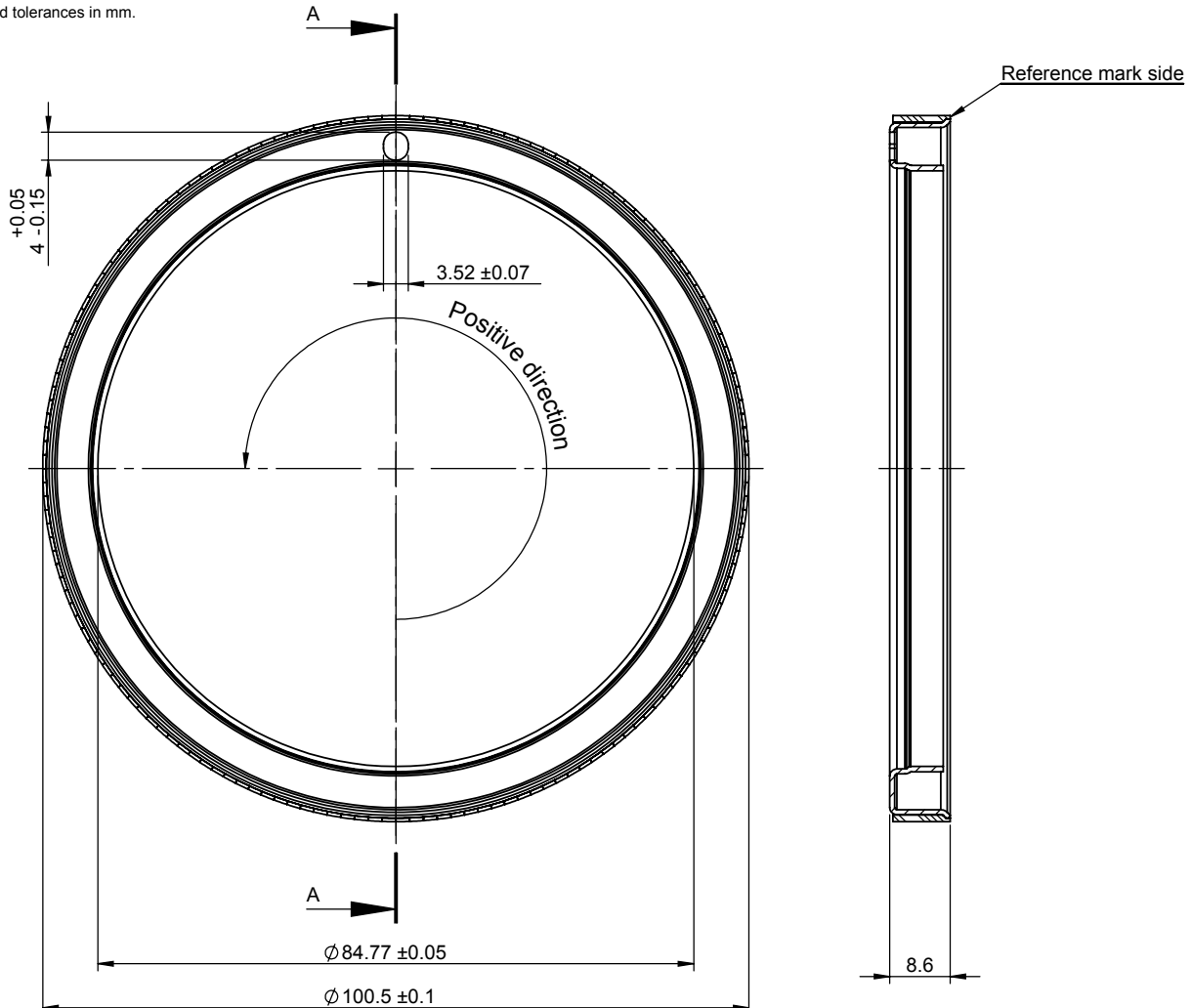


For maximum speed table go to:
www.rls.si/mr100f-radial-max-speed-table-160-poles

* Reference mark option (including DCRM) not available with RLB and RLC2HD readheads.

Dimensions and installation tolerance

Dimensions and tolerances in mm.



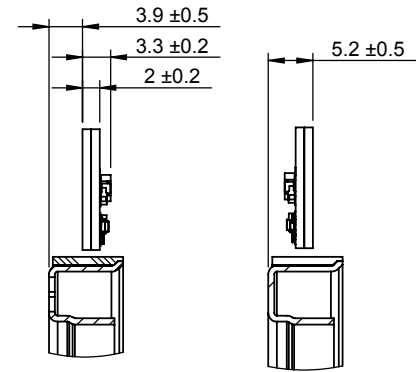
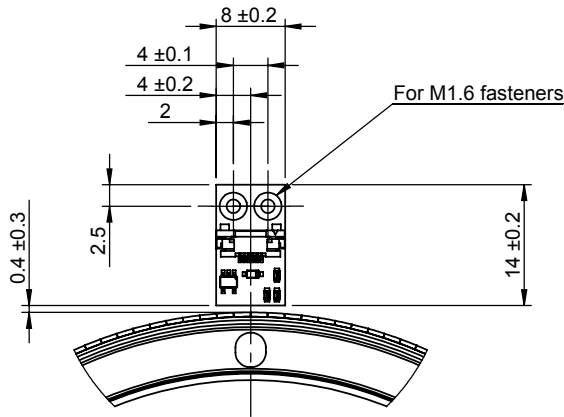
Outer diameter: 100.5 ± 0.1 mm
 Inner diameter: 84.77 ± 0.05 mm
 Number of poles: 160

MR100F

Dimensions and installation tolerance

Dimensions and tolerances in mm.

