Temposonics®

Magnetostrictive Linear-Position Sensors

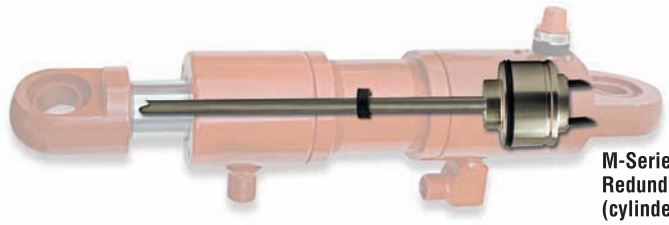
M-Series Mobile Equipment Sensor
Model MT, Redundant
Analog Output

Product Specification

MTS SENSORS

551063 C

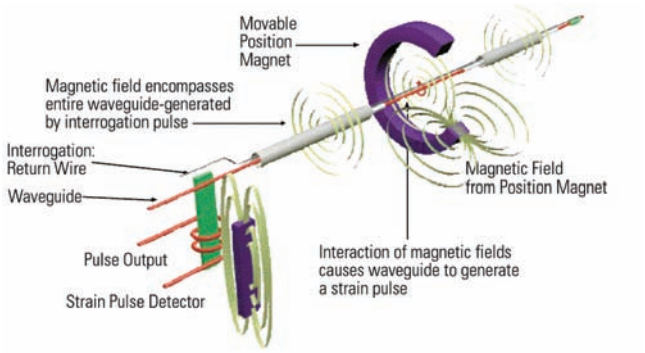
**M-Series (Model MT)
Redundant sensor**



**M-Series (Model MT)
Redundant sensor
(cylinder application example)**

Features

- **Linear, Absolute Position Sensors**
- **Non-contact Sensor Technology**
- **Superior Accuracy: Linearity < +/- 0.04% F.S.**
- **Repeatability: < ± 0.005% F.S.**
- **Compact Design for Embedded Cylinder Applications**
- **No External Electronics**
- **Dual, Electrically Redundant Analog Outputs: 0.25 Vdc - 4.75 Vdc, 4-20 mA**
- **Stroke length: 50 mm (1.97 in.) - 1500 mm (59.05 in.)**
- **Voltage input: 12 Vdc**
- **Shock rating: 100 g (single hit) / IEC 68-2-27**
- **Vibration rating: 10 g / 10-2000 Hz/IEC 68-2-6**
- **100 V/m EMI Immunity**



Product overview

Today's buyers are more concerned with greater productivity, lower overall operating costs and cost of ownership. Temposonics M-Series Mobile Equipment sensors help lower overall costs by increasing safety and versatility, increasing reliability and reducing service costs. Temposonics Mobile Equipment sensors are designed specifically for position sensing applications in rugged environments typically encountered by construction, agriculture and other off-highway machinery.

The M-Series, Model MT Redundant sensor is the latest compact stainless-steel position sensor specifically designed for use in welded and tie-rod style cylinders, or any space limited cylinder application. The M-Series Model MT sensor is an ideal choice for a wide range of standard hydraulic cylinders with diameters of 50 mm (1.97 in.) or larger.

The extremely rugged model MT sensor consists of the following main components:

1. The sensor head; A robust housing with built-in electronics.
2. The pressure-proof sensor pipe. The sensor pipe houses and protects the internal sensing element.
3. The position magnet; The magnet is mounted on the piston, during operation it travels along the stationary sensor tube. This sensor system is "non-contact" by design.
4. Dual electrically independent sensors; These sensors are embedded within a single housing.

Benefits of magnetostrictive sensing

Temposonics linear-position sensors use the time based magnetostrictive position sensing principle developed by MTS. Within the sensing element, a sonic strain pulse is induced in a specially designed magnetostrictive waveguide by the momentary interaction of two magnetic fields. One field comes from a movable permanent magnet that passes along the outside of the sensor. The other field comes from an "interrogation" current pulse applied along the waveguide. The resulting strain pulse travels at ultrasonic speed along the waveguide and is detected at the head of the sensing element.

The position of the magnet is determined with high precision and speed by accurately measuring the elapsed time between the application of the interrogation pulse and the arrival of the resulting strain pulse with a high-speed counter. Elapsed time is used to determine the permanent magnet position which provides an absolute position reading that never requires recalibration or re-homing after a power loss. Non-contact sensing eliminates wear, and guarantees the best durability and output repeatability.

