Temposonics®
Absolute, Non-Contact Position Sensors

L-Series
Analogue + Digital

Temposonics® LD
Measuring range 50 - 5000 mm

- Absolute Sensor
- Non-contact Measurement
- Modular Construction
- Stable Design
- Highest Durability
- Measuring Range: 50 - 5000 mm
- Linearity: Better 0.02 %
- Repeatability: 0.001 %
- Direct Analogue Output (V/mA): 100% field adjustable
- Digital Pulse Output, Start-Stop

A Compact Sensor for Hydro Cylinders

ISO 9001 CERTIFIED

The Measurable Difference
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 high precise speed-measurement of an ultrasonic wave (torsion pulse in its sensor element) for position detecting. The integral signal processing transforms the measurements into analogue or digital standardized 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.

### Measured Variables
- **Displacement**
  - Measuring Range: 50 - 5000 mm
  - Output: Voltage: 0...10 VDC or 10...0 VDC
    - (Minimum load: > 5 kOhm)
    - Current: 4(0)...20 mA or 20...4(0) mA
      - (Min/Max. 0 / 500 Ohm)
- **Adjustment of NULL and SPAN**
  - Analogue: 100% of measuring range (F.S.)
  - Digital: 0.1 mm; 0.01 mm (controller depending)
- **Linearity**
  - < ± 0.02 % F.S. (Minimum ± 50 µm)
- **Repeatability**
  - < ± 0.001 % F.S.
- **Update Frequency**
  - Analogue: 1kHz / Digital: controller dependent
- **Temperature Coefficient**
  - < 40 ppm/°C
- **Electric Strength**
  - 500 V (DC ground to machine ground)
- **Operating Temperature**
  - -40 °C...+75 °C
- **Dew Point, Humidity**
  - 90 % rel. humidity, no condensation
- **EMV-Test**
  - Electromagnetic emission EN 50081-2; Electromagnetic immunity EN 50082-2
  - EN 61000-4-2/3/4/6 Level 3/4 Criteria A,
  - LD-sensor installed in a ground metal housing
  - 100 g, 6 ms / IEC-Standard 68-2-27
  - 10 g, 10 - 2000 Hz / IEC-Standard 68-2-6
- **Shockrating**
  - Any orientation
- **Vibration Rating**
  - Any
- **Magnet speed**
  - Stainless steel 1.4301 / AISI 304
- **- Pressure Rating**
  - 350 bar, 700 bar peak pressure
- **Sensor Electronic Housing**
  - Aluminium diecasting housing
- **Sealing**
  - IP 65
- **Sensor Installation**
  - Fitting flange or thread M18 x 1.5
- **Magnet Type**
  - Ring magnet
**Temposonics®-LD**

The compact position sensor system was designed for installation in hydraulic cylinders, specifically for use in standard clevis head cylinders or any space limited cylinder applications.

- The pressure proof stainless steel sensor rod with fitting or threaded flange protects the sensing element in which gives rise to the measurement signal. It fits into the bored piston rod.

- The external standard industrial housing accommodates the modular electronic interface with active signal conditioning. The sensor electronic is connected to the basicsensor via inside terminal screws and to the controller with integrated cable outlet.

- The position magnet, the only moving part is mounted on the piston bottom. The permanent magnet travels wearfree and contactless along the stationary sensor tube. Its magnetic field starts the measurement signal through sensor’s rod wall.

### LD with fitting flange

**Cable gland**

**Pressure tube Ø 10**

**Mounting zone**

**Null position**

**Position magnet**

**Inactive zone > 4500 mm**

**Stroke length 50-5000 mm**

**Stroke length 66 mm**

### LD with threaded flange

**Sensor electronic type >>B<<**

**Sensor rod type >>M<<**

**Sensor electronic type >>S<<**

**O-Ring 15,3 x 2,2 FPM75 (supplied) profile of screw boring see ISO 6149-1**

**23 across flats**

**Tightening torque < 50 Nm**

**Thread M16 x 1.5**

**Pressure tube Ø 10**

**Inactive zone > 4500 mm**

**Stroke length 66 mm**

**Active stroke length**

**Null position**

**Rear mounting plate**

**3 holes Ø 4,34 mm for cable to basic sensor**

**3 holes Ø 4,34 mm for cable connector**

**4 holes Ø 4,34 mm for mounting**

**4 pcs. *)**

*) Supplied screws: 1) M4x12, DIN 912A2, mounting plate black anodized (from F-No. 06190054)
2) 8-32UNC-2B, mounting plate silver anodized (up to F-No. 06190053)
**Analogue Output**

Tempsonics® LD sensors provide direct analogue outputs, including voltage (0-10 V) and current (4-20 or 0-20 mA), forward and reverse acting. Resolution is only limited by the output ripple. Since the outputs are direct, no signalconditioning electronics are needed when interfacing with controllers or meters.

