Temposonics®

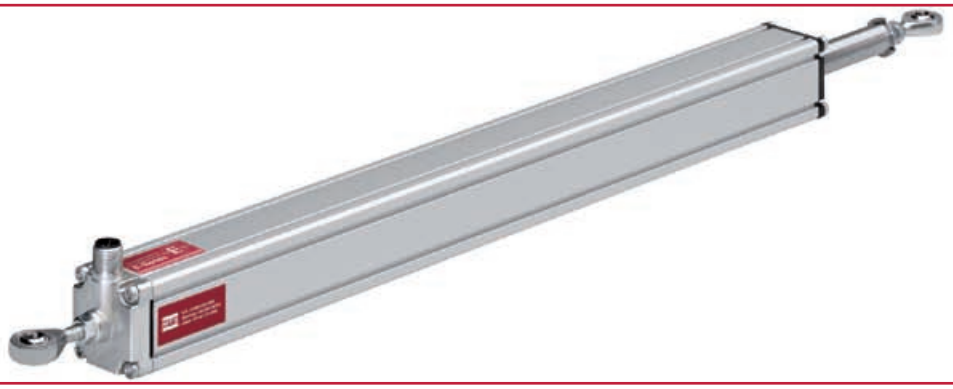
Absolute, Non-Contact Position Sensors

MTS SENSORS

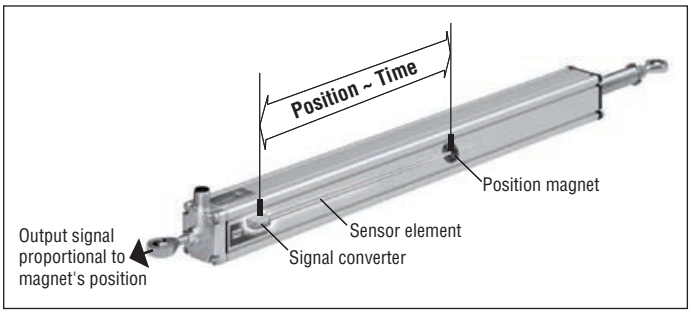
E-Series
Analog or Start/Stop

Temposonics® ER
Stroke length 50...1500 mm

Document Part Number
551246 Revision F



- **Aluminum cylinder with strong piston**
- **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:**
  - **Analog (V/mA)**
  - **Start/Stop + sensor-parameter upload**



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 hysteretic 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

Temposonics® ER linear position transducers are precise, durable and cost effective alternatives to linear potentiometers. The innovative concept of Temposonics® ER transducers, combined with solid engineering and extremely rugged construction, provides proven reliability in toughest industrial environments. Temposonics® ER models offer solutions to wear problems associated with linear potentiometers.
Whether your position sensing requirements are simple or complex, Temposonics® ER transducers will provide a solution in their form factor and mounting configuration that fits to your application.

CE ISO 9001 CERTIFIED c UL us

Temposonics® ER
A cylinder version with strong piston - Stroke length 50…1500 mm.

Temposonics® are extremely robust sensors, ideal for continuous operation under harshest industrial conditions. An aluminum cylinder profile offers flexible mounting configurations and easy installation. Position measurement is completely contactless and done via position magnet inside the cylinder.
The cylinder piston is constructed of large diameter for enhanced load-bearing, corrosion resistance and extended life. Using the piston ends the sensor can be mounted between two joints, it is possible to measure the distance between two independent moving parts.

