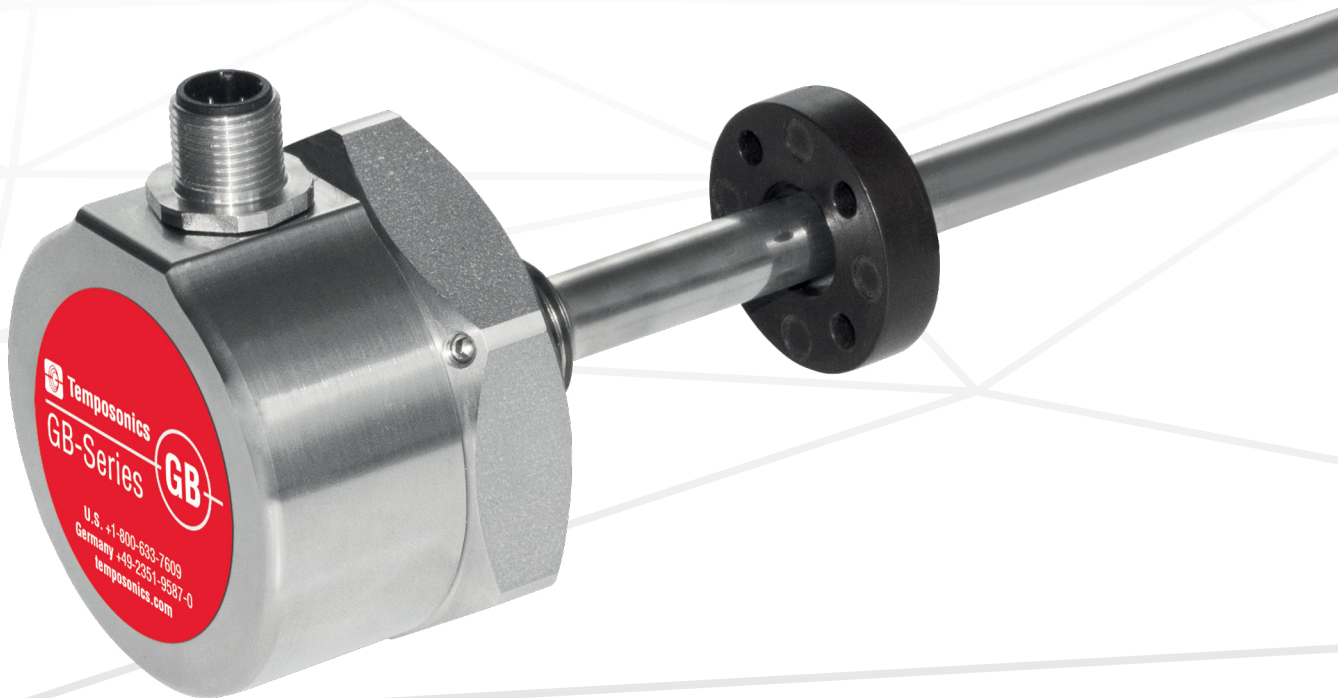


Data Sheet

GB with threaded flange Analog

Magnetostrictive Linear Position Sensors

- 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 Temposonics rely on the company's proprietary 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 beginning 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.