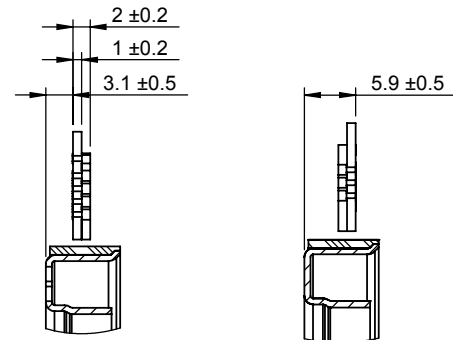
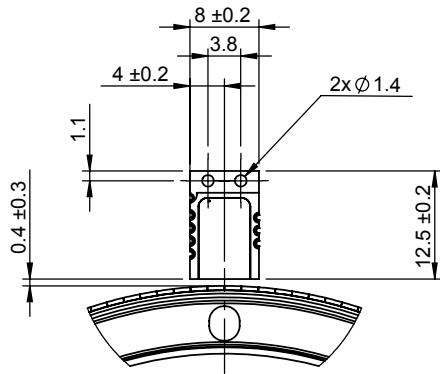
RLB



Mounting option A

Mounting option B

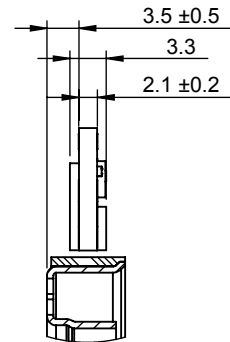
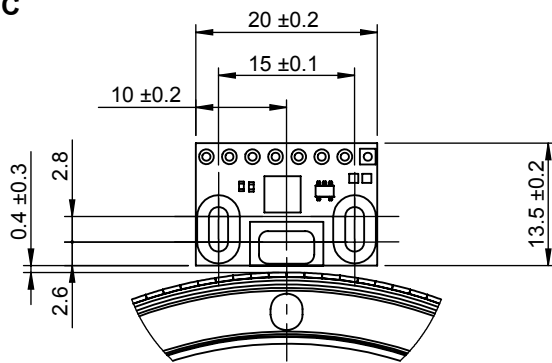
RLC2HD



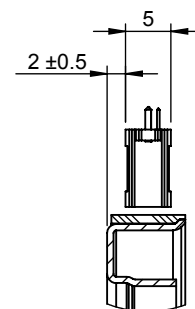
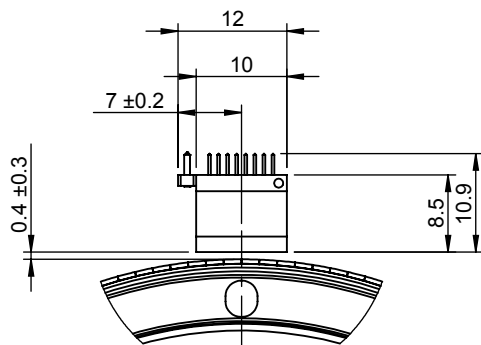
Mounting option A

Mounting option B

RLC2IC



RLM



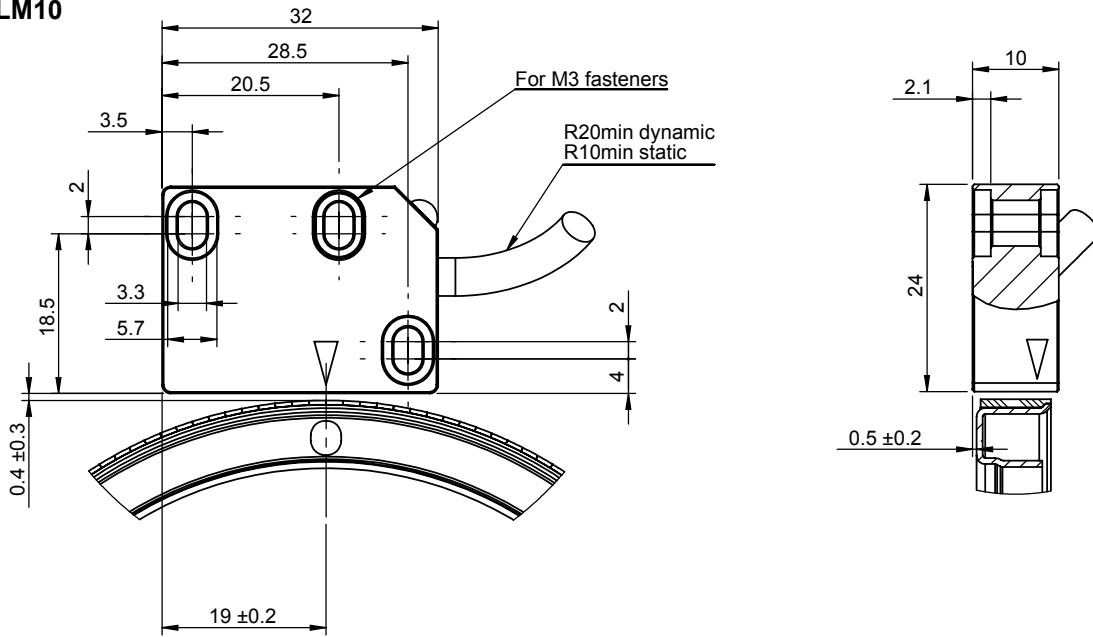
MR100F

Outer diameter: 100.5 ± 0.1 mm
Inner diameter: 84.77 ± 0.05 mm
Number of poles: 160

