Dynasonics®
Ultrasonic Flow Meters

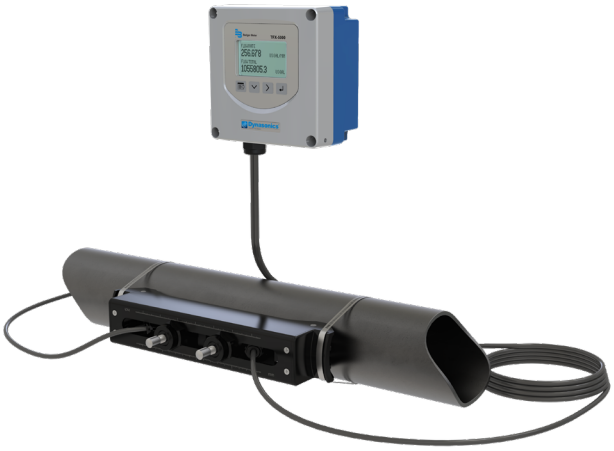
Transducers

Easy Rail Mounting System (JZ/KZ)

INTRODUCTION

This document explains how to install transit time ultrasonic transducers with Easy Rail mounting systems.

The Easy Rail mounting system can be installed on vertical or horizontal pipes. For horizontal applications, install the system on the side of the pipe.



⚠ WARNING

EQUIPMENT SHALL BE PROTECTED FROM UV LIGHT.

⚠ WARNING

EQUIPMENT TO BE PROTECTED FROM IMPACT.

⚠ WARNING

THIS EQUIPMENT INCLUDES EXTERNAL NON-METALLIC PARTS. THE USER SHALL THEREFORE ENSURE THAT THE EQUIPMENT IS NOT INSTALLED IN A LOCATION WHERE IT MAY BE SUBJECTED TO EXTERNAL CONDITIONS (SUCH AS HIGH-PRESSURE STEAM) WHICH MIGHT CAUSE A BUILD-UP OF ELECTROSTATIC CHARGES ON NON-CONDUCTING SURFACES. ADDITIONALLY, CLEANING OF THE EQUIPMENT SHOULD BE DONE ONLY WITH A DAMP CLOTH.

⚠ WARNING

DO NOT CONNECT OR DISCONNECT WHEN ENERGIZED.

SPECIFICATIONS

- Voltage: 30V
- Current: 0.375A
- Power: 3.15W

PRE-INSTALLATION REQUIREMENTS

NOTE: Protect all parts until installation is complete.

Program the Meter

Before installing the Easy Rail mounting system, 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 Easy Rail Mounting System

Select a location for the Easy Rail mounting system 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 3 inch pipe is being measured, the minimum upstream pipe in front of the mounting rail should be 30 in. and the minimum downstream pipe behind the transducers should be at least 15 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.

Badger Meter

IND-UM-02650-EN-08 (July 2022)

Installation Guide

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.

