



# MAX48N-22V10AD2000

MAX®

LINEAR ENCODERS

**SICK**  
Sensor Intelligence.



Illustration may differ

## Ordering information

Type	Part no.
MAX48N-22V10AD2000	1222157

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.
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### Performance

<b>Measured values</b>	Positioning
<b>Measuring range</b>	Position (F.S.) 0 mm ... 2,000 mm <sup>1)</sup>
<b>Unusable range</b>	Null zone 30 mm Damping zone 36 mm
<b>Switch-on time</b>	< 250 ms
<b>Measuring frequency (internal)</b>	2 ms
<b>Transmission rate (cycle time)</b>	Constant analog output signal
<b>Setpoint tolerance</b>	Zero point and F.S. $\leq \pm 1$ mm
<b>Resolution</b>	Typ. 0.1 mm (noise-free)
<b>Hysteresis</b>	$\pm 0,1$ mm
<b>Repeatability</b>	Typically $\pm 0.2$ mm
<b>Linearity (in the operational status)</b>	Typ. $\pm 0.25$ mm (measuring range 50 to 500 mm) Typ. $\pm 0.04\%$ F.S. (measuring range from 500 to 2,500 mm)
<b>Temperature drift</b>	Self-heating of the electronics (warm-up phase) Typ. $\leq \pm 0.25$ mm (2 min) Operational status (hydraulic oil at operating temperature) Typ. $\leq \pm 0.005\% \times \text{F.S.} \times \Delta T$ ( $\Delta T 40$ °C) <sup>2)</sup>

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

<sup>2)</sup> 40 °C increase in oil temperature during operation.

### Interfaces

<b>Communication interface</b>	Analog
<b>Communication Interface detail</b>	Voltage
<b>Voltage output</b>	0.5 V DC ... 4.5 V DC

## Electrical data

<b>Connection type</b>	Male connector, M12 type S (20x20 mm), 4-pin
<b>PIN assignment</b>	1=V DC; 2=n.c.; 3=GND; 4=SIG
<b>Supply voltage</b>	8 ... 36 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>	
	Construction size
	48 mm (48f7 mm (for installation in a 48H8 bore hole))
	Ø pressure pipe
	10 mm
	Ø support ring
	42.6 mm x 48 mm x 1.4 mm
	M12 flange
	Construction DM 20x20 mm - hole pattern 14 mm (EN 61076-2-101)
	Length of stranded cable
	90 mm
<b>Material</b>	
	Electronics enclosure
	Stainless steel 1.4305, AISI 303
	Pressure pipe
	Stainless steel 1.4404, AISI 316L
	O-ring
	NBR 70
	Support ring
	PTFE
	M12 plug insert
	Glass fiber reinforced polyamide, nickel-/gold-plated brass contacts
	M12 flange
	Nickel-plated brass with O-ring (NBR)
	Stranded cable sheath
	PVC

## Ambient data

<b>EMC</b>	EU Directive 2014/30 / EU CE marking EU Directive 2009/64/EU Agricultural machinery
<b>Generic standards</b>	According to EN 61000-6-2 and EN 61000-6-3
<b>Agricultural and forestry machinery Construction machinery</b>	ISO 14982 EN13309/ ISO 13766
<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>	

<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).

	IP67 (EN 60529)
	IP67 (EN 60529)
M12 male connector	IP69k (ISO 20653)
<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>	Fall 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) 18 g (r.m.s), 36 h / spatial axis, 10 ... 2.000 Hz (IEC 60068-2-80) 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).

General notes

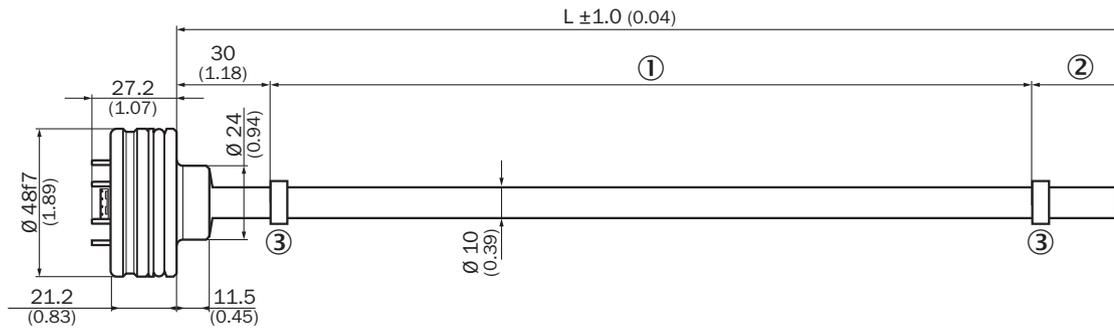
<b>Note</b>	Accessories not included with delivery, please order separately.
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Classifications

<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>	27270703
<b>ECl@ss 11.0</b>	27270703
<b>ETIM 5.0</b>	EC002544
<b>ETIM 6.0</b>	EC002544
<b>ETIM 7.0</b>	EC002544
<b>UNSPSC 16.0901</b>	41111613

