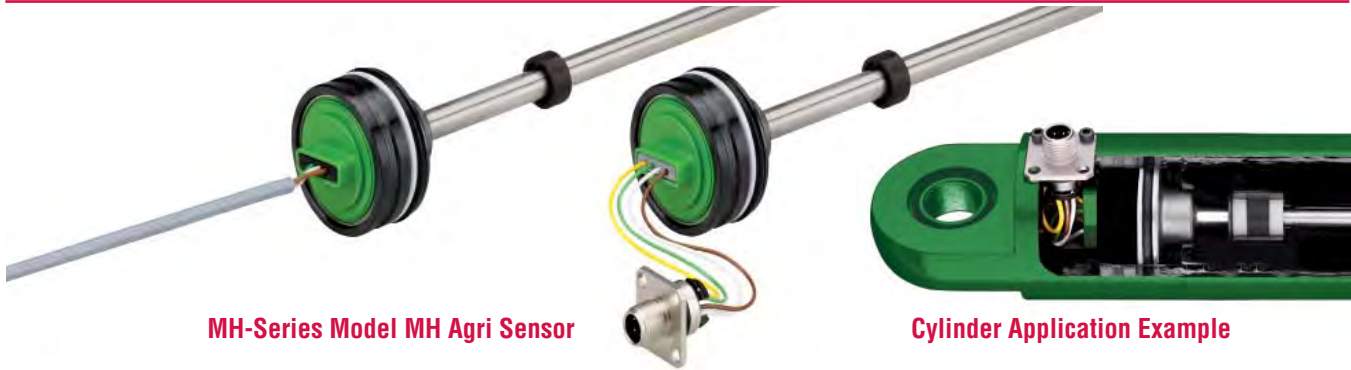


Temposonics®

Magnetostrictive, Absolute, Non-contact
Linear-Position Sensors



MH-Series Mobile Hydraulic in-Cylinder Sensor Model MH Agri Analog Output Data Sheet



MH-Series Model MH Agri Sensor

Cylinder Application Example

FEATURES

- Linear, Absolute Measurement in Hydraulic Cylinders
- Non-Contact Sensing Technology
- Superior Accuracy, $< \pm 0.08\%$ F.S.
- Hysteresis $< \pm 0.25$ mm
- Repeatability, $< \pm 0.01\%$ F.S.
- Compact Design for Embedded Cylinder Applications
- Direct Analog Output:
0.25 to 4.75 Vdc, 0.5 to 4.5 Vdc
- Stroke length: 50 mm (2 in.) to 1000 mm (40 in.)
- Voltage input: 12 Vdc
- Shock Rating: 50 g (single hit) / IEC 68-2-27
- Vibration Rating 20 g / 10-2000 Hz/IEC 68-2-6
- 140 V/m EMI Immunity

BENEFITS

- Rugged Mobile Sensor
- Direct Analog Output

APPLICATIONS

- Continuous Operation In Harsh Mobile Conditions
- High Pressure Conditions
- For Welded and Tie-rod Cylinder Applications

TYPICAL INDUSTRIES

- Agriculture
- Off-highway Machinery

Product overview

The Temposonics® MH-Series Model MH Agri sensor is designed specifically for the agricultural machine market.

All specifications conform to 2009/19/EG Agricultural and forest machine regulations. Optimized production of the MTS Model MH Agri sensor allows customers to purchase cost effective in-cylinder position sensing solutions for larger quantity applications.

Model MH Agri sensors can be used in versatile mobile machines without any restriction and replace contact-based linear sensors like potentiometers. Highly dynamic systems are controlled safely by means of Model MH Agri sensors, thus enhancing the productivity, availability and quality of the working process of the machine.

Insensitive to vibration, shocks, dust and weathering influence and electro-magnetic interference. MH Series sensors are successfully used in front axle and articulated frame steering cylinders, hydraulic jacks and in steering systems for hydraulic units on agricultural and construction machinery.

