Temposonics®

Absolute, Non-Contact Positions Sensors

Temposonics
AN AMPHENOL COMPANY

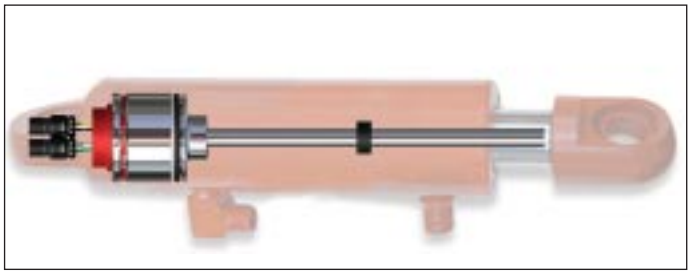
MH-Series
Analog Redundant

Document Part Number
551218 Revision F

Temposonics MT
Measuring length 50 - 2500 mm

Redundant Sensor for Mobile Hydraulics

- **Redundant Sensor System**
- **Linear, Absolute Position Sensors**
- **Non-Contact Sensor Technology with Highest Durability**
- **Superior Accuracy: Linearity Tolerance < 0.04 % F.S.**
- **Hysteresis ± 0.1 mm**
- **Direct Analog Displacement Output: Current or Voltage**
- **Power Supply: 12/24 VDC**
- **Shock Rating 100 g (single hit) / IEC 68-2-27**
- **Vibration Rating 15 g / 10-2000 Hz / IEC 68-2-6**



Designed for the mobile world

MH-Series sensors were designed with the “mobile” world in mind, and have been validated in the field by customers worldwide. They are availabe with a redundant output for safety sensitive applications. Performance is second to-none; high accuracy, position output. Ruggedness is “designed in”; 100 g shock rating. Cable and wire options are sized for direct connection to proven connectors. The model MT sensor can be fully sealed and embedded in a cylinder to ensure a long operating life.

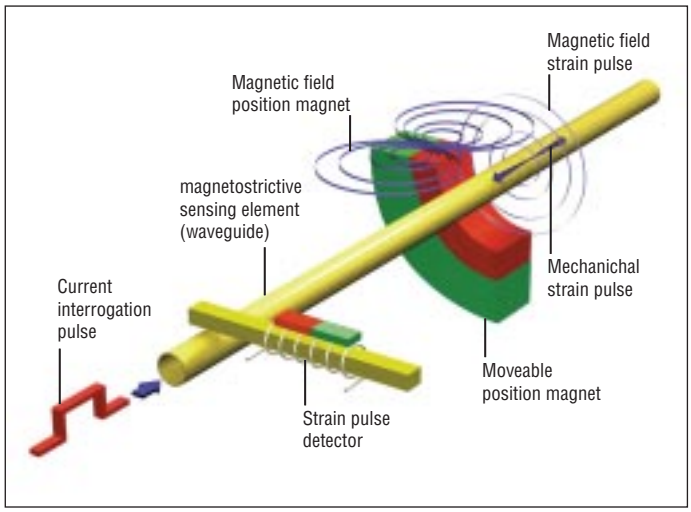
ISO 9001 CERTIFIED

UK CA CE

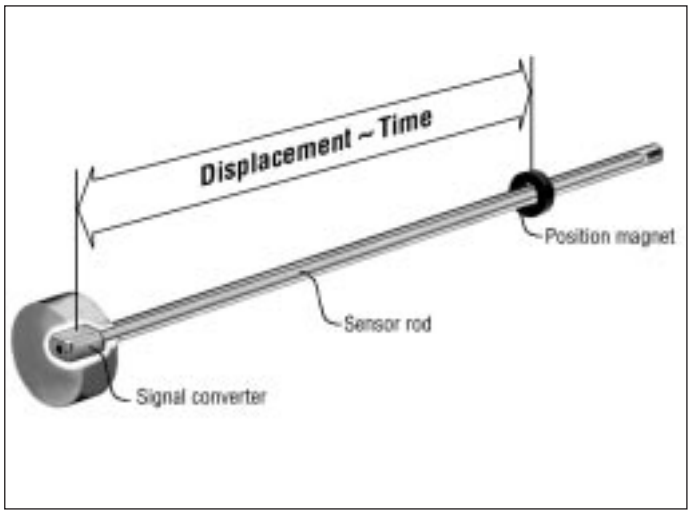
Magnetostriction

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 contactless 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®-MT - Redundant Sensor for Mobile Applications Measuring Range 50 - 2500 mm.

