



# MAX48N-12V20K10500

MAX®

LINEAR ENCODERS

**SICK**  
Sensor Intelligence.



Illustration may differ

### Ordering information

Type	Part no.
MAX48N-12V20K10500	1220580

Accessories not included with delivery, please order separately.

Other models and accessories → [www.sick.com/MAX](http://www.sick.com/MAX)



### Detailed technical data

#### Features

<b>Items supplied</b>	Accessories not included with delivery, please order separately.
-----------------------	--

#### Performance

<b>Type</b>	48 mm installation housing – IN cylinder mounting
<b>Cable connection</b>	Radial
<b>Pressure pipe/End cap</b>	Flat/M6 threaded stud
<b>Measured values</b>	Positioning
<b>Measuring range</b>	
Position (F.S.)	0 mm ... 500 mm <sup>1)</sup>
<b>Unusable range</b>	
Null zone	30 mm
Damping zone	30 mm
<b>Switch-on time</b>	< 250 ms
<b>Measuring frequency (internal)</b>	2 ms
<b>Transmission rate (cycle time)</b>	Steady signal
<b>Setpoint tolerance</b>	
Zero point and F.S.	≤ ± 1 mm
<b>Resolution</b>	Typ. 0.1 mm (noise-free)
<b>Hysteresis</b>	± 0,1 mm
<b>Repeatability</b>	Typ. ± 0.2 mm
<b>Linearity (in the operational status)</b>	Typ. ± 0.25 mm (measuring range 50 to 500 mm) <sup>2)</sup> Typ. ± 0.04% F.S. (measuring range from 500 to 2,500 mm)
<b>Temperature drift</b>	
Warming up phase	Typ. ≤ ± 0.25 mm (2 min)
In the operational status	Typ. ≤ ± 0.005% x F.S. x ΔT (ΔT 40 °C) <sup>3)</sup>

<sup>1)</sup> F.S. = Full Scale (Measuring range).

<sup>2)</sup> Hydraulic oil at operating temperature.

<sup>3)</sup> 40 °C increase in oil temperature during operation.

<sup>4)</sup> This product is a standard product and does not constitute a safety component as defined in the Machinery Directive. Calculation based on nominal load of components, average ambient temperature of electronic 60 °C, frequency of use 8760 h/a.

<sup>5)</sup> Every second failure of an electronic component is regarded as a dangerous failure.

<b>MTTFd</b>	69 years (EN ISO 13849-1) <sup>4) 5)</sup>
--------------	--

1) F.S. = Full Scale (Measuring range).

2) Hydraulic oil at operating temperature.

3) 40 °C increase in oil temperature during operation.

4) This product is a standard product and does not constitute a safety component as defined in the Machinery Directive. Calculation based on nominal load of components, average ambient temperature of electronic 60 °C, frequency of use 8760 h/a.

5) Every second failure of an electronic component is regarded as a dangerous failure.

## Interfaces

<b>Communication interface</b>	Analog
<b>Communication Interface detail</b>	Voltage
<b>Voltage output</b>	0.25 V DC ... 4.75 V DC

## Electrical data

<b>Connection type</b>	Connecting cable, 3-wire
<b>Supply voltage</b>	24 V DC (8 ... 32 V DC)
<b>Residual ripple</b>	< 1% S-S
<b>Power consumption</b>	≤ 0.75 W
<b>Current consumption</b>	≤ 30 mA
<b>Load resistance</b>	
Voltage signal	RL ≥ 10 kΩ
<b>Switch-on current</b>	Typ. 5.0 A / 50 μs
<b>Over voltage protection</b>	≤ 36 V at all poles during power-up (60 s) ≤ 48 V To GND during power-up (60 s)
<b>Reverse polarity protection</b>	≤ 36 V (at all poles) (ISO 16750-2)
<b>Insulation resistance</b>	Riso ≥ 10 MΩ, 60 s (ISO 16750-2)
<b>Dielectric strength</b>	500 V DC, 0 V against housing (ISO 16750-2)

