Temposonics®
Absolute, Non-Contact Position Sensors

MH Series
Temposonics® MB Analog

Technical Data / Description

Compact Sensor for Mobile Hydraulics

- 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

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.

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

Measuring principle
2. Dimensions and mechanical Installation

![Diagram showing 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 العالي</td>
<td>10 N/mm²</td>
</tr>
</tbody>
</table>

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 MTS 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

**Temposonics® ordering**

<table>
<thead>
<tr>
<th>M</th>
<th>B</th>
<th>H</th>
<th>M</th>
<th>4</th>
<th>1</th>
<th>0</th>
<th>Z</th>
<th>V</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
</table>

**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)**

<table>
<thead>
<tr>
<th>Part no.</th>
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<td>401 032</td>
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**Temposonics® Testkit**

- Part no. 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