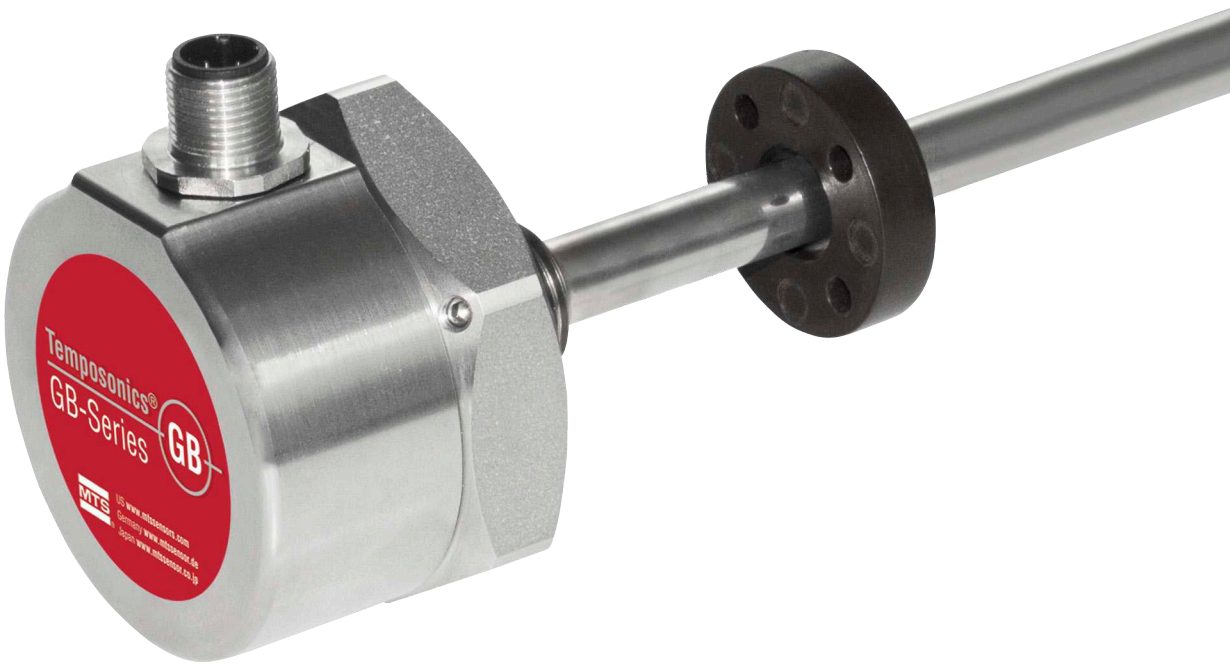
MTS SENSORS

Temposonics®

Magnetostrictive Linear Position Sensors

GB-M / GB-T Analog
Data Sheet

– Sensor element and electronics can be changed
– Flat & compact sensor electronics housing
– Electrical connection is freely rotatable



MEASURING TECHNOLOGY

The absolute, linear position sensors provided by MTS Sensors rely on the company's proprietary Temposonics® magnetostrictive technology, which can determine position with a high level of precision and robustness. Each Temposonics® position sensor consists of a ferromagnetic waveguide, a position magnet, a strain pulse converter and supporting electronics. The magnet, connected to the object in motion in the application, generates a magnetic field at its location on the waveguide. A short current pulse is applied to the waveguide. This creates a momentary radial magnetic field and torsional strain on the waveguide. The momentary interaction of the magnetic fields releases a torsional strain pulse that propagates the length of the waveguide. When the ultrasonic wave reaches the end of the waveguide it is converted into an electrical signal. Since the speed of the ultrasonic wave in the waveguide is precisely known, the time required to receive the return signal can be converted into a linear position measurement with both high accuracy and repeatability.

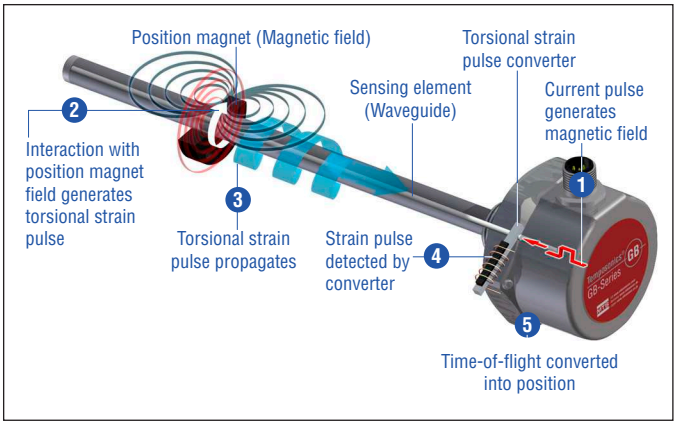


Fig. 1: Time-of-flight based magnetostrictive position sensing principle

GB-M / GB-T SENSOR

Robust, non-contact and wear free, the Temposonics® linear position sensors provide the 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.

