

Operating Manual

SERIES BMIX

Magnetic, battery-backed Quasi-Absolute Encoder



- Quasi-absolute length and position measurement
- Movements are also detected when switched off
- Proven magnetically based measuring technology
- Wear-free, contactless measurement principle
- Selectively with Analog output (voltage or current) or CANopen interface (DS406 encoder profile)
- High shock and vibration resistance
- Thanks to protection class IP67 insensitive against dust, dirt, smoke and water

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1 Contents

1	Contents	3
2	List of Figures	4
3	List of Tables	4
4	General, Safety, Transport and Storage	5
4.1	Information Operating Manual	5
4.2	Explanation of Symbols	5
4.3	Statement of Warranties	6
4.4	Demounting and Disposal	6
4.5	General Causes of Risk	6
4.6	Personal Protective Equipment	6
4.7	Conventional Use	7
4.8	Safety Instructions for Transport, Unpacking and Loading	7
4.9	Handling of Packaging Material	7
4.10	Inspection of Transport	7
4.11	Storage	7
5	Product Features	8
5.1	Functional Principle	8
5.2	Available Output Interfaces	8
5.3	The quasi-absolute Measuring Principle	8
6	Technical Data	9
6.1	Identification	9
6.2	Dimensions BMIX Sensor	9
6.3	Technical Data Sensor	10
6.4	Technical Data Magnetic Tape	11
7	Installation and First Start-Up	12
7.1	Operating Area	12
7.2	Description installation / Mounting of the Magnetic Tape	13
7.3	Mounting the Sensor	16
7.4	Calibration of the MIN and MAX Values	18
8	Connections and Interfaces	19
8.1	Analog Output	19
8.2	CANopen Interface	20
9	Disturbances, Maintenance, Cleaning	21
9.1	Fault Clearance	21
9.2	Re-start after Fault Clearance	21
9.3	Maintenance	21
9.4	Cleaning	21
10	Type Designation	22
10.1	Accessories	22

11	Index	23
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2 List of Figures

Figure 1: BMIX sensor	8
Figure 2: Magnetic tape encoding.....	8
Figure 3: Dimensions BMIX sensor.....	9
Figure 4: Components of the magnetic tape	13
Figure 5: Handling	14
Figure 6: Alignment sensor – magnetic tape.....	16
Figure 7: Mounting tolerances of the sensor.....	17
Figure 8: TEACH inputs.....	18
Figure 9: CANopen interface	20

3 List of Tables

Table 1: Resistance against Chemical Influence.....	15
Table 2: Mounting tolerances	17
Table 3: Pin assignment analog out (open cable ends).....	19
Table 4: Pin assignment analog out (R8M0).....	19
Table 5: Pin assignment CANopen (open cable ends)	20
Table 6: Pin assignment CANopen (D9M0).....	20
Table 7: Pin assignment CANopen (R5M0)	20
Table 8: Accessories	22

4 General, Safety, Transport and Storage

4.1 Information Operating Manual




This manual contains important information regarding the handling of the device. For your own safety and operational safety, please observe all safety warnings and instructions. Precondition for safe operation is the compliance with the specified safety and handling instructions. Moreover, the existing local accident prevention regulations and the general safety rules at the site of operation have to be observed.

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.


4.2 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:

	DANGER! 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.
	WARNING! 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.
	CAUTION! 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:

	DANGER! 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:

	NOTE! ...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.

4.3 Statement of Warranties

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

4.4 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.

4.5 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.

4.6 Personal Protective Equipment

Employees have to wear protective clothing during the installation of the device 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:

	PROTECTIVE CLOTHING
	... 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.
	PROTECTIVE GLOVES
	...for protecting the hands against abrasion, wear and other injury of the skin.
	PROTECTIVE HELMET
	...for protection against injuries of the head.

4.7 Conventional Use

The ELGO-device is only conceived for the conventional use described in this manual.
The BMIX linear encoder only serves to measure lengths, distances or positions.



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.

4.8 Safety Instructions for Transport, Unpacking and Loading



CAUTION!

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

4.9 Handling of Packaging Material

Notes for proper disposal: ↗ 4.4

4.10 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.

4.11 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 (↗ 6) needs to be observed
- Relative humidity (↗ 6) must not be exceeded
- Inspect packages regularly if stored for an extensive period of time (>3 months)

5 Product Features

The ELGO measuring system BMIX is based on the physical principle of length and position measurement by using magneto-sensitive components. It is used for a high-precision determination of the position, moving distance or speed. Based on this wear-free and contactless single-track measuring system, ELGO offers these “quasi absolute” version.



Figure 1: BMIX sensor

5.1 Functional Principle

The basis of the magnetic incremental linear encoder consists of a scanning technology, which scans the north and south poles on the single-track coded magnetic tape and produces a single sine/cosine wave for each pole. The pole pitch of the magnetic tape type **MB20-160-10-1-R** is 16 mm. The complete sine/cosine signal process is interpolated electronically.

