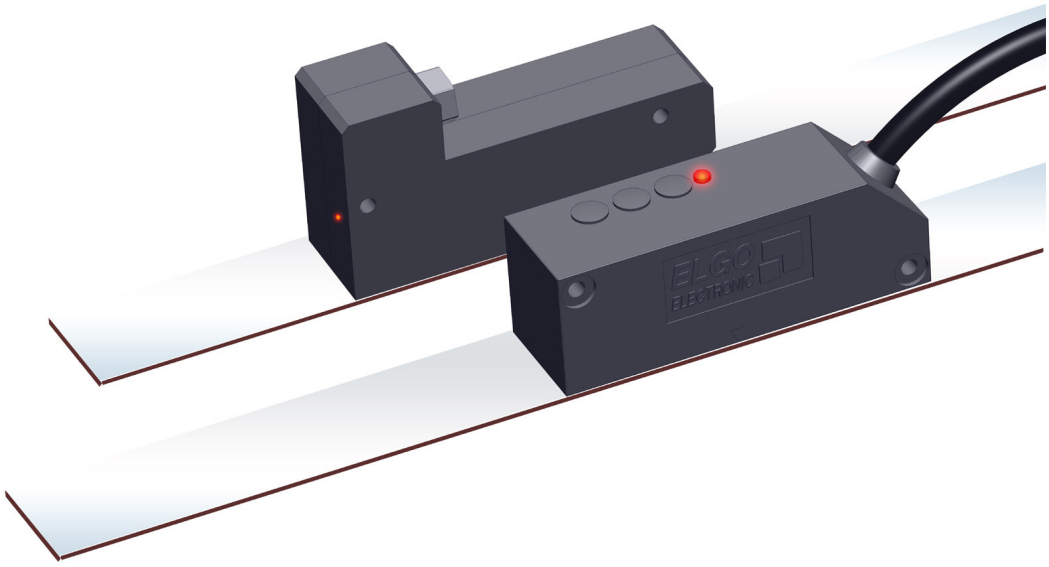
ELGO ELECTRONIC

EMAX/EMAL - IO

Magnetic Absolute Linear Encoder with IO-Link Interface

IO-Link



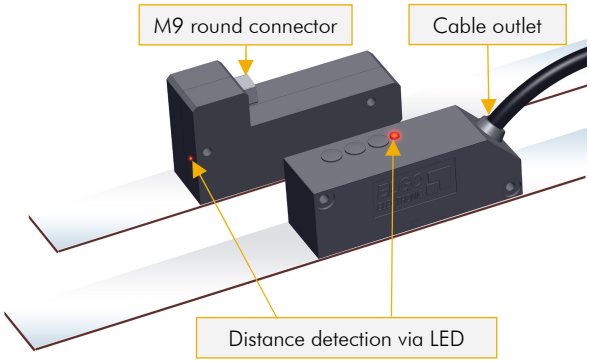
- IO-Link interface according to IEC 61131-9
- Absolute measurement with 10 µm resolution
- Contactless and wear free measurement
- Measuring length 10 m (EMAX) resp. 20 m (EMAL)
- No referencing necessary (position changes are also detected in the de-energized state)
- With distance detection: LED lights up red if the distance to the magnetic tape is not correct
- Two designs available: Housing with fixed cable outlet or with M9 round connector
- For design with cable outlet additional incremental outputs (HTL, TTL or 1 Vpp Sin/Cos) are available

EMAX/EMAL - IO - Magnetic Absolute Linear Encoder with IO-Link Interface

General

The series *EMAX / EMAL* is an absolute length measuring system. Sensor and translator and interpolation unit are together in the same compact housing. The magnetic tape of series EMAB is paste up to a plain area. The EMAX / EMAL encoders can be mounted with a maximum distance of 1.5 mm to the magnetic tape. With a reduced measuring accuracy the sensor distance can be up to 2.0 mm.

The only difference between *EMAX* and *EMAL* is the maximum measuring length: *EMAX* max. 10 m / *EMAL* max. 20 m



Applications

Typical applications are handling systems, storage and conveying technology, injection moulding machines, linear guides, Industry 4.0 applications and many more.

