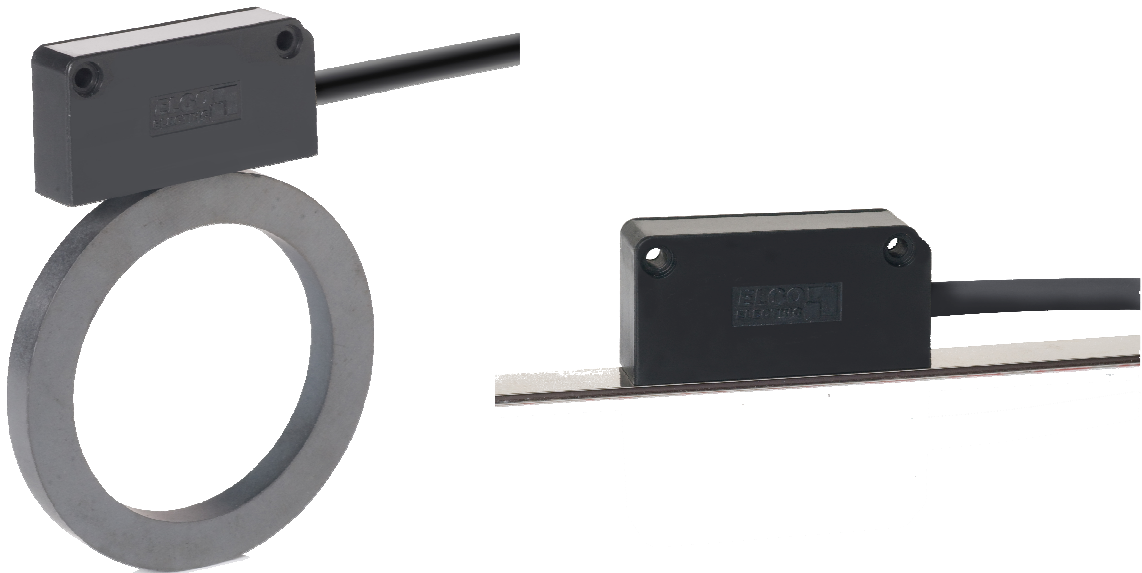


Operation Manual

Series RMIX2

Magnetic length and angle measuring system with 0.025 mm resolution



Important Features:

- Direct contact-free measurement
- The distance between sensor and magnetic tape/magnetic ring can be between 0.1 and 0.6 mm.
- Measuring length unlimited theoretically
- Resolution 0.1 mm (0.025 mm at 4 edge triggering)
- Standard ring diameter 72 mm, 38 mm and 19.75 mm available (different sizes on request)
- Repeat accuracy +/- 0.1 mm
- Very robust against dirt

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1. General Information

1.1. Information Operation Manual

The manual contains important information regarding the handling of the device. Precondition for safe operation is the compliance with the specified safety and handling instructions. Furthermore, observe the existing local accident prevention regulations and general safety rules. Please read the operation manual carefully before starting to work. The manual should be kept accessible at anytime. The illustrations in the manual are for better representation of the facts they are not necessarily to scale and can be slightly different to the actual construction.

1.2. Explanation of Symbols

Warning notices

Warning notices are characterized by symbols in the operation manual. The notes will be introduced by signal words to express the magnitude of the danger. Follow these advices in order to avoid accidents and injuries to persons and property.



DANGER!

... adverts to direct dangerous situations that can lead to death or severe injuries.



CAUTION!

... adverts to potentially dangerous situations that can lead to death or severe injuries.



ATTENTION!

... adverts to potentially dangerous situations that can lead to damages on property.

Hints and Commendations

**ADVERT!**

... highlights helpful hints and recommendations for efficient and failure-free operation.

Specific Safety Instructions

The following symbols in conjunction with safety instructions are used in order to point out possible hazards:

**DANGER!**

... marks perilous situations by electricity. By non-observance of the safety instructions the possibility of death or severe injuries exists. The operations have to be carried out only by an electrician.

1.3. Statement of Warranties

The warranty conditions are in a separate document.

Warranty

The producer guarantees the functional capability of the process engineering and the selected parameter. The period of warranty is one year and begins with the date of delivery.

1.4. Demounting and Disposal

Unless otherwise authorized, dispose the item considering the safety instructions.

