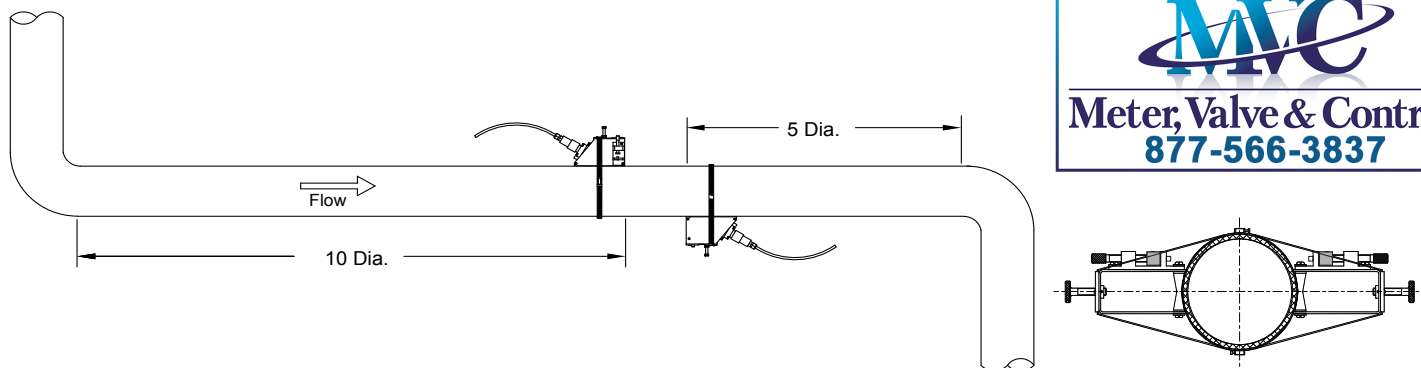


F-4000 Series Brackets and Spacer Bar Hardware Installation Instructions for Direct Mode Operation



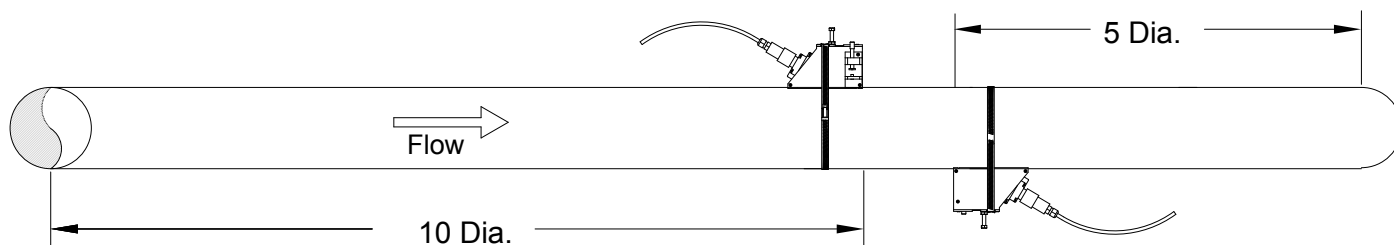
Installation Site Selection

For best results, the transducers must be installed on a straight run of pipe, free of bends, tees, valves, transitions, insertion probes and obstructions of any kind. For most installations, ten straight unobstructed pipe diameters upstream and five diameters downstream of the transducers is the minimum recommended distance for proper operation. Additional considerations are outlined on the next page.



IMPORTANT NOTE

In some cases, longer straight runs may be necessary when the transducers are placed downstream from devices which cause unusual flow profile disruptions or swirl; for example, modulating valves or two elbows in close proximity and out of plane, etc.



