

# Operating Manual

## Magnetic Rings

The favorable alternative for rotative measurements with small space requirement



- interpolation up to 22800 pulses/revolution possible
- direct assembly on axes possible (e. g. motor shaft)
- contactless and wear free measurement principle
- applicable in roughest environments (protection class IP67)
- vibration- and shock-resistant

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## 2 General, Safety, Transport and Storage

### 2.1 Information Operating Manual

Please read the operating manual carefully before starting to work with the device! It is part of the product and should be kept close to the device and accessible for the staff at any time. The illustrations in the manual are for better demonstration of the facts. They are not necessarily to scale and can slightly differ from the actual design.

### 2.2 Explanation of Symbols

Special notes in this manual are characterized by symbols. The notes are introduced by signal words which express the magnitude of danger. Please follow this advice and act carefully in order to avoid accidents, damage, and injuries.

#### Warning notes:

	<b>DANGER!</b> This symbol in connection with the signal word "Danger" indicates an immediate danger for the life and health of persons. Failure to heed these instructions can result in serious damage to health and even fatal injury.
	<b>WARNING!</b> This symbol in connection with the word „Warning“ means a possibly impending danger for the life and health of persons. Failure to heed these instructions can result in serious damage to health and even fatal injury.
	<b>CAUTION!</b> This symbol in connection with the signal word "Caution" indicates a possibly dangerous situation. Failure to heed these instructions can lead to minor injuries or damage of property.

#### Special safety instructions:

	<b>DANGER!</b> This symbol in connection with the signal word "Danger" indicates an immediate danger for the life and health of persons due to voltage. Failure to heed these instructions can result in serious damage to health and even fatal injury. The operations may only be carried out by a professional electrician.
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#### Tips and recommendations:

	<b>NOTE!</b> ... points out useful tips and recommendations as well as information for an efficient and trouble-free operation.
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#### Reference marks:

-  Marks a reference to another chapter of this manual.
-  Marks a reference to another chapter of another document.

## 2.3 Statement of Warranties

The producer guarantees the functional capability of the process engineering and the selected parameters.

## 2.4 Demounting and Disposal

Unless acceptance and disposal of returned goods are agreed upon, demount the device considering the safety instructions of this manual and dispose it with respect to the environment.

### Before demounting:

Disconnect the power supply and secure against re-start. Then disconnect the supply lines physically and discharge remaining energy. Remove operational supplies and other material.

### Disposal:

Recycle the decomposed elements: Metal components in scrap metal, Electronic components in electronic scrap, Recycle plastic components, dispose the remaining components according to their material consistence.



### CAUTION!

Wrong disposal causes environmental damages! Electronic scrap, electronic components, lubricants and other auxiliary materials are subject to special refuse and can only be disposed by authorized specialists!

Local authorities and waste management facilities provide information about environmentally sound disposal.

### Safety



### CAUTION!

Please read the operating manual carefully, before using the device! Observe the installation instructions! Only start up the device if you have understood the operating manual. The operating company is obliged to take appropriate safety measure. The initial operation may only be performed by qualified and trained staff. Selection and installation of the devices as well as their embedding into the controlling system require qualified knowledge of the applicable laws and normative requirements on the part of the machine manufacturer.

## 2.5 General Causes of Risk

This chapter gives an overview of all important safety aspects to guarantee an optimal protection of employees and a safe and trouble-free operation. Non-observance of the instructions mentioned in this operating manual can result in hazardous situations.

## 2.6 Personal Protective Equipment

Employees have to wear protective clothing during the installation of the magnet rings to minimize danger of health.

**Therefore:** Change into protective clothing before performing the works and wear them throughout the process. Additionally observe the labels regarding protective clothing in the operating area.

### Protective clothing:

	<p><b>PROTECTIVE CLOTHING</b></p> <p>... is close-fitting working clothing with light tear strength, tight sleeves and without distant parts. It serves preliminarily for protection against being gripped by flexible machine parts. Do not wear rings, necklaces or other jewelry.</p>
	<p><b>PROTECTIVE GLOVES</b></p> <p>... for protecting the hands against abrasion, wear and other injury of the skin.</p>
	<p><b>PROTECTIVE HELMET</b></p> <p>... for protection against injuries of the head.</p>

## 2.7 Conventional Use

The ELGO-device is only conceived for the conventional use described in this manual.  
The ELGO Magnet Rings serve exclusively for the measurement of rotative and radial values.



### CAUTION! Danger through non-conventional use!

Non-intended use and non-observance of this operating manual can lead to dangerous situations.

