

# MIL10

System for linear motion feedback

Sensor head with magnetic tape

## Overview

- Sensor head with magnetic tape
- Robust magnetic sensing method
- Output signals A 90° B with index signal
- Output circuits: HTL/push-pull and TTL/RS422
- Resolution up to 5 µm (4-times evaluation)
- Non-contact, wear-free sensing system
- High resistance to dirt and vibrations



## Technical data

### Technical data - electrical ratings

Short-circuit proof	Yes
Initializing time	≤ 50 ms after power on (see general informations)
Resolution	5 µm (4-times evaluation) 10 µm (4-times evaluation) 25 µm (4-times evaluation)
Interpolation	20-fold 50-fold 100-fold
Output signals	A+, B+, R+, A-, B-, R-
Output stages	HTL/push-pull TTL/RS422
Reference signal	Index signal, width 90°
Output frequency	≤350 kHz
System accuracy	±(0.02 mm + 0.04 mm x magnetic tape length (m))
Duty cycle	40...60 %
Sensing method	Magnetic
Interference immunity	EN 61000-6-2
Emitted interference	EN 61000-6-4
Approval	CE UL

### Technical data - electrical ratings (HTL)

Voltage supply	10...30 VDC
Reverse polarity protection	Yes

### Technical data - electrical ratings (HTL)

Consumption typ.	20 mA (w/o load)
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### Technical data - electrical ratings (TTL)

Voltage supply	5 VDC ±5 %
Consumption typ.	30 mA (w/o load)
Recommended cable termination	On control side each channel pair 120 Ohm

### Technical data - mechanical design

Dimensions (sensor head)	10 x 15 x 45.5 mm
Protection EN 60529	IP 66 IP 67
Movement speed	<5 m/s (resolution 5 µm) <10 m/s (resolution 10 µm) <25 m/s (resolution 25 µm)
Working distance	0.1 ... 0.6 mm
Material	Housing: zinc diecast, plated
Operating temperature	-40...+85 °C
Relative humidity	EN 60068-2-78:2010 EN 60068-2-30:2005 93 % condensation permitted
Resistance	EN 60068-2-6 Vibration 30 g, 10-2000 Hz EN 60068-2-27 Shock 500 g, 6 ms
Weight approx.	130 g
Connection	Cable 2 m Cable 0.3 m with connector M12

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## General information

The initializing time of the sensor is 50 ms. Output signals may not be processed during this time.

## Terminal assignment

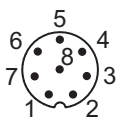
### Cable

Core colour	Signals
white	0 V
brown	+Vs
green	A+
yellow	A-
grey	B+
pink	B-
blue	R+ (reference sinal)
red	R- (reference signal inv.)

Cable screen: Screen is connected to sensor housing  
Cable data: PUR 4 x 2 x 0.14 mm<sup>2</sup>, shielded  
Bending radius: >50 mm (fix) / >100 mm (cable chain)  
Outer diameter: 6.3 mm

### Cable 0.3 m with connector M12

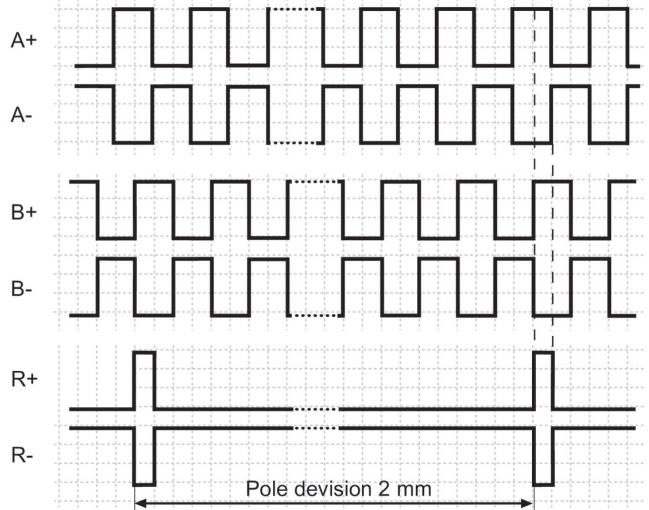
Pin	Core colour	Signals
1	white	0 V
2	brown	+Vs
3	green	A+
4	yellow	A-
5	grey	B+
6	pink	B-
7	blue	R+ (reference sinal)
8	red	R- (reference signal inv.)