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Product Specifications and Output Options

Product specifications

Parameters	Specifications
OUTPUT	
Measured variable:	Linear Position measurement
Resolution:	Resolution: ± 0.25 mm Typical
Outputs:	Voltage: 0.25 to 4.75 Vdc 0.5 to 4.5 Vdc with failure output signal Load resistance: > 10kΩ
Stroke length:	50 mm to 1000 mm (2 in. to 40 in.) Measured in 5 mm (0.20 in.) increments
Linearity uncorrected:	< ± 0.08% full stroke (minimum ± 0.100 mm 0.003 in.)
Repeatability:	< ± 0.01% of full stroke
Hysteresis:	± 0.25 mm (0.003 in.)
Outputs:	Direct Analog: ‡ Voltage: 0.25 to 4.75 Vdc , 0.5 to 4.5 Vdc
Operating voltage:	12 Vdc (8-16 Vdc)
Power consumption:	1 W
ELECTRONICS	
Electrical isolation:	500 Vdc (DC ground to machine ground)
Polarity protection:	Up to -36 Vdc
Overvoltage protection:	Up to 36 Vdc

Parameters	Specifications
ENVIRONMENTAL	
Operating conditions:	Operating: -40 °C (-40 °F) to +105 °C (221 °F) Storage: -25 °C (-13 °F) to 65 °C (149 °F) 90% relative humidity, no condensation
EMI test:	140 V/m: ISO 11452-5 ISO 14982 - Agriculture and forest machinery
Shock rating:	50 g (single hit)/IEC standard 68-2-27 (survivability)
Vibration rating:	20 g / 10 to 2000 Hz /IEC standard 68-2-6
WIRING	
Connection type:	One 4-wire with the M12x1 connector and flange (provides IP69K environmental protection when installed in a cylinder).
ROD STYLE SENSOR (Model MH Agri)	
material:	Sensor rod: Stainless steel 1.0718 Housing: Steel 1.4305 / AISI 303/Blued Mechanical assembly: Flange housing 48 mm (1.89 in.) dia., O-ring 40.87 x 3.53 mm NBR 80, backup ring 42.6 x 48 x 1.4 PTFE
Sealing:	IP67 (IP69k when installed inside a cylinder with M12 x 1 connector system)
Pressure rating:	Sensor rod, 10 mm (0.39 in.): Operating, 300 bar (4351 psi) Peak, 400 bar (5800 psi)
Magnet type:	Ring magnet,
‡ Output range is factory programmable through entire stroke.	

Output options

The MH-Series Model MH Agri position analog sensor provides direct analog outputs:

- Voltage; 0.25 to 4.75 Vdc, 0.5 to 4.50 Vdc

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Model MH Agri sensor dimension references

Model MH Agri, rod-style Sensor Drawing is for reference only, contact applications engineering for tolerance specific information.

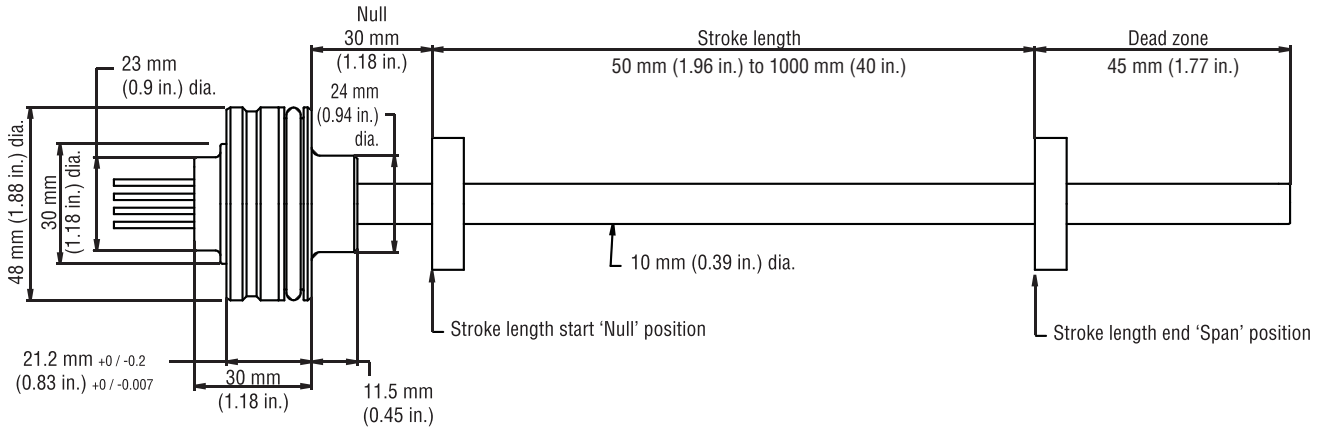


Figure 1. MH-Series Model MH Agri rod-style sensor dimension reference

Standard magnet selections (Model MH Agri)

SELECTION OF POSITION MAGNETS (MAGNET AND MAGNET SPACER MUST BE ORDERED SEPARATELY)

A choice of three magnets are available with the Model MH Agri rod-style sensor. Magnets must be ordered separately with Model MH Agri position sensors. The standard ring magnet (part number 201542-2) is suitable for most applications.

