Temposonics®

Magnetostrictive, Absolute, Non-contact
Linear-Position Sensors

G-Series Redundant Models GT2 and GT3

Analog (Voltage/Current)

MTS SENSORS

Data Sheet Part Number
Reference: 551102

Model RH Rod-style position sensor
Stroke length: 50 mm (2 in.) to 2540 mm (100 in.)

FEATURES

- Offers Redundancy for Enhanced Safety Applications
- Linear, Absolute Measurement
- Contains Up to Three Separate, Independent Measuring Systems in a Single Compact Housing
- Non-Contact Sensing Technology
- Superior Accuracy, Linearity Less Than 0.02%
- Repeatability Within 0.001%
- Fully Adjustable Analog Outputs (Voltage or Current) Within: -10 to +10 Vdc or 0 to 20 mA

BENEFITS

- Rugged Industrial Sensor
- Compact Design with a Standard Size 10 mm (0.39 in.) O.D. Stainless-Steel Rod
- Uses Standard Mounting

APPLICATIONS

- Ideal for High-Safety Applications Requiring Redundancy
- Continuous Operation In Harsh Industrial Conditions
- High Pressure Conditions

TYPICAL INDUSTRIES

- Power Plants
- Water and Wind Turbine Pitch Settings
- Marine Propellers
- Ship Control Systems
- Floodgate Control

G-Series GT Redundant

ISO 9001 CERTIFIED

CE

Product overview

G-Series model GT sensors are extremely robust and are ideal for continuous operation under harsh industrial conditions. The rod housing is capable of withstanding high pressures such as those found in hydraulic cylinders. G-Series redundant sensors provide accurate, linear-position measurement for applications that benefit from redundancy due to safety relevant functions.

G-Series Redundant sensors feature two or three independent measuring systems contained in one compact housing. Each measuring system contains its own channel with sensor element, power and evaluation electronics and output signal. Each channel has it's own output connector or cable.

All sensor elements are integrated in one pressure proofed, high-grade steel rod. Rod and housing style feature the approved standard dimensions with 10 mm (0.39 in.) diameter rod and 3/4-16 UNF or M18 x 1.5 threaded hex flanges. The redundant sensor easily installs in applications measuring linear movements of control valves, linear drives, fluid cylinders and machines.

Product specifications

Parameters	Specifications
OUTPUT	
Measured output variables:	Position
Resolution:	**Analog:** Infinite (restricted by output ripple)
Update times:	< 1 ms (typical)
Linearity deviation:	< ± 0.02% full stroke (minimum ± 50 µm)
Repeatability:	< ± 0.001% of full stroke (minimum ± 2.5 µm)
Hysteresis:	< 4 µm
Analog Outputs:	**Model GT2:** 2 output channels **Model GT3:** 3 output channels **Voltages (Fully adjustable):** 0 to 10, 10 to 0, -10 to +10, +10 to -10 Vdc (minimum controller load >5k ohms) **Current (Fully Adjustable):** 4 (0) to 20 mA, 20 to 4 (0) mA (min./max. load 0/500 ohms)
Stroke Length:	**GT2/GT3:** **Analog:** 50 mm (2 in.) to 2900 mm (1015 in.)
ELECTRONICS	
Operating voltage:	**+24 Vdc nominal:** -15 or +20% **Polarity protection:** up to -30 Vdc **Overvoltage protection:** up to 36 Vdc **Current drain:** 100 mA typical per channel **Dielectric withstand voltage:** 500 Vdc (DC ground to machine ground)
Setpoints:	**Setpoint adjustment (Null/Span):** 100% of electrical stroke length, 50 mm (2 in.) minimum distance between setpoints.

Parameters	Specifications
ENVIRONMENTAL	
Operating conditions:	**Operating temperature:** -40 °C (-40 °F) to +75 °C (167 °F) **Relative humidity:** 90% no condensation
EMC test:	**Emissions:** IEC/EN 61000-6-3 **Immunity:** IEC/EN 61000-6-2 IEC/EN 61000-4-2/3/4/5/6/8, level 3/4 criterium A, CE qualified
Shock rating:	100 g (single hit)/ IEC standard 68-2-27 (survivability)
Vibration rating:	5 g /10 to 2000 Hz, IEC standard 68-2-6 (operational)
WIRING	
Connection type:	6-pin male D60 (M16) connector or integral cable
ROD STYLE SENSOR (MODEL GT2/GT3)	
Electronic head:	Aluminum housing
Sealing:	IP 67
Sensor rod:	304L stainless steel
Operating pressure:	350 bar static, 690 bar peak (5000 psi static, 10,000 psi peak)
Mounting:	Any orientation. Threaded flange M18 x 1.5 or 3/4 - 16 UNF-3A
Typical mounting torque:	45 N-m (33 ft. - lbs.)
Magnet types:	Ring magnet, open-ring magnet, or magnet float

Output options

G-Series rod-style redundant sensors are available with analog (voltage and current) outputs. The G-Series redundant, model GT2 sensor provides two output channels, and model GT3 provides three output channels.

