

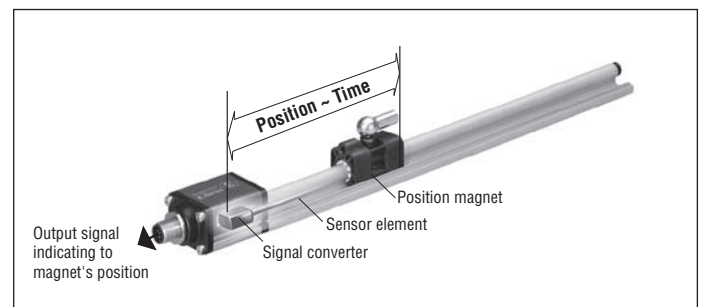
E-Series CANopen

Temposonics® EP and EL
Stroke length 50...2500 mm

Document Part Number
551307 Revision C



- Linear, absolute measurement
- Contactless sensing with highest durability
- Rugged industrial sensor
- EMC tested and marked with CE
- Linearity less than 0.02 % F.S.
- Repeatability less than 0.005 % F.S.
- Direct signal output for position CANopen
- Stroke length 50...2500 mm



Magnetostriction

The Temposonics® linear position transducers are based on magnetostriction technology. Magnetostriction is a ferromagnetic material phenomenon which relates a dimensional change of the material to its magnetization properties. It is the product of a general coupling between the magnetic and elastic transport properties of the materials crystal lattice. This affect is typically on the scale of a few parts per million. It is quasi linear with the material's magnetization, may be positive or negative, and reaches a maximum at magnetic saturation. It is reversible, but exhibits a hysteric affect if the magnetization does so. Magnetostriction was characterized in the late 19th century, the longitudinal version is called the „Joule“ effect, the torsional version is called the „Wiedemann“ effect, and the reciprocal effect where mechanical stress changes the magnetic properties is referred to as the „Villari“ effect.

Design

Inherently robust, non-contact and wear free, the Temposonics® linear positions transducers provide the best durability and accurate position measurement solutions in harsh industrial environments. The position measurement technique is similar to the radar principle but using magnetostrictive effects. The position measurement accuracy is tightly controlled by the quality of our waveguide which is manufactured by MTS. The sensors are completely modular in electrical and mechanical design. They provide flexibility of use in many different applications. In EP and EL sensors, an aluminum profile housing protects the sensor element and provides guidance for the position magnet. The environmentally sealed sensor head houses the modular electronics which provides the measurement and the choice of various different signal output interfaces. The external position measurement target is a permanent position magnet. It is attached to the moving part of the machinery while the transducer itself can be stationary.

CANopen
certified

CIA201202-301V402/20-0151



Temposonics® EP and EL

Robust aluminum profile-style housing - Stroke length 50...2500 mm

MTS Sensors continues to establish new performance standards for low-cost, fully-industrial, durable position sensors based on the magnetostrictive technology. This principle for accurate and non-contact measurement of linear-position sensing was developed 30 years ago by MTS and is used with outstanding success in a large variety of industrial applications.

The Temposonics® EP and EL sensors consist of robust aluminum profile-style housings that offer flexible mounting configurations and easy installation. Sensors EP and EL are ideal for demanding industrial applications where simple, reliable non-contact feedback is essential.

Technical data

Input

Measured variable	position
Stroke length	50...2500 mm

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
Update frequency	The sensor will be supplied with ordered baud rate, which is changeable by customer 1 ms				

Accuracy

Resolution	10 µm, 20 µm
Velocity	1 mm / s
Linearity ¹	≤ ± 0.02 % F.S. (minimum ± 60 µm)
Repeatability	≤ ± 0.005 % F.S. (minimum ± 20 µm)

Operating conditions

Magnet speed	any
Operating temperature	-40 °C...+75 °C
Dew point, humidity	90 % rel. humidity, no condensation
Electronic ingress protection ²	IP67 with proper mating connector
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 EN 61000-6-4 (for use in industrial environment) Electromagnetic immunity EN 61000-6-2 The sensor meets the requirements of the EC directives and is marked with CE

Design / Material

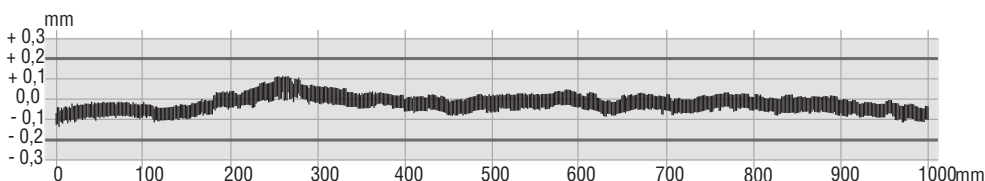
Sensor enclosure	aluminum
Sensor housing	aluminum
Position magnet type	magnet slider hard ferrite, block magnet plastic

