

Magnetostrictive, Absolute, Non-contact Linear-Position Sensors

> MH-Series Mobile Hydraulic External Sensor Model MSR Analog Output Data Sheet



Document Part Number 551315 Revision B



MH-Series Model MSR Sensor

FEATURES

- Linear, Absolute Measurement in Hydraulic Cylinders
- Non-Contact Sensing Technology
- Superior Accuracy, < ± 0.04% F.S.
- Hysteresis < ± 0.1 mm
- Repeatability, < ± 0.005% F.S.
- Compact Design for Embedded Cylinder Applications
- Direct Analog Displacement Output: Current and Voltage 0.25 to 4.75 Vdc, 4 to 20 mA
- Stroke length: 50 mm (2 in.) to 500 mm (20 in.)
- Voltage input: 12/24 Vdc
- Shock Rating: TBD shock value is pending
- Vibration Rating: TBD vibration value is pending
- 100 V/m EMI Immunity

BENEFITS

- Rugged Mobile Sensor
- Direct Analog Output (Fully reversible)

APPLICATIONS

- Continuous Operation In Harsh Mobile Conditions
- High Pressure Conditions
- External Sensor Solution For Cylinder Applications

TYPICAL INDUSTRIES

- Construction
- Agriculture
- Off-highway Machinery

Product overview

The MH-Series Model MSR sensor is designed with the "mobile" world in mind. The Model MSR sensor is validated in the field by customers worldwide. Performance is second-to-none with high EMI resistance of 100 V/m. Ruggedness is designed in, shock and vibration ratings are stated for a fully retracted sensor. The rating for full or partially extended sensor is application dependent. The model MSR analog sensor can be installed along side of a hydraulic cylinder where a in-cylinder installation is not practical. Direct connection to the Temposonics[®] M12 x 1 connector system is standard.

All specifications are subject to change. Contact MTS for specifications and engineering drawings that are critical to your application. Drawings contained in this document are for reference only. Go to http://www.mtssensors.com for the latest support documentation and related media.

