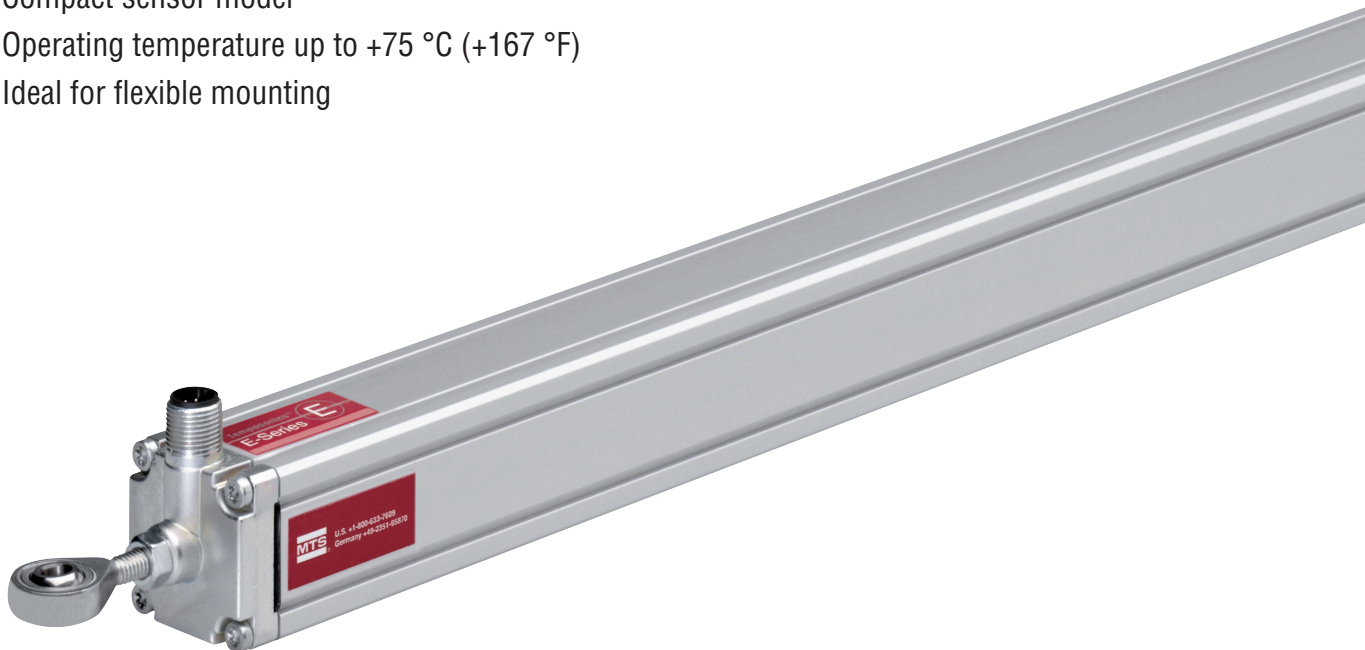


Temposonics®

Magnetostrictive Linear Position Sensors

ER IO-Link Data Sheet

- Compact sensor model
- Operating temperature up to +75 °C (+167 °F)
- Ideal for flexible mounting



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.

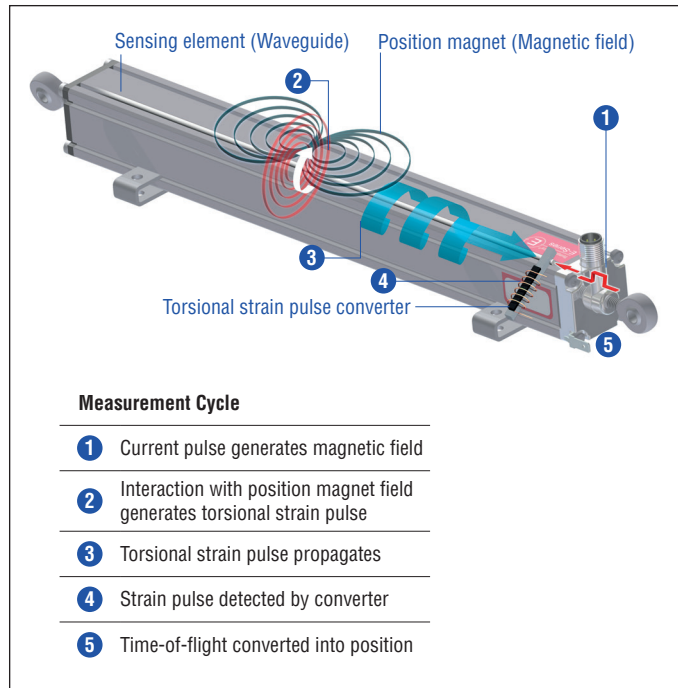


Fig. 1: Time-of-flight based magnetostrictive position sensing principle

ER 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.

