MTS SENSORS

Temposonics®

Magnetostrictive Linear Position Sensors

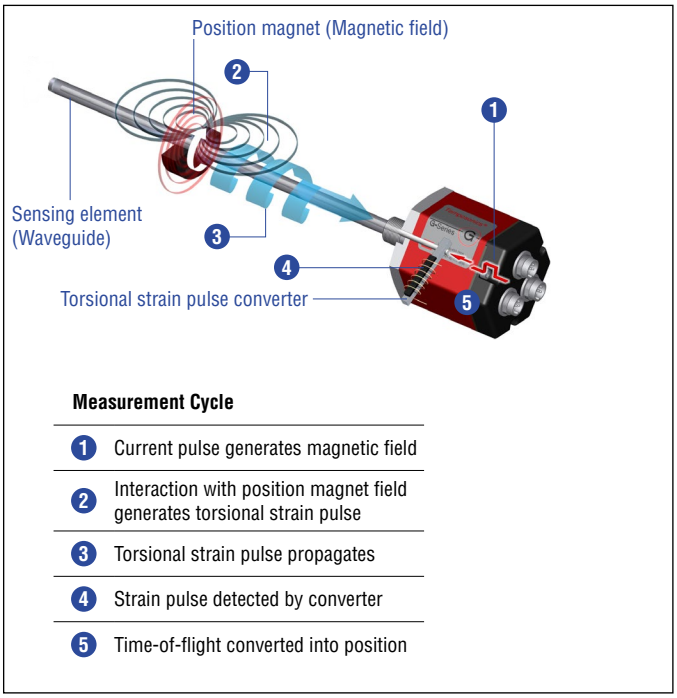
GT2 / GT3 ANALOG REDUNDANT WITH DNV GL CERTIFICATE

Data Sheet

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

MEASURING TECHNOLOGY

The absolute, linear position sensors provided by MTS Sensors rely on the company's proprietary Temposonics® magnetostrictive tech-no-logy, 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.



Measurement Cycle

1	Current pulse generates magnetic field
2	Interaction with position magnet field generates torsional strain pulse
3	Torsional strain pulse propagates
4	Strain pulse detected by converter
5	Time-of-flight converted into position

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 MTS Sensors. 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 appli-cations. The waveguide is installed in a pressure-resistant high-grade steel rod. The Temposonics® GT sensor is suitable for linear position measurement in fluid cylinders on ships and floodgates.

