Temposonics®

Magnetostrictive Linear-Position Sensors

M-Series
Model MH, CANbus Interface
(CANopen, CAN J1939™ and ISOBUS)
Product Specification

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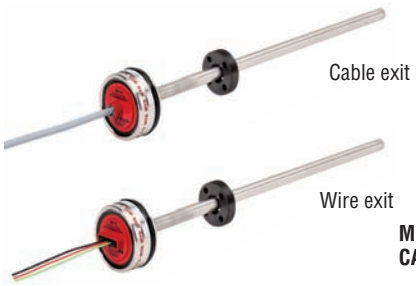
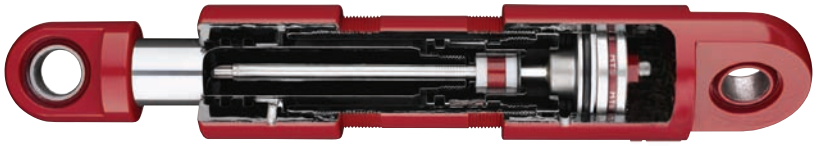


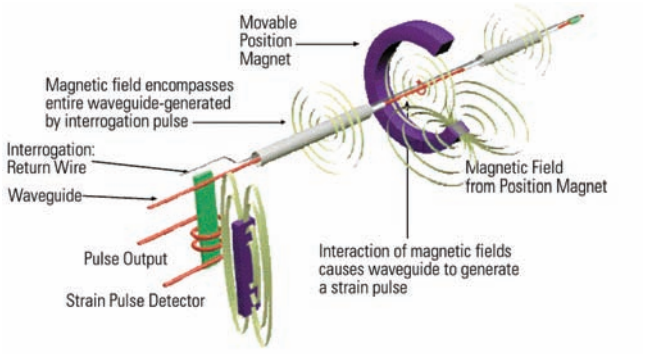
**M-Series (Model MH)
CANbus Interface sensors**



**M-Series (Model MH) 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**
- **Direct CAN Output: Displacement + Velocity**
- **Stroke length: 50 mm (1.97 in.) - 2000 mm (79 in.)**
- **Voltage input: 12/24 Vdc**
- **Shock rating: 100 g (single hit) / IEC 68-2-27**
- **Vibration rating: 25 g / 10-2000 Hz/IEC 68-2-6**
- **200 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 MH CANbus output 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 MH 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 MH 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.

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 MH sensor is designed with the “mobile” world in mind and applies specifically to applications that require a CANbus interface. The Model MH sensor is validated in the field by customers worldwide. Performance is second-to- none; high accuracy, 200 V/m EMI, position output. Ruggedness is “designed in”; 100 g shock and 25 g vibration rating. Cable wires are sized for direct connection to industry proven connectors. The model MH sensor can be fully sealed and embedded in a cylinder to ensure a long operating life.

Output options

The M-Series Model MH position sensor provides the following interface outputs:

