### Features
- Superior resolution and repeatability
- Absolute displacement and velocity measurement
- Modular, non-contacting design
- 100% field programmable zero and span settings
- Selection of application housings
- Field replaceable sensor cartridge (Model RH only)
- 2-year warranty
- CE certified

---

### Product Specifications

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measured Variable</td>
<td>Displacement, Velocity (magnitude only)</td>
</tr>
<tr>
<td>Resolution</td>
<td>16 bit or 0.025 mm, whichever is greater</td>
</tr>
<tr>
<td>Non-Linearity</td>
<td>$\leq \pm 0.02%$ of full stroke or $\pm 0.05$ mm, whichever is greater</td>
</tr>
<tr>
<td>Repeatability</td>
<td>$\leq \pm 0.001%$ of full scale or $\pm 0.0025$ mm, whichever is greater</td>
</tr>
<tr>
<td>Hysteresis</td>
<td>$&lt; 0.004$ mm</td>
</tr>
<tr>
<td>Outputs</td>
<td>Voltage: 0 to 10 Vdc or $+10$ to 0 Vdc[^1]</td>
</tr>
<tr>
<td></td>
<td>Minimum load: $\leq 5$ kΩ</td>
</tr>
<tr>
<td></td>
<td>Current: 4 (0) to 20 mA, 20 to 4 (0) mA</td>
</tr>
<tr>
<td></td>
<td>Maximum load: $\leq 500$ Ω</td>
</tr>
<tr>
<td>Measuring Range</td>
<td>Profile Style Sensors (PB): 50 to 5000 mm (2 to 196 in.)</td>
</tr>
<tr>
<td></td>
<td>Rod Style Sensors (RH): 50 to 7600 mm (2 to 300 in.)</td>
</tr>
<tr>
<td>Velocity</td>
<td>Velocity output range: 0.1 to 10 m/s or 1.0 to 400.0 in/s</td>
</tr>
<tr>
<td></td>
<td>Minimum velocity: 1.0 in/s or 0.05 x stroke length in inches, whichever is greater</td>
</tr>
<tr>
<td></td>
<td>Maximum velocity: 400.0 in/s or 100 x stroke length in inches, whichever is less (factory calibrated)</td>
</tr>
<tr>
<td>Operating Voltage</td>
<td>$\pm$24 Vdc (+20%, -15%)</td>
</tr>
<tr>
<td>Power Consumption</td>
<td>100 mA typical</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>Head Electronics: -40 to 75°C (-40 to 167°F)</td>
</tr>
<tr>
<td></td>
<td>Sensing Element: -40 to 105°C (-40 to 221°F)</td>
</tr>
<tr>
<td>EMC Test</td>
<td>DIN IEC 801-4, Type 4, CE Qualified; DIN EN 50081-1 (Emissions), DIN EN 50082-2 (Immunity)</td>
</tr>
<tr>
<td>Shock Rating</td>
<td>100 g (single hit/IEC standard 68-2-27 (survivability))</td>
</tr>
<tr>
<td>Vibration Rating</td>
<td>5 g/10-150 Hz/IEC standard 68-2-6</td>
</tr>
<tr>
<td>Adjustment of Zero &amp; Span</td>
<td>100% field adjustment of measuring range</td>
</tr>
<tr>
<td>Update Time</td>
<td>$\leq$ 1 ms typical (length dependent)</td>
</tr>
</tbody>
</table>

#### PROFILE STYLE (PB MODEL)
- **Electronic Head**: Aluminum die-cast housing
- **Sensor Stroke**: Aluminum profile
- **Sealing**: Electronics Head: IP 67, Extrusion: IP 65
- **Mounting**: Adjustable mounting feet or T-slot M5 nut in base channel
- **Magnet Type**: Captive sliding magnet or floating magnet

#### ROD STYLE (RH MODEL)
- **Electronic Head**: Aluminum die-cast housing
- **Sensor Rod with Flange**: 304L Stainless Steel
- **Operating Pressure**: 350 bar, 530 bar peak (5000 psi static; 10,000 psi spike)
- **Maximum Torque**: 45 Nm (33.19 ft. lbs.)
- **Sealing**: IP 67
- **Mounting**: M18 x 1.5 or 3/4-16 UNF-3A
- **Magnet Type**: Ring magnet

[^1]: Due to single ended power supply, 0.0 V is not attainable. Typical minimum voltage is 50 mV. All specifications are subject to change. Please contact MTS for specifications critical to your needs.
**ANALOG OUTPUT**

The “smart” Temposonics® III Series position sensors provide fast, reliable, and highly precise data processing and communication. Displacement and velocity data is preprocessed by the sensor electronics, thereby reducing the processing overhead of your machine controller.

