

Selector Guide

Tempsonics®
Level Plus®

MTS Sensors Technology



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MTS Sensors Technology Corporation

737 Aihara-machi, Machida-shi
Tokyo 194-0211, Japan
TEL: +81-42-775-3838
FAX: +81-42-775-5512

URL www.mtssensor.co.jp
E-Mail info.jp@mtssensors.com

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MTSSTJGe-0314



The Measurable Difference

USA
MTS Systems Corporation
Sensors Division
3001 Sheldon Drive
Cary, NC 27513, USA
TEL: +1-919-677-0100 FAX: +1-919-677-0200
URL: www.mtssensors.com
E-Mail: info.us@mtssensors.com

Germany
MTS Sensor Technologie GmbH & Co.KG
Auf dem Schüffel 9
D-58513 Lüdenscheid, Germany
TEL: +49-2351-95870
FAX: +49-2351-56491
URL: www.mtssensor.de
E-Mail: info.de@mtssensors.com

The Company



Headquarters
MTS Systems Corporation, Minneapolis, USA



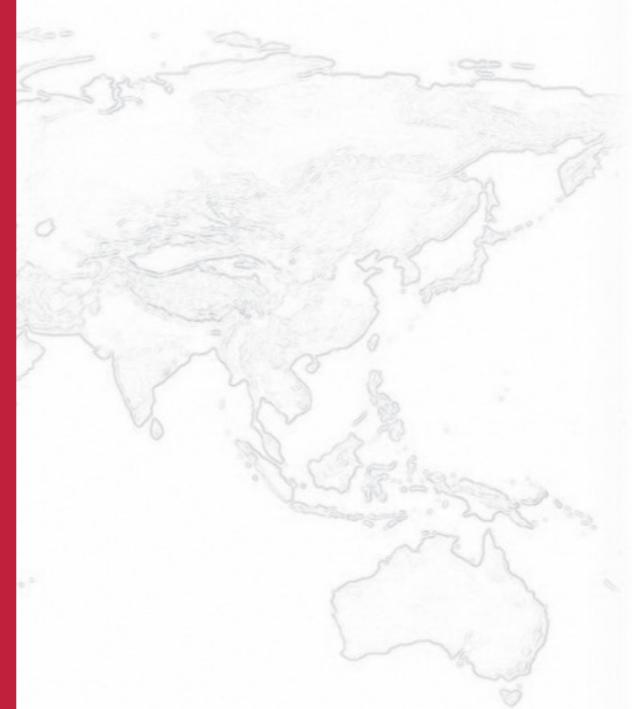
MTS Sensors Technology Corp.
Tokyo, Japan



MTS Sensors Division
Cary (North Carolina), USA



MTS Sensor Technologie
Lüdenscheid, Germany



MTS Systems Corporation

Foundation: 1966
Location: Minneapolis, Minnesota, USA
NASDAQ (MTSC)
Sites: 60 nations worldwide
Business: Test and simulation systems

MTS Sensors Technology Corporation

Foundation: 1995
Location: 737 Aihara-machi, Machida-shi, Tokyo 194-0211, Japan
MTS Sensors Sites: Japan, USA and Germany
Business: Magnetostrictive position sensors and level transmitters

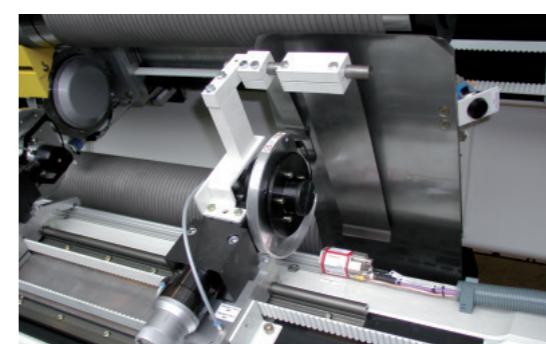
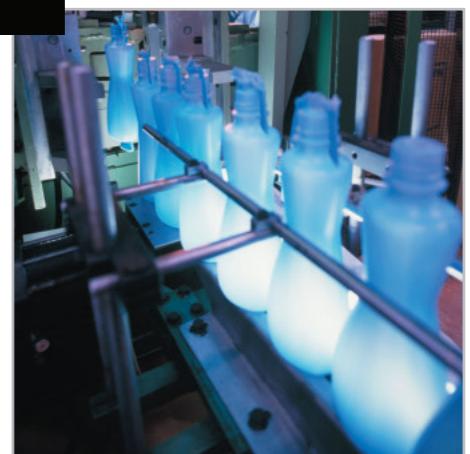
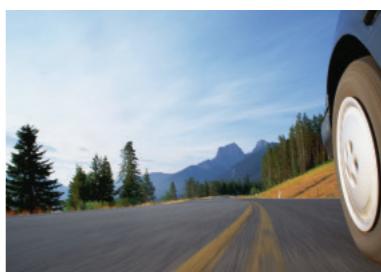
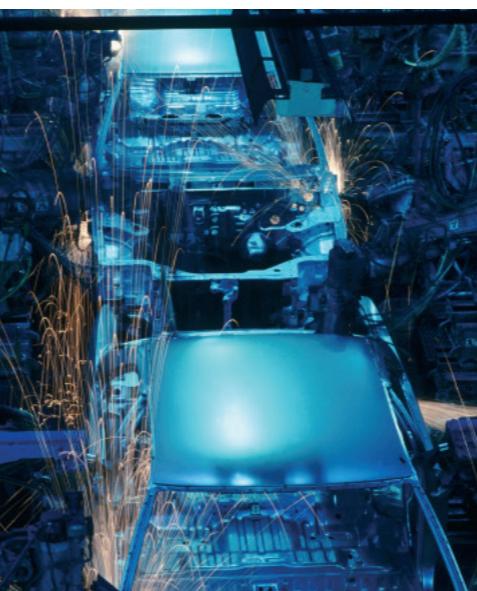
The World of MTS - Precision and Reliability

MTS Sensors Technology Corp. is a subsidiary of MTS Systems Corp. in Minneapolis, USA, a worldwide leading manufacturer of test and simulation systems. Innovative ideas and intensive research are the driving forces of progress at MTS. Since more than 30 years, the inventor of the magnetostrictive measurement method uses this unique technology successfully as a market leader for linear position sensors and float-based level sensors. MTS Sensors remains a highly focused technology company that provides the kind of customer service and support, and offers you various technical innovations and creative solutions.

