Echotel® Model 335 Non-Contact Ultrasonic Transmitter for Level, Volume, or Open Channel Flow

DESCRIPTION

Echotel Model 335 is a high performance, non-contact ultrasonic transmitter for liquid level, volume, and open channel flow measurement. The extremely powerful and flexible software incorporated in the Echotel 335 results in virtually unsurpassed measurement performance. Advanced digital signal processing enables the 335 to perform in applications involving in-tank obstructions, light foam and agitation.

The custom graphics LCD display module facilitates complete setup and configuration, and displays level, volume, flow and temperature, as well as diagnostic information. Three LEDs reflect the status of the relay, echo, and communications. A bar graph displays echo strength from the return signal, or tank level as a percentage of span.

FEATURES

- Custom graphics LCD display module with operational status icons.
- Advanced digital signal processing assures reliable measurement in difficult applications
- Dual function bar graph displays echo signal strength or tank level
- 50 kHz transducer with 26 ft (8 meter) range
- Narrow, 7 degree beam angle for excellent focus
- 4–20 mA output and SPDT relay for level control, alarm, diagnostics or remote flow totalization
- 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
- Dual compartment housing separates user interface (LCD module) from wiring

APPLICATIONS

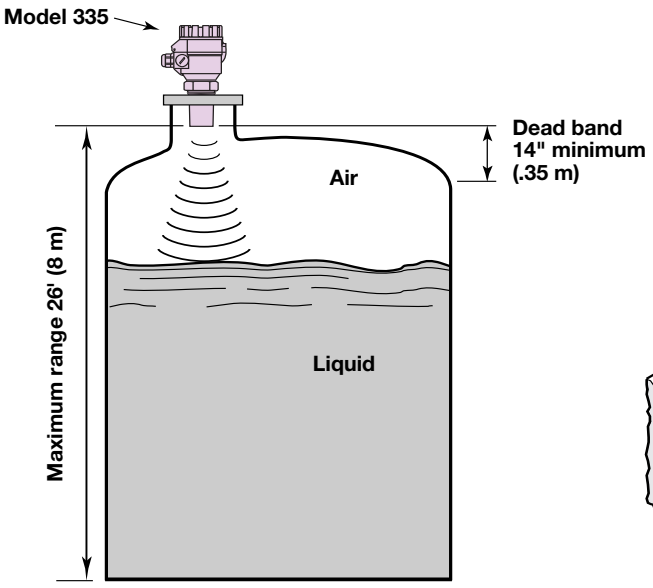
- Sump, well, tank and open channel measurement
- Water and Wastewater treatment facilities
- General industrial applications
- Chemical storage tanks
- Vessels with highly viscous media
- Paint, ink and solvent tanks
- Food and beverage vessels
- Batch and day tanks

TECHNOLOGY

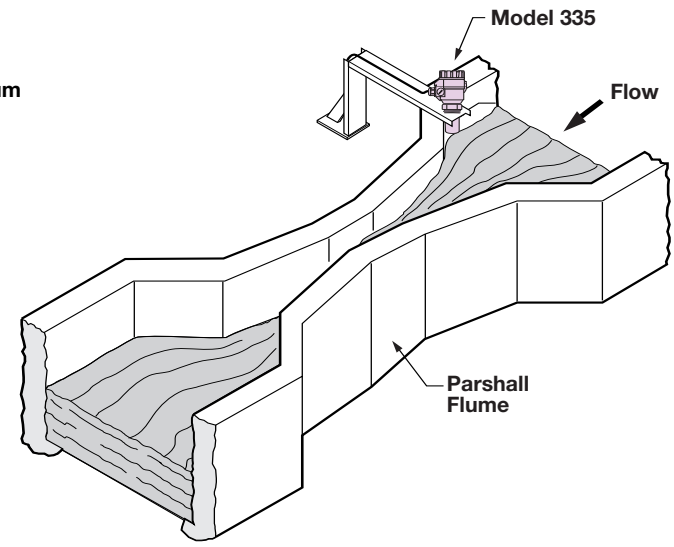
Non-contact ultrasonic level technology is a proven method for accurate liquid level measurement. This technology features the ability to measure the level or volume of the fluid without making physical contact with the material. This is especially important in applications containing corrosive materials, 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, calculates 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 335 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 335 software. A 32-point linearization table is also available for unusual tanks or primary flow elements.



