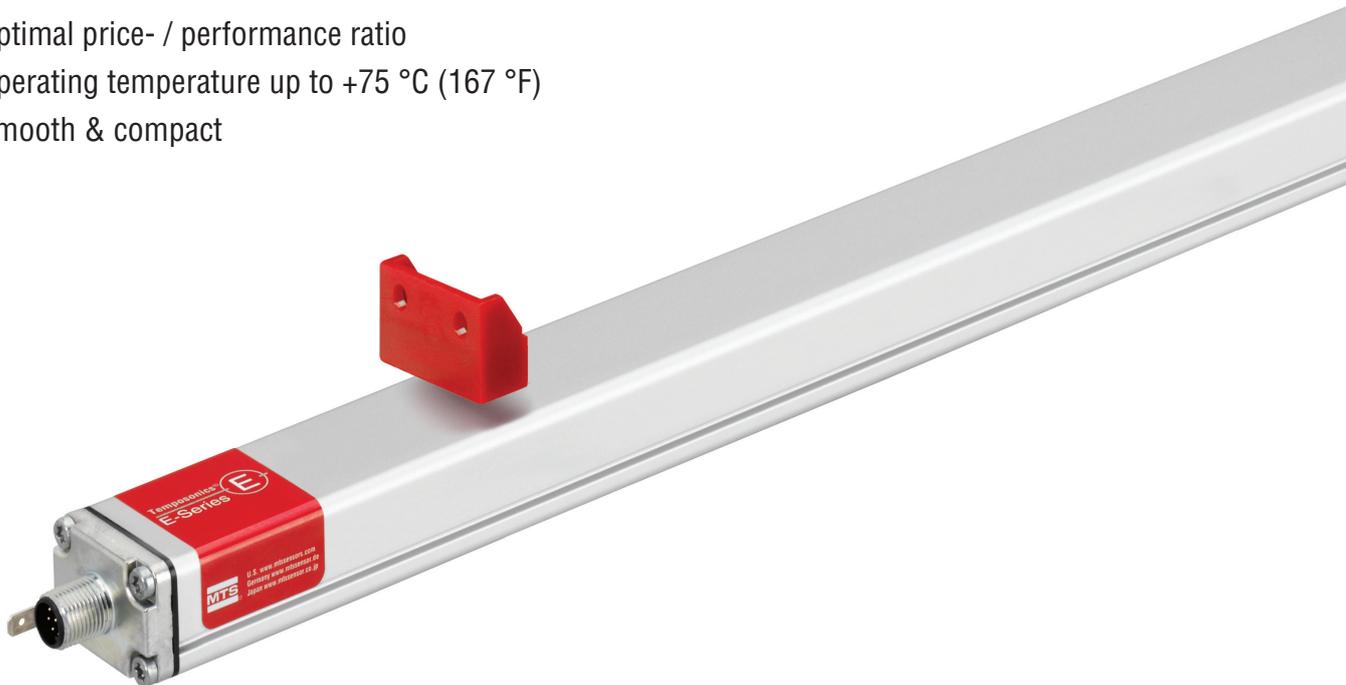


# Temposonics®

Magnetostrictive Linear Position Sensors

## EP2 SSI Data Sheet

- Optimal price- / performance ratio
- Operating temperature up to +75 °C (167 °F)
- Smooth & compact



## MEASURING TECHNOLOGY

The absolute, linear position sensors provided by MTS Sensors rely on the company's proprietary Temposonics® magnetostrictive technology, which can determine position with a high level of precision and robustness. Each Temposonics® position sensor consists of a ferromagnetic waveguide, a position magnet, a strain pulse converter and supporting electronics. The magnet, connected to the object in motion in the application, generates a magnetic field at its location on the waveguide. A short current pulse is applied to the waveguide. This creates a momentary radial magnetic field and torsional strain on the waveguide. The momentary interaction of the magnetic fields releases a torsional strain pulse that propagates the length of the waveguide. When the ultrasonic wave reaches the end of the waveguide it is converted into an electrical signal. Since the speed of the ultrasonic wave in the waveguide is precisely known, the time required to receive the return signal can be converted into a linear position measurement with both high accuracy and repeatability.