## Mechanical data

<b>Dimensions</b>	
Housing	48 mm, 48f7 for IN cylinder mounting – cylinder bore hole 48H8
Ø pressure pipe	10 mm
Ø O-ring	40.87 mm x 3.53 mm
Ø support ring	42.6 mm x 48 mm x 1.4 mm
Ø connecting cable	Ø 5.0 mm; 3 x 0.38 mm <sup>2</sup> (AWG22), stripped
Length of cable	300 mm
<b>Material</b>	
Housing	Stainless steel 1.4305, AISI 303
Pressure pipe	Stainless steel 1.4404, AISI 316L
Housing cover	Plastic
O-ring	NBR 70
Support ring	PTFE
Connecting cable	PUR

Ambient data

<b>EMC</b>	EU Directive 2014/30 / EU CE marking
<b>Generic standards</b>	According to EN 61000-6-2:2005 and EN 61000-6-3:2007
<b>Agricultural and forestry machinery Construction machinery</b>	EN ISO 14982:2009 / EN 13309:2010 / EN ISO 13766-1:2018
<b>Transient pulses</b>	ISO 7637-2
<b>ESD (air and contact discharge)</b>	EN 61000-4-2 ISO/TR 10605
<b>Enclosure rating</b>	
Housing with connecting cable	IP67 (EN 60529)
<b>Temperature</b>	
Operating temperature range (electronics)	-40 °C ... +105 °C <sup>1)</sup>
Ambient temperature (fluid)	-30 °C ... +95 °C <sup>2)</sup>
Storage temperature range	-20 °C ... +65 °C <sup>3) 4)</sup>
<b>Permissible relative humidity</b>	90 % (Condensation not permitted)
<b>Resistance to shocks</b>	Drop test in acc. with IEC 60068-2-31 100 g, 11 ms (Single shock in acc. with IEC 60068-2-27) 50 g, 11 ms (Continuous shocks, 1,000 shocks per spatial axis in acc. with IEC 60068-2-27)
<b>Resistance to vibration</b>	
Sine	20 g, 24 h / spatial axis, 55 ... 2.000 Hz (IEC 60068-2-6)
Sine over noise	18 g (r.m.s), 36 h / spatial axis, 10 ... 2.000 Hz (IEC 60068-2-80)
Broadband noise (resonance peaks removed)	20 g (r.m.s), 48 h / spatial axis, 10 ... 2.000 Hz (IEC 60068-2-64)
<b>Nominal operating pressure (P<sub>N</sub>)</b>	400 bar
<b>Max. overload pressure during operation (P<sub>N</sub> x 1.2)</b>	480 bar
<b>Max. test pressure in cylinder (P<sub>N</sub> x 1.5)</b>	600 bar
<b>Note</b>	For details of applied tests and descriptive standards, please see document 8021473

<sup>1)</sup> Taking into account self-heating, generated through constant electrical operation with supply voltage.

<sup>2)</sup> Caused by the permitted temperature range of the O-ring seal, the hydraulic oil and the temperature-dependent signal quality of the position magnet.

<sup>3)</sup> Relative humidity 55 %.

<sup>4)</sup> Caused by dry storage of the O-ring in uninstalled state (no coating with oil).

