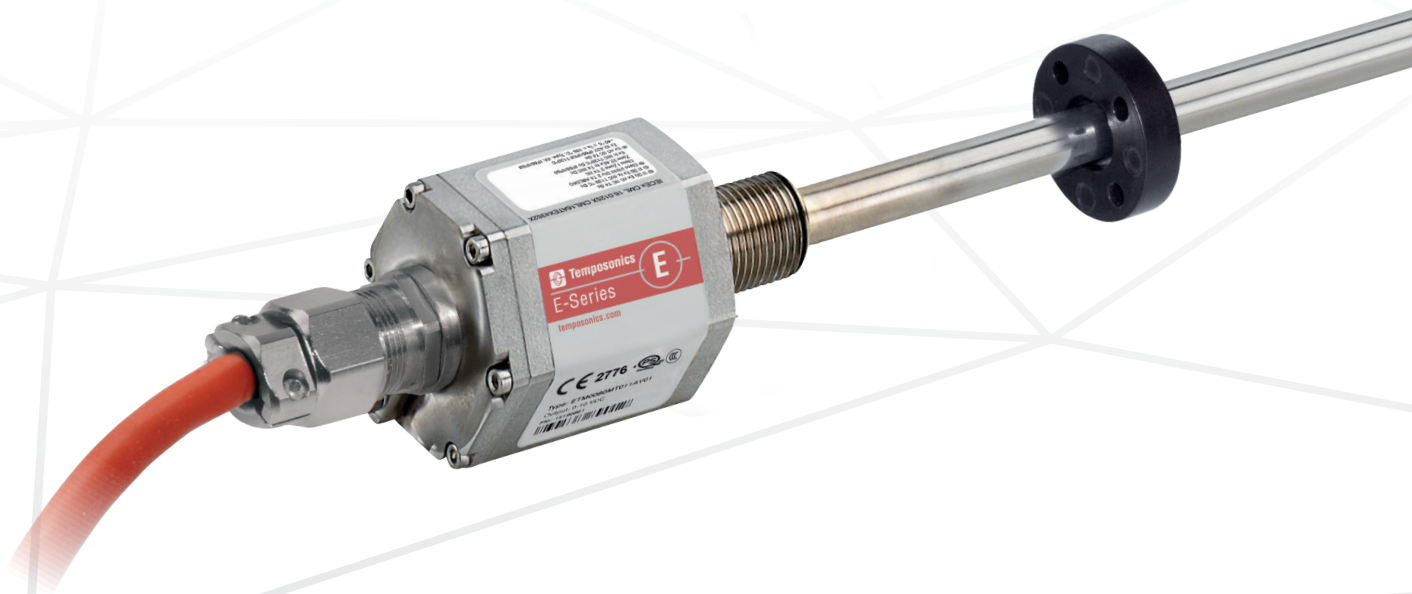


Data Sheet

E-Series ET Start/Stop Magnetostrictive Linear Position Sensors

- High operating temperature
- Compact sensor housing
- ATEX/UK Ex/IECEX/CEC/NEC/CCC certified



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.