Product overview continued

The M-Series Model MT sensor is designed with the “mobile” world in mind and applies specifically to applications that require redundancy. The Model MT sensor is validated in the field by customers worldwide. Performance is second-to- none; high accuracy, 100 V/m EMI, position output. Ruggedness is “designed in”; 100 g shock and 10 g vibration rating. Cable wires are sized for direct connection to industry proven connectors. The model MT redundant sensor can be fully sealed and embedded in a cylinder to ensure a long operating life.

Output options

The M-Series Model MT position analog sensor provides two Analog, dual electrically redundant outputs:

- Voltage: 0.25 to 4.75 Vdc (reverse acting: 4.75 to 0.25 Vdc, 4.5 to 0.5 Vdc)
- Current, 4 to 20 mA, 0 to 20 mA (reverse acting: 4.75 to 0.25 Vdc, 4.5 to 0.5 Vdc)

Product specifications

Parameters	Specifications
Measured variable:	Position measurement
Resolution:	Infinite, restricted by output ripple
Linearity, uncorrected:	± 0.04% full stroke (minimum ± 0.100 mm (0.003 in.)
Repeatability:	< ± 0.005% of full stroke
Outputs:	Analog, dual electrically redundant: ‡Voltage: 0.25 to 4.75 Vdc (reverse: 4.75 to 0.25 Vdc, 4.5 to 0.5 Vdc) ‡Current: 4 to 20 mA, 0 to 20 mA (reverse: 4.75 to 0.25 Vdc, 4.5 to 0.5 Vdc)
Stroke length:	50 mm (1.97 in.) to 1500 mm 59.05 in.) in 5 mm (0.20 in.) increments
Operating voltage:	12 Vdc (10 Vdc minimum to 16 Vdc maximum)
Operating environment:	Temperature (sensor): -40 °C (-40 °F) to +105 °C (221 °F) Dew point, humidity: 90% relative humidity, no condensation
EMC test:	100 V/m: ISO 11452-5 ISO 14982 - Agriculture and forest machinery IEC 61000-6-1/2 - CE
Shock rating:	100 g (single hit)/IEC 68-2-27
Vibration rating:	10 g RMS/10-2000 Hz/IEC 68-2-6
Operating range:	10 to 36 Vdc
Current drain:	80 mA typical (per sensor)
Sensor Material:	Stainless steel 1.4301/AISI 304
Sealing:	IP 67
Pressure ratings:	Sensor rod, 10 mm (0.39 in.): Operating, 350 bar (5076 psi) Peak, 530 bar (7687 psi)
Electrical isolation:	500 Vdc (DC ground to machine ground)
Polarity protection:	Up to -36 Vdc
Overvoltage protection:	Up to 36 Vdc
Electrical connection:	4-wire, Pigtailed PUR cable
Magnet selection:	Ring magnet

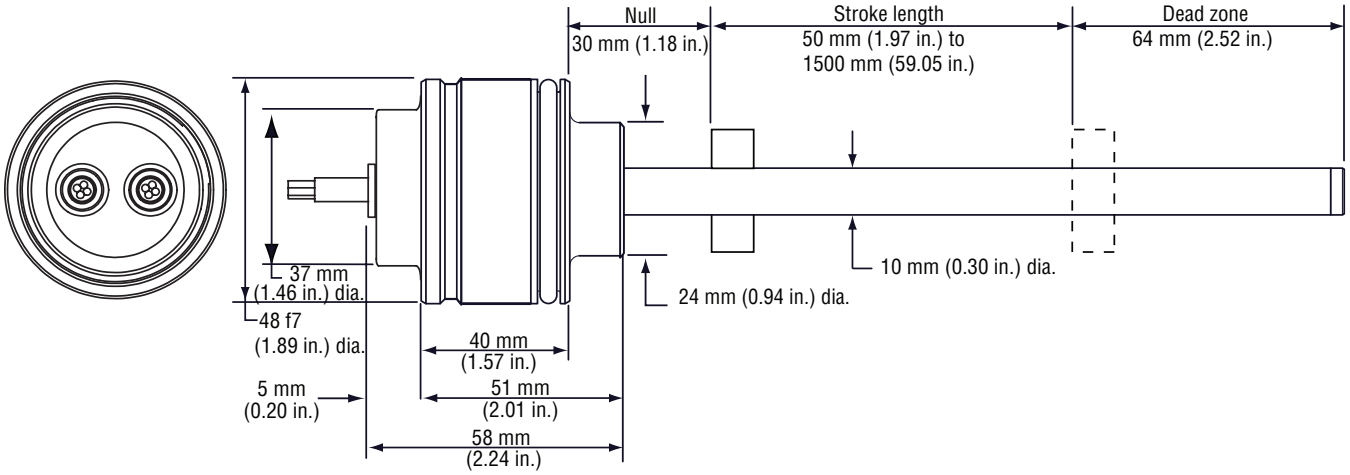
‡ Output rage is factory programmable through entire stroke and is fully reversible.