Housing Designs

Two different designs are available: A housing variant with a fixed cable outlet and a version with a M9 round connector.

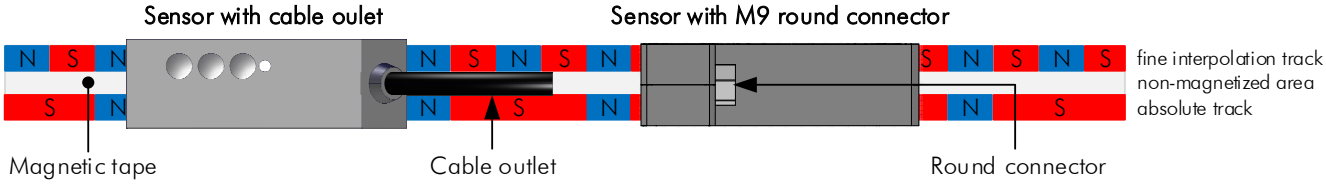
Difference:

- The shape and external dimensions are different (see last page).
- To connect the version with M9 round connector, the accessorial DKA cable is required.
- No optional incremental outputs are available for the version with M9 round connector (see type designation).

Functional Principle

A Hall sensor and a magneto-resistive impedance measuring bridge are guided over a dual-track magnetic tape with a fine-interpolation track and an absolute track. Together with the sensor line the absolute track provides an absolute value and the fine-interpolation track provides together with the interpolation electronic the measuring systems high resolution. The fine interpolation track encloses alternately north and south pole tracks with a distance of 5 mm. These are scanned with resistance bridges and provide a resolution of 0.01 mm. The absolute value provides the sensor line with 16 single Hall sensors; these sensors are scanning the code sections of the north and south poles. The absolute value on the magnetic tape recurs every 10 m with an *EMAX* resp. every 20 m with an *EMAL* system.

Measurement principle and coding of the magnetic tape



IO-Link Interface

The IO-Link interface integrated in the sensor enables continuous communication between the system controller and the field level. Position information and errors are independently reported to the controller and can be easily viewed. Conversely, format adjustments, for example, can be set up more easily.

Process data:

EMAX-IO cyclically transmits a measurement value via the IO-Link interface .

Byte			
1	2	3	4
Measurement value			

Measurement value properties:

- signed
- output in µm
- 32 Bit Format
- index 28 (16)

Set Zero:

- Move the EMAX-IO sensor to the desired position.
- Write E0 (16) on Index 2 / Subindex 0 via system command “Set Zero”.
- EMAX-IO calculates the offset so that zero is output at the approached position.

Download Data Sheet:

The download of the complete data sheet with all relevant data, commands and parameters can be found on:
https://www.elgo.de/fileadmin/user_upload/pdf/flyer/sensors/EMAX-IO-000-TD-E.pdf

EMAX/EMAL - IO - Magnetic Absolute Linear Encoder with IO-Link Interface

Technical Data

EMAX/EMAL - IO	
Mechanical Data	
Measuring principle	absolute
Measurement	linear
Repeat accuracy	±1 increment
System accuracy in µm at 20° C (L = measuring length in meter)	±(150+ 20 x L) = standard 010 ±(50 + 20 x L) = option F10
Distance from sensor to the magnetic tape	max. 1,5 mm (2,0 mm at reduced measurement accuracy)
Basic pole pitch	5 mm
Sensor housing material	*with cable outlet:* zinc die cast, *with M9 connector:* aluminium
Sensor housing dimensions (L x W x H)	*with cable outlet:* 75 x 24 x 26 mm, *with M9 connector*: 75 x 22 x 39 mm
Required magnetic tape	EMAX: AB20-50-20-R-11 EMAL: AB20-50-10-R-12
Measuring length	EMAX: max.10 m EMAL: max. 20 m
Connections	*with cable outlet:* open cable ends or optionally with M12 round connector *with M9 connector:* DKA cable (accessorial part)
DKA signal cable for IO-Link	*with cable outlet:* 1.5 m standard (others on request) *with M9 connector: 2,* 5 or 10 m long DKA cable (accessorial part)
Sensor weight	ca. 100 g
Electrical Data	
Power supply voltage	+ 10 ... 30 VDC
Residual ripple	10 - 30 V: <10 %
Current consumption	max. 150 mA
Interfaces	IO-Link according to IEC 61131-9
Resolution	10 µm
Operating speed	max. 4 m/s
Environmental Conditions	
Storage temperature	-20 ... +85° C
Operation temperature	-10 ... +70° C (-20 ... +85° C on request)
Humidity	max. 95 %, not condensing
Protection Class	IP40 (Standard) IP65 (Option V)