STANDARD RING MAGNET Part number 201542-2



Material: Ferrite PA
I.D.: 13.5 mm (0.53 in.)
O.D.: 33 mm (1.3 in.)
Thickness: 8 mm (0.3 in.)
Operating temperature:
 - 40 °C (-40 °F) to
 - 105 °C to (221 °F)

MAGNET SPACER Part number 400633 (used with magnet part no.: 201542-2)



Material: Non-ferrous, used with
 ring magnet (part no.: 201542-2)
I.D.: 14 mm (0.56 in.)
O.D.: 32 mm (1.25 in.)
Thickness: 3.2 mm (0.125 in.)

RING MAGNET Part number 400533



Material: Ferrite PA
I.D.: 13.5 mm (0.53 in.)
O.D.: 25.4 mm (1 in.)
Thickness: 8 mm (0.3 in.)
Operating temperature:
 - 40 °C (-40 °F) to
 - 105 °C to (221 °F)

RING MAGNET Part number 401032



Material: Ferrite PA
I.D.: 13.5 mm (0.53 in.)
O.D.: 17 mm (0.68 in.)
Thickness: 8 mm (0.31 in.)
Operating temperature:
 - 40 °C (-40 °F) to
 - 105 °C to (221 °F)

Model MH Agri Rod-Style Sensor

Installation

Model MH Agri sensor installation references

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

Installation Notes:

1. Use a non-ferrous circlip to fix the magnet.
2. The piston rod bore is dependent on hydraulic pressure and piston velocity. Minimum drilling for a (10 mm rod) should be 13.5 mm.
3. There should be no less than 3 mm clearance between the end of the sensor rod and the bottom of the rod bore at full retraction.

Model MH Agri, rod-style sensor mechanical installation Drawing is for reference only, contact applications engineering for tolerance specific information.

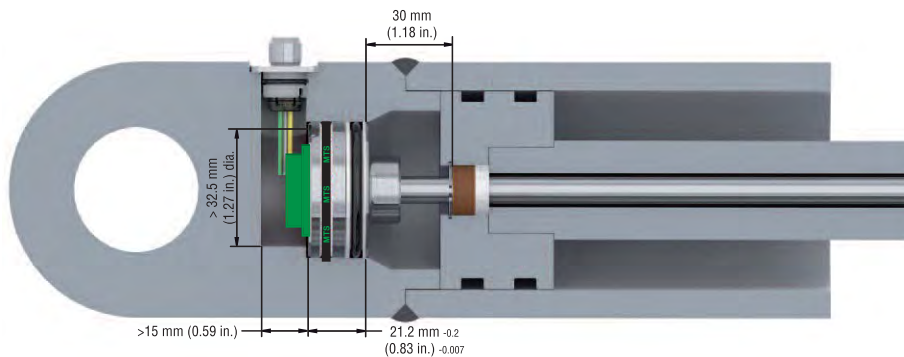


Figure 2. MH-Series Model MH Agri rod-style sensor mechanical installation example

Model MH Agri, rod-style sensor installation Drawings are for reference only, contact applications engineering for tolerance specific information.

Installation methods are possible in magnetic and non-magnetic applications (shown in *Figures 3 and 4*) and are 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.

Magnetic material installation reference

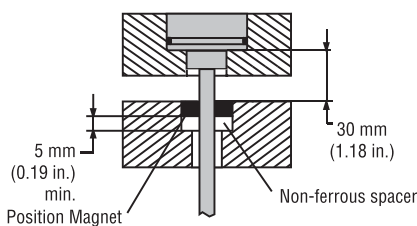


Figure 3. Model MH Agri installation in magnetic material using a non-ferrous magnet spacer.

