LEVEL MEASUREMENT

Level Plus® liquid level transmitters are designed specifically for level applications, typically used in variety of industrial and process automation as well as hazardous and sanitary applications. The Level Plus® sensors utilize the inherent advantages of magnetostrictive technology to provide the product level, interface level, and temperature measurement of the process from a single opening.

In addition to the Level Plus® product lines, any Temposonics rod-style magnetostrictive sensor can be used for monitoring level by just adding a float and a float securement method (like a stop collar).

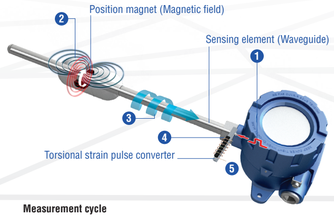
Applications
- **Oil & Gas**
- **Chemical**
- **Food & Beverage**
- **Pharmaceutical**
- **Medical**
- **Off-highway sprayers**
- **Water and Wastewater**
- **Hydraulics**

MEASURING TECHNOLOGY

The liquid level transmitters provided by Temposonics rely on the company's proprietary magnetostrictive technology, which can determine position with a high level of precision and robustness.

Each liquid level transmitter consists of a ferromagnetic waveguide, a float, a strain pulse converter and supporting electronics. The float, containing a permanent magnet and sitting on the liquid, generates a magnetic field at its location on the waveguide. A short current pulse is applied to the waveguide. This creates a momentary radial magnetic field and torsional strain on the waveguide. The momentary interaction of the magnetic fields releases a torsional strain pulse that propagates the length of the waveguide. When the ultrasonic wave reaches the end of the waveguide it is converted into an electrical signal. Since the speed of the ultrasonic wave in the waveguide is precisely known, the time required to receive the return signal can be converted into a liquid level measurement with both high accuracy and repeatability.

The technology, based on magnetostriction and is not exposed to mechanical stress. Therefore, the sensors exhibit considerably longer lifespans and much higher reliability when compared to other technologies, even in harsh working conditions. Furthermore, since the output from sensors corresponds to an absolute position, rather than a relative value, it is not required to recalibrate sensors.



Measurement cycle	
1	Current pulse generates magnetic field
2	Interaction with position magnet field generates torsional strain pulse
3	Torsional strain pulse propagates
4	Strain pulse detected by converter
5	Time-of-flight converted into distance

UNITED STATES
Temposonics, LLC
Americas & APAC Region

3001 Sheldon Drive
Cary, N.C. 27513
Phone: +1 919 677-0100
E-Mail: info.us@temposonics.com

GERMANY
Temposonics GmbH & Co. KG
EMEA Region & India

Auf dem Schüffel 9
58513 Lüdenscheid
Phone: +49 2351 9587-0
E-Mail: info.de@temposonics.com

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Find more information or your local Temposonics office or authorized distributor at:

temposonics.com

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SENSOR SELECTOR GUIDE

Magnetostrictive Sensor Solutions for

Liquid Level Applications

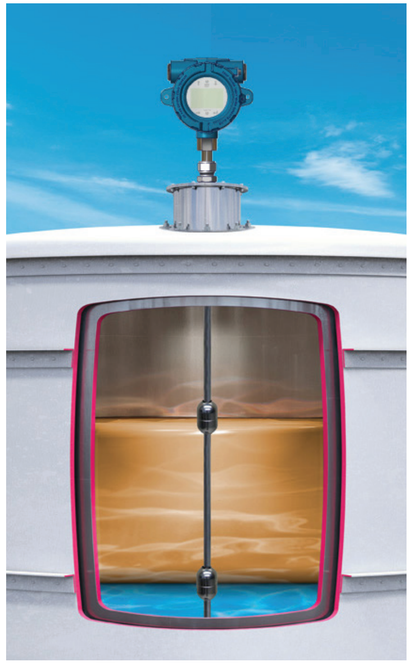
LEVEL CHART

	C-Series	MH-Series	LL-Series	LP-Series			LL-Series
	General Purpose			Hazardous Area		Sanitary	
							