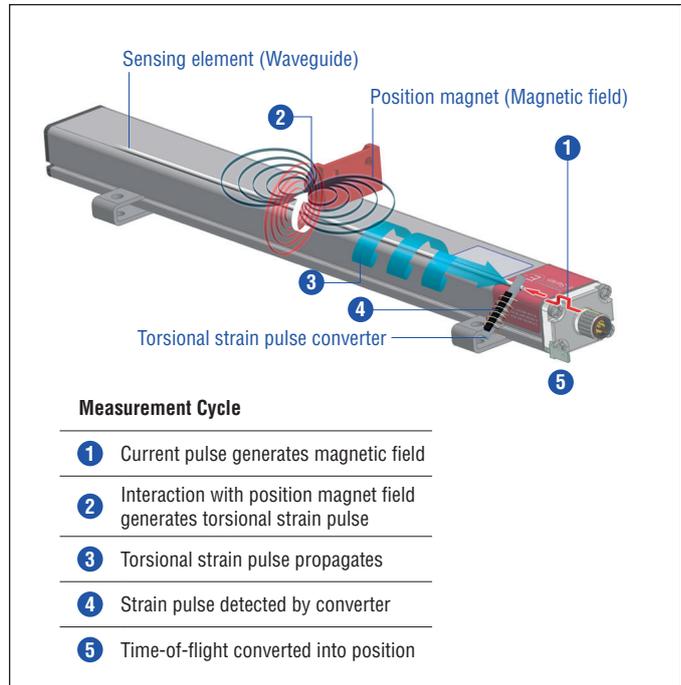


Fig. 1: Time-of-flight based magnetostrictive position sensing principle

## EP2 SENSOR

Robust, non-contact and wear free, the Temposonics® linear position sensor provide high durability and precise position measurement feedback in harsh industrial environments. Measurement accuracy is tightly controlled by the quality of the waveguide manufactured exclusively by MTS Sensors.

The compact and smooth aluminum profile offers flexible mounting options and easy installation. Moreover, the position magnet can travel along the entire flat housing profile. The EP2 has an attractive price- / performance ratio and is ideal for industrial applications including plastics molding and processing, factory automation and packaging.



Fig. 2: Plastic granulate for injection molding or extrusion

## TECHNICAL DATA

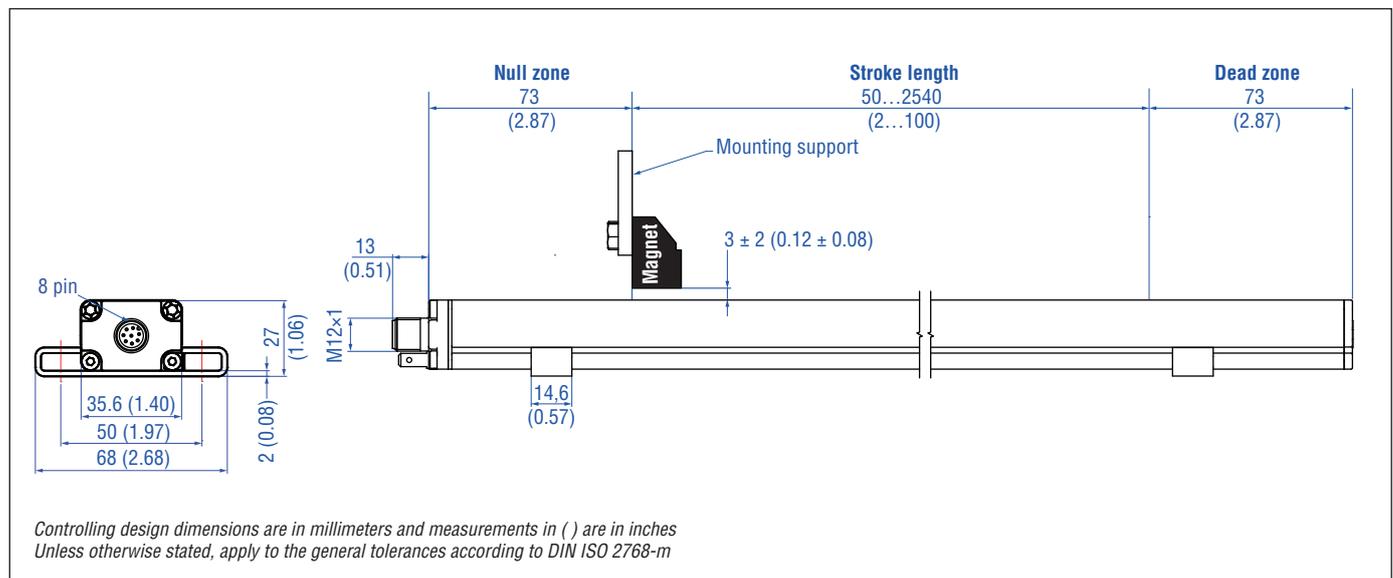
Output					
Interface	SSI (Synchronous Serial Interface)				
Data format	Binary or Gray				
Data length	24; 25 bit				
Data transmission rate	70 kBaud*...1 MBaud, dependent on cable length:				
	Cable length < 3 m	< 50 m	< 100 m	< 200 m	< 400 m
	Baud rate	1.0 MBd	< 400 kBd	< 300 kBd	< 200 kBd < 100 kBd
Measured value	Position				
Measurement parameters					
Resolution	20 µm, 50 µm or 100 µm				
Cycle time	Stroke length	300 mm	750 mm	1000 mm	2000 mm
	Measurement rate	3.7 kHz	3.0 kHz	2.3 kHz	1.2 kHz
Linearity	≤ ±0.02 % F.S. (minimum ±90 µm)				
Repeatability	≤ ±0.005 % F.S. (minimum ±20 µm)				
Operating conditions					
Operating temperature	-40...+75 °C (-40...+167 °F)				
Humidity	90 % rel. humidity, no condensation				
Ingress protection <sup>1,2</sup>	IP67 (if mating cable connector is correctly fitted)				
Shock test	100 g (single hit) / IEC standard 60068-2-27				
Vibration test	8 g / 10...2000 Hz IEC standard 60068-2-6 (resonance frequencies excluded)				
EMC test	Electromagnetic emission according to EN 61000-6-3				
	Electromagnetic immunity according to EN 61000-6-2				
	The sensor meets the requirements of the EC directives and is marked with <b>CE</b>				
Magnet movement velocity	Any				
Design / Material					
Sensor lid	Zinc die-cast				
Sensor profile	Aluminum				
Stroke length	50...2540 mm (2...100 in.)				
Mechanical mounting					
Mounting position	Any				
Mounting instruction	Please consult the technical drawings and the brief instructions (document number: <a href="#">551684</a> )				
Electrical connection					
Connection typ	M12 (8 pin) male connector				
Operating voltage	+24 VDC (-15 / +20 %); UL recognition requires an approved power supply with energy limitation (UL 61010-1), or Class 2 rating according to the National Electrical Code (USA) / Canadian Electrical Code				
Ripple	≤ 0.28 V <sub>pp</sub>				
Current consumption	90 mA typical				
Dielectric strength	500 VDC (DC ground to machine ground)				
Polarity protection	Up to -30 VDC				
Overvoltage protection	Up to 36 VDC				