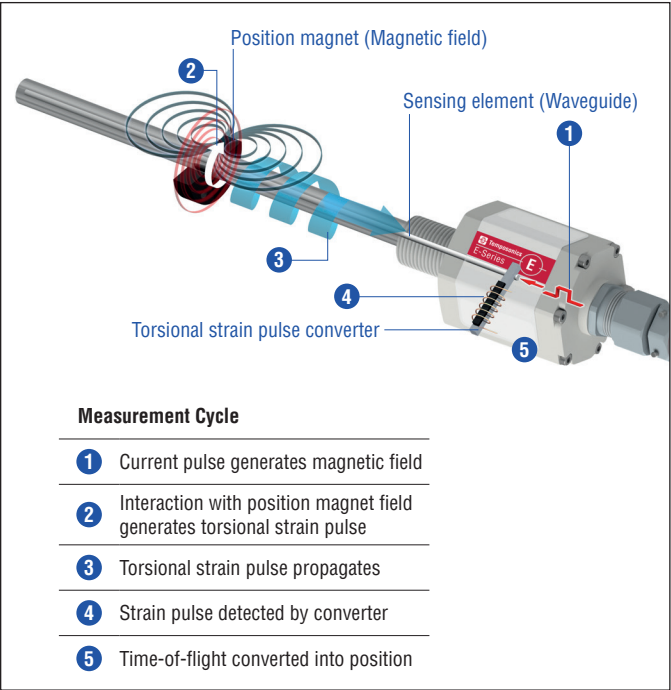


Fig. 1: Time-of-flight based magnetostrictive position sensing principle

ET SENSOR

Robust, non-contact and wear free, the Temposonics linear position sensors provide best durability and accurate position measurement solutions in harsh industrial environments. The position measurement accuracy is tightly controlled by the quality of the waveguide which is manufactured by Temposonics. The position magnet is mounted on the moving machine part and travels contactlessly over the sensor rod with the built-in waveguide.

ET sensor specifications:

- High operating temperature up to +105 °C (+221 °F)
- Compact sensor housing
- ATEX/UK Ex/IECEX/CEC/NEC/CCC certified
- Sensor parameters upload function

Certification
II 3G Ex nC IIC T4 Gc II 3D Ex tc IIIC T130 °C Dc Class I/II/III Div 2 T4 ABCDFG Class I Zone 2 T4 IIC Zone 22 AEx tc T4 IIIC Dc Ex tc IIIC T130°C Dc IP66/IP68 Ex nC IIC T4 Gc Ex tc IIIC T130°C Dc -40 °C ≤ Ta ≤ 105 °C; Type: 4X; IP66/IP68

Fig. 2: Certification of Temposonics® ET (version A and E)



Fig. 3: Typical application: Metal processing

TECHNICAL DATA

Output											
Start/Stop	RS-422 differential signal Serial parameter upload available for: Stroke length, offset, gradient, status, serial number and manufacturer number										
Measured value	Position										
Measurement parameters											
Resolution	Controller dependent										
Cycle time	Controller and stroke length dependent Recommendation: <table><tr><td>Stroke length</td><td>≤ 1000 mm (40 in.)</td><td>≤ 2000 mm (79 in.)</td><td>≤ 3000 mm (118 in.)</td></tr><tr><td>Cycle time</td><td>0.5 ms</td><td>0.9 ms</td><td>1.25 ms</td></tr></table>			Stroke length	≤ 1000 mm (40 in.)	≤ 2000 mm (79 in.)	≤ 3000 mm (118 in.)	Cycle time	0.5 ms	0.9 ms	1.25 ms
Stroke length	≤ 1000 mm (40 in.)	≤ 2000 mm (79 in.)	≤ 3000 mm (118 in.)								
Cycle time	0.5 ms	0.9 ms	1.25 ms								
Linearity ¹	≤ ±0.02 % F.S. (minimum ±60 µm)										
Repeatability	≤ ±0.005 % F.S. (minimum ±20 µm) typical										
Operating conditions											
Operating temperature	−40...+105 °C (−40...+221 °F)										
Humidity	90 % relative humidity, no condensation										
Ingress protection	With FEP cable (part no. 530 112): IP66 With silicone cable (part no. 530 113): IP68 (2 bar (29 psi) @ 30 min)										
Shock test	100 g (single shock), IEC standard 60068-2-27										
Vibration test	20 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 ET sensors fulfill the requirements of the EMC directives 2014/30/EU, UKSI 2016 No. 1091 and TR CU 020/2011										
Operating pressure	Up to 350 bar (5076 psi)										
Magnet movement velocity ²	Any										
Design/Material											
Sensor electronics housing/flange	Stainless steel 1.4305 (AISI 303); option: Stainless steel 1.4404 (AISI 316L)										
Sensor rod	Stainless steel 1.4306 (AISI 304L); option: Stainless steel 1.4404 (AISI 316L)										
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...3000 mm (2...118 in.)										
Mechanical mounting											
Mounting position	Any										
Mounting instruction	Please consult the technical drawings on page 4 and the operation manual (document number: 551677)										
Electrical connection											
Connection type	Cable outlet										
Operating voltage	+24 VDC (−15/+20 %); the ET sensors must be power supplied via an external Class 2 power source in accordance with the UL approval										
Ripple	≤ 0.28 V _{pp}										
Current consumption	Maximum 50 mA										
Dielectric strength	700 VDC (DC ground to machine ground)										
Polarity protection	Up to −30 VDC										
Overvoltage protection	Up to ≤ 32 VDC										