Before demounting:

- Disconnect the power supply
- Secure against re-start
- Disconnect supply lines physically and discharge remaining energy
- Dispose operating supplies with respect to the environment

Disposal

Recycle decomposed elements:

- Scrap metal elements
- Recycle plastic parts
- Dispose the rest of the components according to their material consistence



ATTENTION

Wrong disposal → damage caused to the environment!

Electronic waste, electronic components, lubricants and operating supplies are liable to treatment of hazardous waste. Only approved specialized companies should perform disposal.

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

2. Safety

2.1. General Cause of Risks

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

2.2. Personal Protective Equipment

Employees should wear protective clothing during installation of the device to minimize the risk of accidents.

Therefore:

Change into protective clothing before beginning the work process. Also observe any labels in the operating area regarding protective clothing.

Principally wear protective clothing:



Safety working clothing

- ... is close-fitting
- ... is tear proof
- ... has tight sleeves without distant parts

Also wear no rings, necklaces or other jewelry.



Protective gloves

- ... for protecting the hands against abrasion and cuts.

2.3. Conventional Use

The ELGO RMIX2 length and angle measuring system is for the limited purpose as described in this manual:

The RMIX2 length and angle measuring system is constructed for measuring lengths and angles.



CAUTION! **Danger through non conventional use!**

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

Therefore:

- Use **RMIX2** only as described.
- Strictly follow this manual.

Avoid in particular:

Remodeling, refitting or changing of the device or parts of it with the intention to alter functionality or scope of the **RMIX2**.

ELGO is not liable for any damages resulting from improper use of the product.

3. Transport, Storage

3.1. Safety Instructions for Transport / Unpacking and Loading

**CAUTION!**

Professional transport only Do not throw, hit or fold the package.

3.2. Handling of Packaging Material

Adverts for proper disposal refer to 1.4.

3.3. Check of Transport

Examine delivery immediately after receiving for completeness and transport damages.

In case of externally recognizable transport damages:

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

**ADVERT!**

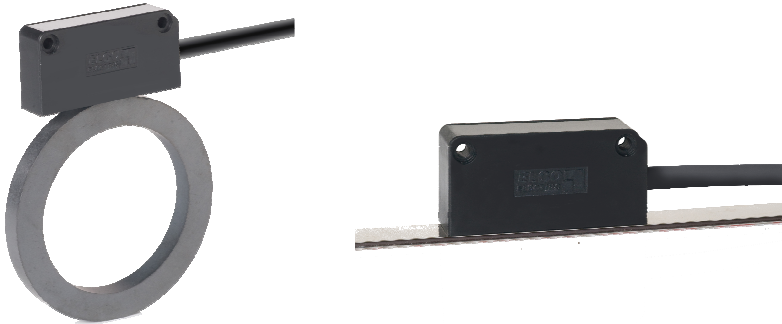
Claim any damages you recognize as soon as possible. The claims for damage must be filed in the lawful reclaim periods.

3.4. Storage

Store device only under 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: -20 to +70 °C
- Relative humidity: max. 80%
- Inspect packages regularly if stored for an extensive period of time (> 3 months)

4. Product Features



Essential Features:

- Direct contactless measurement
- The distance between sensor and magnetic tape/magnetic ring can vary between 0.1 ... 0.6 mm
- Measuring lengths theoretically unlimited
- High resolution of 0.1 mm (0.025 mm at 4 edge triggering)
- Repeating accuracy +/- 0.1 mm
- Very robust against pollution
- Index pulse 4 mm - periodical

General: The series *RMIX2* is a magnetic length and angle measuring system. The sensor technology and the translator are placed in one housing. The magnetic tape is fixed with the sticky tape to a level area. The *RMIX2* can be installed up to a maximum distance of 0.6 mm.

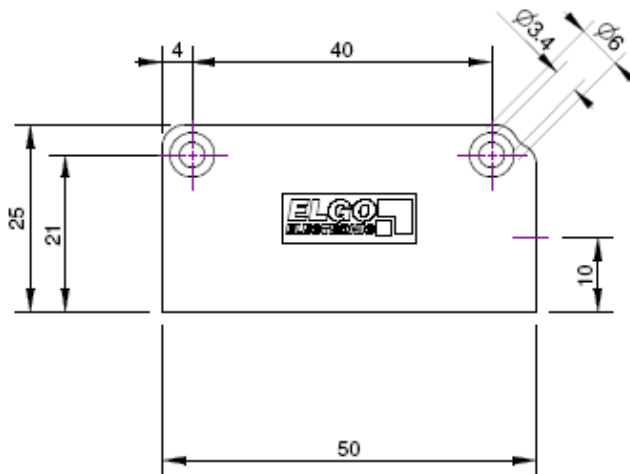
Possible signals are A, B, Z.

