

## Data Sheet

# GT2/GT3 Analog Redundant Magnetostrictive Linear Position Sensors

- Double or triple redundant
- For enhanced safety applications
- Pressure-resistant high-grade steel rod



## 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 a 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.

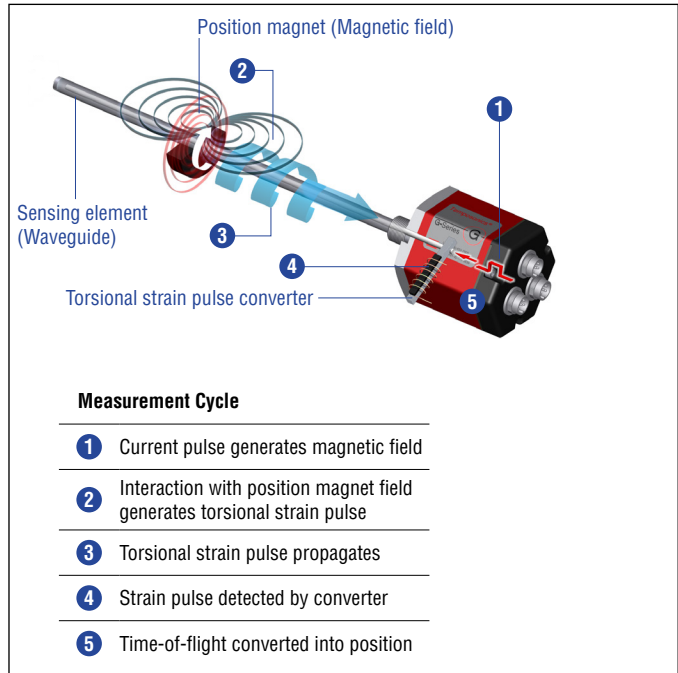


Fig. 1: Time-of-flight based magnetostrictive position sensing principle

## GT2/GT3 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 Temposonics. The position magnet is mounted on the moving machine part and travels contactlessly over the sensor rod with the built-in waveguide.

Temposonics® GT is a sensor with double or triple redundancy. Two or three independent measuring systems are integrated in one sensor housing. In particular the sensor is suitable for enhanced safety applications. The waveguide is installed in a pressure-resistant high-grade steel rod. That qualifies the sensor for measuring linear movements of control valves, fluid cylinders and drives in power plants for pitch settings at water- or wind turbines or for ship control systems and floodgates.