Imagine...

A hillside threatened by land slipping. A 15 m long MTS Temposonics® sensor detects even smallest ground movements and can predict land slipping. In other words: it is able to prevent catastrophes.

...Reliability



Imagine...

Minimum size of gluing points, exact mixing ratios, filigree finishing. A sensor ensures high-accuracy dosing due to continuous measurement of the flow quantity and speed.

...Accuracy

Temposonics® Magnetostriuctive Position Sensors for Industrial Applications

Whether your application is industrial or medical, harsh environment or commercial, extra-long or ultra-space sensitive, standard or custom, MTS Sensors have the features, options and flexibility to work in your design.

	R-Series Smart sensors with ruggedness, highest accuracy and a large variety of designs & interfaces				G-Series Sensors with analog or Start/Stop output for standard applications			E-Series Sensors designed for applications requiring simple and low cost position feedback							
Sensor Model	RH Pressure-resistant stainless steel rod sensor for fluid technology	RP Robust aluminum profile for industrial manufacturing	RD4 Separate electronics + pressure-resistant rod for limited space	RF Smart sensor with flexible measuring rod	GH/GP Simple and robust sensor	GT High reliability redundant triple/twin sensor	GBS High pressure resistant sensor rod	EP Aluminum profile for industrial automation technology	ER Profile sensors with "Rod & Cylinder" actuation and integral electronics	EL Low profile sensor for applications where tight mounting space is a critical factor	EH High pressure rod with compact waterproof stainless steel housing	EP2 Non-contact linear position sensor to substitute linear potentiometers			
Features	Displacement, Velocity (except DeviceNet)				Displacement			Displacement, Velocity (Output dependent)							
	Simultaneous Multi Position Measurement (Multi Magnet Measurement) Analog up to 2 positions; SSI differential measurement up to 2 positions; CAN, Profibus, EtherCAT, EtherNet/IP up to 20 positions; Profinet RT up to 19 positions				Simultaneous Multi Position Measurement Start/Stop up to 9 positions	2 or 3 totally separated, independent measuring systems in 1 housing	High operating temperature	Rugged profile	Rod-and-cylinder style and competitive with potentiometers	For tight mounting space	Cost effective & compact rod type	Flat Profile			
	Diagnostic LED				Diagnostic LED	Redundant	Flat & compact	Simultaneous 2 Positions Measurement (Analog)							
Output	Voltage : 0 to 10V, 10 to 0V, -10 to +10V, +10 to -10V				Voltage : 0 to 10V, 10 to 0V, -10 to +10V, +10 to -10V	Voltage : 0-10V, 10-0V	Voltage : 0-10V, 10-0V	Voltage : 0 to 10V, 10 to 0V							
	Current : 4 to 20mA, 0 to 20mA, 20 to 4mA, 20 to 0mA				Current : 4 to 20mA, 0 to 20mA, 20 to 4mA, 20 to 0mA	Current : 4 (0) -20mA, 20-4 (0) mA	Current : 4 (0) -20mA, 20-4 (0) mA	Current : 4 to 20mA, 20 to 4mA							
	SSI : Binary or Gray, Data Length 24bit - 25bit - 26bit, 32bit (Binary only)				Start/Stop pulse	-	-	Start/Stop pulse							
	Fieldbus : CANbus, CANopen, Profibus, Profinet RT, EtherCAT, EtherNet/IP, DeviceNet (except RD4)				PWM	-	-	SSI : 24/25bit Binary or Gray, CANopen (ER : Please contact factory)							
Measuring Range	Analog : 50-7600mm	Analog : 50-5000mm	0.1-20m >15m: Contact Factory	Analog : 50-2500mm	50-2900mm	25-3250mm	Analog, SSI, CANopen : 50-2500mm	50-1500mm	Analog, SSI, CANopen : 50-2500mm	50-2500mm	Analog : 50-2500mm				
	Digital : 25-7600mm	Digital : 25-5000mm		Digital : GH : 50-7600mm GP : 50-5000mm			Start/Stop : 50-3000mm		Start/Stop : 50-3000mm		Start/Stop : 50-3000mm	Start/Stop : 50-3000mm			
Non-Linearity	<±0.01%F.S. (Option internal linearization)		<±0.02%F.S. (Contact factory for internal linearization of RD4)		<±0.02%F.S.			<±0.02%F.S. (Min.±60 μm)			<±0.02%F.S.				
Resolution (Please see P.9 for velocity)	Analog : 16bit/0.0015%, SSI : 0.5 μm, EtherCAT, Profibus, Profinet RT, EtherNet/IP : 1 μm, CAN, DeviceNet : 2 μm, RD4 : 5 μm				Analog : infinite Digital : 5 μm	infinite	16bit (min.1 μm)	Analog : infinite Start/Stop : 0.1/0.01/0.005mm SSI : 20 μm CANopen : 10 μm			Analog : infinite Start/Stop : 5 μm~				
Repeatability	<±0.001%F.S.				<±0.001%F.S.		<±0.005%F.S.	<±0.005%F.S.							
Update Time / Sampling Rate (1 magnet) (Please see P.9 for details.)	Analog : 0.5ms (2KHz) CANbus/DeviceNet : 0.5ms (2KHz) EtherCAT : Stroke dependent, EtherNet/IP : 2ms (0.5KHz) Profibus : 0.5ms (2KHz), Profinet RT : 1KHz, SSI : 0.27ms (3.7KHz), 10KHz synchronous mode				Analog : <1ms typ (>1KHz) Start/Stop : max 2800m/s (length, controller dependent) e.g. 1200mm : 0.42ms (2.4KHz) +Controller processing time	<2.5ms	Up to 1200mm : 0.5ms Up to 2400mm : 1ms >2400mm : 2ms	Analog : >0.33ms typ (<3KHz) Start/Stop : max 2800m/s (length, controller dependent) e.g. 1200mm : 0.42ms (2.4KHz)+controller processing time SSI : 0.27ms (3.7KHz) CANopen : 1ms (1KHz)			Analog : <3KHz Start/Stop : controller dependent				
Temperature Coefficient	Analog : <30ppm/°C, SSI, CAN, Profibus, EtherCAT, Profinet RT, EtherNet/IP, DeviceNet : <15ppm/°C				TBD			SSI, CANopen : <15ppm/°C			-				
Shock Test	100G single hit (IEC60068-2-27)				100G single hit (IEC60068-2-27)			100G single hit (IEC60068-2-27)							
Vibration Test	15G 10-2KHz (IEC60068-2-6), 30G (option)		10G 10-2KHz (IEC60068-2-6)	5G 10-150Hz (IEC60068-2-C)	15G 10-2KHz (IEC60068-2-6), 30G (option/except GT)	5G 10-2KHz (IEC60068-2-6)	15G 10-2KHz (IEC60068-2-6)	Analog, Start/Stop, CANopen : 15G 10-2KHz SSI : 10G 10-2KHz (IEC60068-2-6)	Analog, Start/Stop, CANopen : 15G 10-2KHz SSI : 10G 10-2KHz (IEC60068-2-6)	Analog, Start/Stop, CANopen : 15G 10-2KHz SSI : 10G 10-2KHz (IEC60068-2-6)	15G 10-2KHz (IEC60068-2-6)	8G 10-2KHz (IEC60068-2-6)			
Pressure Rating	35MPa 70MPa peak 80MPa (option)	-	35MPa 70MPa peak	-	35MPa 70MPa peak (GH)	35MPa 69MPa peak	35MPa 70MPa peak	-	-	-	Analog, Start/Stop Φ7mm : 30MPa 45MPa peak Φ10mm : 35MPa 53MPa peak SSI, CANopen Φ7mm : 30MPa 35MPa peak Φ10mm : 35MPa 45MPa peak	-			
Protection	IP67 IP68 (Cable outlet) IP68/IP69K (in SSH housing)	IP65	Sensor Electronics IP67 Side Cable Entry IP65 Bottom Cable Entry IP30	IP30 Waterproof Rod option	GH : IP67 IP68 (Cable outlet) IP68/IP69K (in SSH housing) GP : IP65	IP67 IP68 (Cable outlet)	IP67 IP68 (Cable outlet)	IP67			IP69K	IP67			
Input Voltage	24VDC (-15/+20%)				24VDC (-15/+20%), 9-28.8V (option)	24VDC (-15% /+20%)		24VDC (-15% /+20%)							
Operation Temperature	-40°C to +75°C , 0°C to +75°C (EtherNet/IP, Profinet RT)				-40°C to +80°C	-40°C to +75°C	-40°C to +90°C (option -40°C to +100°C)	-40°C to +75°C, -25°C to +75°C (ER SSI)							
Current Consumption	Analog, SSI : 100mA typ CAN, Profibus, DeviceNet : 90mA typ EtherCAT : 80mA typ, EtherNet/IP, Profinet RT : 110mA typ				100mA typ	100mA	Stroke dependent	Analog : 50-140mA, Start/Stop : 50-100mA SSI : 90mA, CANopen : 90mA (EP, EL), 40-60mA (EH)							
EMC	EMI : EN61000-6-4, EMS : EN61000-6-2, ESD : EN61000-4-2, RFI : EN61000-4-3 Electrical fast transient / burst immunity test : EN61000-4-4 Immunity to conducted disturbances, induced by radio-frequency fields : EN61000-4-6 Criterion A, CE-qualified				EMI : EN61000-6-4, EMS : EN61000-6-2 CE-qualified	EMI : EN61000-6-4 EMS : EN61000-6-2 CE-qualified (SSI, CANopen : See datasheet)			EMI : EN61000-6-4 EMS : EN61000-6-2 CE-qualified (SSI, CANopen : See datasheet)						
Option	TIS Explosion-proof ATEX Pressure-resistant and explosion-proof ATEX Explosion proof	ATEX Explosion proof	Head to Rod Cable up to 5m	Waterproof rod cover	GH : ATEX Pressure-resistant and explosion-proof ATEX Explosion proof GP : ATEX Explosion proof		Wireless programming	SUS 316							