Therefore:

- Only use the device as described
- Strictly follow the instructions of this manual

Avoid in particular:

- Remodeling, refitting or changing of the construction or single components with the intention to alter the functionality or scope of the device.

Claims resulting from damages due to non-conventional use are not possible.  
Only the operator is liable for damages caused by non-conventional use.

## 2.8 Safety Instructions for Transport, Unpacking and Loading



### CAUTION!

Transport the package (box, palette etc.) professionally. Do not throw, hit or fold it.

## 2.9 Handling of Packaging Material

Notes for proper disposal: ☞ 2.4

## 2.10 Inspection of Transport

Check the delivery immediately after the receipt for completeness and transport damage.  
In case of externally recognizable transport damages:

- Do not accept the delivery or only accept under reserve.
- Note the extent of damages on the transportation documents or delivery note.
- File complaint immediately.



### NOTE!

Claim any damage immediately after recognizing it.  
The claims for damage must be filed in the lawful reclaim periods.

## 2.11 Storage

Store the device only under the following conditions:

- Do not store outside
- Keep dry and dust-free
- Do not expose to aggressive media
- Protect from direct sun light
- Avoid mechanical shocks
- Storage temperature (☞ 4) needs to be observed
- Relative humidity (☞ 4) must not be exceeded
- Inspect packages regularly if stored for an extensive period of time (>3 months)

### 3 Product Features

All the advantages of the magnetic measurement principle can be used by using magnetic rings also for rotary movements e.g. revolutions -, angle or extent measurements.

Besides the magnetic rings are a wear-free and space-saving alternative to optical rotary encoders and are insensitive against dirt, dust, liquids and vibrations also.

For scanning these magnetic rings the conventional ELGO Incremental-Measuring-Systems of the product rows GMIX, LMIX and EMIX are useable.

The ring -provided with a magnetic pole division- (north/south poles) is scanned contactless with a magnetic sensor system. At present two different standard magnetic ring sizes are available (on request customized variants are possible):

- Big: outside diameter 72 mm, inside diameter 54 mm, width 7 mm
- Medium: outside diameter 38 mm, inside diameter 31 mm, width 6.5 mm
- Small: outside diameter 19.75 mm, inside diameter 14.7 mm, width 4.1 mm

These can be referred in each case with the used sensor adapted pole division:

- Types with 5 mm pole pitch (for GMIX and LMIX systems)
- Types with 2 mm pole pitch (for EMIX and RMIX2 systems)

All information and data not contained in this description are available in the manual of the respectively selected sensor type.

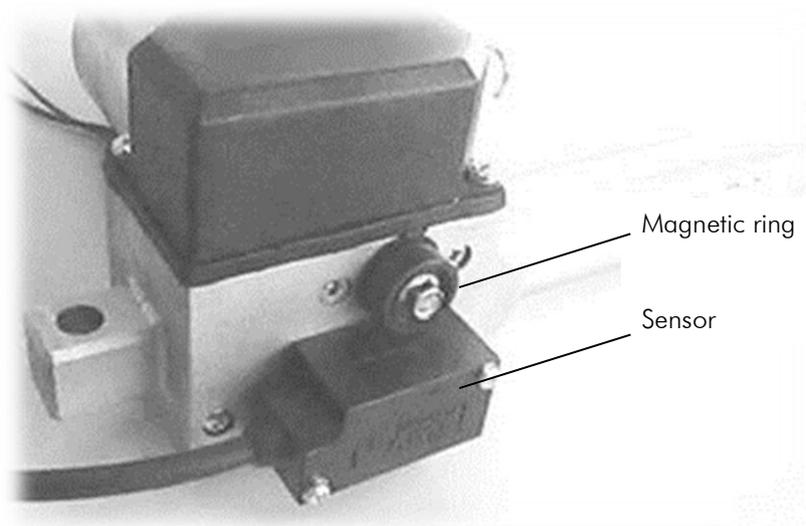


Figure 1: Example - angular adjustment of a saw blade with LMIX3

## 4 Technical Data

### 4.1 Technical Data

#### Magnet Rings

##### Mechanical Data

System accuracy at 20°C	< +/- 1 %
Total error	< 0,15 ° (standard) / < 0,007 ° (special applications)
Material	Hard ferrite 8/22 according to DIN 17410, sintered isotrop