Non-magnetic material installation reference

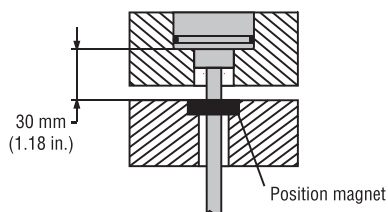
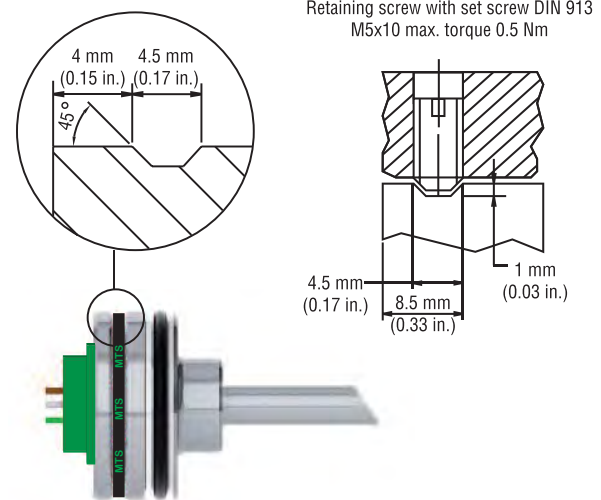


Figure 4. Model MH Agri installation in non-magnetic material shown without magnet spacer

Set screw detail



Connections and wiring

CONNECTION TYPE

The Temposonics® M12 connector system (shown in *Figures 7, 8, 9 and 10*), meets the most stringent protection requirements important for the difficult environmental conditions of mobile hydraulics applications. Protection type IP69K makes the robust metal housing not only completely dust and waterproof, even the harshest cleaning measures cannot damage the sensor.

Model MH Agri, rod-style sensor connector and pin assignments *Drawings are for reference only, contact applications engineering for tolerance specific information.*

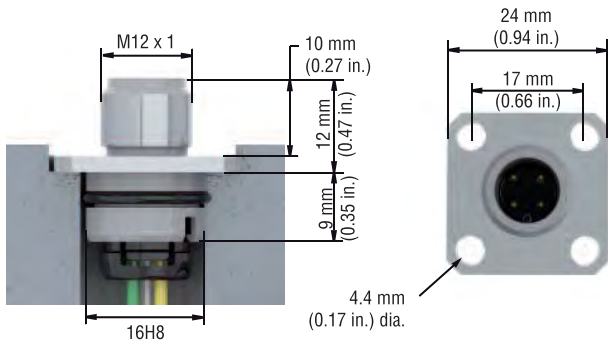


Figure 5. Model MH Agri sensor connection dimensions

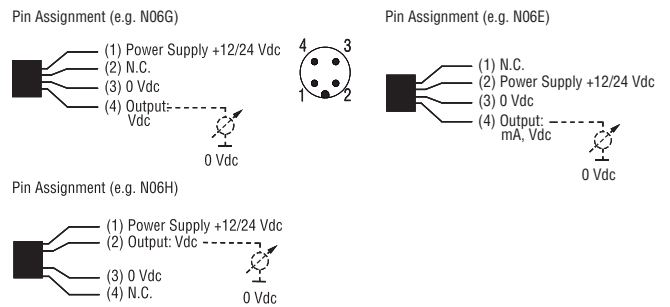


Figure 6. M12 x 1 connector system pin assignments

MOUNTING THE CONNECTOR SYSTEM TO THE CYLINDER

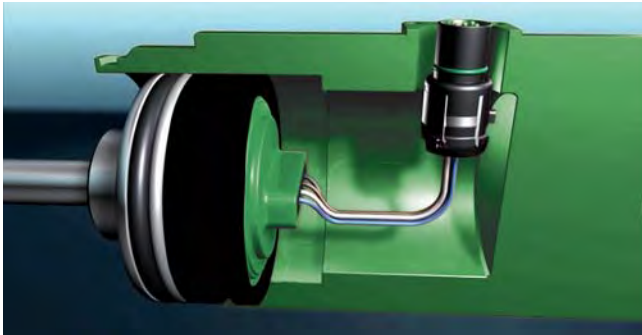


Figure 7. The MH sensor is delivered by MTS together with the new connector system: The connector insert carrier is already connected to the sensor electronics, i.e. no soldering, any color or connection mistake.