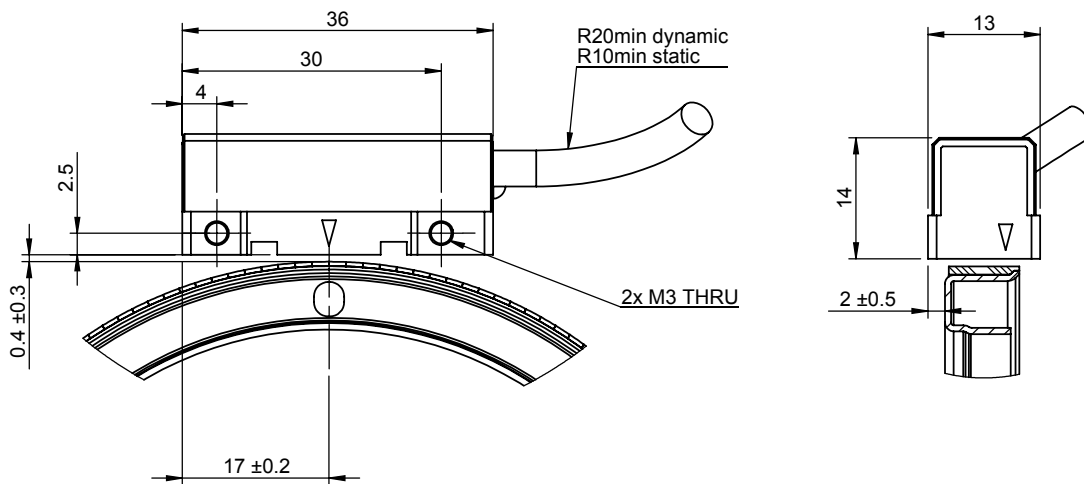
Dimensions and installation tolerance

Dimensions and tolerances in mm.

LM10



LM13



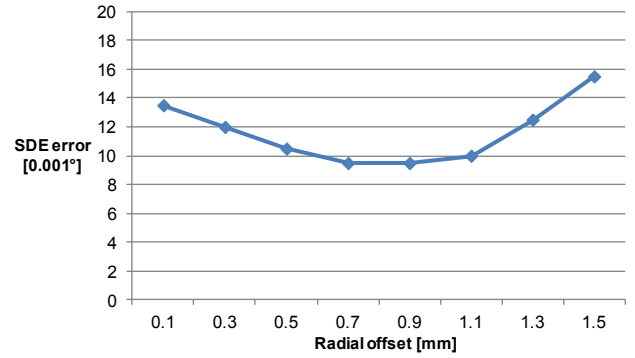
MR122E

Features and compatibility

Outer diameter	122 ± 0.1 mm
Inner diameter	90 H7 mm
Height	10 ± 0.1 mm
Mass	392 g
Pole length	2 mm
Number of poles	194
Moment of inertia	110,370 gmm ²
Material of magnetic layer	HNBR + ferrite
Hub material	EN1.4104 / AISI 430
Hub thermal expansion coefficient (CTE)	10 × 10 ⁻⁶ K ⁻¹
Type of reference	Unique or DCRM*
Basic increment of distance coded reference mark	48 mm / 45°
Compatibility	
LM10, LM13, RLM, RLC2IC, RLC2HD, RLB	Yes
LM15	No
Protection cover option	Yes

* Reference mark option (including DCRM) not available with RLB and RLC2HD readheads.

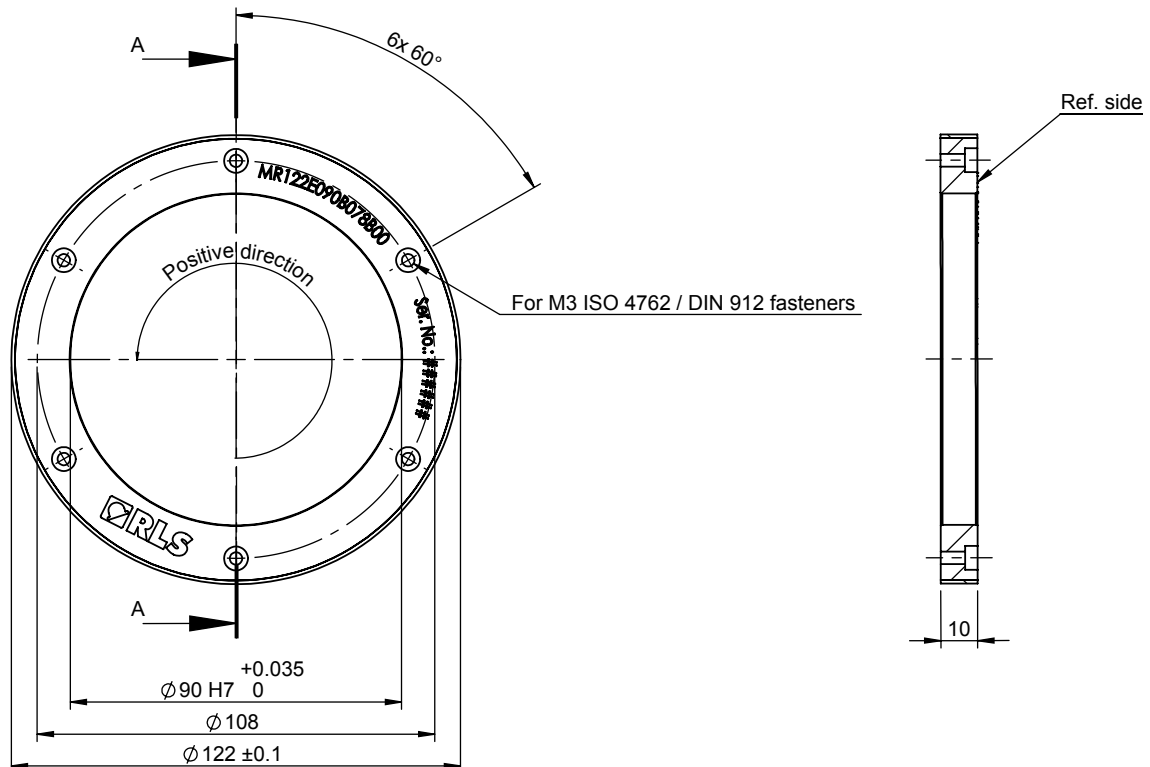
SDE error



For maximum speed tables please go to www.rls.si/mr122e-radial-max-speed-table-194

Dimensions and installation tolerance

Dimensions and tolerances in mm.