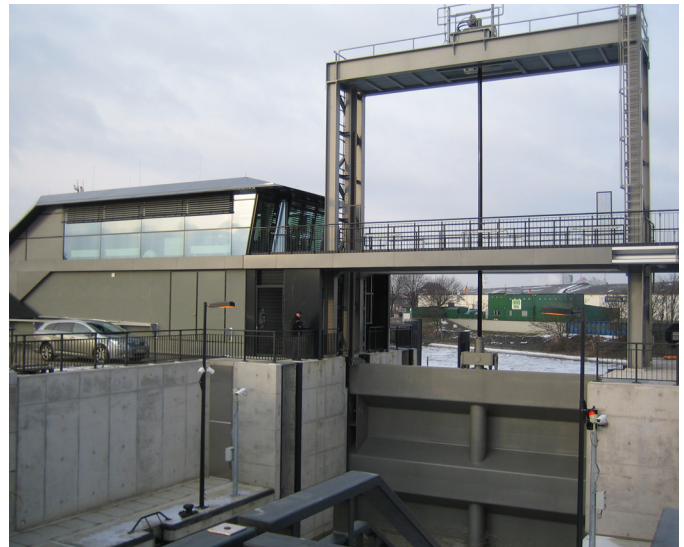


Fig. 2: Typical application: Floodgate

## TECHNICAL DATA

Output	
Voltage	0...10/10...0/-10...+10/+10...-10 VDC (min. load controller: > 5 kΩ)
Current	4(0)...20 mA/20...4(0) mA (min./max. load: 0/500 Ω )
Measured value	Position, the position is measured separately by two or three position measuring systems
Measurement parameters	
Resolution	Analog
Cycle time	< 2.5 ms
Linearity <sup>1</sup>	< ±0.02 % F.S. (minimum ±50 μm)
Repeatability	< ±0.001 % F.S. (minimum ±2.5 μm)
Operating conditions	
Operating temperature	-40...+75 °C (-40...+167 °F)
Humidity	90 % relative humidity, no condensation
Ingress protection	IP67
Shock test	100 g (single shock) IEC standard 60068-2-27
Vibration test	5 g/10...2000 Hz IEC standard 60068-2-6 (resonance frequencies excluded)
EMC test	Electromagnetic emission according to EN 61000-6-3 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	Aluminum
Sensor rod	Stainless steel 1.4306 (AISI 304L), option 1.4404 (AISI 316L)
Stroke length	50...3500 mm (2...138 in.)
Operating pressure	350 bar (5,076 psi), 690 bar (10,007 psi) peak
Mechanical mounting	
Mounting position	Any orientation
Mounting instruction	Please consult the technical drawings
Electrical connection	
Connection type	M16 connector (6 pin) or integral PUR cable
Operating voltage	+24 VDC (-15/+20 %)
Ripple	≤ 0.28 Vpp
Current consumption	100 mA typical (each channel)
Dielectric strength	500 VDC (DC ground to machine ground)
Polarity protection	Up to -30 VDC
Overvoltage protection	Up to 36 VDC