The GB-M / GB-T is an extension of the GB-Series. Its compact housing can be easily mounted, even if there is only limited space. Due to the high temperature resistance, no measures for cooling the sensor have to be taken – saving you time and work. Further advantages of the GB-M / GB-T sensor are:

TURN ME.

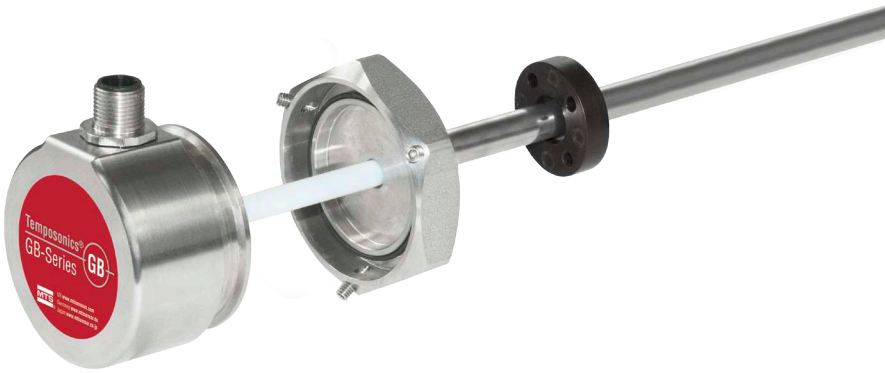
The sensor electronics housing with its electrical connection can be rotated 360 degrees after mounting to easily achieve the necessary connection orientation.

REPLACE ME.

If needed, the sensor element and electronics can be replaced without interrupting the hydraulic circuit – resulting in lower maintenance costs and reduced downtime.

PROGRAM ME.

The start position and end position of the measurement range are programmable, e.g. via programming kit, allowing users to adjust to meet the application requirements.