MR122E

Outer diameter: 122 ± 0.1 mm

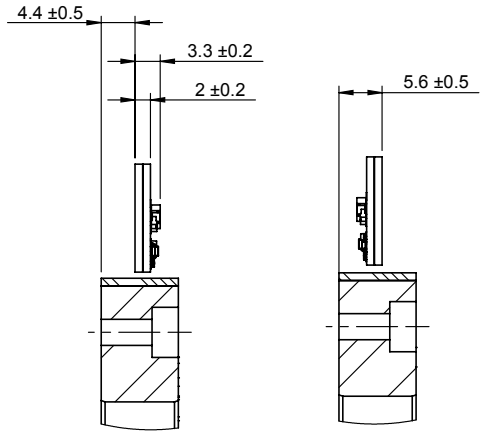
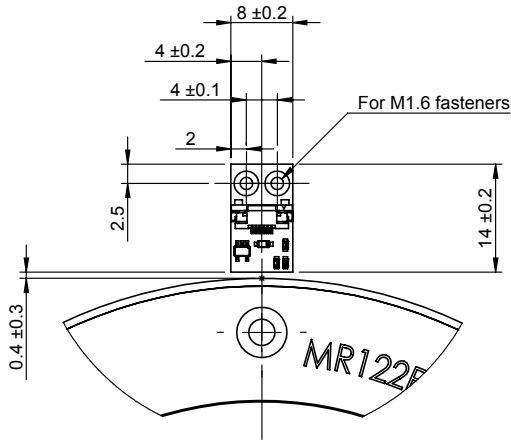
Inner diameter: 90 H7 mm

Number of poles: 194

Dimensions and installation tolerance

Dimensions and tolerances in mm.

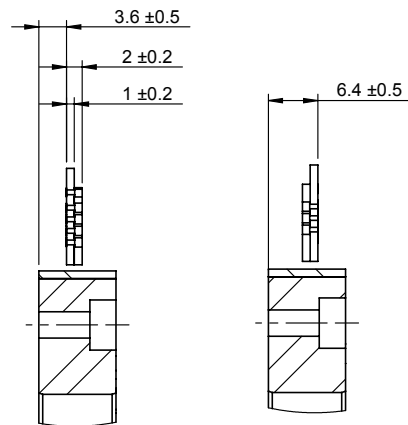
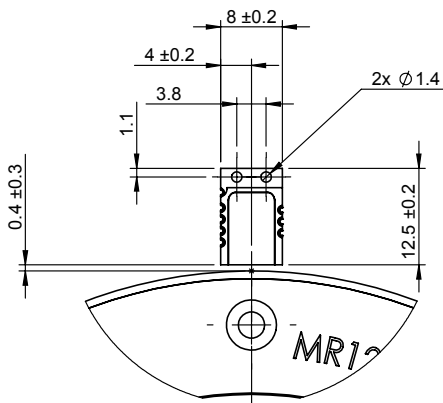
RLB



Mounting option A

Mounting option B

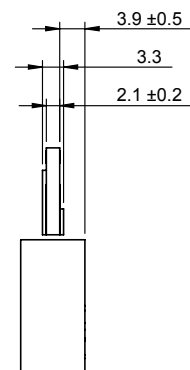
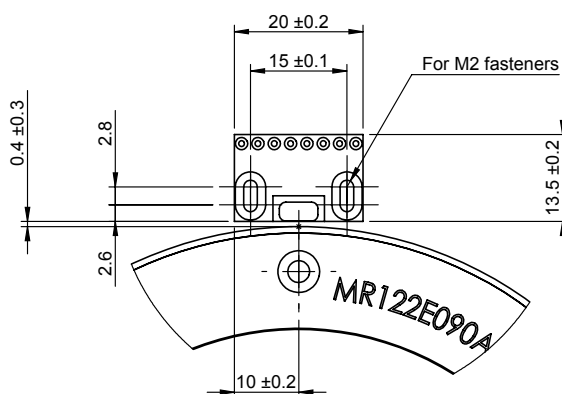
RLC2HD



Mounting option A

Mounting option B

RLC2IC



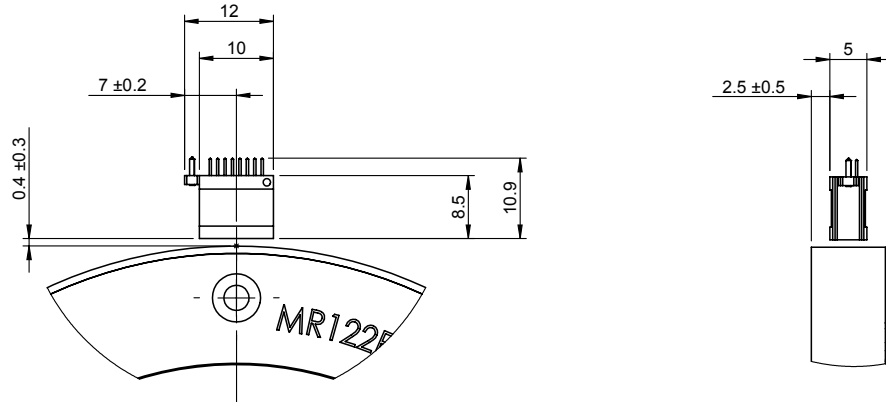
Outer diameter: 122 ± 0.1 mm
 Inner diameter: 90 H7 mm
 Number of poles: 194