Technical data

Input

Measured variable	position
Stroke length	50...1500 mm

Output

1. Voltage	0...10 VDC or 10...0 VDC, 0...10 VDC and 10...0 VDC (min. load controller > 5 kOhms)
2. Current	4...20 mA or 20...4 mA (min./max. load: 0/500 Ohms)
3. Start/Stop	RS-422 differential signal for position additional available: serial parameter upload of stroke length, offset, gradient, status and manufacturer number

Accuracy

Resolution	analog: infinite start/stop: 0.1 / 0.01 / 0.005 mm
Linearity	≤ ± 0.02 % F.S. (minimum ± 60 µm)
Repeatability	≤ ± 0.005 % F.S. (minimum ± 20 µm)
Update frequency, stroke dependent	analog: < 3 kHz / start/stop: controller dependent
Ripple	analog: ≤ 0.01 % F.S. / start/stop: controller dependent

Operating conditions

Mounting position	any
Magnet speed	any
Operating temperature	-40 °C...+75 °C
Dew point, humidity	90 % rel. humidity, no condensation
Electronic ingress protection [1]	IP67 if mating cable connector is correctly fitted
Shock test	100 g (single shock) IEC-Standard 60068-2-27
Vibration test	10 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 susceptibility EN 61000-6-2 The sensor meets the requirements of the EC directives and is marked with CE

Design / Material

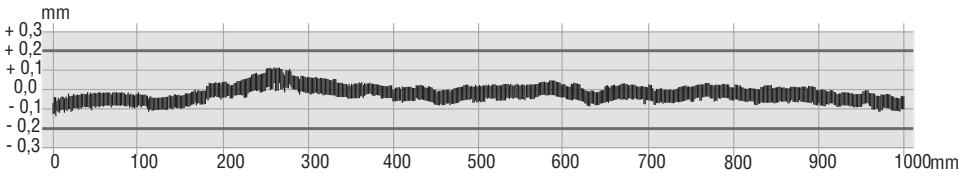
Sensor housing	aluminum
Piston	aluminum

Installation

Mounting type	adjustable mounting feet or adjustable rod ends M6
Mounting position	any

Electrical connection

Connection type	5 pin connector M12 (analog); 8 pin connector M12 (start/stop)
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	50...140 mA (start/stop 50...100 mA)
Ripple	≤ 0.28 Vpp
Electric strength	500 VDC (DC ground to machine ground)
Polarity protection	up to -30 VDC
Overvoltage protection	up to 36 VDC

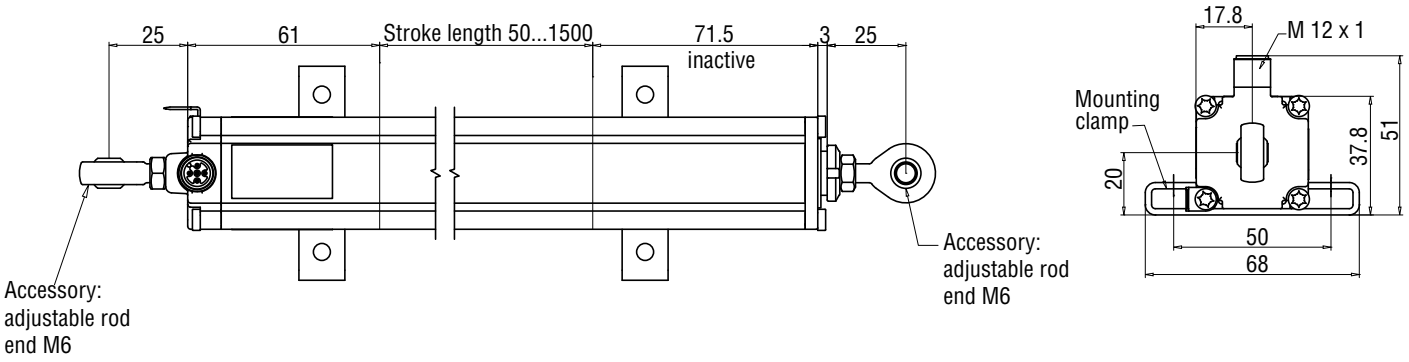


Linearity protocol

Sensor Temposonics® ER, stroke length 1000 mm
Tolerance allowed: ± 0.2 mm
Tolerance measured: typical ± 0.12 mm