Features	**OEM**	**MH Threaded**	**LLE**	**RefineME®**	**Tank SLAYER®**	**SoClean®**	**LLH**
Input voltage	+5 VDC or +12 VDC	+12/24 VDC	+24 VDC	Loop powered or 10.5…28 VDC	Loop powered or 10.5…28 VDC	Loop powered or 10.5…28 VDC	+24 VDC
Output	• Analog (Voltage) • PWM	• Analog (Current or Voltage)	• Analog (Current or Voltage) • IO-Link • SSI • CANbus • RTD	• Modbus RTU • DDA • Analog (Current) • HART®	• Modbus RTU • DDA • Analog (Current) • HART®	• Modbus RTU • DDA • Analog (Current) • HART®	• Analog (Current or Voltage) • IO-Link • SSI • CANbus • EtherCAT® • POWERLINK • Ethernet/IP™ • PROFINET
Linearity deviation	±0.3 mm F.S.	≤ ±0.8 mm	±0.5 mm	±1 mm	±1 mm	±1 mm	±0.5 mm
Wetted parts	Plastic	Ø 7 mm rod: Stainless steel (AISI 304) Ø 10 mm rod: Stainless steel (AISI 304L)	Ø 7 mm rod: Stainless steel 1.4301 (AISI 304) Ø 10 mm rod: Stainless steel 1.4306 (AISI 304L) or stainless steel 1.4404 (AISI 316L)	Stainless steel (AISI 316L), Nickel Alloy C-276 or FEP	Stainless steel (AISI 316L)	Sanitary stainless steel (AISI 316L) with Ra 0.625 (Ra 25) or Ra 0.38 (Ra 15)	Sanitary stainless steel 1.4404 (AISI 316L) with Ra 25 (0.625)
Rod diameter	4 mm	7 mm or 10 mm	7 mm or 10 mm	5/8"	7/8"	5/8"	5/8"
Approvals	–	–	–	Intrinsically Safe, Flameproof, Explosion Proof, SIL2	Intrinsically Safe, Flameproof, Explosion Proof, SIL2	3-A, Intrinsically Safe, Flameproof, Explosion Proof, SIL2	–
Process temperature	–40…+75 °C (–40…+167 °F)	–40…+85 °C (–40…+185 °F)	–40…+85 °C (–40…+185 °F)	–40…+150 °C (–40…+302 °F)	–40…+125 °C (–40…+257 °F)	–40…+150 °C (–40…+302 °F)	–40…+85 °C (–40…+185 °F)
Max tank height	250 mm (10 in.)	2500 mm (100 in.)	3000 mm (120 in.)	7620 mm (300 in.)	22000 mm (866 in.)	7620 mm (300 in.)	2525 mm (99.4 in.)
Use case	• Embedded applications	• Battery powered • Rugged design for off-highway usage • Economical	• Wash down applications (IP69K) • Small package size • Economical	• Hazardous Area Approvals • SIL Capable • Loop Powered • Integral Temperature Measurement	• Flexible hose for large tanks • Hazardous Area Approvals • SIL Capable • Integral Temperature Measurement	• Sanitary grade pipe • Loop Powered • Integral Temperature Measurement	• Small package size • Fast update rate
Applications	• Laboratory testing • Pump protection system	• Agricultural sprayers • Liquid transport tanks • On-board fuel monitoring	• Hydraulic reservoir tanks • Chemical totes • Transmission fluid replacement Systems	• LPG bullet tanks • Separators / Settlers • Sump tanks	• Bulk refined fuel storage tanks • LPG spheres • Distillery storage tanks	• Bioreactors • Fermentation tanks • CIP tanks	• CBD extraction • Bottle filling machines

Temposonics® offers numerous floats for different applications made of materials such as stainless steel, nitrile, FEP, and Nickel Alloy C-276 for both product level and interface level. To be able to accurately detect the interface level there needs to be a difference of at least 0.05 in specific gravities between the product and interface liquids. For detailed information about floats, refer to the 'Accessories Catalog', (Part No. 551103).

For assistance with selecting a specific float for your application, please contact Application Support with the following information:

- Specific gravity of liquid(s) being measured
- Process temperature
- Process opening size
- Vessel pressure



Temposonics has been manufacturing level transmitters for over 40 years and has millions of sensors installed around the world. We offers multiple ways of mounting the level transmitter to or on the tank. Level Plus® level transmitters can be installed from the top or bottom of the tank and extend the full length of the tank and provide a high accuracy continuous level measurement that can be transmitted to the control system. A level transmitters consist of a pipe, housing with electronics, and float(s).