MR122E

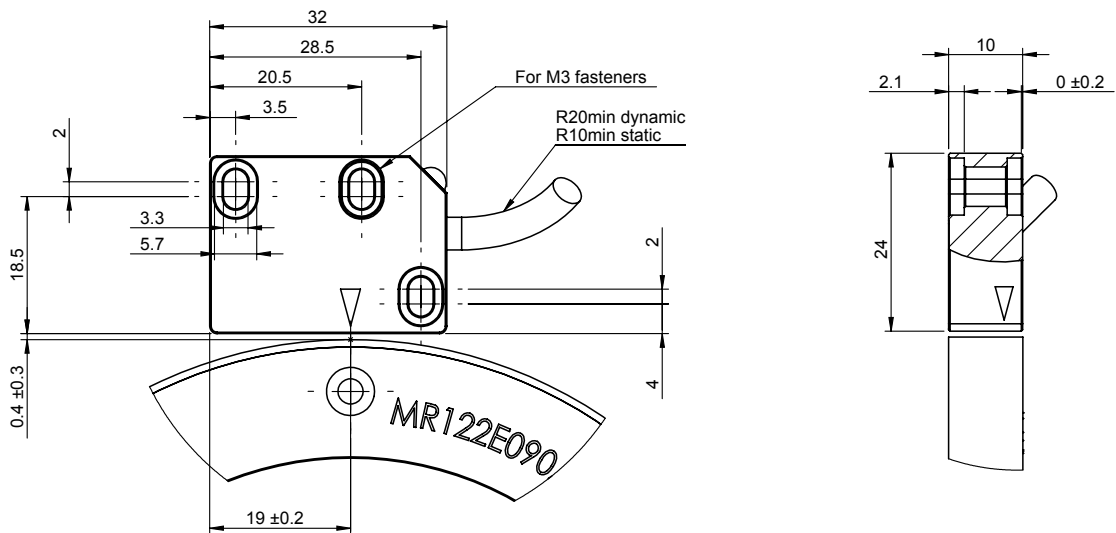
Dimensions and installation tolerance

Dimensions and tolerances in mm.

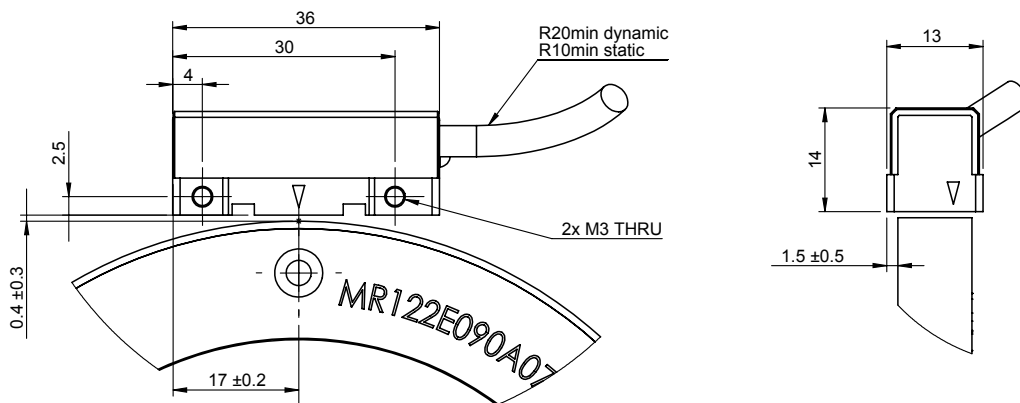
RLM



LM10



LM13

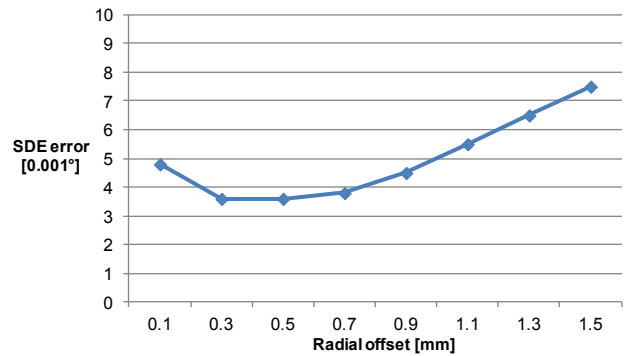


MR324E

Features and compatibility

Outer diameter	324.8 ± 0.2 mm
Inner diameter	240 ± 0.1 mm
Installation diameter	280 G7 mm
Height	10 ± 0.1 mm
Mass	2,200 g
Pole length	2 mm
Number of poles	512
Moment of inertia	46,000 gmm ²
Material of magnetic layer	HNBR + ferrite
Hub material	EN1.4301 / AISI 304
Hub thermal expansion coefficient (CTE)	16 × 10 ⁻⁶ K ⁻¹
Type of reference	Unique or DCRM
Basic increment of distance coded reference mark	68 mm / 24°
Compatibility	
LM10, LM13	Yes
RLM, RLC2IC, RLC2HD, RLB, LM15	No
Protection cover option	Yes