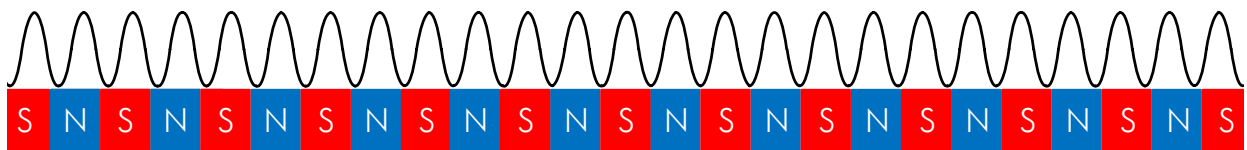


Figure 2: Magnetic tape encoding

Depending on refinement of the interpolation, together with the pole pitch of the magnetic tape, the resolution of the measuring system is determined. Depending on the ordered interface option, the sampled signal information is converted by the internal evaluation electronics into the corresponding output format.

5.2 Available Output Interfaces

Depending on the interface option ordered (see Type Designation ☞ 10), the sampled signal information is converted by the internal evaluation electronics into one of the following output signals:

- Interface option **I20** → Analog 12 bit output signal (0 ... 20 mA), proportional to the measured value
- Interface option **I24** → Analog 12 bit output signal (4 ... 20 mA), proportional to the measured value
- Interface option **V04** → Analog 12 bit output signal (0.5 ... 4.5 V), proportional to the measured value
- Interface option **V10** → Analog 12 bit output signal (0 ... 10 V), proportional to the measured value
- Interface option **CA0** → CANopen standard interface according to the DS406 encoder profile

Further information on the interfaces can be found in chapter ☞ 8 Connections and Interfaces.

5.3 The quasi-absolute Measuring Principle

A battery line integrated in the sensor turns the incremental measuring system into a quasi-absolute measuring system, since the current position is permanently detected and internally processed even in a de-energized state. This is guaranteed for up to 6 months under consideration of the optimal charging and environmental conditions.

6 Technical Data

6.1 Identification

The type label serves for the identification of the unit. It is located on the housing of the device and indicates the exact type designation (=order reference ☞ 10) with the corresponding part number. Furthermore, the type label contains a unique, traceable device number. When corresponding with ELGO please always indicate this data.

6.2 Dimensions BMIX Sensor

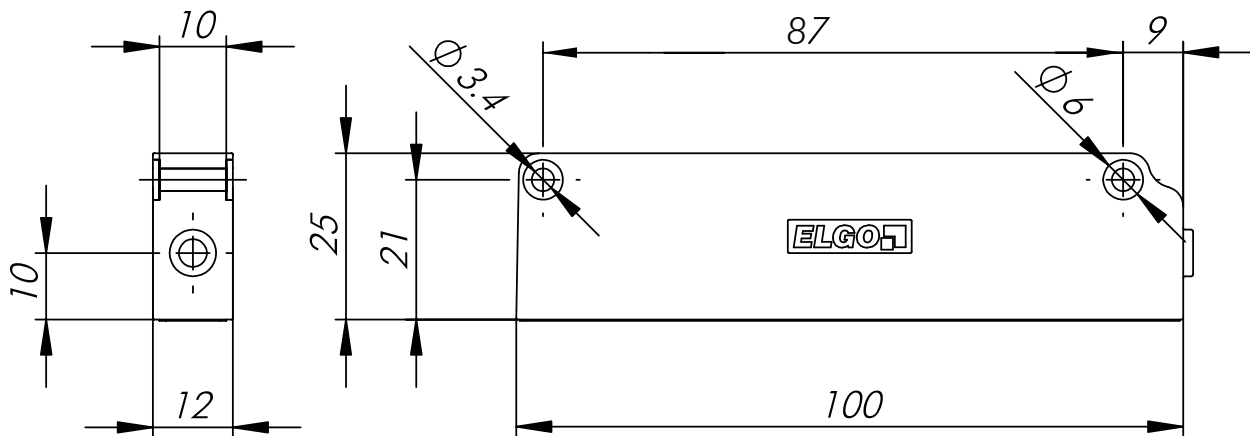


Figure 3: Dimensions BMIX sensor

6.3 Technical Data Sensor

BMIX (Standard Version)

Mechanical Data

Measuring principle	incremental, quasi-absolute
Repeat accuracy	±1 increment
System accuracy in μm at 20 °C	±(1000 + 20 x L) L = measuring length in meters
Distance sensor - tape	max. 10 mm
Pole pitch	16 mm
Material sensor housing	ABS plastic
Housing dimensions	L x W x H = 100 x 12 x 25 mm
Required magnetic tape	MB20-160-10-1-R
Measuring length	Theoretically unlimited
Connection type	standard: open cable ends options: D-SUB or round (see ☞ 10)
Sensor cable length	1.5 m (others on request)
Sensor cable bending radius	60 mm
Weight	measuring system: approx. 120 g; cable: approx. 60 g/m

Electrical Data

Power supply voltage	10 ... 30 VDC
Residual ripple	< 10 %
Current consumption	max. 150 mA
Battery operating time	With movement: approx. 16 days after power-off Without movement / in storage: approx. 32 days after power-off
Charging time before first use	4 h
Interfaces (see ☞ 8 and ☞ 10)	12 bit analog output 0 ... 20 mA 12 bit analog output 4 ... 20 mA 12 bit analog output 0.5 ... 4.5 V 12 bit analog output 0 ... 10 V CANopen (DS406)
Resolution	1 mm
Operating speed	max. 2.0 m/s