The robust Temposonics MT sensor's stainless steel housing is designed for direct stroke measurement in compact standard hydraulic cylinders. MT type sensors are ideal choices for a wide range of hydraulic cylinders. Magnetostrictive displacement sensors, high quality cylinders and precise con-trol valves form ideal driving systems for technically demanding of mobile hydraulics.

Simple Mechanics

The extremely rugged sensor consist of 3 main parts and has two independent sensors "embedded" in one single housing.

- The flange housing with independent signal converter and built-in electronics
- The pressure-proof sensor pipe (up to 350 bar) with flange, fits into the bored piston rod, protects two internal sensing elements, the waveguide systems.
- The position magnet, only moving part, is mounted on the piston bottom This permanent magnet travels wearfree and contactless along the stationary sensor tube.

Technical Data

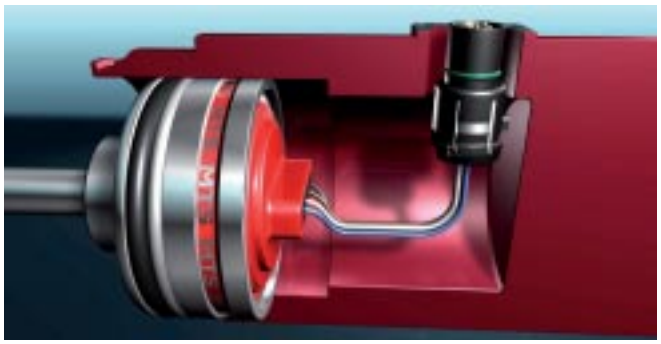
Input		
Measured variables:	Displacement	
Measuring range:	50 - 2500 mm in 5 mm steps	
Output		
Signal characteristic:	Continuously analog output restricted by noise or A/D converter of control unit	
Voltage:	0.25...4.75 VDC	inverse: 4.75...0.25 VDC
	0.5...4.5 VDC	inverse: 4.5...0.5 VDC
Current:	4...20 mA	inverse: 20...4 mA
Resolution:	typ ± 0.1 mm	
Internal Cycle Time:	2 ms	
Accuracy		
Linearity:	50...250 ± 0.1 mm	
	255…2000 ± 0.04 % F.S.	
	2005…2500 ± 0.08 mm	
Hysteresis:	± 0.1 mm	
Setpoint Tolerance:	≤ 1 mm	
Operating conditions		
Assembly orientation:	In any direction	
Operating temperature electronics, storage temp.:	-40°C...+105°C	
Fluid temperature:	-30°C...+85°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	Pressure impulse test acc.
	Pmax: 450 bar	DIN EN ISO 19879
IP rating sensor housing		
Sensor housing:	IP67, EN60529	
Environmental testing:		
Shock:	IEC-68-2-27	
	100 g (6 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 15g (r.m.s)	
EMC:	ISO 14982 agricultural and forestry machines	
	ISO 11452-2 (radiated immunity) (Increased immunity voltage output 100V/m)	
	ISO 11452-4 (conducted immunity)	
	ISO 7637-1/2 (transient Impulses)	
Materials and dimensions		
Sensor rod:	Stainless steel 1.4306 / AISI 304L (Ø 10 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		
Connector:	Connector System 2 x 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 $\%_{PP}$	
Power drain:	< 1 W	
Electric strength:	500 VDC (DC ground to machine ground)	
Over voltage protection (GND - VDC):	+ 36 VDC	
Polarity protection (GND - VDC):	up to -36 VDC	
Load:	R_L ≥ 10 kΩ mA output	
	R_L ≤ 250 Ω (12 VDC) VDC output	
	R_L ≤ 500 Ω (24 VDC) VDC output	

Temposonics® Connector System M12

MTS presents the innovative Connector System for Temposonics® MH-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