Functions and the approved certification depend on the sensor model.
Please contact factory for other measuring ranges, materials, operating environments, etc.

Tempsonics® Commercial and Compact Sensor

Tempsonics® C-Series sensors provide persuading solutions for various applications as commercial, medical equipment and automotive markets.

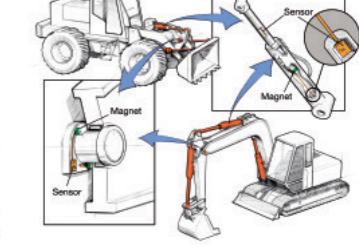
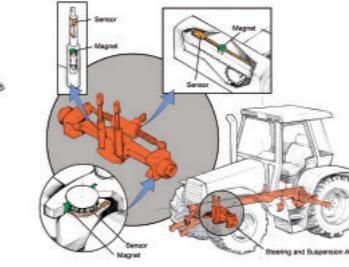
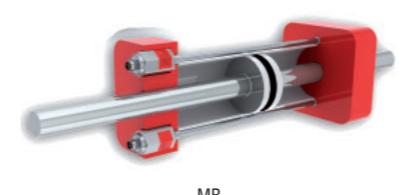
Tempsonics® Magnetostrictive Position Sensors for Construction Machines, Special Vehicles and Railway Vehicles

Tempsonics® sensors provide optimum measuring results even under harsh environmental conditions. Integrated into the hydraulic cylinder of off-road vehicles, Tempsonics® sensors detect the slightest bit of movement.

