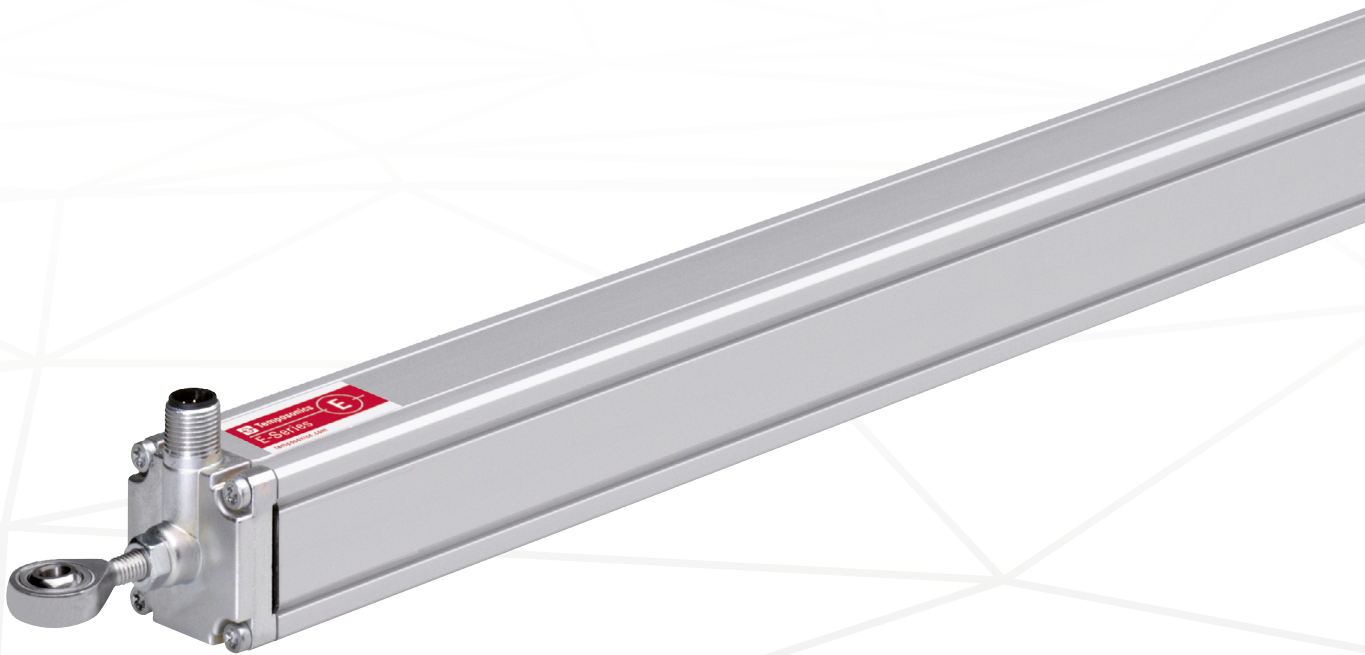


Data Sheet

E-Series ER IO-Link

Magnetostrictive Linear Position Sensors

- Compact sensor model
- Position and velocity measurements
- Ideal for flexible mounting



MEASURING TECHNOLOGY

The absolute, linear position sensors provided by Temposonics rely on the company's proprietary 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 beginning 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.