**Digital Start/Stop pulse**

Digital LD sensor is equipped with a start/stop output. The sensor requires a start signal from an external indicator in onsite 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 displacement. Time measurement is by the indicator and used for calculating the position value. Generation and evaluation of the start/stop pulse is made by a customized Start/Stop interface module of many controller companies.

**Sensor field programming**

LD sensors are preconfigured at the factory by model code designation. If needed, MTS offers different external service tools for modifying sensor parameters inside the active electrical stroke (50 mm minimum clearance between setpoints) via the standard connection cable. There is no need to open the sensors electronics.

Following tools are available:

1. **Handheld-Programmer G-Analogue**
   for setups of measuring length inside the ordered output by pushing up/down buttons.

2. **PC-Programmer G-Analogue**
   This hardware converter is required to communicate via serial port of Windows PC to the sensor. Customized settings are possible by using a MTS programming software (CD-ROM) for:
   1. Null and Span
   2. Forward and reverse acting
   3. Output: Voltage/Current output values encl. range
Cylinder installation
Temposonics® LD is designed for installation into hydraulic cylinders. Mounting of a LD sensor requires the use of a O-ring (black) and a backup-ring (orange). Both are supplied with the sensor. The sensor will be fixed via special screw.

Interconnection cable
When mounted in the manner as shown below, interconnection cable is shielded according to EMC standard at the cylinder end cap. However, when the LD sensor is mounted in an alternative way, proper care must be taken to shield the interconnection cable.

When installing the sensor in the cylinder notice following:
• Magnet must not slide along the sensor tube.
• The bore in the piston rod and type of sealing are determined by cylinder manufacturers as that depend on hydraulic pressure and piston velocity. We recommend 13 mm bore diameter at minimum. Do not exceed peak pressure.
• Protect sensor rod from wear.

Mounting ring magnet
For accurate position measurements mount the magnet with non-magnetizable material (screws, etc.).

Rod style “S” with Electronics Housing style Typ “B”

Example mounting detail:
Setscrew 8 M6 - ISO 7379 with internal hexagon

Minimum tolerances for magnetizable material

Detail: Flange

ATTENTION
Only the mounting of sensorsystem as shown here fulfill the EMC standards of Electromagnetic Emission and Immunity.
**Temposonics-LD**  
*Analogue + Digital*

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### Sensor Electronics Housing

- **Customer Wiring**
- **Factory Wiring**
- **Cable to Control unit Pigtailed**
- **Option: Connector**

**Cable off Sensor rod**

**J1**
- 13: black
- 12: grey
- 11: green
- 10: white
- 9: yellow
- 8: brown

**J2**
- 13: black
- 12: grey
- 11: green
- 10: white
- 9: yellow
- 8: brown

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### Wiring of 10-0 V and 20-(0) mA outputs is valid for LD sensors from fabrication # (F-No.) 0546 xxxx.

**1. Start/Stop Output**

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Colour</th>
<th>Function</th>
<th>Option: Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>white</td>
<td>DC Ground (0 V)</td>
<td>Pin 6</td>
</tr>
<tr>
<td>2</td>
<td>pink</td>
<td>Stop (+)</td>
<td>Pin 2</td>
</tr>
<tr>
<td>3</td>
<td>yellow</td>
<td>Start (+)</td>
<td>Pin 3</td>
</tr>
<tr>
<td>4</td>
<td>grey</td>
<td>Stop (-)</td>
<td>Pin 1</td>
</tr>
<tr>
<td>5</td>
<td>green</td>
<td>Start (-)</td>
<td>Pin 4</td>
</tr>
<tr>
<td>6</td>
<td>brown</td>
<td>+24 VDC</td>
<td>Pin 5</td>
</tr>
</tbody>
</table>

