

### INTRODUCTION

This document explains how to install small pipe transit time ultrasonic transducers with a rail mounting. The transducers can be installed vertically or horizontally. For horizontal applications, install them on the side of the pipe.

The small pipe transducers have integrated transmitter and receiver elements. A spacing slider is provided to adjust the required spacing, based on pipe size and mounting method.



### PRE-INSTALLATION REQUIREMENTS

**NOTE:** Protect all parts until installation is complete.

#### Program the Meter

Before installing the transducers, you must select the optimum transmission mode, enter the site information, and enter the fluid and pipe properties into the ultrasonic flow meter. For detailed instructions, see the user manual for your flow meter.

#### Select a Pipe Location for the Transducer

Select a location for the transducers on a section of pipe that has at least 10 pipe diameters upstream of the transducers and 5 pipe diameters downstream. See *“Figure 2: Piping configuration and transducer positioning”* on page 2.

For example, if a 2 in. pipe is being measured, the minimum upstream pipe in front of the transducer should be 20 in. and the minimum downstream pipe behind the transducer should be at least 10 in.

Pipe runs shorter than the minimums may sometimes be used with reduced accuracy. There is no way to determine how much accuracy is sacrificed without doing in-field testing. For installations where the 10/5 pipe diameters rule cannot be followed, divide the total length of available straight pipe into thirds and mount the rail with 2/3 of the pipe upstream and 1/3 of the pipe downstream.

A full pipe is absolutely essential for making accurate flow measurements. The flow meter cannot determine if the pipe is full or not. If the pipe is partially full, the meter will over-report the amount of flow by the percentage of the pipe that is not filled with liquid or may not detect any flow.

Install the mounting system in an area where the transducers will not be inadvertently bumped or disturbed.

Avoid installations on downward flowing pipes unless adequate downstream head pressure is present to overcome partial filling of—or cavitation in—the pipe.

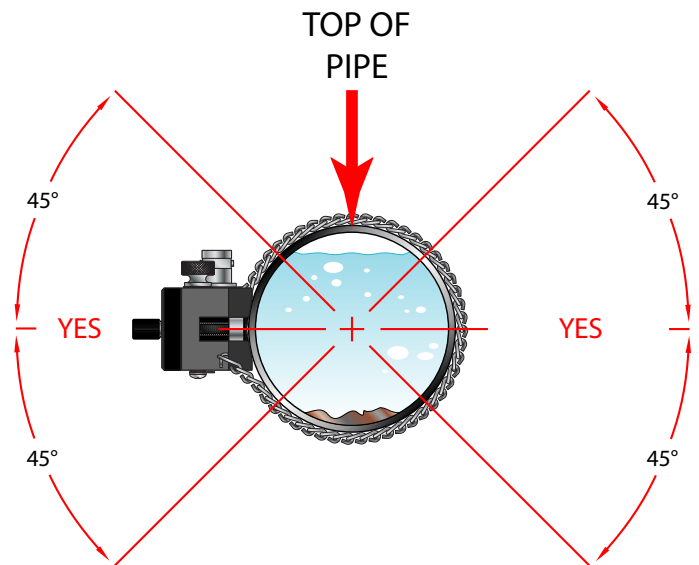


Figure 1: Transducer positioning

## Piping Configurations and Transducer Positioning

Figure 2 shows the number of pipe diameters required downstream and upstream of the transducers for various piping configurations.