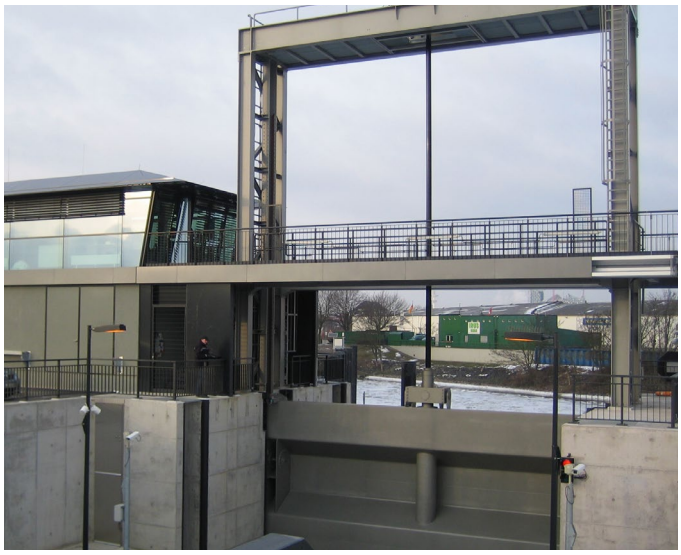


Fig. 2: Typical application: floodgate

TECHNICAL DATA

Output	
Voltage	0…10 / 10…0 / –10…+10 / +10…–10 VDC (min. load controller: > 5 kΩ)
Current	4(0)…20 / 20…4(0) mA (min / max. burden: 0 / 500 Ω)
Measured value	Position, the position is measured separately on two or three position measuring systems
Accuracy	
Resolution	Analog
Cycle time	< 2.5 ms
Linearity	< ±0.02 % F.S. (minimum ±50 µm)
Repeatability	< ±0.001 % F.S. (minimum ±2.5 µm)
Hysteresis	< 4 µm
Operating conditions	
Operating temperature	–40…+75 °C
Humidity	90 % relative humidity, no condensation
Ingress protection	M16 connector: IP67 (if mating connectors are correctly fitted) Cable outlet: IP68 (for 2 m / 6 h)
Shock test	100 g (single shock) IEC-Standard 60068-2-27
Vibration test	4 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 EMC directive 2014/30/EU and is marked with CE
Operating pressure	350 bar, 690 bar peak
Magnet movement velocity	Any
Design/Material	
Sensor electronics housing	Aluminum
Sensor rod with flange	Stainless steel 1.4306 (AISI 304L)
Stroke length	50…2900 mm
Mechanical mounting	
Mounting position	Any
Mounting instruction	Please consult the technical drawings
Electrical connection	
Connection type	M16 (6 pin) male connector or PUR-cable
Operating voltage	+24 VDC (–25 / +30 %)
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/ with position magnet # 251 416-2

