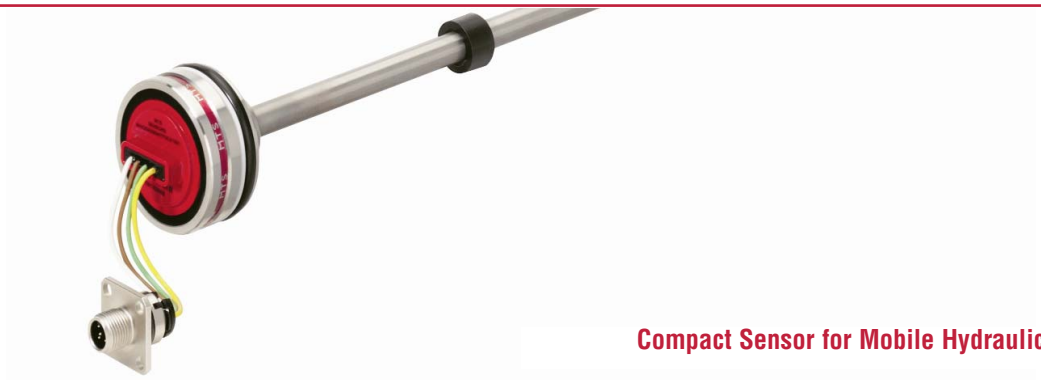
Temposonics®

Absolute, Non-Contact Position Sensors

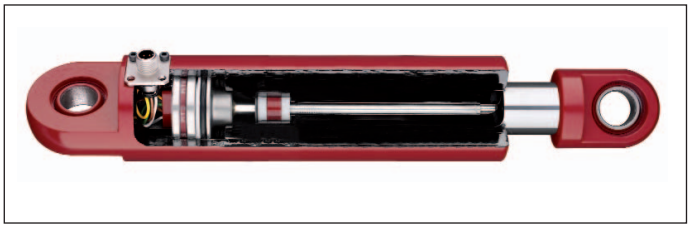
M-Series
PWM

Temposonics MH
Measuring Length 50 - 2500 mm



Compact Sensor for Mobile Hydraulics

- **Linear, absolute Measurement in Hydraulic Cylinders**
- **Non-Contact Sensing with Highest Durability**
- **Compact Dimensions**
- **Accuracy: Linearity Tolerance < ± 0,04%**
- **Hysteresis < ± 0,1 mm**
- **Direct PWM Output: Displacement**
- **Power Supply: 12/24 VDC**
- **Immunity against electromagnetic HF-fields up to 200 V/m**
- **Shockrating: 100 g (singlehit) / IEC 68-2-27**



Designed for the Mobile World

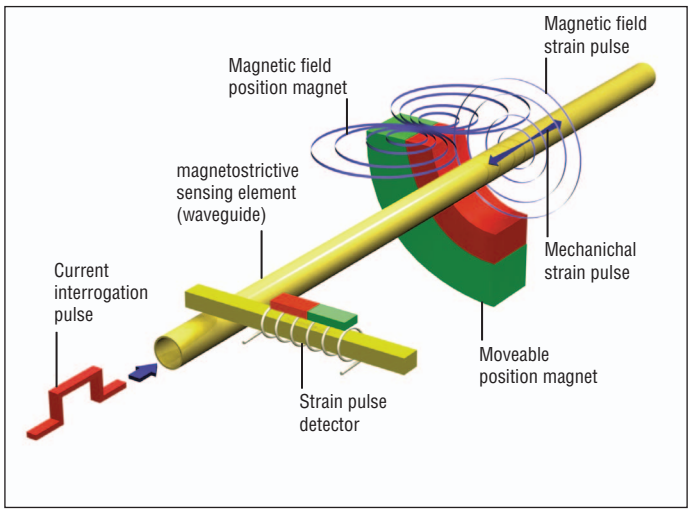
M-Series sensors were designed with the “mobile” world in mind, and have been validated in the field by customers worldwide. Performance is second to-none; high accuracy, 200 V/m EMI position output. Ruggedness is “designed in”, 100 g shock rating. The MH sensor can be fully sealed and embedded in a cylinder to ensure a long operation life. The direct connection to the Temposonics® M12 connector system and other proven mobile connectors are possible.