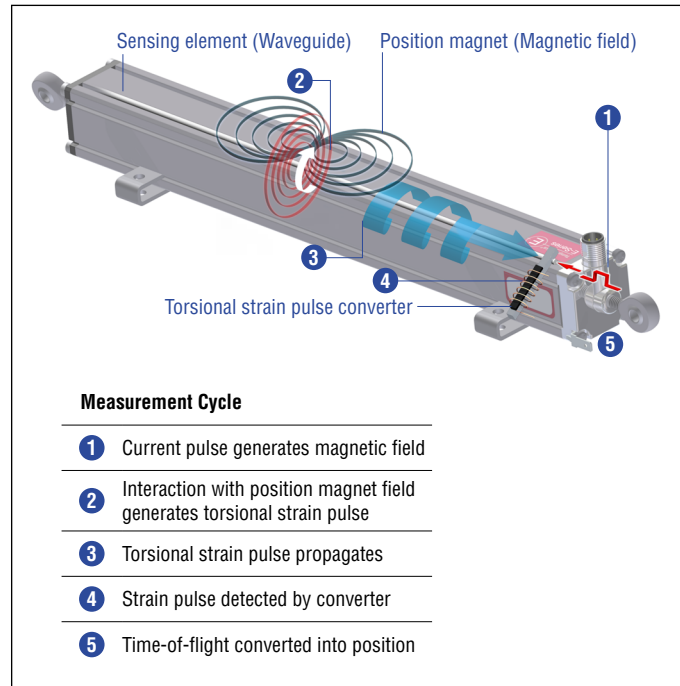


Fig. 1: Time-of-flight based magnetostrictive position sensing principle

E-SERIES ER IO-LINK

The Temposonics® E-Series offers you a compact solution for linear position measurement. It is ideally suited for different applications in the industrial environment. The main advantages of the E-Series ER are:

- **Direct measurement of the axis movement**
The sensor with strong piston ER is designed for a flexible installation on a machine. This allows you to easily measure the movement of a machine axis directly.
- **Compact design**
The E-Series sensors are designed to take up very little space. This means that you can also use the sensors well in limited spaces.
- **Efficient performance**
With their efficient performance, the sensors of the E-Series ensure reliable position measurement. Therefore, the sensors are very well suited for many different applications.
- **Robust and proven**
The E-Series sensors are designed to be robust. The E-Series has proven in the industrial environment for many years.

IO-LINK

IO-Link is a standardized IO technology (IEC 61131-9) for serial and bidirectional communication between sensor and controller. The E-Series IO-Link is characterized by:

- **IO-Link certified**
The E-Series with IO-Link V1.1 and COM3 fulfills the IO-Link specification. This is the prerequisite that the sensor works on any IO-Link master.
- **Customize to your requirements**
You can adjust important parameters at the sensor for the position measurement such as resolution, measuring direction and measuring range according to your requirements.
- **Position, velocity and switch state**
The sensor reports not only the position but also the velocity. In addition, a switch state can be transmitted in parallel via the digital output. You can parameterize the switch points and the switch logic.

TECHNICAL DATA

Output	
Interface	Digital
Transmission protocol	IO-Link V1.1
Data format	Standard single-position measurement: 32 bit signed (position in μm) Advanced single-position measurement: 8 × 32 bit signed (position in μm , velocity in $\mu\text{m/s}$)
Data transmission rate	COM3 (230.4 kBaud)
Process data device – master	Standard single-position measurement: 4 bytes Advanced single-position measurement: 32 bytes
Process data master – device	0 bytes
Measured value	Standard single-position measurement: Position Advanced single-position measurement: Position and velocity
Measurement parameters	
Resolution ¹	5 μm , 10 μm , 20 μm , 50 μm or 100 μm
Cycle time	Standard single-position measurement: Sensors with stroke length ≤ 1000 mm (≤ 39 in.): 1 ms Sensors with stroke length ≥ 1000 mm (≥ 39 in.): 2 ms Advanced single-position measurement: 4 ms
Linearity deviation	$\leq \pm 0.02$ % 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 (connector 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 (excluding resonant frequencies)
EMC test	Electromagnetic emission according to EN 61000-6-3 Electromagnetic immunity according to EN 61000-6-2 The ER sensors fulfill the requirements of the EMC directives 2014/30/EU and UKSI 2016 No. 1091
Magnet movement velocity	≤ 5 m/s
Design/Material	
Sensor electronics housing	Aluminum
Sensor profile	Aluminum
RoHS compliance	The used materials are compliant with the requirements of EU Directive 2011/65/EU and EU Regulation 2015/863 as well as UKSI 2022 No. 622 with amendments
Stroke length	50...1500 mm (2...60 in.)
Mechanical mounting	
Mounting position	Any
Mounting instruction	Please consult the technical drawings on page 4 and the operation manual (document number: 551845)

Technical data “Electrical connection” on [page 4](#)

^{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.