Environment Conditions

Storage temperature	-20 ... +45 °C
Operation temperature – charging process	0 ... +45 °C
Operation temperature – Battery operation	-20 ... +45 °C
Protection class	max. 95 %, non-condensing
Humidity	IP67

6.4 Technical Data Magnetic Tape

The magnetic tape consists of two components:

- The actual magnetic tape which carries the position information
- A mechanical stainless steel back iron

Magnetic Tape MB20-160-10-1-R

Coding	incremental, single track system
Pole pitch	16 mm
Operation temperature installed	-20 °C ... +65 °C (-20 °C ... +80 °C if usage without adhesive tape resp. options „B“ or „D“)
Storage temperature uninstalled	Short-term: -10 °C ... +60 °C Medium-term: 0 °C ... +40 °C Long-term: +18 °C (-20 °C ... +80 °C if usage without adhesive tape resp. options „B“ or „D“)
Gluing temperature:	+18°C ... +30°C
Relative humidity	max. 95 %, non-condensing
Material carrier tape	Precision strip steel 1.4310 / X10CrNi 18-8 (EN 10088-3)
Double-faced adhesive tape	3M-9088 (observe instructions), others on request
Dimensions	→ without adhesive tape: 10 mm (±0.1) x 1.35 mm (±0.11) → with adhesive tape (excl. carrier): 10 mm (±0.1) x 1.56 mm (±0.13) → with adhesive tape (incl. carrier): 10 mm (±0.1) x 1.63 mm (±0.14)
Length expansion coefficient	$\alpha \approx 16 \times 10^{-6} \text{ 1/K}$
Thermal length expansion	$\Delta L[\text{m}] = L[\text{m}] \times \alpha[\text{1/K}] \times \Delta \vartheta[\text{K}]$ (L = tape length in meters, $\Delta \vartheta$ = relative temperature change)
Bending radius	min. 150 mm (min. 50 mm if usage without adhesive tape resp. options „B“ or „D“)
Available lengths	32 m (up to 70m on request)
Weight magnetic tape	ca. 62 g/m (incl. magnetic tape and cover tape)
Tape imprint	ELGO standard, printing color black, digit height ≥ 5 mm
Influence of external magnets	External magnetic fields must not exceed 64 mT (640 Oe; 52 kA/m on the surface of the magnetic tape as this could damage or destroy the code on the magnetic tape.
Protection class	IP65

7 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 qualified staff that has been trained and authorized by the operator.

7.1 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.

7.2 Description installation / Mounting of the Magnetic Tape



NOTE: External Magnetic Fields

The magnetic tape must not be influenced by external magnetic fields! The magnetic tape must not come into direct contact with other magnetic fields (e.g. permanent magnets, magnetic clamps, electromagnets, magnetic stands)! This may cause irreparable damage, which will compromise the measuring accuracy or even the functioning.

7.2.1 The Magnetic Tape MB20-160-10-1-R

In the standard case, the magnetic tape is delivered as described
It is installed by gluing it to the respective mounting surface.

The magnetic tape consists of 2 pre-assembled components (see figure below):

- A magnetized, flexible plastic tape (Pos. 3), which is connected with a magnetically conductive steel tape as inference band (Pos. 4) and is supplied with an adhesive tape (Pos. 5).
- A magnetized permeable cover tape (Pos. 1), which serves for the mechanical protection of the plastic tape (not required for the measurement) and is supplied with an adhesive tape (Pos. 2).

Therefore a divergent tape structure and scope of delivery is also possible.
The cover tape is also available separately