CE ISO 9001 CERTIFIED

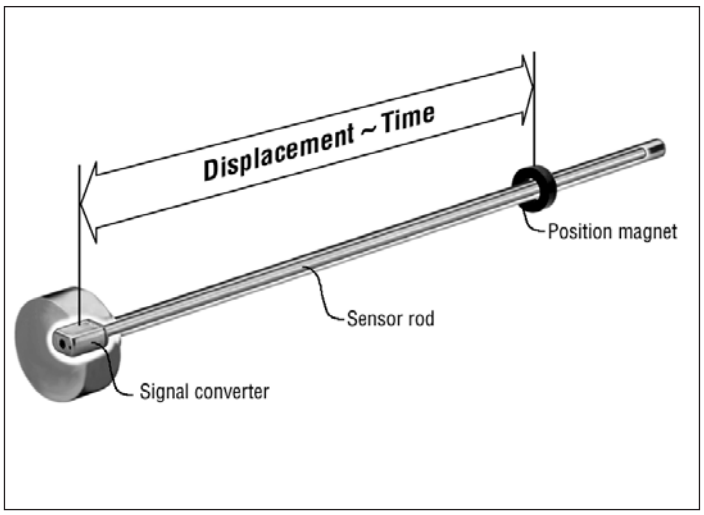
Magnetostriction

The absolute **Temposonics®** linear position sensors are based on the MTS developed magnetostrictive measurement principle. That combines various magneto-mechanical effects and uses the physical height precise speed-measurement of an ultrasonic wave (torsion pulse in its sensor element) for position detecting. Sensor integrated signal processing transforms the measurements directly into market standard outputs. The non-contact principle - an external movable magnet marks the position - eliminates the wear, noise and erroneous signal problems and guarantees the best durability without any recalibration.

Measuring Principle



Measuring Prinicple (simplified illustration)



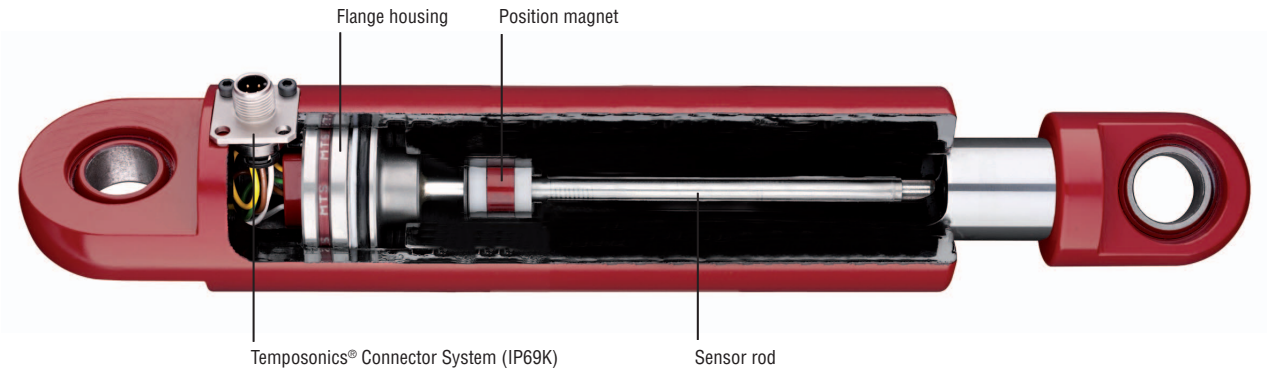
Temposonics MH - High Pressure Compact Sensor
Measuring Range 50 2500 mm

Temposonics MH, the new compact stainless steel position sensor is designed for installation into hydraulic cylinders, specifically for use in clevis head mobile cylinders or any space limited cylinder applications. MH type sensors are ideal choices for a wide range of standard hydraulic cylinders. Magnetostrictive displacement sensors, high quality cylinders and precise control valves form ideal driving systems for technically demanding of mobile hydraulics.