1/ The IP rating is not part of the UL recognition

2/ The IP rating IP67 is only valid for the sensors electronics housing, as water and dust can get inside the profile.

\* / With standard monoflop of 16 µs

## TECHNICAL DRAWING



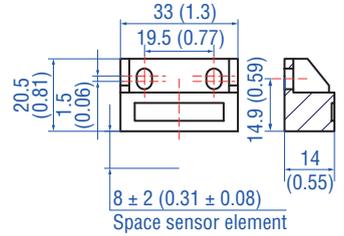
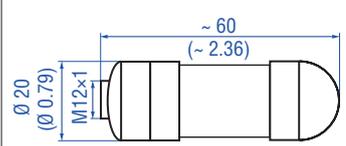
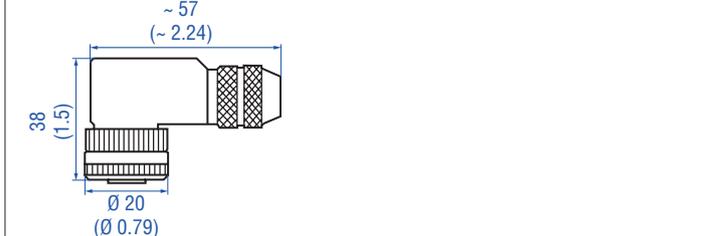
## CONNECTOR WIRING

### D84

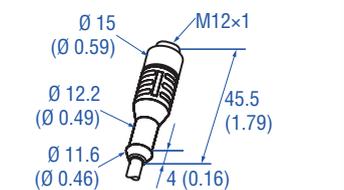
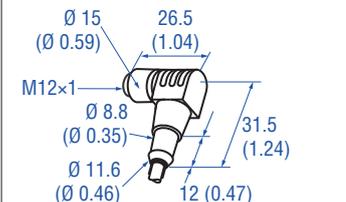
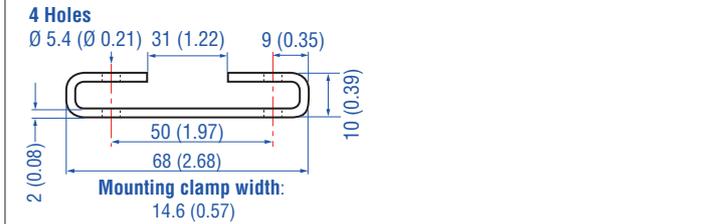
M12 A-coded	Pin	Function
	1	Clock (+)
	2	Clock (-)
	3	Data (+)
	4	Data (-)
	5	Not connected
	6	Not connected
	7	+24 VDC (-15 / +20 %)
	8	DC Ground (0 V)