<b>Pole pitch</b>	<b>2 mm</b>		
<b>Systems</b>	<b>EMIX1/2/3 and RMIX2</b>		
Magnet Rings	MR2030	MR3860	MR72114
Outer Ø in mm	19,75 (- 0,05)	38 (- 0,1)	72 (± 0,05)
Inside Ø in mm	14,7 (+0,2/- 0,15)	30 (± 0,5)	54 (± 0,8)
Width in mm	4,1 (+ 0,05)	6,5 (± 0,05)	7 (± 0,1)
Number of poles (P)	30	60	114
Interpolation factor (IF)	EMIX: 200 / RMIX2: 80		
max. pulse/r = IF x P	6000 (MR2030) 12000 (MR3860) 22800 (MR72114)		

<b>Pole pitch</b>	<b>2,5 mm</b>		
<b>Systems</b>	<b>IZ14/15/16</b>		
Magnetic Rings	MR3848		
Outer Ø in mm	38 (- 0,1)		
Inside Ø in mm	30 (± 0,5)		
Width in mm	6,5 (+ 0,05)		
Number of poles (P)	48		
Interpolation factor (IF)	250		
max. pulse/r = IF x P	12000 (MR3848)		

<b>Pole pitch</b>	<b>5 mm</b>		
<b>Systems</b>	<b>GMIX2</b>	<b>LMIX1/2/3</b>	<b>GMIX1A</b>
Magnetic Rings	MR2012	MR3824	MR7244
Outer Ø in mm	19,75 (- 0,05)	38 (- 0,1)	72 (± 0,05)
Inside Ø in mm	14,7 (+0,2/- 0,15)	30 (± 0,5)	54 (± 0,8)
Width in mm	4,1 (+ 0,05)	6,5 (± 0,05)	7 (± 0,1)
Number of poles (P)	12	24	44
Interpolation factor (IF)	2	200	500
max. pulse/r = IF x P	24 (MR2012) 48 (MR3824) 88 (MR7244)	2400 (MR2012) 4800 (MR3824) 8800 (MR7244)	6000 (MR2012) 12000 (MR3824) 22800 (MR7244)

## 5 Installation and First Start-Up



**CAUTION:**

Please read the operating manual carefully before using the device! Strictly observe the Installation instructions! In case of damage caused by failure to observe this operating manual, the warranty expires.

ELGO is not liable for any secondary damage and for damage to persons, property or assets.

The operator is obliged to take appropriate safety measures.

The first start-up may only be performed by staff that has been trained and authorized by the operator.

### 5.1 Operating Area



**WARNING!**

Do not use the device in explosive or corrosive environments!  
The device must not be installed close to sources of strong inductive or capacitive interference or strong electrostatic fields!



**CAUTION!**

The electrical connections must be made by suitably qualified personnel in accordance with local regulations.



The device may be designed for switchboard mounting. During work on the switchboard, all components must be de-energized if there is a danger of touching the energized parts! (protection against contacts)

Wiring works may only be performed in the de-energized state!



Thin cable strands have to be equipped with end sleeves!

Before switching on the device, connections and plug connectors have to be checked!



The device must be mounted in a way that it is protected against harmful environmental influences such as splashing water, solvents, vibration, shock and severe pollution and the operating temperature must not be exceeded.

## 5.1 Mounting on an Axis or Shaft

The magnetic ring can be mounted on the axle or shaft either as a thermal fit or by bonding.

### 5.1.1 Recommended Adhesive

For bonding the magnetic ring to the shaft, we recommend the use of **Loctite AA 326** adhesive with pre-treatment with **Loctite 7649** activator.

## 5.2 Description Mounting with the Different Sensor Types

Because the magnetized surface by the radius and the smaller width of magnetic rings are substantially smaller than with the magnetic tape, is to be paid attention here to the correct installation of the sensor head (active sensor areas) with the magnetic ring. The permitted distance of the sensors to the magnetic ring is identical as with the magnetic tape assembly, however those must be considered the radius of the ring.

### 5.2.1 Mounting with GMIX2

It is to be made certain that both active sensor surfaces shown here are covered within the permitted 4 mm distance. I.e. the radius and/or diameter of the ring must be selected in an accordingly size. The active sensor area are represented in the following graph as hatched square.