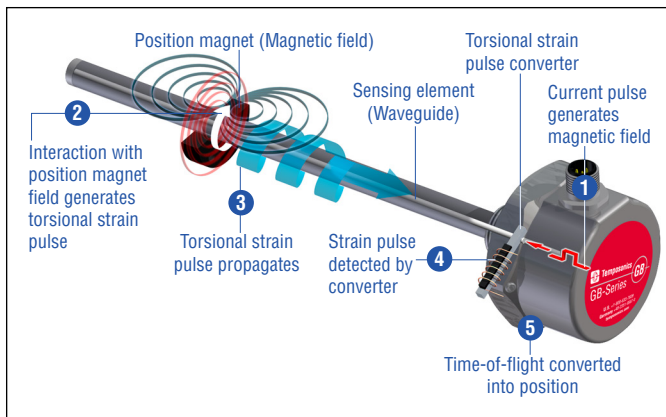


Fig. 1: Time-of-flight based magnetostrictive position sensing principle

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 high quality of the in-house manufactured waveguide forms the basis for precise measurements. 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 Temposonics® 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 (minimum load controller: > 5 kΩ)			
Current	4(0)...20 mA or 20...4(0) mA (minimum/maximum load: 0/500 Ω)			
Programming	Programming of set points using optional accessories			
Measured value	Position			
Measurement parameters				
Resolution	16 bit (minimum 1 μm depending on stroke length) ¹			
Cycle time	Cycle time	0.5 ms	1.0 ms	2.0 ms
	Stroke length	≤ 1200 mm	≤ 2400 mm	> 2400 mm
Linearity deviation ²	≤ ±0.02 % F.S. (minimum ±60 μm) typical			
Repeatability	≤ ±0.005 % F.S. (minimum ±20 μm) typical			
Operating conditions				
Operating temperature	-40...+90 °C (-40...+194 °F); options: -40...+75 °C (+167 °F)/-40...+100 °C (+212 °F)			
Ingress protection	IP67 (connectors correctly fitted)/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 (excluding resonant frequencies)			
EMC test	Electromagnetic emission according to EN 61000-6-4			
	Electromagnetic immunity according to EN 61000-6-2 The GB sensors fulfill the requirements of the EMC directives 2014/30/EU, UKSI 2016 No. 1091 and TR CU 020/2011			
Operating pressure	350 bar (5,076 psi), 700 bar (10,153 psi) peak (at 10 × 1 min)			
Magnet movement velocity	Any			
Design/Material				
Sensor electronics housing ³	Stainless steel 1.4305 (AISI 303)			
Sensor flange	Stainless steel 1.4305 (AISI 303)			
Sensor rod	Stainless steel 1.4306; 1.4307 (AISI 304L)			
RoHS compliance	The used materials are compliant with the requirements of EU directive 2011/65/EU and EU regulation 2015/863 as well as UKSI 2022 No. 622 with amendments			
Stroke length	25...3250 mm (1...128 in.)			
Mechanical mounting				
Mounting position	Any			
Mounting instruction	Please consult the technical drawings and the operation manual (document number: 551511)			
Electrical connection				
Connection type	M12 male connector (5 pin) or M16 male connector (6 pin) or cable outlet			
Operating voltage	+24 VDC (-15/+20 %); The GB sensors must be power supplied via an external Class 2 power source in accordance with the UL approval			
Ripple	≤ 0.28 V _{pp}			
Current consumption	100 mA typical, 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/ The internal digital value is measured through a 16-bit D/A converter and transferred into a proportional, analog current or voltage signal.

2/ With position magnet # 251 416-2

3/ For option **H** (-40...+100 °C /-40...+212 °F) an aluminum cover plate is used