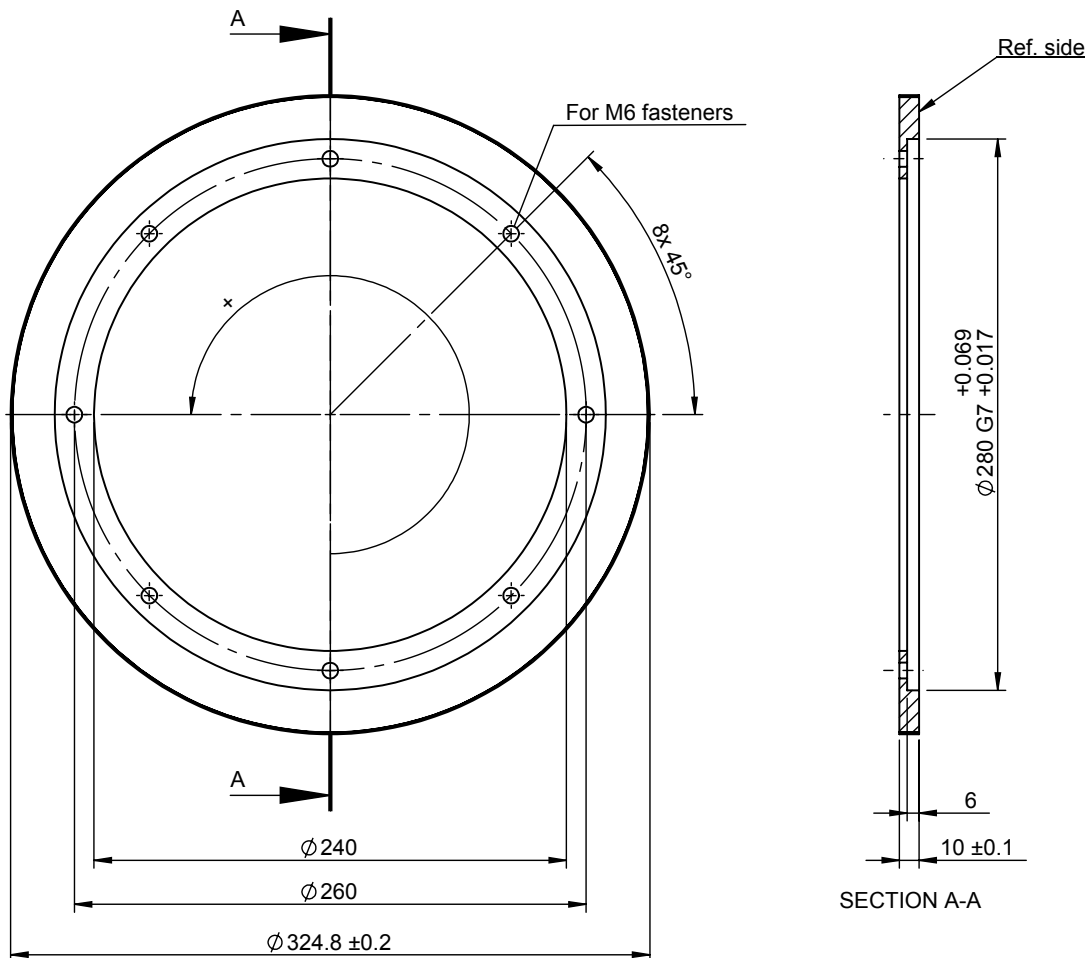
SDE error



For maximum speed tables please go to www.rls.si/mr324e-radial-max-speed-table-512-poles

Dimensions and installation tolerance

Dimensions and tolerances in mm.



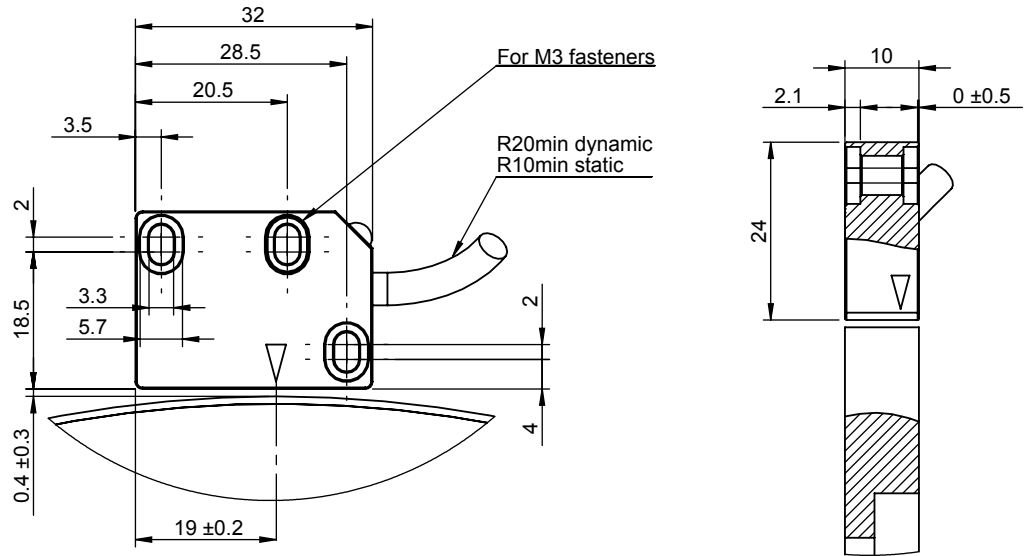
Outer diameter: 324.8 ± 0.2 mm
Inner diameter: 240 ± 0.1 mm
Number of poles: 512

MR324E

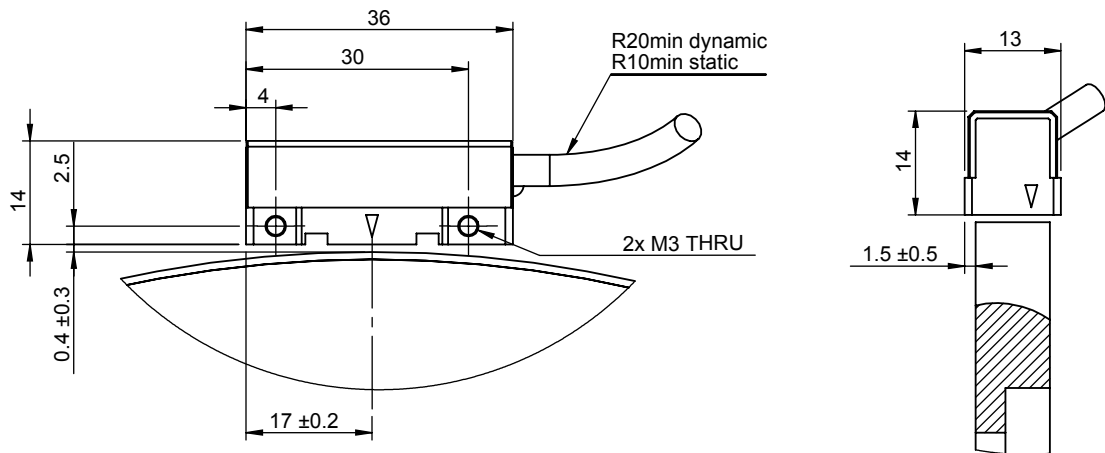
Dimensions and installation tolerance

Dimensions and tolerances in mm.

