



Alfa Laval Vortex® Shear-Mixer

Advanced slurry mixing eductor

Introduction

Mixing of liquid and powder, or slurry mixing, is a necessary process for many applications. Effective slurry mixing significantly impacts operational safety, speed, and overall cost. However, the perceived simplicity of the process often leads to poor, unsafe slurry mixing practices and the use of outdated or improper equipment. Venturi eductors, or slurry eductors as they are commonly referred to, are relatively simple devices that are installed directly into motive liquid flow lines. They have been employed in numerous applications over the years as an extremely cost effective means of mixing slurries. They have no moving parts or motors, and passively convert motive flow pressure into vacuum, inducing powdered additives directly into the motive fluid. However, they are not free from issues such as plugging, sensitivity to recirculation of solid containing slurries, and inadequate powder dispersion which disqualifies them for use in applications where continuous powder flow, batch recirculation, and slurry homogeneity are critical. The Alfa Laval Vortex Shear-Mixer is an advanced style of venturi eductor that provides all of the functional simplicity of its predecessor, but overcomes multiple issues that inhibit the traditional venturi eductor.

Applications

The Alfa Laval Vortex Shear-Mixer is a high-performance venturi slurry eductor uniquely designed to operate in demanding slurry mixing jobs. Handling high flow rate requirements, high solids content, and difficult to mix additives are major criteria for meeting demanding slurry mixing conditions in applications such as oil and gas drilling fluid mixing, construction material production, chemical production, mining, liquid sugar mixing, brine mixing, cosmetics, paint pigment mixing, metal processing, and plastic production.

Benefits

- Robust design, no moving parts, easy to replace inserts
- Superior additive loading rates for solids, liquids and gas
- Dynamically shears additives into fluid
- Handles hard to mix additives such as clays or polymers
- Prevents clumps, fish eyes, and microgels
- Highly customizable to fit specific site applications



Standard Design

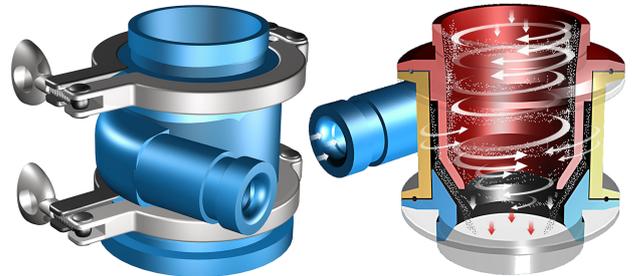
Much like traditional slurry eductors, The Alfa Laval Vortex Shear Mixer has no motorized or rotating components. It relies on low pressure vacuum and dynamic, hydraulic shear to easily mix additives into fluid. It outperforms traditional venturi eductors; providing higher additive loading rates and more complete additive mixing. However, unlike traditional venturi eductors, it is exceedingly resistant to plugging and downtime. The Alfa Laval Vortex Shear Mixer is offered in four standard sizes: 51 mm (2 in.), 76 mm (3 in.), 102 mm (4 in.), and 152 mm (6 in.). The 102 mm (4 in.) and 152 mm (6 in.) Shear-Mixers are available in dual suction port options for added versatility and connection to secondary additive feed devices or accessories, such as bulk bag hoppers or bulk surge tanks. The Shear-Mixer consists of a housing body with special **Lobestar Mixing Nozzle®** and venturi/diffuser tube inserts. 76 mm (3 in.), 102 mm (4 in.), and 152 mm (6 in.) models can be outfitted with the Radial Premixer “pre-wetting” and wash down accessory and all Shear-Mixers can be equipped with optional hopper, **V-Slide®** bulk flow promoter, bulk bag station, or dustless surge tank accessories. The standard connection style for all Shear-Mixer sizes but the 51 mm (2 in.) is grooved end pipe couplings. The 51 mm (2 in.) size has male pipe threaded connections. The most prominent Shear-Mixer model for large industrial applications is the single suction, 152 mm (6 in.) version with heavy duty, table hopper and Radial Premixer accessories.