TECHNICAL DRAWING

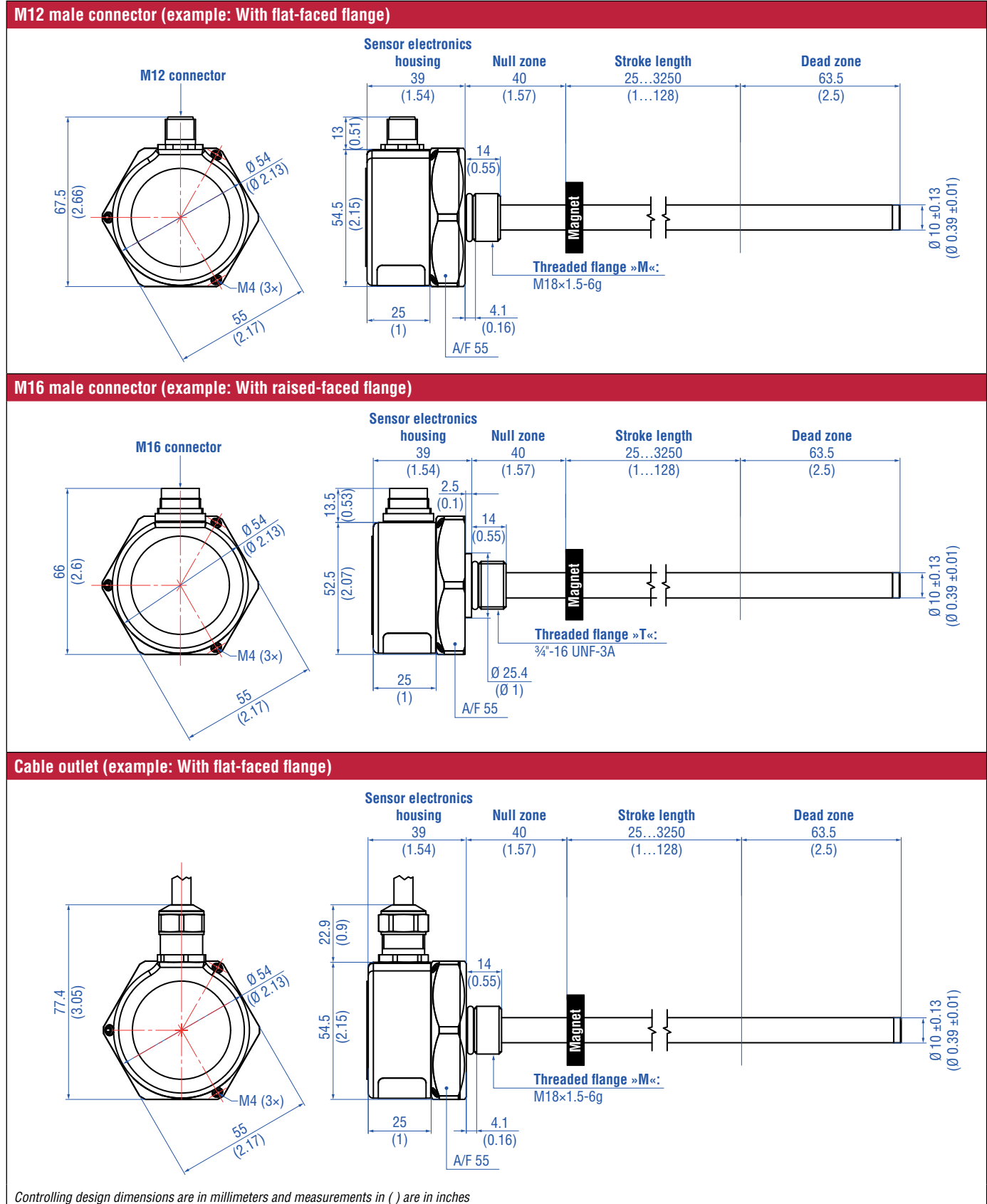
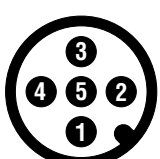


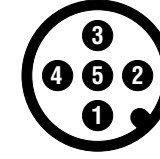
Fig. 2: Temposonics® GB-M/GB-T with ring magnet

CONNECTOR WIRING

D34 (for outputs: V0, A4 in order code)				
Signal + power supply				
M12 male connector (A-coded)	Output	Pin	Voltage	Current
 <p>View on sensor</p>	1	1	+24 VDC (-15 /+20 %)	+24 VDC (-15 /+20 %)
		2	0...10 VDC	4...20 mA *
		3	DC Ground (0 V)	DC Ground (0 V)
	2	4	10...0 VDC	20...4 mA
		5	Signal Ground for Output 1/2	Signal Ground for Output 1/2


*/ Connect the first output to ground, if you only use the second output.

Fig. 3: Connector wiring D34 (M12) for outputs V0, A4

D34 (for outputs: A0, A1, A2, A3 in order code)				
Signal + power supply				
M12 male connector (A-coded)		Pin	Current	
 <p>View on sensor</p>		1	+24 VDC (-15 /+20 %)	
		2	4(0)...20 mA or 20... 4(0) mA	
		3	DC Ground (0 V)	
		4	Do not connect *	
		5	Signal Ground	

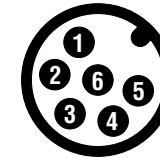
*/ Connection necessary for programming with hand or cabinet programmer.