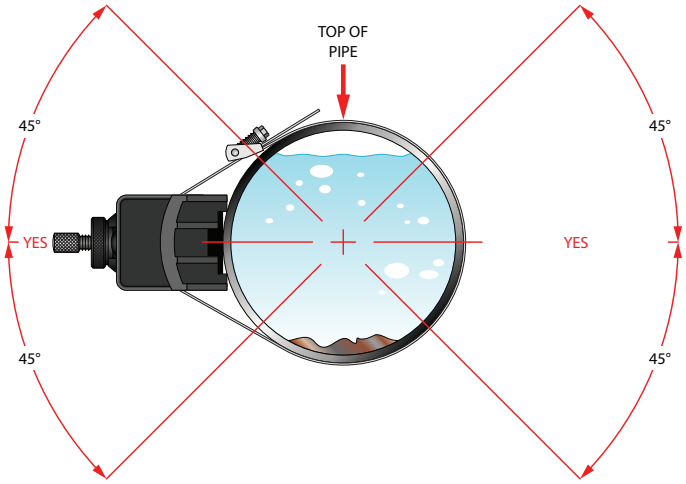


Figure 1: Transducer positioning

Piping Configurations and Transducer Positioning

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

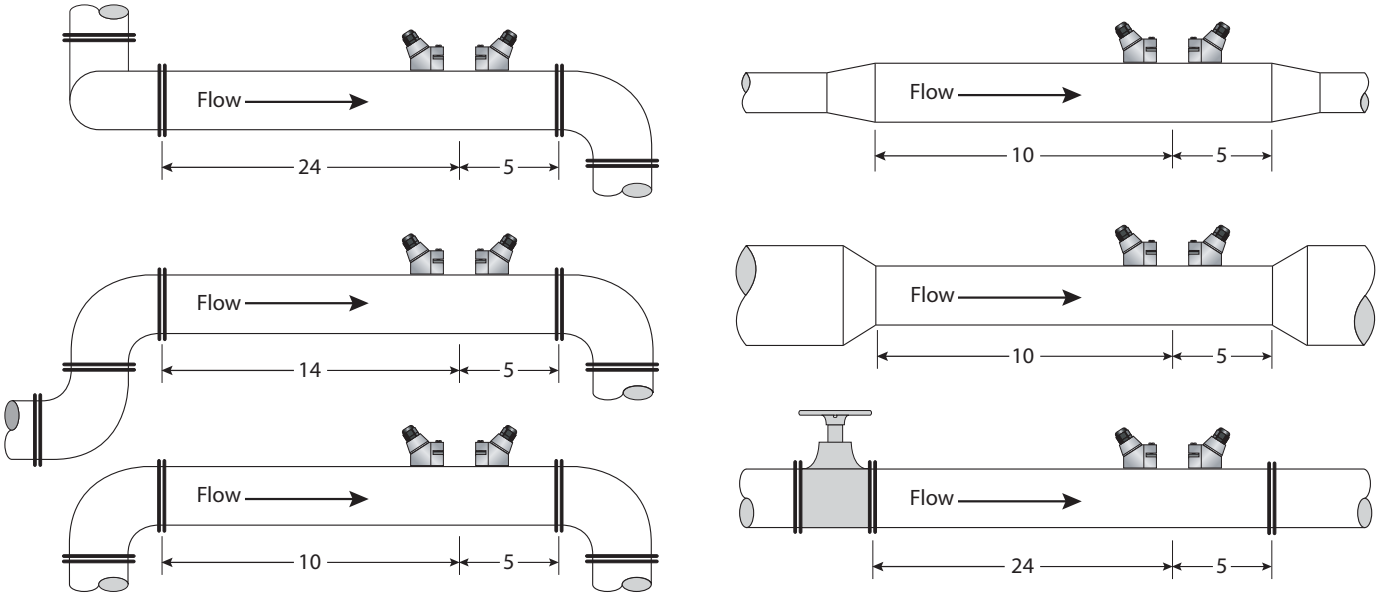


Figure 2: Piping configuration and transducer positioning

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.

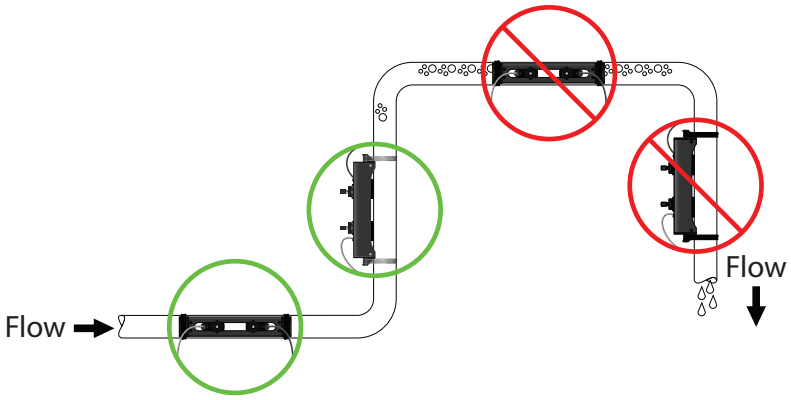
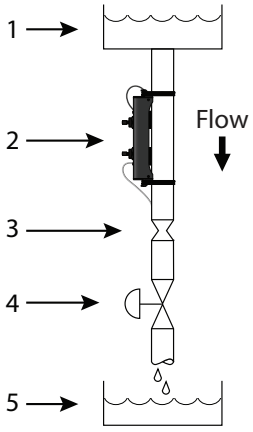