Working Principle

Fluid is pumped at a high rate into the inlet of the Shear-Mixer where pressure builds behind the Lobestar Mixing Nozzle insert. The fluid's velocity spikes as it passes through the nozzle, and the resulting pressure drop creates a near perfect vacuum for maximum additive loading. The Lobestar Mixing Nozzle produces a unique jet stream that has a dual impact. First, it dynamically shears fluid, rapidly hydrating and uniformly dispersing additives. Secondly, it promotes a highly-energized fluid boundary layer, which when combined with the effect of the Shear-Mixer's specialized venturi/diffuser tube, minimizes the impact of pressure loss in the downstream piping and increases the distance and elevation which the mixed slurry can be delivered through the discharge piping. Generally, the Shear-Mixer can be utilized in any application where the motive fluid can be handled by a centrifugal pump.

The optional Radial Premixer accessory can be combined with 76 mm (3"), 102 mm (4"), and 152 mm (6") Vortex Shear-Mixers. This device "pre-wets" chemical additive particles,

preventing them from forming clumps, fish eyes, or microgels in the mixed slurry. The Radial Premixer wash down effect also helps to inhibit foaming in slurries by partially flooding the Shear-Mixer suction with motive fluid and preventing entrainment of free air into the slurry. During mixing start up or shut down, motive fluid can be recirculated through the Radial Premixer to clear the Shear-Mixer mixing chamber of any accumulated or settled additives.