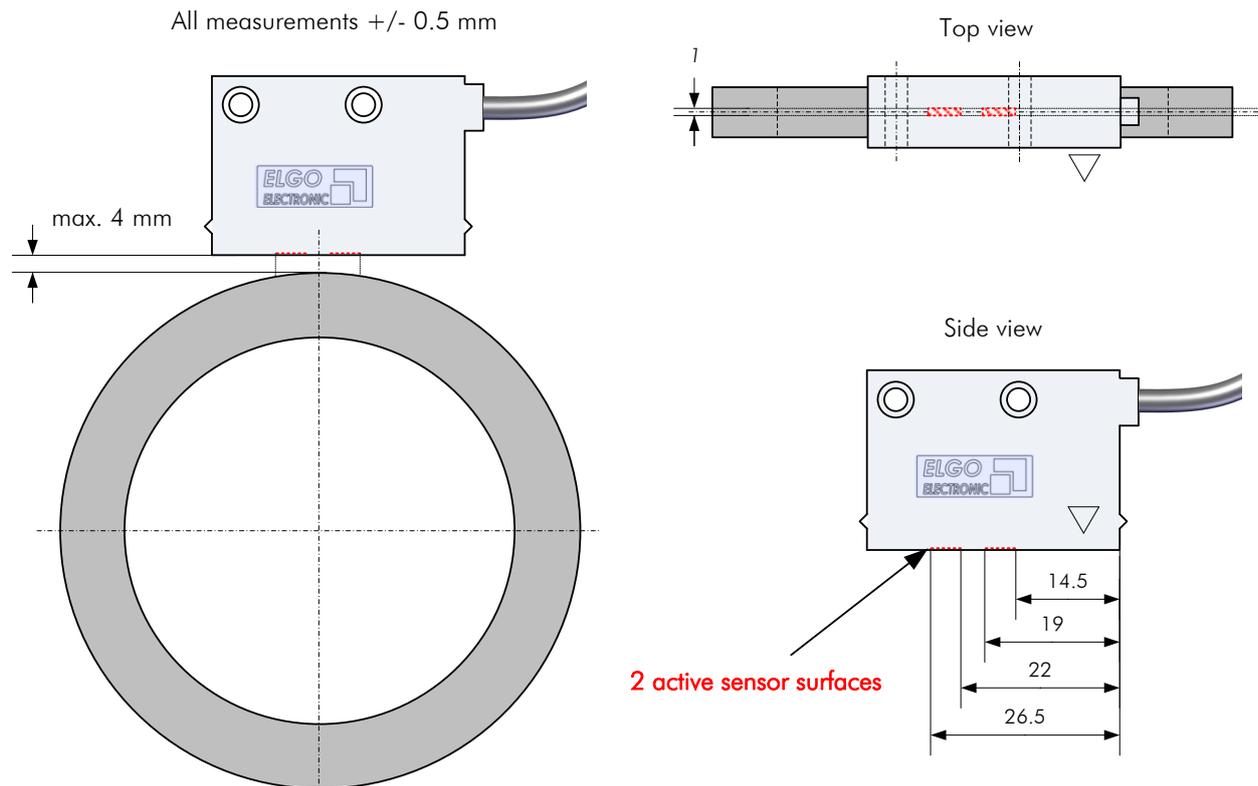


Figure 2: Mounting with GMIX2

### 5.2.2 Mounting with GMIX1A, LMIX1 or EMIX1

The active sensor area is represented in the following graph as hatched square.

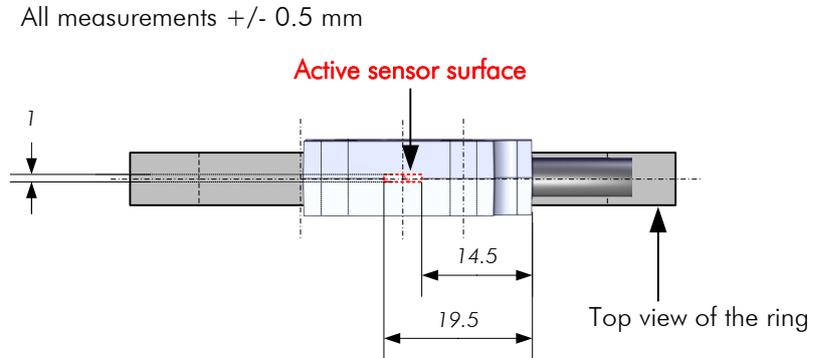


Figure 3: Mounting with GMIX1A, LMIX1 or EMIX1

The entire active sensor surface must be installed within the permitted distance to the magnetic ring.

