Data Sheet

EP / EL CANopen
Magnetostrictive Linear Position Sensors

- For standard applications
- Position measurement with more than one magnet
- Ideal for limited installation space
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.

EP / EL SENSOR

Robust, non-contact and wear free, the Temposonics linear position sensors provide the best 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 Temposonics® EP as well as the ultra low Temposonics® EL are profile sensors suitable for standard applications and in particular for applications with limited installation space. The evaluation electronics is accommodated in an aluminum sensor housing. Typical fields of applications are plastics industry, metal forming and woodworking as well as factory automation.
**TECHNICAL DATA**

### Output

<table>
<thead>
<tr>
<th>Interface</th>
<th>CAN System ISO-11898</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data protocol</td>
<td>CANopen: CIA standard DS 301 V3.0 / encoder profile DS 406 V3.1</td>
</tr>
<tr>
<td>Baud rate, kBit/s</td>
<td>1000 800 500 250 125</td>
</tr>
<tr>
<td>Cable length, m</td>
<td>&lt; 25 &lt; 50 &lt; 100 &lt; 250 &lt; 500</td>
</tr>
</tbody>
</table>

The sensor will be supplied with ordered baud rate, changeable by customer via LSS.

### Measured value

Position / option: multi-position measurement (2 positions)

### Measurement parameters

- **Resolution**: 10 µm, 20 µm
- **Cycle time**: 1 ms
- **Linearity**¹: Magnet slider: ≤ ±0.02 % F.S. (minimum ±60 µm), U-magnet: ≤ ±0.02 % F.S. (minimum ±60 µm), block magnet: ≤ ±0.03 % (minimum ±90 µm)
- **Repeatability**: ≤ ±0.005 % F.S. (minimum ±20 µm)

### Operating conditions

- **Operating temperature**: −40…+75 °C (−40…+167 °F)
- **Humidity**: 90 % rel. humidity, no condensation
- **Ingress protection**²³: IP67 (if mating connectors are correctly fitted)
- **Shock test**: 100 g (single shock) IEC standard 60068-2-27
- **Vibration test**: 15 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**: Magnet slider: ≤ 5 m/s; U-magnet: Any; block magnet: Any

### Design / Material

- **Sensor electronics housing**: Aluminum
- **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 operation manual (document number: 551774)

### 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 Vpp
- **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

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¹/ Magnet slider # 252 182 and # 252 184, U-magnet # 251 416-2 and block magnet # 403 448
²/ The IP rating is not part of the UL recognition
³/ The IP rating IP67 is only valid for the sensor electronics housing, as water and dust can get inside the profile
**TECHNICAL DRAWING**

**Temposonics® EP**

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

**Temposonics® EL**

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

**CONNECTOR WIRING**

**D34**

<table>
<thead>
<tr>
<th>M12 A-coded</th>
<th>Pin</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>Shield</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>+24 VDC (-15 / +20 %)</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>DC Ground (0 V)</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>CAN_H</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>CAN_L</td>
</tr>
</tbody>
</table>
Position magnets

**Magnet slider S**
Part no. 252 182
Material: GFK, magnet hard ferrite
Weight: Ca. 35 g
Operating temperature: −40...+75 °C (−40...+167 °F)

**Magnet slider V**
Part no. 252 184
Material: GFK, magnet hard ferrite
Weight: Ca. 35 g
Operating temperature: −40...+75 °C (−40...+167 °F)

**U-magnet OD33**
Part no. 251 416-2
Material: PA ferrite GF20
Weight: Ca. 11 g
Operating temperature: −40...+105 °C (−40...+221 °F)
Surface pressure: Max. 40 N/mm²
Fastening torque for M4 screws: 1 Nm

**Block magnet L**
Part no. 403 448
Material: Hard ferrite
Weight: Ca. 20 g
Operating temperature: −40...+75 °C (−40...+167 °F)
Fastening torque for M4 screws: 1 Nm

Cable connectors 4

**M12 (5 pin) female, straight**
Part no. 370 677
Housing: GD-Zn, Ni / IP67
Termination: Screw; max. 1.5 mm²
Contact insert: CuZn
Operating temperature: −30...+85 °C (−22...+185 °F)
Cable Ø: 4...8 mm (0.16...0.31 in.)
Fastening torque: 0.6 Nm

**M12 (5 pin) female, angled**
Part no. 370 678
Housing: GD-Zn, Ni / IP67
Termination: Screw; max. 0.75 mm²
Contact insert: CuZn
Operating temperature: −25...+85 °C (−13...+185 °F)
Cable Ø: 4...8 mm (0.16...0.31 in.)
Fastening torque: 0.6 Nm

**M12 (5 pin) male, straight**
Part no. 561 665
Housing: GD-Zn, Ni / IP67
Ingress protection: IP67
Cable: Shielded, pigtail end
Cable length: 5 m (16.4 ft.)

**M12 (5 pin) female, straight**
Part no. 370 673
Housing: GD-Zn, Ni / IP67
Termination: Screw; max. 1.5 mm²
Contact insert: CuZn
Operating temperature: −30...+85 °C (−22...+185 °F)
Cable Ø: 4...8 mm (0.16...0.31 in.)
Fastening torque: 1 Nm

**M12 (5 pin) female, angled**
Part no. 370 675
Ingress protection: IP67
Cable: Shielded, pigtail end
Cable length: 5 m (16.4 ft.)

**M12 (5 pin) CANopen T-Connector**
Part no. 370 691
Selfcuring coupling nut
2 × cable connector female
1 × cable connector male shielded

**M12 (5 pin) CANopen bus terminator**
Part no. 370 700
Housing: PUR
Contact insert: Au

**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

4/ Follow the manufacturer’s mounting instructions

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

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Follow the manufacturer’s mounting instructions
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 | 18 | 19 | 20 | 21 | 22 |
| E | 0 |  |  |  |  |  |  | D | 3 | 4 | 1 | C |  |  |  |  |  |  |  |  |  |  |
| a | b | c |  |  |  |  |  | d | e |  |  |  |  |  |  |  |  |  |  |  |  |  |

### Sensor model
- **L** Ultra low profile
- **P** Compact profile

### Design
- **D** Without position magnet

### Stroke length
- **X** Standard stroke length (mm)*
  - **X** 0050…2540 mm
  - **X** 002.0…100.0 in.
- **X** Standard stroke length (in.)*
  - **X** 2…20 in.
  - **X** 20…100 in.

### Connection type
- **D** M12 (5 pin) male connector

### Operating voltage
- **1** +24 VDC (−15 / +20 %)

### Output
- **C** CANopen
- **C** CANopen (bus terminator)

### Baud rate
- **1** 1000 kBit/s
- **2** 500 kBit/s
- **3** 250 kBit/s
- **4** 125 kBit/s

### Resolution
- **4** 10 µm
- **5** 20 µm

### Type
- **1** Standard
  - Optional
- **2**

### 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.**

### NOTICE
- Use magnets of the same type for multi-position measurement, e.g. 2 × U-magnets (part no. 251 416-2).

**Manuals & Software available at:**
[www.temposonics.com](http://www.temposonics.com)

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