ANALOG (VOLTAGE/CURRENT)

G-Series analog sensors provide direct signals, including voltage (0 to 10 Vdc or -10 to +10 Vdc, foward or reverse acting) and current (4 to 20 mA, or 0 to 20 mA, forward or reverse acting). *(see 'Figure 1').* Both voltage and current outputs allow full adjustments of null and span setpoints (minimum 2 in. between setpoints). Since the outputs are direct, no signal-conditioning electronics are needed when interfacing with controllers or meters.

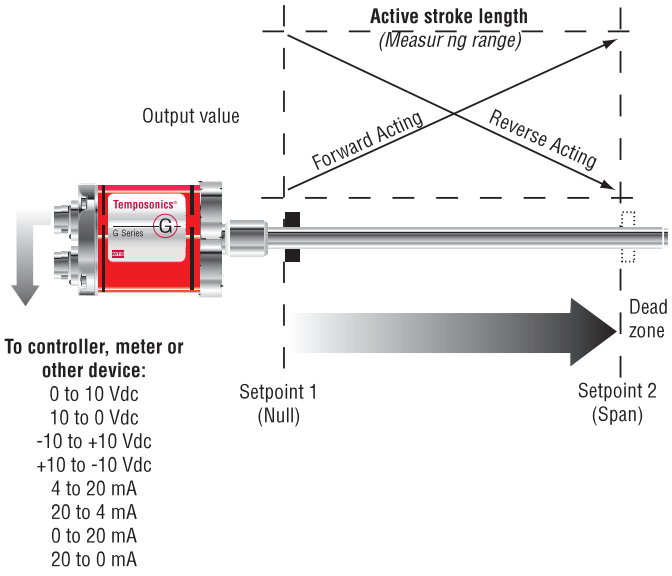

Figure 1. Single magnet analog output diagram

Advanced communications and programmability

SENSOR FIELD PROGRAMMING AND G-SERIES PC PROGRAMMING KIT

Temposonics G-Series Redundant sensors are preconfigured at the factory by model code designation. For many applications no adjustments are required for normal sensor installation and operation. If, however, sensor parameter changes are desired while in the field, the G-Series Redundant sensor is easily programmed by using the G-Series PC Programming kit *(see 'Figure 2').*

Figure 2. G-Series PC Programming Kit, part no. 253311-1

G-Series PC setup software is shipped with the sensor and can also be downloaded from www.mtssensors.com. You can use the PC setup software to configure, diagnose, monitor and program your G-Series sensor in the field without opening the sensor's electronics housing.

This can simplify installation and commissioning, saving valuable time. Keeping the sensor electronics isolated ensures that seal integrity and the highest product reliability are maintained.

G-Series Analog PC Programming Kit (part no.: 253311-1) includes the following components:

- Wall adapter style power supply (24 Vdc output)
- USB Serial converter box with USB cable to connect to PC
- Two conection cables:
  - Cable for sensor ordered with the D60 integral connector option.
  - Cable with quick connects for sensor ordered with the integral cable option.
- G-Series Analog PC Setup software, on CD-ROM (for Windows XP or higher)

G-Series PC Setup and Configuration Software Interface

VISUAL SOFTWARE INTERFACE

The G-Series PC Setup and configuration software provides a user-friendly interface *(see 'Figure 3')* along with the sensor's advanced technology enables the operator to take advantage of the following features:

- Built-in serial interfaces for robust hard-wired serial communication (RS-485).
- Remote programmability for operational modes and sensor parameters *(see 'Table 1)*.