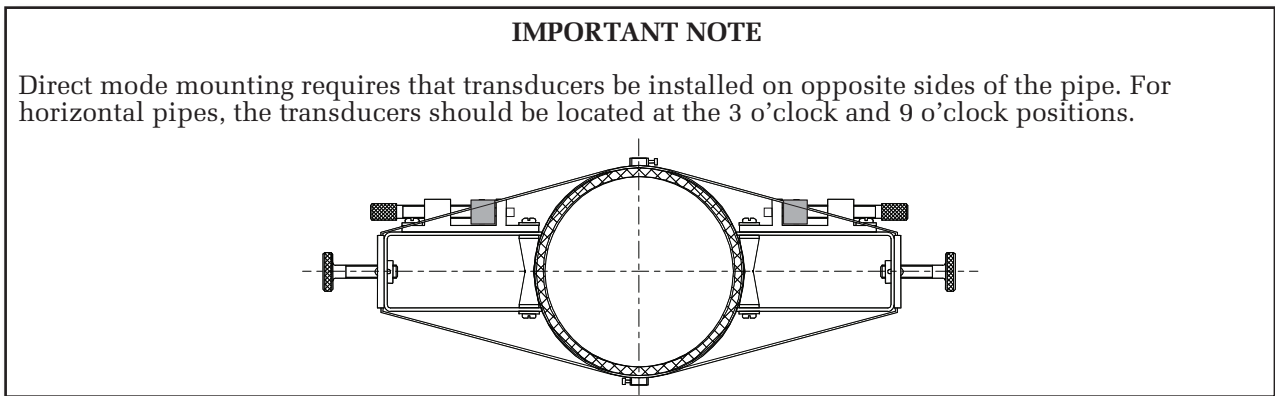
Determining Diameters of Straight Pipe

For each application, locate the longest straight, unobstructed section of pipe (no bends, tees, valves, other insertion probes, size transitions). The longest straight pipe run in inches divided by nominal pipe size in inches equals “diameters of straight pipe.” For closed loop applications, consider both the supply and return lines as possible locations.

Other Considerations When Determining Mounting Location

1. Do not, if possible, install the transducers downstream from a throttling valve, a mixing tank, the discharge of a positive displacement pump or any other equipment that could possibly aerate the liquid. The best location will be as free as possible from flow disturbances, vibration, sources of heat, noise, or radiated energy.
2. Do not mount transducers on the top or bottom of a horizontal pipe. The best placement on a horizontal pipe is one sensor at 3 o'clock and one sensor at 9 o'clock for direct mode.
4. Mounting on a vertical pipe is recommended only if flow is in the upward direction. When mounting on a vertical pipe flowing in a downward direction, make sure there is sufficient back pressure in the system to maintain a full pipe.
5. Do not mount the transducers on or across a surface aberration (pipe seam, etc.)
6. Avoid mounting the transducers on a section of pipe with any external scale. Remove all scale, rust, loose paint, etc. from the location prior to mounting the transducers. It is not necessary to remove paint that fully adheres to the pipe surface.
7. Do not mount transducers from different ultrasonic flow meters on the same pipe.
8. Never mount transducers under water, unless you have specifically purchased submersible transducers and you install them in accordance with factory instructions.

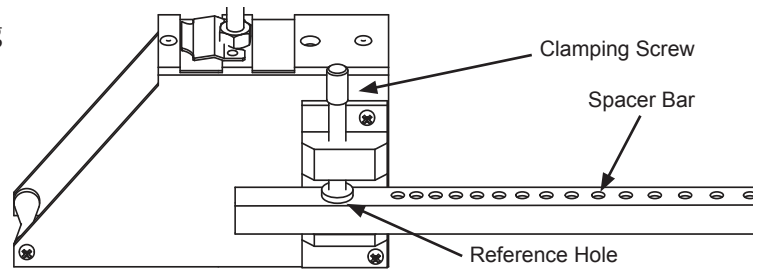
Preparing the Pipe and Mounting the Hardware



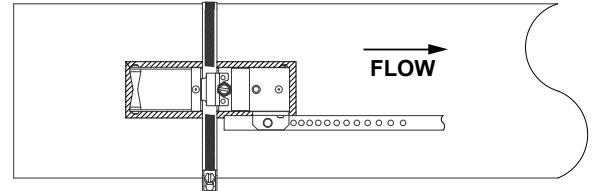
1. To prepare the pipe, temporarily position a mounting bracket on the pipe where you will be mounting it. Ensure that the pipe surface is smooth without any raised areas (seams, etc.) Also, make sure there are no pipe seams or joints between the transducer mounting locations. With a pencil, marker or chalk, draw a generous rectangle around the bracket. Clean and de-grease the area within the rectangle. Use the small sanding block provided with the installation hardware as necessary to remove any grit, corrosion, rust, loose paint or other contaminants. You do not need to remove paint that fully adheres to the pipe. Be sure to wipe the surface clean after sanding. The cleaned surface should extend at least 1/2" beyond the length and width of the mounting bracket.



