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.

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.

Temposonics GT2 and GT3
Measuring length 50 - 1500 mm
Temposonics-GT2+GT3

Analog

Temposonics G-Series Redundant

The G-Series Redundant sensor is designed for applications with high safety requirements. Two or three measuring systems, which work totally independent, are installed inside the compact sensor housing. Each measuring system contains its own canal with sensor element, evaluation electronics, output signal, separated power supply, connector and cable.

All sensor elements are integrated in one pressure proofed high-grade steel rod. Rod and fixing flange feature the approved standard dimensions with 10 mm diameter and M18x1.5 winding. That qualifies the redundant sensor for measuring linear movements of control valves, linear drives, fluid cylinders and machines.

In particular applications with safety relevant functions benefit from a redundant position measurement:

- Valves and drives at power plants
- Pitch settings at water- or wind turbines or at marine propellers
- Ship control systems and floodgates.

Analog output

Temposonics G-Series with analog outputs provide direct analog outputs including voltage and current, forward or reverse acting. All outputs allow full adjustment of Null and Span setpoints (minimum range 50 mm between setpoints) inside the active electrical stroke length. Since the outputs are direct, no signal conditioning electronics are needed when interfacing with controllers or meters.

Sensor field programming

Temposonics G-Series 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 (minimum 50 mm between setpoints) via the standard connection cable. There is no need to open the sensors electronics. Following tools are available:

1. Hand-Programmer G-Analog
   for setups of measuring length inside the ordered output by pushing an up/down-button.

2. PC-Programmer G-Analog
   This hardware converter is required to communicate via serial port of Window PC to the sensor. Customized settings are possible by using a MTS programming software (CD-ROM) for:
   Analog: 1. Null and Span; 2. Forward and reverse acting; 3. Output: Voltage/Current and output values
## Technical Data

### Input
- **Measured variables**: Position
- **Measuring range**: 50 - 1500 mm

### Output
- **Sensor model GT2**: Two output channels
- **Sensor model GT3**: Three output channels
- **Voltage**: 0...10 / 10...-10 / -10...+10 / +10...-10 VDC (min. load controller: > 5 kOhms)
- **Current**: 4(0)...20 mA / 20...4(0) mA (min/max. load: 0/500 Ohms)
- **Null/Span adjustment**: 100 % of electrical stroke (Min. range 50 mm)

### Accuracy
- **Position measurement**:
  - **Resolution**: Analog: Infinite
  - **Linearity**: < ± 0.02 % F.S. (Minimum ± 50 µm)
  - **Repeatability**: < ± 0.001 % F.S. (Minimum ± 2.5 µm)
  - **Hysteresis**: < 4 µm
  - **Update time (ms)**: Analog: < 1 ms typical
  - **Ripple**: < 0.01 % F.S.

### Operating conditions
- **Magnet speed**: any
- **Operating temperature electronic housing**: -40 °C ... +75 °C
- **Dew point, humidity**: 90% rel. humidity, no condensation
- **Protection**: IP 67
- **Shock test**: 100 g single hit, IEC-Standard 68-2-27
- **Vibration test**: 15g / 10 - 2000 Hz, IEC-Standard 68-2-6
- **Standards, EMC test**:
  - Electromagnetic emission EN 50081-1
  - Electromagnetic immunity EN 50082-2
  - EN 61000-4-2/3/4/6, Level 3/4, Criterion A, CE-qualified

### Form factor, material
- **Sensor head**: Aluminum
- **Rod with flange**: Stainless steel 1.4301 / AISI 304
- **Pressure rating**: 350 bar, 700 bar peak
- **Position magnet**: Ring magnets, U-magnets

### Installation
- **Mounting position**: any orientation
- **Rod**: Threaded flange M18 x 1.5, nut M18
- **Position magnet**: Mounting plate and screws from antimagnetic material

### Electrical connection
- **Connection type**: 6 pin connector M16 or integral PUR-cable with open ends
- **Input voltage**: 24 VDC (-15 / +20 %)
- **Polarity protection**: up to -30 VDC
- **Overvoltage protection**: up to 36 VDC
- **Current drain**: 100 mA typical
- **Ripple**: < 1 % S-S
- **Electric strength**: 500VDC (DC ground to machine ground)
Selection of position magnet (not on delivery)

- **Ring magnet OD33**
  - Part No.: 201 542-2
  - Composite: PA-Ferrite-GF20
  - Weight: ca. 14g
  - Operating temperature: -40...+100°C
  - Surface pressure max.: 40 N/mm²
  - Fastening Torque for M4 screws max.: 1 Nm

- **U-magnet M OD33**
  - Part No.: 251 416-2
  - Composite: PA-Ferrite-GF20
  - Weight: ca. 11g
  - Operating temperature: -40...+100°C
  - Surface pressure max.: 40 N/mm²
  - Fastening Torque for M4 screws max.: 1 Nm

High Pressure Rod Design

Temposonics-GT with a pressure-resistant stainless steel flange and sensing rod is suitable for use in hydraulic cylinders and externally in all applications where space is a problem. Position measurement is via ring or U-magnets travelling along the sensing rod without any mechanical contact.

