

Temposonics®

Magnetostrictive Linear Position Sensors

EH SSI Data Sheet

- High pressure resistant sensor rod
- Operating temperature up to +75 °C (+167 °F)
- Small & compact – Ideal for standard hydraulic cylinders



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.

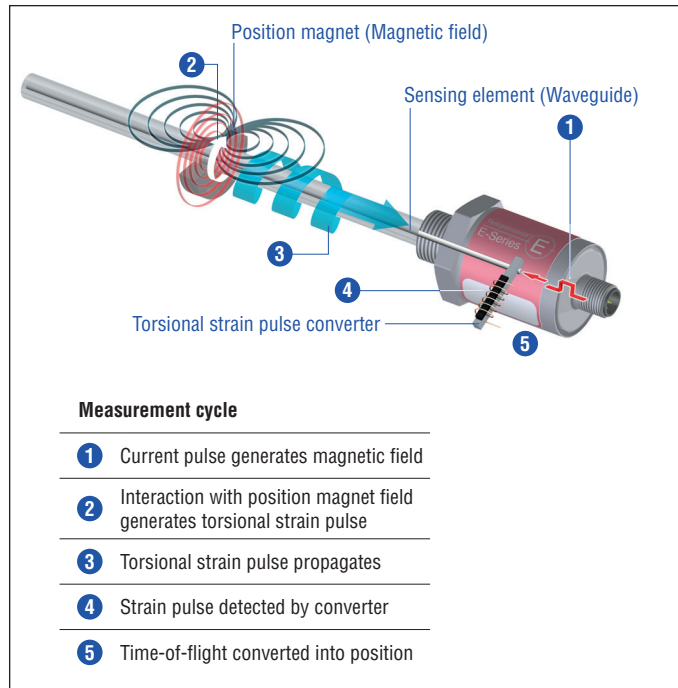


Fig. 1: Time-of-flight based magnetostrictive position sensing principle

EH SENSOR

Robust, non-contact and wear free, the Temposonics® linear position sensor provide the best 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.

Temposonics® EH is a compact rod-style sensor and the ideal solution for direct stroke measurement in small hydraulic cylinders. The position magnet mounted on the piston head of the hydraulic cylinder travels over the sensor rod with the built-in waveguide to provide a precise, non-contact position measurement. The EH is ideal for a variety of applications including: fluid power, food industry, plastic industry, glass and ceramics, energy sector, machine tools and testing machines.



