Temposonics®

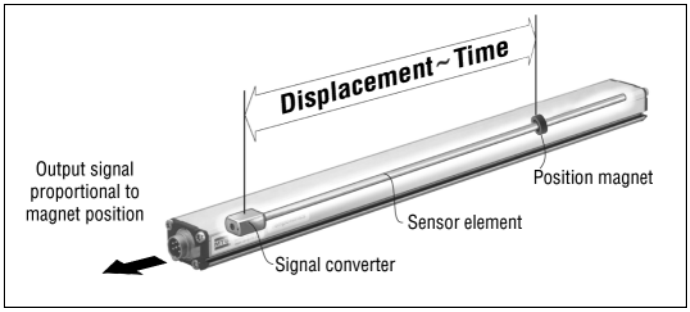
Magnetostrictive Position Sensors

MTS SENSORS

E-Series
Analog

Temposonics EH
Measuring length 50 - 1000 mm

- **Linear, Absolute Measurement in Hydraulic Cylinders**
- **Contacless Sensing with Highest Durability**
- **Minor Dimensions for Compact Hydrocylinders**
- **Replacement for Potentiometers and inductive Position Sensors**
- **Superior Acuracy: Linearity Tolerance better 0,03 %**
- **Repeatability 0,005 %**
- **Direct Analog Output for Displacement: Analog (V/mA)**
- **Measuring Range 50 - 1000 mm**



Magnetostriction

The absolute **Temposonics®** linear position sensors are based on the MTS developed magnetostrictive measurement principle. That combines various magneto-mechanical effects and uses the physical height precise speed-measurement of an ultrasonic wave (torsion pulse in its sensor element) for position detecting. Sensor integrated signal processing transforms the measurements directly into market standard outputs. The contactless principle - an external movable magnet marks the position - eliminates the wear, noise and erroneous signal problems and guarantees the best durability without any recalibration.

Form factor

The extremely robust sensor, ideal for continuous operation under harshest industrial conditions is completely modular in mechanic and electronic design.

- A profile or rod-shaped sensor housing protects the sensing element in which gives rise to the measurement signal.
- The sensor head accommodates the complete modular electronic interface with active signal conditioning. Double encapsulation ensures high operating safety and optimum EMC protection.
- The position transmitter, a permanent magnet - fixed at the mobile machine part - drives contactlessly over the sensor's stroke and starts measuring through the housing wall.

CE ISO 9001 CERTIFIED

Temposonics-EH
High Pressure Compact Sensor - Measuring Range 50 - 1000 mm.

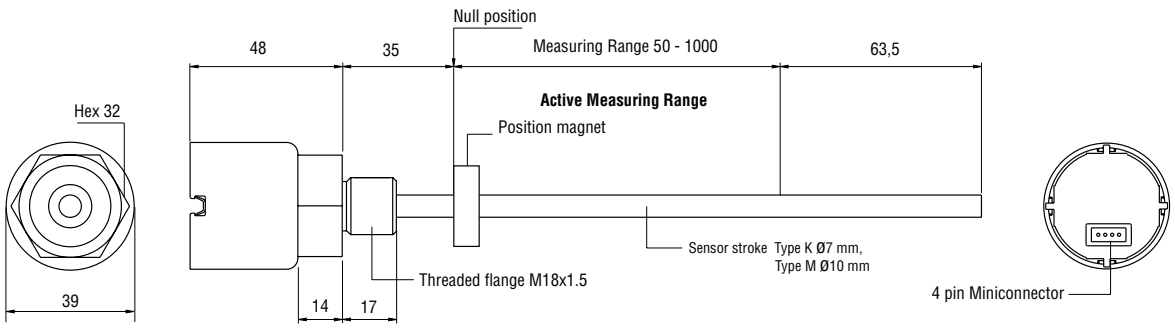
The new compact stainless steel position sensors are designed for installation into hydraulic cylinders, specifically for use in standard clevis head cylinders or any space limited cylinder applications. The EH type sensors are ideal choices for a wide range of standard hydraulic cylinders. Magetostrictive displacement sensors, high quality cylinders and precise control valves form ideal driving systems for technically demanding machine industries.

Simple mechanics
The extremely rugged sensor consists of 3 main parts
1. The sensor head, a robust housing with built-in electronics.
2. The pressure-proof sensor pipe (up to 450 bar) with threaded flange protects the internal sensing element, the waveguide system. It fits into the bored piston rod.
3. The position magnet, the only moving part is mounted on the piston bottom. This permanent magnet travels wearfree and contactless along the stationary sensor tube. Its magnetic field starts the measurement signal through sensor's rod wall.

