GENERAL
The Series UL Ultrasonic Level Transmitter provides continuous, noncontact sensing for level control of liquids or slurries. The sensor emits an ultrasonic pulse which is reflected back to the sensor at the liquid/air interface. The distance traveled by the pulse is calculated and converted to a 4 to 20 mA output signal.

MECHANICAL INSTALLATION
The sensor should be mounted on the top of the vessel with the sensor facing down. The sensor face should be parallel to the surface being measured. A clear path, free of obstructions must be provided between the sensor and the liquid surface. Obstructions in the beam path will cause incorrect readings.

The ultrasonic wave spreads as it travels from the sensor to the target material with the beam angle being 6.5 degrees from the center line. Typically the beam diameter will increase three inches (3") for every foot (1') of range. For example: An 18' deep tank will have a beam diameter of 54" (3" × 18') in diameter at the bottom of the tank.

A blind zone exists directly in front of the sensor. Liquid levels cannot be detected in the blind zone. The UL100 has a blind zone of 12", and the UL200 has a blind zone of 18". If it is necessary to measure to the top of the vessel, the sensor may be raised above the tank with a pipe or other means. The diameter of the pipe or extension piece must be greater than 6". Be sure not to mount the sensor too close to the tank wall.

The Series UL include a 2" or 3" mounting flange. Simply bolt the sensor/flange assembly to the proper mating flange connection. The NEMA 4X control box can be remotely mounted at a maximum distance of 100 feet (30 m).

SPECIFICATIONS
Accuracy: ±0.3% of span.
Repeatability: ±0.125" (+3 mm) typical.
Supply Voltage: 115±10% VAC, 5-/60 Hz, 5 VA.
Output: 4 to 20 mA into 600 isolated.
Blind Zone: (UL100) 12" (5 cm), (UL200) 18" (7 cm).
Beam Angle: Coniclo 12°.
Sensor Pressure Rating: 150 psig maximum.
Temperature Compensation: -20 to 180°F (-30 to 82°C).
Temperature Range: Sensor: -20 to 180°F (-30 to 82°C),
Electronics: -10 to 160°F (-23 to 71°C).
Sensor Material: CPVC.
Control Box Enclosure: Polycarbonate, NEMA 4X.
Mounting: (UL100) 2" PVC 150# flange, (UL200) 3" PVC 150# flange.

ELECTRICAL INSTALLATION
When routing wires, the AC power must be kept separate from the analog output. Do not run the analog output in the same conduit with any AC power or near any AC wiring or AC conduit. If using several UL transmitters, do not run the sensor cables together. The sensor cables must be run in separate conduit or interference may result.

Use 18 AWG shielded two conductor cable for the output signal. Use 16 AWG two conductor cable for the power and ground. Connect the sensor cable as shown in figure 1, with the red wire connected to the “TC” terminal, the center of the cable connected to the “CENT” terminal, and the shield of the cable to the “SHIE” terminal.

NOTE: Do not use the Series UL Ultrasonic Level Transmitter in applications where foam, agitation or heavy vapor are present.
OPERATION
The Series UL is factory calibrated. Do not make adjustments on the board except programming English/Metric, failsafe condition, and desired zero and span. All programming is achieved through five numbered BCD turn switches and two slide switches, see Figure 1.

Select english (inches) or metric measurement (centimeters divided by two) using the slide switch marked “E” or “M.” English (inches) is designated by “E,” metric designated by “M.” The slide switch marked “H” and “L” determines the failsafe condition if the echo is lost. If “H” is selected, the output becomes 21 mA if the sensor loses the echo. If “L” is selected, the output becomes 3 mA if the echo is lost.

SETTING ZERO AND SPAN
The span is the distance from the sensor face to the closest point or level to be measured. This point corresponds to an output of 20 mA. The span must be adjusted for a distance greater to or equal to the dead zone. See Figure 2. The Model UL100 has a dead zone of 12” and the UL200 has a dead zone of 18”. Set the span using a small screwdriver and adjusting the two BCD switches labeled “SPAN” (Figure 1). The left switch adjusts in increments of ten, the right switch adjusts in increments of one. Example: left switch set at 1, right switch set at 2 corresponds to 12. The zero is the distance from the sensor to the furthest point or level to be measured. This point corresponds to an output of 4 mA. Using the three BCD switches marked “ZERO,” adjust the zero distance in the same manner as the span was adjusted. From left to right, the switches adjust in increments of 100, 10 and 1. Example: far left set at 1, middle set at 2, right switch set at 0 corresponds to 120.

LED INDICATION
Apply power to the unit. During normal operation, the red LED will flash. If the red LED is off, the unit is not receiving an echo. Check sensor wiring and placement. Be sure the sensor points at the liquid surface with the sensor face parallel to the liquid. If the red LED remains on, the unit is receiving out of range echos. Check tank measurements, reprogram, and check E/M slide switch for proper setting.

A flashing yellow LED indicates power fluctuations or the temperature wire is not connected. Verify the red wire from the sensor is connected to the “TC” terminal. Also make certain the power source is not shared with motors or heavy switching loads. All instrumentation should be on its own power source.

MAINTENANCE
After final installation of the Series UL Ultrasonic Level Transmitter, no routine maintenance is required. Periodic checks of connections and sensor placement is recommended. Units are not field serviceable and should be returned to the factory, freight prepaid, if repair is necessary. Be sure to include a complete description of the application and problem.