Simple Mechanics

The extremely rugged sensor consist of the following main parts:

- The flange housing with singal converter and built-in electronics
- The pressure-proof sensor pipe (up to 450 bar) with flange protects the internal sensing element, the waveguide system. It fits into the bored piston rod
- The position magnet, only moving part is mounted into the piston bottom. This permanent magnet travels wearfree and contactless along the stationary sensor tube. Its magnetic field starts the measurement signal through the sensors rod wall
- The innovative Connector System can easily be mounted in a few seconds, any soldering or crimping needless, dust-and waterproof up to IP69K



Technical Data

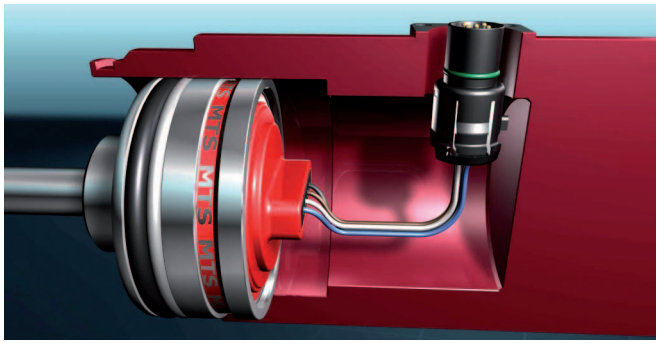
Input			
Measured variables:	Displacement		
Measuring range:	50 - 2500 mm in 5 mm steps		
Output			
Interface:	PWM		
Resolution:	The resolution is constant PWM ≤ ± 0,1 mm		
Signal output frequency:	PWM adjustable 1 ms...65 ms		
Accuracy			
Linearity:	50...250 mm ≤ ± 0,1 mm 255...2000 mm ≤ ± 0,04 % full stroke 500 mm ≤ ± 0,2 mm 750 mm ≤ ± 0,3 mm 1250 mm ≤ ± 0,5 mm 2005...2500 mm ≤ ± 0,8 mm		
Hysteresis:	± 0,1 mm		
Cycle Time:	1 ms		
Setpoint Tolerance:	± 0,2 mm		
Operating conditions			
Assembly orientation:	In any direction		
Operating temperature electronics, storage temp.:	-40°C...+105°C		
Fluid temperature:	-30°C...+105°C		
Dew point, humidity:	90 % rel. humidity, no condensation acc. EN60068-2-30		
Pressure			
Operating pressure ratings:	**Ø 10 mm sensor rod** PN: 350 bar Pmax: 450 bar	**Ø 7 mm sensor rod** PN: 300 bar Pmax: 400 bar	Pressure pulse test acc. DIN EN ISO 19879
IP rating			
M12 connector:	IP69K plugged, EN60529		
Sensor housing:	IP67, EN60529		
Environmental testing:			
Shock:	IEC-68-2-27 100 g (11 ms) single hit 50 g (11 ms) at 1000 Shocks per axis		
Vibration:	IEC 68-2-6 (10...2000 Hz) Ø 10 mm sensor rod 25 g Ø 7 mm sensor rod 15 g		
EMC:	ISO 14982 agricultural and forestry machines ISO 11452-2 (transient emissions, antenna) ISO 11452-4 (transient emissions, bulk current injection) ISO 11452-5 (transient emissions stripline - 200 V/m) DIN EN 50121-3-2 EMC for rail vehicles ISO 7637-1/2 road vehicles CE certified acc. to EG directives 89/336/EWG (12/24 VDC)		
Materials and dimensions			
Sensor rod:	Stainless steel 1.4306 / AISI 304L (Ø 10 mm / Ø 7 mm)		
Housing:	Stainless steel 1.4305 /AISI 303		
Mechanical assembly:	Flange housing Ø 48 mm O-ring 40.87 x 3.53 mm NBR 80, backup ring 42.6 x 48 x 1.4 PTFE		
Electrical installation			
Outputs:	Connector System M12x1 with O-ring 7 x 1,35 mm NBR 70 Connecting flange brass nickel-plated with O-ring 13 x 1,6 NBR 70		
Supply voltage:	12/24 VDC (tolerance range 8 - 32 VDC)		
Voltage supply ripple:	< 1 % p-p		
Power drain:	< 1,5 W		
Electric strength:	500 VDC (DC ground to machine ground)		
Polarity protection (GND - VDC - Signal):	Up to -36 VDC		
Over voltage protection (GND - VDC):	Up to 36 VDC		