- CAN J1939
- CANopen
- ISOBUS

Product specifications

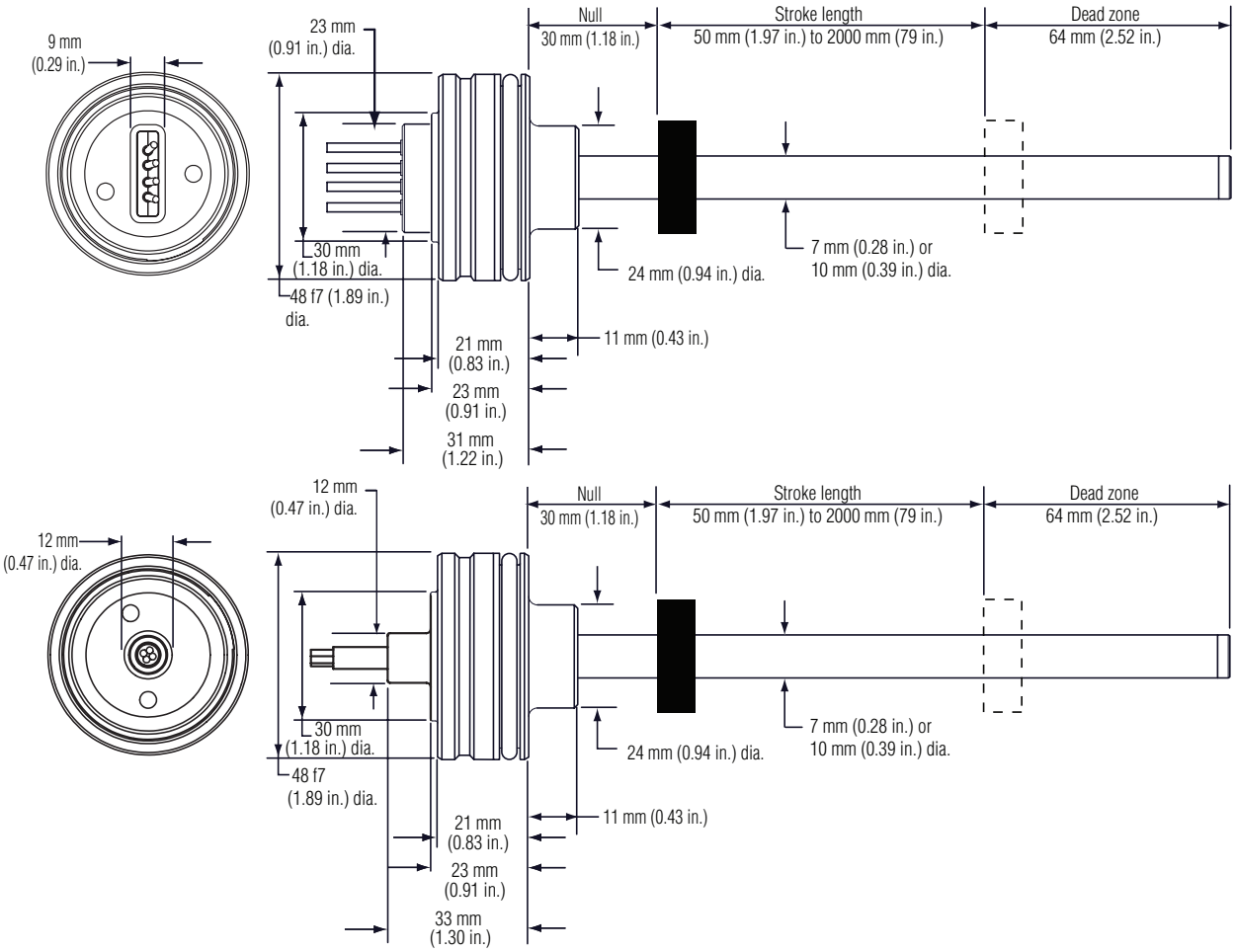
Parameters	Specifications
Measured variations:	Displacement + velocity
Resolution:	0.1
Linearity, uncorrected:	< ± 0.04% F.S. minimum ± 0.100 mm (0.003 in.)
Repeatability:	< ± 0.005% F.S.
Update frequency:	> 488 Hz
Ripple:	< 0.05% F.S.
Stroke length:	50 mm - 2000 mm (1.97 in. - 79 in.) in 5 mm (0.19 in.) increments
Outputs:	Interface: CAN J1939, CANopen and ISOBUS
Operating temperature:	-40 °C (-40 °F) to 105 °C (221 °F) (sensor)
Dew point, humidity:	90% rel. humidity, no condensation
Sealing:	IP 67 (individual wires); IP 67 (cable exit)
Rod pressure ratings **10 mm (0.39 in.) rod:** **7 mm (0.27 in.) rod:**	350 bar (5076 psi) operating, 530 bar (7687 psi) peak pressure 300 bar (4351 psi) operating, 450 bar (6526 psi) peak pressure
Electrical connection:	Individual 4-wire (optional M12 connector) or Pigtailed PUR cable
Voltage input:	12/24 Vdc (10 to 32 Vdc)
EMC tests:	200 V/m: ISO 11452-5 ISO 14982, Agricultural and forest machines ISO 7637-0/1/2/3, Road vehicles DIN EN 50121-3-2:5/2001, Railway applications IEC 61000-6-1/2 - CE
Shock ratings:	**10 mm (0.39 in.) rod:** 100 g (single hit) /IEC 68-2-27 **7 mm (0.27 in.) rod:** 100 g (single hit) /IEC 68-2-27
Vibration ratings:	**10 mm (0.39 in.) rod:** 25 g RMS/ 10-2000 Hz/IEC 68-2-6 **7 mm (0.27 in.) rod:** 15 g RMS/ 10-2000 Hz/IEC 68-2-6
Current drain:	80 mA typical
Electrical isolation:	500 Vdc (DC ground to machine ground)
Polarity protection:	Up to -36 Vdc
Overvoltage protection:	Up to 36 Vdc
Sensor material:	Stainless steel 1.4301/AISI 304