Product specifications

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Parameters	Specifications		Parameters	Specifications		
OUTPUT						
Measured variable: Outnuts:	Linear Position measurement Direct Analog: ‡ Voltage: 0.25 to 4.75 Vdc , 0.5 to 4.5 Vdc 4.75 to 0.25 Vdc , 4.5 to 0.5 Vdc		Operating conditions:	Operating: -40 °C (-40 °F) to +105 °C (221 °F) Storage: -30 °C (-22 °F) to +105 °C (221 °F) 90% relative humidity, no condensation		
			EMC test:	100 V/m: ISO 11452-5 (transient emissions stripline) CE certified acc. EN 60068-2-30,		
Resolution:	‡ Current: 4 to 20 mA Range:	, 20 to 4 mA Resolution:	Shock rating:	100 g (single hit)/IEC standard 68-2-27 (survivability) Fully retracted		
Stroke length:	50 to 500 mm 50 mm to 500 mm (2 i Measured in 5 mm (0 f	± 0.10 mm n. to 20 in.) 20 in) increments	Vibration rating:	♦15 g / 10 to 2000 Hz /IEC standard 68-2-6, Fully retracted		
	Standard length: 100 mm, 200 mm, 300 mm, 600 mm and 500 mm		WIRING Connection type:	Male, M12 x 1 connector (IP69K environmen- tal protection).		
Linearity		0.04% full stroke (minimum ± 0.100 mm 03 in.) 0.08% full stroke (for short damping zone)		NSOR (Model MSR) Sensor rod: Stainless steel 1.4306 / AISI 304L		
uncorrected:	< ± 0.04% full stroke (0.003 in.) < ± 0.08% full stroke (minimum ± 0.100 mm for short damping zone)	ROD STYLE SEN Material:	ISOR (Model MSR) Sensor rod: Stainless steel 1.4306 / AISI 304L		
uncorrected: Repeatability:	<pre>< ± 0.04% full stroke (0.003 in.) < ± 0.08% full stroke (< ± 0.005% of full stroke</pre>	minimum ± 0.100 mm for short damping zone) ke	ROD STYLE SEN Material:	ISOR (Model MSR) Sensor rod: Stainless steel 1.4306 / AISI 304L Housing: Stainless steel 1.4305 / AISI 303		
uncorrected: Repeatability: Hysteresis:	< ± 0.04% full stroke (0.003 in.) < ± 0.08% full stroke (< ± 0.005% of full stro ± 0.1 mm (0.003 in.)	minimum ± 0.100 mm for short damping zone) ke	ROD STYLE SEN Material: Sealing:	ISOR (Model MSR) Sensor rod: Stainless steel 1.4306 / AISI 304L Housing: Stainless steel 1.4305 / AISI 303 IP67K (IP69K with M12 connector)		
uncorrected: Repeatability: Hysteresis: Operating voltage:	< ± 0.04% full stroke (0.003 in.) < ± 0.08% full stroke (< ± 0.005% of full stro ± 0.1 mm (0.003 in.) 12/24 Vdc (8-32 Vdc)	minimum ± 0.100 mm for short damping zone) ke	ROD STYLE SEN Material: Sealing: Mounting:	ISOR (Model MSR) Sensor rod: Stainless steel 1.4306 / AISI 304L Housing: Stainless steel 1.4305 / AISI 303 IP67K (IP69K with M12 connector) Threaded M10 x 1.5 stud and rod end or MTS accessory spherical ball end		
uncorrected: Repeatability: Hysteresis: Operating voltage: Power consumption:	< ± 0.04% full stroke (0.003 in.) < ± 0.08% full stroke (< ± 0.005% of full stro ± 0.1 mm (0.003 in.) 12/24 Vdc (8-32 Vdc) 1 W	minimum ± 0.100 mm for short damping zone) ke	ROD STYLE SEN Material: Sealing: Mounting: ‡ Output range i and is fully rever	ISOR (Model MSR) Sensor rod: Stainless steel 1.4306 / AISI 304L Housing: Stainless steel 1.4305 / AISI 303 IP67K (IP69K with M12 connector) Threaded M10 x 1.5 stud and rod end or MTS accessory spherical ball end s factory programmable through entire stroke rsible.		
uncorrected: Repeatability: Hysteresis: Operating voltage: Power consumption: ELECTRONICS	< ± 0.04% full stroke (0.003 in.) < ± 0.08% full stroke (< ± 0.005% of full stro ± 0.1 mm (0.003 in.) 12/24 Vdc (8-32 Vdc) 1 W	minimum ± 0.100 mm for short damping zone) ke	ROD STYLE SEN Material: Sealing: Mounting: ‡ Output range i and is fully rever ◊ The vibration a sensor. The rati	ISOR (Model MSR) Sensor rod: Stainless steel 1.4306 / AISI 304L Housing: Stainless steel 1.4305 / AISI 303 IP67K (IP69K with M12 connector) Threaded M10 x 1.5 stud and rod end or MTS accessory spherical ball end s factory programmable through entire stroke rsible. and shock rating is stated for a fully retracted ng for full or partially extended sensor depends		
uncorrected: Repeatability: Hysteresis: Operating voltage: Power consumption: ELECTRONICS Electrical isolation:	<pre>< ± 0.04% full stroke (0.003 in.) < ± 0.08% full stroke (< ± 0.005% of full stro ± 0.1 mm (0.003 in.) 12/24 Vdc (8-32 Vdc) 1 W 500 Vdc (DC ground to </pre>	minimum ± 0.100 mm for short damping zone) ke o machine ground)	ROD STYLE SEN Material: Sealing: Mounting: ‡ Output range i and is fully rever ◊ The vibration a sensor. The rati on the application	ISOR (Model MSR) Sensor rod: Stainless steel 1.4306 / AISI 304L Housing: Stainless steel 1.4305 / AISI 303 IP67K (IP69K with M12 connector) Threaded M10 x 1.5 stud and rod end or MTS accessory spherical ball end s factory programmable through entire stroke rsible. and shock rating is stated for a fully retracted ng for full or partially extended sensor depends in		
uncorrected: Repeatability: Hysteresis: Operating voltage: Power consumption: ELECTRONICS Electrical isolation: Polarity protection:	<pre>< ± 0.04% full stroke (0.003 in.) < ± 0.08% full stroke (</pre>	minimum ± 0.100 mm for short damping zone) ke o machine ground)	<pre>ROD STYLE SEN Material: Sealing: Mounting: # Output range i and is fully rever ◊ The vibration a sensor. The rati on the applicatio</pre>	ISOR (Model MSR) Sensor rod: Stainless steel 1.4306 / AISI 304L Housing: Stainless steel 1.4305 / AISI 303 IP67K (IP69K with M12 connector) Threaded M10 x 1.5 stud and rod end or MTS accessory spherical ball end s factory programmable through entire stroke rsible. and shock rating is stated for a fully retracted ng for full or partially extended sensor depends in		