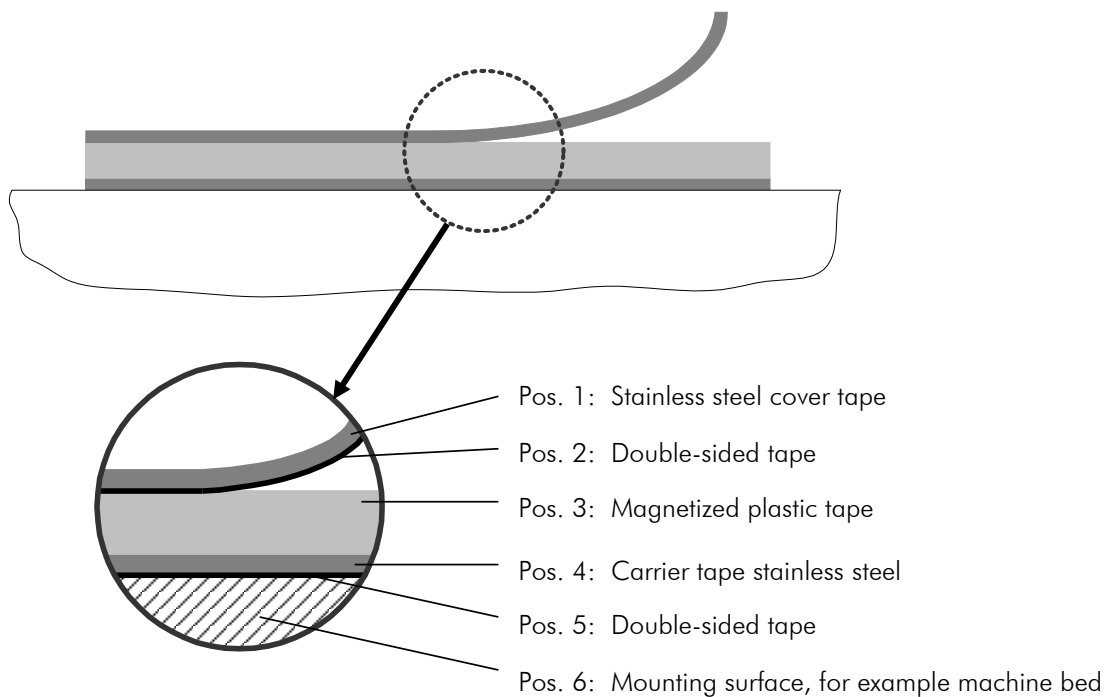


Figure 4: Components of the magnetic tape

7.2.2 Handling

In order to avoid tension in the tape, it must not be stretched, compressed or twisted. It should be stored with the magnetized plastic tape to the outside. The minimum bending radius is 150 mm.

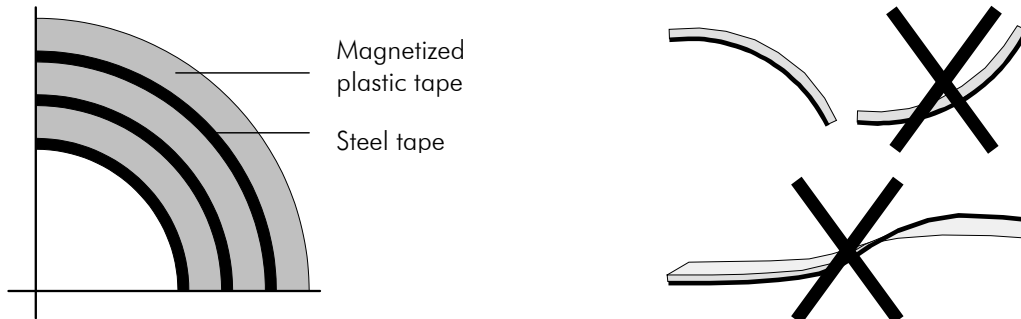


Figure 5: Handling

7.2.3 Processing hint for the gluing of magnetic tapes

Surface-Preparation: In order to guarantee optimal adhesion, all anti-adhesive contamination (e.g. oil, grease, dust, separating agents) has to be removed using solvents with residue-free evaporation. Suitable agents are ketones or alcohols. Typical solvents for cleaning the surface are a 50/50 isopropyl alcohol/water mixture or heptane. Those agents are offered by Loctite and 3M among others as surface cleaners. When using solvents, always observe the manufacturer instructions! If the surface is copper, brass etc., it should be sealed to avoid oxidation.

Contact-Pressure: The strength of the adhesion is directly dependent on the contact the adhesive can form with the surface. Therefore it is important to use as much pressure as possible when gluing the tape, possibly by using aids such as draw rolls. The optimum contact pressure is 4...5 kg/cm².

Gluing temperature: The optimal gluing temperature is between + 18° C and 30° C. Avoid colder sticking surfaces than + 10°C, because in this case the adhesive becomes too hard and perhaps a sufficient immediate adhesion is hardly to achieve. After proper sticking, the stability of the connection is ensured also when the temperature is below zero. The final tackiness of a sticking is from experience reached after approximately 72 hours (at + 21° C). For gluing use only the supplied adhesive tape.

7.2.4 Cutting and Gluing

Before starting the gluing process, both the magnetic and the cover tape have to be cut to the required length

Length cover tape = measuring length + 100 mm sensor length + 50mm (when using end caps)



NOTE!

When sticking the magnetic tape pay attention to the markings on the tape and the Sensor. Improper installation does not provide the correct values. A already glued magnetic tape is destroyed after the removal, and cannot be used again. Note also the direction of counting of the measuring system.

Preferably the magnetic tape should be glued close to an edge or into a groove, which should be deep enough to embed the magnetic tape and the cover tape.

When unprotected, the cover tape may peel off!

Therefore: Use tape end caps (☞ 10.1) or let the cover tape overlap the end of the magnetic tape and fix it with a screw.

The tape must be glued smoothly on the surface. The measuring accuracy decreases if the tape is not even!

Before gluing the magnetic tape and the cover tape onto the surface, they should be left lying on the mounting surface for ca. 30 minutes so that the temperature matches. This prevents strain in the tape due to thermal expansion.

Mounting steps:

1. Thoroughly clean the surface (☞ 7.2.3)
2. Acclimatization: let magnetic tape and cover tape adjust their temperature
3. Remove the protection foil from the magnetic tape
4. Glue magnetic tape under great pressure
5. Thoroughly clean surface of magnetic tape
6. Remove the protection foil from the cover tape
7. Glue the cover tape under great pressure
8. Safeguard the ends of the cover tape against peeling off, e.g. by using end caps (☞ 10.1)

7.2.1 Resistance against Chemical Influence

Table 1: Resistance against Chemical Influence

Show no or little effect in constant contact after 2-5 years:

formic acid	glycerol 93°C	linseed oil	soy beans oil
cotton seed oil	N-hexane	lactic acid	
formaldehyde 40%	Iso octane	petroleum	

Show weak to moderate effects in constant contact after approximately 1 year:

acetone	gasoline	acetic acid 30%	oleic acid
acetylene	steam	acetic acid, pure acetic acid	sea water
ammonia	acetic acid 20%	isopropyl ether	stearic acid 70°C, anhydrous
kerosene			