	C-Series Small Sensor		M-Series The rugged Sensor for Mobile Hydraulics						
Sensor Model	CS/CM Low cost and small sensor	CS/CM-H2 Compact level sensor with float	MH Analog Position sensor to integrate in hydraulic cylinder	MH CAN Digital Sensor with CANopen, SAE J1939 and PWM interface	MS Compact position sensor for small installation space	MT Redundant rod sensor for maximum safety	MB Compact & robust sensor, all-stainless steel	MH ⁵ Compact sensor for mobile hydraulics	
Features	Displacement		Displacement	Displacement, Velocity (CAN)	Displacement				
	Compact	IP67	With M12 connector system (to integrate in hydraulic cylinder)		IP69K		With InterConnection plug with M12 connector system		
	Flexible Stroke	Compact	Option SIL2 (IEC61508, ISO13849) Model		Small Sensor	Redundant	Compact		
Output	Voltage : 0.1 to 4.9V		Voltage : 0.25-4.75V, 0.5-4.5V	CANopen	Voltage : 0.25-4.75V, 0.5-4.5V	Voltage : 0.25-4.75V (inverse) 0.5-4.5V, (inverse)	Voltage : 0.5 to 4.5V	Voltage: 0.25-4.75V, 0.5-4.5V	
			Current : 4-20mA	SAE J1939	Current : 4-20mA	Current : 4-20mA (inverse)		Current: 4-20mA (MH 24V)	
	PWM		PWM						
Measuring Range	72mm, 109mm, 128mm, 148mm, 162mm, 186mm, 194mm, 217mm, 250mm		50-2500mm (5mm steps) 2520-5000mm (Option, Contact Factory)		50-2500mm (5mm steps)	50-1500mm (5mm steps)	Please see C-Series	125-1450mm (5mm steps)	
Linearity	$\pm 0.15\text{mm}$		50-250mm $\pm 0.1\text{mm}$, 255-2000mm $\pm 0.04\%\text{F.S.}$, 2005-2500mm $\pm 0.8\text{mm}$		50-250mm $\pm 0.1\text{mm}$ 255-2000mm $\pm 0.04\%\text{F.S.}$ 2005-2500mm $\pm 8\text{mm}$	50-250mm $\pm 0.1\text{mm}$ 255-1500mm $\pm 0.04\%\text{F.S.}$	$\pm 0.15\text{mm}$	$\pm 0.04\%\text{F.S.}$	
Resolution	infinite		$\pm 0.1\text{mm}$	Displacement : $\pm 0.1\text{mm}$ Velocity : $>1\text{ms}$ (CAN)	$\pm 0.1\text{mm}$		$\pm 0.2\text{mm}$	typ. 0.1mm	
Hysteresis	$\pm 25\mu\text{m}$		$\pm 0.1\text{mm}$						
Shock Test	10G (11ms) single hit 10G (11ms) 1000hit per axis IEC-60068-2-27 (optional housing for shock and vibration)		100G (11ms) single hit 50G (11ms) 1000 hit per axis IEC-60068-2-27		100G (11ms) single hit 50G (11ms) 1000 hit per axis IEC-60068-2-27	100G (11ms) single hit 50G (11ms) 1000 hit per axis IEC-60068-2-27	50G (11ms) single hit 50G (11ms) 1000 hit per axis IEC-60068-2-27	100G (11ms) single hit 50G (11ms) 1000 hit per axis IEC-60068-2-27	
Vibration Test	10G Sinus (10-2000Hz) /IEC-60068-2-6 (optional housing for shock and vibration)		20G (r.m.s.) (10mm Rod) (10-2000Hz) IEC-60068-2-64		15G (10-2000Hz) IEC-60068-2-64		20G (r.m.s.) (10mm Rod) (10-2000Hz) IEC-60068-2-64		
Pressure Rating	-	Contact Factory	35MPa 45MPa peak (10mm Rod)		30MPa 40MPa peak (7mm Rod)	30MPa 45MPa peak (10mm Rod)	25MPa 32.5MPa peak (8mm Rod)	35MPa, 45MPa peak (10mm Rod)	
Protection	IP30	IP67	IP67, IP69K (with M12 connector system)		IP67	IP69K	M12 connector: EN60529 (IP69K) plugged Sensor housing: EN60529 (IP67)		
Operation Temperature	-40°C to $+75^\circ\text{C}$		-40°C to $+105^\circ\text{C}$						
EMC	Contact Factory		2009/64/EG Road Vehicles (e1 conform) 2009/19/EG Agricultural and Forest Machines ISO 14982 Emissions/Immunity ISO 7637-1/2 Transient Impulses ISO/TR 10605 Electrostatic Discharge (E.S.D.)		ISO 14982 Agricultural and Forestry Machines ISO 11452-2 (Radiated Immunity) ISO 11452-4 (Conducted Immunity) ISO 7637-1/2 (Transient Impulses)	ISO 14982 Agricultural and Forestry Machines ISO 11452-2 (Radiated Immunity) ISO 11452-4 (Conducted Immunity) ISO 7637-1/2 (Transient Impulses)	ISO 14982 Agricultural and Forestry Machines Radiated Immunity ISO 11452-2 (Antenna) ISO 11452-5 (Stripline) Radiated Emission CISPR 12/16 ISO 7637-1: Electric Disturbance on Vehicles ISO/TR 10665 E.S.D.	ISO 14982 Agricultural and forest machines EN 13309 Construction machines Immunity: ISO 11452-2 (200 V/m Antenna) ISO 11452-4 (200 mA BCI) Emissions: CISPR 25 Transiente Impulses: ISO 7637-1/2 E.S.D.: ISO / TR 10605	
Input Voltage	5V (CS), 12V (CM) Over voltage protection		12V/24V (8-32V) Over voltage protection				12V (9-15V) Over voltage protection	12V (8-16V): MH Agri, 24V (8-32V): MH Over voltage protection	

Functions and the approved certification depend on the sensor model.
Please contact factory for other measuring ranges, materials, operating environments, etc.

Application



Level Plus® Magnetostrictive Liquid-Level Transmitters

Today's storage facilities and processing operations demand innovation, accuracy, cost-effectiveness and reliability. Our Level Plus® liquid-level transmitters work well in continuous and batch process control, bulk storage, precision inventory control, product level, interface level, and temperature monitoring applications. A wide choice of interfaces (Analog, HART®, Modbus / DDA / FOUNDATION™ fieldbus) are available.