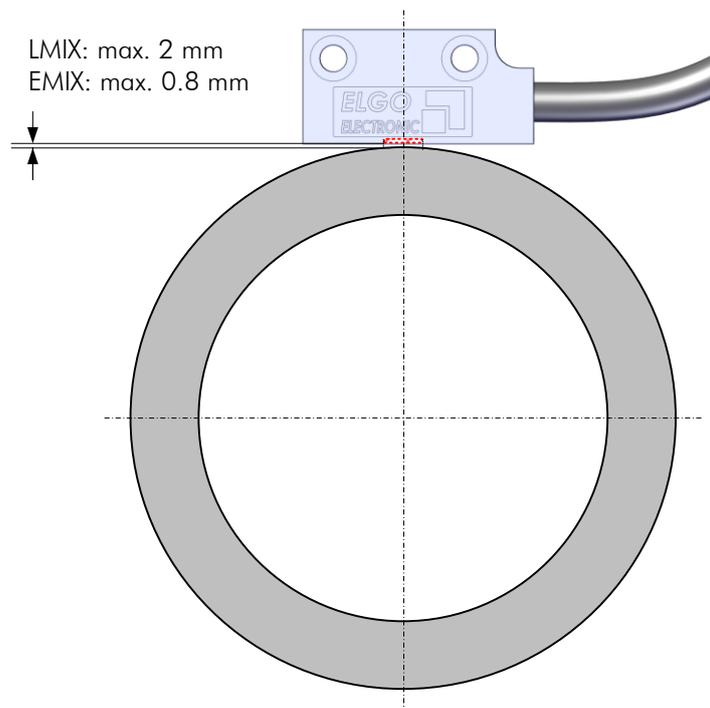
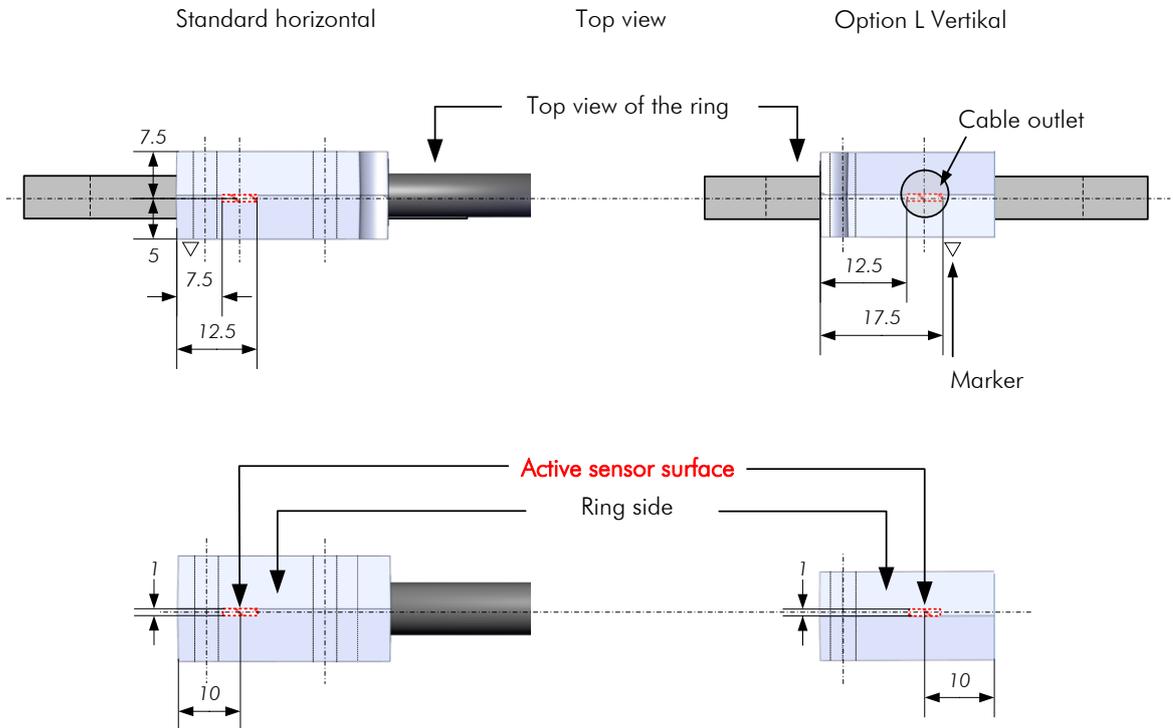