Have strong effects when contacting permanently after 1-5 months:

benzene	nitric acid 70%	turpentine	toluene
lacquer solvent	nitric acid, red, vitriolic	carbon tetrachloride	tetrahydrofuran
trichloroethylene	nitrobenzene	hydrochloric acid 37%, 93°C	xylene

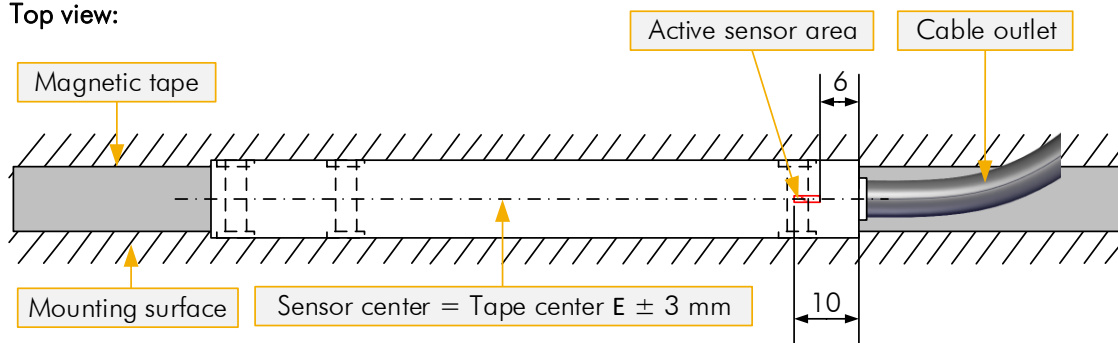
7.3 Mounting the Sensor

Three mounting holes are available on the sensor housing for mounting. The sensor can be fastened with two or three M3 screws of appropriate length (see dimensional drawing ☞ 6.2).

7.3.1 Alignment of the Sensor to the Magnetic Tape

To ensure that the active sensor surface is correctly positioned over the tape, the sensor must be aligned centrally to the magnetic tape (allowed lateral offset ± 3 mm). The reading distance between the sensor and the magnetic tape should be selected over the entire measuring distance so that the sensor does not touch the tape and at the same time does not exceed an air gap of 10 mm.

Top view:



Side view:

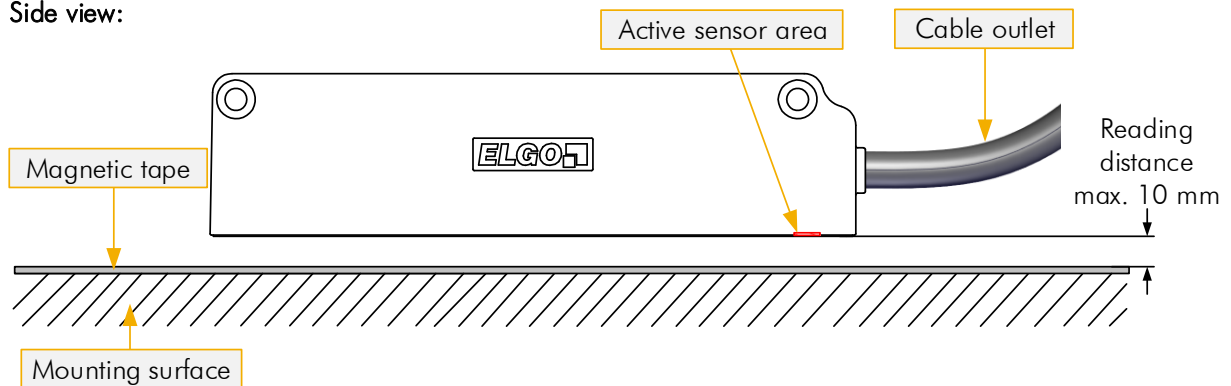


Figure 6: Alignment sensor – magnetic tape

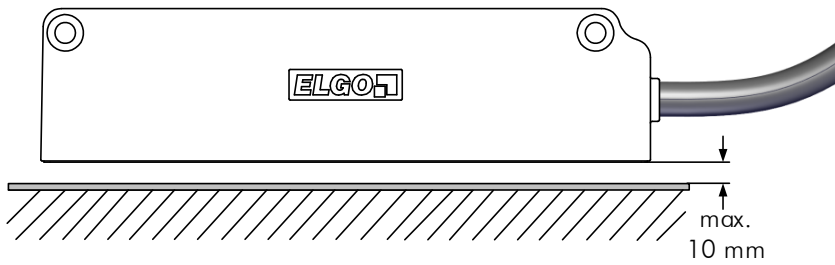
It must also be ensured that the installation tolerances described in next section ☞ 7.3.2 are observed.