Model MT sensor dimensions

Contact MTS for specifications and engineering drawings that are critical to your application. Drawings below are for reference only.

Note:

Contact factory for the latest tolerance drawing and cavity detail.

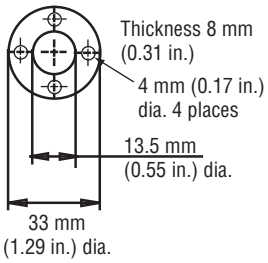


Position magnet options

Magnet spacer, part no. 400633 is used with ring magnet, part number 201542-2.

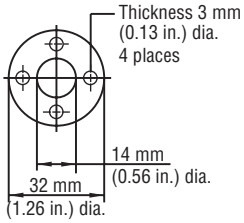
Part no. 201542-2

Temperature:
-40°C (-40 °F) to
105 °C (221 °F)
Material: Ferrite PA



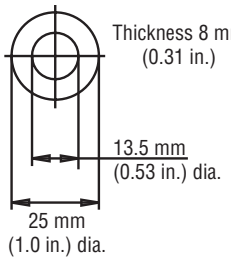
Part no. 400633

Magnet spacer
(use with magnet
part no. 201542-2)



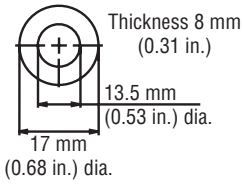
Part no. 400533

Temperature:
-40°C (-40 °F) to
105 °C (221 °F)
Material: Ferrite PA



Part no. 401032

Temperature:
-40°C (-40 °F) to
105 °C (221 °F)
Material: Ferrite PA



Connections and wiring

Wiring diagram (standard configuration)

Wire color	Signal
Green	Position output
Brown	12/24 Vdc
White	DC ground (0 Vdc)
Yellow	N/C

Installation examples

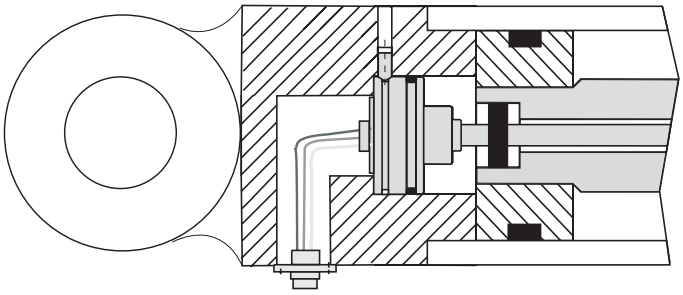
The robust Temposonics Model MT Redundant sensor's new stainless-steel position sensor is designed for direct stroke measurement in standard compact hydraulic cylinders. The Temposonics Model MT Redundant sensor can be installed from the head side or the rod side of the cylinder depending on the cylinder design.

Sensor installation

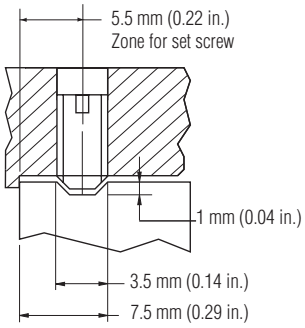
The method of installation is entirely dependent on the cylinder design. While the most common method of installation is from the rod side of the cylinder, installation from the head side of the cylinder is also possible. In both installation methods, the sensor seals the cylinder by using an O-Ring and backup ring which is installed on the sensor housing.

Rod-side installation example

The following illustration and dimensional drawing are for reference only. Refer to the wiring diagram on page 3 for the standard wiring configuration.

