

# Tempsonics®

Magnetostrictive Linear Position Sensors

## GB SSI Data Sheet

- High pressure resistant sensor rod
- High operating temperature up to +100 °C (+212 °F)
- Flat & compact – ideal for the valve market



## MEASURING TECHNOLOGY

For position measurement, the absolute, linear Temposonics® position sensors make use of the properties offered by the specially designed magnetostrictive waveguide. Inside the sensor a torsional strain pulse is induced in the waveguide by momentary interaction of two magnetic fields. The interaction between these two magnetic fields produces a strain pulse, which is detected by the converter at the sensor electronics housing. One field is produced by a moving position magnet, which travels along the sensor rod with the waveguide inside. The other field is generated by a current pulse applied to the waveguide. The position of the moving magnet is determined precisely by measuring the time-of-flight between the application of the current pulse and the arrival of the strain pulse at the sensor electronics housing. The result is a reliable position measurement with high accuracy and repeatability.

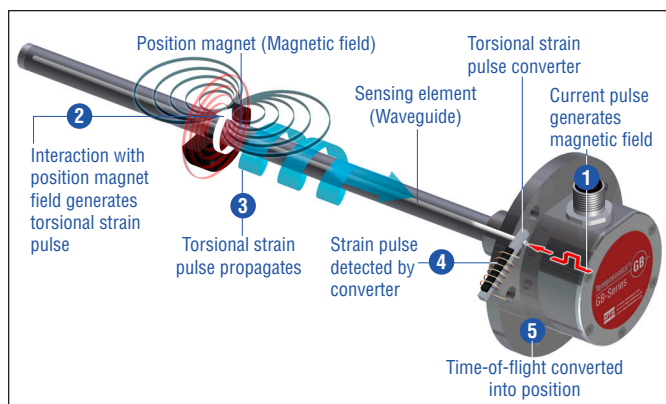


Fig. 1: Time-based magnetostrictive position sensing principle

## GB SENSOR

Robust, non-contact and wear free, the Temposonics® linear position sensors provide best durability and accurate position measurement solutions in harsh industrial environments. The position measurement accuracy is tightly controlled by the quality of the waveguide which is manufactured by MTS Sensors. The position magnet is mounted on the moving machine part and travels non-contact over the sensor rod with the built-in waveguide.

Temposonics® GB is a rod-style sensor for installation into hydraulic cylinders, e.g. in power engineering. With its flat and compact sensor housing and side-mounted signal connection, the sensor is ideal for small spaces. Due to the pressure-resistant sensor rod and its high operating temperature the Temposonics® GB sensor is perfectly suitable for use in fluid technology. For improved signal quality the sensor automatically adapts to the strength of the magnet used in the application.

The set points, start and end position of the measurement, can be modified after installation of the Temposonics® GB sensor. Programming can be carried out using the standard connection cable. Optionally the sensor offers Bluetooth® <sup>1</sup> connectivity for programming. In the case of Bluetooth® connectivity, set points can be modified even when the sensor is no longer accessible. The maximum range between sensor and receiver is 5 m (16 ft). With this option it is still possible to program the sensor via the cable connection.



Fig. 2: Bluetooth wireless technology

<sup>1</sup>/ The Bluetooth® word mark and logos are registered trademarks owned by Bluetooth SIG, Inc. and any use of such marks by MTS Sensors is under license. Other trademarks and trade names are those of their respective owners.

Fig. 2: Montage of MTS Sensors and © Tsiumpa - Fotolia.com  
For iOS available in the future.