Cable screen: Screen is connected to connector M12 and sensor housing  
Cable data: PUR 4 x 2 x 0.14 mm<sup>2</sup>, shielded  
Bending radius: >50 mm (fix) / >100 mm (cable chain)  
Outer diameter: 6.3 mm

## Output signals

Signal A leads to signal B by 90° in the moving direction shown below.



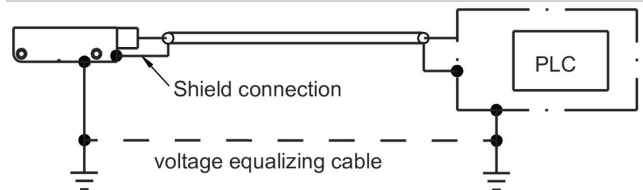
## Trigger level

Outputs	HTL/push-pull
Output level High	>+Vs -2.2 V
Output level Low	<0.7 V
Load	≤20 mA

Outputs	TTL/RS422
Output level High	>2.4 V
Output level Low	<0.7 V
Load	≤20 mA

## Recommended grounding concept



## Rotational or linear direction

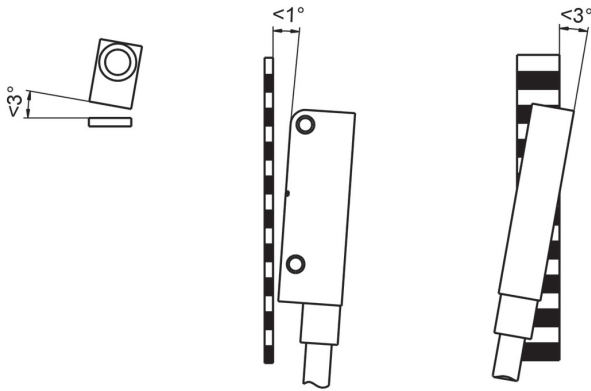


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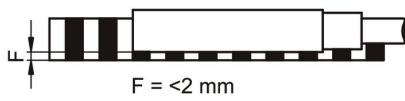
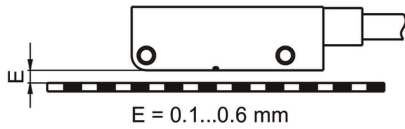
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### Angular misalignment



### Working distance

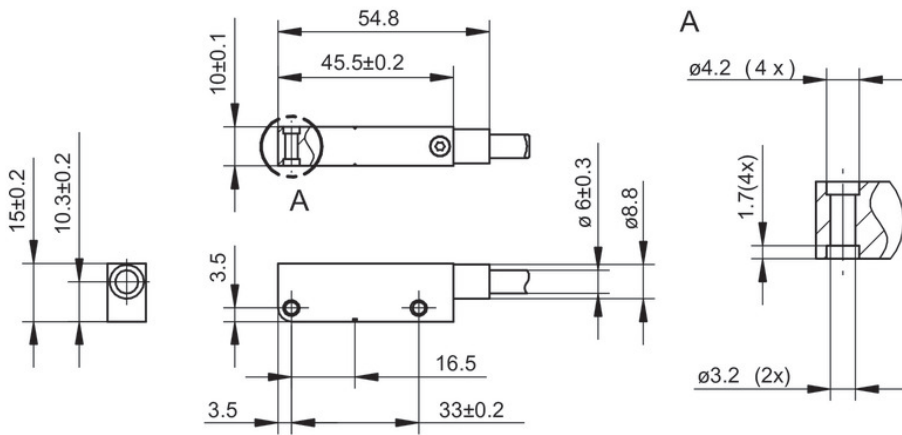


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## Dimensions



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**Ordering reference**
**MIL10 - S 2 . # # . #### P . A**
**Product**