Temposonics® ER has the shape of an aluminum cylinder with a guided driving rod and contains both the sensor element and the electronics. The position is detected via the solid extractable driving rod, which contains the position magnet and is mounted to the moveable machine part. The sensor can be installed in any orientation. Typical fields of application are printing and paper industry, machine tools and plastics industry as well as control systems. Temposonics® ER with IO-Link allows customers to adjust parameters including measuring direction, resolution or offset. In addition, a switching state can be outputted in parallel to the transfer of the position value. The switching points as well as the switching logic can be parameterized. IO-Link is an open standard according to IEC 61131-9. It is a serial, bi-directional point-to-point connection for signal transmission and energy supply. The bi-directional communication enables consistent communication between sensors and the controller as well as consistent diagnostic information down to the sensor level.



Fig. 2: Typical application: Paper industry

TECHNICAL DATA

Output	
Interface	Digital
Transmission protocol	IO-Link V1.1
Data format	32 bit signed (position in μm)
Data transmission rate	COM3 (230.4 kBaud)
Process data device – master	4 bytes
Process data master – device	0 bytes
Error value	0
Measured value	Position
Measurement parameters	
Resolution ¹	5 μm , 10 μm , 20 μm , 50 μm or 100 μm
Cycle time	minimum 1 ms (master dependent)
Linearity	$\leq \pm 0.02$ % F.S. (minimum ± 60 μm)
Repeatability	$\leq \pm 0.005$ % F.S. (minimum ± 20 μm)
Operating conditions	
Operating temperature	$-40 \dots +75$ °C ($-40 \dots +167$ °F)
Humidity	90 % relative humidity, no condensation
Ingress protection ²	IP67 (connectors correctly fitted)
Shock test	100 g (single shock) IEC standard 60068-2-27
Vibration test	5 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	≤ 5 m/s
Design / Material	
Sensor electronics housing	Aluminum
Guided driving rod	Aluminum
Stroke length	50...1500 mm (2...60 in.)
Mechanical mounting	
Mounting position	Any
Mounting instruction	Please consult the technical drawings and the brief instruction (document number: 551845)
Electrical connection	
Connection type	M12 (4 pin) male connector
Operating voltage	+24 VDC (± 25 %)
Ripple	≤ 0.28 V _{pp}
Current consumption	< 50 mA
Dielectric strength	500 VDC (DC ground to machine ground)
Polarity protection	Up to -30 VDC
Overvoltage protection	Up to 36 VDC