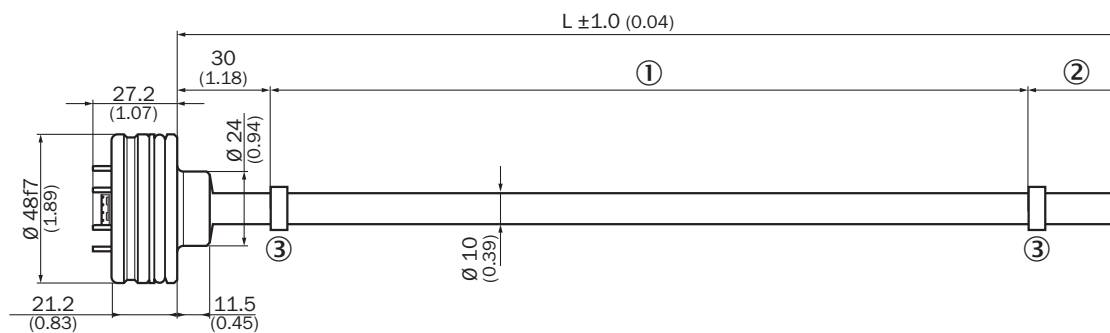
Classifications

<b>ECl@ss 5.0</b>	27270705
<b>ECl@ss 5.1.4</b>	27270705
<b>ECl@ss 6.0</b>	27270705
<b>ECl@ss 6.2</b>	27270705
<b>ECl@ss 7.0</b>	27270705
<b>ECl@ss 8.0</b>	27270705
<b>ECl@ss 8.1</b>	27270705
<b>ECl@ss 9.0</b>	27270705
<b>ECl@ss 10.0</b>	27270705
<b>ECl@ss 11.0</b>	27270705
<b>ETIM 5.0</b>	EC002544
<b>ETIM 6.0</b>	EC002544

<b>ETIM 7.0</b>	EC002544
<b>ETIM 8.0</b>	EC002544
<b>UNSPSC 16.0901</b>	41111613

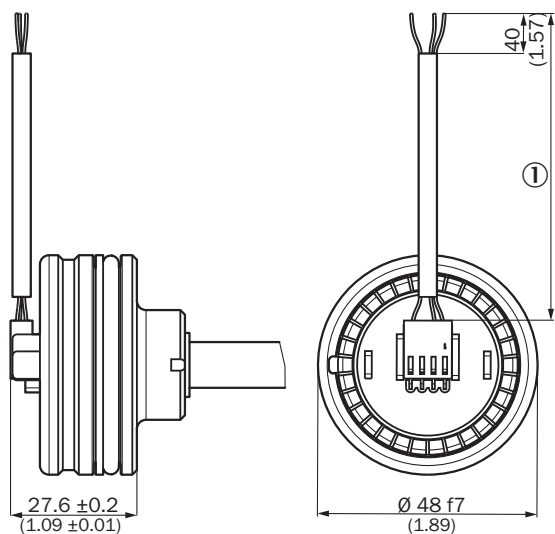
**Dimensional drawing** (Dimensions in mm (inch))

MAX48



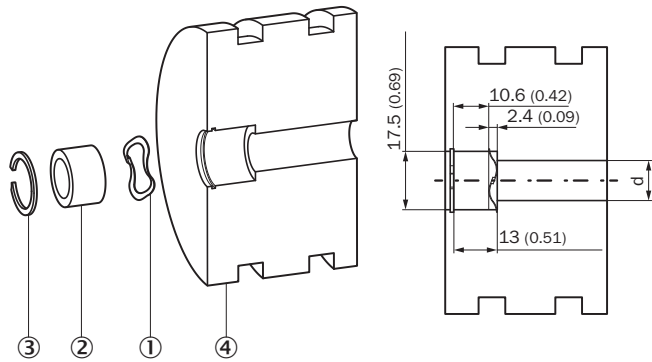
- ① Measuring range
- ② Damping zone
- ③ Position magnet

Cable, 3-wire



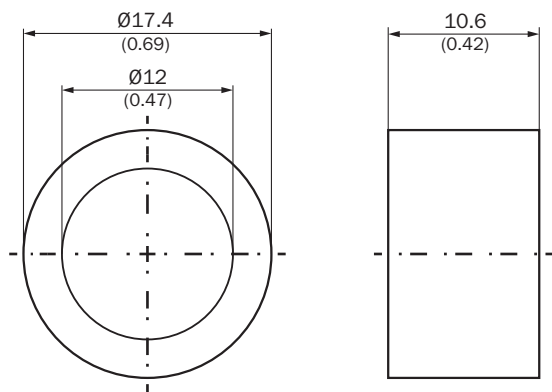
- ① Length of cable (according to type code)