Installation

Mounting type	adjustable mounting clamps
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Electrical connection

Connection type	5 pin connector M12
Supply voltage	24 VDC (+20 % / -15 %); 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.
Current consumption	max. 90 mA
Ripple	≤ 0.28 Vpp
Dielectric strength	500 VDC (DC ground to machine ground)
Polarity protection	up to -30 VDC
Overvoltage protection	up to 36 VDC



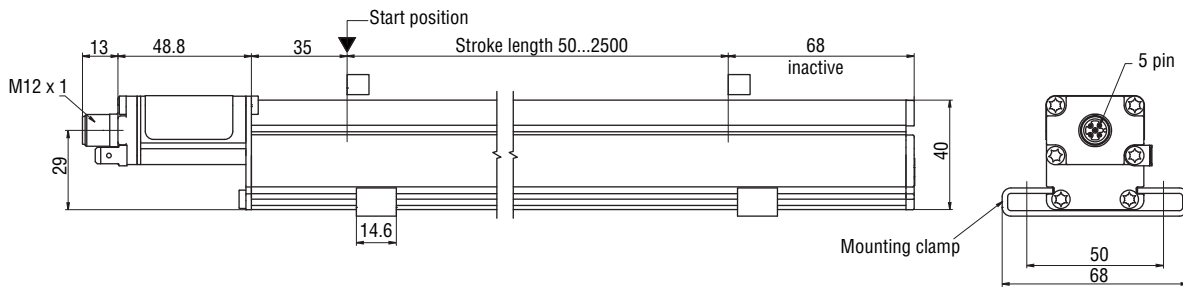
Linearity protocol

Sensor Temposonics® EP EL, Stroke length 1000 mm
Tolerance allowed: ± 0.2 mm
Tolerance measured: typical ± 0.09 mm

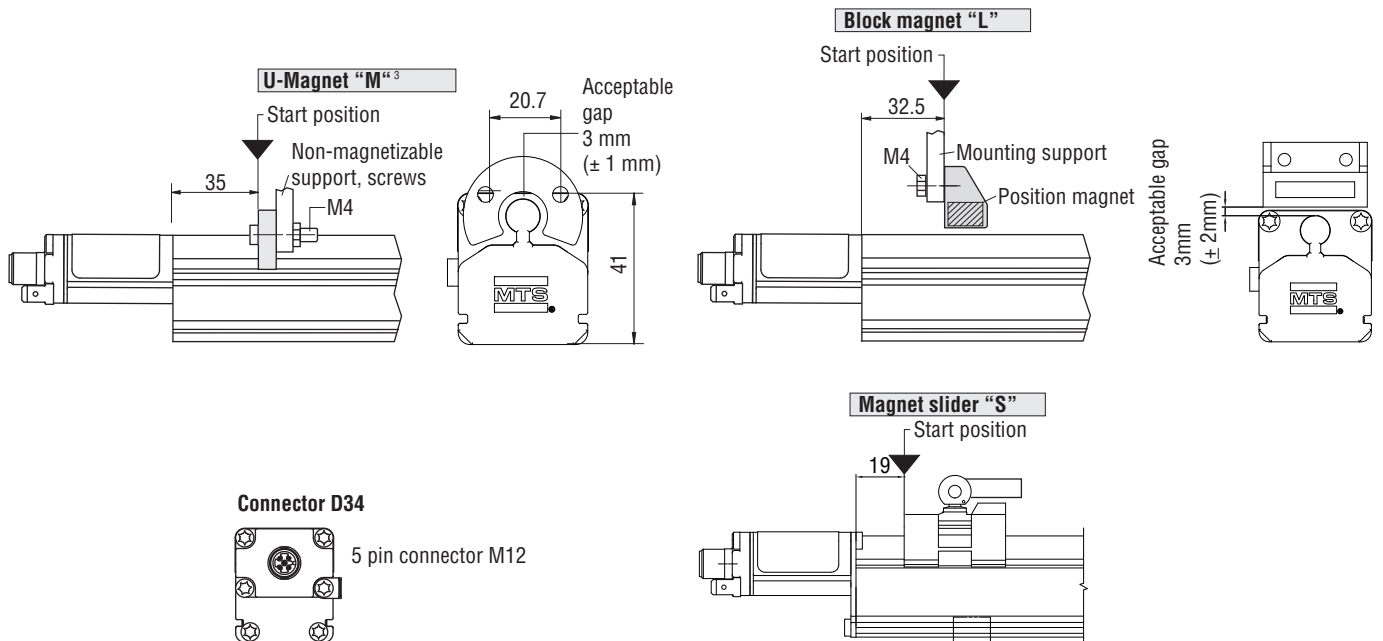
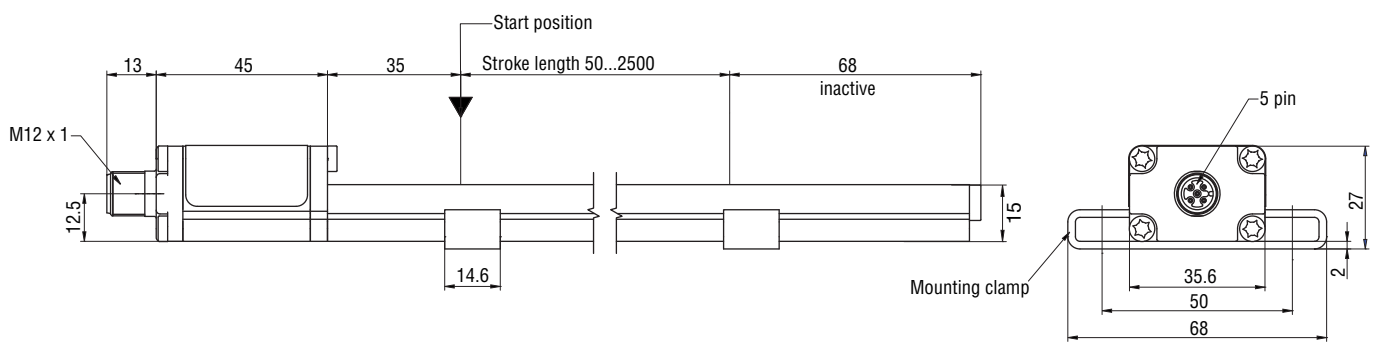
¹ with position magnet # 252 182.