1/ With position magnet # 251 416-2

2/ If there is contact between the moving magnet including the magnet holder and the sensor rod, make sure that the maximal speed of the moving magnet is ≤ 1 m/s (Ex requirement due to ESD [Electro Static Discharge])

TECHNICAL DRAWING

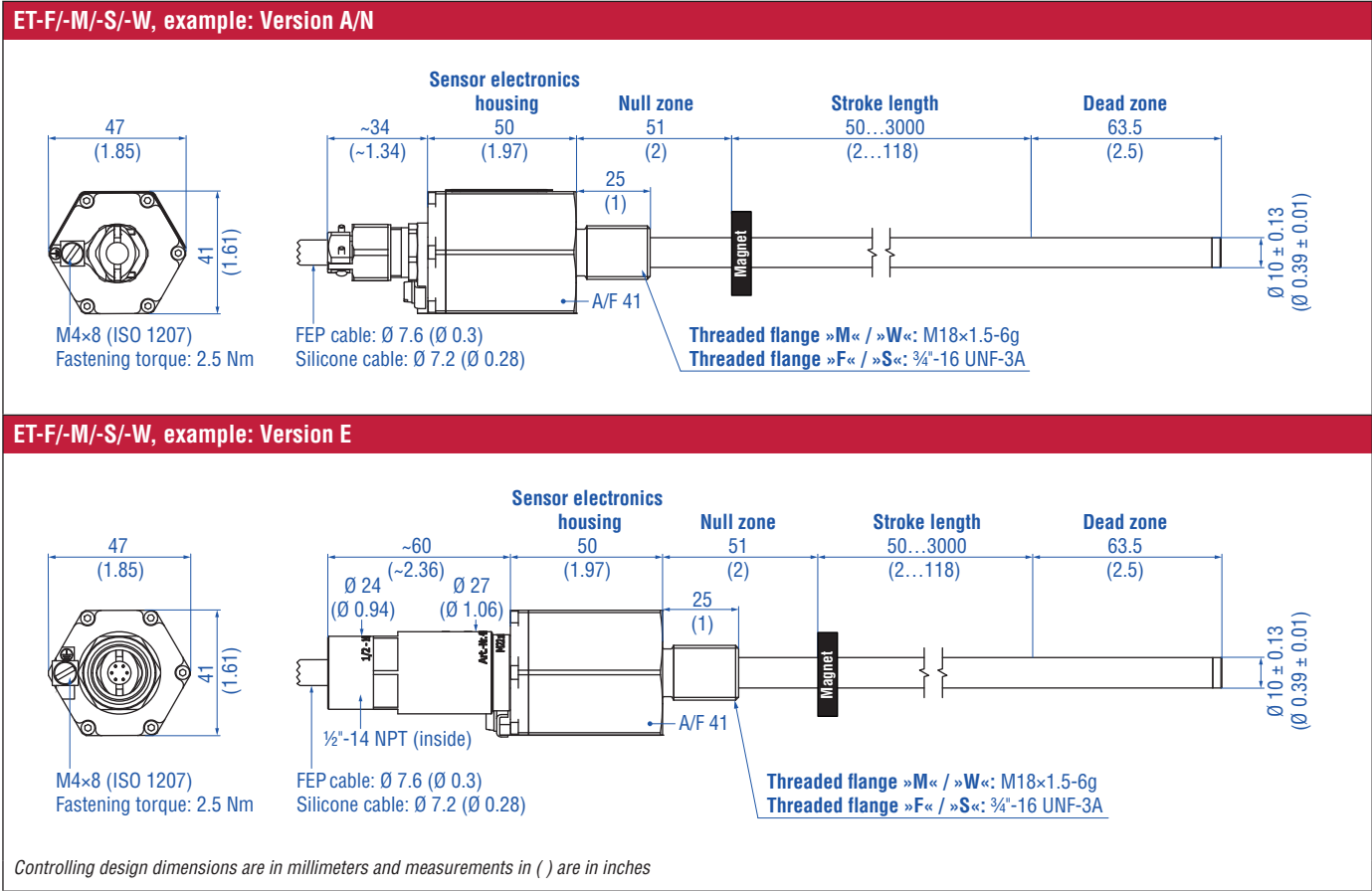


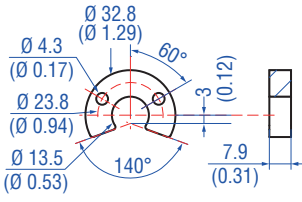
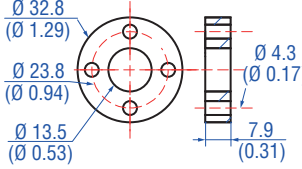
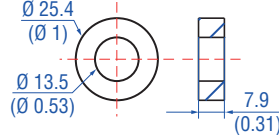
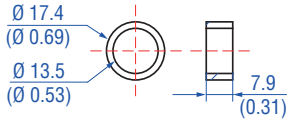
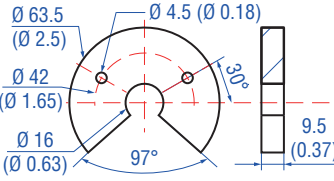
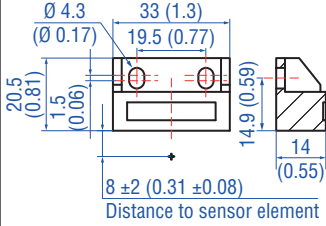
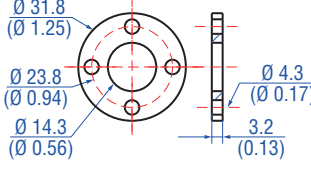
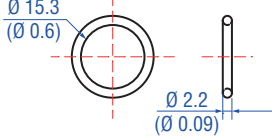
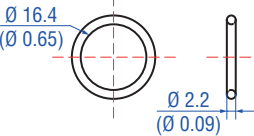
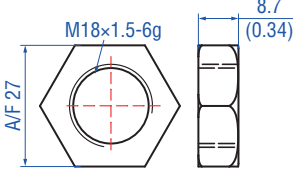
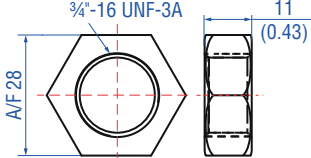
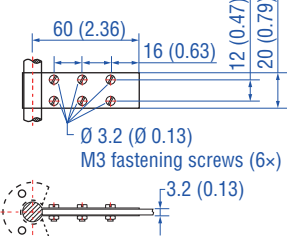
Fig. 4: Temposonics® ET with ring magnet

CONNECTOR WIRING

TXX/VXX		
Signal + power supply		
Cable	Color	Function
	GY	Stop (-)
	PK	Stop (+)
	YE	Start (+)
	GN	Start (-)
	BN	+24 VDC (-15/+20 %)
	WH	DC Ground (0 V)

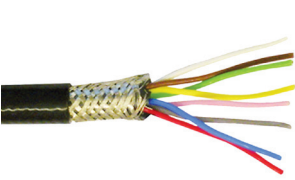
Fig. 5: Connector wiring TXX/VXX

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

Position magnets			
 U-magnet OD33 Part no. 251 416-2 Material: PA ferrite GF20 Weight: Approx. 11 g Surface pressure: Max. 40 N/mm² Fastening torque for M4 screws: 1 Nm Operating temperature: -40...+120 °C (-40...+248 °F)	 Ring magnet OD33 Part no. 201 542-2 Material: PA ferrite GF20 Weight: Approx. 14 g Surface pressure: Max. 40 N/mm² Fastening torque for M4 screws: 1 Nm Operating temperature: -40...+120 °C (-40...+248 °F)	 Ring magnet OD25.4 Part no. 400 533 Material: PA ferrite Weight: Approx. 