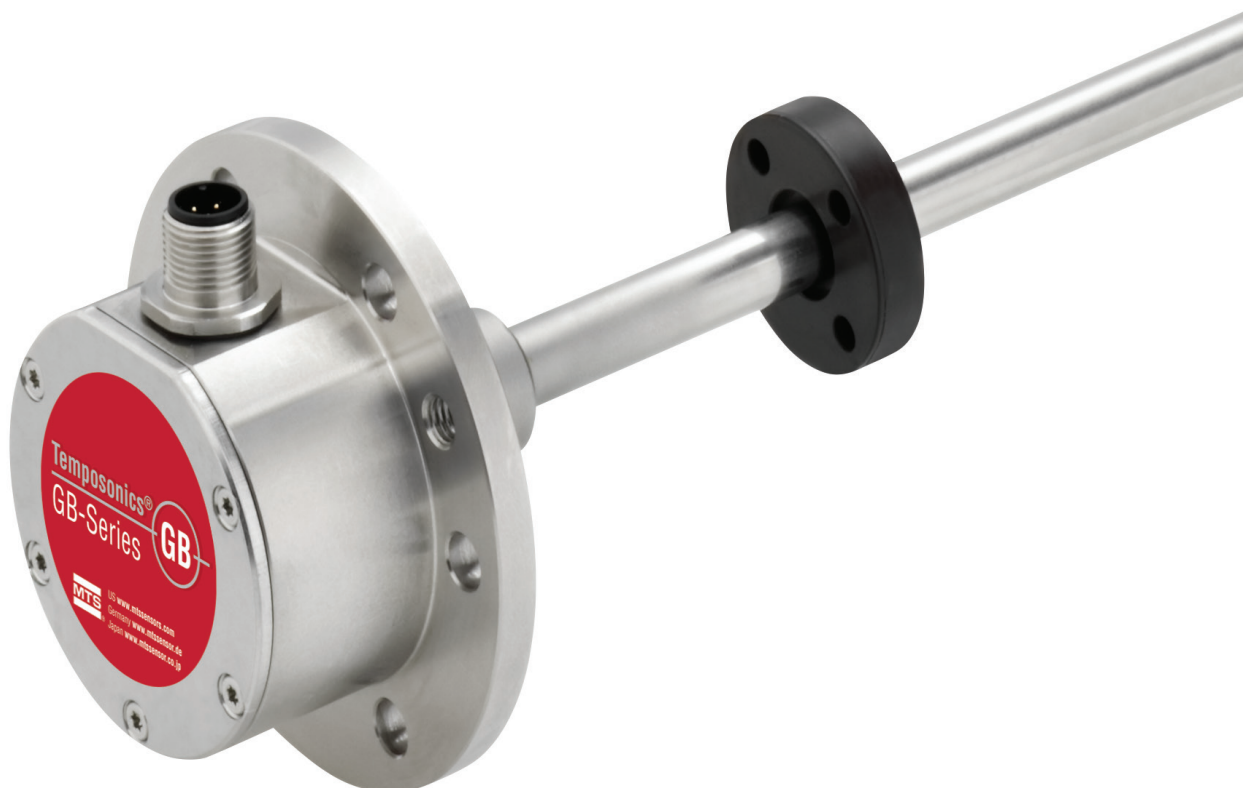


# Temposonics®

Magnetostrictive Linear Position Sensors

## DATA SHEET GBS SSI

- 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 electronics housing. The result is a reliable position measurement with high accuracy and repeatability.

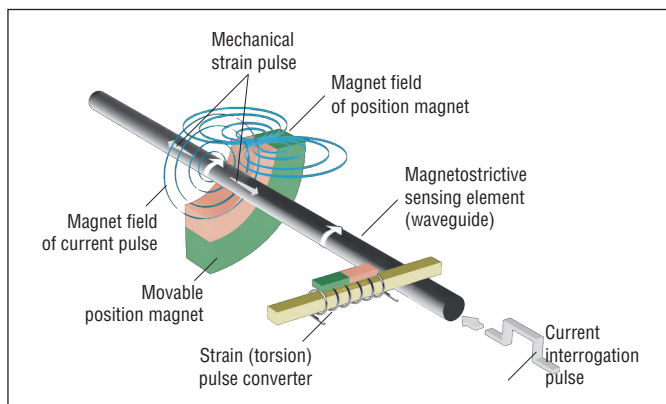


Fig. 1: Measuring principle

## 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 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® 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.




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. Take notice of delivery.

