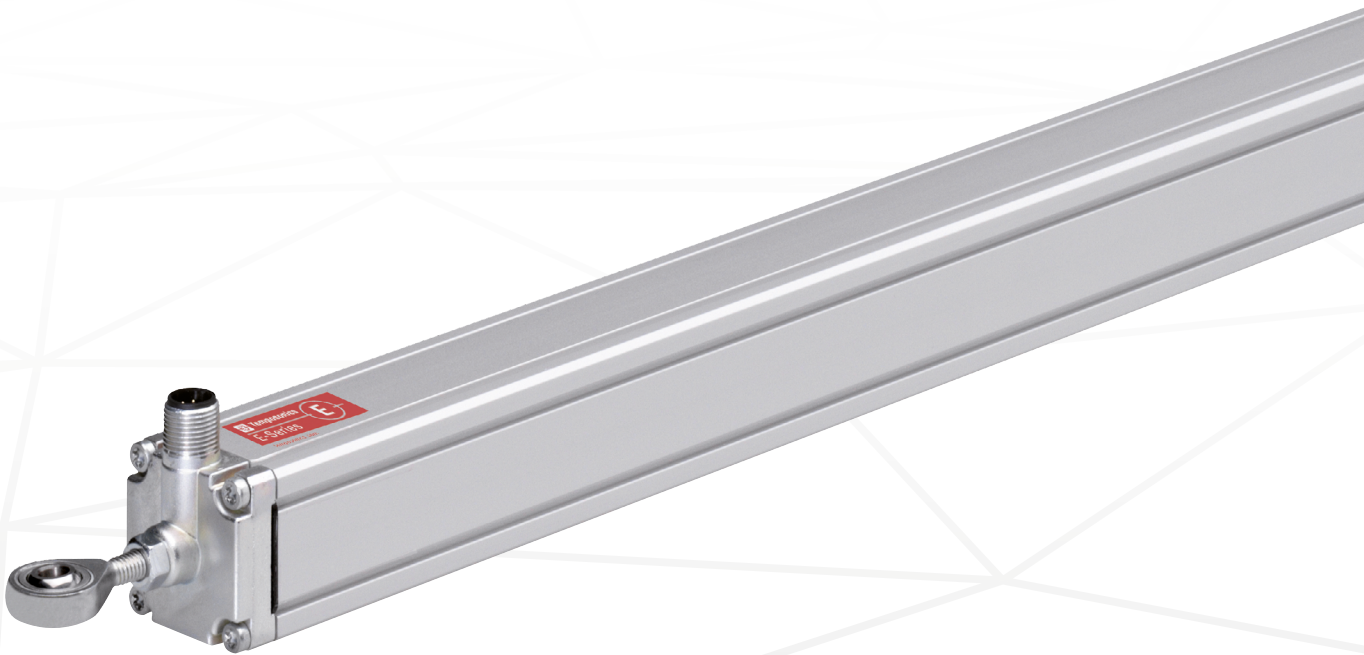


Data Sheet

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 a 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.

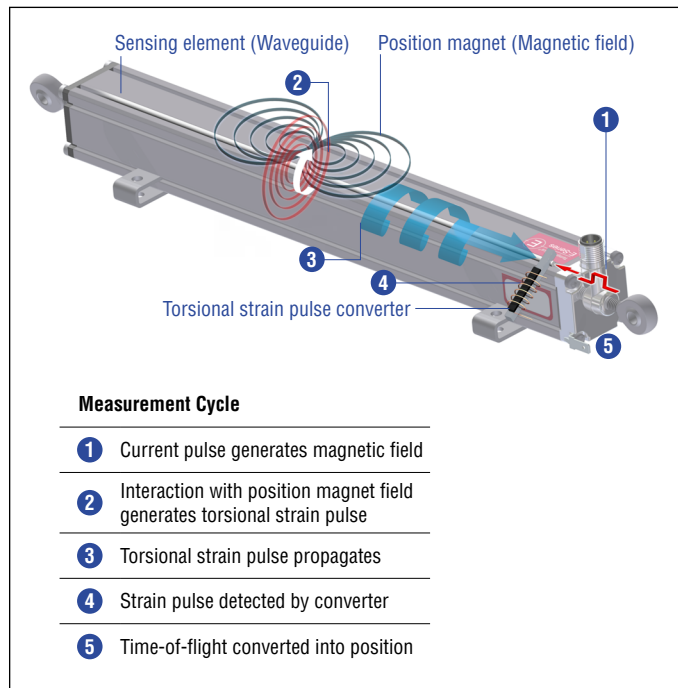


Fig. 1: Time-of-flight based magnetostrictive position sensing principle

E-SERIE 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.
- **Reliable performance**
With their 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	$\leq \pm 0.02$ % 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 (resonance frequencies excluded)
EMC test	Electromagnetic emission according to EN 61000-6-3 Electromagnetic immunity according to EN 61000-6-2
Magnet movement velocity	≤ 5 m/s
Design/Material	
Sensor electronics housing	Aluminum
Sensor profile	Aluminum
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).
Electrical connection	
Connection type	M12 male connector (4 pin)
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