5. Technical Specifications

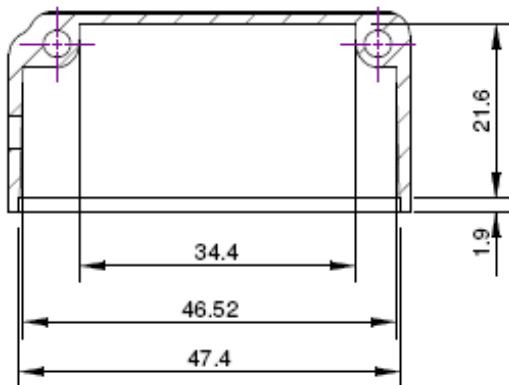
Power supply	10... 30 VDC / 5 VDC
Consumption	10... 30 VDC: max. 150 mA / 5 VDC: 200 mA
Signal	10... 30 V HTL / 5 V TTL
Resolution	0.1 mm (0.025 mm at 4 edge triggering)
Repeating accuracy	+/- 0.1 mm
Maximum operation speed	20 m/s [linear] 300,000 rpm / number of pole pairs
Signal outputs	A, B, Z
Measuring length	Theoretical unlimited
Distance sensor - tape/ring	Max. 0.6 mm
System accuracy in μm at 20 °C	+/- (25 + 20 x L) (L= measuring length in meter)
Operating temperature	-10... +70 °C (higher on request)
Storage temperature	-35... +85 °C
Humidity	Non condensing, max. 90%
Protection class	IP 67
Mechanical data sensor	RMIX2 housing: 50 x 25 x 12 mm
Cable	Drag chain suitable, Length max. 30.0 m, Weight: ca. 58.0 g/m, Wires: 2 x 0.75 mm ² and 6 x 0.14 mm ² , Bending radius: min. 60 mm
Magnetic tape MB20-20-10-1-R	Coefficient of extension $\alpha = 16 \times 10^{-6} \text{K}^{-1}$, Linear extension $\Delta L = L \times \alpha \times \Delta\alpha$, 10 mm x ca. 1.8 mm (W x H), Min. bending radius: 150 mm

5.1. Dimensions

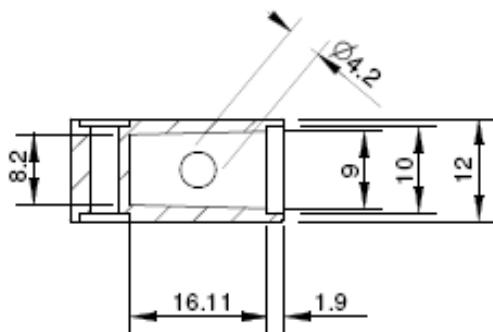
Front view:



Back view:



Side view:

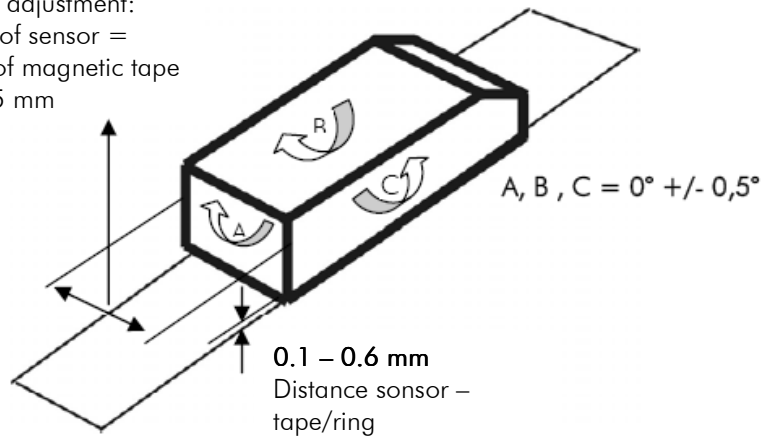


6. Installation / Initial start-up

6.1. Mounting of the Sensor

Please use 2 x M3 screws to install the sensor. Tolerances for distance and angle must be observed.