## TECHNICAL DATA

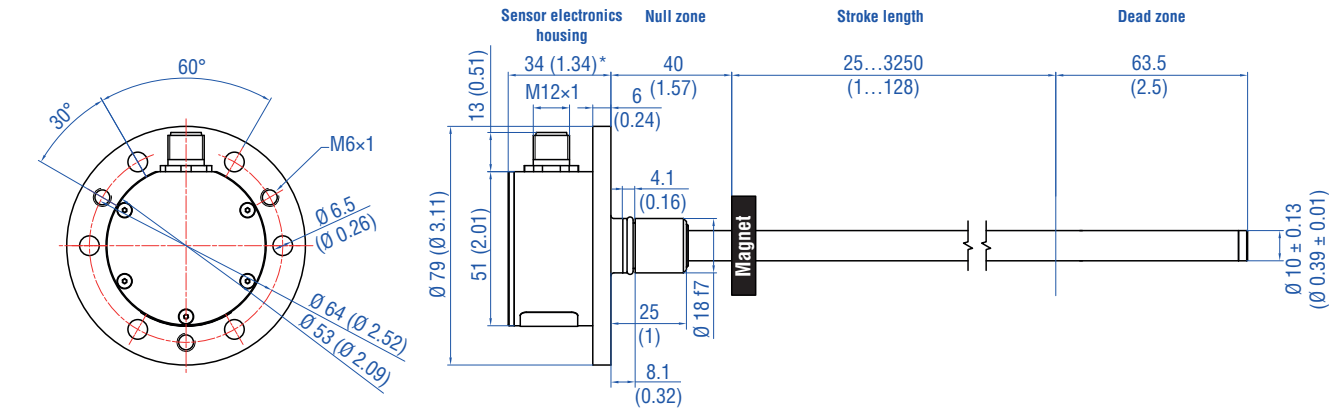
Output	
Interface	SSI (Synchronous Serial Interface) – Differential signal in SSI standard
Data format	Binary, gray
Bluetooth® version	2.1
Programming	Programming of set points using optional accessories <sup>2</sup>
Measured value	Position
Measurement parameters	
Resolution	Min. resolution 5 µm
Cycle time	Up to 3.7 kHz depending on stroke length
Linearity	typ. ≤ ±0.02 % F.S. (minimum ±60 µm)
Repeatability	typ. ≤ ±0.005 % F.S. (minimum ±20 µm)
Operating conditions	
Operating temperature	–40...+90 °C (–40...+194 °F), option: –40...+100 °C (–40...+212 °F)
Ingress protection	IP67 with proper mating connector IP68 for cable outlet
Shock test	100 g (single shock) IEC standard 60068-2-27
Vibration test	15 g / 10...2000 Hz IEC standard 60068-2-6 (resonance frequencies excluded)
EMC test	Electromagnetic emission according to EN 61000-6-4 Electromagnetic immunity according to EN 61000-6-2 The sensor meets the requirements of the EC directives and is marked with <b>CE</b>
Magnet movement velocity	Any
Design/Material	
Sensor electronics housing <sup>3</sup>	Stainless steel 1.4305 (AISI 303), option: stainless steel 1.4404 (AISI 316L)
Sensor rod	Stainless steel 1.4306; 1.4307 (AISI 304L), option: stainless steel 1.4404 (AISI 316L)
Stroke length	25...3250 mm (1...128 in.)
Operating pressure	350 bar, 700 bar peak (at 10 × 1 min)
Mechanical mounting	
Mounting position	Any
Mounting instruction	Please consult the technical drawings and the operation manual (document number: <a href="#">551631</a> )
Electrical connection	
Connection type	Cable outlet 8 pin M12 connector A-coded 7 pin connector M16
Operating voltage	+24 VDC (–15 / +20 %)
Ripple	≤ 0.28 Vpp
Current consumption	Typ. 90 mA
Dielectric strength	500 VDC (DC ground to machine ground)
Polarity protection	Up to –30 VDC
Overvoltage protection	Up to 36 VDC

<sup>2</sup> / Programming via Bluetooth wireless technology is disabled from operating temperature typically > +55 °C (+131 °F)