Temposonics® Connector System M12

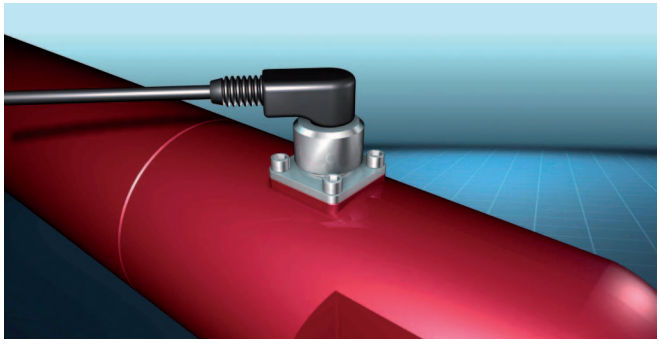
MTS presents the innovative Connector System for Temposonics® M-Series
The Temposonics® Connector System meets the most exacting protection requirements important for the difficult environmental conditions of mobile hydraulics applications. Protection type IP69K makes the robust metal housing not only completely dust- and waterproof, even the harshest cleaning measures can not damage the sensor.

A The MH sensor is delivered by MTS together with the new Connector System: The connector insert carrier is already connected to the sensor conductors, i.e. no soldering, any colour or connection mistake.
B The connector insert is taken out of the cylinder through a bore hole. The flange housing can be clicked in position easily from outside.
C Four standard screws must be tightened to mount the Connector System on the cylinder.
D With a corresponding mating plug the Connector System fulfills an IP rating of IP69K.

