

## Applications

The robust RLS magnetic rings consist of a vulcanised elastoferfrite layer securely attached to a steel hub. They are compatible with RLS standard LM family or component level RoLin readheads, which bring reliable solutions to surveillance, transportation, industrial automation, renewable energy and other tough, hard-working motion control applications.



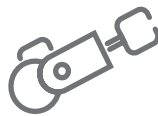
MEDICAL



PAN/TILT  
POSITIONING



GREEN ENERGY  
HARVESTING



ROBOTIC ARM  
JOINTS



AUTOMOTIVE



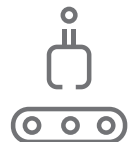
MOTOR CONTROL



PRECISE  
GEAR BOX



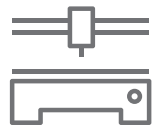
AGRICULTURE



INDUSTRIAL  
AUTOMATION



SMT PICK AND  
PLACE



PRINTING  
TECHNOLOGY



ASSEMBLY LINES

## About us

We design, produce and supply advanced rotary and linear motion sensors to meet growing global market demands. Our experience and knowledge combined with innovative ideas enable us to offer product solutions to match customer's needs.

Over the last few decades we worked closely with partners from a broad range of industries. From heavy machinery, advanced surgical and collaborative robots, aerospace and submarine applications to one of the largest solar power plants in the world, our encoders work in diverse environments.

RLS is an associate company of Renishaw, a world leading metrology company which holds a 50 % share in the ownership of RLS, and which sells and supports our magnetic encoders through an extensive global network.

Our mission is to develop, manufacture and supply advanced motion sensing components.

Our vision is to become a world leader for the supply of motion sensing components and systems.



**RLS merilna tehnika d.o.o.**  
Poslovna cona Zeje pri Komendi  
Pod vrhama 2  
SI-1218 Komenda  
Slovenia

**T:** +386 1 5272100  
**F:** +386 1 5272129  
**E:** mail@rls.si

A **RENISHAW**  associate company

## Incremental magnetic rings



### Why choose incremental magnetic rings?

#### FEATURES:

- ✓ Various diameters and sizes
- ✓ Wide operating temperatures
- ✓ High rotational speeds
- ✓ Excellent shock resistance
- ✓ Compatible with LM and RoLin encoders

#### BENEFITS:

- ✓ UV and ozone resistance
- ✓ Excellent resistance to chemicals
- ✓ High reliability
- ✓ Single, periodic or distance coded reference mark



Axial rings



Available axial ring sizes and encoder compatibility





| Ring   | Outer diameter (OD) | Inner diameter (ID) | Height (H) | Pole length | Number of poles | Compatible with ... |      |     |     |        |        |      |
|--------|---------------------|---------------------|------------|-------------|-----------------|---------------------|------|-----|-----|--------|--------|------|
|        |                     |                     |            |             |                 | LM10                | LM13 | RLB | RLM | RLC2HD | RLC2IC | LM15 |
| MR020C | 19.5 ±0.1           | 12 H7               | 2 ±0.1     | 2           | 26              | -                   | -    | ✓ * | ✓ * | ✓ *    | ✓ *    | -    |
| MR024C | 24 ±0.1             | 15 H7               | 2 ±0.1     | 2           | 32              | -                   | -    | ✓ * | ✓ * | ✓ *    | ✓ *    | -    |
| MR026C | 26 ±0.1             | 16 ±0.1             | 2 ±0.1     | 2           | 36              | ✓ *                 | ✓ *  | ✓ * | ✓ * | ✓ *    | ✓ *    | -    |
| MR034C | 34 ±0.1             | 20.5 H7             | 2 ±0.1     | 2           | 48              | -                   | -    | ✓ * | ✓ * | ✓ *    | ✓ *    | -    |
| MR045C | 45 ±0.1             | 28.5 H7             | 2 ±0.1     | 2           | 64              | ✓ *                 | ✓ *  | ✓ * | ✓ * | ✓ *    | ✓ *    | -    |
| MR049N | 49 ±0.1             | 25 H7               | 2 ±0.1     | 2           | 72              | ✓ *                 | ✓ *  | ✓ * | ✓   | ✓ *    | ✓      | -    |
| MR050C | 50 ±0.1             | 40 ±0.02            | 2 ±0.1     | 2           | 72              | ✓ *                 | ✓ *  | ✓ * | ✓   | ✓ *    | ✓      | -    |
|        |                     |                     |            |             |                 |                     |      |     |     |        |        |      |
| MR061C | 61.3 ±0.1           | 51.3 ±0.1           | 2 ±0.1     | 2           | 90              | ✓ *                 | ✓ *  | ✓ * | ✓   | ✓ *    | ✓      | -    |
|        |                     |                     |            |             | 92              | ✓ *                 | ✓ *  | ✓ * | ✓   | ✓ *    | ✓      | -    |
| MR080N | 80 ±0.1             | 55 H7               | 2 ±0.1     | 2           | 122             | ✓ *                 | ✓ *  | ✓ * | ✓   | ✓ *    | ✓      | -    |
| MR100S | 100 ±0.1            | 71 H7               | 4 ±0.1     | 2           | 152             | ✓ *                 | ✓ *  | ✓ * | ✓   | ✓ *    | ✓      | -    |

