

Low Signal Strength (Error 0010)

The values for signal strength in a particular application are not entirely predictable. Signal strength should be perceived as “Go/No-Go” value. When adequate signal strength is achieved there is no advantage to having double or triple the original signal strength. Acceptable signal strength values for most pipe sizes, as viewed from UltraLink, can range from about 3-5% on the low end up to a high of about 90%. One half inch pipe may sometimes go from 2% up to 198%.

The important consideration is that the Low Signal Strength Error (0010) is not present.

Installation and Configuration Checks

1. Are the transducers correct for the meters transmission frequency?

	Size					
	1/2	3/4	1	1 1/4	1 1/2	2
ANSI Pipe	2MHz	2MHz	2MHz	2MHz	2MHz	1MHz
Copper Tubing	2MHz	2MHz	2MHz	2MHz	2MHz	1MHz
Rigid Tubing	2MHz	2MHz	2MHz	2MHz	2MHz	2MHz

2. 2” DTTS for ANSI pipe and all DTTN transducers require electronics transmitting at 1 MHz.

3. Are the DTTS transducers correct for the application?

- a. DTTS transducers come in six sizes and three categories of pipe or tube.
 - i. Sizes are 2”, 1 1/2”, 1 1/4”, 1”, 3/4” and 1/2”
 - ii. Categories are ANSI Pipe, Copper Tubing, and Rigid Tubing.

4. Are the transducers wired properly to the transmitter?

- a. Ensure that the terminal strip is clamped on to the conductor and not the wire insulation.
- b. A capacitance check of the transit time transducers should produce values near 5 nf (nano farads) for 1 MHz transducers and 2 nF for 2 MHz transducers and both transducers of a pair should have almost exactly the same values

The crystals alone have nominal values of about 3.8 to 4.0 nF (1 MHz) or 1 nF (2 MHz). The remaining capacitance comes from the cables and will vary with cable length. An approximate cable capacitance value would be 0.018 nF/foot.

The important measurement is that the variation in capacitance **between** transducers should be no greater than 0.07 nF.

- c. If a capacitance check is not available the next best test is for resistance. Measuring at the end of the transducer leads the test should produce an “open” on the voltmeter. Any resistance value other than open indicates the transducer is shorted and is non-functional.

5. Are the transducers mounted:
 - a. On bare metal or plastic?
 - b. Facing each other on the pipe?
 - c. Properly spaced for the transmission mount chosen?
 - i. That is on the same side of the pipe for V and W mount and opposite sides of the pipe for Z mount.
 - ii. Transducers using Z mount may also work better mounted at 2-8 o'clock or 4-10 o'clock positions rather than the 3-9 o'clock position.
 - d. Using enough acoustic couplant jelly?
 - e. Not on either the very top or very bottom of the pipe?
 - f. Properly positioned away from piping components that can cause turbulence?
 - g. On a pipe section that can be guaranteed to be completely full of fluid?

6. Are the software settings correct?
 - a. Is the correct "system configuration" file for the transmitter being used?
 - b. Check the transmitters configuration settings for:
 - i. Is the correct transducer "Type" selected?
 - ii. Is the transducer "Mount" appropriate for the pipe size?
 - iii. Is the "Pipe Material" correct?
 - iv. Is the outside diameter "Pipe OD" and "Wall Thickness" correct?
 - v. If there is a liner is it specified correctly?
 - vi. Is the proper fluid selected?

 - c. Check the flow settings for
 - i. "Min Flow" and "Max Flow" values
 - ii. An appropriate value for the "Low Flow Cutoff"
 - iii. An appropriate value for the "Low Signal Cutoff"

Other Considerations

If the signal strength is adequate with the pipe full but no fluid flowing and the signal strength decreases as the flow increases the most likely causes are:

1. As the flow develops, turbulence is produced to the extent that the ultrasonic transmission is no longer captured by the receiving transducer. A change in the location of the transducers away from the turbulence can normally correct this problem.

2. Some systems with poor filtering contain sediment. When the fluid is not moving the sediment accumulates on the bottom of the pipe. It is possible to have a normal signal strength reading with the pipe in this condition.

When the pumps are turned on the sediment is distributed throughout the liquid and as in the turbulence problem the signal strength will drop off until the meter will no longer read. The remedy for this condition is better filtration.