LM10



LM13

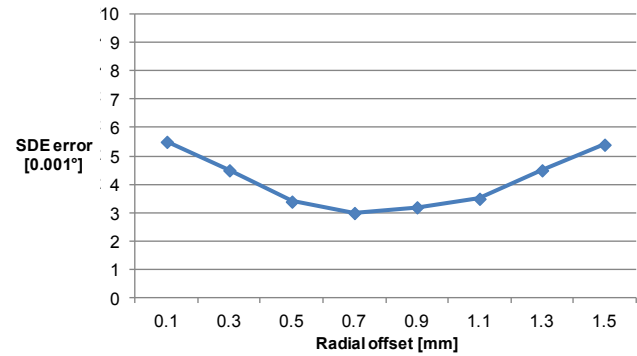


MR406E

Features and compatibility

Outer diameter	406.2 ± 0.1 mm
Inner diameter	360 H7 mm
Height	10 ± 0.1 mm
Mass	2,200 g
Pole length	2 mm
Number of poles	640
Moment of inertia	79,000 gmm ²
Material of magnetic layer	HNBR + ferrite
Hub material	EN1.4305 / AISI 303
Hub thermal expansion coefficient (CTE)	16 × 10 ⁻⁶ K ⁻¹
Type of reference	Unique or DCRM
Basic increment of distance coded reference mark	100 mm / 28°
Compatibility	
LM10, LM13	Yes
RLM, RLC2IC, RLC2HD, RLB, LM15	No
Protection cover option	Yes

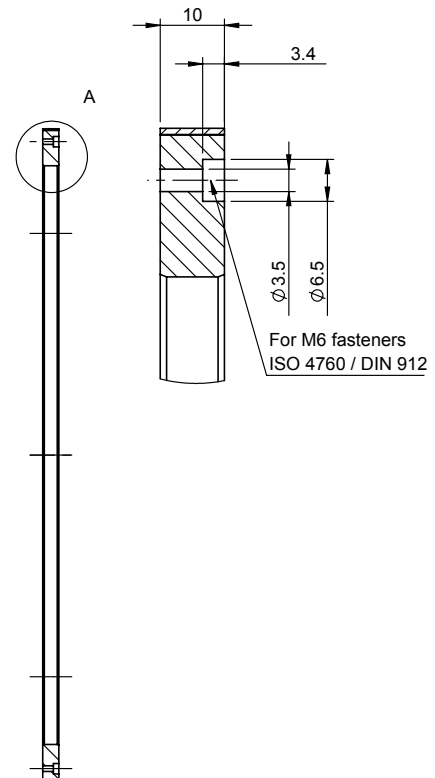
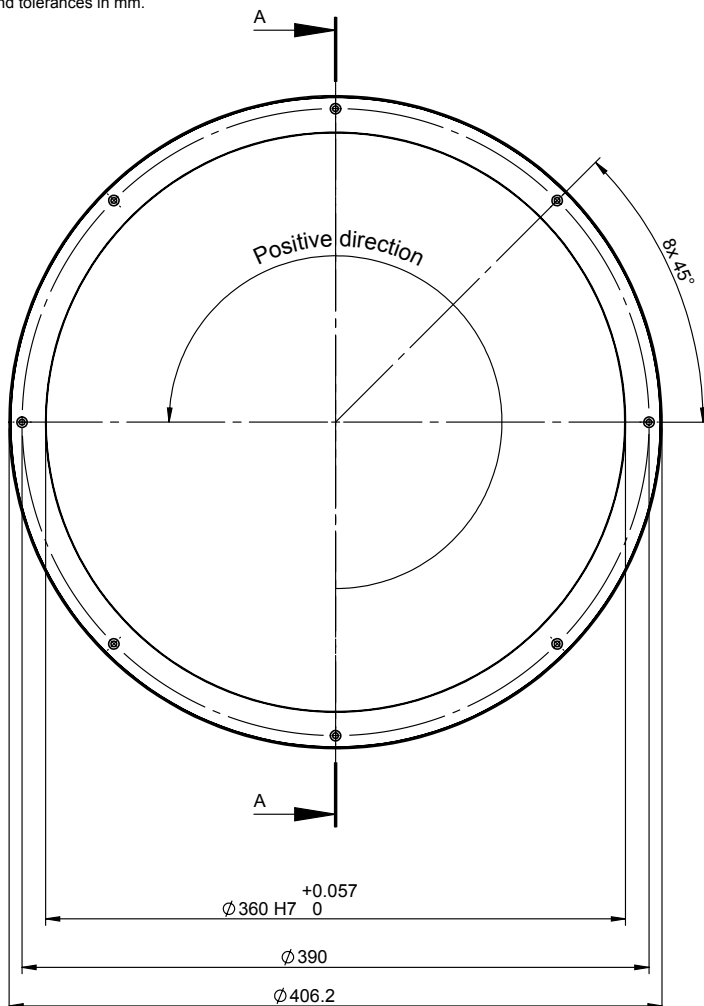
SDE error



For maximum speed tables please go to www.rls.si/mr406e-radial-max-speed-table-640-poles

Dimensions and installation tolerance

Dimensions and tolerances in mm.



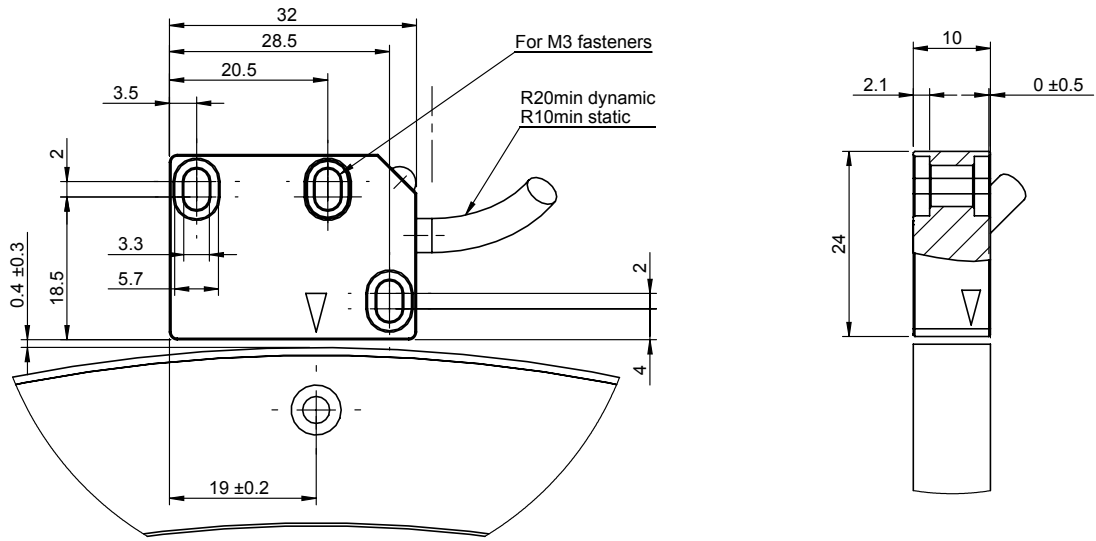
Outer diameter: 406.2 ± 0.1 mm
Inner diameter: 360 H7 mm
Number of poles: 640