Parallel adjustment:
Center of sensor =
center of magnetic tape
+/- 0.5 mm



6.2. Pin assignment

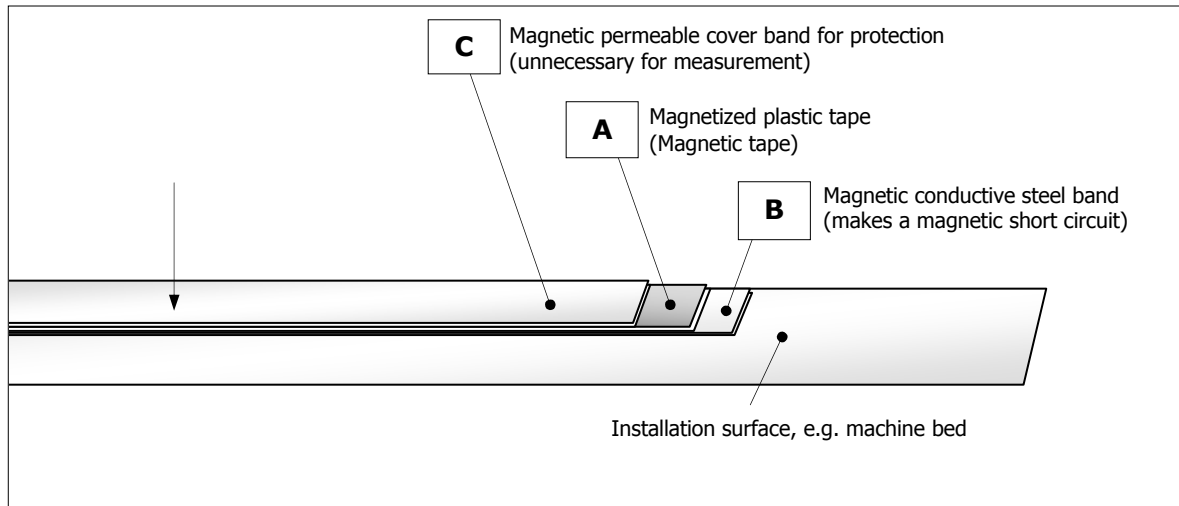
Function	Color
0 V (GND)	White
5 VDC/ 10... 30 VDC in	Brown
Channel A	Green
Channel B	Yellow
Channel Z	Grey
Shielding	PE

7. Options

7.1. Magnetic tape MB20-20-10-1-R

Structure of the magnetic tape with 3 components:

ELGO standard magnetic tape will be delivered as described. The assembly of the tape takes place through gluing the tape onto the desired surface.



The standard ELGO magnetic tape consists of 3 components:

- A** The magnetized, highly flexible rubber tape, connected on the bottom with ...
- B** ... a magnetized, flexible steel tape. This steel tape protects the rubber tape from mechanical damages and is at the same time a magnetic short circuit. This increases significantly the functional security under extreme magnetic influences. **A** and **B** are already factory-bonded, a different structure of the tape for special solutions is possible (see ordering code).
- C** To keep the flexibility for transport and installation, the third part, also a steel tape (magnetic permeable), is delivered separately. It serves for mechanical protection of the rubber tape and must be stuck on the magnetic rubber tape after installation.

The tape consists of 3 components (see Figure 1), a magnetized, flexible plastic tape (Item 3), which is connected with a steel band (Item 5) and a cover tape (item 1), which is for protection of the plastic tape. The cover tape is needed for the mechanical protection of the magnetic tape. In addition, it protects the magnetic tape from extreme external magnetic influences. For the complete bonding between the different materials a special sticky tape is used (item 2, item 4, and item 6).

