



Echotel® Model 338 Non-Contact Ultrasonic Two-Wire Transmitter for Level, Volume, or Open Channel Flow

DESCRIPTION

Echotel Model 338 is a two-wire, loop-powered non-contact transmitter for liquid level, volume, and open channel flow measurement. Featuring advanced digital signal processing and a powerful transducer, this versatile transmitter provides exceptional measurement performance in a wide variety of applications.

The plug-in liquid crystal display module is used for setup and configuration, and displays level, volume, flow and temperature, as well as diagnostic information. A bar graph displays echo strength from the return signal, or tank level as a percentage of span.

The 80 kHz transducer has an extremely narrow 5 degree conical beam angle. This highly collimated beam ensures a reliable ultrasonic signal, even in tanks with internal obstructions, turbulence, and other application difficulties.

FEATURES

- Plug-in 6-digit alphanumeric LCD module with custom graphics display
- 4–20 mA output with 600 Ω load
- Advanced digital signal processing assures reliable measurement in difficult applications
- Dual function bar graph displays echo signal strength or tank level
- 80 kHz transducer with 20 feet (6 meter) range
- Narrow, 5 degree beam angle provides excellent performance in tanks with obstructions
- Fixed target suppression to eliminate interference from in-tank obstructions
- Common tank shapes and 32-point linearization table for volume calculations
- Extensive support of flume and weir calculations for open channel flow
- Two totalizers for flow, one resettable, and one non-resettable



APPLICATIONS

- Sump, well, tank and open channel measurement
- Water and Wastewater treatment facilities
- General industrial applications
- Chemical storage tanks
- Vessels with highly viscous media
- Paint, ink and solvent tanks
- Food and beverage vessels
- Batch and day tanks

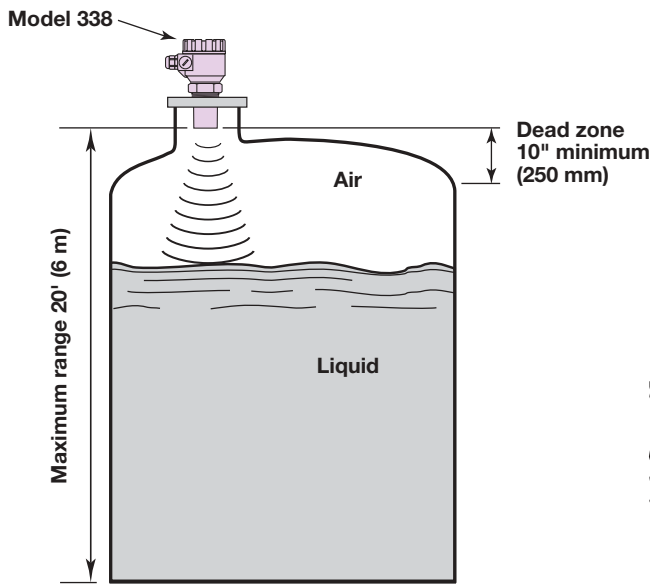
TECHNOLOGY

Non-contact ultrasonic level technology is a proven method for accurate liquid level measurement. This technology features the ability to measure the level or volume of the fluid without making physical contact with the material. This is especially important in applications containing corrosive materials, suspended solids or coating media.

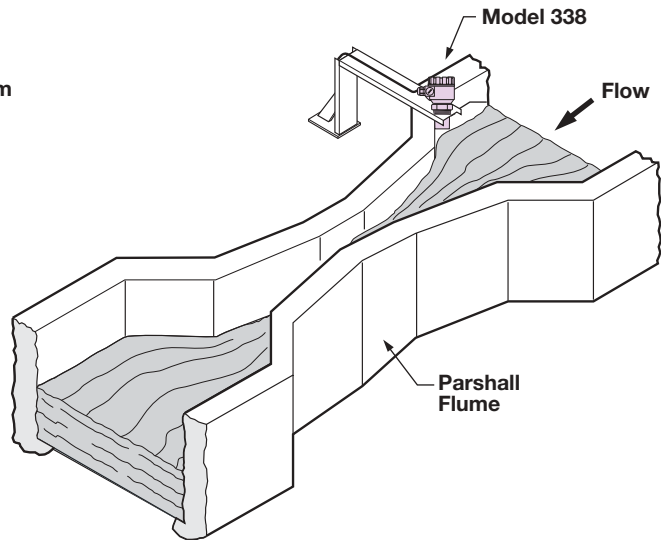
The level measurement is made by emitting an ultrasonic pulse from the transducer and measuring the time required for the echo to reflect from the liquid surface and return to the transducer. The powerful electronics measure the time of the round trip pulse and, by

knowing the speed of sound, calculate the distance. Since speed of sound is temperature dependent, the transducer also measures the temperature in the vessel to provide compensation for changing temperature.