Dual, simultaneous analog outputs are offered as standard (i.e., one displacement and one velocity output using one magnet, or two identical displacement outputs using two magnets). Like all of our sensors, the Temposonics III sensors use non-contacting magnetostrictive technology. Two application housings are available: rod-style (Model RH) and profile-style (Model PB). With RH sensors, the sensor cartridge can be quickly replaced in the field without removing the application housing (available for sensor lengths up to 72 inches).

Temposonics III position sensors provide direct analog outputs, including voltage and current. Both voltage and current outputs allow 100% adjustments of zero and span setpoints. Since the outputs are direct, no signal-conditioning electronics are needed when interfacing with controllers or meters.

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**SINGLE/DUAL MAGNETS**

Temposonics III position sensors with analog outputs will support one or two magnets. (Refer to the illustration, right.)

A single magnet system provides one displacement output over the entire active range of the sensor’s stroke length and one velocity output* (magnitude only).

A dual magnet system provides two identical displacement outputs; a separate output is provided for each of two magnets positioned along the sensor length. It is important to note that a gap of at least three inches must be maintained between the magnets. Therefore, the output range of each magnet equals the active stroke length of the sensor less three inches. (Minimum sensor length for dual magnet systems is 6 inches.)

* Please contact MTS applications engineering for assistance with velocity outputs.
ROD-STYLE (Model RH)
The Temposonics III rod-style application housing (Model RH) offers modular construction, flexible mounting configurations, and easy installation. It is designed for internal mounting in applications where high-pressure conditions exist (5000 PSI continuous, 10,000 PSI spike) such as hydraulic cylinders. Temposonics RH may also be mounted externally in many applications.

In addition, the RH housing offers the ability to quickly and easily replace the sensor cartridge in the field (for sensors up to 72 inches).

MAGNETS FOR TEMPOSONICS RH
Magnets must be ordered separately with Temposonics RH sensors. The standard ring magnet (P/N 201542) is suitable for most applications.

TYPICAL CYLINDER INSTALLATION
The rod-style Temposonics III position sensors (Model RH) are designed for installation into hydraulic cylinders. The sensor’s high-pressure, stainless steel tube installs into a 1/2 inch bore in the piston head and rod assembly as illustrated (right).

The illustration above represents a typical installation. Some installation requirements may be application specific.
**PROFILE-STYLE (Model PB)**

Temposonics PB low profile-style position sensors offer modular construction, flexible mounting configurations, and easy installation. A choice of two magnet mounting configurations are available with the low profile housing: captive sliding magnet or floating magnet.

Temposonics PB sensors are effective in applications where space is an issue and in environments where there are high levels of dust and contamination. In addition, low profile Temposonics PB sensors are designed for external mounting on machines and can be configured with a variety of connector options.

**CAPTIVE SLIDING MAGNET**

![Diagram of Captive Sliding Magnet](image)

**Connector Dimensions**

<table>
<thead>
<tr>
<th>Connector Type</th>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>RG Connector w/Straight Exit RG</td>
<td>85.85 mm (3.38 in.)</td>
</tr>
<tr>
<td>Mating Connector &amp; Cable Bend</td>
<td></td>
</tr>
<tr>
<td>RG Connector w/90° RA Mating Connector</td>
<td>54.01 mm (2.13 in.)</td>
</tr>
<tr>
<td>R Integral Cable &amp; Cable Bend:</td>
<td>69.85 mm (2.75 in.)</td>
</tr>
</tbody>
</table>
MAGNETS & MAGNET ACCESSORIES
FOR TEMPOSONICS PB

Magnets are included with the order of Temposonics PB sensors. There are two styles of captive sliding magnet, and one style of floating magnet.

FLOATING MAGNET

Connector Dimensions

- RG Connector w/Straight Exit RG Mating Connector & Cable Bend: 85.85 mm (3.38 in.)
- RG Connector w/90° RA Mating Connector: 54.61 mm (2.15 in.)
- R Integral Cable & Cable Bend: 69.85 mm (2.75 in.)