Output options

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

- Voltage; 0.25 to 4.75 Vdc, 0.5 to 4.50 Vdc (reverse acting: 4.75 to 0.25 Vdc, 4.5 to 0.5 Vdc)
- Current; 4 to 20 mA (reverse acting: 20 to 4 mA)

Model MSR sensor dimension references (Connector version shown)

MODEL MSR, ROD-STYLE SENSOR (ROD RETRACTED) DRAWING IS FOR REFERENCE ONLY, CONTACT APPLICATIONS ENGINEERING FOR TOLERANCE SPECIFIC INFORMATION.



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

MODEL MSR SENSOR (ROD EXTENDED) DRAWING IS FOR REFERENCE ONLY, CONTACT APPLICATIONS ENGINEERING FOR TOLERANCE SPECIFIC INFORMATION.



Figure 2. MH-Series Model MSR rod-style sensor dimension reference

Connections and wiring

CONNECTION TYPE

The Temposonics[®] M12 integrated connector system (shown in *Figure 3*), 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.

M12 X 1 KEY ORIENTATION



CONNECTOR PIN ASSIGNMENT REFERENCE



Integrated connector (male) as viewed from the end of the sensor

Standard	Integrated connector	Pin assignment and function			
IE	5-pin M12 x 1, IP69K	2-3-4; Power, ground, output			

Table 1.Pin assignments

Figure 3. M12 x 1 connector system key orientation

Model MSR Rod-Style Sensor Ordering Information

		MS	R		ſ	/		3		
		1 2	3	4 5	6 7	3 9	10 11 1	12 13	14	15 16
S MS = E	ENSOR MODEL	elf-contained hou	using					=	MS	1-2
S R = R	ENSOR STYLES								- = R	3
S	TROKE LENGTH (ORDER LENGT M = Millimeters 50 to 500 mm (2 to 2	[H) 20 in.) (in 5 mm	(0.2 in.) inc	crements)			=		M	4-8
C(ONNECTION TYPE							- =		9-12
IE	Key orientations and pin as (See 'Connections and Wirin = 5 pin, M12 x 1 IP69K, 4 pin	ssignments: ng' on page 3) (pin assignment	2-3-4)							
	Termination type: A = Pigtail (stripped conducto	rs) for wire term	ination.							1
3 = +	12/24 Vdc								- = 3]
0	UTPUT							=		14-16
V11 =	= 0.25 to 4.75 Vdc									
V12 =	= 0.5 to 4.5 Vdc									
V13 =	= 4.75 to 0.25 Vdc									
V14 =	= 4.5 to 0.5 Vdc									
	Current:									
A01 =	= 4 to 20 mA									
A04 =	= 20 to 4 mA									

Accessory selections (Model MSR)

SELECTION OF MOUNTING ACCESSORIES (MUST BE ORDERED SEPARATELY)

A choice of two mounting accessories are available with the Model MSR rod-style sensor.



Optional accessory	Part no.
MH-Series Analog/PWM Tester	280618
The MH-Series Tester includes:	
 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





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