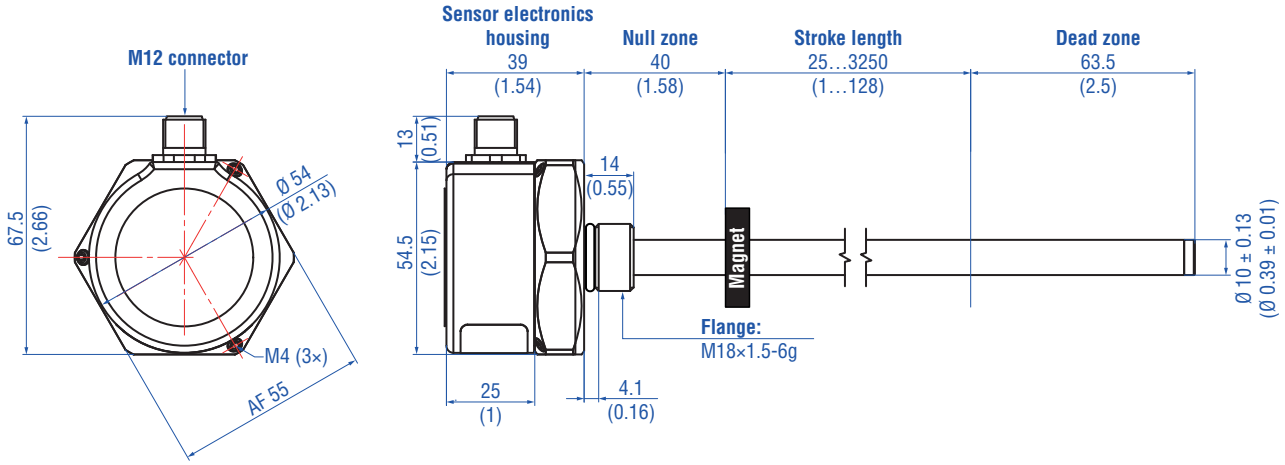
TECHNICAL DATA

Output	
Voltage	0…10 VDC and 10…0 VDC (min. load controller: > 5 kΩ)
Current	4(0)…20 mA or 20…4(0) mA (min. / max. load: 0 / 500 Ω)
Programming	Programming of set points using optional accessories [1]
Bluetooth® version	2.1
Measured value	Position
Measurement parameters	
Resolution	16 bit (minimum 1 µm depending on stroke length)
Cycle time	≤ 1200 mm: 0.5 ms ≤ 2400 mm: 1.0 ms > 2400 mm: 2.0 ms
Linearity	≤ ±0.02 % F.S. (minimum ±60 µm) typically
Repeatability	≤ ±0.005 % F.S. (minimum ±20 µm) typically
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 CE.
Magnet movement velocity	Any
Design/Material	
Sensor electronics housing [2]	Stainless steel 1.4305 (AISI 303)
Sensor rod	Stainless steel 1.4306; 1.4307 (AISI 304L)
Stroke length	25…3250 mm (1…128 in.)
Operating pressure	350 bar (5076 psi), 700 bar (10153 psi) peak (at 10 × 1 min)
Mechanical mounting	
Mounting position	Any
Mounting instruction	Please consult the technical drawings and the operation manual (document number: 551511)
Electrical connection	
Connection type	M12 (5 pin) male connector A-coded M16 (6 pin) male connector Cable outlet
Operating voltage	+24 VDC (–15 / +20 %)
Ripple	≤ 0.28 V_{pp}
Current consumption	100 mA typically dependent on stroke length
Dielectric strength	500 VDC (DC ground to machine ground)
Polarity protection	Up to –30 VDC
Overvoltage protection	Up to 36 VDC

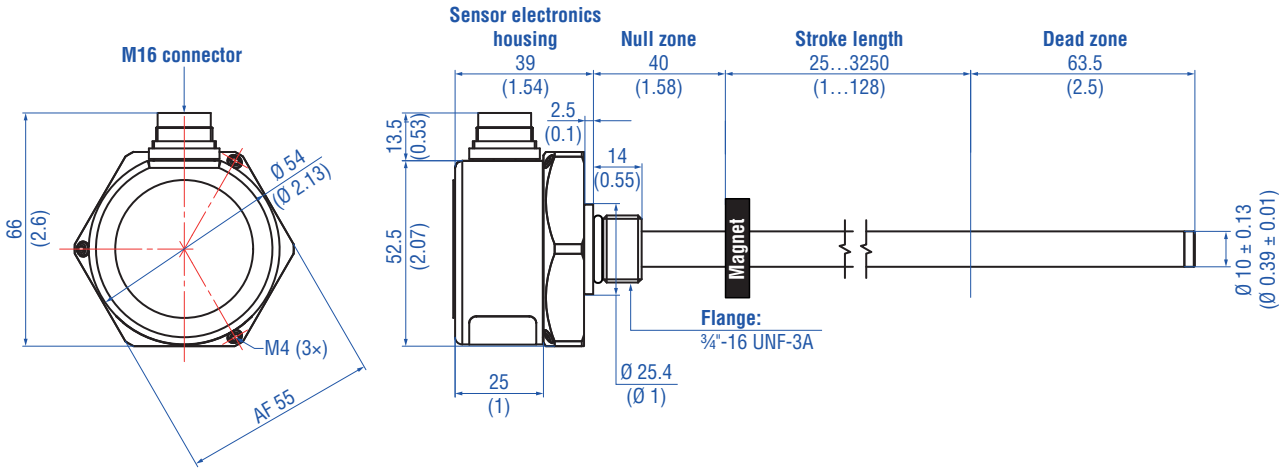
1/ Programming via Bluetooth wireless technology is disabled from operating temperature typically > +55 °C (> +131 °F)
2/ For option H (–40…+100 °C / –40…+212 °F) and option W (programming via Bluetooth wireless technology) an aluminum cover plate is used

