

# Temposonics®

Magnetostrictive Linear Position Sensors

## DATA SHEET GBS Analog

- High pressure resistant sensor rod
- High operating temperature up to 100 °C
- 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 electronics at the head of the sensor. 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 elapsed between the application of the current pulse and the arrival of the strain pulse at the sensor head. The result is a reliable position measurement with high accuracy and repeatability.

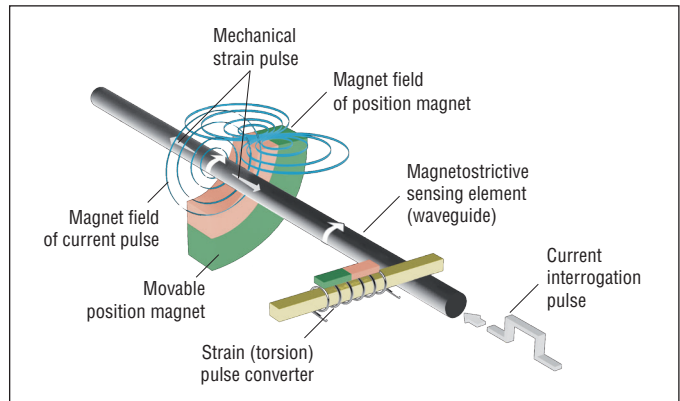


Fig. 1: Measuring principle

## GBS SENSOR

Robust, non-contact and wear free, the Temposonics® linear position transducers 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. The position magnet is mounted on the moving machine part and travels non-contact over the sensor rod with the built-in waveguide.

Temposonics® GBS is a rod-style sensor with backwards compatibility for installation into hydraulic cylinders, e.g. in power engineering. With its flat and compact sensor housing and the collateral signal connection the sensor is ideal for small spaces. Due to the pressure-resistant sensor rod and its high operating temperature the Temposonics® GBS 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, zero and span position of the measurement, can be modified after installation of the Temposonics® GBS sensor. Programming can be carried out using the standard connection cable. Optionally the sensor offers *Bluetooth*®<sup>1</sup> connectivity for programming. In case of *Bluetooth*® connectivity the set points can be modified even when the sensor is no longer accessible. In the case of a wireless *Bluetooth*® connection there is the possibility to program the sensor via 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 Sensor Technology 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 operating system available in the future. Please take notice of delivery.

## TECHNICAL DATA

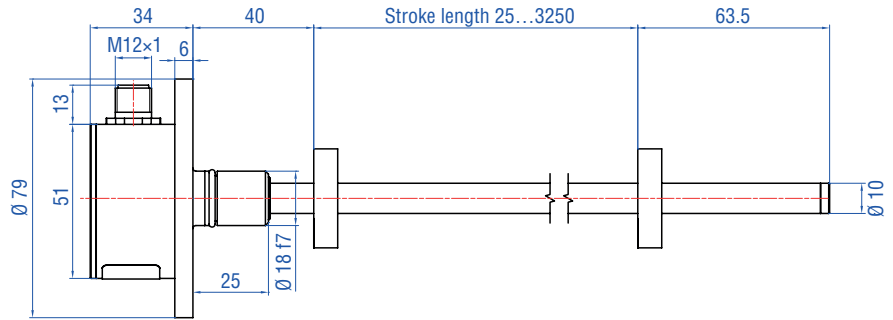
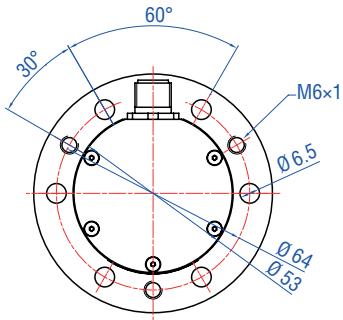
Input	
Measured value	position
Stroke length	25...3250 mm
Output	
Voltage	0...10 VDC and 10...0 VDC (min. load controller: > 5 kOhms)
Current	4(0)...20 mA or 20...4(0) mA (min./max. load: 0/500 Ohms)
Programming	programming of set points using optional accessories <sup>2</sup>
Accuracy	
Resolution	16 bit (minimum 1 µm)
Linearity	< ±0.02 % F.S. (minimum ±60 µm)
Repeatability	≤ ±0.005 % F.S. (minimum ±20 µm)
Sample rate	up to 1200 mm: 0.5 ms up to 2400 mm: 1 ms > 2400 mm: 2 ms
Operating conditions	
Magnet movement velocity	any
Operating temperature	-40...+90 °C, Option -40...+100 °C
Operating pressure	350 bar, 700 bar peak (at 10×1 min)
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>
Design/Material	
Sensor electronics housing	stainless steel 1.4305 / AISI 303 <sup>3</sup>
Sensor rod with flange	stainless steel 1.4306; 1.4307 / AISI 304 L
Position magnet	ring magnet, PA ferrite
Installation	
Mounting position	any
Mounting	fitting flange Ø 18 f7, 6 bores for machine screws (ISO 4762)
Electrical connection	
Connection type	cable gland M12 a-code (5 pin) M16 (6 pin)
Operating voltage	+24 VDC (+20 % / -15 %)
Current consumption	100 mA typically dependent on stroke length
Ripple	≤ 0.28 Vpp
Dielectric strength	500 VDC (DC ground to machine ground)

