Dynasonics®
Ultrasonic Flow Meters

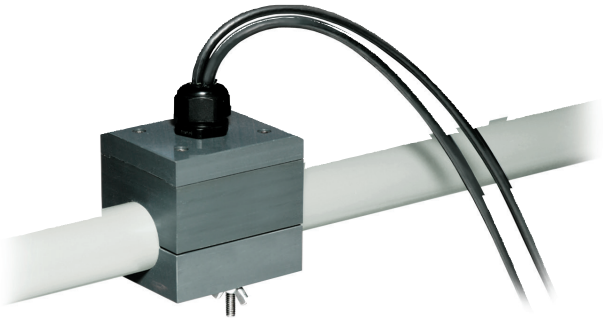
Transducers

Small Pipe Transit Time Ultrasonic Transducers Standard and High Temperature (DTTS/C)

INTRODUCTION

This document explains how to install small pipe transit time ultrasonic *integral* transducers and transducers with *remote mounting*. The transducers can be installed vertically or horizontally.

The transducers have integrated transmitter and receiver elements that eliminate the requirement for spacing measurement and alignment.



PRE-INSTALLATION REQUIREMENTS

Program the Meter

Before the flow meter will be operational, 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 Transducers

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.

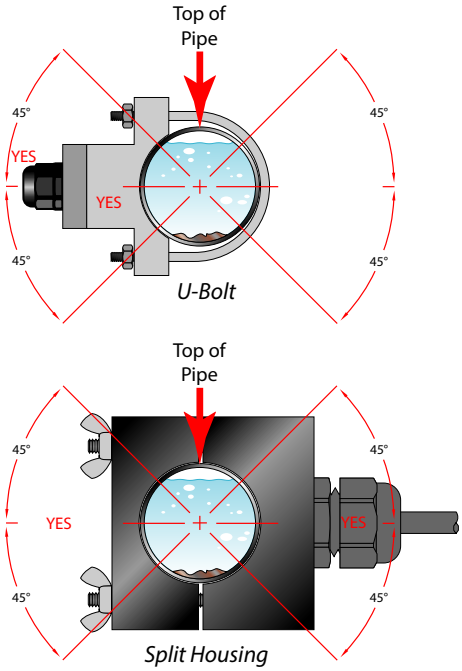


Figure 1: Transducer positioning

Badger Meter

IND-UM-02649-EN-03 (July 2019)

Installation Guide

Piping Configurations and Transducer Positioning

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

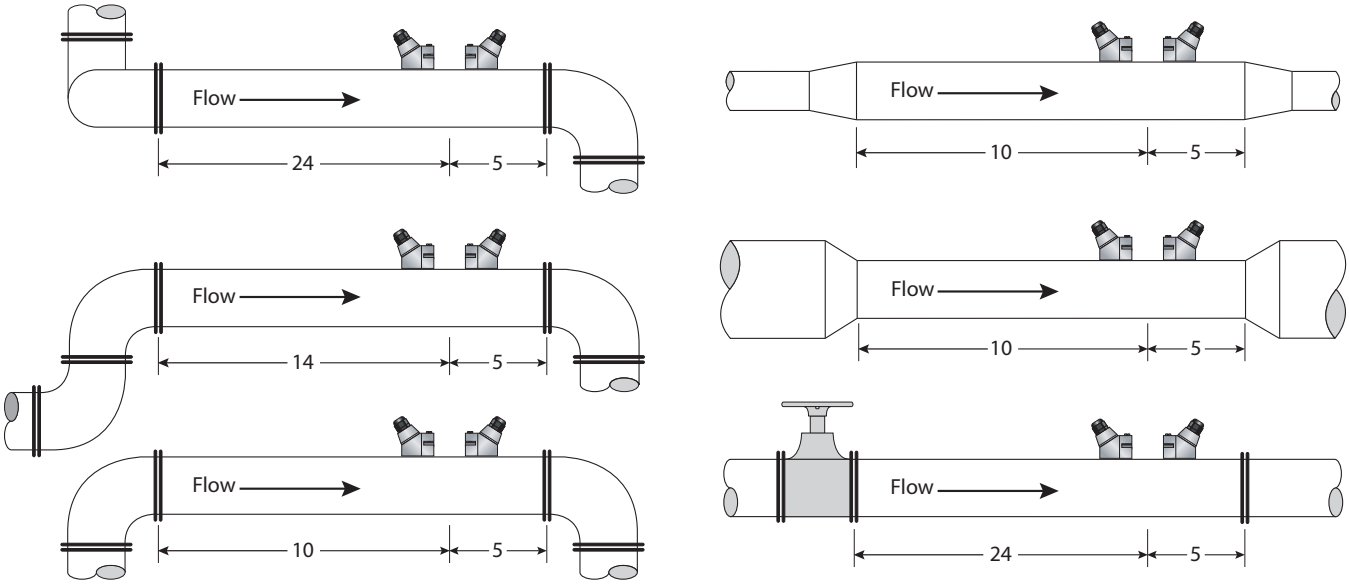


Figure 2: Piping configuration and transducer positioning

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.

Mounting Configuration

The mounting configuration for these transducers is **V**-Mount, where the sound traverses the pipe twice. **V**-Mount is a compromise between travel time and signal strength.

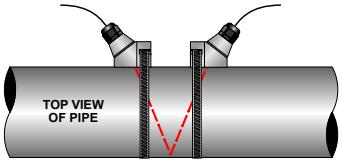


Figure 3: V-mount configuration

The frequency setting depends on the pipe material.