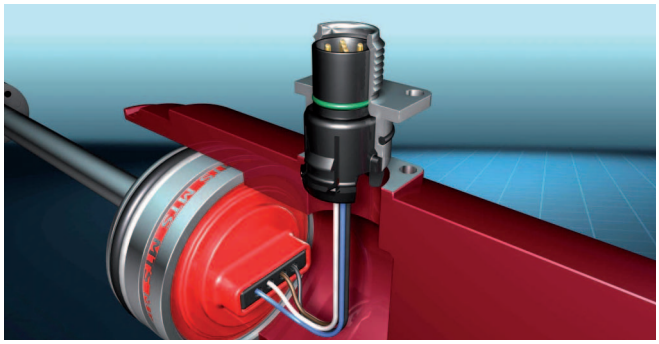
A



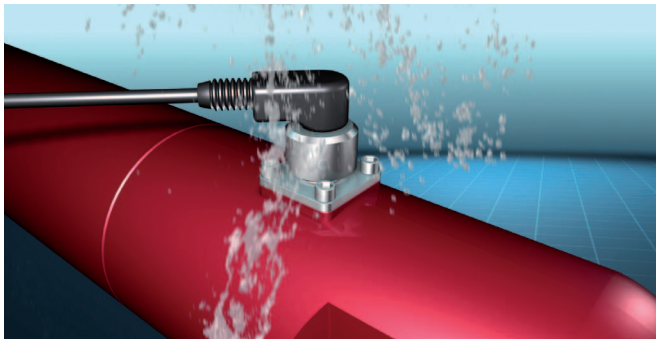
C



B

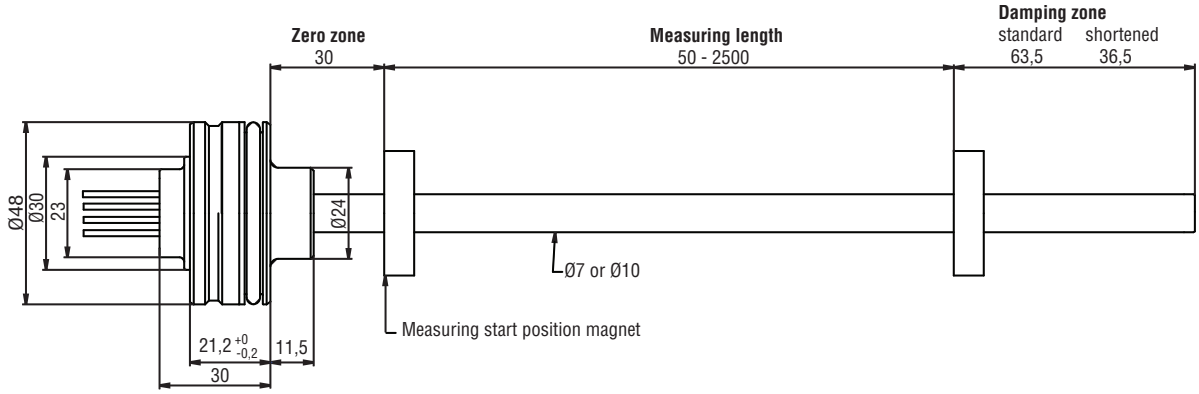


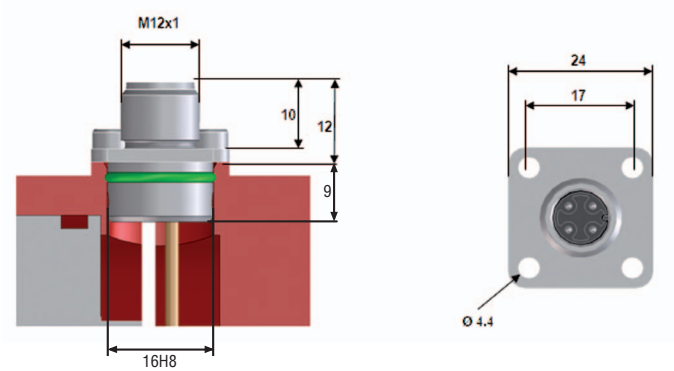
D



Electrical Connection / Dimensions

M12 connector system
4 single wire, 0,5 mm²





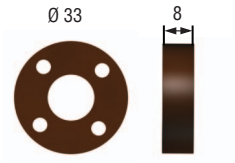
Pin Assignment

Pin	Signal
1	N.C.
2	Power Supply 12/24 VDC
3	DC Ground
4	PWM

Ring magnet Part No. 401032
OD 17,4 mm
ID 13,5 mm
Height 8 mm
Surface pressure max. 10 N/mm²*
in axial direction

*max. mechanical burden, e.g. by
circlip, lock washers etc.

Ring magnet Part No. 400533
OD 25,4 mm
ID 13,5 mm
Height 8 mm
Surface pressure max. 40 N/mm²*
in axial direction



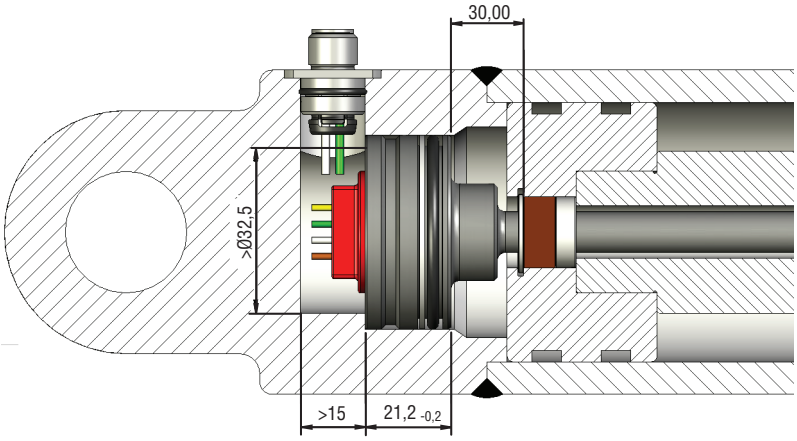
Ring magnet Part No. 201542-2
OD 33 mm
ID 13,5 mm
Height 8 mm
Fixing holes 4,2 mm, circle Ø24 mm
Surface pressure max. 40 N/mm²*
in axial direction
Fastening torque for screws M4:
max 1 Nm

All dimensions in mm.