<sup>1</sup>/ With position magnet # 251 416-2

## TECHNICAL DRAWING

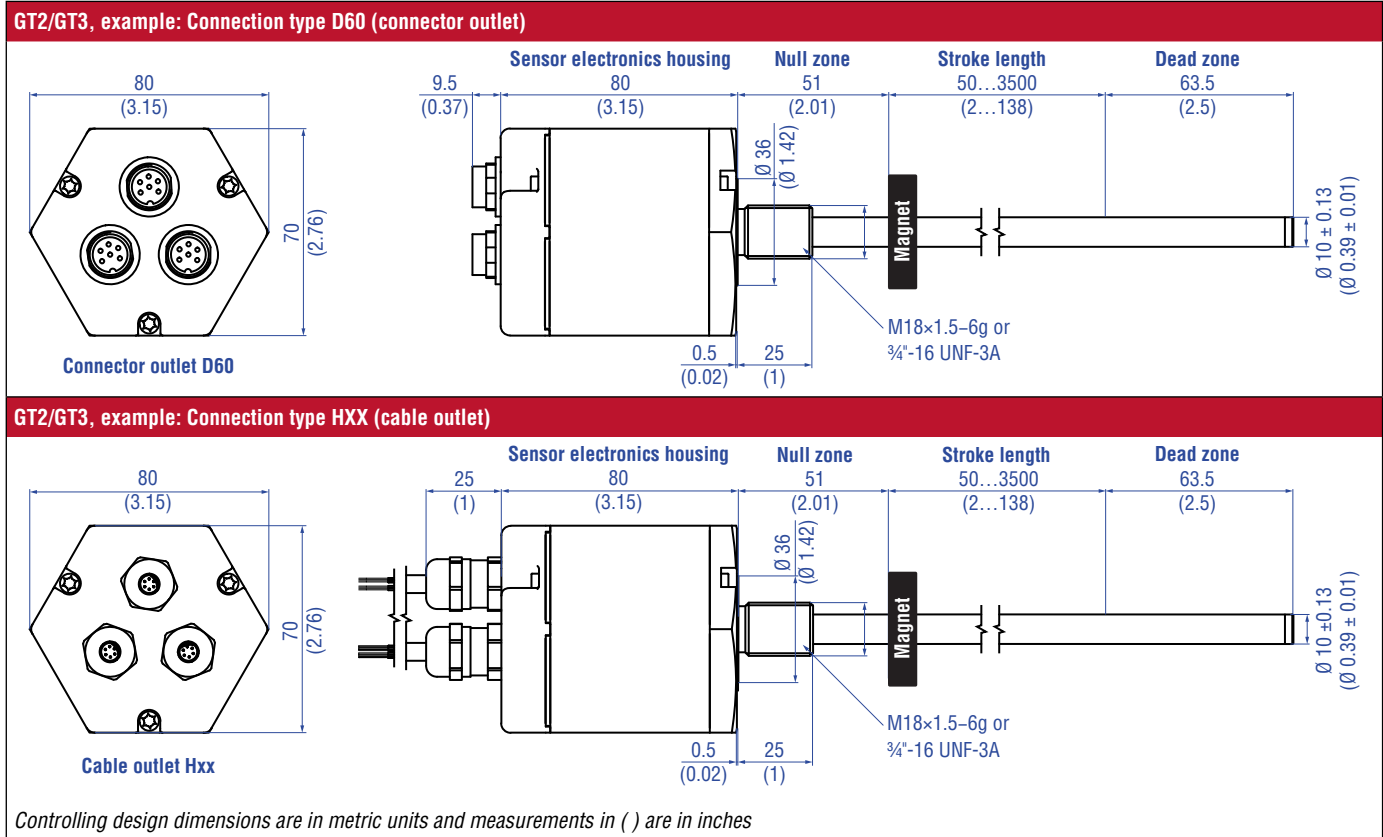


Fig. 3: Tempsonics® GT2/GT3

## CONNECTOR WIRING

D60	
Signal + power supply	
M16 male connector	Pin
<p>View on sensor</p>	1 V/mA
	2 DC Ground
	3 Only PC Programmer tool
	4 Only PC Programmer tool
	5 +24 VDC (-15/+20 %)
	6 DC Ground

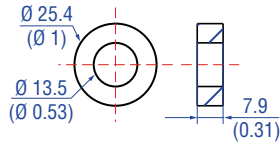
Fig. 4: Connector wiring D60

HXX		
Signal + power supply		
Cable	Color	Current
	GY	V/mA
	PK	DC Ground
	YE	Only PC programming tool
	GN	Only PC programming tool
	BN	+24 VDC (-15/+20 %)
	WH	DC Ground

Fig. 5: Connector wiring HXX

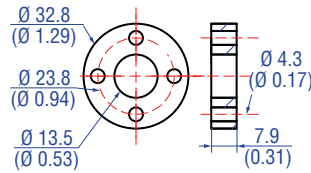
**FREQUENTLY ORDERED ACCESSORIES** – Additional options available in our [Accessories Guide](#) 551444

**Position magnets**



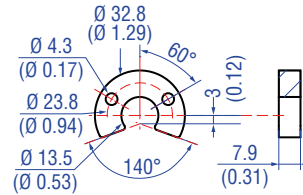
**Ring magnet OD25.4**  
Part no. 400 533

Material: PA ferrite  
Weight: Approx. 10 g  
Surface pressure: Max. 40 N/mm<sup>2</sup>  
Operating temperature:  
-40...+105 °C (-40...+221 °F)



**Ring magnet OD33**  
Part no. 201 542-2

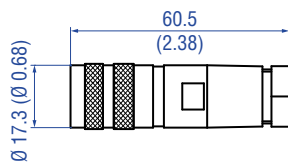
Material: PA ferrite GF20  
Weight: Approx. 14 g  
Surface pressure: Max. 40 N/mm<sup>2</sup>  
Fastening torque for M4 screws: 1 Nm  
Operating temperature:  
-40...+105 °C (-40...+221 °F)



**U-magnet OD33**  
Part no. 251 416-2

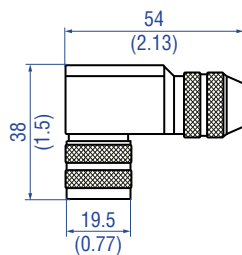
Material: PA ferrite GF20  
Weight: Approx. 11 g  
Surface pressure: Max. 40 N/mm<sup>2</sup>  
Fastening torque for M4 screws: 1 Nm  
Operating temperature:  
-40...+105 °C (-40...+221 °F)

**Connectors**



**Block magnet L**  
Part no. 403 448

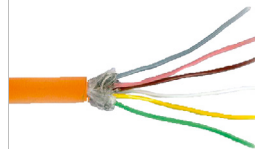
Material: Plastic carrier with hard ferrite magnet  
Weight: Approx. 20 g  
Fastening torque for M4 screws: 1 Nm  
Operating temperature:  
-40...+75 °C (-40...+167 °F)  
  
This magnet may influence the sensor performance specifications for some applications.