Temposonics-EH sensors provide analog output of Voltage and Current. The output signal is proportional to the magnet positon along the active measuring stroke of the sensor. The measuring range is factory set and does not need recalibration. Since the outputs are direct, no signal-conditioning electronics are needed when interfacing with controllers or meters.

Technical Data

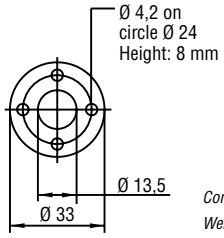
Input	
Measuring Variable	Displacement
Measuring Range	50 - 1000 mm
Output	
Voltage	0 - 10 VDC (Controller input resitor RL: > 5 kOhm, short circuit-proof)
Strom	4 - 20 mA (load resistor 0...500 Ohm)
Accuracy	
Resolution	Infite, restricted by output riplle
Linearity, uncorrected	< ± 0,03 % F.S. (Minimum ± 0,09 mm)
Repeatability	< ± 0,005 % F.S.
Update Frequency	> 1,5 kHz
Ripple	< 0,02 % F.S.
Operating conditions	
Mounting Position, Sensor	any orientation
Magnet Speed	any
Operating Temperature	40° C ... +75° C
Dew Point, Humidity	90 % rel. humidity, no condensation
Sealing	Connector IP 30
Shock Test	100 g (single hit) IEC-Standard 68-2-27
Vibration Test	10 g / 10 - 2000 Hz IEC-Standard 68-2-6
EMC-Test*	Electromagnetic emission EN 50081-1
	Electromagnetic immunity EN 50082-2
	EN 61000-4-2/3/4/6, Criterium A (*Sensor mounted in metal housing) / **CE-certified**
Form factor / Material	
Sensor head	Aluminum
Rod with flange	Stainless steel 1.4301 / AISI 304
Pressure Rating	7 mm Rod: 300 bar, 450 bar peak
	10 mm Rod: 350 bar, 530 bar peak
Magnet Type	Ring magnet, PA-Ferrit
Installation	
Mounting	Threaded flange M18 x 1,5
Electrical Connection	
Connection Type	1) 4 pin Miniconnector with 200 mm cable 4 x 0,25mm² or
	2) see no.1, additional 6 pin wall mount receptacle
Input Voltage	24 VDC (+20 % / -15 %)
Current Drain	50 - 140 mA, stroke length dependent
Ripple	< 1 % s-s
Electric Strength	500 V (DC ground to machine ground)
Polarity Protection	up to 30 VDC



Measurement in mm

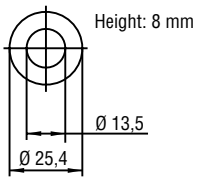
Position magnets

Measurement in mm



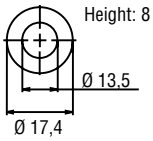
Ring magnet OD33
Part No. 201 542-2

Composite PA-Ferrite-GF20
Weight ca. 14g
Operating temperature:
-40 ... +100°C



Ring magnet OD25,4
Part No. 400 533

Composite PA-Ferrite
Weight ca. 10g
Oporating temperature:
-40 ... +100°C



Ring magnet OD17,4
Part No. 401 032

Composite PA-Ferrite
Weight ca. 5g
Operating temperature:
-40 ... +100°C

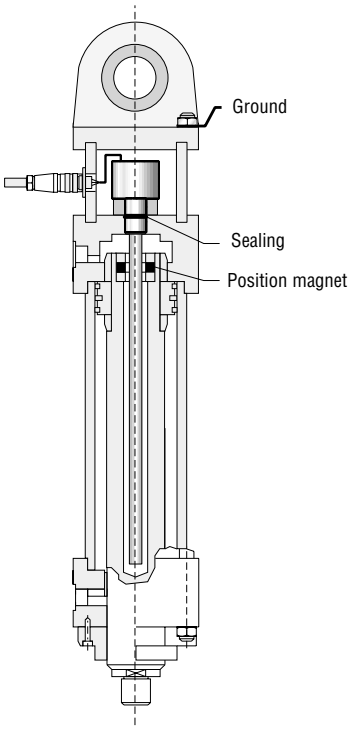
Rod

Temposonics-EH is designed for installation into standard hydraulic cylinders or parallel to moved machine parts. The sensor can be mounted in any position.
The sensor's high-pressure, stainless steel tube will be fixed via the threaded flange M18 x 1,5. Hydraulic sealing recommendation: By use of an O-Ring (e.g. 21,89 x 2,62) in a channel of cylinder cover or O-Ring 15,3 x 2,2 sealing in sensor thread undercut.