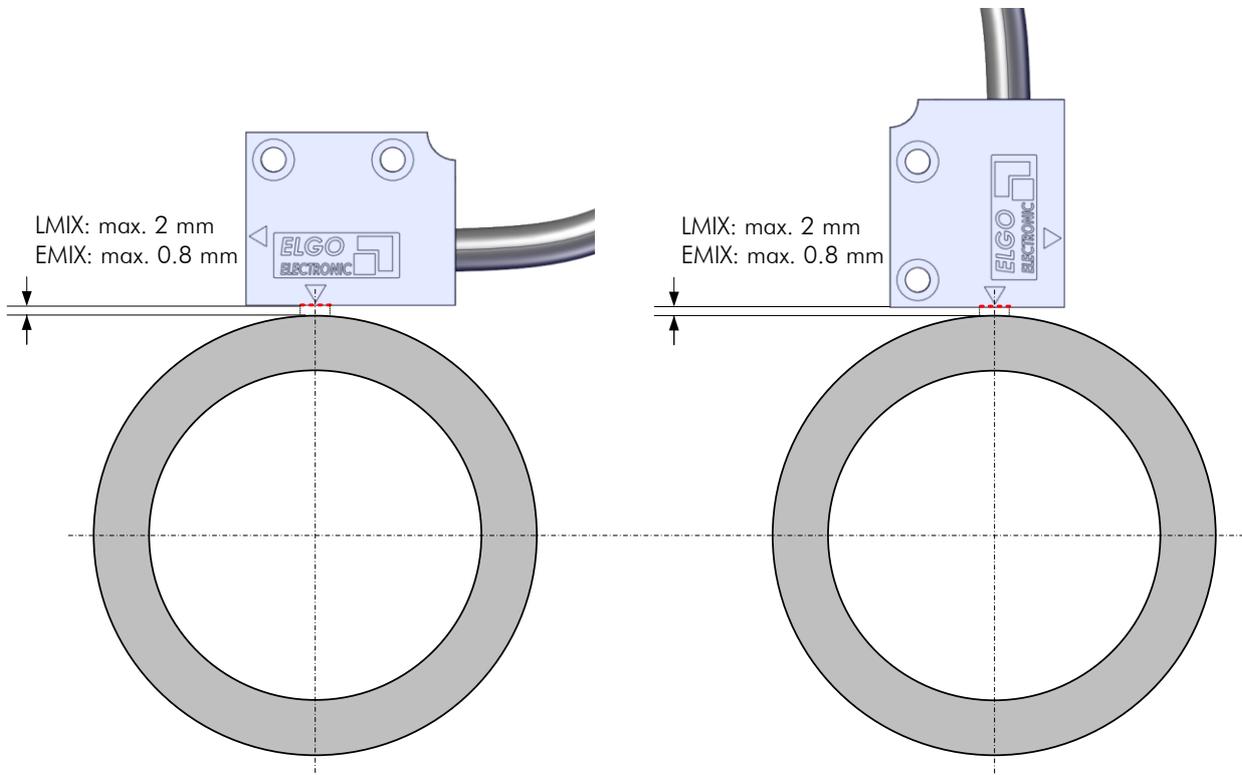
Figure 4: GMIX1A, LMIX1 or EMIX1 on ring

### 5.2.3 Mounting with LMIX2 or EMIX2

The active sensor area is represented in the following graph as hatched square.



The entire active sensor surface must be installed within the permitted distance to the magnet ring.