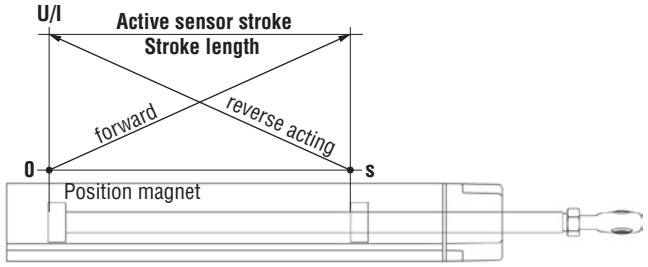
[1] The IP rating is not part of the UL recognition

Temposonics® ER



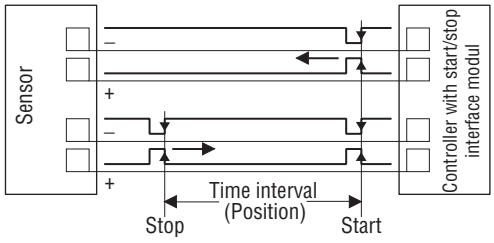
All dimensions in mm

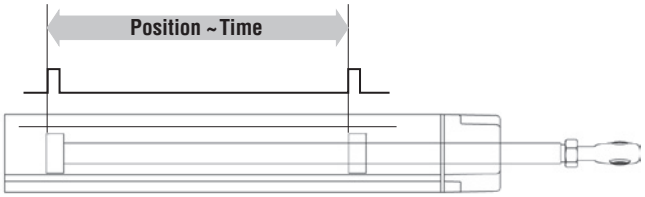
Analog output
Temposonics® ER are provided with an integrated analog interface and can directly be connected to a control system or indicator without an interface. The microelectronics in the sensor's head generate continuous, strict position proportional voltage and current outputs whose upscale or downscale output action can be selected when ordering. The output variables are factory-setted. Recalibration is not necessary.



Start/Stop output
Temposonics® ER is equipped with a start/stop output. The sensor requires a start signal from an external indicator in the control system and returns a signal corresponding to the magnet position. The time elapsed between the two signals is proportional to the magnet position, i.e. to the position. Time measurement is done by the indicator and used for calculating the position value.
For easy adaption to user's control systems, the following sensor parameters
- **Stroke length**
- **Offset**
- **Gradient** (speed of sensing pulse)
- **Status**
- **Manufacturer number**

can be read into the controller without additional wiring. It can simply be done by using the standard signal outputs.

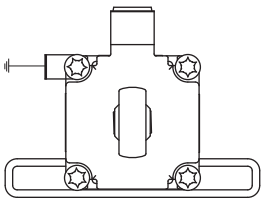




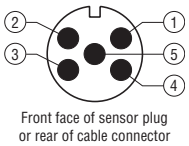
Mounting
Temposonics® ER sensors are designed for external installation on machines. They feature several mounting options, with mounting clamps slots on three sides of the sensor, to offer a simple, yet versatile installation process. The entire sensor can be mounted to the machine using standard mounting clamps and screws that can be easily adjusted to the desired integral connector orientation. Rod end mounting options help to simplify the sensor installation design and facilitate articulated motion sensing.
Please note that only 90% of the stroke length can be used in articulated sensor applications, when the stroke length of the sensor is more than 750 mm.

CAUTION:
Sensor has to be grounded as shown!