IO-Link Connections

- In order to comply with the IO-Link standard, the housing variant with fixed cable outlet is supplied with a 4-pin M12 round connector with the IO-Link standard pin assignment (see drawing on the right).
- For versions with IO-Link and additional incremental output the 4-pin IO-Link standard round connector is no longer sufficient. Here, the sensor cable is supplied with open cable ends as standard. Optionally, the cable can be supplied with a 12-pin M12 (male) round connector (see Type Designation / Connection Options "RCM0").
- For the housing version with round connector, an additional DKA cable with a (male) 9-pin M12 round connector is available as an accessory (pin assignment see drawing on the right). **Please note:** For this version no additional incremental outputs are available.

Type Designation

Please use the following code to order:

AAAA BBCCC DDD EEE FFFF G HHHH I JJJJ

A Series / Type

EMAX = measuring length up to 10 m
EMAL = measuring length up to 20 m

B Version

00 = standard version
01 = 01 ... 99 (special versions)

C Sensor Housing / Cable Outlet

000 = no cable, housing with M9 round connector (DKA cable as accessorial part available)
015 = sensor housing with fixed cable outlet (1.5 m standard length, other lengths on request)

D Resolution in µm

010 = 10 µm - at system accuracy in µm ±(150 + 20 x L)
F10 * = 10 µm - at system accuracy in µm ±(50 + 20 x L)
* Variant F10 at extra charge

E Interface

IOL = IO-Link according to IEC 61131-9 standard

F Bit rate

230k = 230400 Bit/s (default setting)

Additional Options

G Address

- = none (bus-compatible interface)

H Connection Options

- - - - = for versions with cable outlet or M9 connector
RCM0 = 12-pin (male) M12 round connector (only for versions with cable outlet + incremental output)

I Construction

V = sealed IP65 housing

J Additional Incremental Output

(only for versions with fixed cable oulet available)

H2N5 = Incremental square wave signals HTL, 2.5 µm resolution
H005 = Incremental square wave signals HTL, 5 µm resolution
H010 = Incremental square wave signals HTL, 10 µm resolution
H025 = Incremental square wave signals HTL, 25 µm resolution
T2N5 = Incremental square wave signals TTL, 2.5 µm resolution
T005 = Incremental square wave signals TTL, 5 µm resolution
T010 = Incremental square wave signals TTL, 10 µm resolution
SC50 = Sine/Cosine signal output 1 Vpp, pole pitch = 5 mm

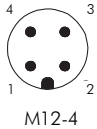
Remark: Order options that are not desired will be filled in with "-"!

Order example:

EMAX 00 015 010 IOL 230K - - - - - SC50
AAAA BB CCC DDD EEE FFFF G HHHH I JJJJ

ELGO standard EMAX with fixed cable outlet (1.5 m) max. 10 m measuring length, 10 µm resolution, IO-Link interface with 230400 bit/s and additional incremental 1 Vpp sine/cosine output