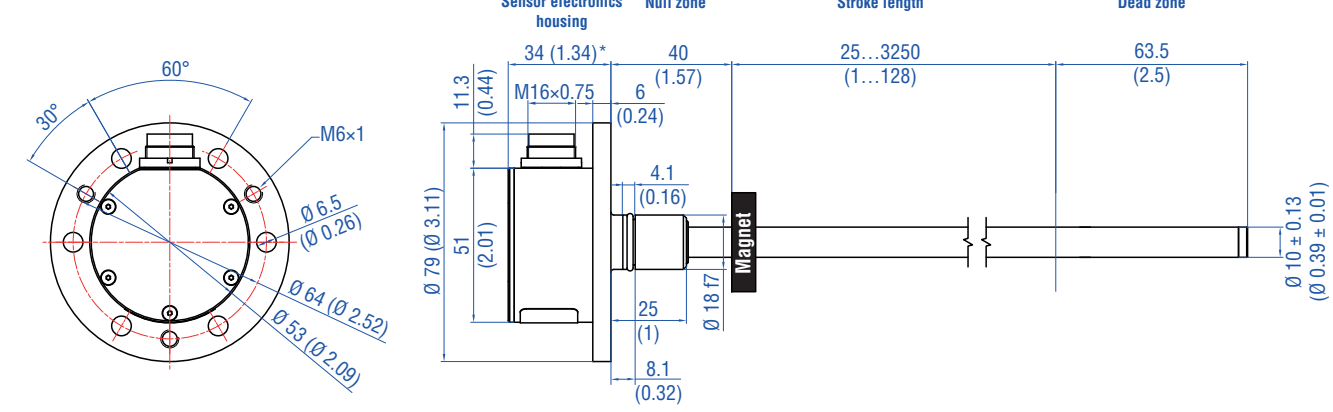
<sup>3</sup> / For option **H** (–40...+100 °C / –40...+212 °F) and option **W** (programming via Bluetooth wireless technology) an aluminum cover plate is used

TECHNICAL DRAWING

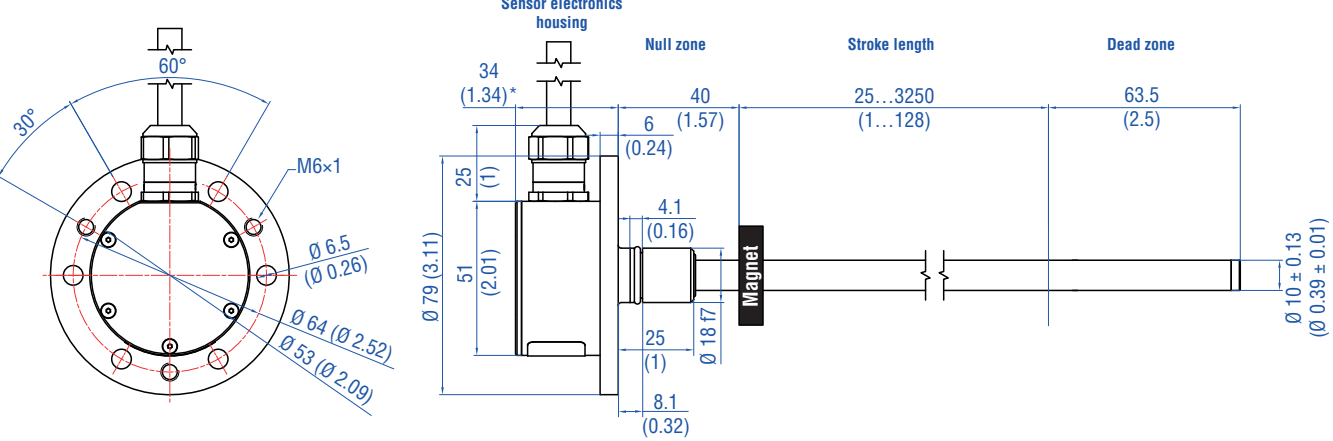
M12 connector



M16 connector



Cable outlet




Controlling design dimensions are in millimeters and measurements in ( ) are in inches  
Unless otherwise stated, apply to the general tolerances according to DIN ISO 2768-m


\* / 34.5 mm (1.36 in.) for sensors with Bluetooth wireless technology (option **W**)

## CONNECTOR WIRING

### M12 connector

D84	Pin	Function
	1	Clock (+)
	2	Clock (-)
	3	Data (+)
	4	Data (-)
	5	–
	6	–
	7	+24 VDC (–15 / +20 %)
	8	DC Ground (0 V)

