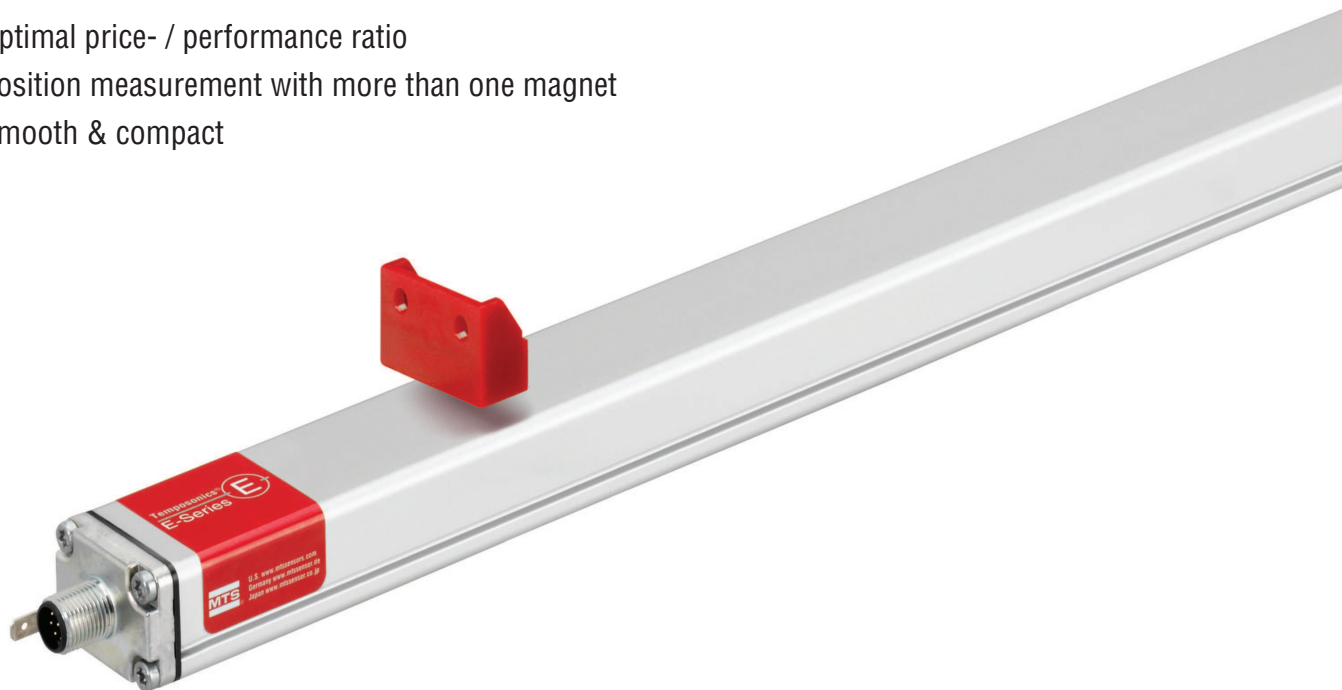


Temposonics®

Magnetostrictive Linear Position Sensors

EP2 CANopen Data Sheet

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



MEASURING TECHNOLOGY

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

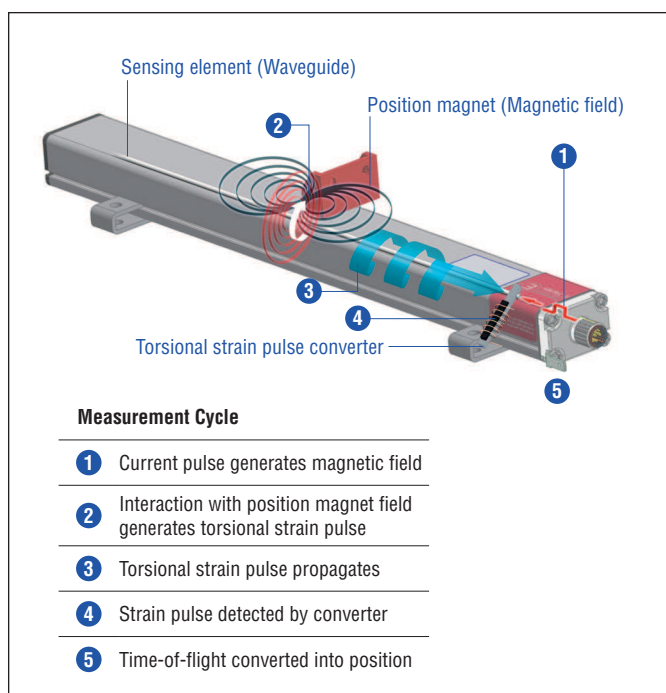


Fig. 1: Time-of-flight based magnetostrictive position sensing principle

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 MTS Sensors.