Fig. 4: Connector wiring D34 (M12) for outputs A0, A1, A2 and A3

D60 (for outputs: V0, A4 in order code)				
Signal + power supply				
M16 male connector	Output	Pin	Voltage	Current
 <p>View on sensor</p>	1	1	0...10 VDC	4...20 mA *
		2	Signal Ground	Signal Ground
	2	3	10...0 VDC	20...4 mA
		4	Signal Ground	Signal Ground
		5	+24 VDC (-15 /+20 %)	+24 VDC (-15 /+20 %)
		6	DC Ground (0 V)	DC Ground (0 V)

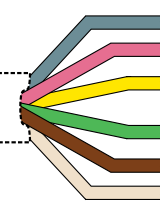
*/ Connect the first output to ground, if you only use the second output.

Fig. 5: Connector wiring D60 (M16) for outputs V0, A4

D60 (for outputs: A0, A1, A2, A3 in order code)				
Signal + power supply				
M16 male connector		Pin	Current	
 <p>View on sensor</p>		1	4(0)...20 mA or 20... 4(0) mA	
		2	Signal Ground	
		3	Do not connect *	
		4	DC Ground	
		5	+24 VDC (-15 /+20 %)	
		6	DC Ground (0 V)	

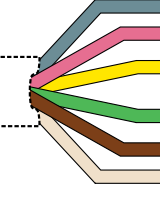
*/ Connection necessary for programming with hand or cabinet programmer.

Fig. 6: Connector wiring D60 (M16) for outputs A0, A1, A2 and A3

HXX/TXX/VXX (for outputs: V0, A4 in order code)				
Signal + power supply				
Cable	Output	Color	Voltage	Current
	1	GY	0...10 VDC	4...20 mA *
		PK	Signal Ground	Signal Ground
	2	YE	10...0 VDC	20...4 mA
		GN	Signal Ground	Signal Ground
		BN	+24 VDC (-15 /+20 %)	+24 VDC (-15 /+20 %)
		WH	DC Ground (0 V)	DC Ground (0 V)

*/ Connect the first output to DC Ground (0 V), if you only use the second output.

Fig. 7: Connector wiring cable outlet for outputs V0, A4

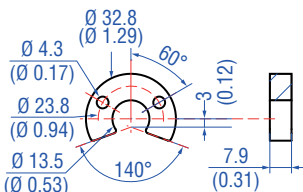
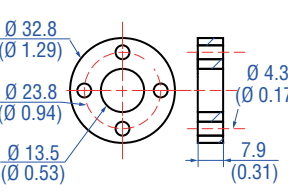
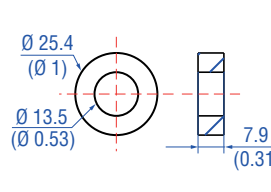
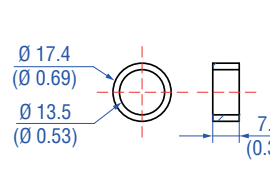
HXX/TXX/VXX (for outputs: A0, A1, A2, A3 in order code)				
Signal + power supply				
Cable		Color	Current	
		GY	4(0)...20 mA or 20... 4(0) mA	
		PK	Signal Ground	
		YE	Do not connect *	
		GN	DC Ground	
		BN	+24 VDC (-15 /+20 %)	
		WH	DC Ground (0 V)	

*/ Connection necessary for programming with hand or cabinet programmer.

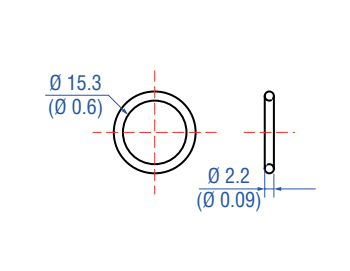
Fig. 8: Connector wiring cable outlet for outputs A0, A1, A2 and A3

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

Position magnets

			
<p>U-magnet OD33 Part no. 251 416-2</p> <p>Material: PA ferrite GF20 Weight: Approx. 11 g Surface pressure: Max. 40 N/mm² Fastening torque for M4 screws: 1 Nm Operating temperature: -40...+105 °C (-40...+221 °F)</p>	<p>Ring magnet OD33 Part no. 201 542-2</p> <p>Material: PA ferrite GF20 Weight: Approx. 14 g Surface pressure: Max. 40 N/mm² Fastening torque for M4 screws: 1 Nm Operating temperature: -40...+105 °C (-40...+221 °F)</p>	<p>Ring magnet OD25.4 Part no. 400 533</p> <p>Material: PA ferrite Weight: Approx. 10 g Surface pressure: Max. 40 N/mm² Operating temperature: -40...+105 °C (-40...+221 °F)</p>	<p>Ring magnet OD17.4 Part no. 401 032</p> <p>Material: PA neobond Weight: Approx. 5 g Surface pressure: Max. 20 N/mm² Operating temperature: -40...+105 °C (-40...+221 °F)</p>