10 g Surface pressure: Max. 40 N/mm² Operating temperature: -40...+120 °C (-40...+248 °F)	 Ring magnet OD17.4 Part no. 401 032 Material: PA neobond Weight: Approx. 5 g Surface pressure: Max. 20 N/mm² Operating temperature: -40...+105 °C (-40...+221 °F)
Position magnets		Magnet spacer	O-ring
 U-magnet OD63.5 Part no. 201 553 Material: PA 66-GF30, magnets compound-filled Weight: Approx. 26 g Surface pressure: 20 N/mm² Fastening torque for M4 screws: 1 Nm Operating temperature: -40...+75 °C (-40...+167 °F)	 Block magnet L Part no. 403 448 Material: Plastic carrier with neodymium magnet Weight: Approx. 20 g Fastening torque for M4 screws: 1 Nm Operating temperature: -40...+75 °C (-40...+167 °F) This magnet may influence the sensor performance specifications for some applications.	 Magnet spacer Part no. 400 633 Material: Aluminum Weight: Approx. 5 g Surface pressure: Max. 20 N/mm² Fastening torque for M4 screws: 1 Nm	 O-ring for threaded flange M18×1.5-6g Part no. 401 133 Material: Fluoroelastomer Durometer: 75 ± 5 Shore A Operating temperature: -40...+204 °C (-40...+400 °F)
O-ring	Mounting accessories		
 O-ring for threaded flange ¾"-16 UNF-3A Part no. 560 315 Material: Fluoroelastomer Durometer: 75 ± 5 Shore A Operating temperature: -40...+204 °C (-40...+400 °F)	 Hex jam nut M18×1.5-6g Part no. 500 018 Material: Steel, zinc plated	 Hex jam nut ¾"-16 UNF-3A Part no. 500 015 Material: Steel, zinc plated	 Fixing clip Part no. 561 481 Application: Used to secure sensor rods (Ø 10 mm (Ø 0.39 in.)) when using an U-magnet or block magnet Material: Brass, non-magnetic