7.3.2 Mounting Tolerances

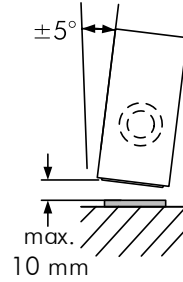
Table 2: Mounting tolerances

Tolerances	
Magnetic tape type	MB20-160-10-1-R
Reading distance sensor / tape	max. 10 mm
Tilt angle	$\pm 5^\circ$ (the maximum reading distance must not be exceeded at any position)
Pitch angle	$\pm 5^\circ$ (the maximum reading distance must not be exceeded at any position)
Lateral offset	± 3 mm
Yaw angle	$\pm 1.5^\circ$

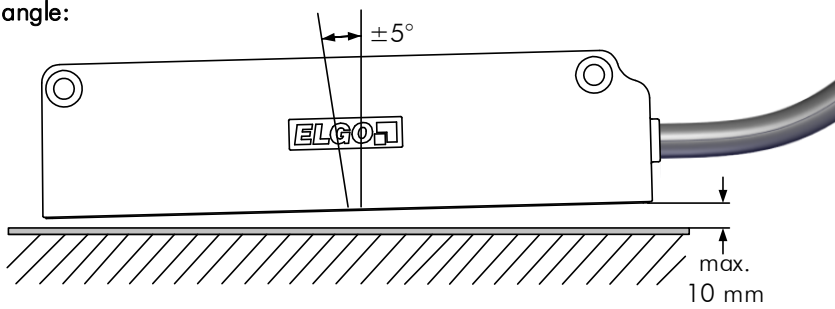
Reading distance:



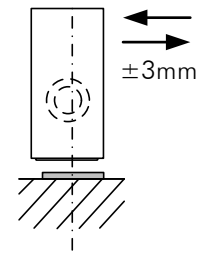
Tilt angle:



Pitch angle:



Lateral offset:



Yaw angle:

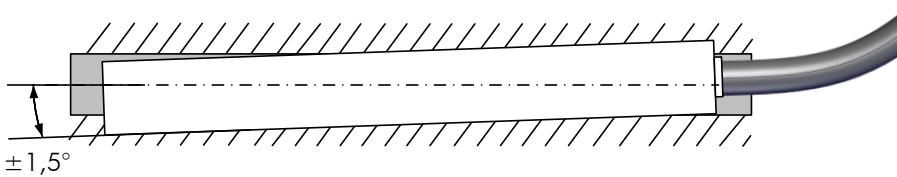


Figure 7: Mounting tolerances of the sensor

7.4 Calibration of the MIN and MAX Values

7.4.1 Calibrating Analog Versions

To define the minimum and maximum position, a calibration procedure must be performed during commissioning of the analog version.

For this purpose the inputs **TEACH 1** and **TEACH 2** are required (see also pin assignment in section 8.1.1).

First, these two inputs should (temporarily) be connected to a switch or push-button against +VCC (see figure on the right).

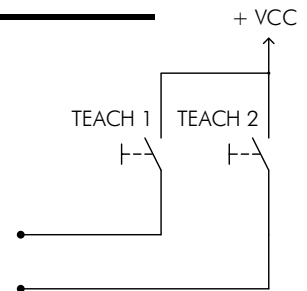


Figure 8: TEACH inputs

For calibration proceed as follows:

1. Move the sensor to the desired lower (MIN) position on the magnetic tape.
2. Activate the "Teach Mode" by pressing **TEACH 1** and **TEACH 2** simultaneously. Keep them pressed for at least 3 seconds, then release.
3. Save the defined MIN position by pressing **TEACH 1** briefly.
4. Move the sensor to the desired upper (MAX) position on the magnetic tape.
5. Briefly press **TEACH 2** to save the MAX position.
6. This concludes the teach process and the calibration is complete.

If the sensor is removed from the magnetic tape at any point, the calibration must be carried out again.

7.4.2 Calibrating CANopen Versions

A hardware calibration as described in section 7.4.1 is not necessary for BMIX versions with CANopen interface. The values MIN and MAX must only be approached and stored in the control system.

8 Connections and Interfaces

8.1 Analog Output

The 12-bit analog output operates proportional to the measured value. Depending on the interface option ordered, the output is designed for operation with voltage or current. The following variants are available:

- Interface option **I20** → Analog 12 bit output signal (0 ... 20 mA)
- Interface option **I24** → Analog 12 bit output signal (4 ... 20 mA)
- Interface option **V04** → Analog 12 bit output signal (0.5 ... 4.5 V)
- Interface option **V10** → Analog 12 bit output signal (0 ... 10 V)

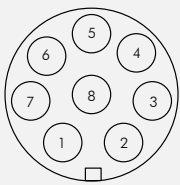
8.1.1 Connections Analog Output

The connections are made via open cable ends (standard version) or optionally via an 8-pin (male) M12 round connector (connection option **R8M0**). See also type designation ☞ 10.

Table 3: Pin assignment analog out (open cable ends)

Connection Type	Drawing	Color	Function	Description
Standard version: open cable ends		black	0 V / GND	Ground
		brown	+VCC	10 ... 30 VDC
		red	TEACH 1	Teach input 1 (see ☞ 7.4.1)
		orange	TEACH 2	Teach input 2 (see ☞ 7.4.1)
		green	Analog OUT	+ Volt resp. mA
		yellow	Analog GND	- Volt resp. mA

Table 4: Pin assignment analog out (R8M0)

Connection Type	Drawing	Pin	Function	Description
Connector option R8M0 : 8-pol. (male) M12 round connector	 Soldering side (counterpart)	1	0 V / GND	Ground
		2	+VCC	10 ... 30 VDC
		3	TEACH 1	Teach input 1 (see ☞ 7.4.1)
		4	TEACH 2	Teach input 2 (see ☞ 7.4.1)
		5	Analog OUT	+ Volt resp. mA
		6	Analog GND	- Volt resp. mA
		7	-	not connected
		8	-	not connected