## TECHNICAL DATA

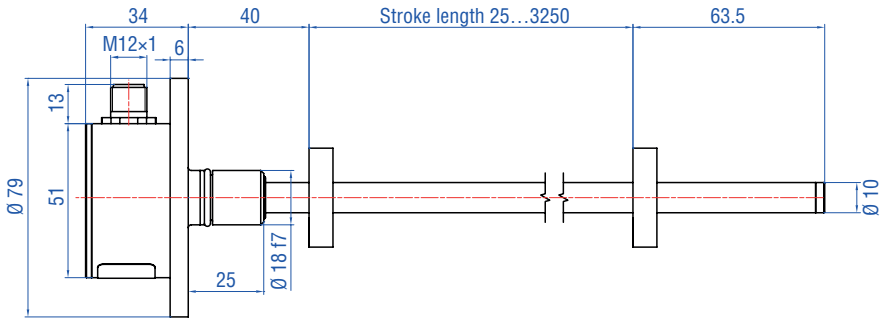
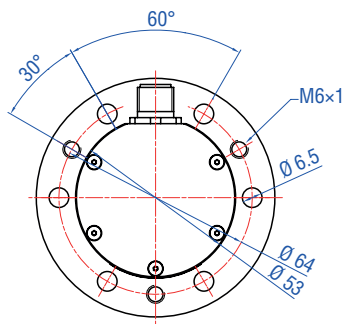
| Input                                  |   |         |           |           |                     |
|--|---|---------|-----------|-----------|---------------------|
| Measured value                         | Position  |         |           |           |                     |
| Stroke length                          | 25...3250 mm  |         |           |           |                     |
| Output                                 |   |         |           |           |                     |
| Interface                              | SSI (Synchronous Serial Interface) – Differential signal in SSI standard  |         |           |           |                     |
| Output format                          | Binary or gray  |         |           |           |                     |
| Data length                            | 24; 25 bit  |         |           |           |                     |
| Sample rate                            | Up to 3.7 kHz depending on stroke length<br>70 kBaud...1 MBaud, depending on cable length   |         |           |           |                     |
| Data transmission rate (ms)            | Cable length  | < 3     | < 50      | < 100     | < 200 < 400 m       |
|  | Baudrate  | 1.0 MBd | < 400 kBd | < 300 kBd | < 200 kBd < 100 kBd |
| Programming                            | Programming of set points using optional accessories <sup>2</sup>   |         |           |           |                     |
| Accuracy                               |   |         |           |           |                     |
| Resolution                             | Min. resolution 5 µm  |         |           |           |                     |
| Linearity                              | ≤ ±0.02 % F.S. (minimum ±60 µm)   |         |           |           |                     |
| Repeatability                          | ≤ ±0.005 % F.S. (minimum ±20 µm)  |         |           |           |                     |
| 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<br>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<br>Electromagnetic immunity according to EN 61000-6-2<br>The sensor meets the requirements of the EC directives and is marked with  |         |           |           |                     |
| Design/Material                        |   |         |           |           |                     |
| Sensor electronics housing with flange | Stainless steel 1.4305 / AISI 303 <sup>3</sup>  |         |           |           |                     |
| Sensor rod                             | Stainless steel 1.4306; 1.4307 / AISI 304L  |         |           |           |                     |
| 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 outlet<br>M12 a-coded (8 pin)<br>M16 (7 pin)  |         |           |           |                     |
| Operating voltage                      | 24 VDC (+20 % / –15 %)  |         |           |           |                     |
| Current consumption                    | Typ. 90 mA  |         |           |           |                     |
| Ripple                                 | ≤ 0.28 Vpp  |         |           |           |                     |
| 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 only possible up to an operating temperature of +75 °C

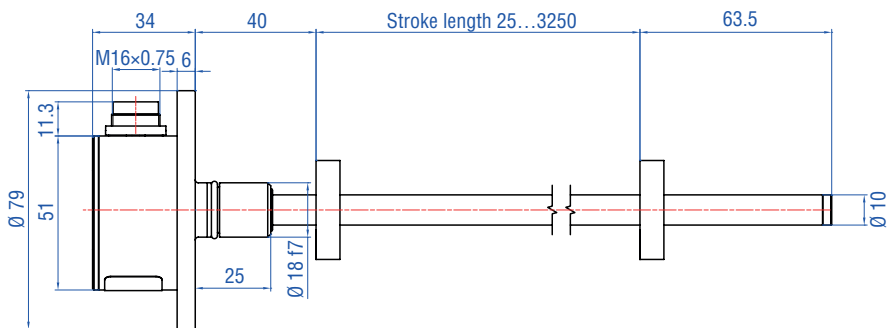
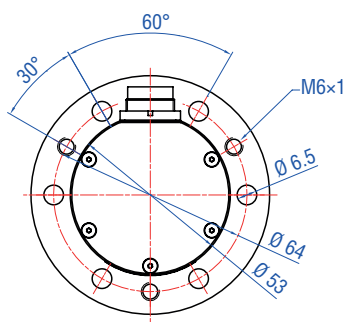
<sup>3</sup> For option **H** (–40...+100 °C) and option **W** (programming via Bluetooth wireless technology) an aluminum cover plate is used