MIL10

**Type**

Sensor head

S

**Suitable for pole pitch**

2 mm

2

**Connection**

Cable radial, 2 m

L

Female socket M12, 8-poles, after 0.3 m cable

C

**Voltage supply / Output**

 5 VDC  $\pm 5\%$ , TTL/RS422, 6 channel, A+, A-, B+, B-, R+, R-

E

10...30 VDC, HTL/PP, 6 channel, A+, A-, B+, B-, R+, R-

N

**Interpolation / resolution**

 5  $\mu\text{m}$ 

0005

 10  $\mu\text{m}$ 

0010

 25  $\mu\text{m}$ 

0025

**Reference signal**

Index signal (pole-periodic)

P

**Operating temperature**

-40...+85 °C

A

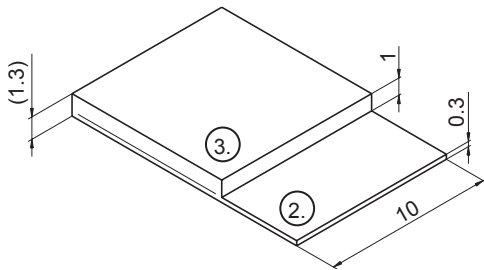
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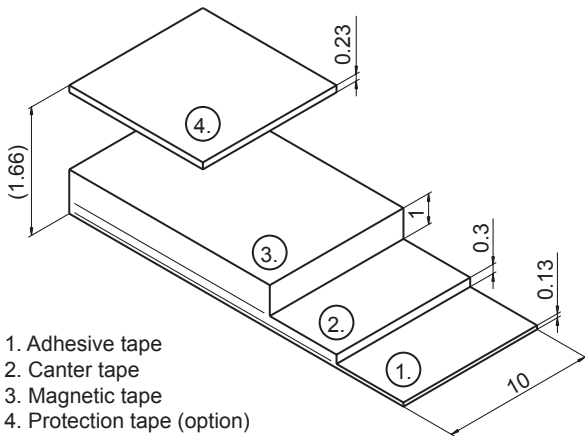
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### Magnetic tapes

#### Layers – magnetic tape



#### Layers – magnetic tape self-adhesive



1. Adhesive tape
2. Canter tape
3. Magnetic tape
4. Protection tape (option)

#### Technical data - magnetic tape

Measuring range	<50 m
Pole length	2 mm
Precision class	±40 μ (further upon request)
Tape width	10 mm
Material	Elastomer bounded tape on an stainless steel support
Mounting	Self-adhesive or self-mounting
Bending radius	Min. 75 mm
Usable measuring length	Total length - (2 x 5 mm)

#### Part number

10128662	MIL10-M402.00050.P10NN Magnetic tape 50 mm
10128663	MIL10-M402.00150.P10NN Magnetic tape 150 mm
10128664	MIL10-M402.00300.P10NN Magnetic tape 300 mm
11177271	MIL10-M402.00500.P10NN Magnetic tape 500 mm
11181983	MIL10-M402.01000.P10NN Magnetic tape 1 m
11177272	MIL10-M402.05000.P10NN Magnetic tape 5 m
11177273	MIL10-M402.10000.P10NN Magnetic tape 10 m
11177274	MIL10-M402.25000.P10NN Magnetic tape roll 25 m
11177276	MIL10-M402.00050.P10TN Magnetic tape 50 mm, self-adhesive
11173414	MIL10-M402.00150.P10TN Magnetic tape 150 mm, self-adhesive
11177277	MIL10-M402.00300.P10TN Magnetic tape 300 mm, self-adhesive
11177278	MIL10-M402.00500.P10TN Magnetic tape 500 mm, self-adhesive
11177279	MIL10-M402.01000.P10TN Magnetic tape 1 m, self-adhesive
11177290	MIL10-M402.05000.P10TN Magnetic tape 5 m, self-adhesive
11177291	MIL10-M402.10000.P10TN Magnetic tape 10 m, self-adhesive
11177292	MIL10-M402.25000.P10TN Magnetic tape roll 25 m, self-adhesive

Tolerance: ≤500 mm: ±0.5 mm; 500...1000 mm: ±2 mm  
>1000 mm: 0/+50 mm

On request: Protection tape self-adhesive, stainless steel, 0.3 mm thick