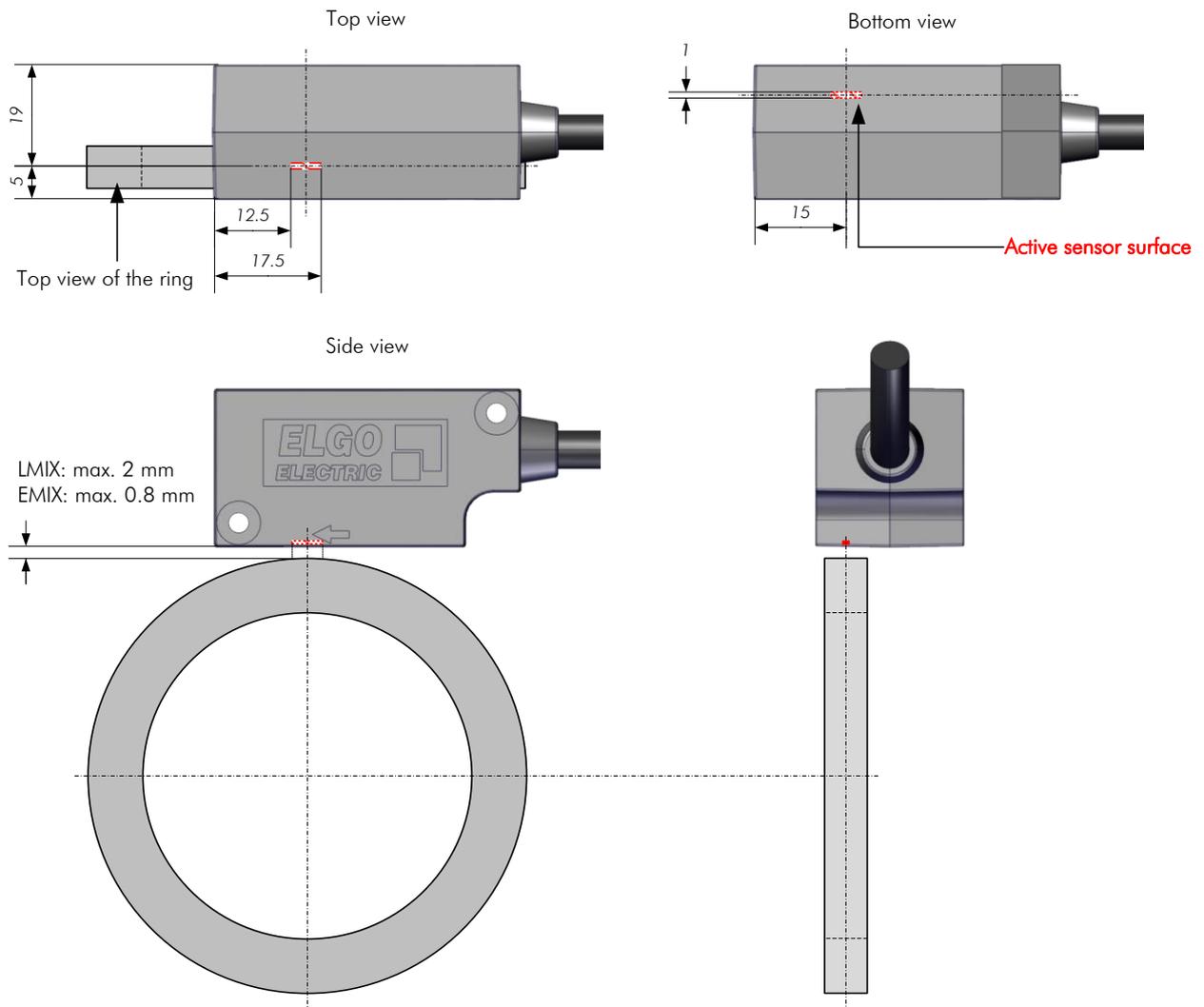


All measurements +/- 0.5 mm

Figure 5: Mounting with LMIX2 or EMIX2

### 5.2.4 Mounting with LMIX3 or EMIX3

It is to be made certain that the entire active sensor surface is within the permitted distance to the magnetic ring. The active sensor area is represented in the following graph as hatched square.



All measurements +/- 0.1 mm

Figure 6: Mounting with LMIX3 or EMIX3

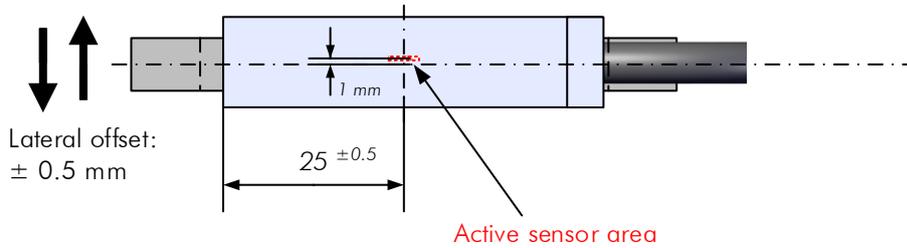
### 5.2.1 Mounting with RMIX2

It is to be made certain that the entire active sensor surface is within the permitted distance to the magnetic ring. The active sensor area is represented in the following graph as hatched square.

**Top view:**

Mounting:

RMIX2 center = Ring center



**Front view:**

Mounting:

RMIX2 center = Ring center

← Axial offset:  
→ ± 0.5 mm

Sensor distance:  
max. 0.6 mm

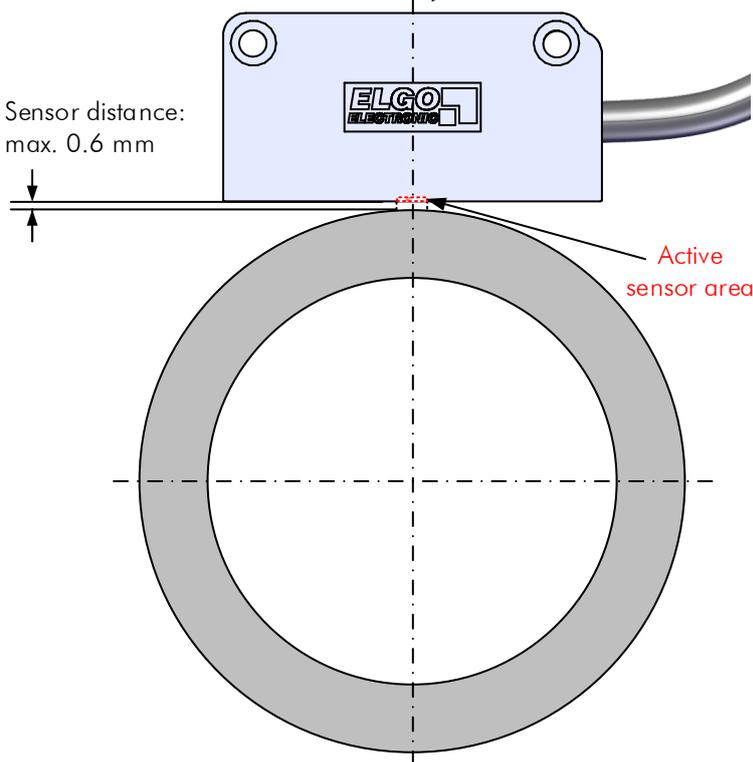


Figure 7: Mounting with RMIX2

## 6 Maintenance, Cleaning

### 6.1 Maintenance

Magnet rings are generally maintenance-free.

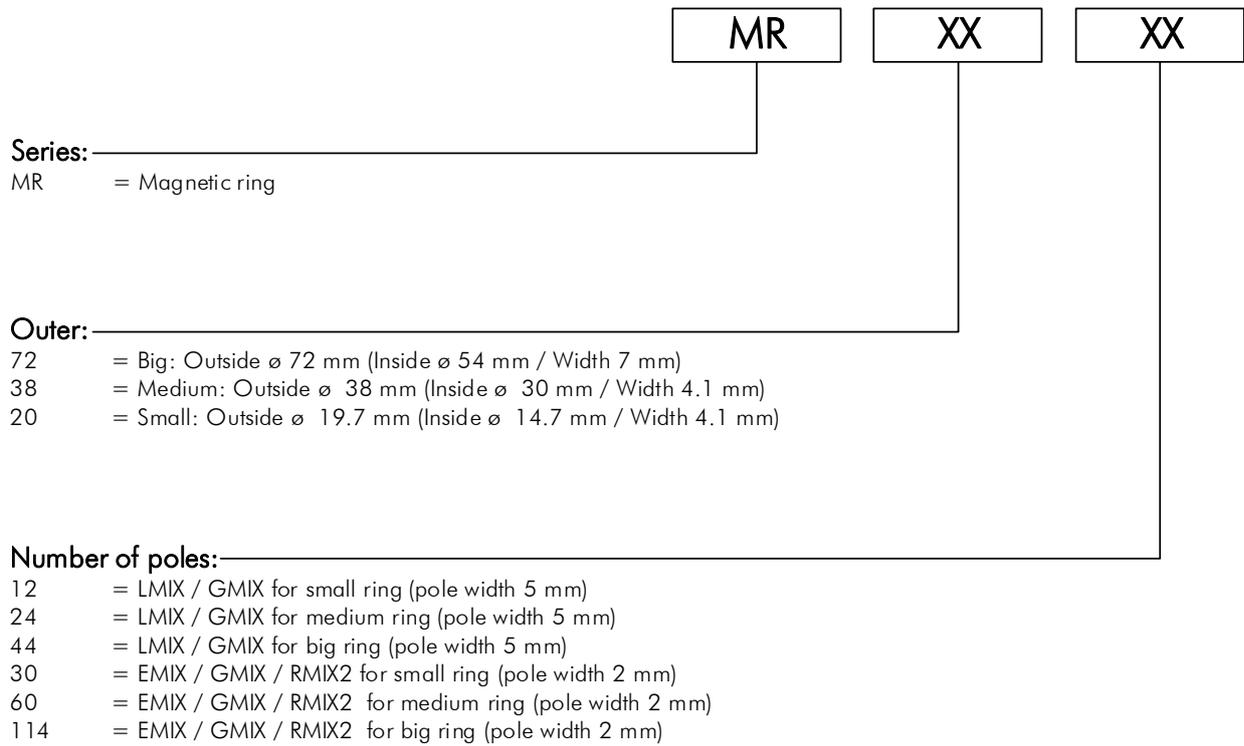
### 6.2 Cleaning



**WARNING!**

Magnet rings must only be cleaned with a damp cloth. Do not use aggressive cleanser!

## 7 Type Designation



**NOTE**

When ordering, please use the here described ordering code (Type Designation).

Notes:

Notes:

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**Measuring | Positioning | Control**

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