Standard IO-Link Pin Assignment



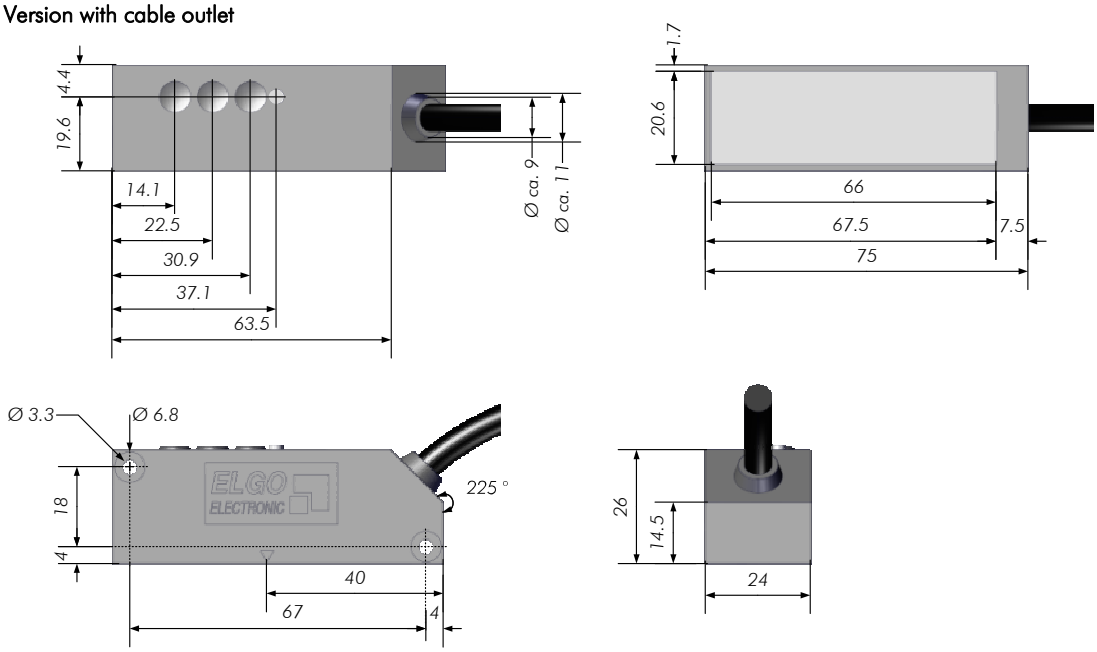
M12-4

1 = + 24VDC
2 = N.C.
3 = 0 V / GND
4 = C / Q

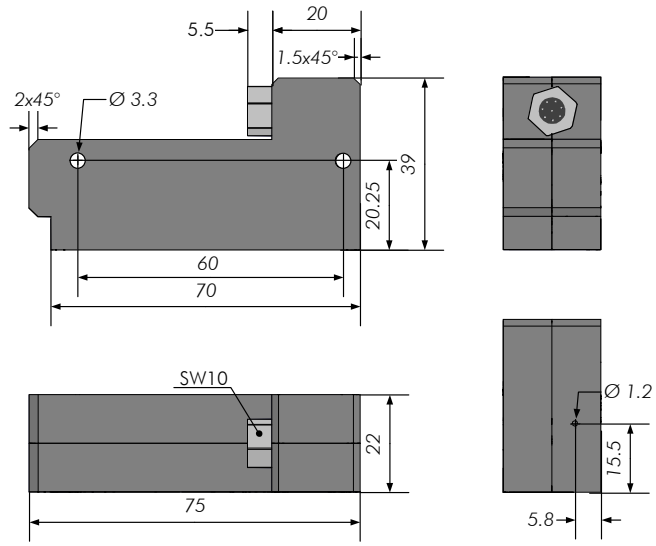
(Pin assignment for versions with additional incremental output see operating manual)

Sensor Housing Dimensions

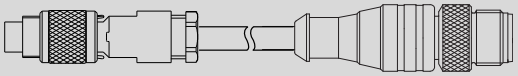
Version with cable outlet



Version with round connector



Accessories

Order Designation	Description
AB20-50-20-2-R-11	Absolute coded magnetic tape for EMAX
AB20-50-20-2-R-12	Absolute coded magnetic tape for EMAL
End cap set (20 mm)	2 end caps (20 mm) and two M3 screws; additional fixation in the radial and linear range and protection of the magnetic tape ends
FS-1000, FS1500 or FS2000	Guide rail for magnetic tape (length 1.0, 1.5 or max. 2.0 m). For larger distances several guide rails can be rowed together.
FW2080	Guide carriage for EMAX / EMAL (only versions with connector housing)
DKA-00-Q7F0-050*-R4MA-04-N-N-N)* 050 = standard length 5 m 020 = 2 m 100 = 10 m (others on request)	IO-Link signal cable for versions with connector on housing.  (sensor side 7-pin M9) (customer side 4-pin M12)
710000130	PSF 30 x 30 mm pole finder foil for magnetic tapes

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