Joint Rod (1) Sleeve, Part No. 401603 (2) Ball Jointed Arm, Part No. 401600-1

Captive Sliding Magnet, Style V
Part No. 252111-1

Captive Sliding Magnet, Style S
Part No. 252110-1

Floating Magnet
Part No. 251416
**WIRING**

### Connector

**RG Connector:**

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Wire Color</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Gray</td>
<td>Output #1 (Displacement) *</td>
</tr>
<tr>
<td>2</td>
<td>Pink</td>
<td>Return for Pin 1</td>
</tr>
<tr>
<td>3</td>
<td>Yellow</td>
<td>Output #2 (Displacement or Velocity) *</td>
</tr>
<tr>
<td>4</td>
<td>Green</td>
<td>Return for Pin 3</td>
</tr>
<tr>
<td>5</td>
<td>Red or Brown</td>
<td>+24 Vdc (+20%, -15%), Customer Supplied</td>
</tr>
<tr>
<td>6</td>
<td>White</td>
<td>DC Ground</td>
</tr>
<tr>
<td>7</td>
<td>-</td>
<td>No Connection</td>
</tr>
</tbody>
</table>

When wiring Temposonics III sensors, **DO NOT** connect DC ground to the cable shield or drain wire.

**INTEGRAL CABLE**

**R0 Cable:**

<table>
<thead>
<tr>
<th>Wire Color</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gray</td>
<td>Output #1 (Displacement) *</td>
</tr>
<tr>
<td>Pink</td>
<td>Displacement Output Return for Gray Wire</td>
</tr>
<tr>
<td>Yellow</td>
<td>Output #2 (Displacement or Velocity) *</td>
</tr>
<tr>
<td>Green</td>
<td>Displacement Output Return for Yellow Wire</td>
</tr>
<tr>
<td>Red or Brown</td>
<td>+24 Vdc (+20%, -15%), Customer Supplied</td>
</tr>
<tr>
<td>White</td>
<td>DC Ground</td>
</tr>
</tbody>
</table>

*When using dual outputs, outputs #1 and #2 must have the same output scale (i.e., voltage or current) and the same orientation (i.e., forward or reverse acting).*

**CAUTION!**

When wiring Temposonics III sensors, **DO NOT** connect DC ground to the cable shield or drain wire.

---

6
HOW TO ORDER

When placing an order, build the desired model number using the model number guide (right). A wide range of Temposonics III sensor configurations are available to meet the demands of your particular application. See the following page for how to order extension cables and accessories.

If you have any questions about how to apply Temposonics III position sensors, please contact one of our Application Engineers or your local MTS distributor—they are available to help you design an effective position sensing system to fit your application.

IMPORTANT:
Consult MTS Applications Engineering before ordering analog outputs.

POSITION SENSORS

SENSOR MODEL
RH = Hydraulic Rod Style
PB = Low-Profile Style

HOUSING STYLE
Temposonics RH only (magnet must be ordered separately):
S = US customary threads, flat-faced hex, and pressure tube
M = Metric threads, flat-faced hex, and pressure tube
N = Metric threads, raised-face hex, and pressure tube
B = Sensor cartridge only (No application housing, stroke lengths ≤ 72 in.)
Temposonics PB only (magnet included):
M = Floating Magnet, (Open ring: 140°)
S = Captive sliding magnet with joint at top
V = Captive sliding magnet with joint at front

LENGTH
__ __ __ __ = Inches and tenths
or
__ __ __ __ = Millimeters
(Encode length in 0.5 in. or 5 mm increments)

CONNECTION TYPE/CONNECTOR OR CABLE
Connector
RG0 = Standard 7-pin micro connector
Integral Cables
R__ __ = Integral Cable, Standard
CABLE LENGTH
For Sensor Connection Types RG or RA (see above)
005 = 5 ft.
025 = 25 ft.
100 = 100 ft.

INTRODUCTION TO METHOD OF ORDERING

Single Magnet Analog System
1 = One (1) displacement output only
1 = One (1) each displacement and velocity (magnitude only) output
( fill in blanks with desired max. velocity) See chart at right.

Velocity output range: 001.0 to 400.0 inches/second or meter equivalents
Minimum velocity = 1.0 inches/second or 0.05 x stroke length in inches, whichever is greater.
Maximum velocity = 400 inches/second or 100 x stroke length in inches, whichever is less.

Dual Magnet Analog System
2 = Two (2) displacement outputs (Set points are referenced to the zero point of each application housing.)