Analog (voltage/current) output features
Voltage or current output mode
Voltage or current output range
Full adjustment for Null and Span setpoints

Table 1. Remote programmability and operational modes

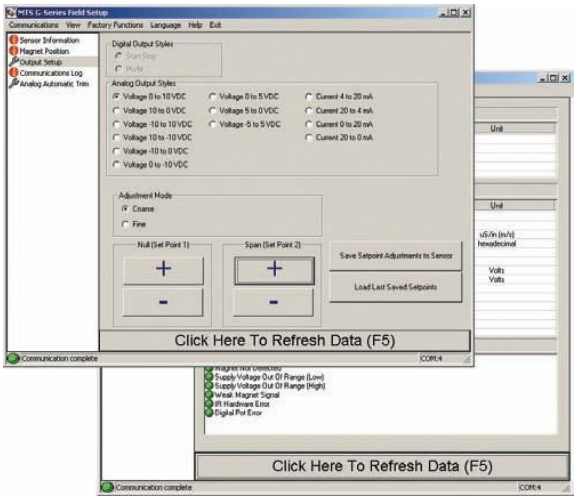

Figure 3. G-Series PC setup software interface examples

G-SERIES HANDHELD PROGRAMMER ACCESSORY FOR ANALOG OUTPUT

Programming for your G-Series analog output sensor can be achieved in the field using the G-Series Analog Handheld programmer accessory, part no. 253853 *(see 'Figure 4')*.

Figure 4. G-Series Analog Handheld Programmer (part no.: 253853). Front and back views shown.

Using the G-Series Analog Handheld Programmer, magnet positions and corresponding output values can be adjusted for the beginning of stroke (Setpoint 1) and for the end of stroke (Setpoint 2) that is actually needed for the specific application. These adjustments are easily done, even when the sensor is not directly accessible, by connecting the programmer to the sensor's integral cable or extension cable.

Additionally, the programmer has it's own red and green LEDs to provide a remote display of the sensor's status and error diagnostics.

For detailed information refer to the G-Series Analog Handheld Programmer Operating Instructions *(document part no.: 551024)* available at http://www.mtssensors.com.

Models GT2/GT3 rod-style sensor dimension references

Note:

When mounting the sensor, use a basic wrench *(see 'Figure 5')* with a maximum 8 mm (0.31 in.) thickness to ensure tightening torque is only applied to the hex flange and not to the electronics housing.

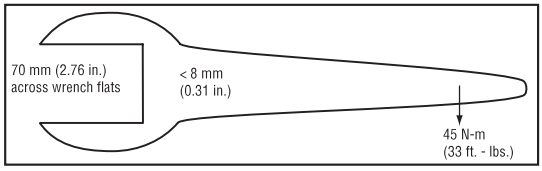

Figure 5. Basic wrench

Temposonics G-Series rod-style sensors (Models GT2/GT3) offer modular construction, flexible mounting configurations, and easy installation. Models GT2/GT3 sensors are designed for mounting in applications where high pressure conditions exist (5000 psi continuous, 10,000 psi spike), such as inside hydraulic cylinders. Both GT2 and GT3 sensor models can also be mounted externally in many applications.

MODEL GT3 ROD-STYLE SENSOR WITH RING MAGNET (MAGNET ORDERED SEPARATELY)

Drawing is for reference only, contact applications engineering for tolerance specific information.

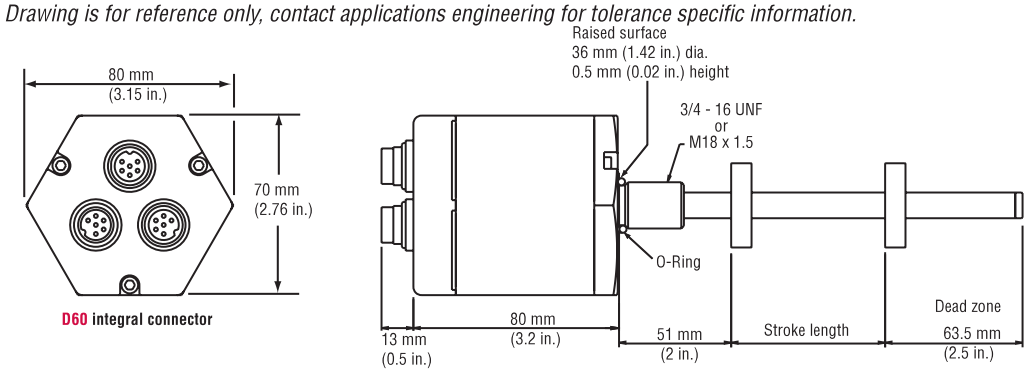

Figure 6. Models GT3 Rod-style sensor dimension reference (shown with ***D60*** integral connection type)

MODEL GT3 ROD-STYLE SENSOR WITH INTEGRAL CABLE (MAGNET ORDERED SEPARATELY)

Drawing is for reference only, contact applications engineering for tolerance specific information.