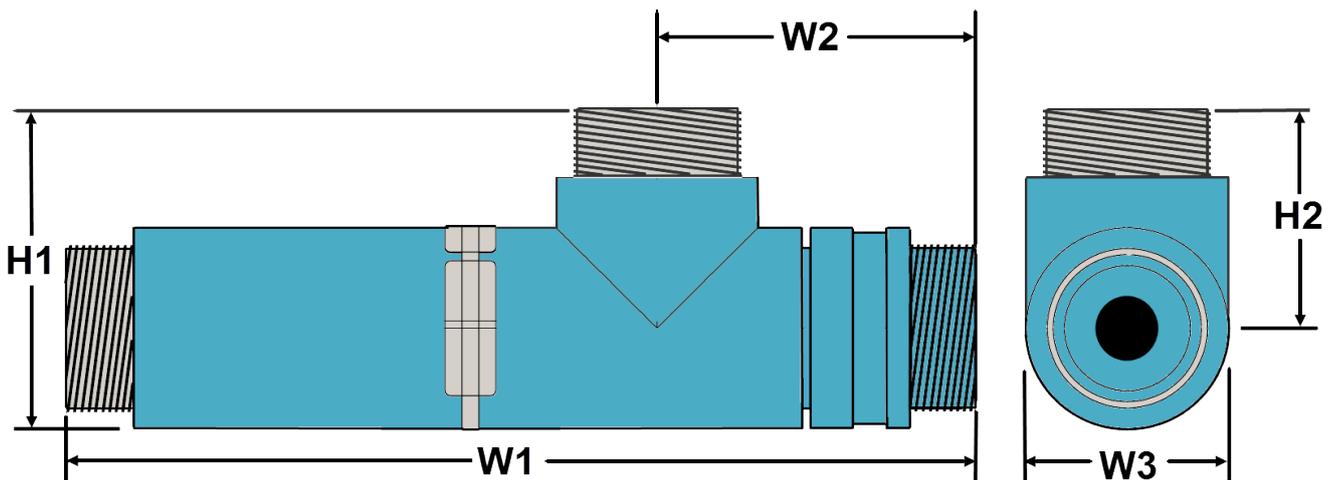


Radial Premixer "pre-wetter" and washdown accessory

Technical Data

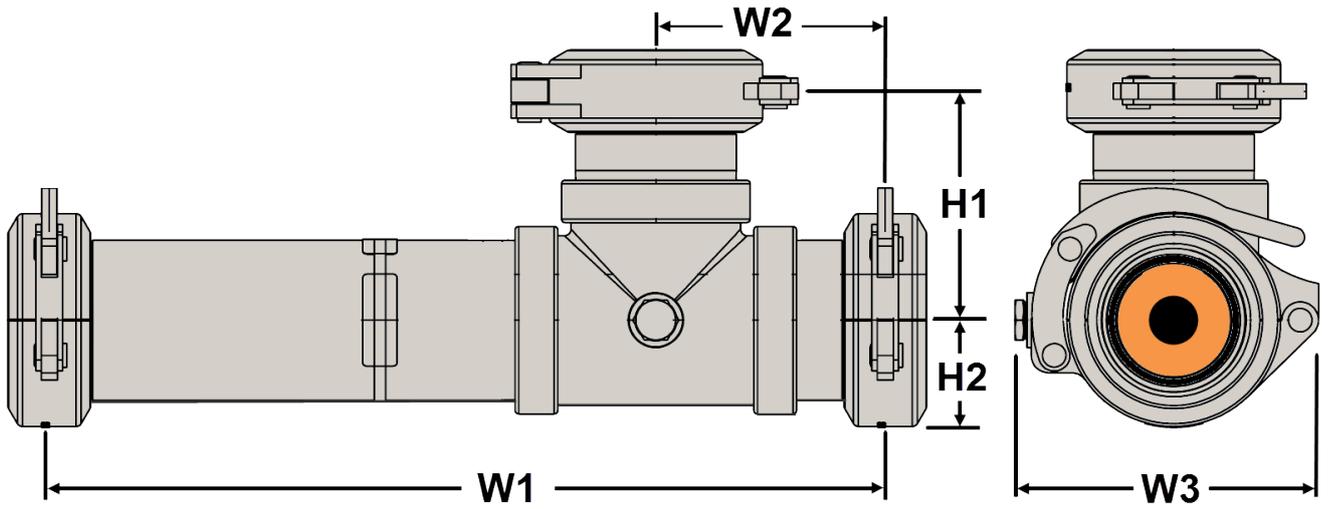
Model Number	SM2000	SM3100	SM4100	SM6100
Connections	51mm (2 in) male pipe threads	76 mm (3 in) grooved end pipe	102 mm (4 in) grooved end pipe	152 mm (6 in) grooved end pipe
Body Material	Molded Polyurethane	304 stainless steel	304 stainless steel	304 stainless steel
Insert Material	Molded Polyurethane	Molded Polyurethane	Molded Polyurethane	Molded Polyurethane
Gaskets	N/A	Buna	Buna	Buna
Weight	1.36 kg (3 lbs)	12.25 kg (27 lbs)	26.3 kg (58 lbs)	52.1 kg (115 lbs)
Design Temperature	-28.8°C to 57°C (-20°F to 135°F)			
Liquid Flow	110 to 140 lpm (29 to 37 gpm)	447 to 564 lpm (118 to 149 gpm)	999 to 1268 lpm (264 to 335 gpm)	1892 to 2347 lpm (500 to 620 gpm)
Differential Head Requirement	35 to 56 m of head (115 to 185 ft of head)	35 to 56 m of head (115 to 185 ft of head)	35 to 56 m of head (115 to 185 ft of head)	35 to 56 m of head (115 to 185 ft of head)