Figure 3: Transducer orientation



1	Supply Tank
2	Transducers
3	Pipe Restriction
4	Valve
5	Batching Tank

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. During installation, make sure the rail is firmly positioned on the pipe and all thumbscrews are hand-tight. See *Figure 5*.

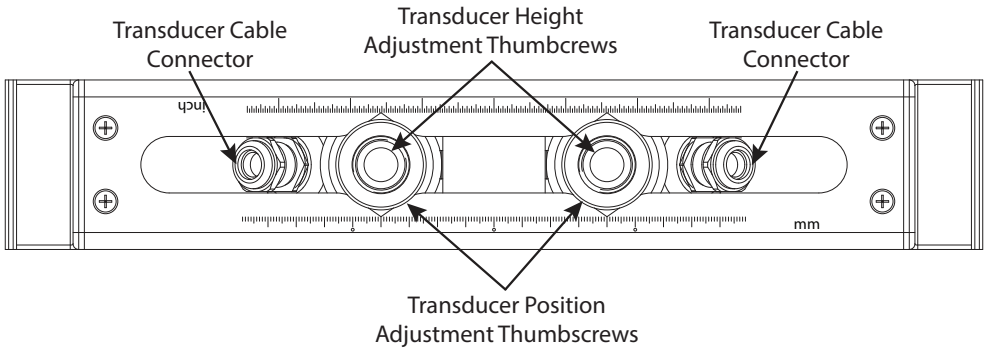


Figure 5: Easy rail top view

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 thumbscrews and slide the transducers along the scale to set the distance between the them. The top of the rail shows the distance in millimeters and inches.
3. Tighten the position adjustment thumbscrews hand-tight to lock the transducers in place.
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.

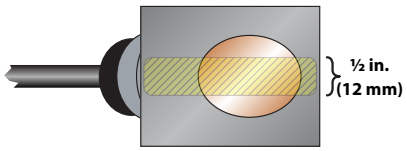


Figure 6: Transducer bottom view

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. Place the mounting rail on the pipe and fasten it with metal banding straps. See *Figure 7*.
   a. Slide the strap into the arched groove on the end of the transducer.
   b. Wrap the strap around the pipe.
   c. Slide the free end of the strap into the end clip of the strap with the screw at 90 degrees to the strap.
   d. Pull the strap through until it loosely fits around the pipe.
   e. Rotate the screw so it is parallel to the strap and tighten the screw slightly to help hold the transducer onto the pipe.