	MODEL MC420 Analog Output	MODEL MR Analog Output			MODEL MG Digital Output			MODEL USTD II Digital Output			
Model	MC420	MR Sanitary	MR Industrial	MR Flexible	MG Sanitary	MG Industrial	MG Flexible	USTD II			
Measured Variable	Product Level or Interface Level	Product Level, Interface Level & Temperature (3 in 1)			Product Level, Interface Level & Temperature (3 in 1)			Product Level, Interface Level & Temperature (3 in 1)			
Features	HART®	3A, CIP, SIP, DIP	Stainless Rod	Stainless Flexible Rod	3A, CIP, SIP, DIP	Stainless Rod	Stainless Flexible Rod	For underground storage tanks Average and multipoint temperatures measurement max 5 point No recalibration			
					Gross observed volume of product, interface, total and ullage Average and multipoint temperatures max 12 point 100 point Strap Table (Product level memory) setup						
Output	4-20 mA with HART®	4-20 mA with HART®, 1 or 2 loop			Modbus RTU, DDA, FOUNDATION™ fieldbus			DDA			
Order Length	457-5486mm	508-7620mm		3048-12200mm	508-7620mm		3048-22000mm	737-3785mm			
Non-Linearity	0.02% F.S. or 0.794 mm whichever is greater	0.02% F.S. or 0.794mm whichever is greater			Inherent Accuracy : ±1mm			±0.5mm			
Resolution	infinite	infinite			0.025mm			-			
Repeatability	0.01% F.S. or 0.381mm whichever is greater	0.01% F.S. or 0.381mm whichever is greater			Hysteresis : 0.002% F.S or 0.397mm whichever is greater			0.001% F.S. or 0.381 mm whichever is greater			
Humidity	0-100%R.H.	0-100%R.H.			0-100%R.H.			0-100%R.H.			
Temperature Accuracy	-	±1.5°C			±0.28°C Modbus : max 12 point, DDA/FOUNDATION™ fieldbus : max 5 point			±0.28°C max 5 point			
Operating Temperature Electronics	-34°C to +71°C	-40°C to +71°C			-40°C to +71°C			-40°C to +71°C			
Operating Temperature Sensing Element	-40°C to +125°C	-40°C to +125°C			-40°C to +125°C			-40°C to +125°C			
Input Voltage	10.5-36VDC	10.5-36VDC			Modbus/DDA : 10.5-30.1VDC FOUNDATION™ fieldbus : 9-32VDC			10.5-30.1VDC			
Wetted Parts Material	316L SS	316L SS, Ra25 or Ra 15 Finish	316L SS, Hastelloy, Teflon	316L SS	316L SS, Ra25 or Ra 15 Finish	316L SS, Hastelloy, Teflon	316L SS	316L SS			
Enclosure Rating	NEMA Type 4X	NEMA Type 4X			NEMA Type 4X			IP68			
EMC	Line-to-ground surge suppression : IEC61000-4-5 Line-to-line and line-to-ground transient suppressors : IEC61000-4-4			Line-to-ground surge suppression : IEC61000-4-5 Line-to-line and line-to-ground transient suppressors : IEC61000-4-4							
Hazardous Area Approval	TIIS (Japan)	-	-			-			Intrinsically Safe, Ex ia II B T4		
	NEPSI (China)	-	-			Explosion Proof, Ex d II B T4			Intrinsically Safe, Ex ia II C T4		
	FM	Intrinsically Safe, Class I Div. 1	Intrinsically Safe, Class I Div. 1			Intrinsically Safe, Class I Div. 1			Intrinsically Safe, Class I Div. 1		
		-	Explosion Proof, Class I , Div. 1, Groups B, C, D			Explosion Proof, Class I , Div. 1, Groups B, C, D			-		
	CSA	Intrinsically Safe, Class I Div. 1	Intrinsically Safe, Class I Div. 1			Intrinsically Safe, Class I Div. 1			-		
		-	Explosion Proof, Class I , Div. 1, Groups B, C, D			Explosion Proof, Class I , Div. 1, Groups B, C, D			-		
	ATEX	Intrinsically Safe, Ex ia II B T4	Intrinsically Safe, Ex ia II B T4			Intrinsically Safe, EEx ia II B T4			Intrinsically Safe, EEx ia II B T4		
		-	Flame Proof Ex d II B T4 Ga/Gb			Flame Proof Ex d II B T4 6a/6b			-		
IEC Ex	-	Flame Proof Ex d II B T4 Ga/Gb			Flame Proof Ex d II B T4 6a/6b			-			

Functions and the approved certification depend on the sensor model.
Please contact factory for other measuring ranges, materials, operating environments, etc.

Option

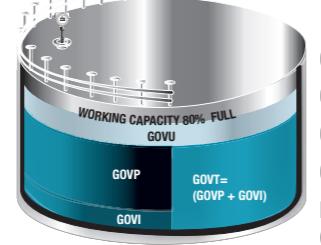


- Float & Weight
- Hand Held Terminal
- Control Panel
- LED Display



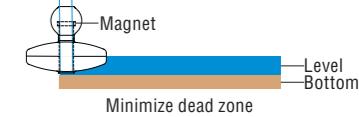
90-Degree Electronic Mounting

Illustration of Volumes Measured by M-Series Liquid Level Transmitter



GOVT = Gross Observed Volume of the Total
GOVP = Gross Observed Volume of the Product
GOVI = Gross Observed Volume of the Interface
GOUV = Gross Observed Volume of the Ullage
NSVP = Net Standard Product Volume
(GOVP x Volume Correction Factor)

Application



Option/Accessories/Supplementary Data

Explosion Proof Option

	Explosion Proof Type	Approved Sensors
	Explosion proof ATEX Ex nA II C T4 Gc	RH-Analog RH-CANbus RH-SSI RH-Start/Stop RP-Analog RP-CANbus GP-Analog GP-Start/Stop
	Pressure-resistant and explosion-proof ATEX Ex d II C T5 Tamb -40°C to +60°C UL Class1, Division1, Group A, B, C and D with High Pressure Housing (HPH) IP68	RH-Analog RH-Profinet RH-CANbus RH-SSI RH-DeviceNet GH-Analog GH-Start/Stop GH-PWM
	Explosion-proof TIIS Ex d II B H2T6	RH-Analog Current 4-20mA
	Intrinsically safe ATEX EEx ia II A T4 (Liquid Level) ATEX EEx ia II B T4 (Liquid Level) TIIS Ex ia II T4 (Liquid Level)	Liquid Level Transmitters