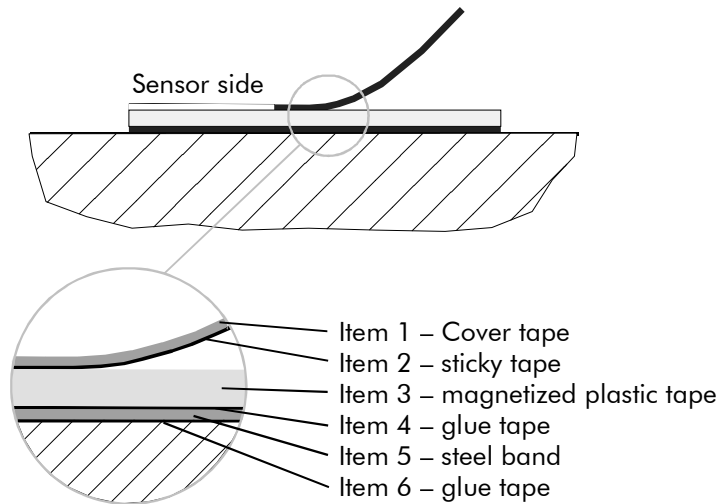


Fig. 1: Components of magnetic tape

7.2. Handling

To avoid tension in the tape, it should not be twisted or stored with the magnetized plastic tape to the inside minimum radius of curvature 150 mm).

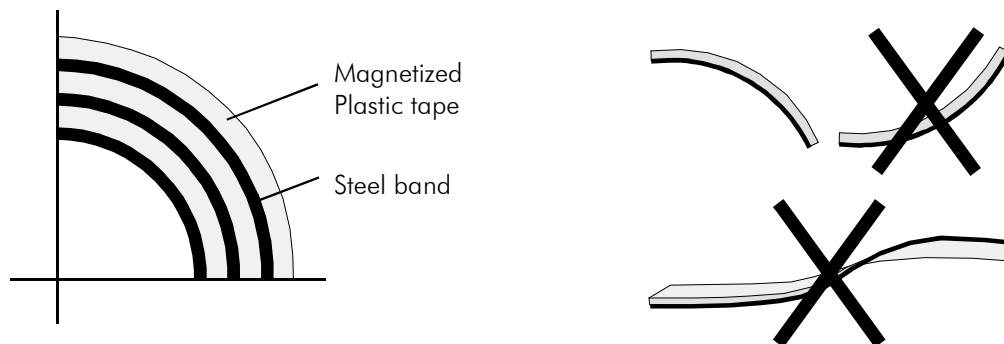


Fig. 2 Storage and Transport

7.3. Processing instructions for the adjustment of magnetic tapes

The provided sticky tapes stick well on clean, dry and plain surfaces. The surface should be very clean if the surroundings are very dirty. The ideal depth of roughness is $R_a < 3.2$ ($R_z < = 25 / N8$). Typical solvent for cleaning surfaces are a 50/50 mixed isopropyl-alcohol / water mixture or heptane. The surfaces of materials as copper, brass etc. should be sealed to avoid an oxidation. A high press proof results in a good surface contact. The optimal sticking temperature is between + 21° C and 38° C.

The optimal sticking temperature is between + 21° C and 38° C. Avoid colder sticking surfaces than + 10°C, because in this case the adhesive becomes too hard and perhaps a sufficient immediate adhesion might be difficult to achieve. After proper sticking the stability of the connection is ensured also when the temperature is below zero. Please use only the delivered magnetic tape.

7.4. Resistance against chemical influences

Chemicals showing no or only small effects after 2-5 years:

Formic acid, glycerol 95 °C, linseed oil, soy bean, cotton seed oil, N-hexane, lactic acid, formaldehyde 40 °C, Iso octane, petroleum.

Chemicals showing small to medium effects after 1 year:

30 % Oleic acid, acetylene, steam, acetic acid, sea water, ammonia, acetic acid 20%, isopropyl ether, stearic acid 70 °C water free, kerosene

Chemical showing strong effects after 1-5 months:

benzene, nitric acid 70%, turpentine, toluol, lacquer solvent, red fuming nitric acid, carbon tetra chlorine, trichloroethylene, nitro benzene, hydrochloric acid 37% 93 °C, tetra hydro furan, xylene

7.5. Sticking and Cutting

**NOTE!**

When gluing / sticking the magnetic tape pay attention to the marks on the magnetic tape. Improper installation delivers incorrect values. A previously glued tape is destroyed after removal and cannot be reused. Before the start of the bonding are magnetic tape and masking tape to the exact length basis. Observe also the counting direction of the measuring system. Before adjusting the tape (gluing) please cut the magnetic tape and the cover band to exact the length.

Length of magnetic tape = Measuring length + Sensor length

Preferably, the magnetic tape should be stuck into a nut or aligned to an edge.