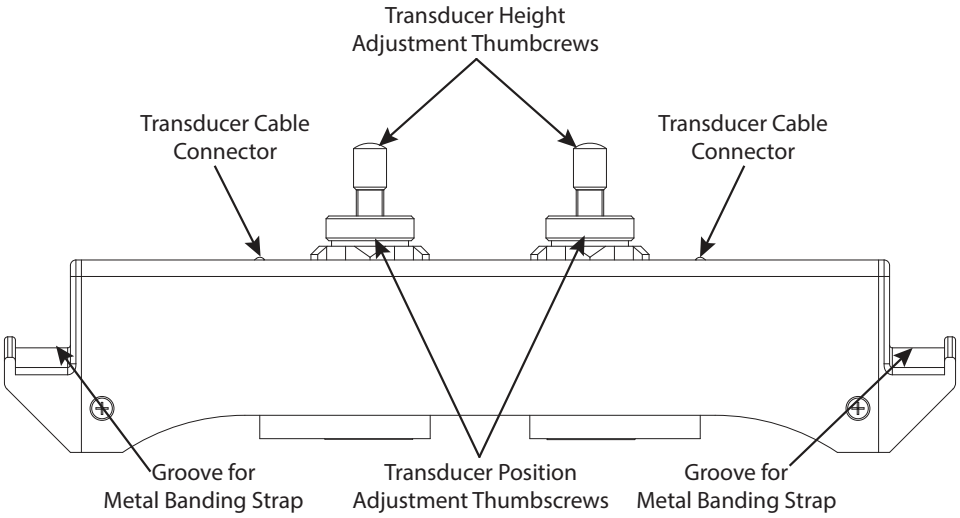


Figure 7: Easy rail side view

6. Turn the transducer height adjustment thumbscrews clockwise to lower the transducers onto the pipe surface.
7. Verify that the transducer is true to the pipe and all air is expelled out of the gap between the transducer faces and the pipe as necessary.
8. Route the transducer cables back to the flow meter location, avoiding high voltage cable trays and conduits.

Transducer Spacing

Spacing for V-Mount Medium Pipe Transducers on ASME/ANSI Pipes with Potable Water

After the mounting path, fluid and pipe properties are entered into the transmitter, the transmitter calculates the proper transducer spacing. *Table 1* lists the transducer spacing for common ASME/ANSI pipe sizes, materials and schedules.

NOTE: JZ transducers accommodate only up to 6 in. pipes.

Pipe Size	Pipe Material	Schedule	Spacing
3 in.	CPVC or PVC	Schedule 40, Standard	2.83 in.
		Schedule 80	2.81 in.
	Carbon Steel	Schedule 40, Standard	3.07 in.
		Schedule 80	3.15 in.
	Stainless 316/316L	Schedule 40, Standard	3.10 in.
		Schedule 80	3.18 in.
	Stainless 304	Schedule 40, Standard	3.03 in.
		Schedule 80	3.10 in.
	Copper	Type K	2.53 in.
4 in.	CPVC or PVC	Schedule 40, Standard	3.52 in.
		Schedule 80	3.51 in.
	Carbon Steel	Schedule 40, Standard	3.79 in.
		Schedule 80	3.89 in.
	Stainless 316/316L	Schedule 40, Standard	3.81 in.
		Schedule 80	3.92 in.
	Stainless 304	Schedule 40, Standard	3.74 in.
		Schedule 80	3.83 in.
	Copper	Type K	3.22 in.
6 in.	CPVC or PVC	Schedule 40, Standard	5.19 in.
		Schedule 80	5.17 in.
	Carbon Steel	Schedule 40, Standard	5.50 in.
		Schedule 80	5.66 in.
	Stainless 316/316L	Schedule 40, Standard	5.53 in.
		Schedule 80	5.70 in.
	Stainless 304	Schedule 40, Standard	5.45 in.
		Schedule 80	5.58 in.
8 in.	CPVC or PVC	Schedule 40, Standard	7.00 in.
		Schedule 80	6.97 in.
	Carbon Steel	Schedule 40, Standard	7.37 in.
		Schedule 80	7.54 in.
	Stainless 316/316L	Schedule 40, Standard	7.40 in.
		Schedule 80	7.58 in.
	Stainless 304	Schedule 40, Standard	7.31 in.
		Schedule 80	7.45 in.
10 in.	CPVC or PVC	Schedule 40, Standard	8.43 in.
		Schedule 80	8.40 in.
	Carbon Steel	Schedule 40, Standard	8.84 in.
		Schedule 80	9.07 in.
	Stainless 316/316L	Schedule 40, Standard	8.88 in.
		Schedule 80	9.13 in.
	Stainless 304	Schedule 40, Standard	8.78 in.
		Schedule 80	8.97 in.
12 in.	Carbon Steel	Schedule 40, Standard	10.23 in.
		Schedule 80	10.53 in.
	Stainless 316/316L	Schedule 40, Standard	10.27 in.
		Schedule 80	10.59 in.
	Stainless 304	Schedule 40, Standard	10.16 in.
		Schedule 80	10.40 in.

Table 1: Transducer spacing

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