**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 mm<sup>2</sup> (20 AWG)  
Operating temperature:  
-40...+95 °C (-40...+203 °F)  
Ingress protection: IP67 (correctly fitted)  
Fastening torque: 0.6 Nm

**Cable**

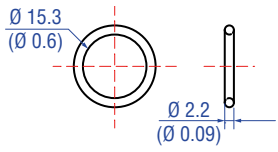
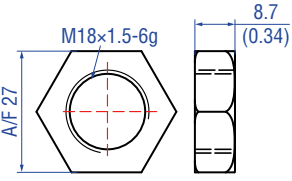




**PUR cable**  
Part no. 530 052

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 mm<sup>2</sup>  
Bending radius: 5 × D (fixed installation)  
Operating temperature:  
-30...+80 °C (-22...+176 °F)

\*/ Follow the manufacturer's mounting instructions

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

Optional installation hardware	Programming tools		
			
<p><b>O-ring for threaded flange</b> <b>M18x1.5-6g</b> <b>Part no. 401 133</b></p>	<p><b>Hex jam nut M18x1.5-6g</b> <b>Part no. 500 018</b></p>	<p><b>Hand programmer for analog output</b> <b>Part no. 253 853</b></p>	<p><b>Programming kit</b> <b>Part no. 253 145-1</b></p>
<p>Material: Fluoroelastomer Durometer: 75 ± 5 Shore A Operating temperature: -40...+204 °C (-40...+400 °F)</p>	<p>Material: Steel, zinc plated</p>	<p>Easy teach-in-setups of stroke length and direction on desired zero / span positions. For sensors with 1 magnet.</p>	<p>Kit includes: 1 × interface converter box, 1 × power supply 1 × cable (60 cm) with M16 female connector (6 pin), straight &amp; 2 × banana connector – D-sub female connector (9 pin), straight 1 × cable (60 cm) with 4 × terminal clamp – D-sub female connector (9 pin), straight 1 × USB cable</p> <p>Software is available at: <a href="http://www.temposonics.com">www.temposonics.com</a></p>

## ORDER CODE

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

a		Sensor model	
G	T	2	Dual redundant
G	T	3	Triple redundant

b		Design	
F		¾"-16 UNF-3A, sensor rod 1.4404 (AISI 316L)	
M		Flange M18×1.5, sensor rod 1.4306 (AISI 304L)	
S		¾"-16 UNF-3A, sensor rod 1.4306 (AISI 304L)	
W		Flange M18×1.5, sensor rod 1.4404 (AISI 316L)	

c		Stroke length			
X	X	X	M	0050...3500 mm	
Standard stroke length (mm)		Ordering steps			
50 ... 500 mm		5 mm			
500 ... 750 mm		10 mm			
750...1000 mm		25 mm			
1000...2500 mm		50 mm			
2500...3500 mm		100 mm			
X	X	X	X	U	002.0...138.0 in.
Standard stroke length (in.)		Ordering steps			
2 ... 20 in.		0.2 in.			
20 ... 30 in.		0.5 in.			
30 ... 40 in.		1.0 in.			
40...100 in.		2.0 in.			
100...138 in.		4.0 in.			

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

d		Connection type	
D	6	0	6 pin male connector M16
H	X	X	H01...H10 (1...10 m) PUR cable (part no. 530 052) H03...H33 (3...33 ft) PUR cable (part no. 530 052) (Note the operating temperature of the cable)
Encode in meters if using metric stroke length. Encode in feet if using US customary stroke length			

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

f		Output	
Voltage			
V	0	0...+10 VDC	
V	1	+10...0 VDC	
V	2	-10...+10 VDC	
V	3	+10...-10 VDC	
Current			
A	0	4...20 mA	
A	1	20...4 mA	
A	2	0...20 mA	
A	3	20...0 mA	

## DELIVERY



Sensor, O-ring

Accessories have to be ordered separately.

Manuals, Software & 3D Models available at:  
[www.temposonics.com](http://www.temposonics.com)

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