TECHNICAL DRAWING

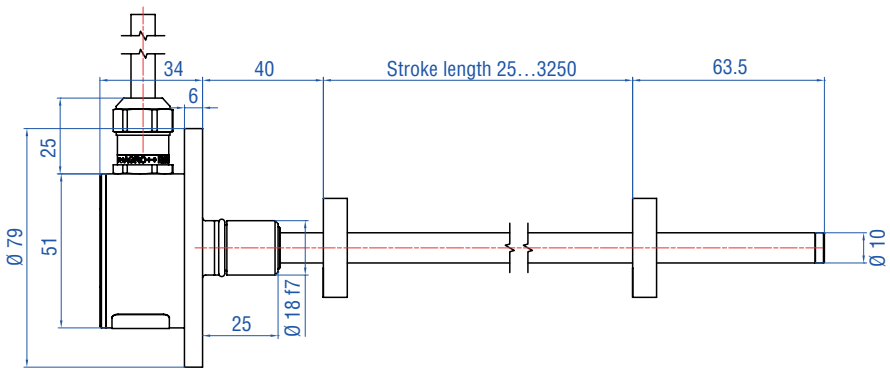
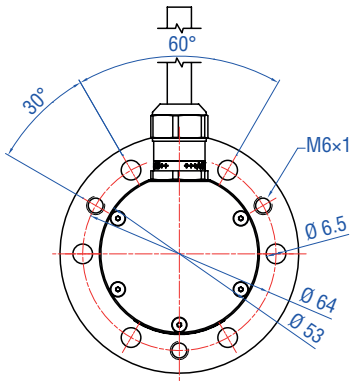
M12 connector



M16 connector



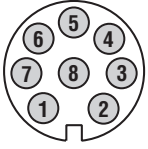
Cable outlet



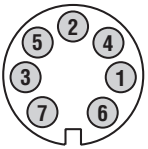
All dimensions in mm

## CONNECTOR WIRING

### M12 connector

| D84   | Pin | Function  |
|---|-----|-----------|
|  | 1   | Clock (+) |
|   | 2   | Clock (-) |
|   | 3   | Data (+)  |
|   | 4   | Data (-)  |
|   | 5   | n.c.      |
|   | 6   | n.c.      |
|   | 7   | +24 VDC   |
|   | 8   | 0 V (GND) |

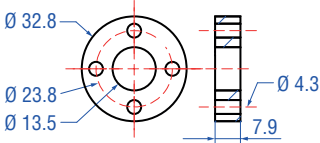
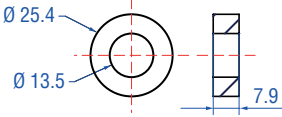
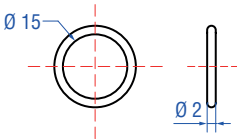
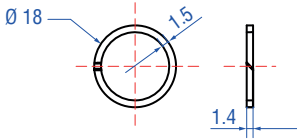
### M16 connector

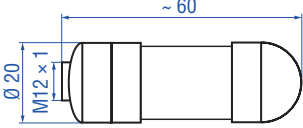
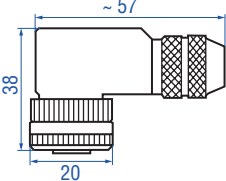
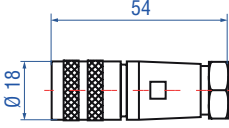
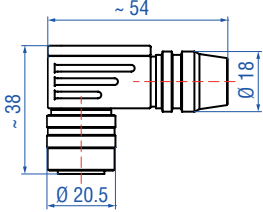
| D70  | Pin | Function  |
|--|-----|-----------|
|  | 1   | Data (-)  |
|  | 2   | Data (+)  |
|  | 3   | Clock (+) |
|  | 4   | Clock (-) |
|  | 5   | +24 VDC   |
|  | 6   | 0 V (GND) |
|  | 7   | n.c.      |

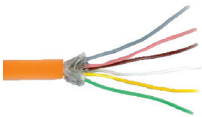
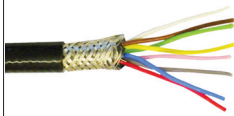