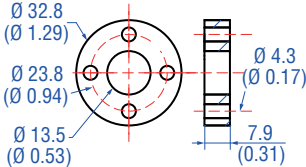
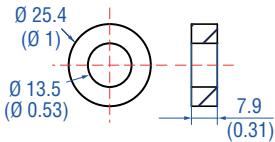
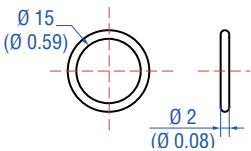
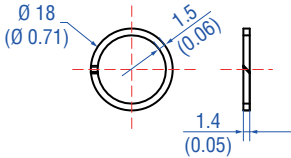
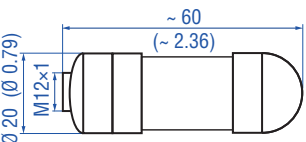
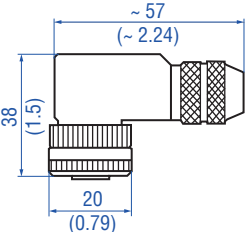
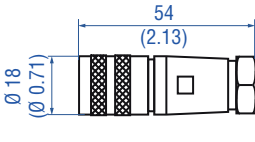
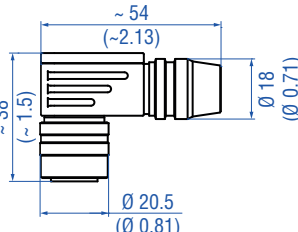

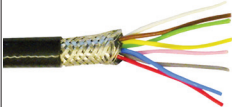

### M16 connector

D70	Pin	Function
	1	Data (-)
	2	Data (+)
	3	Clock (+)
	4	Clock (-)
	5	+24 VDC (–15 / +20 %)
	6	DC Ground (0 V)
	7	–

### Cable outlet

Cable	Function
GY	Data (-)
PK	Data (+)
YE	Clock (+)
GN	Clock (-)
BN	+24 VDC (–15 / +20 %)
WH	DC Ground (0 V)

## FREQUENTLY ORDERED ACCESSORIES – Additional options available in our [Accessories Guide](#) 551444

Position magnets		Optional installation hardware	
 <p><b>Standard ring magnet</b> Part no. 201 542-2</p> <p>Material: PA ferrite GF20 Weight: Ca. 14 g Operating temperature: –40...+105 °C (–40...+221 °F) Surface pressure: Max. 40 N/mm<sup>2</sup> Fastening torque for M4 screws: Max. 1 Nm</p>	 <p><b>Ring magnet OD25,4</b> Part no. 400 533</p> <p>Material: PA ferrite Weight: Ca. 10 g Operating temperature: –40...+105 °C (–40...+221 °F) Surface pressure: Max. 40 N/mm<sup>2</sup></p>	 <p><b>O-ring</b> Part no. 560 853</p> <p>Material: Fluoroelastomer 75 ± 5 durometer</p>	 <p><b>Back-up ring</b> Part no. 561 115</p> <p>Material: PTFE + 60 % bronze</p>
Cable connectors <sup>4</sup>			
 <p><b>Female, straight, 8 pin, M12</b> Part no. 370 694</p> <p>Housing: GD-ZnAL / IP67 Termination: Screw; 0.75 mm<sup>2</sup> Contact insert: CuZn Cable Ø: 4...9 mm (0.16...0.35 in.)</p>	 <p><b>Female, angled, 8 pin, M12</b> Part no. 370 699</p> <p>Housing: GD-ZnAL / IP67 Termination: Screw; max. 0.5 mm<sup>2</sup> Contact insert: CuZn Cable Ø: 6...8 mm (0.24...0.31 in.)</p>	 <p><b>Female, straight, 7 pin, M16</b> Part no. 370 624</p> <p>Housing: Zinc nickel plated Termination: Solder Contact insert: Silver plated Cable clamp: PG9 Cable Ø: 6...8 mm (0.24...0.31 in.)</p>	 <p><b>Female, angled, 7 pin, M16</b> Part no. 560 779</p> <p>Housing: Zinc nickel plated Termination: Solder Contact insert: Silver plated Cable Ø: 6...8 mm (0.24...0.31 in.)</p>
Cable		Programming tools	
 <p><b>Cable</b> Part no. 530 052</p> <p>Dimensions: 3 × 2 × 0.25 mm<sup>2</sup> Cable Ø: 6.4 mm (0.25 in.) Material: PUR jacket; orange Operating temperature: –30...+80 °C (–22...+176 °F) Twisted pair shielded</p>	 <p><b>Cable</b> Part no. 530 112</p> <p>Dimensions: 4 × 2 × 0.25 mm<sup>2</sup> Cable Ø: 7.6 mm (0.3 in.) Material: Teflon® jacket; black Operating temperature: –100...+180 °C (–148...+356 °F) Twisted pair shielded</p>	 <p><b>Cable</b> Part no. 530 113</p> <p>Dimensions: 3 × 2 × 0.25 mm<sup>2</sup> Cable Ø: 7.2 mm (0.28 in.) Material: Silicone coating; red Operating temperature: –50...+180 °C (–58...+356 °F) Twisted pair shielded</p>	<p><b>Programming kit</b> Part no. 254 590</p>