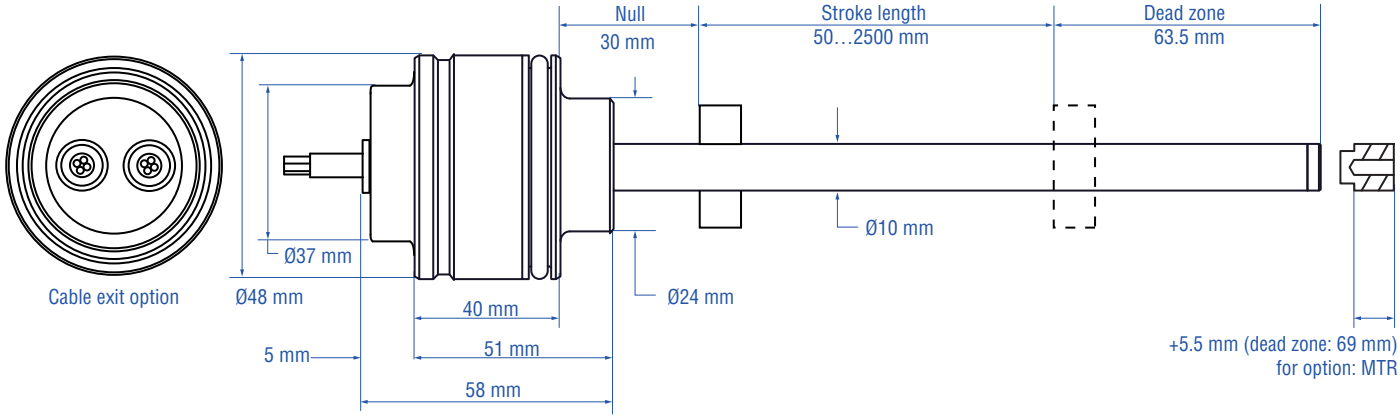
C

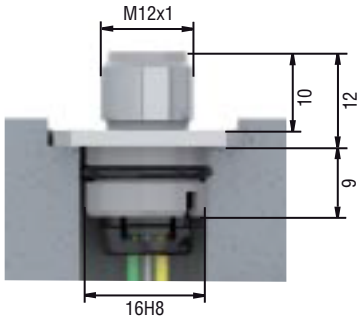
B

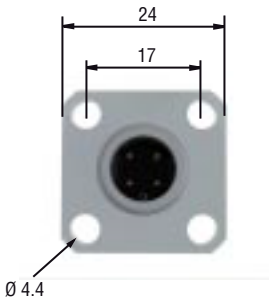
D

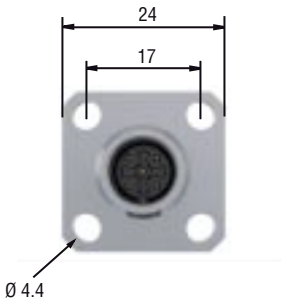
Temposonics MT Redundant Sensor

MH-Series model MT sensors were designed with the mobile world in mind and apply specifically to applications that require redundancy. They help lower overall costs by increasing safety, availabilty and reliability and reducing service costs. MH-Series sensors are designed specifically for position sensing applications in rugged environments typically encountered by construction, agricultural and other off-highway machinery and have been validated in the field by customers worldwide. Their performance is second-to-none. Ruggedness is "designed in" along with 100 g shock and 15 g vibration rating. Cable wires are sized for direct connection to industry proven connectors. The model MT can be fully sealed and embedded in a cylinder to ensure a long operation life.

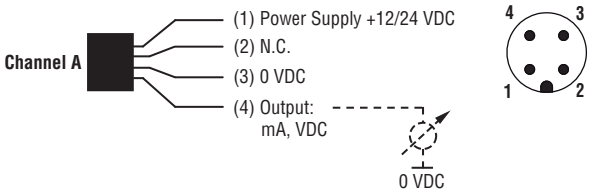


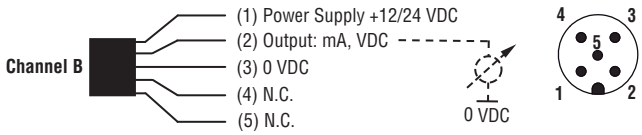


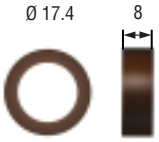




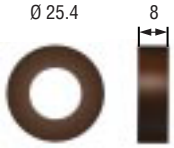
Pin Assignment (e.g. N06R)



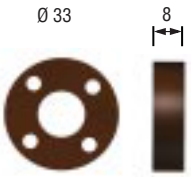




Ring magnet Part No. 401 032
OD 17.4 mm
ID 13.5 mm
Height 8 mm
Surface pressure max. 10 N/mm²*
in axial direction