Procedure for sticking:

1. The magnetic tape is already factory bonded with the steel band, in between is a double sided sticky tape. Stick the provided sticky tape onto the carrier side (=steel band).
2. Now adjust the magnetic tape and stick it onto the surface. The best way to stick the magnetic tape is to do it in two steps. Remove the first half of the adhesive film from the sticky tape and adjust it then do the rest length.
3. Then put the sticky tape on the covering band. It is not important on which side of the covering band the sticky tape is put on.
4. Stick the covering band onto the visible brown magnetic tape.

8. Interferences

The following chapters describe possible causes for malfunction and the instructions to correct them. If you encounter problems check for proper installation first. Make sure that power is supplied to the system. If you observe recurring errors you might consider electrical interference suppression measures as described in section 8.2.

If errors cannot be corrected with the following instructions please contact the manufacturer (see last page).

8.1. Safety

Basics:



CAUTION!
Risks of injury from improper fault clearances!

Improper fault clearances can cause serious personal or property damage.

Therefore:

- Fault clearance may only be carried out by qualified and instructed personnel
- Prior to the beginning of work provide sufficient room to assemble the equipment
- Please look for cleanliness at the place of installation; loosely around laying parts and tools are sources of accidents

If components have to be replaced:

- Look for correct installation of spare parts
- All mounting elements have to be assembled correctly
- Before resetting please ensure that all covers and protective devices are installed correctly and function properly

To ensure a perfect operation of the sensor the following (external) measures have to be taken additionally:

Place of installation:

The sensor should not be installed near to sources of interference generating strong inductive or capacitive interferences or strong electrostatic fields.

8.2. Electrical interference suppression



CAUTION!

Signal wires should be installed separately from load power lines and with a safe distance of at least 0.5 m to capacitive and inductive interferences such as contactors, relays, motors, switching power supplies, timed controls.

If interferences occur in spite of applying all above mentioned measures proceed as follows:

1. Add RC elements over contactor coils of AC contactors (for example 0,1 μF /100 Ω)
2. Add recovery diodes over DC inductances
3. Add RC elements over each drive phase (in connector box of the drive).
4. Do not connect the GND potential with PE (earth potential)!
5. Install a power filter before the external power supply

8.3. Restart after fault clearance

After fault clearance:

1. Reset emergency stop switch.
2. Quit disturbance on sensor.
3. Make sure that no person is located in the danger zone.
4. Start operating as explained in the instructions.

8.4 EMC information

A trouble-free operation of the measuring system devices of the company ELGO Electronic GmbH & Co KG can only be guaranteed if during assembly, wiring and operating the following basic rules are observed and adhered to:

- Use only shielded signal lines with a minimum diameter of 0.15 mm²
- To protect against electrical fields, connect the cable shield unilaterally, low resistance and low inductive with the operating lightning protection.
- Unused arteries in signal lines should be isolated from each other separately
- Isolate signal and power lines in long parallel lines (a distance of 300 mm is required). Therefore, should never different voltage levels be combined in one cable, e.g. 230V/50 Hz power supply and measuring system signal 24V DC.
- To reduce interference of frequency converters, the use of RC-filter, shielded cable and EMC compliant grounding of frequency switchboards are recommended. Please find the necessary instructions in the manufacturer operation manual of the frequency converter.
- Wireless phones and Walky-talkies should never be used in the immediate vicinity of electronic devices

9. Maintenance

The correct orientation of the sensor area to the magnet (see 7.3. description of assembly / installation) should be monitored at regular intervals.

10. Type Designation

For orders please use the following order code:

RMIX2 - - - - - - - -
A A A - B B . B - C C C C - D D

A Version

- 000 ELGO Standard
- 001 first special version

B Cable length

- 01.5 = 1.5 meter (standard cable length)

C Resolution

- 0025 25 μm (per edge)

D Supply

- 00 10... 30 V DC / 10... 30 VDC
- 01 10... 30 V DC / 5 V TTL line driver
- 11 5 V DC / 5 V-TTL line driver

Accessories:

Magnetic tape MB20-20-10-1-R

- 0.2 m minimum length,
- maximum length theoretical unlimited
- cover tape included in delivery
- (hint: length of the magnetic tape = effective measuring length + 0.15m)

Magnetic rings (2 mm pole width)

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