M-Series, Model MH CANbus output 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.

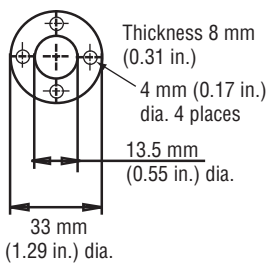


Position magnet options

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

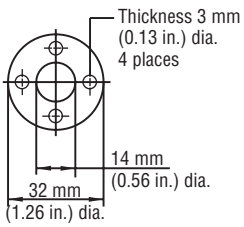
Part no. 201542-2

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



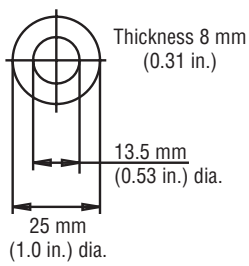
Part no. 400633

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



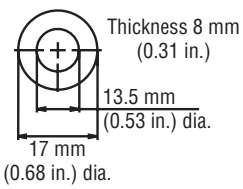
Part no. 400533

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



Installation examples

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

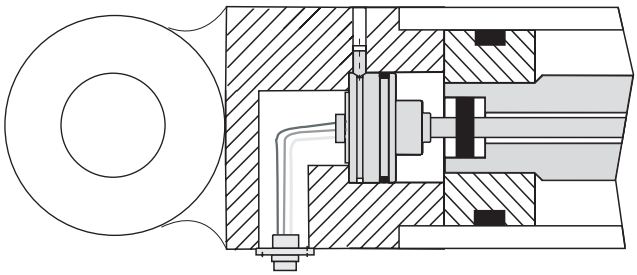
Sensor installation

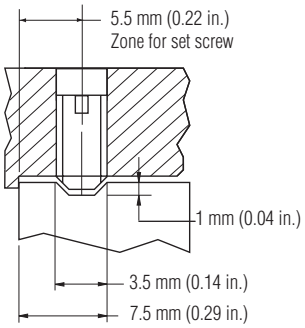
The method of installation is entirely dependent on the cylinder design. While the most common method of installation is from the rod side of the cylinder, installation from the head side of the cylinder is also possible. In both installation methods, the sensor seals the cylinder by using an O-Ring 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 4 for the standard wiring configuration.