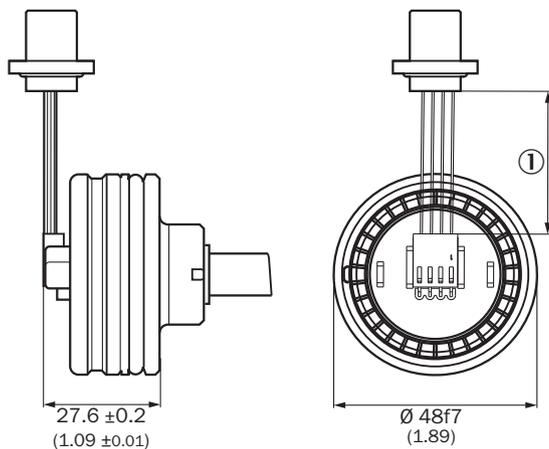
**Dimensional drawing** (Dimensions in mm (inch))

MAX48



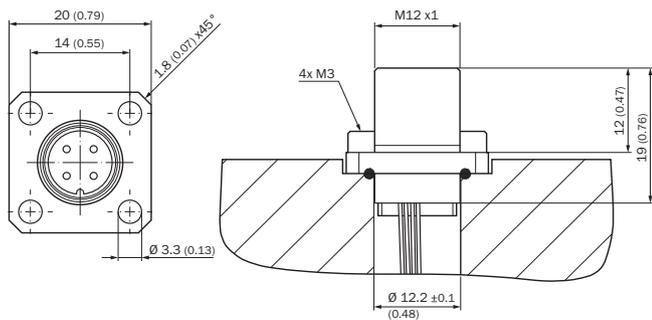
- ① Measuring range
- ② Damping zone
- ③ Position magnet

Male connector M12

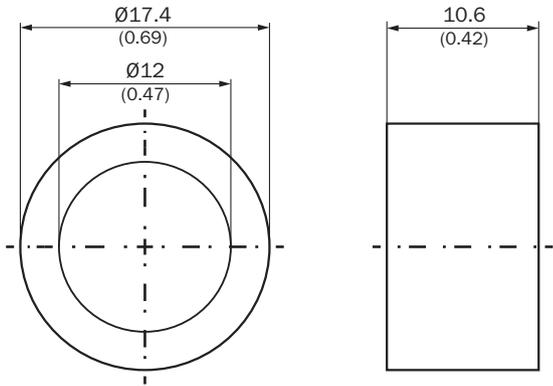


- ① Wire length (according to type code)

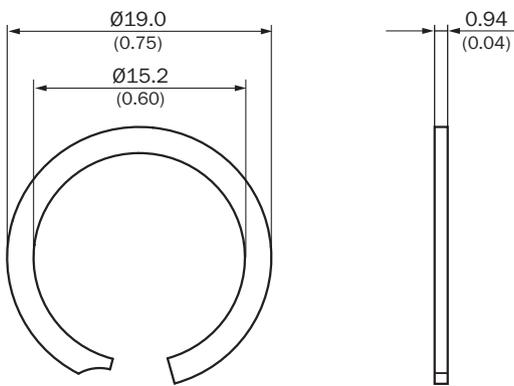
M12 connector type S/ flange - axial seal



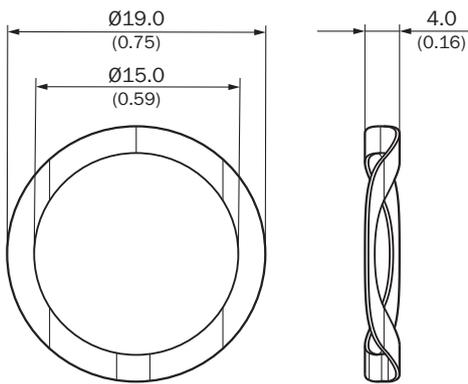
Position magnet



Circlip



Corrugated spring washer



## Recommended accessories

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

	Brief description	Type	Part no.
<b>Flanges</b>			
	1 piece, Flange for M12 male connector, type S square flange (20 mm x 20 mm) with axial seal, 1 piece, nickel-plated brass	BEF-FA-M12S-01	2117507
	5 pieces, Flange for M12 male connector, type S square flange (20 mm x 20 mm) with axial seal, 5 pieces, nickel-plated brass	BEF-FA-M12S-05	2117508
	10 pieces, Flange for M12 male connector, type S square flange (20 mm x 20 mm) with axial seal, 10 pieces, nickel-plated brass	BEF-FA-M12S-10	2117509
<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, 17-7 PH Condition CH900 stainless steel	BEF-MK-WF-01	2116431
	5 pieces, Corrugated spring washer for installing the position magnets in the piston of the hydraulic cylinder, 17-7 PH Condition CH900 stainless steel	BEF-MK-WF-05	2116432
	10 pieces, Corrugated spring washer for installing the position magnets in the piston of the hydraulic cylinder, 17-7 PH Condition CH900 stainless steel	BEF-MK-WF-10	2116433
	50 pieces, Corrugated spring washer for installing the position magnets in the piston of the hydraulic cylinder, 17-7 PH Condition CH900 stainless steel	BEF-MK-WF-50	2116435
<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

## 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)