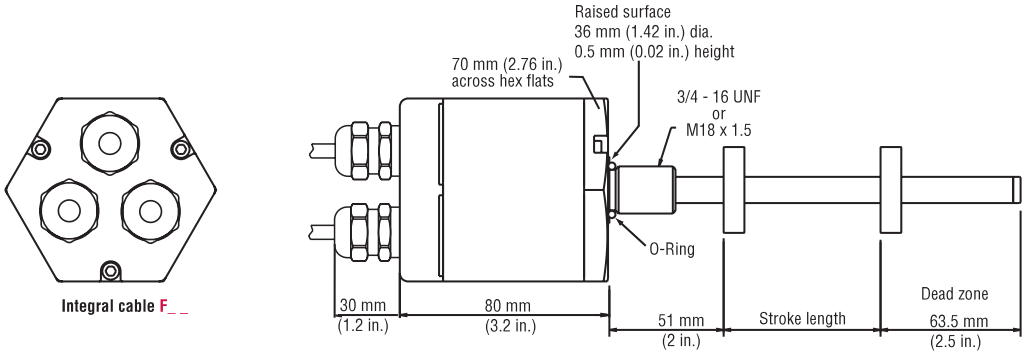

Figure 7. Model GT3 Rod-style sensor dimension reference (shown with integral cable)

Standard magnets, mounting and instalation (Model GT2 and GT3)

Magnets must be ordered separately with models GT2 and GT3 redundant sensors. The standard ring magnet (part number 201542-2) is suitable for most applications

Refer to the Accessories section of this catalog for magnet, cable connector selections and detailed mounting and installation information.

Models GT2/GT3 connections and wiring STANDARD MALE (D60) 6-PIN DIN INTEGRAL CONNECTOR (M16)

Male, 6-pin (D60) integral connector pin-out as viewed from the end of the sensor.

Important Notes:

1. A grounding lug on the end of the sensor is provided for convenient connection to earth ground.
2. Appropriate grounding of cable shield is required at the controller end.
3. For analog output sensors, the yellow wire (pin 3) and green wire (pin 4) provide serial communications. If possible, during sensor installation these wires should be placed for easy access if future programming or diagnostics are needed. When these wires are not used, they should be isolated with electrical tape to avoid unintended contact with other nearby wires or machine surfaces.

Pin Number	Wire Color	Function / Analog output
1	Gray	0 to 10, -10 to +10, or 4 to 20 mA, 0 to 20 mA or reverse acting: 10 to 0, 10 to -10 Vdc or 20 to 4 mA, 20 to 0 mA
2	Pink	Return for pin 1
3	Yellow	Programming (RS-485+)
4	Green	Programming (RS-485-)
5	Red or Brown	Supply voltage (+Vdc)
6	White	DC ground (for supply)

G														
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

SENSOR MODEL = G T [ ] **1-3**

GT2 = Double-redundant rod-style sensor

GT3 = Triple-redundant rod-style sensor

HOUSING STYLE = [ ] **4**

Model GT rod-style sensor (magnet(s) must be ordered separately):

S = US customary threads, flat-faced flange and pressure tube, standard

M = Metric threads, flat-faced flange and pressure tube, standard

STROKE LENGTH = [ ][ ][ ][ ][ ][ ] **5-9**

_ _ _ _ M = Millimeters
(Encode in 5 mm increments)

_ _ _ . _ U = Inches and tenths
(Encode in 0.1 in. increments)

Stroke Length Note:
Rod-style sensor (model GT) stroke range = 50 mm (2 in.) - 1525 mm (60 in.))

CONNECTION TYPE = [ ][ ][ ] **10-12**

Integral connector:

D60 = 6-pin DIN (M16), male, standard (2X or 3X)

Integral cables:

F _ _ = Integral cable, black polyurethane jacket with pigtail termination (2X or 3X)

Cable length:
Encode in feet if using US customary stroke length
Encode in meters if using metric stroke length

→ **_ _** = 1 (**01**) to 99 (**99**) ft. *or* 1 (**01**) to 30 (**30**) meters.

Cable Length Note:
MTS recommends the maximum integral cable length to be 10 meters (33 ft.). Cables greater than 10 m (33 ft.) in length are available, however, proper care must be taken during handling and installation.

INPUT VOLTAGE = [ ] **13**

1 = +24 Vdc (+20% - 15%)

OUTPUT *(134- 15)* = [ ][ ] **14-15**

V0	=	0 to +10 Vdc	**A0**	=	4 to 20 mA
V1	=	+10 to 0 Vdc	**A1**	=	20 to 4 mA
V2	=	-10 to +10 Vdc	**A2**	=	0 to 20 mA
V3	=	+10 to -10 Vdc	**A3**	=	20 to 0 mA

Note:
Standard factory settings configure all outputs to be the same per the output option selected (when configuring the model number). If needed, an output can be individually reprogrammed in the field to best the application.