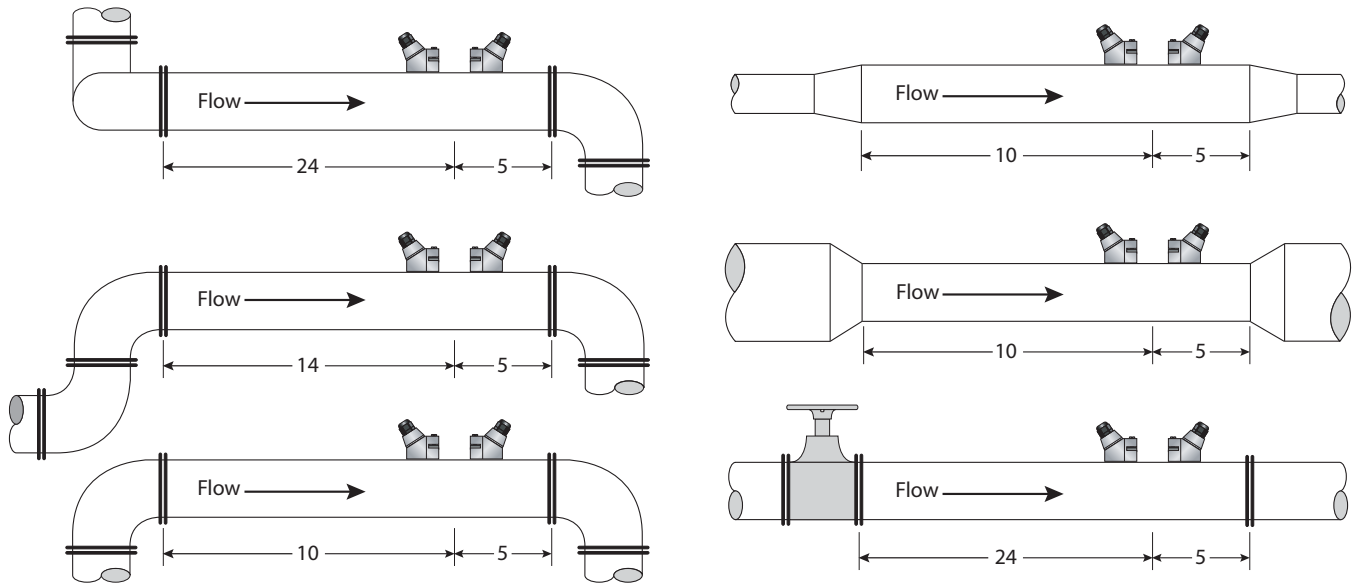


Figure 2: Piping configuration and transducer positioning

The system will provide repeatable measurements on piping systems that do *not* meet these pipe diameter requirements, but the accuracy of the readings may be influenced.

## Partially-Filled Pipe Situations

In some locations, the process pipe may be momentarily only partially filled. Examples include: lack of back pressure, insufficient line pressure and gravity flow applications.

To eliminate these situations:

- Do not install the transducers at the highest point of the pipeline.
- Do not install the transducers in a vertical, downward flow section of pipe.
- Always position the ON/OFF valves on the downstream side of the transducers.

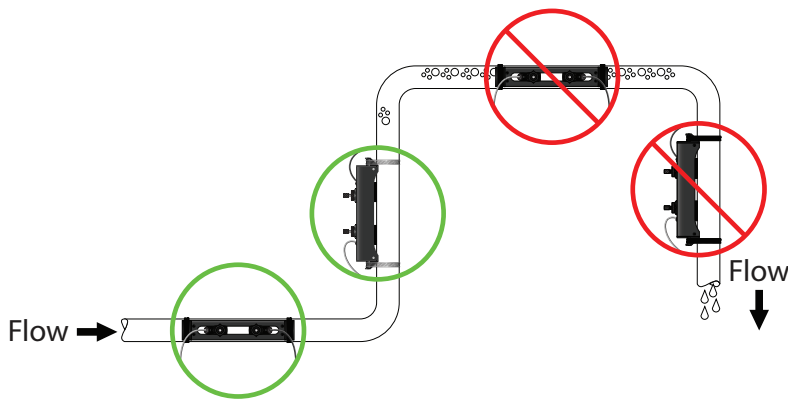


Figure 3: Transducer orientation

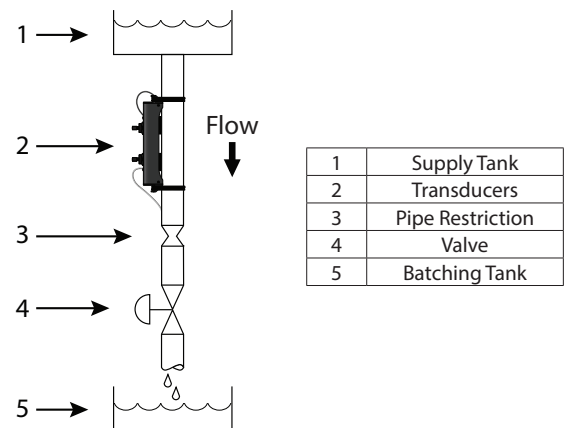


Figure 4: Transducer vertical mount, flow down

## Pipe Material

Pipes must be good conductors of ultrasound and not block or scatter the signal. Most pipe materials will allow the signal to pass through. They include: stainless steel, PVC, CPVC, ABS, polypropylene, PVDF, copper, copper nickel, ductile iron and aluminum.