<sup>2</sup> Programming via Bluetooth wireless technology is only possible up to an operating temperature of 75 °C

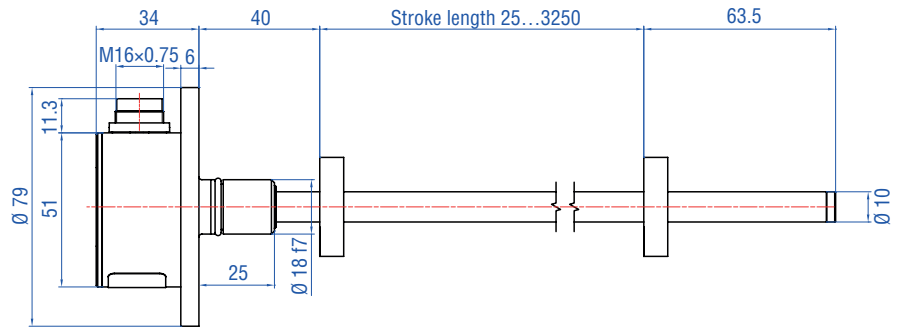
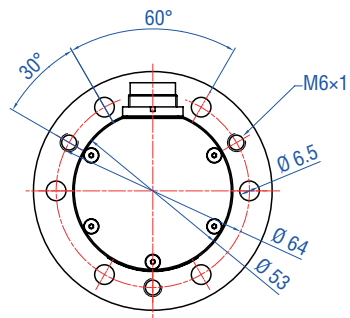
<sup>3</sup> For option **H** (-40...+100 °C) and option **W** (programming via Bluetooth wireless technology) an aluminum cover plate is used

**TECHNICAL DRAWING**

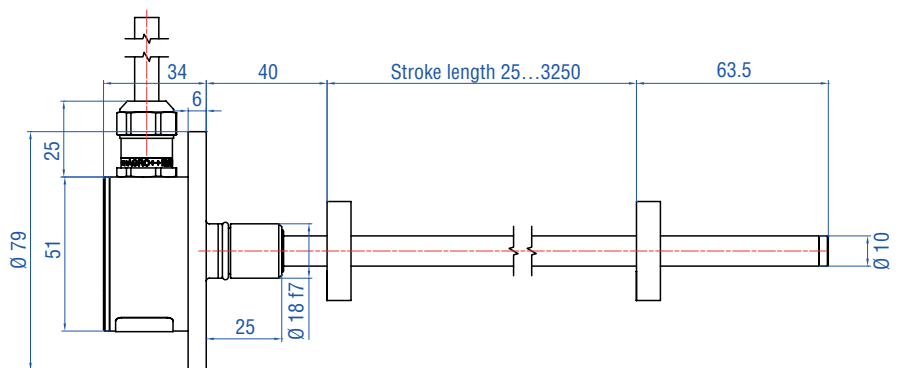
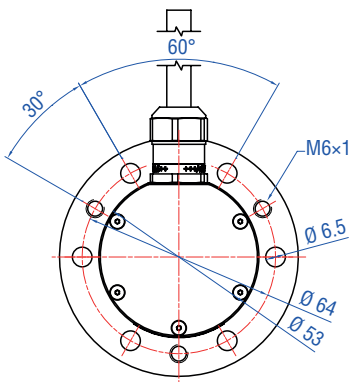
**M12 connector**