By inputting the type and geometry of the vessel, the intelligent electronics can calculate the liquid volume in the vessel. In a similar operation, the Model 338 can perform open channel flow measurement by converting the level reading into units of volume per time. Common tank shapes, flumes, and weirs are stored in the 338 software. A 32-point linearization table is also available for unusual tanks or primary flow elements.



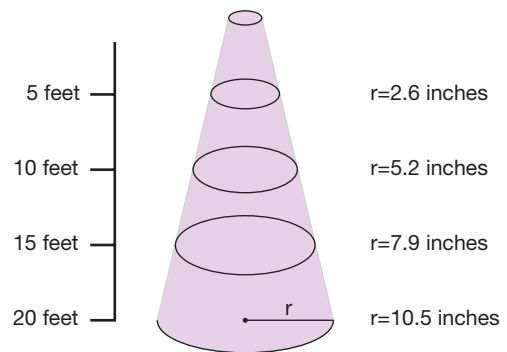
Typical Mounting – Level/Volume



Typical Mounting – Open Channel Flow

PERFORMANCE

Model 338 Transmitters are high performance units that feature a powerful 80 kHz transducer, highly collimated beam angles, and advanced digital signal processing. These features allow the 338 to accurately track the liquid level in difficult applications involving agitation and light foam. The extremely narrow 5° beam angle, shown on the right, allows the 338 to be used in applications where other units with wider beam angles fail due to false reflections in the tank.

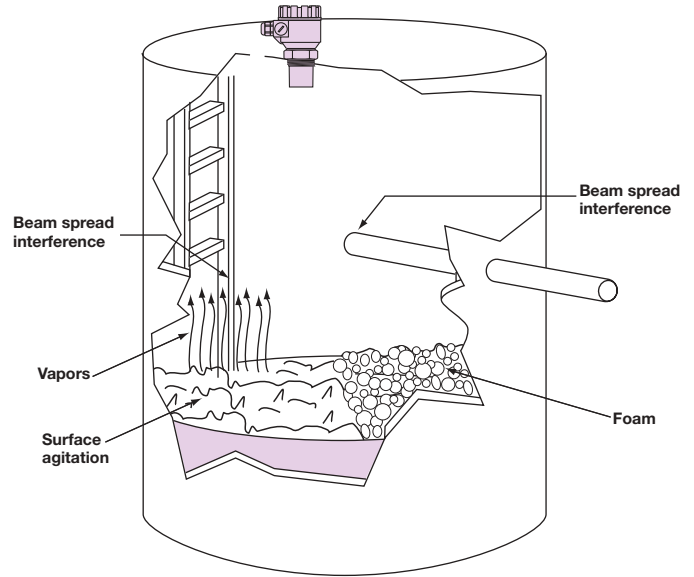


Beam Radius vs. Distance

MEASUREMENT RANGE CALCULATIONS

Ultrasonic non-contact transmitters are typically rated for a maximum range in ideal conditions. Experience has shown that maximum range must be reduced for certain factors. Although the maximum range rating is somewhat conservative, each application must be evaluated for specific conditions in the tank.

Several application parameters that affect ultrasonic performance are shown in the tank at the right. Each of these parameters is assigned a Performance Multiplier in the chart below. Multiply the maximum potential range (20 feet) of the Model 338 by each of the applicable Performance Multipliers to calculate the maximum allowable range for the application.



OPERATING PARAMETER

SURFACE AGITATION: Surface agitation or waves can degrade the performance. Moderate agitation results in only slight degradation of performance. The worst case is when the surface is a good reflector, but in the wrong direction.

VAPORS AND STEAM: Vapors can cause problems when the liquid process temperature is well above the temperature of the airspace. The greater the difference, the more expected vapor problems. The problems result from condensation or layering in the sound path, both of which attenuate the sound signal, and degrade performance. If a vent is used, be sure that it is well away from the transducer.

BEAM SPREAD INTERFERENCE: It is recommended that no obstructions, such as ladder rungs, fill pipes, support struts, etc., be allowed within the 7° ultrasonic beam. If an obstruction is unavoidable, make it as far away as possible from the transducer. Interference from agitator blades is only an intermittent interference that usually has little effect on performance. A special software algorithm can also help suppress false echoes from agitator blades that are within the beam angle.