### Cable outlet

| Cable | Function  |
|-------|-----------|
| GY    | Data (-)  |
| PK    | Data (+)  |
| YE    | Clock (+) |
| GN    | Clock (-) |
| BN    | +24 VDC   |
| WH    | 0 V (GND) |

## ACCESSORIES

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

| Cable connectors <sup>4,5</sup>  |  |  |  |
|--|--|--|--|
|                                |                                    |   |                      |
| <b>Female, straight, 8 pin, M12</b><br><b>Part no. 370 694</b>   | <b>Female, angled, 8 pin, M12</b><br><b>Part no. 370 699</b>   | <b>Female, straight, 7 pin, M16</b><br><b>Part no. 370 624</b>   | <b>Female, angled, 7 pin, M16</b><br><b>Part no. 560 779</b>   |
| Housing: GD-ZnAL / IP67<br>Termination: screw; 0.75 mm <sup>2</sup><br>Contact insert: CuZn<br>Cable Ø: 4...9 mm | Housing: GD-ZnAL / IP67<br>Termination: screw; max. 0.5 mm <sup>2</sup><br>Contact insert: CuZn<br>Cable Ø: 6...8 mm | Housing: zinc nickel plated<br>Termination: solder<br>Contact insert: silver plated<br>Cable clamp: PG9<br>Cable Ø: 6...8 mm | Housing: zinc nickel plated<br>Termination: solder<br>Contact insert: silver plated<br>Cable Ø: 6...8 mm |

| Cable   |  | Programming tools   |   |
|---|--|---|---|
|    |   |   |  |
| <b>Cable</b><br><b>Part no. 530 052</b>   | <b>Cable</b><br><b>Part no. 530 112</b>  | <b>Cable</b><br><b>Part no. 530 113</b>   | <b>Programming kit</b><br><b>Part no. 254 590</b>                                     |
| Dimensions: 3 × 2 × 0.25 mm <sup>2</sup><br>Cable Ø: 6.4 mm<br>Material: PUR jacket; orange<br>Operating temperature: -30...+80 °C<br>Twisted pair shielded | Dimensions: 4 × 2 × 0.25 mm <sup>2</sup><br>Cable Ø: 7.6 mm<br>Material: Teflon® jacket; black<br>Operating temperature: -100...+180 °C<br>Twisted pair shielded | Dimensions: 3 × 2 × 0.25 mm <sup>2</sup><br>Cable Ø: 7.2 mm<br>Material: silicone coating<br>Operating temperature: -50...180 °C<br>Twisted pair shielded |   |

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

## ORDER CODE

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

| a | Type of flange                             |
|---|--|
| S | Rod with fitting flange Ø 18 mm, 10 mm rod |

| b       | Stroke length |
|---------|---------------|
| X X X X | 25...3250 mm  |

| c     | Connection type  |
|-------|--|
| D 8 4 | 8 pin M12 connector  |
| D 7 0 | 7 pin M16 connector  |
| H X X | PUR Cable (suitable for max. operation temperature of 80 °C)<br>H01...H10 (1...10 m) |
| T X X | Teflon Cable T01...T10 (1...10 m)  |
| V X X | Silicone Cable V01...V10 (1...10 m)  |

| d | Operating voltage     |
|---|-----------------------|
| 1 | +24 VDC, +20 %, -15 % |

| e   | Output   |
|---|--|
| <b>S (1) (2) (3) (4) (5) (6) = Synchronous Serial Interface</b> |  |
| <b>Data length (field no. 1)</b>                                |  |
| 1   | 25 bit   |
| 2   | 24 bit   |
| <b>Output format (field no. 2)</b>                              |  |
| G   | Gray   |
| B   | Binary   |
| <b>Resolution (field no. 3)</b>                                 |  |
| 1   | 0.005 mm   |
| 2   | 0.01 mm  |
| 3   | 0.05 mm  |
| 4   | 0.1 mm   |
| 5   | 0.02 mm  |
| <b>Filter (field no. 4)</b>                                     |  |
| 1   | No filter  |
| 2   | Average filter 2                                       |
| 3   | Average filter 4                                       |
| 4   | Average filter 8                                       |
| <b>Performance (field no. 5, 6)</b>                             |  |
| 0 0   | Measuring direction forward, asynchronised measurement |
| 0 1   | Measuring direction reverse, asynchronised measurement |
| 0 2   | Measuring direction forward, synchronised measurement  |
| 0 3   | Measuring direction reverse, synchronised measurement  |

| f | Operating temperature |
|---|-----------------------|
| S | -40...+90 °C          |
| H | -40...+100 °C         |

| g | Programming                       |
|---|-----------------------------------|
| C | Via cable                         |
| W | 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:**  
551630 Revision A (EN) 10/2014

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