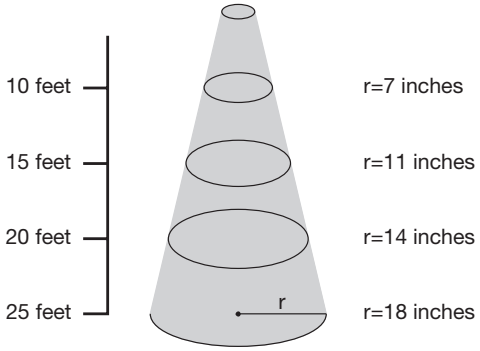
Typical Mounting – Level/Volume



Typical Mounting – Open Channel Flow

PERFORMANCE

Model 335 Transmitters are high performance units that feature a powerful 50 kHz transducer, highly collimated beam angles, and advanced digital signal processing. These features allow the 335 to accurately track the liquid level in difficult applications involving agitation and light foam. The extremely narrow 7° beam angle, shown on the right, allows the 335 to be used in applications where other units with wider beam angles fail due to false reflections in the tank.

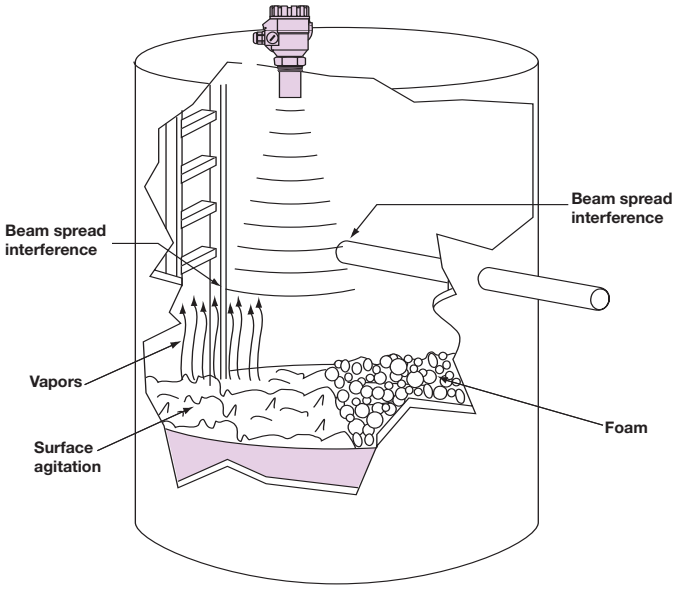


Beam Radius vs. Distance

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 (26 feet) of the Model 335 by each of the applicable Performance Multipliers to calculate the maximum allowable range for the application.



OPERATING PARAMETER	CONDITION	PERFORMANCE MULTIPLIER
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.	Smooth, glass-like surface	1.0
	Slight agitation, choppiness	0.9
	Heavy agitation	0.8
	Slight vortex	0.7
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.	No condensation	1.0
	Little condensation	0.9
	Much condensation/ foggy appearance	0.8
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.	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
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.	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 heavily agitated 15' tank with no condensation, no interference, and a light froth on the surface.

Maximum allowable range: 26' × 0.8 × 1.0 × 1.0 × 0.8 = 16.6 feet
Since the maximum allowable range is 16.6 feet, the 335 is suitable for this 15 foot tank.

335 MODEL NUMBER

Models available for quick shipment, usually within one week after factory receipt of a purchase order, through the Expedite Ship Plan (ESP)

BASIC MODEL NUMBER

335	Integrally mounted transmitter with 50 kHz transducer, cast aluminum housing, polypropylene transducer

ELECTRONICS HOUSING

A	Cast aluminum dual compartment

INPUT POWER

A	85 to 255 VAC

SIGNAL OUTPUT

1	4–20 mA & SPDT relay

ACCESSORIES

A	Digital display / programming module included

AGENCY APPROVALS

G	General purpose (NEMA 6)