Fig. 2: Typical application: Plastics processing

TECHNICAL DATA

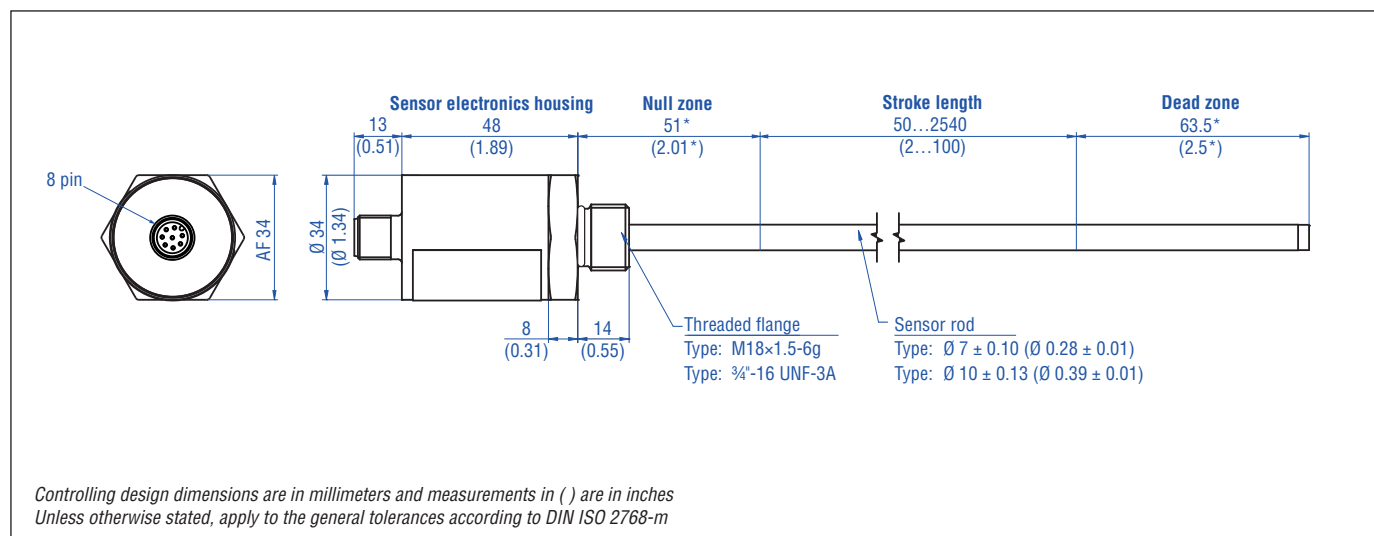
Output					
Interface	SSI (Synchronous Serial Interface)				
Data format	Binary or gray				
Data length	24, 25 bit				
Data transmission rate	70 kBaud*...1 MBaud, dependent on cable length:				
	Cable length < 3 m	< 50 m	< 100 m	< 200 m	< 400 m
	Baud rate	1.0 MBd	< 400 kBd	< 300 kBd	< 200 kBd < 100 kBd
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 ¹	≤ ±0.02 % F.S. (minimum ±60 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 ²	IP67 / IP69K (if mating cable connector is correctly fitted)				
Shock test	100 g (single shock) IEC standard 60068-2-27				
Vibration test	15 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 CE .				
Magnet movement velocity	Any				
Design / Material					
Sensor electronics housing	Stainless steel 1.4305 (AISI 303); option: Stainless steel 1.4404 (AISI 316L)				
Sensor rod	7 mm (0.28 in.) rod-Ø: Stainless steel 1.4301 (AISI 304)				
	10 mm (0.39 in.) rod-Ø: Stainless steel 1.4306 (AISI 304L); option: Stainless steel 1.4404 (AISI 316L)				
Stroke length	50...2540 mm (2...100 in.)				
Operating pressure	7 mm (0.28 in.) rod-Ø: 300 bar (4351 psi), 450 bar (6527 psi) peak				
	10 mm (0.39 in.) rod-Ø: 350 bar (5076 psi), 530 bar (7687 psi) peak				
Mechanical mounting					
Mounting position	Any				
Mounting instruction	Please consult the technical drawings and the brief instructions (document number: 551684)				
Electrical connection					
Connection type	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 _{pp}				
Current consumption	Typ. 90 mA				
Dielectric strength	500 VDC (DC ground to machine ground)				
Polarity protection	Up to -30 VDC				
Overvoltage protection	Up to 36 VDC				

1/ With position magnet # 251 416-2. Not applied for customized version (CP11009)

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

*/ With standard monoflop of 16 µs

TECHNICAL DRAWING



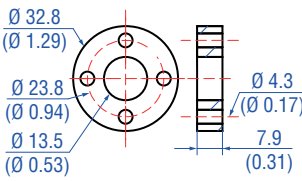
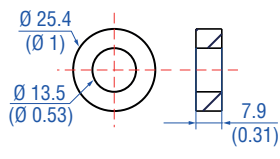
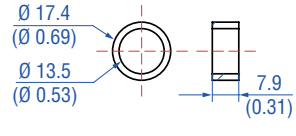
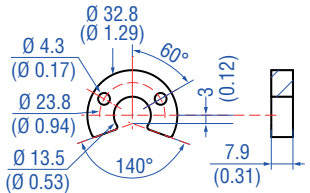
CONNECTOR WIRING

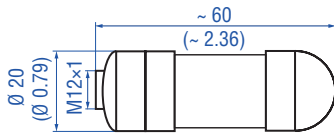
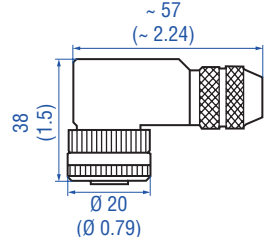
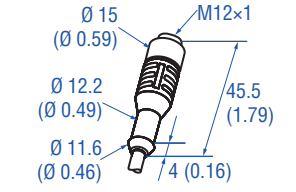
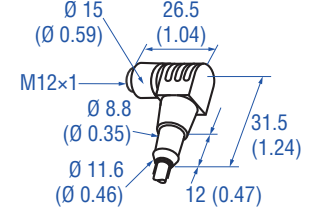
D84

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)

*Use prefix CP11009 to the order code for start position of 30 mm (1.18 inch) and 60 mm (2.36 inch) dead zone.