TECHNICAL DRAWING

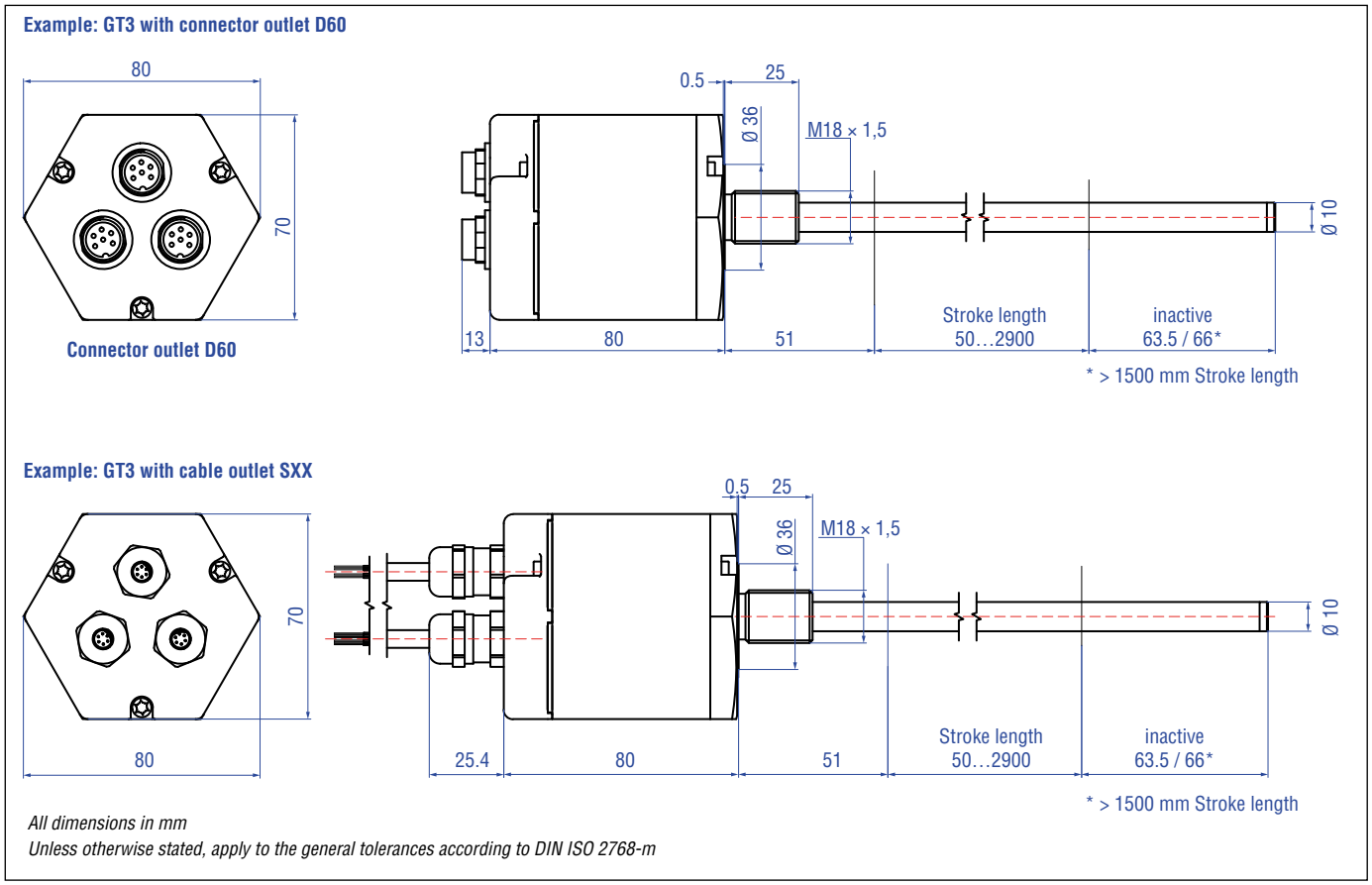


Fig. 3: Temposonics® GT2/GT3 sensor

Connector wiring

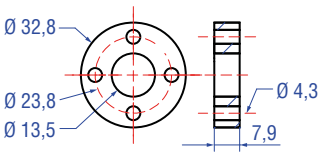
D60 / SXX

M16 connector	Pin	Cable	Function
	1	GY	Position
	2	PK	DC Ground
	3	YE	Programming tool
	4	GN	Programming tool
	5	BN	+24 VDC (–25 / 30 %)
	6	WH	DC Ground (0 V)

Fig. 4: Connector wiring D60 / SXX

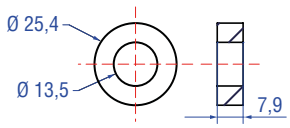
ACCESSORIES

Position magnets



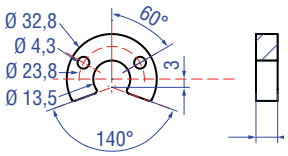
Ring magnet OD33
Part no. 201 542-2

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



Ring magnet OD25,4
Part no. 400 533

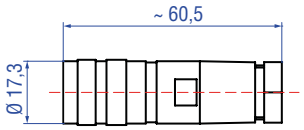
Material: PA ferrite
Weight: Ca. 10 g
Surface pressure: Max. 40 N/mm²
Operating temperature:
–40…+105 °C (–40…+221 °F)



U-magnet OD33
Part no. 251 416-2

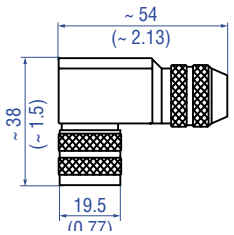
Material: PA ferrite GF20
Weight: Ca. 11 g
Surface pressure: Max. 40 N/mm²
Fastening torque for M4 screws: 1 Nm
Operating temperature:
–40…+105 °C (–40…+221 °F)

Cable connector [2]



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

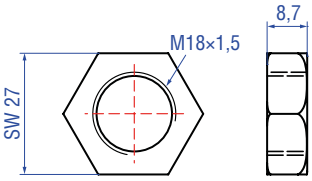
Material: Zinc nickel plated
Termination: Solder
Cable Ø: 6…8 mm (0.24…0.31 in.)
Operating temperature:
–40…+100 °C (–40…+212 °F)
Ingress protection: IP68
Fastening torque: 0.6 Nm



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

Material: Zinc nickel plated
Termination: Solder
Cable Ø: 6…8 mm (0.24…0.31 in.)
Operating temperature:
–40…+95 °C (–40…+203 °F)
Ingress protection: IP67
Fastening torque: 0.6 Nm

Hex nut



Hex-jam nut M18
Part no. 500 018

Application: M18×1.5 thread
Material: Steel, 2 zinc, plated

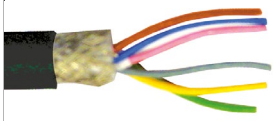
MTS Servicetools

Analog hand programmer – G-Serie
Part no. 253 853

Programming for G-Series analog output sensor models

Programming kit – G
Part no. 253 145-1

Kit includes: interface converter box, power supply, setup software and cabling. Programming software for G-Series sensors.