Temposonics® E-Series ER IO-Link

Data Sheet

Electrical connection	
Connection type	M12 male connector (4 pin)
Operating voltage	+24 VDC ($\pm 25\%$); the ER sensors must be power supplied via an external Class 2 power source in accordance with the UL approval
Ripple	$\leq 0.28 V_{pp}$
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

TECHNICAL DRAWING

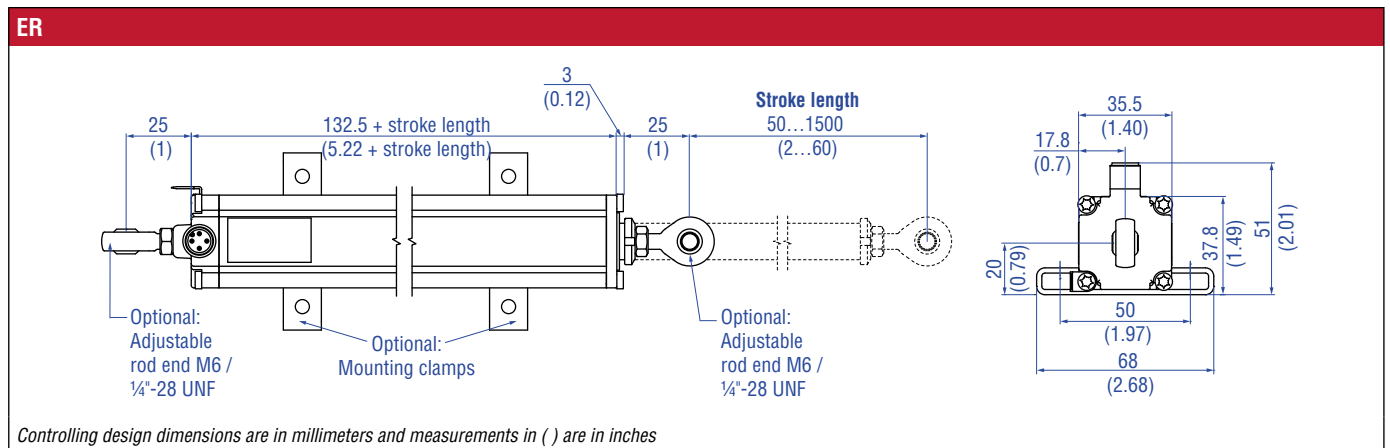


Fig. 2: Temposonics® E-Series ER

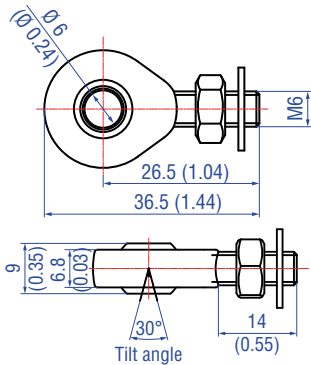
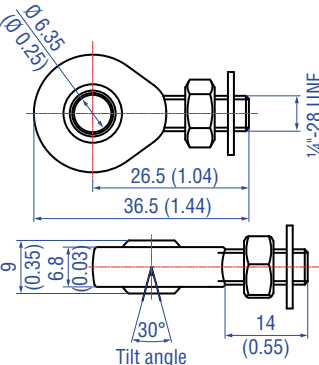
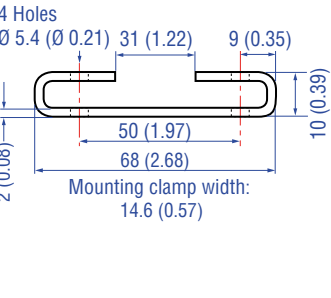
CONNECTOR WIRING