Wound fiberglass and concrete pipes typically trap air and are not suitable for these transducers. Some galvanized pipes may scatter the ultrasonic signal. Sometimes, relocating the transducers or mounting the transducers in a Z mode (1 transverse) will improve the signal strength.

Any liners in the pipe need to adhere to the the pipe walls. Total wall thickness and liner should not exceed 10 in. (254 mm). New mortar-lined ductile iron pipes may have air trapped in the lining initially. Letting the pipe soak will allow water to displace the air and allow the signal to pass through.

Paint with good adhesion to the pipe typically allows the ultrasonic signal to pass through. If there is blistering or peeling paint, sand the paint off before installing the transducers.

Test the signal strength before permanently installing the transducers.

## INSTALLATION PROCEDURE

All moving parts are already mounted on the rail. One transducer is stationery, one is movable by loosening the thumbscrew and sliding it along the spacing scale.

The small pipe transducers are adjustable for pipe sizes between 1/2...2 in. (15...50 mm). Do not attempt to mount the transducers onto a pipe that is either too large or too small for the transducer.

On horizontal pipes, mount the transducers in an orientation such that the cable exits from the side of the pipe. Do not mount with the cable exiting on either the top or bottom of the pipe. See [Figure 1 on page 1](#). On vertical pipes, the orientation does not matter.

1. Clean the surface of the pipe. If the pipe has external corrosion or dirt, wire brush, sand or grind the mounting location until it is smooth and clean. Paint and other coatings, if not flaked or bubbled, need not be removed. Plastic pipes typically do not require surface preparation other than soap and water cleaning.
2. Loosen the position adjustment thumbscrew and slide the transducer along the scale to set the distance between the them. The scale shows the distance in inches. See [Figure 5](#).
3. Tighten the position adjustment thumbscrew hand-tight to lock the transducer in place.

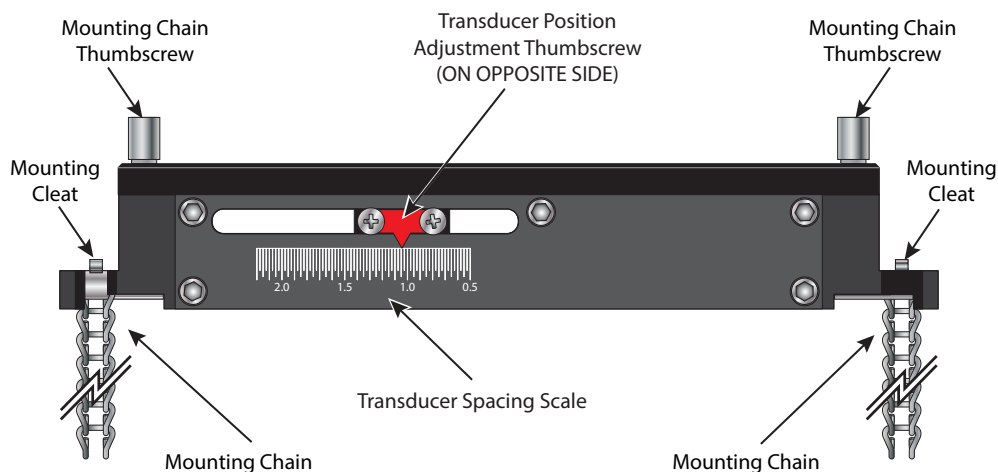


Figure 5: Transducer top view

4. Apply contact gel to the underside of the transducers. Place a single bead of couplant, approximately 1/2 inch (12 mm) thick, on the flat face of the transducers. See [Figure 6](#). Generally, a silicone-based grease is used as an acoustic couplant, but any good quality grease-like substance that is rated to not flow or shrink at the operating temperature of the pipe is typically acceptable.