The compact and smooth 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

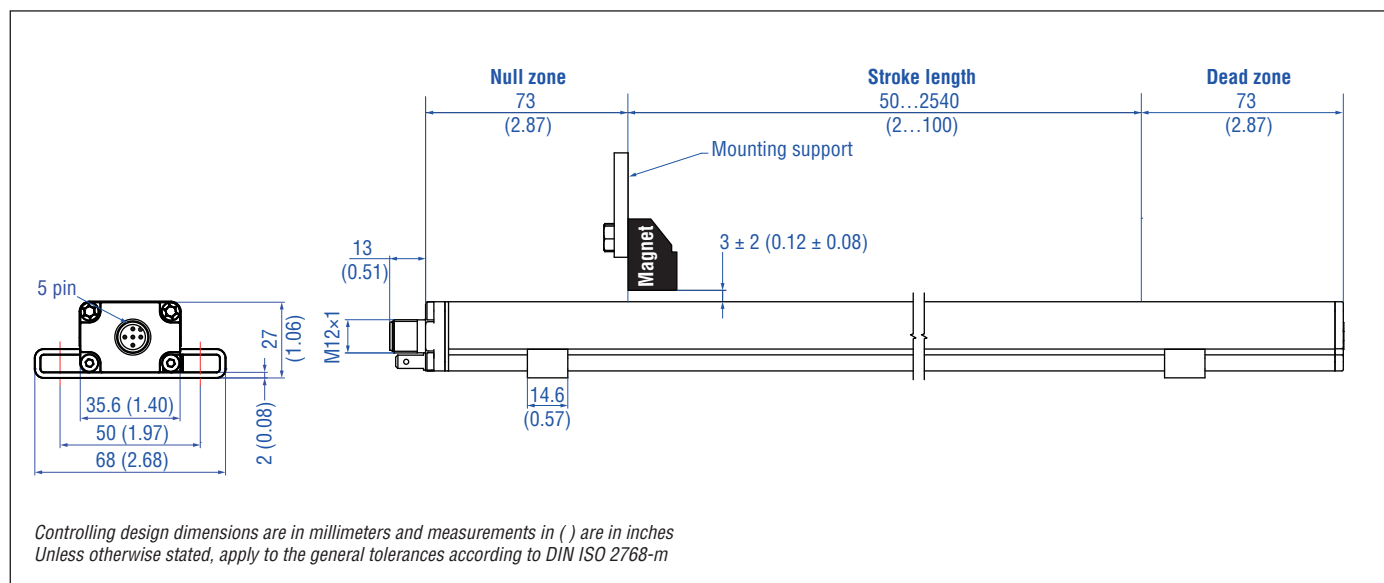
TECHNICAL DATA

| 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 | 1000 800 500 250 125 |
| Cable length, m | < 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 % rel. 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

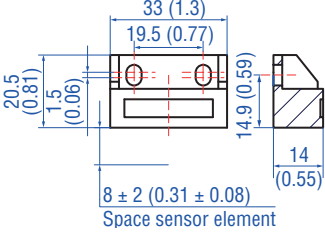
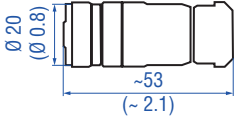
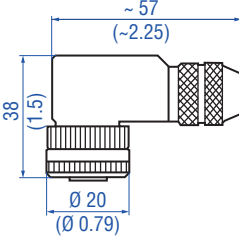
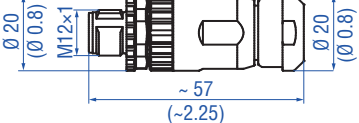


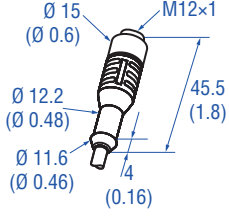
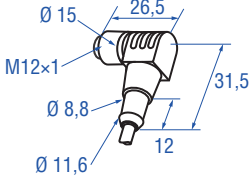
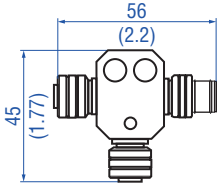
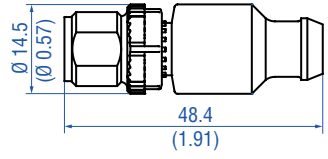
CONNECTOR WIRING