**FREQUENTLY ORDERED ACCESSORIES** – Additional options available in our [Accessories Guide](#) 551444

**Position magnet**      **Cable connectors**<sup>4</sup>

		
<p><b>Block magnet L</b> Part no. 403 448</p> <p>Material: Hard ferrite Weight: Ca. 20 g Operating temperature: –40...+75 °C (–40...+167 °F) Fastening torque for M4 screws: 1 Nm</p>	<p><b>M12 (8 pin) female, straight</b> Part no. 370 694</p> <p>Housing: GD-ZnAL / IP67 Termination: Screw; 0.75 mm<sup>2</sup> Contact insert: CuZn Cable Ø: 4...9 mm (0.16...0.35 in.) Fastening torque: 0.6 Nm</p>	<p><b>M12 (8 pin) female, angled</b> Part no. 370 699</p> <p>Housing: GD-ZnAL / IP67 Termination: Screw; max. 0.5 mm<sup>2</sup> Contact insert: CuZn Cable Ø: 6...8 mm (0.24...0.31 in.) Fastening torque: 0.6 Nm</p>

**Cord sets**      **Mounting clamp**

		
<p><b>M12 (8 pin) female, straight</b> Part no. 370 674</p> <p>Ingress protection: IP67 Cable: Shielded, pigtail end Cable length: 5 m (16.4 ft.)</p>	<p><b>M12 (8 pin) female, angled</b> Part no. 370 676</p> <p>Ingress protection: IP67 Cable: Shielded, pigtail end Cable length: 5 m (16.4 ft.)</p>	<p><b>Mounting clamp</b> Part no. 403 508</p>

Controlling design dimensions are in millimeters and measurements in ( ) are in inches  
4/ Follow the manufacturer's mounting instructions when connecting the connectors

## ORDER CODE

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	
E	P	2						D	8	4	1	S							
a			b					c			d	e							

18, 19: optional

<b>a</b>	<b>Sensor model</b>		
E	P	2	Smooth profile

<b>b</b>	<b>Stroke length</b>				
X	X	X	X	M	0050...2540 mm
X	X	X	X	U	002.0...100.0 in.

### Standard stroke length (mm)\*

Stroke length	Ordering steps
50 ... 500 mm	25 mm
500...2540 mm	50 mm

### Standard stroke length (in.)\*

Stroke length	Ordering steps
2 ... 20 in.	1.0 in.
20...100 in.	2.0 in.

<b>c</b>	<b>Connection type</b>		
D	8	4	M12 (8 pin) male connector

<b>d</b>	<b>Operating voltage</b>
1	+24 VDC (-15 / +20 %)

<b>e</b>	<b>Output</b>	
S	(14) (15) (16) (17) (18) (19) = Synchronous Serial Interface	
<b>Data length (box no. 14)</b>		
1	25 bit	
2	24 bit	
<b>Output format (box no. 15)</b>		
B	Binary	
G	Gray	
<b>Resolution (box no. 16)</b>		
3	0.05 mm	
4	0.1 mm	
5	0.02 mm	
<b>Performance (box no. 17)</b>		
1	Standard	
<b>Optional (box no. 18 and 19)</b>		
0	0	Measuring direction forward

## DELIVERY



- Sensor
- 2 mounting clamps up to 1250 mm (50 in.) stroke length
- + 1 mounting clamp for each 500 mm (20 in.) additional stroke length

Accessories have to be ordered separately.

Operation manuals & software are available at:  
[www.mtssensors.com](http://www.mtssensors.com)

\* / Non standard stroke lengths are available; must be encoded in 5 mm / 0.1 in. increments

**UNITED STATES** 3001 Sheldon Drive  
MTS Systems Corporation Cary, N.C. 27513  
Sensors Division Phone: +1 919 677-0100  
E-mail: info.us@mtssensors.com

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**GERMANY** Auf dem Schüffel 9  
MTS Sensor Technologie 58513 Lüdenscheid  
GmbH & Co. KG Phone: +49 2351 9587-0  
E-mail: info.de@mtssensors.com

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**ITALY** Phone: +39 030 988 3819  
Branch Office E-mail: info.it@mtssensors.com

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**FRANCE** Phone: +33 1 58 4390-28  
Branch Office E-mail: info.fr@mtssensors.com

---

**GREAT BRITAIN** Phone: +44 79 44 15 03 00  
Branch Office E-mail: info.uk@mtssensors.com

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**CHINA** Phone: +86 21 6485 5800  
Branch Office E-mail: info.cn@mtssensors.com

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**JAPAN** Phone: +81 42 707 7710  
Branch Office E-mail: info.jp@mtssensors.com

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