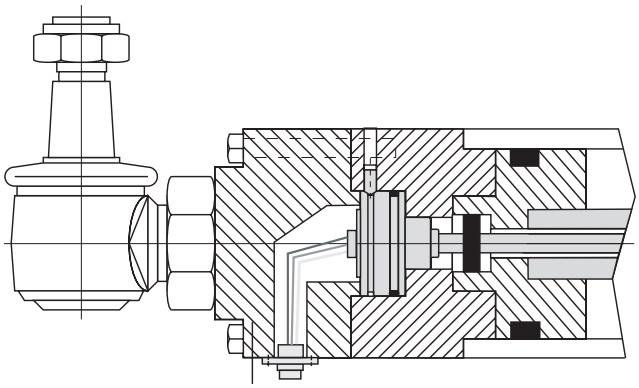
Retaining screw with set screw DIN 914
M5x10 maximum torque 0.5 Nm
(0.369 lbf-ft /4.43 lbf-in) or UNF/UNC equivalent



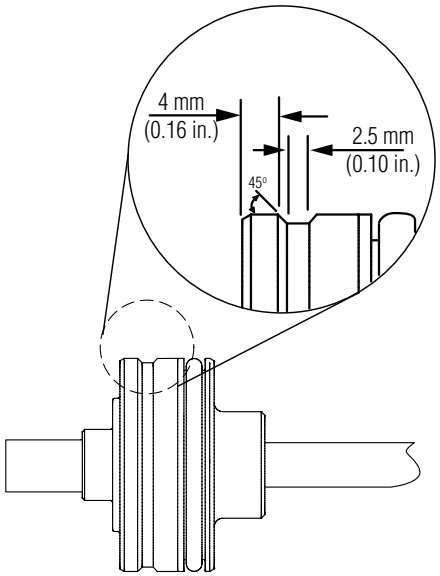


Cylinder head, side installation example

The following illustration and dimensional drawing are for reference only. Refer to the wiring diagram on page 4 for the standard wiring configuration.



Detail flange housing



Wiring diagram (standard configuration)

Wire color	Signal	Pin no.
Yellow	CAN_H	4
Green	CAN_L	5
Brown	12/24 Vdc	2
White	DC ground to (0 Vdc)	3
None	N/C	1

M-Series Model MH Analog sensor How to order and accessories

Accessories	
Description	Part no.
Ring magnet	201542-2
Ring magnet	400533
Ring magnet	401032
Magnet spacer (use with magnet part no. 201542-2)	400633
M12 Flange	253769

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

SENSOR MODEL
Hydraulic rod-style 48 mm
MH = (1.89 in.) dia. housing

PRESSURE PIPE
C = 10 mm (0.39 in.) diameter
D = 7 mm (0.28 in.) diameter

STROKE LENGTH (order length)
_ _ _ _ M = Millimeters (50 mm) (1.97 in.) to 2000 mm (79 in.) in 5 mm (0.19 in.) increments)

CONNECTION TYPE

Wire exit:
N _ _ _ = Integral “single wires”, each conductor is 0.5 mm²

Wire lengths:
10 = 100 mm (3.94 in.) length
20 = 200 mm (7.07 in.) length
30 = 300 mm (11.81 in.) length
Wire length: first digit x 100 mm / second digit x 10 mm

Termination type:
A = Pigtail (stripped conductors)
(Note: For wire termination, consult factory)

F = M12 integrated connector M12x1 for MH-CANbus, MH-ISOBUS and MH-CANopen, A-polarization, 5-pin 4-wires, flange size 24 mm. PIN1-N.C., PIN2 - supply-brown, PIN3 - ground-white, PIN4 - CAN_H yellow, PIN5-CAN_L green.

Cable exit:
T _ _ = 3 or 4 conductor / cable; (output dependent), diecast lid
Cable length (10th digit x 1m., 11th digit x 0.1 m.)
10 = 1.0 m. length (standard, all other lengths require minimum order quantities; 0.5 m. min. to 9.9 m. max.; 0.1 m. increments)

Termination type:
A = Pigtail (wires only)

INPUT VOLTAGE
3 = + 12/24 Vdc

_ _ _ = **OUTPUT**
C01 = CANopen
J01 = J1939
K01 = ISOBUS

ISO 9001 CERTIFIED

NFPA National Fluid Power Association MEMBER

Part Number: 03-08 551027 Revision B

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