Technical Data / Description

MH Series
Temposonics® MB Analog
Magnetostrictive Linear Position Sensors

• Linear, absolute Measurement in Hydraulic Cylinders
• Non-Contact Sensing with Highest Durability
• Compact Dimensions
• Replacing Potentiometers and Inductive Position Sensors
• Accuracy: Linearity Tolerance < 0.15 mm full stroke
• Hysteresis < ± 0.1 mm
• Signal Output: Voltage
• Power Supply: 12 VDC
• Immunity against electromagnetic HF-fields up to 100 V/m
• Easy external mounting

Compact Sensor for Mobile Hydraulics

Standard Differential Cylinder
1. Product description and technology

Temposonics sensors can be used in versatile mobile machines without any restriction and replace contact-based linear sensors like potentiometers. Highly dynamic systems are controlled safely by means of Temposonics® sensors, thus enhancing the productivity, availability and quality of the working process of the machine. Insensitive to vibration, shocks, dust and weathering influences and electro-magnetic disturbances. MB Sensors are designed for threaded port assembly in hydraulic cylinders.

Simple Mechanics

The extremely robust sensor consists of the following main parts:

1. The M12 connector dust-and waterproof up to IP69K.
2. The hexagonal housing with built-in electronics and signal converter.
3. The position magnet as only moving part, which is assembled into the piston bottom. This permanent magnet travels wear-free and contactless along the pressure pipe and measures the actual position.
4. The pressure pipe placed within the drilled piston rod contains the protected magnetostrictive sensing element.

Magnetostriction

Temposonics linear sensors are based on the magnetostrictive technology. By measuring the actual position with a non-contact position magnet the sensor operates 100% wear-free. The absolute operating principle enables reliable readings without any reference point or recalibration. A mechanical strain pulse is triggered by the travelling position magnet. The runtime of this ultrasonic wave is measured precisely and compiled into standard electronic output signals.

Measuring principle

- Compact dimensions
- Suitable for operating pressures up to 280 bar
- Supply voltage (12 VDC)
- Easy installation and replacement
- Output signal:
  • Analog: VDC
2. Dimensions and mechanical Installation

3. Installation

a. Standard Application: Differential Cylinder
(Magnet installation in piston)

Position magnet (M) and magnet assembly with spacer (S) in piston

Ring magnet Part No. 401032

<table>
<thead>
<tr>
<th>OD</th>
<th>17.4 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>ID</td>
<td>13.5 mm</td>
</tr>
<tr>
<td>Height</td>
<td>8 mm</td>
</tr>
<tr>
<td>$P_a$</td>
<td>10 N/mm²</td>
</tr>
</tbody>
</table>

Non-magnetic (stainless steel)
POM, PU, Aluminum

S = 17.5 x 5 x 13.5

N = Null zone (typ.) 12 mm
D = Damping zone 27.5 mm
xxx = Measuring range, see ordering code
4. Installation Example (Double Rod Cylinders)

Please consult Temposonics Applications Engineering for further support!

Example of Customized Application: Double Rod Cylinder
(Magnet installation radial in piston ring)
5. Electrical installation

**MB Analog (4 pin)**

<table>
<thead>
<tr>
<th>PIN assignment analog 4 pin</th>
<th>G</th>
<th>H</th>
</tr>
</thead>
<tbody>
<tr>
<td>PIN 1</td>
<td>VDC</td>
<td>VDC</td>
</tr>
<tr>
<td>PIN 2</td>
<td>n.c.</td>
<td>signal</td>
</tr>
<tr>
<td>PIN 3</td>
<td>GND</td>
<td>GND</td>
</tr>
<tr>
<td>PIN 4</td>
<td>signal</td>
<td>n.c.</td>
</tr>
</tbody>
</table>

**Connecting schematics on vehicle electronics:**
## 6. Technical Data

### Input
- Measured variables: Position
- Measuring range: 72, 109, 128, 148, 162, 186, 194, 217, 250 mm

### Output
- Voltage: 0.5…4.5 VDC
- Resolution: Continuous analog output restricted by noise or AD converter of control unit

### Accuracy
- Linearity: ± 0.15 mm
- Hysteresis: ± 0.1 mm
- Setpoint Tolerance: ± 1 mm

### Operation conditions
- Assembly orientation: In any direction
- Storage temperature: -25 °C…+65 °C
- Fluid temperature: -30 °C ... +85 °C
- Operation temperature electronics, storage temp.: -40 °C…+105 °C

### Pressure
- Operating pressure ratings: Ø 8 mm sensor rod
  - PN: 250 bar
  - Pmax: 325 bar

### IP rating
- M12 connector: DIN 40050 Part 9: IP69K in connected state

### Environmental testing
- Shock: IEC-60068-2-27, 50 g (11 ms) single hit, 50 g (11 ms) at 1000 shocks per axis
- Vibration: IEC 60068-2-64 (10…2000 Hz) 15 g sinus
- EMC: ISO 14982 Agricultural and forestry machines
  - Radiated immunity ISO 11452-2 (antenna)
  - ISO 11452-5 (stripline)
  - Radiated emission CISPR 12/16
  - ISO 7637-1: electric disturbance on vehicles
  - ISO/TR 10665 E.S.D.

### Materials and dimensions
- Sensor rod: Stainless steel 1.4306 / AISI 304L (Ø 8 mm)
- Housing (electronics): Stainless steel 1.4305 / AISI 303
- Pressure port: ISO 6149 Hexagon housing SW27 with M14 x 1,5
- O-ring: 11.3 x 2.2 mm NBR 80

### Electrical installation
- Supply Voltage: 12 VDC (tolerance range 9 - 15 VDC)
- Power drain: < 1 W
- Over voltage protection (GND-VDC): up to 30 VDC
- Polarity protection: VDC - GND
7. Model configurator

Tempsonics® MB

Sensor model
MB = SW27 housing

Form factor
H = Hexagon housing 27 hex
with pressure port M14 x 1.5
ISO 6149, rod Ø 8 mm

Stroke length
0072, 0109, 0128, 0148, 0162, 0186, 0194, 0217, 0250 mm

Connection type
4 pin M12 connector
G = pin assignment 1-3-4
H = pin assignment 1-3-2

Supply voltage
Z = +12 VDC

Output
V12 = 0.5…4.5 VDC

Scope of delivery:
Position sensor

Please order magnets separately!

Accessories (selection) Part no.
0D17,4 Ring magnet 401 032

Tempsonics® Testkit 280618

Scope of delivery
• MH-Series analog/PWM Tester
• 12 VCD battery charger with adapter
  (adapter main plug EU, adapter main plug UK)
• cable with M12 connector
• cable with pigtailed wires
• carrying bag