### Installation of position magnet

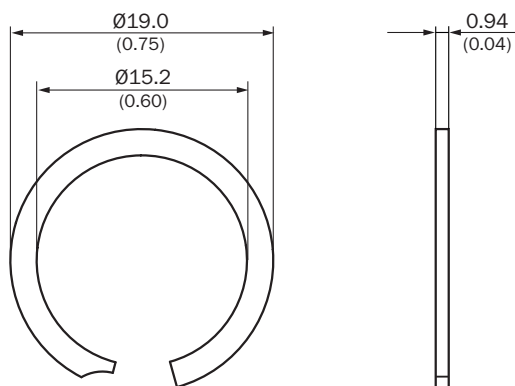


- ① Corrugated spring washer
- ② Position magnet
- ③ Circlip
- ④ Piston

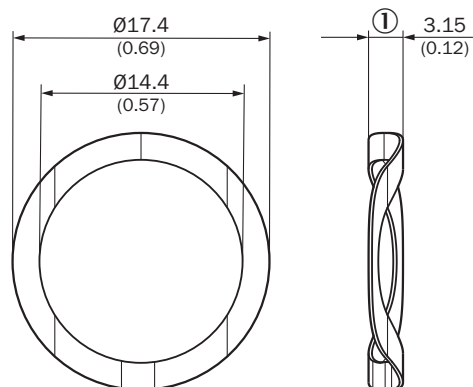
### Position magnet



### Circlip



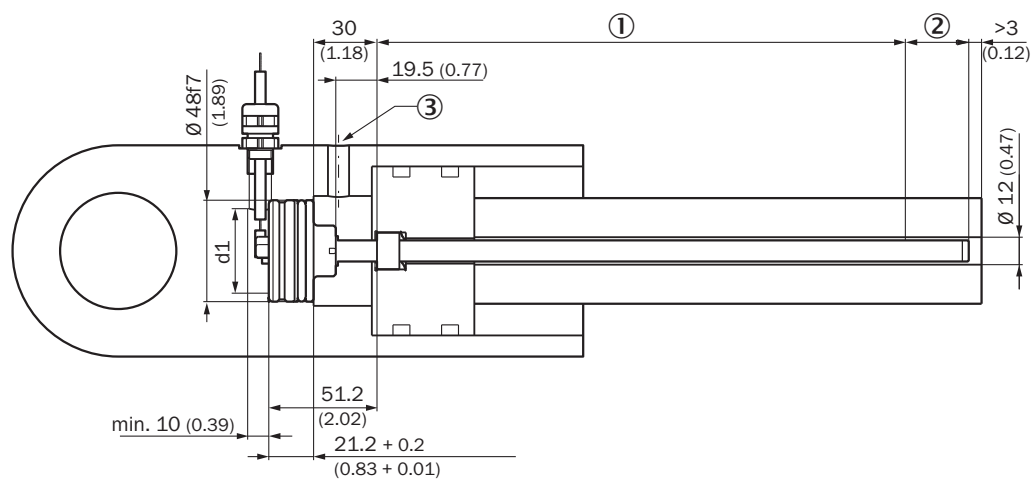
### Corrugated spring washer



① Free height

### Attachment specifications

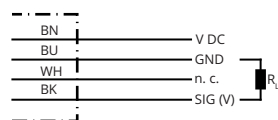
#### Installation space for cylinders



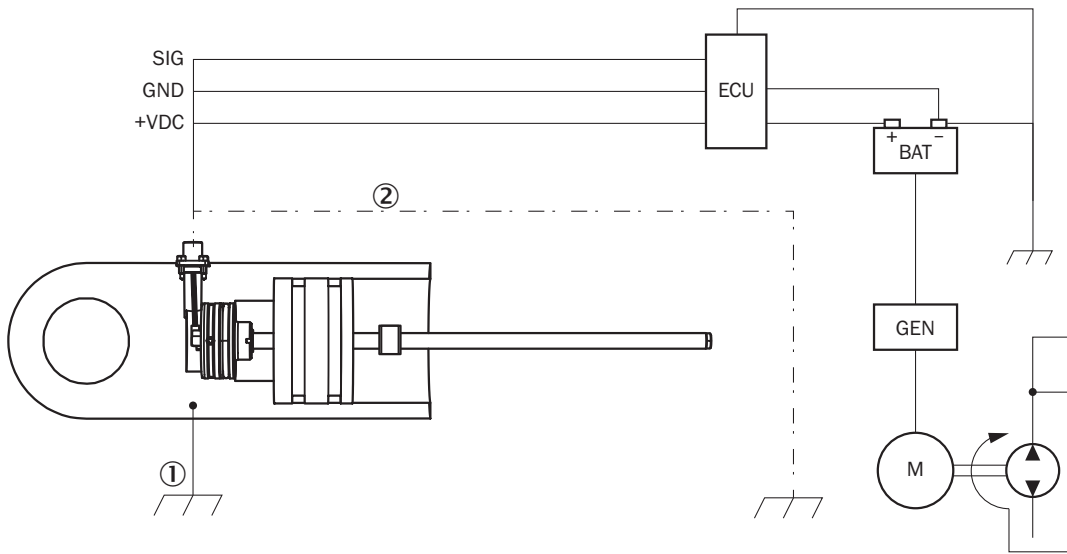
Please note the information in the operating instructions ( $d: 32 \leq d1 \leq 40$ ).