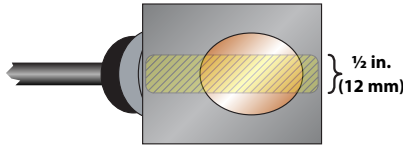


Figure 6: Transducer bottom view

Conditions	Couplant	Timeframe
Pipe surface temperature under 130° F (55° C), dry pipe	P.N. D002-2011-001 or D002-2011-008 Dow Corning 111 Grease	1 year
Pipe surface temperature under 350° F (177° C), dry or submerged, permanent mount	P.N. D002-2011-002 Dow Corning 732 multi-purpose sealant	Product life
Pipe surface temperature under 350° F (177° C), dry pipe	P.N. D002-2011-011 or D002-2011-012 Dow Corning 340 heat sink compound	Product life
Pipe surface temperature under 350° F (177° C), dry pipe, silicone not permitted	P.N. D002-2011-009 Molykote G-N; non-silicone	1 year
Pipe surface temperature under 120° F (49° C), dry pipe	P.N. D002-2011-014 Aquasonic 100 water soluble ultrasound transmission gel	Less than 4 hours

Timeframes are based on conditions where the transducers and couplant are not disturbed.

To check the condition of the couplant, monitor for any decreases in the signal strength and check for any physical changes to the couplant.

5. Wrap the mounting chains around the pipe and secure the chains to their respective mounting cleats. See [Figure 7](#).

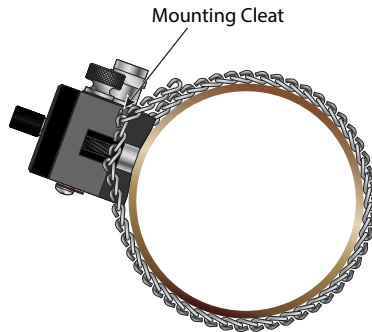


Figure 7: Transducer mounting chain hooked onto mounting cleat

**NOTE:** The chains do not need to be taut at this point. Any slack in the chains is removed when the thumbscrews are adjusted.

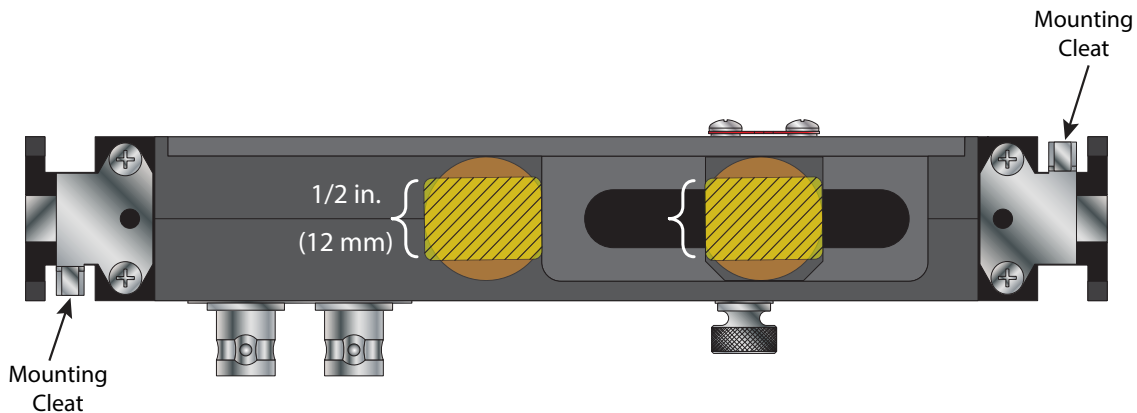


Figure 8: Application of acoustic couplant

6. Finger tighten the position adjustment thumbscrew enough to hold the mounting rail in place. Make sure all air is expelled out of the gap between the transducer faces and the pipe.
7. Route the transducer cables back to the flow meter location, avoiding high voltage cable trays and conduits.

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