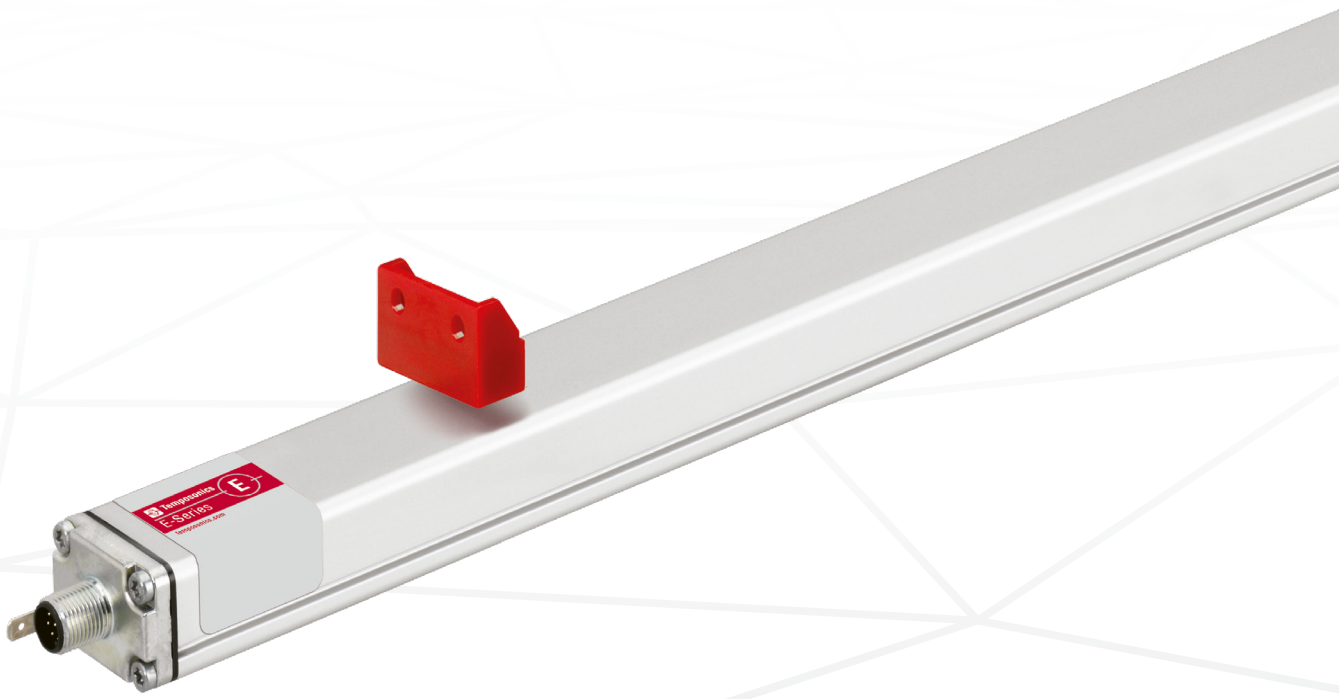
Temposonics
AN AMPHENOL COMPANY

Data Sheet

EP2 CANopen

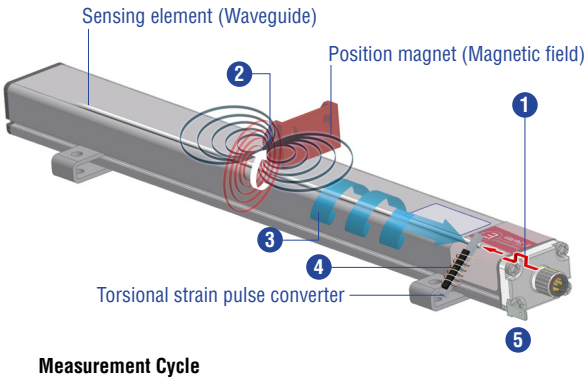
Magnetostrictive Linear Position Sensors

- Optimal price-/performance ratio
- Position measurement with more than one magnet
- Flat & compact



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 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.



Measurement Cycle

1	Current pulse generates magnetic field
2	Interaction with position magnet field generates torsional strain pulse
3	Torsional strain pulse propagates
4	Strain pulse detected by converter
5	Time-of-flight converted into position

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

EP2 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 Temposonics.

The compact and flat aluminum profile offers flexible mounting options and easy installation. Moreover, the position magnet can travel along the entire flat housing profile. The EP2 has an attractive price-/performance ratio and is ideal for industrial applications including plastics molding and processing, factory automation and packaging.