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

Position magnets			
			
<p>Standard ring magnet Part no. 201 542-2</p>	<p>Ring magnet OD25.4 Part no. 400 533</p>	<p>Ring magnet OD17.4 Part no. 401 032</p>	<p>U-magnet OD33 Part no. 251 416-2</p>
<p>Material: PA ferrite GF20 Weight: Ca. 14 g Operating temperature: –40...+105 °C (–40...+221 °F) Surface pressure: Max. 40 N/mm² Fastening torque for M4 screws: 1 Nm</p>	<p>Material: PA ferrite Weight: Ca. 10 g Operating temperature: –40...+105 °C (–40...+221 °F) Surface pressure: Max. 40 N/mm²</p>	<p>Material: PA neobind Weight: Ca. 5 g Operating temperature: –40...+105 °C (–40...+221 °F) Surface pressure: Max. 20 N/mm²</p>	<p>Material: PA ferrite GF20 Weight: Ca. 11 g Operating temperature: –40...+105 °C (–40...+221 °F) Surface pressure: Max. 40 N/mm² Fastening torque for M4 screws: 1 Nm</p>

Cable connectors ³		Cord sets	
			
<p>M12 (8 pin) female, straight Part no. 370 694</p>	<p>M12 (8 pin) female, angled Part no. 370 699</p>	<p>M12 (8 pin) female, straight Part no. 370 674</p>	<p>M12 (8 pin) female, angled Part no. 370 676</p>
<p>Housing: GD-ZnAL / IP67 Termination: Screw; 0.75 mm² Contact insert: CuZn Cable Ø: 4...9 mm (0.16...0.35 in.) Fastening torque: 0.6 Nm</p>	<p>Housing: GD-ZnAL / IP67 Termination: Screw; max. 0.5 mm² Contact insert: CuZn Cable Ø: 6...8 mm (0.24...0.31 in.) Fastening torque: 0.6 Nm</p>	<p>Ingress protection: IP67 Cable: Shielded, pigtail end Cable length: 5 m (16.4 ft.)</p>	<p>Ingress protection: IP67 Cable: Shielded, pigtail end Cable length: 5 m (16.4 ft.)</p>

³/ Follow the manufacturer's mounting instructions when connecting the connectors
Controlling design dimensions are in millimeters and measurements in () are in inches

ORDER CODE

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

18, 19: optional

a	Sensor model
E H	Rod

b	Design
	EH rod-style sensor with housing material 1.4305 (AISI 303) and rod material 1.4301 (AISI 304)
K	Flange M18×1.5-6g, 7 mm rod-Ø
L	Flange ¾"-16 UNF-3A, 7 mm rod-Ø
	EH rod-style sensor with housing material 1.4305 (AISI 303) and rod material 1.4306 (AISI 304L)
M	Flange M18×1.5-6g, 10 mm rod-Ø
S	Flange ¾"-16 UNF-3A, 10 mm rod-Ø
	EH rod-style sensor with housing material 1.4404 (AISI 316L) and rod material 1.4404 (AISI 316L)
F	Flange ¾"-16 UNF-3A, 10 mm rod-Ø
W	Flange M18×1.5-6g, 10 mm rod-Ø

c	Stroke length
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	5 mm
500 ... 750 mm	10 mm
750...1000 mm	25 mm
1000...2540 mm	50 mm

Standard stroke length (in.)*

Stroke length	Ordering steps
2 ... 20 in.	0.2 in.
20 ... 30 in.	0.5 in.
30 ... 40 in.	1.0 in.
40...100 in.	2.0 in.

d	Connection type
D 8 4	M12 (8 pin) male connector

e	Operating voltage
1	+24 VDC (-15 / +20 %)

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

DELIVERY



Sensor, O-ring

Accessories have to be ordered separately.

Operation manuals & software are available at:
www.mtssensors.com

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

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