Connection types

1. **Connector outlet D60**
   - 6 pin Male receptacle M16

2. **Cable outlet H02**
   - 2 m PUR cable 3 x 2 x 0.25 mm²
   - Cable Ø 6.8 mm
   - Screened unshielded twisted pair
   - 50 mm bending radius at fixed installation
### Flexible installation in any position

When mounting the sensor a basic tool with max. 8 mm dimension has to be used. Thereby attention must be paid, that the tool is placed at the flange exclusively.

![Flexible installation in any position](image)

### Rod model

Mount the sensor via flange thread or a hex nut. If possible, non-magnetizable material should be used for mounting support (dimensions as shown). With horizontal mounting, longer sensors (from 1 meter) must be provided with mechanical support.

### Hydraulic sealing

Recommended is sealing of the flange facing with O-Ring (e.g. 22,4 x 2,65) in a cylinder cover nut or an O-Ring 15,3 x 2,2 in undercut.

### Minimum assembly distance

1. Non-magnetizable material
2. Magnetizable material

### Cylinder installation

When used for direct stroke measurement in fluid cylinders, the sensor’s high pressure, stainless steel rod installs into a bore in the piston head/rod assembly as illustrated. That guarantees a longlife and trouble-free operation - independent of used hydraulic fluid.

### Connector outlet D60

![Connector outlet D60](image)

### Connector

<table>
<thead>
<tr>
<th>Pin</th>
<th>Cable</th>
<th>Analog</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>grey</td>
<td>V/mA</td>
</tr>
<tr>
<td>2</td>
<td>pink</td>
<td>DC Ground</td>
</tr>
<tr>
<td>3</td>
<td>yellow</td>
<td>PC-Programming</td>
</tr>
<tr>
<td>4</td>
<td>green</td>
<td>PC-Programming</td>
</tr>
<tr>
<td>5</td>
<td>brown</td>
<td>+24 VDC (-15/+20 %)</td>
</tr>
<tr>
<td>6</td>
<td>white</td>
<td>DC Ground</td>
</tr>
</tbody>
</table>

### Cable connector (recommended, not on delivery)

<table>
<thead>
<tr>
<th>Part No. ST C0 9131 D06 PG9</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 pin female connector M16, PG9</td>
</tr>
</tbody>
</table>

### Cable clamp

- PG7: Max. Cable-Ø 6 mm
- PG9, M16: Max. Cable-Ø 8 mm

### Housing

- Zinc nickel plated
- Terminal: Solder
- Contact insert: Silver plated
- Cable clamp: PG7
- Max. Cable-Ø 6 mm
- Max. Cable-Ø 6 mm

### Torque

- Hex 70: < 50 Nm
- Antimagnetic spacer

- Recommended hydraulic sealing

- O-Ring 15,3 x 2,2

- Alternatives sealing

- O-Ring 15,3 x 2,2
Temposonics-GT2+GT3

**Analog**

**Temposonics**

**Sensor model**
- GT2 = Dual redundant
- GT3 = Triple redundant

**Form factor**
- M = Flange M18 x 1,5 (Standard)

**Measuring length**
- 0050 … 1500 mm

**Connection type**
- D60 = 6 pin male receptacle M16
- H02 = 2m PUR-cable w/o connector, option H01-H10 (1-10m)

**Input voltage**
- 1 = +24 VDC

**Output**
- V0 = Voltage 0 to +10 VDC
- V1 = Voltage +10 to 0 VDC
- V2 = Voltage -10 to +10 VDC
- V3 = Voltage +10 to -10 VDC
- A0 = Current 4 to 20 mA
- A1 = Current 20 to 4 mA
- A2 = Current 0 to 20 mA
- A3 = Current 20 to 0 mA

**On delivery rod model:** Sensor, hex nut, pls. order magnet separately.

**Accessories (selection)**

<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>Ring magnet OD25,4</td>
<td>400 533</td>
</tr>
<tr>
<td>U-magnet OD33</td>
<td>251 416-2</td>
</tr>
<tr>
<td>O-Ring 15.3 x 2.2 Fluorelastomer FPM 75</td>
<td>401 133</td>
</tr>
<tr>
<td>6 pin female cable connector M16, PG9</td>
<td>STC 09131 D06 PG9</td>
</tr>
<tr>
<td>6 pin 90°-female cable connector M16,</td>
<td>STC 09131-6</td>
</tr>
<tr>
<td>PUR-cable 3 x 2 x 0.25 mm^2</td>
<td>K59</td>
</tr>
</tbody>
</table>

**MTS-Servicetools**

<table>
<thead>
<tr>
<th>Description</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analog Hand-Programmer G</td>
<td>253 294</td>
</tr>
<tr>
<td>Analog PC-Programmer G, incl. power supply</td>
<td>253 145</td>
</tr>
<tr>
<td>(100-240 VAC / 24VDC)</td>
<td></td>
</tr>
<tr>
<td>Connection cable and programming software (CD)</td>
<td></td>
</tr>
</tbody>
</table>