Fig. 2: Plastic granulate for injection molding or extrusion

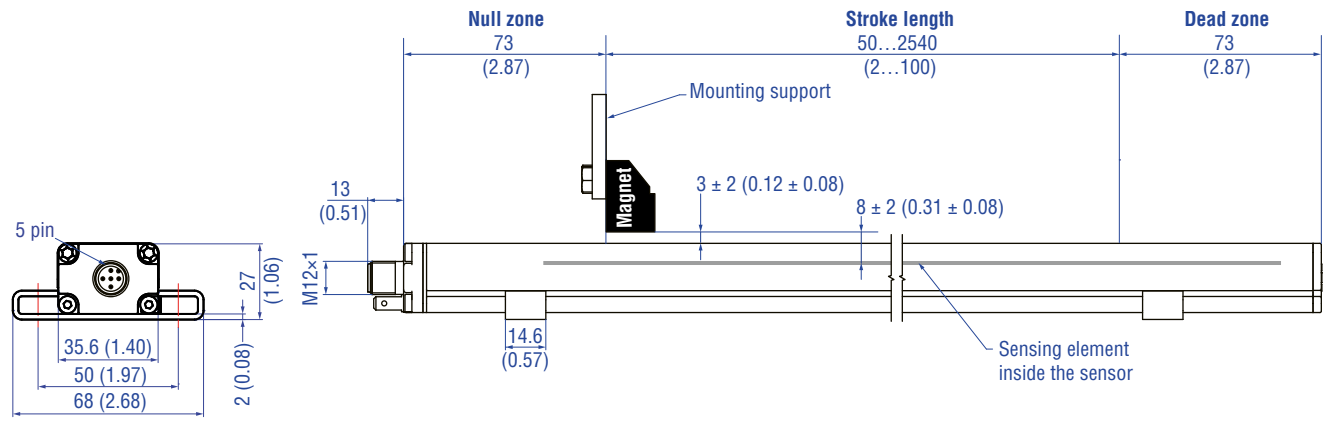
TECHNICAL DATA

Output	
Interface	CAN System ISO-DIS 11898
Data protocol	CANopen: CIA standard DS 301 V3.0/encoder profile DS 406 V3.1
Baud rate, kBit/s Cable length, m	1000 800 500 250 125 < 25 < 50 < 100 < 250 < 500 The sensor will be supplied with ordered baud rate, changeable by customer via LSS
Measured variable	Position, option: Multi-position measurement with a maximum of 2 magnets
Measurement parameters	
Resolution	10 µm, 20 µm
Cycle time	1 ms
Linearity	≤ ±0.02 % F.S. (minimum ±90 µm)
Repeatability	≤ ±0.005 % F.S. (minimum ±20 µm)
Operating conditions	
Operating temperature	–40…+75 °C (–40…+167 °F)
Humidity	90 % relative humidity, no condensation
Ingress protection[1,2]	IP67 (if mating cable connector is correctly fitted)
Shock test	100 g (single shock) IEC standard 60068-2-27
Vibration test	8 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 lid	Zinc die-cast
Sensor profile	Aluminum
Stroke length	50…2540 mm (2…100 in.)
Mechanical mounting	
Mounting position	Any
Mounting instruction	Please consult the technical drawings and the brief instructions (document number: 551684)
Electrical connection	
Connection type	M12 (5 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	40…60 mA depending on stroke length
Dielectric strength	500 VDC (DC ground to machine ground)
Polarity protection	Up to –30 VDC
Overvoltage protection	Up to 36 VDC

1/ The IP rating is not part of the UL recognition
2/ The IP rating IP67 is only valid for the sensors electronics housing, as water and dust can get inside the profile

TECHNICAL DRAWING

EP2



Controlling design dimensions are in millimeters and measurements in ( ) are in inches

Fig. 3: E-Series EP2 with block magnet

CONNECTOR WIRING

D34

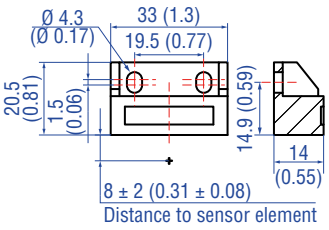
Signal + power supply

M12 male connector (A-coded)	Pin	Function
 View on sensor	1	Shield
	2	+24 VDC (–15/+20 %)
	3	DC Ground (0 V)
	4	CAN_H
	5	CAN_L

Fig. 4: Connector wiring D34 (M12 connector)

FREQUENTLY ORDERED ACCESSORIES – Additional options available in our Accessories Guide 551444

Position magnet

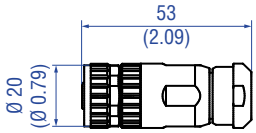


Block magnet L
Part no. 403 448

Material: Plastic carrier with hard ferrite magnet
Weight: Approx. 20 g
Fastening torque for M4 screws: 1 Nm
Operating temperature:
–40…+75 °C (–40…+167 °F)

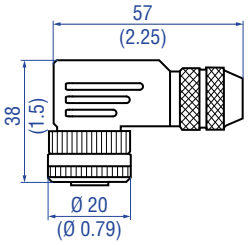
This magnet may influence the sensor performance specifications for some applications.

