SERIES EMAX-RO

Rotative Magnetic Absolute Encoder

- Magnetic Single-turn Absolute Encoder
- Angular measurement without bearing
- High resolution, 16000 measuring steps / turn
- Additional incremental signals for highly dynamic drives
- Diverse Interfaces available:
  - Standard: SSI or CANopen
  - On request: RS422, RS422 (addressable), RS232, CAN BASIC ELGO
  - In preparation: BISS-C
**General:** The angle measuring system EMAX-RO is a combination of a sensor and a magnetic ring. The magnetic ring is mounted directly to an engine shaft or an axle. This ensures a quick and easy installation. EMAX-RO is especially suited for measuring rotative angles. The sensor head with its high protection class is resistant against any kind of dust and dirt and works completely without wear.

Furthermore, the rotative measuring system EMAX-RO has the advantage of absolute measurement and therefore belongs in the category of single turn encoders.

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**Essential features:**
- Rotative angle measuring system
- Resolution of 16000 measuring steps over 360° (other resolutions on request)
- Absolute measurement
- Different interfaces are available
  - **Absolute:** Standard: SSI or CANopen
    - On request: RS422, RS422 (addressable), RS232 or CAN BASIC ELGO
    - In preparation: BISS-C
  - **Incremental:** 90° phase shifted square-wave signals (TTL or HTL) or 1 Vss sine/cosine signals
- Direct measurement on engine shaft or axis possible
- No wear thanks to contact-free measuring principle

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**The magnetic ring:** The magnetic ring that is included in the delivery has a diameter of 50.95 mm (max. 1000 rpm) or 51.50 (max. 20000 rpm) in the version with protection ring.

Caution: the measuring system may only be operated with the corresponding magnetic ring!

**Distance between ring and sensor:** The ideal distance between the magnetic ring and the active sensor area of the measuring system is between 0.5 ... 1.0 mm without protection ring and max. 0.45 mm with protection ring. Outside this area, proper functioning of the device cannot be guaranteed!

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**Dimensions sensor:**
### Technical Data:

#### Mechanical Data
- **Measuring principle:** Absolute
- **Repeat accuracy:** +/- 1 Increment
- **System accuracy in μm at 20 °C:**
  - (+/-) (150 + 20 x L)/ +/- 0.35° (type designation O10)
  - (+/-) (50 + 20 x L)/ +/- 0.16° (type designation F10)
- **Sensor distance to magnetic Ring:**
  - max. 1.0 mm (without protection ring)
  - max. 0.45 mm (with protection ring)
- **Basic pole pitch:** 5 mm
- **Sensor housing material:** Zinc die cast
- **Housing dimensions:** L x W x H = 62 x 40 x 20 mm
- **Required magnetic ring:**
  - MR 00 051 030 206 0032 050 2 14021 (without protection ring)
  - MR 00 052 030 206 0032 050 2 14021 (with protection ring)
- **Max. measuring range:** 360°
- **Connection type:** Circular plug M12 on housing
- **Weight:** 130 g (without cable)
  - Cable (accessory): approx. 60 g per meter

####Ambient conditions
- **Operating temperature:** -10 ... +70 °C (-25 ... +85 °C) on request
- **Storage temperature:** -25 ... +85 °C
- **Protection type:** IP40 (standard), IP65 (option V)

#### Electrical data
- **Supply voltage:** 10 ... 30 VDC
- **Ripple:** <5 %
- **Current consumption:** max. 150 mA
- **Interfaces:** Standard: SSI (Gray or binary), CANopen
  - On request: CAN BASIC ELGO, RS232, RS422 or addressable RS422
  - In preparation: BISS
- **Resolution:** 16000 measuring steps/revolution
- **Max. rotation speed:** 20000 rev./min. (depending on interface)
  - 0 to 1000 rpm without protection ring
  - 1000 to 20000 rpm with protection ring
- **Sensor cable:** max. 30 m (depending on interface)

#### Additional options
- **Device address:** 0 ... F
- **Standard version:**
- **Without terminating resistor:**
- **Incremental signals:**
  - H2NS: incremental square wave signals HTL with 2.5 μm resolution
  - H005: incremental square wave signals HTL with 5 μm resolution
  - H010: incremental square wave signals HTL with 10 μm resolution
  - H025: incremental square wave signals HTL with 25 μm resolution
  - T2NS: incremental square wave signals TTL with 2.5 μm resolution
  - T005: incremental square wave signals TTL with 5 μm resolution
  - T010: incremental square wave signals TTL with 10 μm resolution
  - T025: incremental square wave signals TTL with 25 μm resolution
  - SC50: sine-cosine signal 1 Vss, 5 mm pole pitch

### Order Designation:

For orders, please use the following order key:

#### RMAX

<table>
<thead>
<tr>
<th>Order Key</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>010</td>
<td>10 μm - with system accuracy in μm +/- (150 + 20 x L)</td>
</tr>
<tr>
<td>016</td>
<td>10 μm - with system accuracy in μm +/- (50 + 20 x L)</td>
</tr>
</tbody>
</table>

#### SN-Number

**00** 0 ... 99

#### Signal cable length (cable length in dm)

000 0 m - (standard version without cable)

#### Resolution in μm

010 10 μm - with system accuracy in μm +/- (150 + 20 x L)

#### Interface

- **SBO:** SSI-Interface (25 Bit binary code)
- **SG0:** SSI-Interface (25 Bit Gray code)
- **CA0:** CANopen (DS406)
- **CN0:** CAN BASIC ELGO (on request)
- **420:** RS422 (on request)
- **A20:** addressable RS422 (on request)
- **230:** RS232 (on request)

#### Bit rate

- **09k6:** 9600 Bit/s - standard bit rate for RS422 (420/A20)
- **19k2:** 19200 Bit/s for RS422
- **38k4:** 38400 Bit/s for RS422
- **125k:** 125000 Bit/s for CAN
- **250k:** 250000 Bit/s for CAN
- **500k:** 500000 Bit/s for CAN
- **1MHz:** 1000000 Bit/s for CAN

#### Examples:

**RMAX**

<table>
<thead>
<tr>
<th>Order Key</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>000000010</td>
<td>EMAX-RO with SSI binary interface, 25 bit and circular plug</td>
</tr>
</tbody>
</table>

**RMAX**

<table>
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<tr>
<th>Order Key</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>000000010CA125k0</td>
<td>EMAX-RO after ELGO standard with CANopen (DS406) interface, 12 pin round connector, Bitrate125 kbit/s and device address: 0</td>
</tr>
</tbody>
</table>

**Note:** options that are not required are filled in with "-"!
Dimensions of the magnetic ring:

Without protection ring
Usage up to max. 1000 rpm

With protection ring
Usage up to max. 20000 rpm

Magnetic ring - Installation suggestions:

Screw mounting example:

Adhesive mounting example:

Accessories:

Magnetic ring
MR 00 051 030 206 0032 050 2 14021
(without protection ring)
MR 00 051 030 206 0032 050 2 14021
(with protection ring)
Resolution 16 000 steps per turn

PNO1
SSI / PROFIBUS Converter

DKA-00-RCF0-050-XXXX-12-T-D-S
Connection cable for EMAX-RO, device side with 12-pol. M12-plug female, cable length 5.0 m, evaluation unit with open wires, 12 wires, twisted pair, drag chain suitable, with shield