\* Reference mark option (including DCRM) not available.

All dimensions in mm.

Readheads

| System data                   |          | LM10  | LM13  | LM15  |
|-------------------------------|----------|---|---|---|
| Pole length                   |          | 2 mm  |   | 5 mm  |
| Available resolutions         |          | For analogue voltage output type: N/A<br><br>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        |          | Analogue: Sine/Cosine, 1 Vpp<br>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                          |          | Readhead (1 m cable, no connector) 57 g<br>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<br>Cable (1 m) 34 g |
| Cable data                    |          |   |   |   |
| Voltage drop over cable       |          | 13 mV/m – without load<br>54 mV/m – with 120 Ω load   |   |   |
| Cable                         |          | Ø4.2 ± 0.2 mm, PUR high flexible cable, drag-chain compatible, double-shielded<br>8 × 0.05 mm <sup>2</sup> ; durability: 20 million cycles at 20 mm bend radius   |   |   |
| Environmental data            |          |   |   |   |
| 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   | HNBR: –40 °C to +160 °C   |   |
|                               |          | Storage   | 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 <sup>2</sup> (IEC 60068-2-6)  |   |   |
| Shocks (11 ms)                |          | 300 m/s <sup>2</sup> (IEC 60068-2-27)   |   |   |
| RoHS                          |          | Compliant with EU Directive 2002/95/EC  |   |   |

| System data                   |          |   |  |  |  |
|-------------------------------|----------|---|--|--|--|
| Pole length                   |          | 2 mm  |  |  |  |
| Available resolutions         |          | For analogue voltage output type: N/A<br><br>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                          |          | Readhead (without flex) 1.4 g<br>Readhead (with flex) 1.6 g   |  | Readhead 1.25 g  | Readhead 0.46 g  |
| Environmental data            |          |   |  |  |  |
| Temperature                   | Readhead | Operating   | With flex cable: -20 °C to +85 °C  | -30 °C to +85 °C   |  |
|                               |          |   | Without flex cable: -40 °C to +125 °C  |  |  |
|                               |          | Storage   | -40 °C to +125 °C  | -40 °C to +85 °C   |  |
|                               | Ring     | Operating   | HNBR: -40 °C to +160 °C  |  |  |
| Storage                       |          | NBR: -40 °C to +105 °C  |  |  |  |
| Environmental sealing         |          | N/A   |  |  |  |
| 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/s² (IEC 60068-2-6)  |  |  |  |
| Shocks (11 ms)                |          | 300 m/s² (IEC 60068-2-27)   |  |  |  |
| RoHS                          |          | Compliant with EU Directive 2002/95/EC  |  |  |  |
| Moisture level                |          | -   | -  | MSL6 (IPC/JEDEC-J-STD_020)   | -  |

\* RLM Readhead RS422 is possible only with flex cable.