^{1/} Selectable via IO-Link master

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

TECHNICAL DRAWING

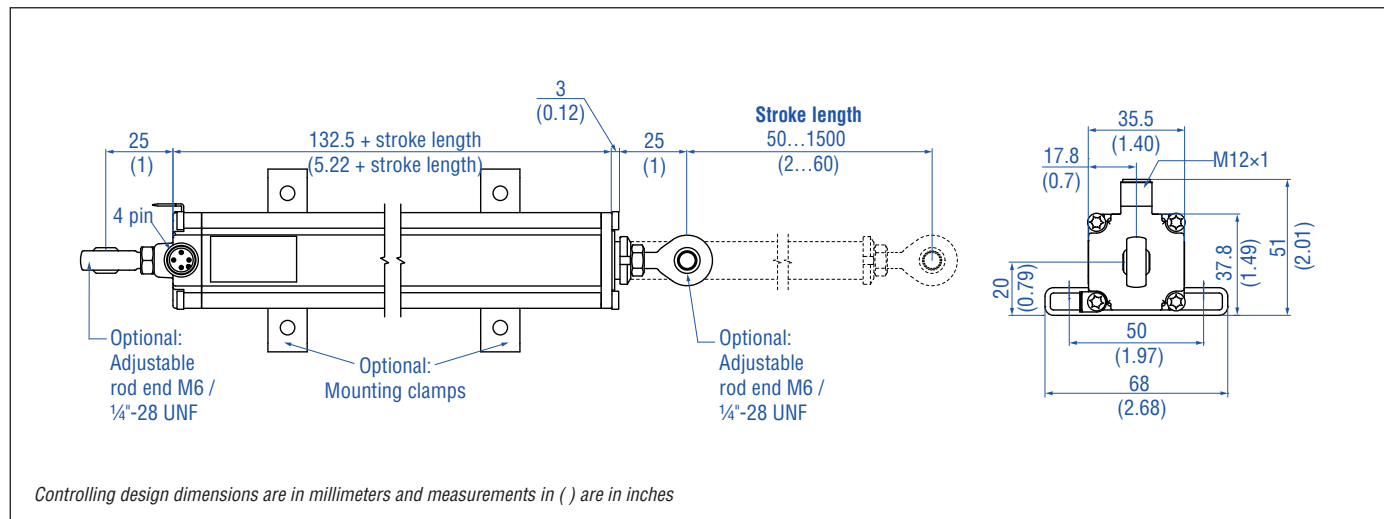



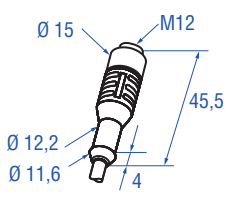
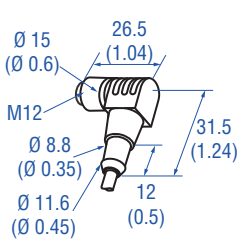
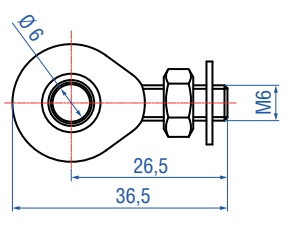
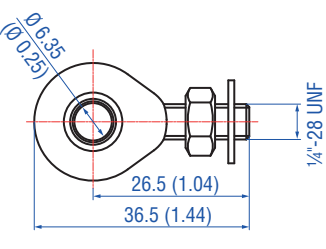
Fig. 3: Temposonics® ER

CONNECTOR WIRING

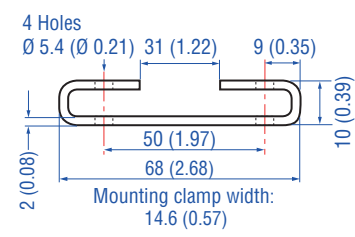
D44		
Signal + power supply		
M12 male connector (A-coded)	Pin	Function
<p>View on sensor</p>	1	+24 VDC (+25 %)
	2	DI / DQ
	3	DC Ground (0 V)
	4	C / Q

Fig. 4: Connector wiring D44

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

Cord sets	Rod ends		
			
<p>Cable with M12 A-coded female connector (5 pin), straight – pigtail Part no. 370 673</p>	<p>Cable with M12 A-coded female connector (5 pin), angled – pigtail Part no. 370 675</p>	<p>Rod end with M6 thread Part no. 254 210</p>	<p>Rod end with 1/4"-28 UNF thread Part no. 254 235</p>
<p>Material: PUR jacket; black Features: Shielded Cable length: 5 m (16.4 ft) Ingress protection: IP67 (correctly fitted) Operating temperature: -25...+80 °C (-13...+176 °F)</p>	<p>Material: PUR jacket Features: Shielded Cable length: 5 m (16.4 ft) Ingress protection: IP67 (correctly fitted) Operating temperature: -25...+80 °C (-13...+176 °F)</p>	<p>Material: Galvanized steel</p>	<p>Material: Galvanized steel</p>

Mounting clamp



Mounting clamp
Part no. 403 508

Material: Stainless steel 1.4301/1.4305
(AISI 304/303)

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
E	R							D	4	4	1	K
a		b	c					d			e	f

a	Sensor model
E R	Aluminum cylinder with a guided driving rod

b	Design
M	Inside thread M6 at end of rod (For metric stroke length measurement)
S	Inside thread ¼"-28 UNF at end of rod (For US customary stroke length measurement)

c	Stroke length
X X X X M	0050...1500 mm
Standard stroke length (mm)* Ordering steps	
50 ... 500 mm	25 mm
500...1500 mm	50 mm
X X X X U	002.0...060.0 in.
Standard stroke length (in.)* Ordering steps	
2...22 in.	1.0 in.
22...60 in.	2.0 in.

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

e	Operating voltage
1	+24 VDC (±25 %)

f	Output
K	IO-Link

DELIVERY



- Sensor
Select mounting accessories regarding your application:
- 1 or 2 rod ends M6 / ¼"-28 UNF or / and
- 2 mounting clamps up to 1250 mm (50 in.) stroke length, 3 mounting clamps for 1500 mm (60 in.) stroke length

Accessories have to be ordered separately.

Manuals, Software & 3D models available at:
www.mtssensors.com

* / Non standard stroke lengths are available; must be encoded in 5 mm / 0.1 in. increments.
Some preferred stroke lengths may be available with faster lead time. Contact MTS Sensors for details.

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

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

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

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

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

CHINA Phone: +86 21 2415 1000 / 2415 1001
Branch Office E-mail: info.cn@mtssensors.com

JAPAN Phone: +81 3 6416 1063
Branch Office E-mail: info.jp@mtssensors.com

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