**M16 connector**



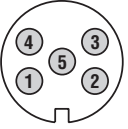
**Cable outlet**



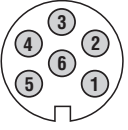
All dimensions in mm

## CONNECTOR WIRING

### M12 connector

D34	Pin	Voltage	Current
	1	+24 VDC (-15/+20 %)	+24 VDC (-15/+20 %)
	2	0...10 V	4(0)...20 mA <i>or</i> 20... 4(0) mA
	3	DC Ground (0 V)	DC Ground (0 V)
	4	10...0 V	n.c.
	5	DC Ground	DC Ground

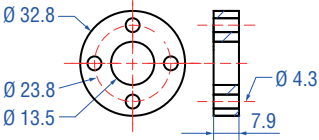
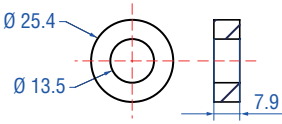
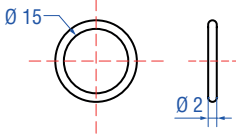
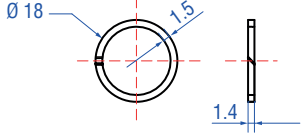
### M16 connector

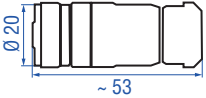
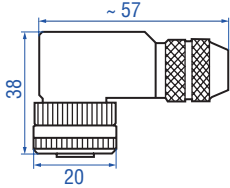

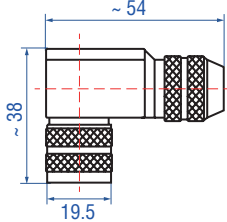
D60	Pin	Voltage	Current
	1	0...10 V	4(0)...20 mA <i>or</i> 20... 4(0) mA
	2	DC Ground	DC Ground
	3	10...0 V	n.c.
	4	DC Ground	DC Ground
	5	+24 VDC (-15/+20 %)	+24 VDC (-15/+20 %)
	6	DC Ground (0 V)	DC Ground (0 V)

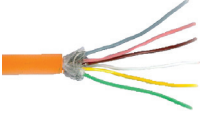
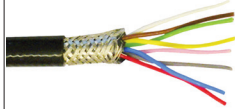

### Cable outlet

Cable	Voltage	Current
GY	0...10 V	4(0)...20 mA <i>or</i> 20... 4(0) mA
PK	DC Ground	DC Ground
YE	10...0 V	n.c.
GN	DC Ground	DC Ground
BN	+24 VDC (-15/+20 %)	+24 VDC (-15/+20 %)
WH	DC Ground (0 V)	DC Ground (0 V)

## ACCESSORIES

Position magnets <sup>4</sup>		Optional installation hardware <sup>4</sup>	
			
<b>Ring magnet OD33</b> <b>Part no. 201 542-2</b>	<b>Ring magnet OD25,4</b> <b>Part no. 400 533</b>	<b>O-ring</b> <b>Part no. 560 853</b>	<b>Back-up ring</b> <b>Part no. 561 115</b>
Material: PA ferrite GF20 Weight: ca. 14 g Operating temperature: -40...+100 °C Surface pressure: max. 40 N/mm <sup>2</sup> Fastening torque for M4 screws: max. 1 Nm	Material: PA ferrite Weight: ca. 10 g Operating temperature: -40...+100 °C Surface pressure: max. 40 N/mm <sup>2</sup>	Material: Fluoroelastomer 75 ± 5 durometer	Material: PTFE + 60 % bronze

