

Fluid Requirements

Doppler Operation	Transit Time Operation
<ul style="list-style-type: none"> • Must conduct sound • Must contain sound reflecting particles such as air bubbles, sand, etc. <p>Doppler measurement requires 0.02% to 15% (200 to 150,000 ppm) particles be present in the flow stream to “reflect” the sound waves.</p>	<ul style="list-style-type: none"> • Must conduct sound • Must be relatively clean fluid <p>Transit Time measurement requires relatively “clean” fluid. Fluids containing from 0% to 10% (0 to 100,000 ppm) of particles are acceptable.</p>

Note: Do not attempt to measure very low flow velocities in the Doppler mode, the particles can fall out of suspension resulting in error or failure.

Pipe Requirements:

Pipe Material	Pipe Size Ranges and Maximum Wall Thickness		
	Doppler Mode Pipe Size Range	Transit Time Mode Pipe Size Range	Max Pipe Wall
Brass (Naval)	2" to 100" (63mm to 2500mm)	2" to 100" (63mm to 2500mm)	.500" (13mm)
Copper	2" to 100" (63mm to 2500mm)	2" to 100" (63mm to 2500mm)	.500" (13mm)
FRP (fiberglass Reinforced Plastic)	2" to 100" (63mm to 2500mm)	2" to 100" (63mm to 2500mm)	.500" (13mm)
Iron (cast)	2" to 100" (63mm to 2500mm)	2" to 100" (63mm to 2500mm)	.500" (13mm)
Iron (ductile)	2" to 100" (63mm to 2500mm)	2" to 100" (63mm to 2500mm)	.500" (13mm)
Nylon	1" to 100" (25mm to 2500mm)	1-1/2" to 100" (40mm to 2500mm)	2.00" (50mm)
Polyethylene (HDPE)	1" to 100" (25mm to 2500mm)	1-1/2" to 100" (40mm to 2500mm)	2.00" (50mm)
Polyethylene (LDPE)	1" to 100" (25mm to 2500mm)	1-1/2" to 100" (40mm to 2500mm)	1.00" (25mm)
Polypropylene	1" to 100" (25mm to 2500mm)	1-1/2" to 100" (40mm to 2500mm)	.500" (13mm)
PVC / CPVC	1" to 100" (25mm to 2500mm)	1-1/2" to 100" (40mm to 2500mm)	2.00" (50mm)
304 Stainless Steel	2" to 100" (63mm to 2500mm)	2" to 100" (63mm to 2500mm)	.500" (13mm)
304L Stainless Steel	2" to 100" (63mm to 2500mm)	2" to 100" (63mm to 2500mm)	.500" (13mm)
316 Stainless Steel	2" to 100" (63mm to 2500mm)	2" to 100" (63mm to 2500mm)	.500" (13mm)
Steel (1% carbon hard)	2" to 100" (63mm to 2500mm)	2" to 100" (63mm to 2500mm)	.500" (13mm)
Steel (carbon)	2" to 100" (63mm to 2500mm)	2" to 100" (63mm to 2500mm)	.500" (13mm)
Titanium	2" to 100" (63mm to 2500mm)	2" to 100" (63mm to 2500mm)	.500" (13mm)

Note: The outside surface of the pipe must be clean and smooth. Insulation, coatings, rust and other surface imperfections should be removed before installing the transducers. The inside surface of the pipe must be smooth to properly reflect the sound wave.

Straight Lengths of Pipe Requirements

Type of Disturbance	Straight Lengths of Pipe Required	
	Upstream from Transducers	Downstream from Transducers
Flange	5 x Nominal Pipe Size	5 x Nominal Pipe Size
Reducer	7 x Nominal Pipe Size	5 x Nominal Pipe Size
90° Elbow	10 x Nominal Pipe Size	5 x Nominal Pipe Size
Two 90° Elbows - 1 Direction	15 x Nominal Pipe Size	5 x Nominal Pipe Size
Two 90° Elbows - 2 Directions	20 x Nominal Pipe Size	5 x Nominal Pipe Size
Gate valve	25 x Nominal Pipe Size	5 x Nominal Pipe Size
Pump	25 x Nominal Pipe Size	5 x Nominal Pipe Size

Note: The Sonic-Pro's sound wave beam is only affected by fluid that actually passes through the beam and therefore, the meter will not measure with high accuracy if the fluid velocity is not consistent across the entire pipe diameter. Flow disturbances such as pumps, elbows, tees, and valves in the flow stream can cause swirl patterns and vortices that will affect the measurement. Install the transducers on a straight run of pipe **as far as possible** from any disturbances. The distance required for high accuracy will depend on the type of disturbance.