Waterproof Option

Waterproof Housing
Protection : IP68, IP69K
Material : 304 SS or 316L SS
Application : RH-Analog/Profibus/SSI/CANbus/ DeviceNet/EtherCAT/ GH-Analog/Digital

Multi Position Magnet

Model	R-Analog	R-SSI	R-CANbus/R-Profibus/R-EtherCAT/EtherNet/IP	R-Profinet	G-Start/Stop
Number of Magnet	2	Differential measurement between 2 magnets	20	19	9

Cable Extension Option

Model	R-SSI					R-CANbus				R-DeviceNet		
Data Speed	1MBd	400kBd	300kBd	200kBd	100kBd	1.0MBd	500kBd	250kBd	125kBd	500kBd	250kBd	125kBd
Max Length	3m	50m	100m	200m	400m	25m	100m	250m	500m	100m	250m	500m
Model	R-Profibus					G-Analog	G-Start/Stop, PWM					
Data Speed	12MBd	1.5MBd	500kBd	187.5kBd	93.75kBd	—	—					
Max Length	100m	200m	400m	1000m	1200m	45m	90m					

Resolution for Velocity Measurement

Resolution	R-Analog	R-CANopen	R-CANbasic	R-EtherCAT	R-Profibus	R-SSI	
	0.1mm/s 0.01mm/s (Option)	0.5mm/s (5 μm)	1.0mm/s (5 μm)	1 μm/s (Stroke dependent)	up to 500mm 0.64mm/s	up to 4500mm 0.21mm/s	velocity over 10 measured values: 0.1 mm/s at 1 ms cycle time
	0.2mm/s (2 μm)	0.1mm/s (2 μm)	up to 2000mm 0.43mm/s		up to 7600mm 0.14mm/s		

Update Time/Sampling Rate

Model	Measuring Length (mm)																								
	300	500	750	1000	1200	2000	2400	4500	4800	5000	7600														
R-Analog	0.5ms 2KHz			1ms 1KHz		2ms 0.5KHz		5ms 0.2KHz																	
R-CANbus	0.5ms 2KHz (up to 1200 mm for CANbasic only), 1ms 1KHz (25-2400mm)					2ms 0.5KHz		4ms 0.25KHz																	
R-DeviceNet	0.5ms 2KHz			1ms 1KHz		2ms 0.5KHz		4ms 0.25KHz																	
R-EtherCAT	Stroke dependent																								
R-EtherNet/IP	2ms 0.5KHz					4ms 0.25KHz																			
R-Profibus	0.5ms 2KHz		1ms 1KHz			2ms 0.5KHz		3.1ms 0.32KHz																	
R-SSI *	0.27ms 3.7KHz	0.33ms 3KHz	0.43ms 2.3KHz	0.83ms 1.2KHz	2ms 0.5KHz																				
GH/GP-Analog	<1ms typ >1KHz																								
GH/GP-Digital	max 2800m/s measuring length, controller dependent, e.g. 1200mm 0.42ms 2.4KHz+controller processing time																								
GT	<1ms typ >1KHz up to 2900mm																								
GBS	0.5ms			1ms		2ms up to 3250mm																			
E-Analog	<3KHz up to 2500mm (ER : up to 1500mm)																								
E-Start/Stop	max 2800m/s measuring length, controller dependent up to 3000mm																								
C-Series	2ms 500Hz																								

* 10KHz synchronous mode option

Programmer/Display

Product	Function	Application
 Hand-Held Programmer 253124 (R-Analog) 253853 (G-Analog)	Null/Span adjustment in the field	R-Analog G-Analog
 USB-Programmer Analog Incl. power supply, USB-cable, sensor-cable and software 253134-1 (R-Analog) 253145-1(G-Analog)	Null/Span adjustment Velocity range Assignment of output to measured position or velocity Error output value	R-Analog G-Analog
 USB-Programmer SSI Incl. power supply, USB-cable, sensor-cable and software 253135-1	Data length, data format, resolution, measuring direction Synchronous / asynchronous measurement, offset position Error, measurement filter, differential measurement	R-SSI GB-SSI
 USB-Programmer Start/Stop, PWM Incl. power supply, USB-cable, sensor-cable and software 253146-1	Start/Stop, PWM parameter setup	G-Start/Stop, PWM
 Profibus Address Programmer Kit 280640	Slave address setup	R-Profibus
 CANopen Address Programmer 252382-D62 (for M16 connector) 252382-D62A (for M16 90° connector)	Node-address setup	R-CANopen
 Cabinet-Programmer 253408	Null/Span adjustment 35mm DIN rail mounting	R-Analog
 Profibus Master Simulator 401727	Sensor function check Slave address change Magnet positions and diagnostic data read out	R-Profibus
 Profibus Filter Box 252916	24VDC power supply filter EMC	R-Profibus
 M-Series Analog/PWM/CAN Test Kit (charge type) Incl. AC adapter, cable, case and software 280618 (Analog/PWM) 254267 (CAN)	Input voltage signal 0-10V, input current signal 4-20mA PWM/CAN signal input Power supply output for 5V/12V sensor	M-Analog, PWM, CAN
 IX345 6-segment LED SSI Display Built-in power supply IX345	SSI signal input Input voltage: AC115-230V Measured value display Power supply output for 24V sensor	R-SSI