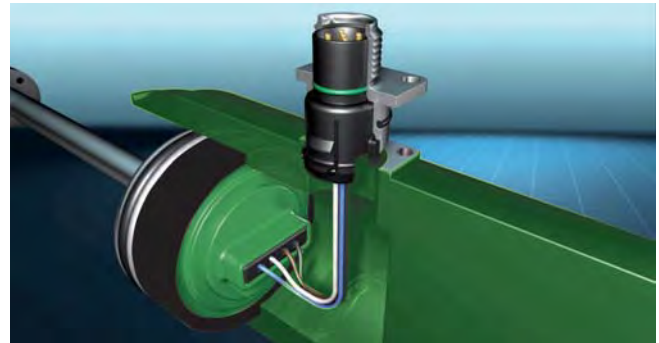


Figure 8. The connector insert is taken out of the cylinder through a bore hole. The flange housing can be snapped into position easily from outside.

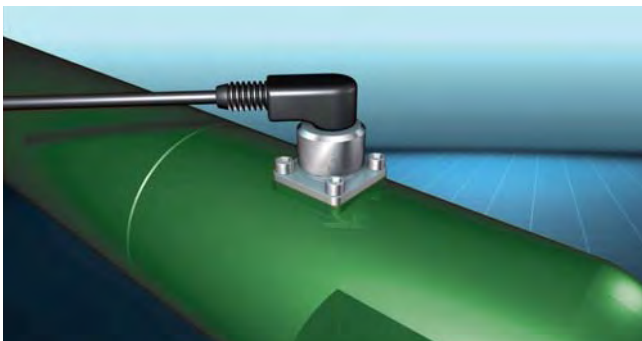


Figure 9. Four standard screws must be tightened to mount the connector system on the cylinder.



Figure 10. With a corresponding mating molded plug the connector system fulfills a ingress rating of IP69K.

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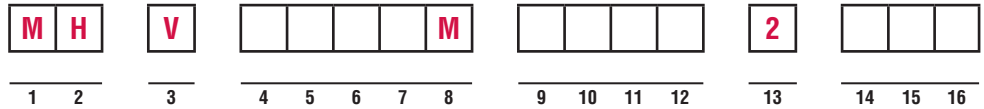
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Model MH Agri Rod-Style Sensor

Ordering Information

MH-Series Model MH Agri ordering information

Use the table below to configure your sensor part number.



SENSOR MODEL _____ =		M H	1-2
MH	= Rod-style with pressure fit flange housing 48 mm (1.88 in.) dia.		
SENSOR STYLES _____ =			3
V	= Rod-style 10 mm (0.39 in.) dia. damping zone 45 mm (1.77 in.)		
STROKE LENGTH (ORDER LENGTH) _____ =			4-8
----- M	= Millimeters 50 to 1000 mm (in 5 mm increments)		
CONNECTION TYPE _____ =			9-12
N _____	= Wire exit Integral 'single wires', Each conductor: 0.5 mm ² (20 AWG) Termination type:		
N __ A	= Pigtail (stripped conductors) no termination		
N __ E	= 4 single wires, M12x1 IP69K, 4 pin (pin assignment 2-3-4)		
N __ G	= 4 single wires, M12x1 IP69K, 4 pin (pin assignment 1-3-4)		
N __ H	= 4 single wires, M12x1 IP69K, 4 pin (pin assignment 1-2-3)		
	Wire length:		
	06 = 60 mm (2.36 in.) min. wire length		
	25 = 250 mm (9.84 in.) max. wire length		
	Cable exit:		
T __ A	4 conductor / cable; integral PUR cable, pigtailed, 4 cables, 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. to 9.9 max.: 0.1 m increments).		
INPUT VOLTAGE _____ =		2	13
2	= 12 Vdc		
OUTPUT _____ =			14-16
	Voltage:		
V11	= 0.25 to 4.75 Vdc		
V12	= 0.5 to 4.5 Vdc		

Magnet selections and optional Test kit

Magnets and the MH-Series Analog/PWM tester must be ordered separately. Refer to the table below for ordering information.

Magnet selections	Part no.
Ring magnet, O.D. 17.4 mm (0.68 in.)	401032
Ring magnet, O.D. 25.4 mm (0.99 in.)	400533
Ring magnet, O.D. 33 mm (1.29 in.)	201542-2
Magnet spacer	400633

Optional accessory	Part no.
MH-Series Analog/PWM Tester	280618
The MH-Series Tester includes:	
<ul style="list-style-type: none">• MH-Series analog / PWM Tester• 12 Vdc battery charger with (adapter main plug North America, adapter main plug EU or adapter main plug UK)• Cable with M12 x 1 connector• Cable with pigtailed wires• Carrying case• CD-Rom with user's guide	



MH-Series Analog/PWM Tester, part no.: 280618