Dimensional Drawings



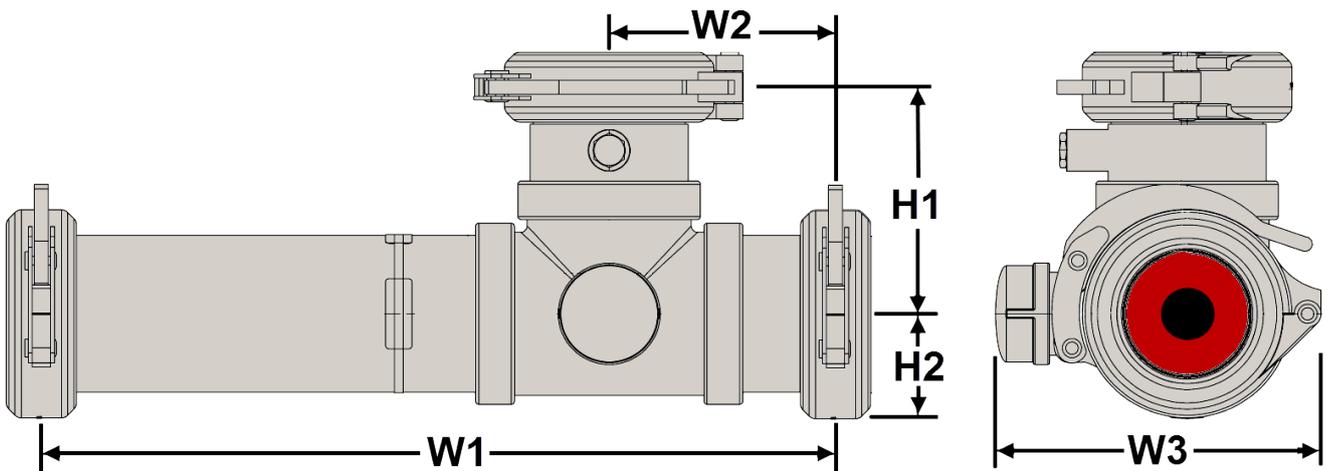
Model SM2100 Dimensions

H1	121 mm (4.75 in)
W1	343 mm (13.5 in)
W2	120 mm (4.7 in)
H2	83 mm (3.3 in)
W3	77 mm (3.0 in)



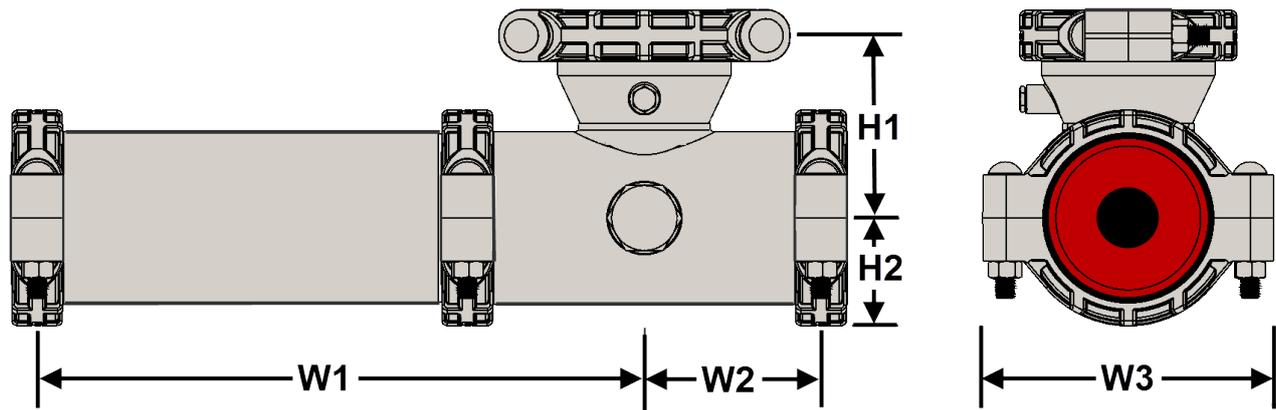
Model SM3100 Dimensions

H1	127 mm (5.0 in)
H2	59 mm (2.34 in)
W1	462 mm (18.17 in)
W2	127 mm (5.0 in)
W3	133 mm (8.43 in)



Model SM4100 Dimensions

H1	163 mm (6.4 in)
H2	76 mm (3.0 in)
W1	575 mm (22.7 in)
W2	164 mm (6.5 in)
W3	236 mm (9.3 in)



Model SM6100 Dimensions

H1	176 mm (6.9 in)
H2	105 mm (4.1 in)
W1	762 mm (30.0 in)
W2	171 mm (6.7 in)
W3	283 mm (11.1 in)

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