Pipe Size	Frequency Setting	Transducer	TFX Ultra Split Housing Transducer	TFX-500w Transducer	Pipe
1/2 in.	2 MHz	DTTSDP, DTTCDP	DTFX*-A	DW-*-CA	ANSI
		DTTSDC, DTTCDP	DTFX*-G	DW-*-CG	Copper
		DTTSDT DTTCDT	DTFX*-M	DW-*-CM	Stainless Steel
3/4 in.	2 MHz	DTTSFP, DTTCFP	DTFX*-B	DW-*-CB	ANSI
		DTTSFC, DTTCFC	DTFX*-H	DW-*-CH	Copper
		DTTSFT, DTTCFT	DTFX*-N	DW-*-CN	Stainless Steel
1 in.	2 MHz	DTTSGP, STTCGP	DTFX*-C	DW-*-CC	ANSI
		DTTSGC, DTTCGC	DTFX*-I	DW-*-CT	Copper
		DTTSGT, DTTCGT	DTFX*-P	DW-*-CP	Stainless Steel
1-1/4 in.	2 MHz	DTTSHP, DTTCHP	DTFX*-D	DW-*-CD	ANSI
		DTTSHC, DTTCHC	DTFX*-J	DW-*-CJ	Copper
		DTTSHT, DTTCHT	DTFX*-Q	DW-*-CQ	Stainless Steel
1-1/2 in.	2 MHz	DTTSJP, DTTCJP	DTFX*-E	DW-*-CE	ANSI
		DTTSJC, DTTCJC	DTFX*-K	DW-*-CK	Copper
		DTTSJT, DTTCJT	DTFX*-R	DW-*-CR	Stainless Steel
2 in.	1 MHz	DTTSLP, DTTCLP	DTFX*-F	DW-*-CF	ANSI
		DTTSLC, DTTCLC	DTFX*-L	DW-*-CL	Copper
	2 MHz	DTTSLT, DTTCLT	DTFX*-S	DW-*-CS	Stainless Steel

Table 1: Transducer frequency settings

Remote System with Small Pipes

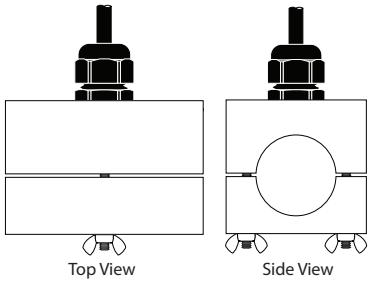


Figure 4: Pipes and tubing 1/2…2 in.

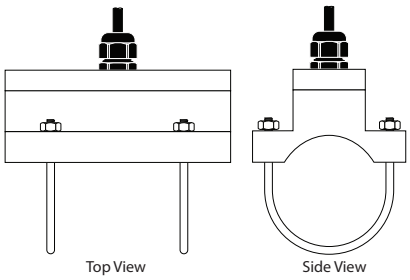


Figure 5: U-bolt connections, ANSI/DS and copper 2 in.

Integral Systems with Small Pipes

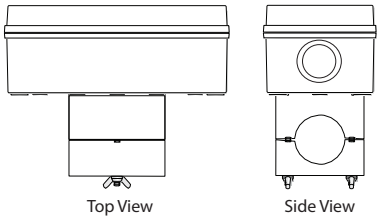


Figure 6: Integral

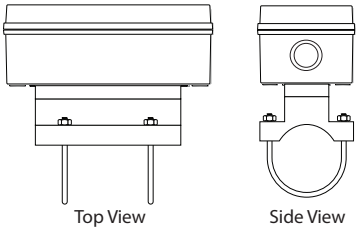


Figure 7: Integral with u-bolt

INSTALLATION PROCEDURE

The small pipe transducers are fixed to pipe sizes between 1/2…2 in. Do not attempt to mount the transducers onto a pipe that is either too large or too small for the transducer.

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. Apply a thin coating of acoustic coupling grease to the half of the housing where the transducer will contact the pipe. See *Figure 8*.
   Generally, a silicone-based grease is used as an acoustic couplant, but any good quality grease-like substance that is rated to not flow at the operating temperature of the pipe is acceptable. For pipe surface temperature over 130° F (55° C), use high-temperature paste (P.N. D002-2011-012) or non-silicone paste (P.N. D002-2011-009).

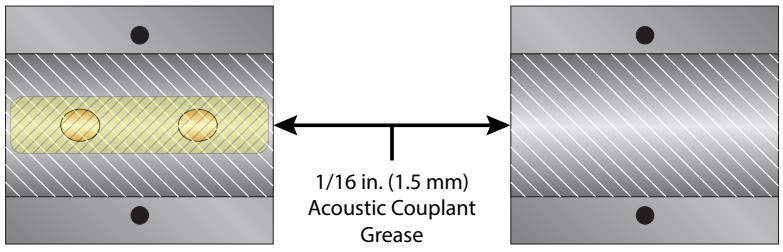


Figure 8: Application of acoustic couplant

3. On horizontal pipes, mount the transducer in an orientation so the cable exits at ±45 degrees 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.
4. Tighten the wing nuts or U-bolts enough to hold the transducers in place, but not so tight that all of the couplant squeezes out of the gap between the transducer faces and the pipe or from the gap between the transducer halves.
5. Route the remote transducer cables back to the flow meter location, avoiding high voltage cable trays and conduits.

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