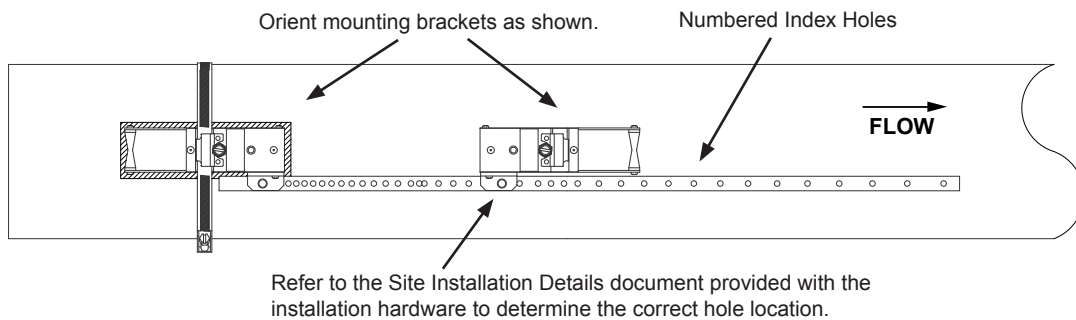
- Attach the spacer bar to one of the mounting brackets at the reference hole.



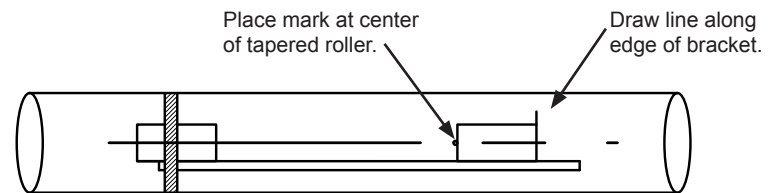
- Position the mounting bracket and spacer bar in the center of the cleaned area and secure it in place with a mounting strap as shown to the right. Make sure the mounting strap tightening screw is facing up. Note that the angled end of the bracket must be facing away from where the other bracket will be mounted. While tightening the strap, check to ensure that the bracket remains centered on the pipe. (The bracket is centered on the pipe when the bottom edges of both aluminum side plates on the bracket are in full contact with the pipe surface.)



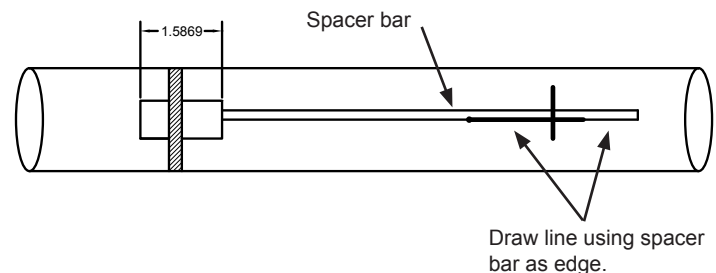
- Attach the second bracket to the spacer bar at the numbered index hole specified on the Site Installation Details document provided with the installation hardware. Note that the angled end of the bracket must be facing away from the other mounting bracket.



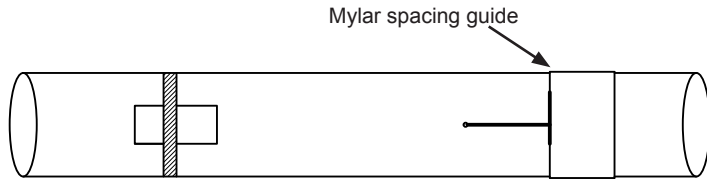
- Check to ensure that this bracket is lined up on the center of the pipe. While holding the bracket centered on the pipe, place a mark (with pencil or chalk) at the center of the tapered roller at the bottom of the bracket as shown to the right. Next, mark along the edge of the bracket as indicated in the drawing to the right.