OUTPUT
V0 = 0 to 10 Vdc
A0 = 4 to 20 mA
A2 = 0 to 20 mA
V1 = 10 to 0 Vdc
A1 = 20 to 4 mA
A3 = 20 to 0 mA

To complete the analog output code, select from the 1 to 5 digit option codes below.

Velocity Output - Magnet Position
Head Velocity Direction
Head Magnet at Tip
0 - 10 Vdc 10 - 0 - 10
10 - 0 Vdc 10 - 0 - 10
20 - 20 mA 20 - 4 - 20
20 - 4 mA 20 - 4 - 20
20 - 20 mA 20 - 0 - 20
20 - 0 mA 20 - 0 - 20

PRESSURE HOUSING (RH Only)

SENSORS CONNECTION TYPE
S = US customary threads, flat-faced hex
T = US customary threads, raised-face hex
M = Metric threads, flat-faced hex
N = Metric threads, raised-face hex

UNIT OF MEASURE
U = US customary (inches and tenths: xxx.x in.)
M = Metric (millimeters: xxx mm)

LENGTH
__ __ __ __ = Inches and tenths (1 to 72 inches) or
__ __ __ __ = Millimeters (25 to 1825 mm)

EXTENSION CABLES

SENSORS CONNECTION TYPE
RG = Mating connector for Temposonics III sensors with RG connector (straight exit)
RA = Mating connector for Temposonics III sensors with RG connector (90° exit)

CABLE LENGTH
For Sensor Connection Types RG or RA (see above)
005 = 5 ft.
025 = 25 ft.
100 = 100 ft.

CABLE TERMINATION
P0 = Pigtail connection
### ACCESSORIES

<table>
<thead>
<tr>
<th>Description</th>
<th>Part No.</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>O-Ring (spare)</td>
<td>560315</td>
<td>For use with Temposonics RH sensors</td>
</tr>
<tr>
<td>Hex (am-nut w/ 3/4-16 UNF threads)</td>
<td>500015</td>
<td>For use with Temposonics RH sensors</td>
</tr>
<tr>
<td>Hex (am-nut w/ M 18 x 1.5 threads)</td>
<td>500018</td>
<td>For use with Temposics RH sensors</td>
</tr>
<tr>
<td>RG Field-installable Connector</td>
<td>401369</td>
<td></td>
</tr>
<tr>
<td>Magnet Spacer</td>
<td>400633</td>
<td>For use with Temposonics RH sensors</td>
</tr>
<tr>
<td>Magnet Mounting Screws</td>
<td>560397</td>
<td>Used to mount standard ring magnet P/N 201542 (4 screws required) and 90° cutout magnent P/N 201552 (2 screws required)</td>
</tr>
<tr>
<td>140° Cut-out Floating Magnet</td>
<td>251416</td>
<td>Spare for Temposonics PB sensors</td>
</tr>
<tr>
<td>Captive Sliding Magnet, Style V</td>
<td>252111-1</td>
<td>Spare for Temposonics PB sensors, Rod joint at front of magnet</td>
</tr>
<tr>
<td>Captive Sliding Magnet, Style S</td>
<td>252116-1</td>
<td>Spare for Temposonics PB sensors, Rod joint at top of magnet</td>
</tr>
<tr>
<td>Joint Rod Sleeve</td>
<td>401002</td>
<td>Optional accessory for Temposonics PB sensors</td>
</tr>
<tr>
<td>Ball Jointed Arm</td>
<td>401060-1</td>
<td>Optional accessory for Temposonics PB sensors</td>
</tr>
<tr>
<td>Power Supply (24/28 Vdc, 0.5 A)</td>
<td>380009</td>
<td></td>
</tr>
<tr>
<td>Mounting Feet, Standard (spares for PB Sensors)</td>
<td>400802</td>
<td>Temposonics PB position sensors are provided with a set of mounting feet</td>
</tr>
<tr>
<td>Mounting Feet, Low Profile (spares for PB Sensors)</td>
<td>400867</td>
<td></td>
</tr>
<tr>
<td>T-slot M5 Nut</td>
<td>401002</td>
<td>Optional accessory for mounting Temposonics PB sensors</td>
</tr>
<tr>
<td>Cable</td>
<td>530026</td>
<td>Specify length in feet at time of order</td>
</tr>
</tbody>
</table>

**Pioneers, innovators, leaders in magnetostrictive sensing.**

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