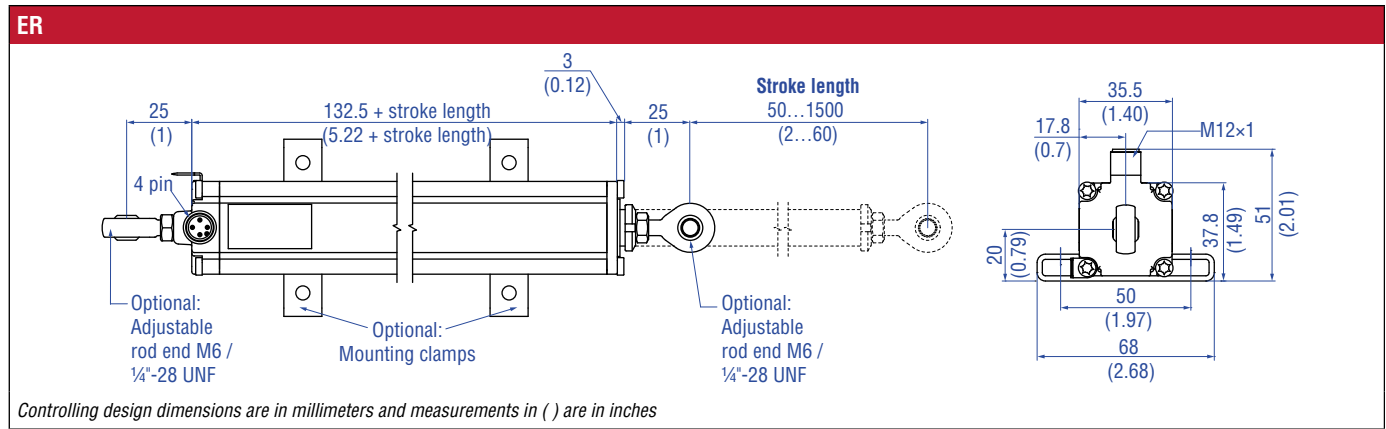


Fig. 2: E-Series ER


CONNECTOR WIRING



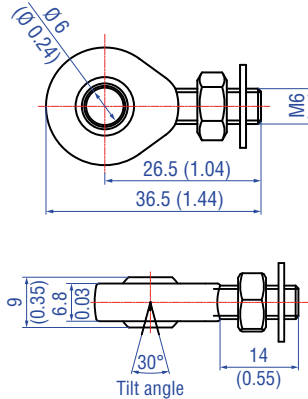
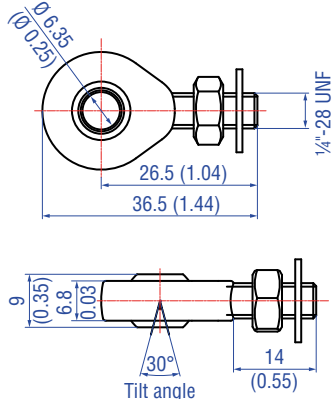
D44

Signal + power supply

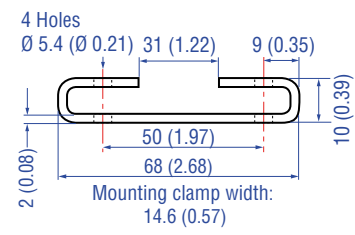
M12 male connector	Pin	Function
<p>View on sensor</p>	1	+24 VDC (-15/+20 %)
	2	DI/DQ
	3	DC Ground (0 V)
	4	C/Q

Fig. 3: Connector wiring D44

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

Cables		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; 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: 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)

NOTICE
 The wiring of the cables is available in the accessories brochure
 ([document no. 551444](#))

*Controlling design dimensions are in millimeters and measurements in () are in inches
 Color of connectors and cable jacket may change. Colors of the cores and technical properties remain unchanged.*

ORDER CODE

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
E	R	M						D	4	4	1	K					
a		b	c					d			e	f	g				

optional

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 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...22 in. 1.0 in.
	22...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
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

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