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

Cable

	
FEP cable Part no. 530 112	Silicone cable Part no. 530 113
Material: FEP jacket; black Features: Twisted pair, shielded, flexible, high thermal resistance, mostly oil & acid resistant Cable Ø: 7.6 mm (0.3 in.) Cross section: 4 × 2 × 0.25 mm² Bending radius: 8 – 10 × D (fixed installation) Operating temperature: –100...+180 °C (–148...+356 °F)	Material: Silicone jacket; red Features: Twisted pair, shielded, highly flexible, halogen free, high thermal resistance Cable Ø: 7.2 mm (0.28 in.) Cross section: 3 × 2 × 0.25 mm² Bending radius: 5 × D (fixed installation) Operating temperature: –50...+180 °C (–58...+356 °F)

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
E	T										1		R	3
a		b	c					d			e	f	g	

a	Sensor model
E T	Rod
b	Design
	ET rod-style sensor with housing and sensor rod material stainless steel 1.4404 (AISI 316L)
F	Threaded flange ¾"-16 UNF-3A
W	Threaded flange M18×1.5-6g
	ET rod-style sensor with housing material stainless steel 1.4305 (AISI 303) and sensor rod material stainless steel 1.4306 (AISI 304L)
M	Threaded flange M18×1.5-6g
S	Threaded flange ¾"-16 UNF-3A

c	Stroke length
X X X X M	0050...3000 mm
Standard stroke length (mm)	Ordering steps
50... 500 mm	5 mm
500... 750 mm	10 mm
750...1000 mm	25 mm
1000...2500 mm	50 mm
2500...3000 mm	100 mm
X X X X U	002.0...118.0 in.
Standard stroke length (in.)	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.
100...118 in.	4.0 in.
Non-standard stroke lengths are available; must be encoded in 5 mm/0.1 in. increments	

d	Connection type
T X X	T01...T10 (1...10 m) XX m FEP cable (part no. 530 112) T03...T33 (3...33 ft.) XX ft. FEP cable (part no. 530 112) See "Frequently ordered accessories" for cable specifications.
V X X	V01...V10 (1...10 m.) XX m silicone cable (part no. 530 113) V03...V33 (3...33 ft.) XX ft. silicone cable (part no. 530 113) See "Frequently ordered accessories" for cable specifications.
Encode in meters if using metric stroke length. Encode in feet if using US customary stroke length.	

e	Operating voltage
1	+24 VDC (–15/+20 %)
f	Version (see "Certification of Temposonics® ET (version A and E)" on page 2 for further information)
A	ATEX/UK Ex/IECEX/CEC/NEC/CCC
E	ATEX/UK Ex/IECEX/CEC/NEC/CCC with ½" NPT adapter
N	Not approved

NOTICE
Version E (section f) is only available with design »M« and »S« (section b).

g	Output
R 3	Start/Stop with sensor parameters upload function

DELIVERY



Sensor

Accessories have to be ordered separately

Manuals, Software & 3D Models available at:
www.temposonics.com

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