Radial rings



Available radial ring sizes and encoder compatibility

| Ring   | Outer diameter (OD) | Inner diameter (ID) | Height (H) | Pole length | Number of poles | Compatible with ... |      |     |      |        |        |      |
|--------|---------------------|---------------------|------------|-------------|-----------------|---------------------|------|-----|------|--------|--------|------|
|        |                     |                     |            |             |                 | LM10                | LM13 | RLB | RLM  | RLC2HD | RLC2IC | LM15 |
| MR031E | 31.85 ±0.1          | 20 H7               | 10 ±0.1    | 2           | 50              | ✓ **                | ✓ ** | ✓ * | ✓ ** | ✓ *    | ✓ **   | -    |
|        |                     |                     |            | 5           | 20              | -                   | -    | -   | -    | -      | -      | ✓ ** |
| MR031G | 31.85 ±0.1          | 20 H7               | 8 ±0.1     | 2           | 50              | ✓ **                | ✓ ** | ✓ * | ✓ ** | ✓ *    | ✓ **   | -    |
|        |                     |                     |            | 5           | 20              | -                   | -    | -   | -    | -      | -      | ✓ ** |
| MR040E | 40.8 ±0.1           | 30 H7               | 10 ±0.1    | 2           | 64              | ✓                   | ✓    | ✓ * | ✓    | ✓ *    | ✓      | -    |
|        |                     |                     |            | 5           | 26              | -                   | -    | -   | -    | -      | -      | ✓    |
| MR040G | 40.8 ±0.1           | 30 H7               | 8 ±0.1     | 2           | 64              | ✓                   | ✓    | ✓ * | ✓    | ✓ *    | ✓      | -    |
| MR047B | 47.5 ±0.1           | 40 ± 0.1            | 5.5 ±0.1   | 2           | 76              | ✓ *                 | ✓ *  | ✓ * | ✓ ** | ✓ *    | ✓ **   | -    |
|        |                     |                     |            | 5           | 30              | -                   | -    | -   | -    | -      | -      | ✓ ** |
| MR050E | 50.1 ±0.1           | 40 H7               | 10 ±0.1    | 2           | 80              | ✓ **                | ✓ ** | ✓ * | ✓ ** | ✓ *    | ✓ **   | -    |
|        |                     |                     |            | 5           | 32              | -                   | -    | -   | -    | -      | -      | ✓ ** |
| MR057E | 57.3 ±0.1           | 45 H7               | 10 ±0.1    | 2           | 90              | ✓                   | ✓    | ✓ * | ✓    | ✓ *    | ✓      | -    |
|        |                     |                     |            | 5           | 36              | -                   | -    | -   | -    | -      | -      | ✓    |
| MR057R | 57.5 ±0.1           | 51 ±0.1             | 11 ±0.1    | 2           | 90              | ✓                   | ✓    | ✓ * | ✓    | ✓ *    | ✓      | -    |
| MR075E | 75.4 ±0.1           | 60 H7               | 10 ±0.1    | 2           | 120             | ✓                   | ✓    | ✓ * | ✓    | ✓ *    | ✓      | -    |
|        |                     |                     |            | 5           | 48              | -                   | -    | -   | -    | -      | -      | ✓    |
| MR080R | 80.3 ±0.1           | 74                  | 11 ±0.1    | 2           | 128             | ✓                   | ✓    | ✓ * | ✓    | ✓ *    | ✓      | -    |
| MR100F | 100.5 ±0.1          | 84.77 ±0.05         | 8.65 ±0.1  | 2           | 160             | ✓                   | ✓    | ✓ * | ✓    | ✓ *    | ✓      | -    |
| MR122E | 122 ±0.1            | 90 H7               | 10 ±0.1    | 2           | 194             | ✓                   | ✓    | ✓ * | ✓    | ✓ *    | ✓      | -    |
| MR162Q | 161.7 ±0.1          | 143 H7              | 12 ±0.1    | 2           | 256             | ✓                   | ✓    | ✓ * | ✓    | ✓ *    | ✓      | -    |
| MR324E | 325.1 ±0.2          | 240                 | 10 ±0.1    | 2           | 512             | ✓                   | ✓    | -   | -    | -      | -      | -    |
| MR406E | 406.7 ±0.2          | 360 H7              | 10 ±0.1    | 2           | 640             | ✓                   | ✓    | -   | -    | -      | -      | -    |

\* Reference mark option (including DCRM) not available.

\*\* DCRM not available.

All dimensions in mm.