TECHNICAL DRAWING

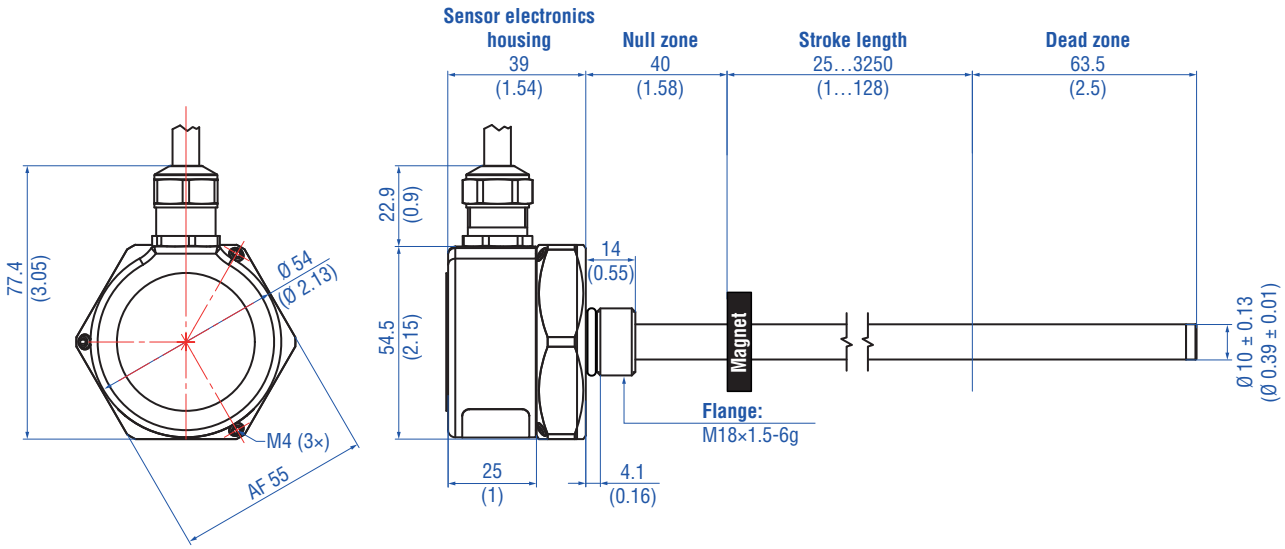
M12 connector (Example: With flat-faced flange)



M16 connector (Example: With raised-faced flange)



Cable outlet (Example: With flat-faced flange)



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

CONNECTOR WIRING

M12 connector

D34	Pin	Voltage	Current
	1	+24 VDC (–15 / +20 %)	+24 VDC (–15 / +20 %)
	2	0…10 VDC	4(0)…20 mA or 20… 4(0) mA
	3	DC Ground (0 V)	DC Ground (0 V)
	4	10…0 VDC	Not connected [3]
	5	DC Ground	DC Ground

M16 connector

D60	Pin	Voltage	Current
	1	0…10 VDC	4(0)…20 mA or 20… 4(0) mA
	2	DC Ground	DC Ground
	3	10…0 VDC	Not connected [3]
	4	DC Ground	DC Ground
	5	+24 VDC (–15 / +20 %)	+24 VDC (–15 / +20 %)
	6	DC Ground (0 V)	DC Ground (0 V)

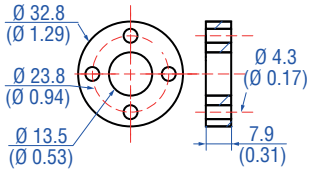
Cable outlet

Cable	Voltage	Current
GY	0…10 VDC	4(0)…20 mA or 20… 4(0) mA
PK	DC Ground	DC Ground
YE	10…0 VDC	Not connected [3]
GN	DC Ground	DC Ground
BN	+24 VDC (–15 / +20 %)	+24 VDC (–15 / +20 %)
WH	DC Ground (0 V)	DC Ground (0 V)

3/ Connection necessary for programming with hand or cabinet programmer

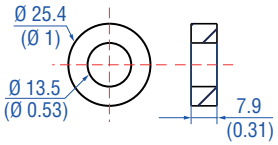
FREQUENTLY ORDERED ACCESSORIES – Additional options available in our Accessories Guide 551444

Position magnets



Standard ring magnet
Part no. 201 542-2

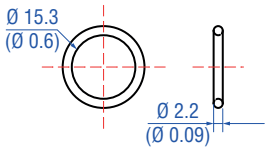
Material: PA ferrite GF20
Weight: Ca. 14 g
Operating temperature:
–40…+105 °C (–40…+221 °F)
Surface pressure: Max. 40 N/mm²
Fastening torque for M4 screws: 1 Nm



Ring magnet OD25.4
Part no. 400 533

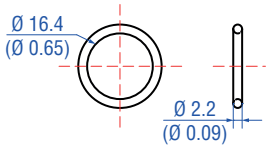
Material: PA ferrite
Weight: Ca. 10 g
Operating temperature:
–40…+105 °C (–40…+221 °F)
Surface pressure: Max. 40 N/mm²

Optional installation hardware



O-ring
Part no. 401 133

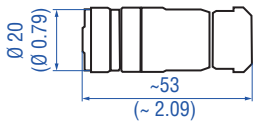
Material: Fluoroelastomer
75 ± 5 durometer
Application: Flange M18×1.5