For shielded versions, the shield is connected to the housing

8.2 CANopen Interface

When ordering the CA0 interface option, the BMIX measuring system is equipped with a CAN interface according to CANopen standard DS406 for encoder device profiles. In order to start the communication with the BMIX an NMT command has to be sent first. The following identifiers are given:

CAN – Identifier

(6 Byte telegram)

181 (16) = Identifier

First 4 bytes = Position (resolution 0.01 mm), Bit rate = 250 KB/s*

Next 2 bytes = Speed in mm/s

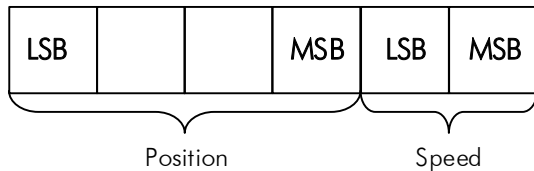


Figure 9: CANopen interface

*) The bit rate and other parameters can be changed via CAN interface. Available CAN options and further information about the DS406 device profile can be found in the downloadable EDS and XDD file. Download link: https://www.elgo.de/fileadmin/user_upload/software/BMIX_DS406.zip

8.2.1 Connections CANopen Interface

The connections are made via open cable ends (standard version), resp. optionally via 9-pin D-SUB connector (connector option D9M0) or 5-pin M12 round connector (connector option R5M0). See also section 10.

Table 5: Pin assignment CANopen (open cable ends)

Connection Type	Drawing	Color	Function	Description
Standard version: open cable ends		black	0 V / GND	Ground
		brown	+VCC	10 ... 30 VDC
		red	-	not connected
		orange	-	not connected
		green	CAN HIGH	positive CAN signal
		yellow	CAN LOW	negated CAN signal

Table 6: Pin assignment CANopen (D9M0)

Connection Type	Drawing	Pin	Function	Description
Connector option D9M0: 9-pin (male) D-SUB		1	-	not connected
		2	CAN LOW	negated CAN signal
		3	-	not connected
		4	-	not connected
		5	-	not connected
		6	0 V / GND	Ground
		7	CAN HIGH	positive CAN signal
		8	-	not connected
		9	+VCC	10 ... 30 VDC
For shielded versions, the shield is connected to the housing				

Table 7: Pin assignment CANopen (R5M0)

Connection Type	Drawing	Pin	Function	Description
Connector option R5M0: 5-pin (male) M12 round connector		1	Screen	CAN shielding
		2	+VCC	10 ... 30 VDC
		3	0 V / GND	Ground
		4	CAN HIGH	positive CAN signal
		5	CAN LOW	negated CAN signal

9 Disturbances, Maintenance, Cleaning

This chapter describes possible causes for disturbances and measures for their removal. In case of increased disturbances, please follow the measures for fault clearance in chapter 9.1. In case of disturbances that cannot be eliminated by following the advice and the fault clearance measures given here, please contact the manufacturer (see second page).

9.1 Fault Clearance



CAUTION!

The device, the connection line and the signal cable must not be installed next to sources of interference that emit strong inductive or capacitive interference or strong electrostatic fields.

External perturbations can be avoided thorough suitable cable routing.



The screen of the signal output cable should only be connected to the following circuit on one side. The screens should not be grounded on both sides. Signal cables always have to be routed separately from the load power line. A safety distance of at least 0.5 m has to be kept from inductive and capacitive sources of interference such as contactors, relays, motors, switching power supplies, clocked controllers etc.!

If interferences occur in spite of all the items stated above being observed, please proceed as follows:

1. Installation of RC-circuits via contactor coils of AC-contactors (e.g. 0.1 μ F / 100 Ω)
2. Installation of recovery diodes via DC-inductors
3. Installation of RC-circuits via the different motor phases (in the terminal box of the motor)
4. Do not connect protective earth and ground
5. Connect a mains filter ahead of the external power pack

9.2 Re-start after Fault Clearance

After the fault clearance:

1. Reset the emergency stop mechanism if necessary
2. Reset the error report at the super-ordinate system if necessary.
3. Ensure that there are no persons in the danger area.
4. Follow the instructions from chapter 7.



WARNING! Danger of injury through non-conventional fault clearance!

Non-conventional fault clearance can lead to severe injuries and damage of property. Therefore:

- Any work to clear the faults may only be performed by sufficiently qualified staff
- Arrange enough space before starting the works
- Make sure that the mounting area is clean and tidy. Loose components and tools are sources of accidents.

If components need to be replaced:

- Pay attention to a correct installation of the spare parts.
- Reinstall all the fixing elements properly
- Before turning on the device, ensure that all covers and safety equipment is installed correctly and functions properly

9.3 Maintenance

The device is maintenance-free.