D34

| M12 A-coded | Pin | Function |
|-------------|-----|-----------------------|
| | 1 | Shield |
| | 2 | +24 VDC (-15 / +20 %) |
| | 3 | DC Ground (0 V) |
| | 4 | CAN_H |
| | 5 | CAN_L |

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

| Position magnet | | Cable connectors ³ | | | |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|  | |  | | | |
| <p>Block magnet L Part no. 403 448</p> <p>Material: Hard ferrite Weight: Ca. 20 g Operating temperature: -40...+75 °C (-40...+167 °F) Fastening torque for M4 screws: 1 Nm</p> | | <p>M12 (5 pin) female, straight Part no. 370 677</p> <p>Housing: GD-Zn, Ni / IP67 Termination: Screw; max. 0.75 mm² Contact insert: CuZn Cable Ø: 4...8 mm (0.16...0.31 in.) Fastening torque: 0.6 Nm</p> | | | |
| | |  | |  | |
| | | <p>M12 (5 pin) female, angled Part no. 370 678</p> <p>Housing: GD-Zn, Ni / IP67 Termination: Screw; max. 0.75 mm² Contact insert: CuZn Cable Ø: 5...8 mm (0.2...0.31 in.) Fastening torque: 0.6 Nm</p> | | <p>M12 (5 pin) male, straight Part no. 561 665</p> <p>Housing: GD-Zn, Ni / IP67 Termination: Screw; max. 0.75 mm² Contact insert: CuZn Cable Ø: 4...8 mm (0.16...0.31 in.) Fastening torque: 0.6 Nm</p> | |

| Cord sets | | Connection accessories | | | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|-----------------------------------------------------------------------------------------------------------------------|--|
|  | |  | | | |
| <p>M12 (5 pin) female, straight Part no. 370 673</p> <p>Ingress protection: IP67 Cable: Shielded, pigtail end Cable length: 5 m (16.4 ft.)</p> | | <p>M12 (5 pin) female, angled Part no. 370 675</p> <p>Ingress protection: IP67 Cable: Shielded, pigtail end Cable length: 5 m (16.4 ft.)</p> | | | |
| | |  | |  | |
| | | <p>M12 (5 pin) CANopen T-Connector Part no. 370 691</p> <p>Selfcuring coupling nut 2 × cable connector female 1 × cable connector male shielded</p> | | <p>M12 (5 pin) CANopen bus terminator male Part no. 370 700</p> <p>Housing: PUR Contact insert: Au</p> | |

| Mounting clamp |
|-------------------------------------------------------------------------------------|
|  |
| <p>Mounting clamp Part no. 403 508</p> |

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

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 | P | 2 | | | | | | D | 3 | 4 | 1 | C | | | | | | 1 | | | |
| a | | | b | | | | | c | | | d | e | | | | f | g | h | i <small>optional</small> | | |

| | | | |
|----------|---------------------|---|----------------|
| a | Sensor model | | |
| E | P | 2 | Smooth profile |

| | | | | | |
|----------|----------------------|---|---|---|-------------------|
| b | Stroke length | | | | |
| X | X | X | X | M | 0050...2540 mm |
| X | X | X | X | U | 002.0...100.0 in. |

Standard stroke length (mm)*

| Stroke length | Ordering steps |
|---------------|----------------|
| 50 ... 500 mm | 25 mm |
| 500...2540 mm | 50 mm |

Standard stroke length (in.)*

| Stroke length | Ordering steps |
|---------------|----------------|
| 2 ... 20 in. | 1.0 in. |
| 20...100 in. | 2.0 in. |

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

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

| | | | | |
|----------|---------------|---|---|--------------------------|
| e | Output | | | |
| C | 3 | 0 | 4 | CANopen |
| C | 4 | 0 | 4 | CANopen (bus terminator) |

| | |
|----------|------------------|
| f | Baud rate |
| 1 | 1000 kBit/s |
| 2 | 500 kBit/s |
| 3 | 250 kBit/s |
| 4 | 125 kBit/s |

| | |
|----------|-------------------|
| g | Resolution |
| 4 | 10 µm |
| 5 | 20 µm |

| | |
|----------|-------------|
| h | Type |
| 1 | Standard |

Optional

| | | | |
|----------|-----------------------------------------------------|---|-----------|
| i | 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.

Operation manuals & software are available at:
www.mtssensors.com

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

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