² The IP rating is not part of the UL recognition

Temposonics® EP



Temposonics® EL



All dimensions in mm

³ only for EP transducers

Position magnets (not included in delivery, please order separately)

Magnet slider S
Part no. 252 182

GRP, magnet hard ferrite
Joint CuZn39Pb3 nickel-plated
Weight ca. 30 g
Operating temperature: -40...+75 °C

Magnet slider V
Part no. 252 184

GRP, magnet hard ferrite
Joint CuZn39Pb3 nickel-plated
Weight ca. 30 g
Operating temperature: -40...+75 °C

U-Magnet OD33⁴
Part no. 251 416-2

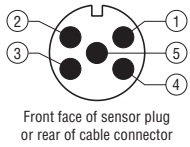
PA-Ferrite-GF20
Weight ca. 11g
Operating temperature: -40...+100 °C

Block magnet L
Part no. 403 448

Magnet support: plastic
Magnet: hard ferrite
Weight: ca. 20 g
Operating temperature: -40...+75 °C

Other position magnets upon request

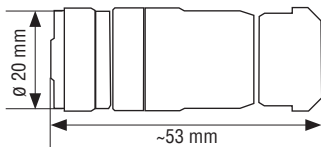
Connector wiring



Connector D34	Function
Pin 1	Shield
Pin 2	+24 VDC
Pin 3	0 V (GND)
Pin 4	CAN_H
Pin 5	CAN_L

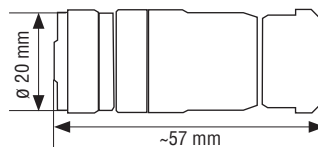
Connectors (not included in delivery, please order separately)

5 pin female connector M12 x 1 *



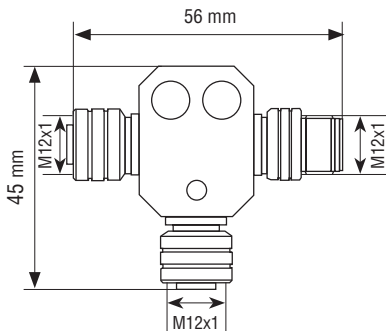
Housing: GD-Zn, Ni / IP67
Termination: screw terminals
Contact insert: CuZn
Max. cable: Ø 4...8 mm
Part no.: 370 677

5 pin male connector M12 x 1 *



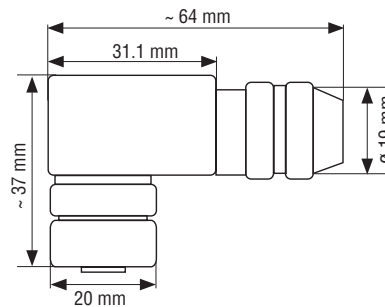
Housing: GD-Zn, Ni / IP67
Termination: screw terminals
Contact insert: CuZn
Max. cable: Ø 4...8 mm
Part no.: 561 664