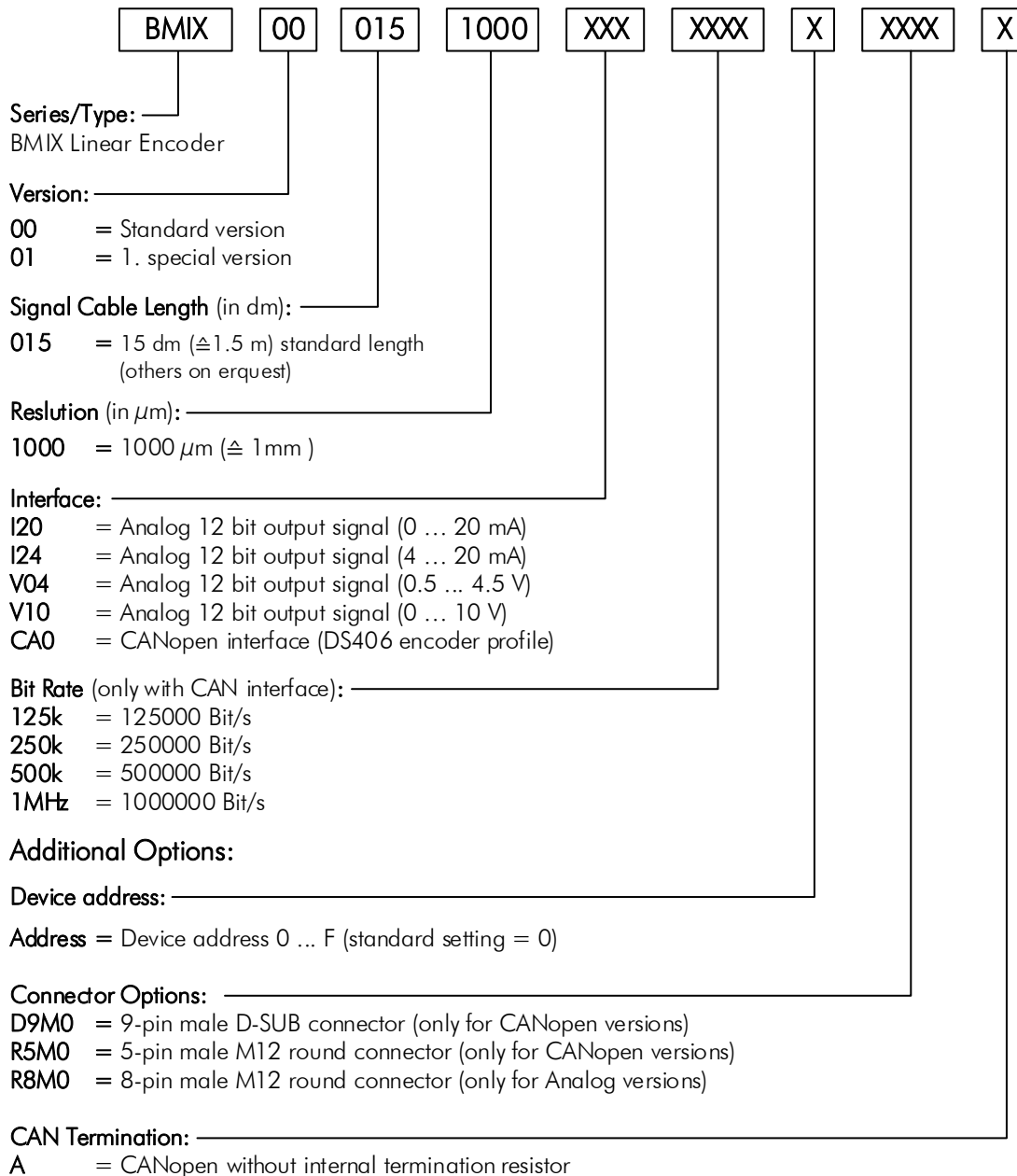
9.4 Cleaning



WARNING!

The device can only be cleaned with a damp cloth, do not use aggressive cleanser!

10 Type Designation



NOTE

When ordering, please use the here described ordering code (Type Designation).
Options that are not required are filled in with "-".

10.1 Accessories

Table 8: Accessories

Order Designation	Description
MB20-160-10-1-R1	Magnetic tape for BMIX. Please indicate the length in XX.X meters. Please note:: <i>Order length = measuring length + 100 mm sensor length + 50 mm (for end caps)</i>
End cap set 10 mm	End caps as fixation of the magnetic tape and for protection of the magnetic tape ends
POSU	Pol finder card 85 x 55 mm (makes the magnetic tape poles visible)

11 Index

Accessories	22	Magnetic tape structure	11
Accident prevention regulations.....	5	Maintenance.....	21
Alignment of the Sensor.....	16	Mounting the Sensor.....	16
Analogausgang	19	Mounting Tolerances	17
Available Output Interfaces.....	8	Operating area	12
Calibration of the MIN and MAX Values	18	Operational safety.....	5
CANopen Interface	20	Order reference	9
Causes of risk.....	6	Packaging material.....	7
Cleaning.....	21	Product Features	8
Connections Analog Output	19	Protection against contact	12
Connections and Interfaces	19	Protective equipment	6
Connections CANopen Interface	20	Safety	5, 6
Conventional use.....	7	Safety instructions	5
Demounting	6	Safety rules	5
Device number	9	Start-up	12
Dimensions BMIX Sensor	9	Storage	7
Disposal.....	6	Technical Data Magnetic Tape	11
Disturbances	21	Technical Data Sensor	10
Explanation of symbols.....	5	The quasi-absolute Measuring Principle.....	8
Fault clearance.....	21	Transport	7
First start-up	12	Transport damage	7
Functional Principle.....	8	Type designation	9
Identification	9	Type Designation	22
Installation	12		

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