**2. Analogue Output**

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Colour</th>
<th>Function</th>
<th>Option: Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>white</td>
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<td>2</td>
<td>pink</td>
<td>DC Ground</td>
<td>Pin 2</td>
</tr>
<tr>
<td>3</td>
<td>green</td>
<td>PC Programmer only</td>
<td>Pin 4</td>
</tr>
<tr>
<td>4</td>
<td>grey</td>
<td>0-10, 10-0 V, 4(0)-20, 20-(0)4 mA</td>
<td>Pin 1</td>
</tr>
<tr>
<td>5</td>
<td>yellow</td>
<td>PC Programmer only</td>
<td>Pin 3</td>
</tr>
<tr>
<td>6</td>
<td>brown</td>
<td>+24 VDC</td>
<td>Pin 5</td>
</tr>
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</table>

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**Cable gland PG 9-EMC**

EMC standard screwed cable gland for shielded cable. Simply to handle, as the cable shield must be removed backup over the plastic insert.

**Wire shielding & DC Ground have to be isolated separately!**

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**Typical Grounding**

- Electronic enclosure = Machine ground
- Pressure housing = Machine ground
- Internal Electronics Cover = DC Ground (0V), isolated from machine ground
- Strain relief = Machine ground

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**All dimensions in mm**

**MTS Sensors**
Temposonics-LD Analogue + Digital

**Sensor rod style**
- S - Fitting flange (with housing »B« only)
- M - Threaded flange (with housing »S« only)

**Sensor electronic housing style**
- B - Bottom cable entry
- S - Side cable entry

**Cable type electronic housing**
- R - PVC-cable
- H - PUR-cable

**Cable outlet**
- PT - Pigtailed
- D6 - Cable with 6 pin male connector

**Cable length, electronic housing**
- 02 - 2 meters, Standard
- 01-10 - 01 up to 10 meters

**Measuring length**
- 0050 - 5000 mm (up to 1000 mm in 50 mm steps; up to 5000 mm in 250 mm steps; Option: In 5 mm steps)

**Input voltage**
- 2 - +24 VDC

**Output signal**
- R0 - Start/Stop
- V8 - 0-10 V
- V9 - 10-0 V
- A4 - 4-20 mA
- A5 - 20-4 mA
- A6 - 0-20 mA
- A7 - 20-0 mA

**Integral cable length of Sensor rod**
- L1 - 270 mm
- L2 - 400 mm

**Position magnets (order separately)**
- Ring magnet OD33
  - Part No. 201 542-2
  - Composite PA-Ferrite-GP20
  - Weight: ca. 14 g
  - Operating temperature: -40...+100°C
  - Surface pressure: 40 N/mm²
  - Fastening torque for M4 screws max. 1 Nm

- Ring magnet OD25,4
  - Part No. 400 533
  - Composite: PA-Ferrite
  - Weight: ca. 10 g
  - Operating temperature: -40...+100°C
  - Surface pressure max. 40 N/mm²

**Male connector M16 wired on cable**
- 6 pin DIN male connector
  - Part No. 370 372
  - Housing: Zinc, nickel plated
  - Termination: Solder
  - Contact insert: Silver plated
  - Cable clamp: PG 7
  - Cable-Ø: 6 mm

- Mating female connector M16
  - Part No. 370 623
  - 6 pin DIN female connector

**Accessories**

<table>
<thead>
<tr>
<th>Description</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ring magnet OD33, Standard</td>
<td>201 542-2</td>
</tr>
<tr>
<td>U-Magnet OD33</td>
<td>251 416-2</td>
</tr>
<tr>
<td>Ring magnet OD25,4</td>
<td>400 533</td>
</tr>
<tr>
<td>6 pol. female cable connector M16</td>
<td>370 623</td>
</tr>
<tr>
<td>O-Ring 21,89 x 2,62</td>
<td>560 705</td>
</tr>
<tr>
<td>O-Ring 15,3 x 2,2 FPM</td>
<td>401 133</td>
</tr>
<tr>
<td>Backup ring</td>
<td>560 629</td>
</tr>
</tbody>
</table>

From F-No. 0546 xxxx LD-Analogue sensors are adjustable with following servicetools:
- Handheld-Programmer G-Analogue | 253 294 |
- PC-Programmer G-Analogue incl. power supply | 253 145 |
(100-240 VAC/24 VDC), cable and programming software (CD)

All dimensions in mm