Cable connectors*



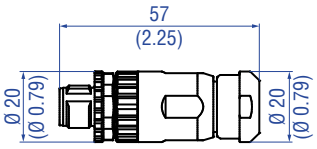
M12 A-coded female connector (4 pin/5 pin), straight
Part no. 370 677

Material: GD-Zn, Ni
Termination: Screw
Contact insert: CuZn
Cable Ø: 4…8 mm (0.16…0.31 in.)
Wire: 1.5 mm²
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; max. 0.75 mm²
Contact insert: CuZn
Cable Ø: 5…8 mm (0.2…0.31 in.)
Wire: 0.75 mm² (18 AWG)
Operating temperature:
–25…+85 °C (–13…+185 °F)
Ingress protection: IP67 (correctly fitted)
Fastening torque: 0.4 Nm



M12 A-coded male connector (5 pin), straight
Part no. 561 665

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

Cord sets

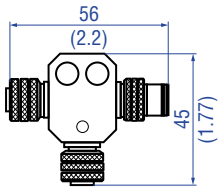
Cable with M12 A-coded female connector (5 pin), straight – pigtail
Part no. 370 673

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)

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

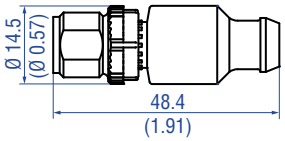
Material: PUR jacket
Features: Shielded
Cable length: 5 m (16.4 ft)
Ingress protection: IP67 (correctly fitted)
Operating temperature:
–25…+80 °C (–13…+176 °F)

Connection accessories



M12 A-coded T connector (5 pin)
Part no. 370 691

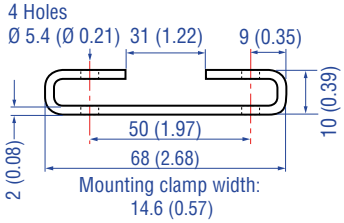
Selfcuring coupling nut
2 × female connector
1 × male connector
Feature: Shielded
Ingress protection: IP67 (correctly fitted)



Passive M12 A-coded male bus terminator (5 pin)
Part no. 370 700

Material: PUR
Termination: Screw
Contact insert: Au
Operating temperature:
–25…+85 °C (–13…+121 °F)
Ingress protection: IP68 (correctly fitted)

Mounting clamp

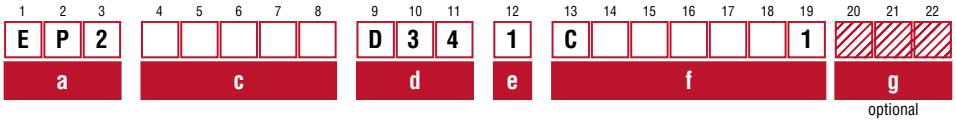


Mounting clamp
Part no. 403 508

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

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

ORDER CODE



a	Sensor model
E P 2	Smooth profile

b	Stroke length
X X X X M	0050…2540 mm

Standard stroke length (mm)	Ordering steps
50… 500 mm	25 mm
500… 2540 mm	50 mm

X X X X U	001.0…128.0 in.

Standard stroke length (in.)	Ordering steps
2… 20 in.	1.0 in.
20… 100 in.	2.0 in.

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

c	Connection type
D 3 4	M12 (5 pin) male connector

d	Operating voltage
1	+24 VDC (–15/+20 %)

f	Output
C (14) (15) (16) (17) (18) (19) = CANopen	
Protocol (box no. 14, 15, 16)	
C 3 0 4	CANopen
C 4 0 4	CANopen (bus terminator)
Baud rate (box no. 17)	
1	1000 kBit/s
2	500 kBit/s
3	250 kBit/s
4	125 kBit/s
Resolution (box no. 18)	
4	10 µm
5	20 µm
Performance (box no. 19)	
1	Standard

Optional

g	Magnet number for multi-position measurement
Z 0 2	2 magnets

DELIVERY

- Sensor
- 2 mounting clamps up to 1250 mm (50 in.) stroke length + 1 mounting clamp for each 500 mm (20 in.) additional stroke length

Accessories have to be ordered separately.

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

Temposonics
AN AMPHENOL COMPANY

UNITED STATES
Temposonics, LLC
Americas & APAC Region
3001 Sheldon Drive
Cary, N.C. 27513
Phone: +1 919 677-0100
E-mail: info.us@temposonics.com

GERMANY
Temposonics
GmbH & Co. KG
EMEA Region & India
Auf dem Schüffel 9
58513 Lüdenscheid
Phone: +49 2351 9587-0
E-mail: info.de@temposonics.com

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

FRANCE
Branch Office
Phone: +33 6 14 060 728
E-mail: info.fr@temposonics.com

UK
Branch Office
Phone: +44 79 21 83 05 86
E-mail: info.uk@temposonics.com

SCANDINAVIA
Branch Office
Phone: +46 70 29 91 281
E-mail: info.sca@temposonics.com

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

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

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