MR406E

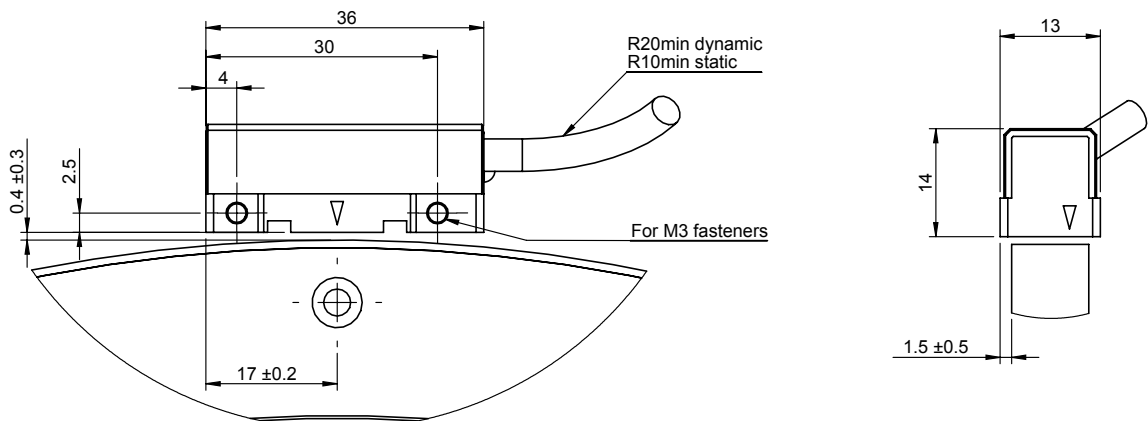
Dimensions and installation tolerance

Dimensions and tolerances in mm.

LM10



LM13



Radial magnetic ring ordering code

MR 040 E 030 A 064 B 00

Series
MR - Magnetic incremental ring

Outer diameter
031 - 31 mm 075 - 75 mm
040 - 40 mm 100 - 100 mm
047 - 47 mm 122 - 122 mm
050 - 50 mm 324 - 324 mm
057 - 57 mm 406 - 406 mm

Cross section
B - Height 5.5 mm, radial magnetisation
E - Height 10 mm, radial magnetisation
F - Height 8.6 mm, radial magnetisation
G - Height 8 mm, radial magnetisation

Inner diameter
020 - 20 mm 085 - 85 mm
030 - 30 mm 090 - 90 mm
040 - 40 mm 240 - 240 mm
045 - 45 mm 360 - 360 mm
060 - 60 mm

Reference mark
A - With reference mark
B - No reference mark
D - Distance coded reference mark

Special requirements
00 - No special requirements

Material
B - Stainless steel hub with vulcanised elastoferrite layer
E - Stamped steel hub with vulcanised elastoferrite layer
H - Stainless steel hub with vulcanised elastoferrite layer and protective foil (for high speed applications)

Number of poles
2 mm pole length:
050 - 50 poles
064 - 64 poles
076 - 76 poles
080 - 80 poles
090 - 90 poles
120 - 120 poles
160 - 160 poles
194 - 194 poles
512 - 512 poles
640 - 640 poles

5 mm pole length:
020 - 20 poles
026 - 26 poles
032 - 32 poles
036 - 36 poles
048 - 48 poles

Please note!

Not all combinations are valid. The inner diameter of rings is related to the outer diameter and cannot be randomly selected. Please check below table for available options.

Series	Outer diameter	Cross section	Inner diameter	Reference mark	Number of poles	Material	Special requirements		
MR	031	E	020	A	050 / 020	B ¹ / H	00		
				B					
	040		030	A	064 / 026				
				B					
				D				064	
	050		040	A	080 / 032				
				B					
	057		045	A	090 / 036				
				B					
				D					
	075		060	A	120 / 048				
				B					
				D					
	122		090	A	194				
				B					
				D					
	324		240	A	512				
				B					
				D					
	406		360	A	640				
				B					
				D					
	031		020	G	A			050 / 020	B ²
					B				
040	030	A	064						
		B							
		D							
047	040	A	076						
		B							
100	085	A	160						
		B							
		D							

¹ Austenitic non-magnetic stainless steel
² Martensitic magnetic stainless steel

Contact us

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RLS magnetic ring encoder systems feature

- Various diameters and sizes
- High rotational speeds
- Excellent resistance to chemicals commonly found in industry
- Excellent shock resistance
- UV and ozone resistance
- Wide operating temperature from -40 °C to +160 °C
- Single, periodic or distance coded reference mark
- Compatible with LM10, LM13, LM15 and RoLin encoders



To be used with ...



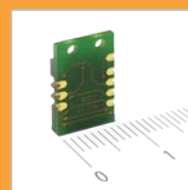
LM10 and LM15



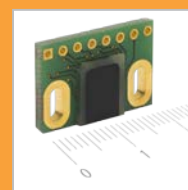
LM13



RLM



RLC2HD



RLC2IC



RLB