Interface

 SSI Interface (Serial

Option/Accessories

Magnet/Float

	Model/Parts No	Dimension	Features	RH	RP	RD4	RF	GH	GP	GT	GB	EP/ EL	EP2	EH	MH	MT	MS	CS/ CM	CS/ CM H2
	Ring Magnet M 201542-2	32.8x7.9x13.5mm (OD x height x ID)	Material : PA-Ferrite GF20 Weight : 14g Temp. : -40 to +100°C	○		○	○	○	○	○			○	○	○	○			
	U-Magnet 251416-2	32.8x7.9x13.5mm (OD x height x ID)	Material : PA-Ferrite GF20 Weight : 11g Temp. : -40 to +100°C	○	○	○	○	○	○	○	○		○						
	U-Magnet OD63.5 201553	63.5x9.5x19mm (OD x height x ID)	Material : PA-66GF30 Weight : 26g Temp. : -40 to +75°C	○		○	○	○	○					○					
	Ring Magnet OD25.4 400533	25.4x7.9x13.5mm (OD x height x ID)	Material : PA-Ferrite Weight : 10g Temp. : -40 to +100°C	○		○		○	○	○			○	○	○	○			
	Ring Magnet OD30.5 402316	30.5x7.6x19.8mm (OD x height x ID)	Material : PA-Ferrite Weight : 13g Temp. : -40 to +100°C	○		○	○	○	○				○						
	Ring Magnet OD17.4 401032	17.4x7.9x13.5mm (OD x height x ID)	Material : PA-Neonbond Weight : 5g Temp. : -40 to +100°C	○		○		○	○				○	○	○	○			
	Ring Magnet OD60 MT0162	60x15x30mm (OD x height x ID)	Material : Al CuMgPb Weight : 90g Temp. : -40 to +75°C	○		○	○												
	Ring Magnet OD28 400424	28x4.7x19.3mm (OD x height x ID)	Material : PA-Ferrite Weight : 6g Temp. : -40 to +100°C	○		○		○					○						
	Ring Magnet 401468	38x11x33mm (OD x height x ID)	Material : PA-Ferrite Weight : 17g Temp. : -40 to +100°C	○		○		○	○				○						
	System Magnet 253928	22x28x13.1mm (OD x height x ID)	Material : POM Weight : 14g Temp. : -40 to +75°C	○		○		○	○				○						
	Ring Magnet OD20 254012	20x10.5x13.5mm (OD x height x ID)	Material : PA-Neonbond Weight : 8.5g Temp. : -40 to +75°C	○		○		○	○				○						
	U-Magnet 252185	37.5x12x70mm (length x height x width)	Material : AlMg 4.5Mn-black anodised Weight : 125g Temp. : -40 to +75°C	○	○		○	○	○				○						
	Bar Magnet 251298-2	20.3x7.4x28mm (length x height x width)	with stainless steel cover Contact Factory	○	○		○	○	○				○	○					
	Ring Magnet OD9 401842	9x9x6.5mm (OD x height x ID)	Contact Factory												○	○			
	Magnet Slider V 252184	25.3x40 (exclude joint) (height x width)	Material : GFK, Hardferrite Weight : 35g Temp. : -40 to +75°C	○					○		○								
	Magnet Slider S 252182	25.3x40 (exclude joint) (height x width)	Material : GFK, Hardferrite Weight : 35g Temp. : -40 to +75°C	○					○		○								
	Magnet Slider G 253421	25.3x40 (exclude joint) (height x width)	Material : GFK, Hardferrite Weight : 25g Temp. : -40 to +75°C backslash free	○					○		○								
	Magnet Slider P 253673	25.3x44 (exclude joint) (height x width)	Material : GFK, Hardferrite Weight : 38g Temp. : -40 to +75°C with end plates	○					○		○								
	Block Magnet L 403448	20.5x33x14mm (height x width x thickness)	Material : Polycarbonate Hardferrite Weight : 20g Temp. : -40 to +75°C	○	○		○	○	○			○	○	○					
	Float 50mm 251447	51x53x14mm (OD x height x ID)	Material : SS SG : 0.72 Pressure : 6MPa Weight : 42g±3g	○		○		○	○			○							
	Wide Float 201611	28.6x30x9.5mm (OD x height x ID)	Contact Factory													○			
	Slim Float 201656	22x33x6mm (OD x height x ID)	Contact Factory													○			

○=MTS recommend

Level Float

	Model/Parts No.	Dimension OD x Height x ID	Magnet Offset	Pressure MPa	Temp. °C	Specific Gravity	Material	Weight offset
	Standard Float 251981-X	47x77x18	No	2.93	149°C	0.65/0.67/0.68/0.71	SS or Hastelloy C	Yes/No
	Standard Float 251387-X	59x57x18	No	2.24	149°C	0.48	SS	Yes/No
	Standard Float 200938-X	41x36x18	No	0.86	149°C	0.74	SS	Yes/No
	Standard Float 252354	55x50x18	No	5.17	149°C	0.74	SS	No
	Standard Float 201605-2	47x54x18	Yes	0.4	149°C	0.6	SS	Yes
	Standard Float 201693-1	45x79x18	Yes	2.93	149°C	0.45	Alminum	No
	Standard Float 251469-X	89x91x18	No	2.93	149°C	0.43/0.45	SS	Yes/No
	Low-Liftoff Float 252228-3	101x76x18	Yes	0.86	149°C	0.65	SS	No
	Standard Interface Float 251982-X 251983-X	47x77x18	No	2.93	149°C	0.9-0.96 1.03-1.1	SS or Hastelloy C	Yes/No
	Standard Interface Float 201606-2	47x31x18	Yes	0.4	149°C	0.85-0.9	SS	Yes
	Sanitary Float 401513-X	47x108x18	Yes	1.03	149°C	0.66	SS 200 Grit/Ra25 or SS 240Grit/Ra15	Yes/No
	Sanitary Float 200931-X	60x75x18	Yes/No	2.24	149°C	0.63	SS 200 Grit/Ra25 or SS 240Grit/Ra15	Yes/No
	Sanitary Float 252228-1	92x102x18	Yes	0.86	149°C	0.48	SS 240 Grit/Ra15	No
	Sanitary Float 251234-X	51x50x18	No	2.24	149°C	0.74	SS 200 Grit/Ra25	Yes/No
	Sanitary Float 560564-2	80x73x23	Yes	6.4	149°C	0.83-0.86	SS 240 Grit/Ra15	Yes
	Teflon Float 201109 251115 251116	61x76x18	Yes	0.17	38°C	0.86 0.9-0.95 1.04-1.11	Teflon	No
	Teflon Float 251939	49x135x18	No	0.17	38°C	0.86	Teflon	No
	Teflon Float 251119 251120	115x115x28	Yes	0.17	38°C	0.9-0.95 1.04-1.11	Teflon	No
	NITROPHYL Float 2016XX-X	31x76x18	Yes	1.72	104°C	0.4/0.45 0.8-0.86 0.91-0.96	NITROPHYL	Yes/No
	Long-Gauge Float 25296X-X	92x88x28	Yes/No	2.93	149°C	0.54/0.65 0.9-0.96 1.03-1.1	SS or Hastelloy C	Yes/No
	Long-Gauge Float 201XXX-X 252XXX-X	130x127x28	Yes/No	3.79	149°C	0.44/0.52 0.9-0.96 1.03-1.1	SS or Hastelloy C	Yes/No
	Long-Gauge Float 25142X-X	178x178x48	No	1.72	149°C	0.44/0.47 0.9-0.96 1.03-1.1	SS or Hastelloy C-22	Yes/No
	Long-Gauge Float 20123X-X	70x127x28	No	2.24	149°C	0.66 0.7 0.92-0.96	SS or Hastelloy C	Yes/No