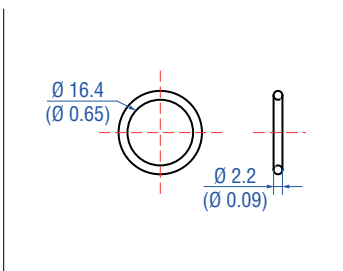
O-rings



O-ring for threaded flange
M18x1.5-6g
Part no. 401 133

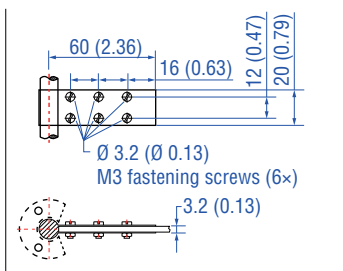
Material: Fluoroelastomer
Durometer: 75 ±5 Shore A
Operating temperature:
-40...+204 °C (-40...+400 °F)

Mounting accessories



O-ring for threaded flange
¾"-16 UNF-3A
Part no. 560 315

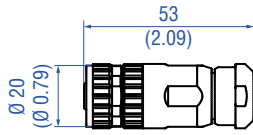
Material: Fluoroelastomer
Durometer: 75 ±5 Shore A
Operating temperature:
-40...+204 °C (-40...+400 °F)



Fixing clip
Part no. 561 481

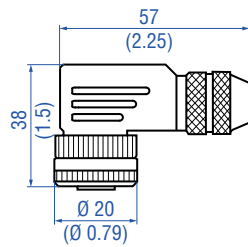
Application: Used to secure sensor rods (Ø 10 mm (Ø 0.39 in.)) when using an U-magnet or block magnet
Material: Brass, non-magnetic

Cable connectors*



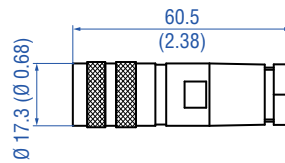
**M12 A-coded female connector
(4 pin/5 pin), straight**
Part no. 370 677

Material: GD-Zn, Ni
Termination: Screw
Contact insert: CuZn
Cable Ø: 4...8 mm (0.16...0.31 in.)
Wire: max. 1.5 mm² (16 AWG)
Operating temperature:
-30...+85 °C (-22...+185 °F)
Ingress protection: IP67 (correctly fitted)
Fastening torque: 0.6 Nm



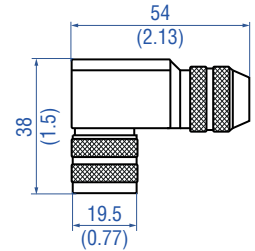
**M12 A-coded female connector
(5 pin), angled**
Part no. 370 678

Material: GD-Zn, Ni
Termination: Screw
Contact insert: CuZn
Cable Ø: 5...8 mm (0.2...0.31 in.)
Wire: max 0.75 mm² (18 AWG)
Operating temperature:
-25...+85 °C (-13...+185 °F)
Ingress protection: IP67 (correctly fitted)
Fastening torque: 0.4 Nm



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

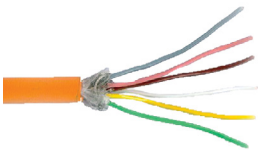
Material: Zinc nickel plated
Termination: Solder
Cable Ø: 6...8 mm (0.24...0.31 in.)
Operating temperature:
-40...+100 °C (-40...+212 °F)
Ingress protection: IP65/IP67
(correctly fitted)
Fastening torque: 0.6 Nm



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

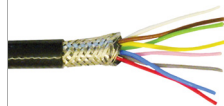
Material: Zinc nickel plated
Termination: Solder
Cable Ø: 6...8 mm (0.24...0.31 in.)
Wire: 0.75 mm² (20 AWG)
Operating temperature:
-40...+95 °C (-40...+203 °F)
Ingress protection: IP67 (correctly fitted)
Fastening torque: 0.6 Nm