O-ring
Part no. 560 315

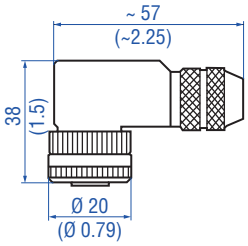
Material: Fluoroelastomer
75 ± 5 durometer
Application: Flange ¾"-16 UNF

Cable connectors [4]



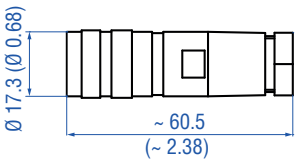
M12 (5 pin) female straight
Part no. 370 677

Housing: GD-Zn, Ni / IP67
Termination: Screw; max. 0.75 mm²
Contact insert: CuZn
Cable Ø: 4…8 mm (0.16…0.31 in.)
Fastening torque: 0.6 Nm



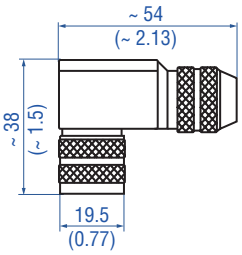
M12 (5 pin) female angled
Part no. 370 678

Housing: GD-Zn, Ni / IP67
Termination: Screw; max. 0.75 mm²
Contact insert: CuZn
Cable Ø: 5…8 mm (0.2…0.31 in.)
Fastening torque: 0.6 Nm



M16 (6 pin) female straight
Part no. 370 423

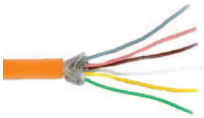
Housing: Zinc nickel plated
Termination: Solder
Contact insert: Silver plated
Cable clamp: PG9
Cable Ø: 6…8 mm (0.24…0.32 in.)
Fastening torque: 0.6 Nm



M16 (6 pin) female angled
Part no. 370 460

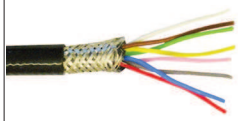
Housing: Zinc nickel plated
Termination: Solder
Contact insert: Silver plated
Cable Ø: 6…8 mm (0.24…0.32 in.)
Fastening torque: 0.6 Nm

Cables



Cable
Part no. 530 052

Dimensions: 3 × 2 × 0.25 mm²
Cable Ø: 6.4 mm (0.25 in.)
Material: PUR jacket; orange
Operating temperature:
–30…+80 °C (–22…+176 °F)
Twisted pair shielded



Cable
Part no. 530 112

Dimensions: 4 × 2 × 0.25 mm²
Cable Ø: 7.6 mm (0.3 in.)
Material: Teflon® jacket; black
Operating temperature:
–100…+180 °C (–148…+356 °F)
Twisted pair shielded

Cable
Part no. 530 113

Dimensions: 3 × 2 × 0.25 mm²
Cable Ø: 7.2 mm (0.28 in.)
Material: Silicone jacket; red
Operating temperature:
–50…+180 °C (–58…+356 °F)
Twisted pair shielded

Programming tools

Analog hand programmer
Part no. 253 124

Analog cabinet programmer
Part no. 253 408

Programming kit
Part no. 254 555

Controlling design dimensions are in millimeters and measurements in ( ) are in inches
4/ Follow the manufacturer's mounting instructions when connecting the connectors

ORDER CODE

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

a	Sensor model
G B	Rod

b	Design
B	Base unit for flange »M« and flange »T«
M	Flat-faced flange, M18×1.5-6g
T	Raised-faced flange, ¾"-16 UNF-3A

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 3 4	M12 (5 pin) male connector
D 6 0	M16 (6 pin) male connector
H X X	PUR cable (part no. 530 052) (suitable for max. operating temperature of +80 °C (+176 °F)) H01…H10 (1…10 m / 3…33 ft) [5] **See "Frequently ordered accessories" for cable specifications**
T X X	Teflon® cable (part no. 530 112) T01…T10 (1…10 m / 3…33 ft) [5] **See "Frequently ordered accessories" for cable specifications**
V X X	Silicone cable (part no. 530 113) V01…V10 (1…10 m / 3…33 ft) [5] **See "Frequently ordered accessories" for cable specifications**

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

f	Output
V 0	0…10 VDC and 10…0 VDC
A 0	4…20 mA
A 1	20…4 mA
A 2	0…20 mA
A 3	20…0 mA

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

GB-B: Sensor

GB-M / GB-T: Sensor, O-ring

Accessories have to be ordered separately.

Operation manuals & software are available at:
www.mtssensors.com

*/ Non standard stroke lengths are available; must be encoded in 5 mm / 0.1 in. increments
5/ Encode in meters if using metric stroke length. Encode in feet if using US customary stroke length.

MTS®
SENSORS

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