SS=SUS316L

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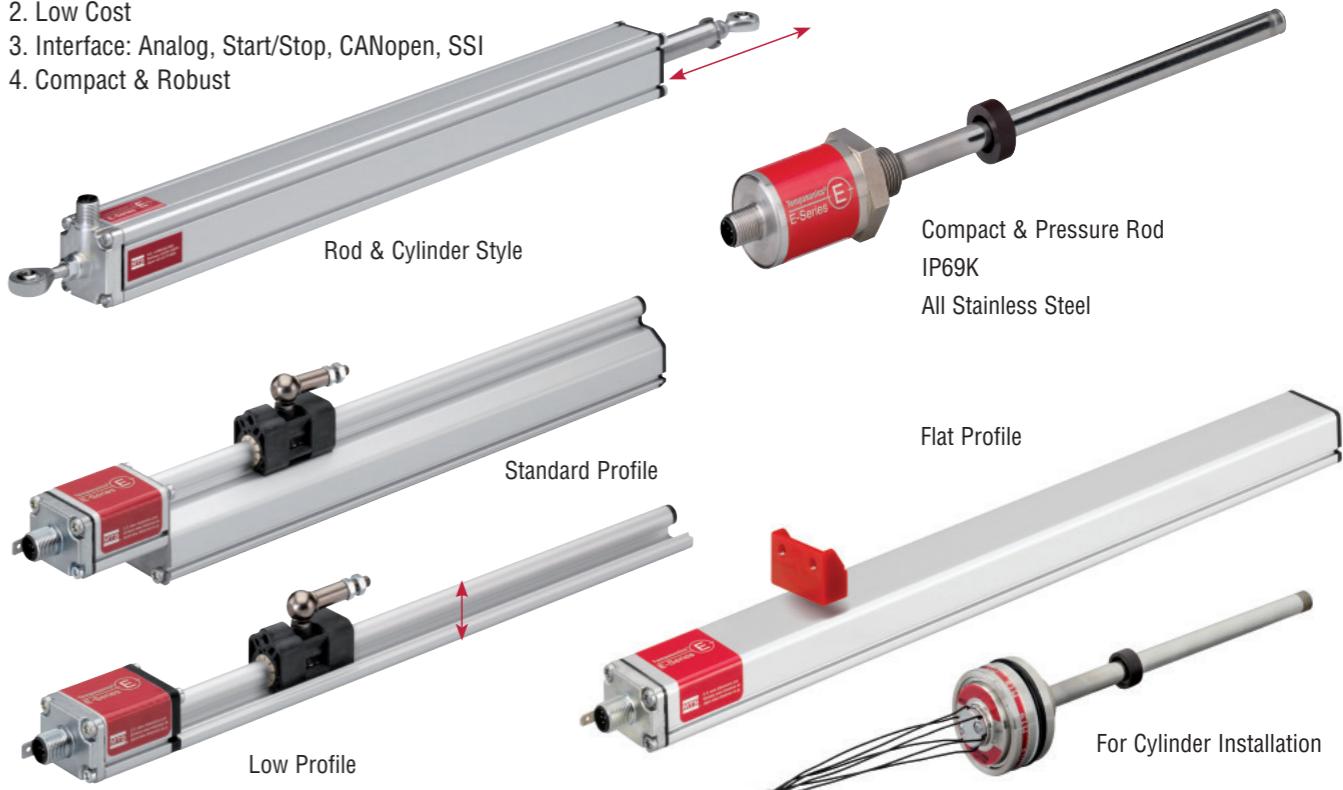
Tempsonics® R-Series Feature Example

1. Non-contact/Wear-less
2. Absolute
3. Position / Velocity Output, Multi Position Measurement Max 20 position
4. Resolution 0.5 μm ~ (Linearity Correction Option available)
5. Interface: Profibus, CANbus, EtherCAT, EtherNet/IP, Profinet RT, SSI, Analog (Voltage & Current)
6. LED Diagnostic & Sensor Status
7. Stroke: up to 7600mm
8. High Pressure Rod 35MPa, 70MPa peak
9. Anti-Vibration 15G (30G Option)
10. Operating Temperature -40 to +75°C
11. IP67
12. CE qualified



Tempsonics® E-Series Feature Example

1. Various Style
2. Low Cost
3. Interface: Analog, Start/Stop, CANopen, SSI
4. Compact & Robust



Tempsonics® R-Series Feature Example

Various Style

Flexible Sensor Rod



Profile Style (Rail guided)



Tempsonics® Cylinder Installation

Model RH, GH, EH enable to install in fluid cylinders to measure for direct stroke.

The sensor cartridge can be removed from the flange and rod housing while still installed in the cylinder. This procedure allows quick and easy sensor cartridge replacement without the loss of hydraulic pressure.