- ① Measuring range
- ② Damping zone
- ③ Hydraulic port

### PIN assignment



Connection diagram







Connection diagram

- ① Chassis GND
- ② Cable shielding (optional)

Recommended accessories

Other models and accessories → [www.sick.com/MAX](http://www.sick.com/MAX)

	Brief description	Type	Part no.
<b>Magnets</b>			
	Position magnet for magnetostrictive linear encoder, Ø 17.4 mm, max. axial surface pressure 40 N/mm <sup>2</sup> , temperature range -30 °C ... +95 °C	MAG-O-174-01	2112714
		MAG-O-174-05	2112713
		MAG-O-174-10	2115045
		MAG-O-174-50	2112711
<b>Other mounting accessories</b>			
	1 piece, Circlip for installing the position magnets in the piston of the hydraulic cylinder, Stainless steel 1.4319	BEF-MK-SR-01	2116437
	5 pieces, Circlip for installing the position magnets in the piston of the hydraulic cylinder, Stainless steel 1.4319	BEF-MK-SR-05	2116438
	10 pieces, Circlip for installing the position magnets in the piston of the hydraulic cylinder, Stainless steel 1.4319	BEF-MK-SR-10	2116439
	50 pieces, Circlip for installing the position magnets in the piston of the hydraulic cylinder, Stainless steel 1.4319	BEF-MK-SR-50	2116440
	1 piece, Corrugated spring washer for installing the position magnets in the piston of the hydraulic cylinder, 1.4568 (17-7 PH Condition CH900)	BEF-MK-WF-01	2116431
	5 pieces, Corrugated spring washer for installing the position magnets in the piston of the hydraulic cylinder, 1.4568 (17-7 PH Condition CH900)	BEF-MK-WF-05	2116432
	10 pieces, Corrugated spring washer for installing the position magnets in the piston of the hydraulic cylinder, 1.4568 (17-7 PH Condition CH900)	BEF-MK-WF-10	2116433
	50 pieces, Corrugated spring washer for installing the position magnets in the piston of the hydraulic cylinder, 1.4568 (17-7 PH Condition CH900)	BEF-MK-WF-50	2116435

	Brief description	Type	Part no.
Plug connectors and cables			
	Head A: M12	BEF-EA-M12-S	2117513

## SICK AT A GLANCE

SICK is one of the leading manufacturers of intelligent sensors and sensor solutions for industrial applications. A unique range of products and services creates the perfect basis for controlling processes securely and efficiently, protecting individuals from accidents and preventing damage to the environment.

We have extensive experience in a wide range of industries and understand their processes and requirements. With intelligent sensors, we can deliver exactly what our customers need. In application centers in Europe, Asia and North America, system solutions are tested and optimized in accordance with customer specifications. All this makes us a reliable supplier and development partner.

Comprehensive services complete our offering: SICK LifeTime Services provide support throughout the machine life cycle and ensure safety and productivity.

For us, that is “Sensor Intelligence.”

## WORLDWIDE PRESENCE:

Contacts and other locations –[www.sick.com](http://www.sick.com)