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



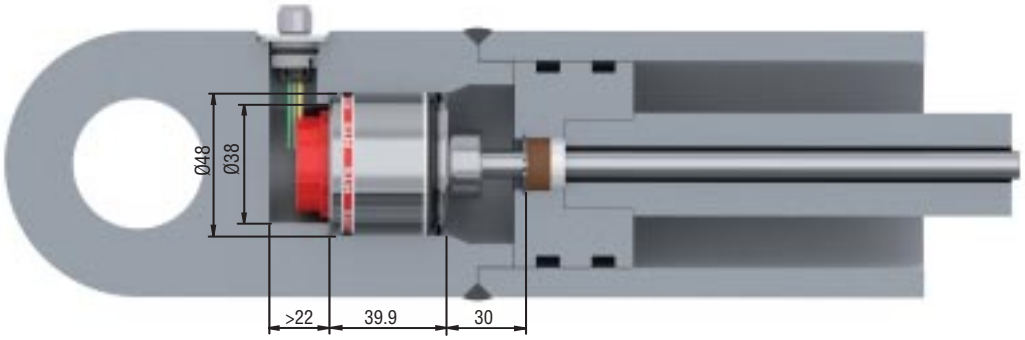
Ring magnet Part No. 201542-2
OD 33 mm
ID 13.5 mm
Height 8 mm
Fixing holes 4.2 mm, circle Ø24 mm
Surface pressure max. 40 N/mm²* in axial direction
Fastening torque for screws M4: 1 Nm

*max. mechanical burden, e.g. by cir-clip, lock washers etc.

Mechanical Installation

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

Example



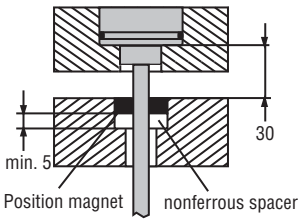
Sensor Installation

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.

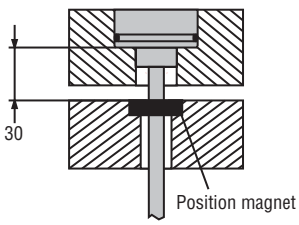
Installation Notes

- 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 13.5 mm (10 mm rod).

1. Installation in magnetic Material with Spacer

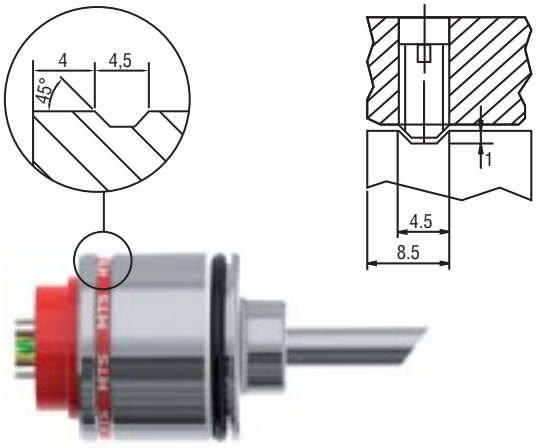


2. Installation in non-magnetic Material without Spacer



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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Form factor
MT = Hydraulic rod / Pressure-fit flange housing Ø 48 mm

Style
C = Rod-Ø 10 mm
R = Rod-Ø 10 mm with welded end plug M4

Measuring Range (Order Length)
0050 - 2500 mm in 5 mm steps

Connection Type
N_ _R = Channel A: 4 single wires, M12 IP69K, 4 pin (pin assignment 2 x 1-3-4)
Channel B: 4 single wires, M12 IP69K, 5 pin (pin assignment 2 x 1-2-3)
N06R = 60 mm min. wire length
N25R = 250 mm max. wire length

Input Voltage
3 = +12/24 VDC

Signal Output

	Channel A	Channel B
V11 =	0.25 - 4.75 VDC	0.25 - 4.75 VDC
V12 =	0.5 - 4.5 VDC	0.5 - 4.5 VDC
A13 =	4.75 - 0.25 VDC	4.75 - 0.25 VDC
A14 =	4.5 - 0.5 VDC	4.5 - 0.5 VDC
V21 =	0.25 - 4.75 VDC	4.75 - 0.25 VDC
V22 =	0.5 - 4.5 VDC	4.5 - 0.5 VDC
A01 =	4 - 20 mA	4 - 20 mA
A04 =	20 - 4 mA	20 - 4 mA
A21 =	4 - 20 mA	20 - 4 mA

Scope of Delivery
Position Sensor, O-Ring, Backup-Ring
Please order magnets separately.

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

MH Testkit	280618

Scope of delivery:
- MH-Series analog / PWM Tester
- 12 VDC battery charger with adapter (adapter main plug EU, adapter main plug UK)
- Cable with M12*1 connector
- Cable with pigtailed wires
- Carrying case
- CD-Rom with user's guide

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