Mounting clamp M5 x 20 cylinder screw **fastening torque max 5 Nm**

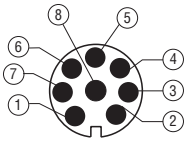


Connector wiring



Front face of sensor plug
or rear of cable connector

Connector D34	Analog (V)
Pin 1	+24 VDC
Pin 2	Signal
Pin 3	GND (PWR)
Pin 4	2. Signal
Pin 5	GND (Signal)



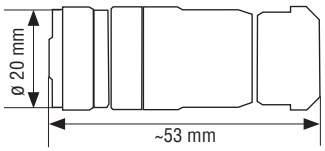
Front face of sensor plug
or rear of cable connector

Connector D84	Start/Stop
Pin 1	Start +
Pin 2	Start -
Pin 3	Stop +
Pin 4	Stop -
Pin 5	n.c.
Pin 6	n.c.
Pin 7	+24 VDC
Pin 8	GND

Cable shield is soldered on connector housing and must be grounded in the control unit.

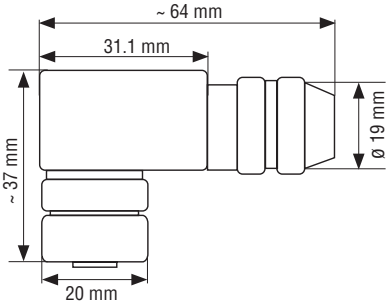
Connectors (not included in delivery, please order separately)

5 pin female connector M12 x 1*



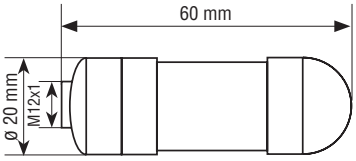
Housing: GD-Zn, Ni / IP67
Termination: screw terminals
Contact insert: CuZn
Max. cable: Ø 4...8 mm
Part no.: 370 677

5 pin 90º female connector M12 x 1*



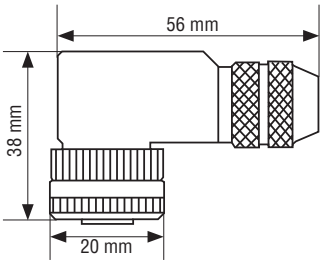
Housing: GD-Zn, Ni / IP67
Termination: screw terminals
Contact insert: CuZn
Max. cable: Ø 6...8 mm
Part no.: 370 678

8 pin female connector M12 x 1*



Housing: GD-ZnAL / IP67
Termination: screw terminals
Contact insert: CuZn
Max. cable: Ø 4...9 mm
Part no.: 370 694

8 pin 90° female connector M12 x 1*



Housing: GD-ZnAL / IP67
Termination: screw terminals
Contact insert: CuZn
Max. cable: Ø 6...8 mm
Part no.: 370 699

All dimensions in mm

*Maximum recommended torque: 0.6 Nm

Temposonics® | ER | M | | | | | M | | | | 1 | | | |

Specification
Inside thread M6

Stroke length
0050…1500 mm

Connection type
D34 - 5 pin cable connector M12 (analog)
D84 - 8 pin cable connector M12 (start/stop)

Supply voltage
1- +24 VDC

Output
Analog voltage
V01 = 0...10 VDC
V11 = 10...0 VDC
V03 = 0...10 VDC and 10...0 VDC (2 output channels)

Analog current
A01 = 4...20 mA
A11 = 20...4 mA

Start/Stop
R3 = Start/Stop with sensor parameters upload function.

Stroke length standard:

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

Delivery includes:
- Sensor

Please order separately!
Select the mounting accessories regarding your application:
- 1 or 2 rod ends M6
- or / and 2 mounting clamps up to 1250 mm,
  3 mounting clamps for 1500 mm

Accessories

Description	Part no.
Mounting clamp	403 508
Adjustable rod end M6	254 210
5 pin female connector M12	370 677
5 pin 90° female connector M12	370 678
8 pin female connector M12	370 694
8 pin 90° female connector M12	370 699
5 pin M12 cordset, 5 m PUR shielded cable	370 673
8 pin M12 cordset, 5 m PUR shielded cable	370 674
5 pin 90° M12 cordset, 5 m PUR shielded cable	370 675
8 pin 90° M12 cordset, 5 m PUR shielded cable	370 676

Adapter cable on request

Notes

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MTS®
SENSORS

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