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

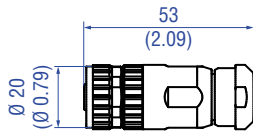
Fig. 3: Connector wiring D44

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

Mounting accessories

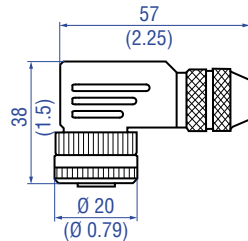
		
<p>Rod end with M6 thread Part no. 254 210</p>	<p>Rod end with 1/4"-28 UNF thread Part no. 254 235</p>	<p>Mounting clamp Part no. 403 508</p>
<p>Material: Galvanized steel</p>	<p>Material: Galvanized steel</p>	<p>Material: Stainless steel 1.4301/1.4305 (AISI 304/303)</p>

Cable connectors*



**M12 A-coded female connector
(4 pin/5 pin), straight**
Part no. 370 677

Material: GD-Zn, Ni
Termination: Screw
Contact insert: CuZn
Cable Ø: 4...8 mm (0.16...0.31 in.)
Wire: Max. 1.5 mm² (16 AWG)
Operating temperature:
-30...+85 °C (-22...+185 °F)
Ingress protection: IP67 (correctly fitted)
Fastening torque: 0.6 Nm



**M12 A-coded female connector
(5 pin), angled**
Part no. 370 678

Material: GD-Zn, Ni
Termination: Screw
Contact insert: CuZn
Cable Ø: 5...8 mm (0.2...0.31 in.)
Wire: Max 0.75 mm² (18 AWG)
Operating temperature:
-25...+85 °C (-13...+185 °F)
Ingress protection: IP67 (correctly fitted)
Fastening torque: 0.4 Nm

Cable sets



**Cable with M12 A-coded female
connector (5 pin), straight – pigtail**
Part no. 370 673

Material: PUR jacket; black
Feature: Shielded
Cable length: 5 m (16.4 ft)
Ingress protection: IP67 (correctly fitted)
Operating temperature:
-25...+80 °C (-13...+176 °F)



**Cable with M12 A-coded female
connector (5 pin), angled – pigtail**
Part no. 370 675

Material: PUR jacket; black
Feature: Shielded
Cable length: 5 m (16.4 ft)
Ingress protection: IP67 (correctly fitted)
Operating temperature:
-25...+80 °C (-13...+176 °F)

Wiring

Wires	Color	Pin	M12 A-coded female connector (5 pin)
	BN	↔ 1	
	WH	↔ 2	
	BU	↔ 3	
	BK	↔ 4	
	GY	↔ 5	

*J/ Follow the manufacturer's mounting instructions
Color of connectors and cable jacket may change. Color codes for the individual wires and technical properties remain unchanged.
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
E	R							D	4	4	1	K				
a		b	c					d			e	f	g <small>optional</small>			

a	Sensor model
E R	Aluminum housing with a guided rod

b	Design
M	Inside thread M6 at end of rod (For metric stroke length measurement)
S	Inside thread 1/4"-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...20 in.	1.0 in.
20...60 in.	2.0 in.
Non-standard stroke lengths are available; must be encoded in 5 mm/0.1 in. increments.	

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

e	Operating voltage
1	+24 VDC (±25 %)

f	Output
K	IO-Link

g	Advanced single-position measurement (optional)
1 Z 0 1	Number of magnets 1 position and velocity (1 magnet)

DELIVERY



- Sensor Accessories have to be ordered separately.

Select mounting accessories regarding your application:

- 1 or 2 rod ends
M6/1/4"-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

Manuals, Software & 3D models available at:
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