MOUNTING

5	2" NPT

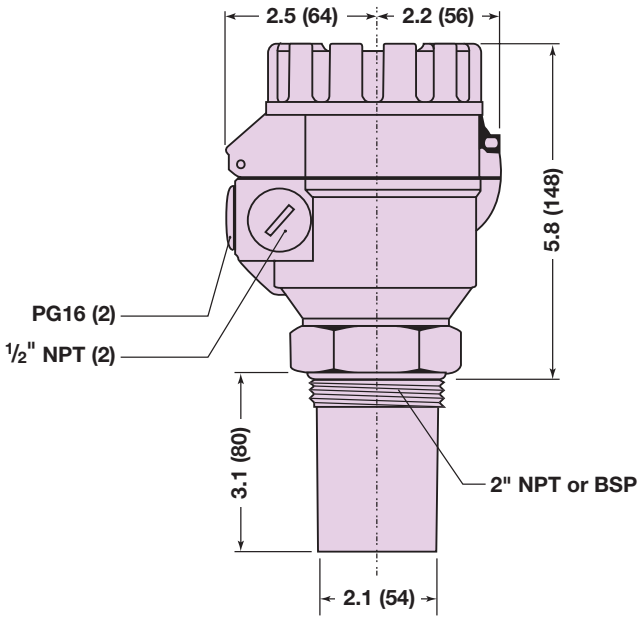
TRANSDUCER

P	Polypropylene

3	3	5	—	A	A	1	A	—	G	5	P

DIMENSIONAL INFORMATION

INCHES (MM)



SPECIFICATIONS

Transmitter	
Supply voltage	85 to 255 VAC (6 VA) (Input power code A)
	10.5 to 40 VDC (3.6 W), 10.5 to 28 VAC (4 VA) (Input power code D)
Output signal	4–20 mA isolated, 600 Ω load
Fault detection	Configurable 3 amp SPDT relay, LED, and 3.6 or 22 mA (NAMUR NE 43)
Relay	One, 3 amp SPDT, 250 VAC
Failsafe	Software selectable
User Interface:	
Keypad	4-button menu-driven data entry
Display	Removable 6 digit LCD module with dual function bar graph
LED status indication	Echo strength, power, and relay LEDs
Ambient temperature	-22° to +140° F (-30° to +60° C)
Enclosure	Dual compartment cast aluminum NEMA 6 (IP 67)
Cable entry	Two – ½" NPT and two PG16 entries
Transducer	
Maximum range	26 feet (8 meters)
Dead zone	14 inches (350 mm)
Frequency	50 kHz
Process connection	2 inch NPT or BSP (flanges optionally available)
Process temperature	-22° to +195° F (-30° to +90° C)
Process pressure	Atmospheric to 44 psi (3 bar)
Ultrasonic beam angle	7 degrees conical
Temperature compensation	Automatic over the operating temperature range of the transducer
Material	Polypropylene NEMA 6P (IP 68)
Performance	
Accuracy	± (0.2% of the measured distance, plus 0.05% of the range)
Resolution	1 mm for up to 6.5 feet (2 meters)
	2 mm for 6.5 to 16.4 feet (2 to 5 meters)
	5 mm for 16.4 to 26 feet (5 to 8 meters)

CE These units have been tested to EN 50081-2 and EN 50082-2 and are in compliance with the EMC Directive 89/336/EEC.

CUSTOM GRAPHICS LCD DISPLAY MODULE

The Model 335 is configured through the use of a custom graphics LCD display module. This 6-character alphanumeric display facilitates complete setup and configuration through the use of 4 push buttons for data selection and entry. A wide selection of level, volume, and open channel flow units may be selected.

The LCD module features a dual function bar graph for quick visual indication of echo signal strength or tank level. Operational status icons provide continuous diagnostic information on the performance of the transmitter. The LCD module provides a continuous display of all measurement data.

QUALITY

MAGNETROL
REGISTERED TO
ISO 9001
Your Assurance of
Quality and Service

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

Several Echotel Model 335 Ultrasonic Level Transmitters are available for quick shipment, usually within one week after factory receipt of a purchase order, through the Expedite Ship Plan (ESP).

Models covered by ESP service are conveniently color coded in the selection data charts.

To take advantage of ESP, simply match the color coded model number codes (standard dimensions apply).

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.

Magnetrol

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