Cable connectors <sup>4,5</sup>			
			
<b>Female, straight, 5 pin M12</b> <b>Part no. 370 677</b>	<b>Female, angled, 5 pin M12</b> <b>Part no. 370 678</b>	<b>Female, straight, 6 pin M16</b> <b>Part no. 370 423</b>	<b>Female, angled, 6 pin M16</b> <b>Part no. 370 460</b>
Housing: GD-Zn, Ni / IP67 Termination: screw; max. 0.75 mm <sup>2</sup> Contact insert: CuZn Cable Ø: 4...8 mm	Housing: GD-Zn, Ni / IP67 Termination: screw; max. 0.75 mm <sup>2</sup> Contact insert: CuZn Cable Ø: 5...8 mm	Housing: zinc nickel plated Termination: solder Contact insert: silver plated Cable clamp: PG9 Cable Ø: 6...8 mm	Housing: zinc nickel plated Termination: solder Contact insert: silver plated Cable Ø: 6...8 mm

Cable			Programming tools
			<b>Analog hand programmer</b> <b>Part no. 253 124</b>
<b>Cable</b> <b>Part no. 530 052</b>	<b>Cable</b> <b>Part no. 530 112</b>	<b>Cable</b> <b>Part no. 530 113</b>	<b>Analog cabinet programmer</b> <b>Part no. 253 408</b>
Dimensions: 3 × 2 × 0.25 mm <sup>2</sup> Cable Ø: 6.4 mm Material: PUR jacket; orange Operating temperature: -30...+80 °C Twisted pair shielded	Dimensions: 4 × 2 × 0.25 mm <sup>2</sup> Cable Ø: 7.6 mm Material: Teflon® jacket; black Operating temperature: -100...+180 °C Twisted pair shielded	Dimensions: 3 × 2 × 0.25 mm <sup>2</sup> Cable Ø: 7.2 mm Material: silicone coating Operating temperature: -50...180 °C Twisted pair shielded	<b>Programming kit</b> <b>Part no. 254 555</b>

<sup>4/</sup> All dimensions in mm  
<sup>5/</sup> Max. fastening torque: 0.6 Nm

## ORDER CODE

<b>G</b>	<b>B</b>	<b>S</b>				<b>M</b>			<b>1</b>					
		<b>a</b>	<b>b</b>				<b>c</b>			<b>d</b>	<b>e</b>		<b>f</b>	<b>g</b>

<b>a</b>	<b>Type of flange</b>
<b>S</b>	Rod with fitting flange Ø 18 mm, 10 mm rod

<b>b</b>	<b>Stroke length</b>
<b>X</b> <b>X</b> <b>X</b> <b>X</b>	25...3250 mm

<b>c</b>	<b>Connector type</b>
<b>D</b> <b>3</b> <b>4</b>	5 pin M12 male connector
<b>D</b> <b>6</b> <b>0</b>	6 pin M16 male connector
<b>H</b> <b>X</b> <b>X</b>	PUR cable (suitable for max. operation temperature of 80 °C) H01...H10 (1...10 m)
<b>T</b> <b>X</b> <b>X</b>	Teflon cable T01...T10 (1...10 m)
<b>V</b> <b>X</b> <b>X</b>	Silicone cable V01...V10 (1...10 m)

<b>d</b>	<b>Operating voltage</b>
<b>1</b>	+24 VDC, +20 %, -15 %

<b>e</b>	<b>Output</b>
<b>V</b> <b>0</b>	0...10 V and 10...0 V
<b>A</b> <b>0</b>	4...20 mA
<b>A</b> <b>1</b>	20...4 mA
<b>A</b> <b>2</b>	0...20 mA
<b>A</b> <b>3</b>	20...0 mA

<b>f</b>	<b>Operating temperature</b>
<b>S</b>	-40...+90 °C
<b>H</b>	-40...+100 °C

<b>g</b>	<b>Programming</b>
<b>C</b>	Via cable
<b>W</b>	Via Bluetooth wireless technology

## STANDARD STROKE LENGTH GBS

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

## DELIVERY



Sensor

Accessories have to be ordered separately.

**Document Part Number:**  
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**ISO 9001**  
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