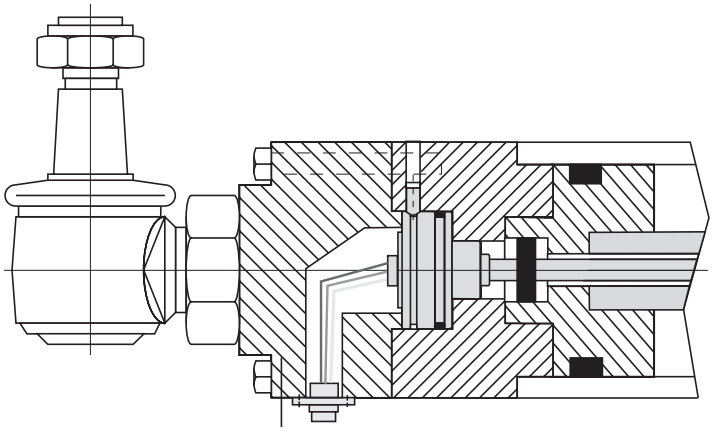


Retaining screw with set screw DIN 914
M5x10 maximum torque 0.5 Nm
(0.369 lbf-ft /4.43 lbf-in) or UNF/UNC equivalent

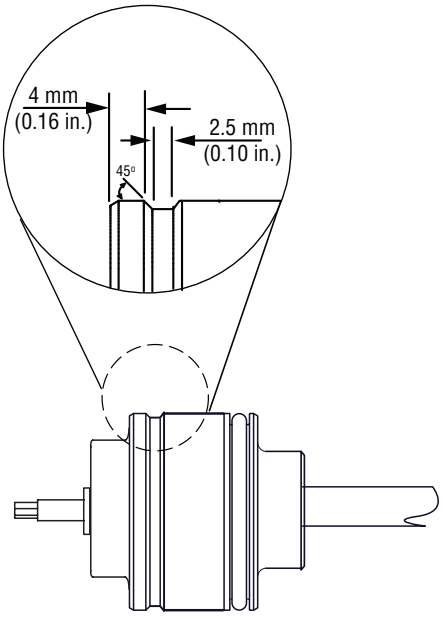


Cylinder head, side installation example

The following illustration and dimensional drawing are for reference only. Refer to the wiring diagram on page 3 for the standard wiring configuration.



Detail f ange housing



How to order

When placing an order, build your model number using the model number matrix (right). If you have any questions about how to apply a model MT reduindant position sensor to your specific application, please contact MTS Applications Engineering.

Accessories	
Description	Part no.
Ring magnet	201542-2
Ring magnet	400533
Ring magnet	401032
Magnet spacer (use with magnet part no. 201542-2)	400633

SENSOR MODEL

Hydraulic rod-style
MT = 48 mm (1.89 in.) dia. housing

PRESSURE PIPE

C = 10 mm (0.39 in.) dia.

STROKE LENGTH

M = Millimeters 50 mm (1.97 in.) to 1500 mm (59.05 in.)
(Encode in 5 mm (0.20 in.) increments)

CONNECTION TYPE

Cable exit:

T ▶ = 4 conductor / cable, Pigtailed, 4 wires, shielded

Cable length (first digit x 1 m, second digit x 0.1 m):
10 = 1.0 m length (standard, all other lengths require minimum order quantities
0.5 m min. - 9.9 m max; 0.1 m increments)

CABLE TERMINATION OPTION

A = Pigtail (stripped conductors)
(Note: For wire termination, contact the factory)

INPUT VOLTAGE

3 = + 12 Vdc (consult factory)

OUTPUT

Voltage:

V11 = 0.25 - 4.75 Vdc
V12 = 0.5 - 4.50 Vdc
V13 = 4.75 - 0.25 Vdc
V14 = 4.5 - 0.5 Vdc

Current:
A01 = 4 -20mA

ISO 9001 CERTIFIED

National Fluid Power Association MEMBER

CE

Part Number: 03-08 551063 Revision C

MTS® SENSORS

UNITED STATES
MTS Systems Corporation
Sensors Division
3001 Sheldon Drive
Cary, NC 27513
Tel: (800) 633-7609
Fax: (919) 677-0200
(800) 498-4442
www.mtssensors.com
sensorsinfo@mts.com

GERMANY
MTS Sensor Technologie
GmbH & Co. KG
Auf dem Schüffel 9
D - 58513 Lüdenscheid
Tel: +49 / 23 51 / 95 87-0
Fax: +49 / 23 51 / 56 491
www.mtssensor.de
info@mtssensor.de

JAPAN
MTS Sensors Technology
Corporation
Ushikubo Bldg.
737 Aihara-cho, Machida-shi
Tokyo 194-0211, Japan
Tel: +81 (42) 775 / 3838
Fax: +81 (42) 775 / 5516
www.mtssensor.co.jp
info@mtssensor.co.jp