Mechanical Installation

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

Example



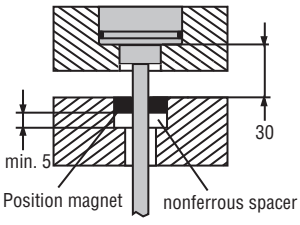
Sensor Installation

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 cylinder is sealed by O-ring and backup ring which is ready installed on the sensor housing.

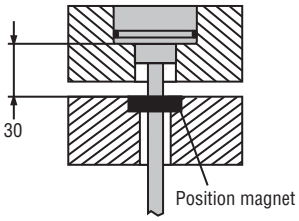
Installation Notes

- Use a non-ferrous circlip to fix the magnet.
- The bore in the piston rod is dependent on hydraulic pressure and piston velocity etc. The minimum drilling should be 10 (7 mm rod) or 13,5 mm (10 mm rod).

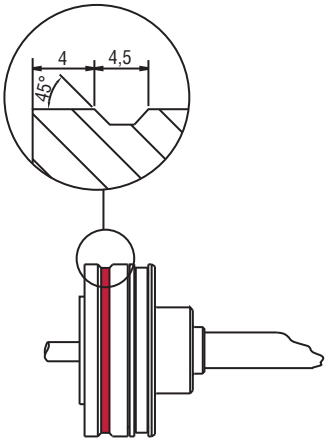
1. Installation in magnetic Material with Spacer



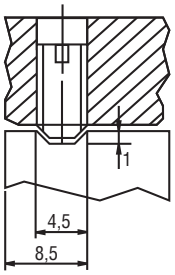
2. Installation in non-magnetic Material without Spacer



Detail Flange Housing



e.g. retaining with set screw DIN 913
M5x10 (with flat point!)
max. torque 0,5 Nm



All dimensions in mm.

Temposonics

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Sensor model
MH = Hydraulic rod /
Flange housing Ø 48 mm

Form factor
C = Rod-Ø 10 mm (damping zone 63,5 mm)
D = Rod-Ø 7 mm (damping zone 63,5 mm)
E = Rod-Ø 10 mm (reduced daming zone 36,5 mm)
F = Rod-Ø 7 mm (reduced damping zone 36,5 mm)
R = Rod-Ø 10 mm with rod end plug,
threaded hole M4 (damping zone 63,5 mm)

Measuring length
0050 - 2500 mm in 5 mm steps

Connection type
Single wires with Connector System M12
N _ _ E = 4 single wires, 0,5 mm² with Connector System M12 IP69K, 4 pin
N06E = 60 mm min. wire length
N25E = 250 mm max. wire length

Input
3 = +12/24 VDC

Output
P_ _ = PWM
15. digit: Span range **A** = 5 - 95 % • **B** = 10 - 90 % • **C** = 15 - 85 % • **D** = 20 - 80 % • **E** = 25 - 75 %

16. digit: Frequency **A** = 50 Hz • **B** = 60 Hz • **C** = 100 Hz • **D** = 200 Hz • **E** = 300 Hz • **F** = 400 Hz
G = 500 Hz • **X** = not defined

Scope of delivery
Position sensor, O-Ring, backup-ring
M12 connector system
Please order magnets seperately!

Accessories (selection)	Part No.
OD17,4 Ring magnet	**401 032**
OD25,4 Ring magnet	400 533
OD33 Ring magnet	201 542-2

www.mtssensor.com
www.temposonics-shop.de

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