Controlling design dimensions are in millimeters and measurements in ( ) are in inches

4/ Max. fastening torque: 0.6 Nm

## ORDER CODE

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
G	B										1	S								
a	b	c	d	e	f	g	h													

a	Sensor model
G B	Rod

b	Design
N	Model GB rod-style sensor with housing 1.4404 (AISI 316L), rod-style material 1.4404 (AISI 316L) <sup>5</sup> Rod with fitting flange Ø 18 mm, Ø 10 mm rod
S	Model GB rod-style sensor with housing 1.4305 (AISI 303), rod-style material 1.4306; 1.4307 (AISI 304L) Rod with fitting flange Ø 18 mm, Ø 10 mm rod

c	Stroke length
X X X X M	0025...3250 mm
X X X X U	001.0...128.0 in.

Standard stroke length (mm) \*

Stroke length	Ordering steps
25... 500 mm	5 mm
500... 750 mm	10 mm
750...1000 mm	25 mm
1000...2500 mm	50 mm
2500...3250 mm	100 mm

Standard stroke length (in.) \*

Stroke length	Ordering steps
1... 20 in.	0.2 in.
20... 30 in.	0.5 in.
30... 40 in.	1.0 in.
40...100 in.	2.0 in.
100...128 in.	4.0 in.

d	Connection type
D 8 4	8 pin M12 connector
D 7 0	7 pin M16 connector
H X X	PUR cable (suitable for max. operating temperature of +80 °C (+176 °F)) H01...H10 (1...10 m / 3...33 ft) <sup>6</sup>
T X X	Teflon® cable T01...T10 (1...10 m / 3...33 ft) <sup>6</sup>
V X X	Silicone cable V01...V10 (1...10 m / 3...33 ft) <sup>6</sup>

e	Operating voltage
1	+24 VDC (–15 / +20 %)

f	Output
S (14) (15) (16) (17) (18) (19)	Synchronous Serial Interface
	Data length (box no. 14)
1	25 bit
2	24 bit
	Output format (box no. 15)
B	Binary
G	Gray
	Resolution (box no. 16)
1	0.005 mm
2	0.01 mm
3	0.05 mm
4	0.1 mm
5	0.02 mm
	Filter (box no. 17)
1	No filter
2	Average filter 2
3	Average filter 4
4	Average filter 8
	Performance (box no. 18, 19)
0 0	Measuring direction forward, asynchronous measurement
0 1	Measuring direction reverse, asynchronous measurement
0 2	Measuring direction forward, synchronised measurement
0 3	Measuring direction reverse, synchronised measurement

g	Operating temperature
H	–40...+100 °C (–40...+212 °F)
S	–40...+90 °C (–40...+194 °F)

h	Programming
C	Via cable
W	Via Bluetooth wireless technology

## DELIVERY



Sensor

Accessories have to be ordered separately.

<sup>5</sup>/ The sensor in stainless steel 1.4404 (AISI 316L) is only available with following options:

[S] (–40...+90 °C / –40...+194 °F) and [C] (programming via cable)

\* / Non standard stroke lengths are available; must be encoded in 5 mm / 0.1 in. increments

<sup>6</sup>/ Encode in meters if using metric stroke length.

Encode in feet if using US customary stroke length.

Operation manuals & software are available at:  
[www.mtssensors.com](http://www.mtssensors.com)

**Document Part Number:**  
551630 Revision B (EN) 10/2015

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