PUR cable
Part no. 530 114

Material: PUR jacket; black
Cable Ø: 5.9 mm
Dimensions: 3 × 2 × 0.14 mm²
Operating temperature: –40…+80 °C

All dimensions in mm

ORDER CODE

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
G	T		M					M				1			C	A	1
a			b	c					d			e	f		g		

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

b	Design
M	Flange M18×1.5-6g

c	Stroke length				
X	X	X	X	0050…2900 mm

STANDARD STROKE LENGTH

Stroke length	Ordering steps
50 … 500 mm	5 mm
500 … 750 mm	10 mm
750…1000 mm	25 mm
1000…2500 mm	50 mm
2500…2900 mm	100 mm

d	Connection type		
D	6	0	M16 (6 pin) connector
S	X	X	PUR-cable w/o connector (part no. 530 114), Option: S01…S06 (1…6 m)

e	Operating voltage
1	+24 VDC (–25 / +30 %)

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

g	Approval		
C	A	1	DNV GL certificate

DELIVERY

Sensor, O-ring

Accessories have to be ordered separately.

MTS®
SENSORS

Document Part Number:
551636 Revision A (EN) 08/2016

LOCATIONS

USA
MTS Systems Corporation
Sensors Division
3001 Sheldon Drive
Cary, N.C. 27513, USA
Tel. +1 919 677-0100
Fax +1 919 677-0200
info.us@mtssensors.com
www.mtssensors.com

GERMANY
MTS Sensor Technologie
GmbH & Co. KG
Auf dem Schüffel 9
58513 Lüdenscheid, Germany
Tel. +49 2351 9587-0
Fax +49 2351 56491
info.de@mtssensors.com
www.mtssensors.com

JAPAN
MTS Sensors Technology Corp.
737 Aihara-machi,
Machida-shi,
Tokyo 194-0211, Japan
Tel. +81 42 775-3838
Fax +81 42 775-5512
info.jp@mtssensors.com
www.mtssensors.com

CHINA
MTS Sensors
Room 504, Huajing Commercial Center,
No. 188, North Qinzhou Road
200233 Shanghai, China
Tel. +86 21 6485 5800
Fax +86 21 6495 6329
info.cn@mtssensors.com
www.mtssensors.com

FRANCE
MTS Systems SAS
Zone EUROPARC Bâtiment EXA 16
16/18, rue Eugène Dupuis
94046 Creteil, France
Tel. +33 1 58 4390-28
Fax +33 1 58 4390-03
info.fr@mtssensors.com
www.mtssensors.com

ITALY
MTS Systems Srl
Sensor Division
Via Camillo Golgi, 5/7
25064 Gussago (BS), Italy
Tel. +39 030 988 3819
Fax +39 030 982 3359
info.it@mtssensors.com
www.mtssensors.com

LEGAL NOTICES

MTS, Temposonics and Level Plus are registered trademarks of MTS Systems Corporation in the United States; MTS SENSORS and the MTS SENSORS logo are trademarks of MTS Systems Corporation within the United States. These trademarks may be protected in other countries. All other trademarks are the property of their respective owners.
Copyright © 2016 MTS Systems Corporation. No license of any intellectual property rights is granted. MTS reserves the right to change the information within this document, change product designs, or withdraw products from availability for purchase without notice. Typographic and graphics errors or omissions are unintentional and subject to correction. Visit www.mtssensors.com for the latest product information.

ISO 9001 CERTIFIED

Reg.-No. 003095-QM08

TYPE APPROVED PRODUCT DNV·GL MARITIME