Cables



PUR cable
Part no. 530 052

Material: PUR jacket; orange
Features: Twisted pair, shielded, highly flexible, halogen free, suitable for drag chains, mostly oil & flame resistant
Cable Ø: 6.4 mm (0.25 in.)
Cross section: 3 × 2 × 0.25 mm²
Bending radius: 5 × D (fixed installation)
Operating temperature:
-20...+80 °C (-4...+176 °F)



FEP cable
Part no. 530 112

Material: FEP jacket; black
Features: Twisted pair, shielded, flexible, high thermal resistance, mostly oil & acid resistant
Cable Ø: 7.6 mm (0.3 in.)
Cross section: 4 × 2 × 0.25 mm²
Bending radius: 8 – 10 × D (fixed installation)
Operating temperature:
-100...+180 °C (-148...+356 °F)



Silicone cable
Part no. 530 113

Material: Silicone jacket; red
Features: Twisted pair, shielded, highly flexible, halogen free, high thermal resistance
Cable Ø: 7.2 mm (0.28 in.)
Cross section: 3 × 2 × 0.25 mm²
Bending radius: 5 × D (fixed installation)
Operating temperature:
-50...+180 °C (-58...+356 °F)

*/ Follow the manufacturer's mounting instructions

Color of connectors and cable jacket may change. Color codes for the individual wires and technical properties remain unchanged.
Controlling design dimensions are in millimeters and measurements in () are in inches

Programming tools



Hand programmer for analog output
Part no. 253 124

Easy teach-in-setups of stroke length and direction on desired zero/span positions. For sensors with 1 magnet.



Cabinet programmer for analog output
Part no. 253 408

Features snap-in mounting on standard DIN rail (35 mm). This programmer can be permanently mounted in a control cabinet and includes a program/run switch. For sensors with 1 magnet.



Programming kit
Part no. 254 555

Kit includes:
 1 × interface converter box
 1 × power supply
 1 × cable (60 cm) with M12 female connector (5 pin), straight – D-sub female connector (9 pin), straight
 1 × cable (60 cm) with M16 female connector (6 pin), straight – D-sub female connector (9 pin), straight
 1 × cable (60 cm) with 3 × terminal clamp – D-sub female connector (9 pin), straight
 1 × USB cable

Software is available at:
www.temposonics.com

ORDER CODE

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

a	Sensor model
G B	Rod

b	Design
B	Base unit for threaded flanges »M« and »T« (only for replacement)
GB rod-style sensor with housing material 1.4305 (AISI 303) and rod material 1.4306/1.4307 (AISI 304L)	
M	Threaded flange with flat-face, M18×1.5-6g
T	Threaded flange with raised-faced, ¼"-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)	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.)	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
Connector	
D 3 4	M12 male connector (5 pin)
D 6 0	M16 male connector (6 pin)
Cable outlet	
H X X	XX m/ft. PUR cable (part no. 530 052) H01...H30 (1...30 m/3...99 ft.) (Note the temperature range of the cable!) See "Frequently ordered accessories" for cable specifications
T X X	XX m/ft. FEP cable (part no. 530 112) T01...T30 (1...30 m/3...99 ft.) See "Frequently ordered accessories" for cable specifications
V X X	XX m/ft. Silicone cable (part no. 530 113) V01...V30 (1...30 m/3...99 ft.) See "Frequently ordered accessories" for cable specifications
Encode in meters if using metric stroke length. Encode in feet if using US customary stroke length.	

e	Operation 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
A 4	4...20 mA and 20...4 mA

g	Operating temperature
H	-40...+100 °C (-40...+212 °F)
S	-40...+90 °C (-40...+194 °F)
L	-40...+75 °C (-40...+167 °F)

h	Programming
C	Via cable

DELIVERY



GB-B: Sensor
GB-M/GB-T: Sensor O-ring
Accessories have to be ordered separately.

Manuals, Software & 3D Models available at:
www.temposonics.com

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Document Part Number:
551838 Revision D (EN) 10/2024



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