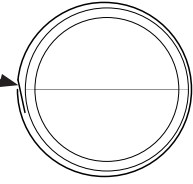
- Remove the bracket from the spacer bar and then remove the spacer bar from the bracket that is strapped to the pipe. Using the spacer bar as a straight edge, draw a line down the center of the pipe intersecting the mark made at the center of the tapered roller and the line drawn against the edge of the bracket as shown below.



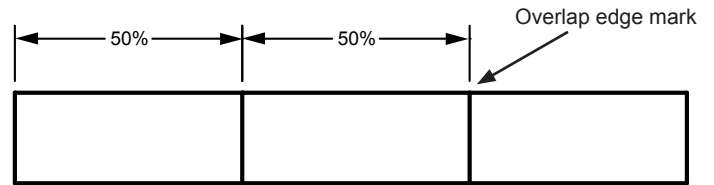
- Wrap the Mylar spacing guide around the pipe so that the left edge is against the transducer edge mark. Arrange so that one end overlaps the other. Ensure that it is snug around the pipe and mark along the overlapping edge.



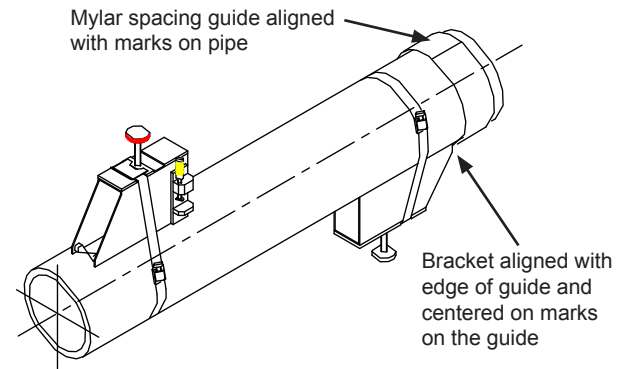
Draw the guide tightly around the pipe and mark at the overlapping edge.



- Remove Mylar spacing guide and lay it out on a flat surface. Either measure the exact distance half-way between the overlap edge and the mark at the overlap, or fold the guide from the overlap edge to overlap mark and draw a line at the fold or halfway point.

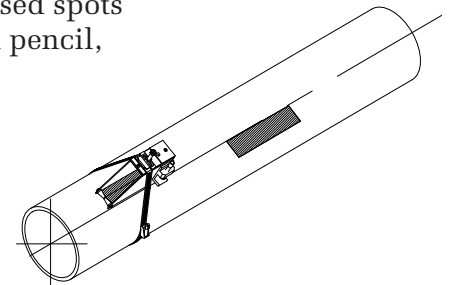


- Reinstall the Mylar spacing guide; its edge abutting the bracket edge mark on the pipe and the overlapping edge in line with the line drawn down the center of the pipe. Tape it in this position on the pipe. Take the second bracket and place it against the edge of the guide with its tapered roller centered on the half way mark drawn on the guide.



- Ensure that the bracket is sitting on a smooth area without any raised spots (seams, etc.). Mark a generous rectangle around the bracket with a pencil, marker or chalk. Remove the bracket and the Mylar guide.

- Clean and de-grease the area within the rectangle. Use the small sanding block provided with the installation hardware as necessary to remove any grit, corrosion, rust, loose paint or other contaminants. The cleaned surface should extend at least 1/2" beyond the length and width of the mounting bracket.



- Replace the Mylar guide back in the same position it was in and re-tape it to the pipe.

- Position the bracket as before, against the edge of the guide with its tapered roller centered on the half way mark drawn on the guide. Secure it in place with a mounting strap as shown to the right. Make sure the mounting strap tightening screw is facing toward the bracket so you can hold it in place while tightening the screw. Note that the angled end of the bracket must be facing away from where the other bracket will be mounted. While tightening the strap, check to ensure that the bracket remains centered on the pipe. (The bracket is centered on the pipe when the bottom edges of both aluminum side plates on the bracket are in full contact with the pipe surface.)