5 pin T-Connector *



Selfcuring coupling nut
2 x cable connector female
1 x cable connector male
Part No.: 370 691

5 pin 90° female connector M12 x 1 *



Housing: GD-Zn, Ni / IP67
Termination: screw terminals
Contact insert: CuZn
Max. cable: Ø 4...8 mm
Part no.: 370 678

All dimensions in mm

⁴ only for EP transducers

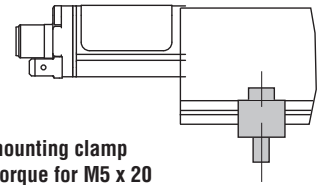
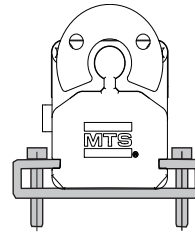
* Maximum recommended torque: 0.6 Nm

Profile

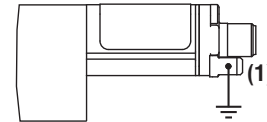
The sensor is fixed on a flat surface of the machine with the mounting clamps. The number of clamps is dependent on the length of the sensor. The clamps should be distributed evenly along the profile. We recommend M5 x 20 (DIN 6912) screws for attachment to be tightened with a torque of max. **5 Nm**.

CAUTION!

In order to use the sensor correctly the sensor housing must be grounded with a flat pin terminal (6.3 x 0.8 mm) on the sensor head (1).



Sliding mounting clamp
Tightening torque for M5 x 20
Machine screws: max. 5 Nm



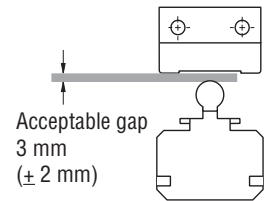
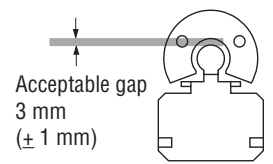
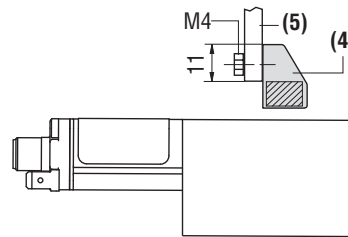
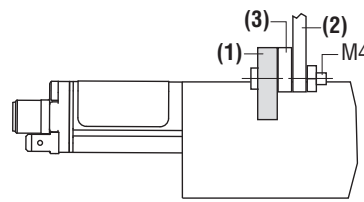
Position transmitter

U-Magnet: For accurate position measurements mount the position magnet (1) with non-magnetizable fastening material (2) (screws, supports etc.). Using magnetizable supports, note that the position magnet must be mounted with nonferrous support (3) of 5 mm minimum and screws.

Block magnet: The position magnet (4) can be fixed with standard material and screws (5) Note the clearance, as shown here in the diagram on the right.

CAUTION!

Do not exceed the maximum permitted gap.



Temposonics®



Specification

P = Temposonics® EP sensor
L = Temposonics® EL sensor

0 - without position magnet

Stroke length

0050...2500 mm

Connection type

D34 - 5 pin cable connector M12

Supply voltage

1 - +24 VDC

Output

C [1] [2] [3] [4] [5] [6] = CAN-Bus

[1] [2] [3] Protocol: 404 = CANopen (active Duo Terminator) 304 = CANopen
 [4] Baud rate: 1 = 1000 kBit/s 2 = 500 kBit/s 3 = 250 kBit/s 4 = 125 kBit/s
 [5] Resolution: 5 = 20 µm 4 = 10 µm
 [6] Type: 1 = Standard

Position magnet number for multi-position measurement⁵

Z02 = 2 pcs.

Stroke length standard:

Stroke	Ordering steps
≤ 500 mm	25 mm
> 500 ... ≤ 2500 mm	50 mm

Delivery includes:

- Sensor, mounting clamps
Please order separately: accessories (see below)

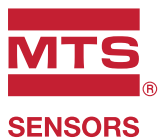
Accessories

Description	Part no.
U-Magnet OD33	251 416-2
Block magnet L	403 448
Magnet slider V	252 184
Magnet slider S	252 182
5 pin female connector M12	370 677
5 pin male connector M12	561 664
5 pin 90° female connector M12	370 678
5 pin T-Connector	370 691
Terminator	370 700

⁵ Note: Please specify position magnet numbers for your sensing application and order separately

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