Cylinder mounting

Use a rod bush (e.g. teflon) to prevent wear on the magnet and the sensor pipe. The bore in the piston rod is dependent on hydraulic pressure and piston velocity etc.
The minimum drilling must be 10 mm for
Ø 7 mm sensor rod and 13 mm for Ø 10 mm sensor rod. Do not exceed the 450 (530)bar peak pressure.

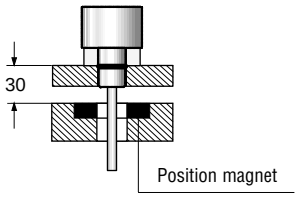
Mounting example clevis head cylinder with TEMPOSONICS-EH Sensor



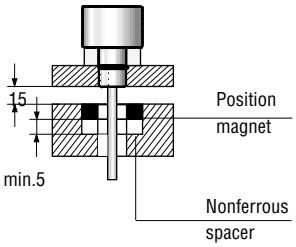
Position magnet

For accurate position measurements mount the magnet with non-magnetizable fastening material (screws, supports etc.).
Using ferromagnetic supports, note that the magnet must be mounted with non-magnetizable spacer and screws (see right).

Non-magnetizable material

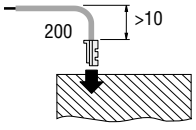


Magnetizable material



Connection Type M01:

4 pin minconnector with 4 wires 0,25 mm2, length 200 mm



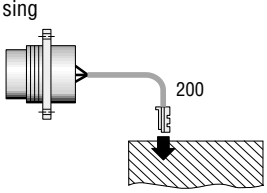
Cable Wiring

1. Output: Voltage (V)

Pin	*Function*
grey	0 - 10 V
pink	DC Ground
brown	+24 VDC (+20%/-15%)
white	DC Ground (0V)

Connection Type M02:

see left, additional with soldered 6 pin wall mount receptacle (metal) for customized sensor protection housing

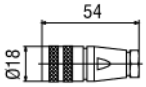


2. Output: Current (mA)

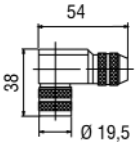
Pin	*Function*
grau	4 - 20 mA
rosa	DC Ground
braun	+24 VDC (+20%/-15%)
weiß	DC Ground (0V)

Cable Connector

(recommended, not on delivery)



6 pin female connector M16, PG7
Part No. ST C0 9131 D



6 pin 90° female connector M16
insurt adjustable in 45° Raster positions
Part No. ST C0 9131-6

Housing: zinc Nickle plated
Termination: Solder
Contact insert: Silver plated (Ag)
Cable clamp: PG7, M16
Cable-Ø 4-6 mm (PG7)
Cable-Ø 6-8 mm (PG9/M16)

All measurements in mm

Front face of pin insert

Connector wirring

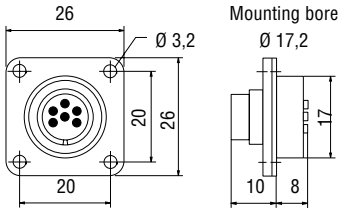
1. Output: Voltage (V)

Pin	*Function*
1	0 - 10 V
2	DC Ground
3	NC
4	NC
5	+24 VDC (+20%/-15%)
6	DC Ground (0V)

2. Output: Current (mA)

Pin	*Function*
1	4 - 20 mA
2	DC Ground
3	NC
4	NC
5	+24 VDC (+20%/-15%)
6	DC Ground (0V)

Wall mount receptacle
On delivery at connectionstyle



6 pin wall mount flange receptacle M 16, male
Part No. ST C0 9131 S06

Temposonics **EH** [ ] [ ] [ ] [ ] [ ] **M** [ ] [ ] [ ] **1** [ ] [ ]

Rod Model
K - Threaded Flange M18 x 1,5 / Rod-Ø 7 mm
M - Threaded Flange M18 x 1,5 / Rod-Ø 10 mm

Measuring Range
0050 - 1000 mm

Connection Type
M01 - miniconnector with 4 wires (200 mm long)
M02 - miniconnector with 4 wires (200 mm long), 6 pin flange receptacle M16

Input voltage
1 - +24 VDC

Signal Output
V0 - 0 - 10 V
A0 - 4 - 20 mA

Accessories

Description	Part No.
Position magnet OD33	**201 542-2**
Position magnet OD25,4	**400 533**
Positionsmagnet OD17,4	**401 032**
6 pin wall mount recaptacle, male	**ST C0 9131 S06**
6 pin female cable connector M16	**ST C0 9131 D**
6 pin 90° female cable connector M16	**ST C0 9131-6**
O-Ring 15,3 x 2,2 Fluorelastomer FPM 75	**401 133**

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