FOAM: Foam can attenuate the ultrasound and render the system inoperative. If possible, moving the transducer to an area in the tank where there is less foam will improve the performance. Thick, heavy-density foams can sometimes produce a reflection from the top of the foam. The multipliers shown at right are general guidelines. For further assistance consult the factory.

CONDITION

PERFORMANCE MULTIPLIER


Smooth, glass-like surface	1.0
Slight agitation, chopiness	0.9
Heavy agitation	0.8
Slight vortex	0.7
No condensation	1.0
Little condensation	0.9
Much condensation/ foggy appearance	0.8
No interference within 3.5° half beam angle	1.0
Agitator at speed less than 60 RPM	1.0
Agitator at speed greater than 60 RPM	Consult factory
Interference outside 2°, far from transducer (in bottom third of range)	0.8
Interference outside 2°, near to transducer (in top third of range)	0.5
No foam	1.0
Light froth, less than 0.25" thick	0.8
Light foam, less than 0.5" thick	0.5
Light foam, more than 1" thick	0.1

EXAMPLE: A slightly agitated 12' tank with no condensation, no interference, and a light froth on the surface.

Maximum allowable range: $20' \times 0.9 \times 1.0 \times 1.0 \times 0.8 = 14.4$ feet

Since the maximum allowable range is 14.4 feet, the 338 is suitable for this 12 foot tank.

338 MODEL NUMBER

 Quick shipment, usually within one week after factory receipt of a purchase order, through the Expedite Ship Plan (ESP).

BASIC MODEL NUMBER

338 | Integrally mounted transmitter with 80 kHz transducer, plastic housing, polypropylene transducer

ELECTRONICS HOUSING

P | Plastic (PBT) NEMA 6

INPUT POWER

5 | 12 to 36 VDC

SIGNAL OUTPUT

3 | 4–20 mA (600 Ω load)

ACCESSORIES

A | Digital display / programming module

AGENCY APPROVALS

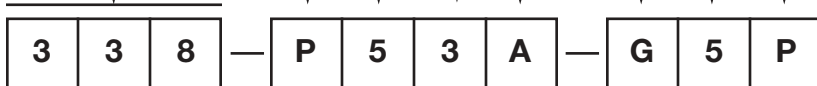
G | General purpose NEMA 6

MOUNTING

5 | 2" NPT

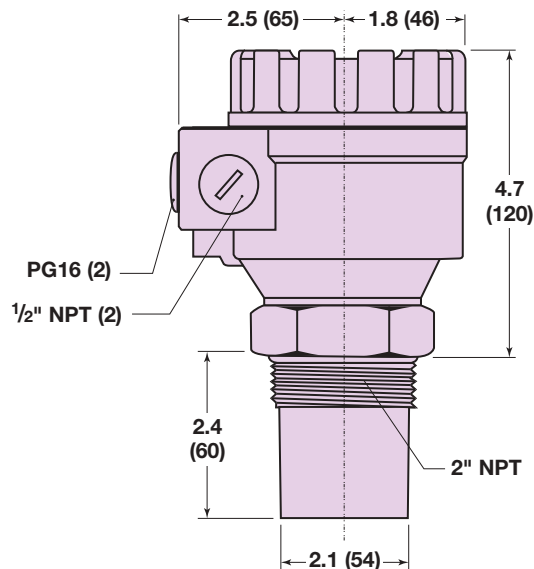
TRANSDUCER

P | Polypropylene NEMA 6P



DIMENSIONAL INFORMATION

INCHES (MM)



QUALITY



The quality assurance system in place at Magnetrol guarantees the highest level of quality throughout the company. Magnetrol is committed to providing full customer satisfaction both in quality products and quality service.

Magnetrol's quality assurance system is registered to ISO 9001 affirming its commitment to known international quality standards providing the strongest assurance of product/service quality available.

ESP

Expedite Ship Plan

The Echotel Model 338 Ultrasonic Level Transmitter is available for quick shipment, usually within one week after factory receipt of a purchase order, through the Expedite Ship Plan (ESP).

The model is color coded in the selection data charts.

ESP service may not apply to orders of ten units or more. Contact your local representative for lead times on larger volume orders, as well as other products and options.

WARRANTY



All Magnetrol electronic level and flow controls are warranted free of defects in materials or workmanship for one full year from the date of original factory shipment.

If returned within the warranty period; and, upon factory inspection of the control, the cause of the claim is determined to be covered under the warranty; then, Magnetrol will repair or

replace the control at no cost to the purchaser (or owner) other than transportation.

Magnetrol shall not be liable for misapplication, labor claims, direct or consequential damage or expense arising from the installation or use of equipment. There are no other warranties expressed or implied, except special written warranties covering some Magnetrol products.



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