

# Mixing & Blending



**Fristam**  
PUMPS®  
Engineered For Lasting Performance®



## Better Blending in Less Time

Fristam mixers and blenders improve product texture, reduce processing time, produce repeatable results, are economical to maintain and operate, and feature low maintenance designs for continuous duty and CIP.

“It used to take us 8 hours.  
Now, it’s only 15 minutes with  
the Powder Mixer.”  
- Midwest cheese processor

# Choose from our complete line of Blenders and Mixers

From powder induction to in-line blending and complete wet/dry blending table systems, Fristam has your mixing and blending solution.

## Powder Induction

Consistent incorporation of powders into a fluid stream, with no plugging.



## In-line Blending

Thorough blending of powders and/or liquids into a fluid stream, in one pass.



# Full Mixing System

Quick, efficient powder induction and dispersion in one ergonomic package.



Fristam  
Powder Mixer  
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# Powder Induction

Fristam's FZX produces even flow and a uniform, well-blended product, even as viscosity increases.

## PULL, DON'T PUSH

The Fristam Powder Induction System utilizes the self-priming FZX series pump in combination with a restricting valve to create vacuum under a hopper to pull powder into the fluid stream. This vacuum can be maintained throughout the entire product run, ensuring your powder rate will remain consistent and fluid will not plug the funnel.

Traditional funnel-pump powder inductors rely on gravity, vortex or Venturi to push powder into fluid stream. These methods all require very specific control of the flow rate to maintain proper induction. As product viscosity changes, flow rate decreases, causing the pump to clog.

Because the FZX is designed to pump entrained air, it will not lose prime or cause fluid to back up in the funnel. The result is consistent flow, no plugging and a well-blended product.



FZX Cover





#### ERGONOMIC AND SAFE

The FZX can become a stand-alone powder induction system with the addition of a powder funnel or wand. Its small footprint allows operators to stand on the floor to pour the powder, eliminating dangerous ladder climbing involved with traditional large batch tanks.

#### CIP AND SIP

FZX series pumps are fully cleanable and steamable in place.

#### TYPICAL FZX POWDER INDUCTION APPLICATIONS:

##### Salts

- Dissolving NaCl to make brine

##### Sugars

- Dissolving sugar to make sucrose
- Dissolving dextrose to make glucose

#### FZX SERIES SPECIFICATIONS

- 6 pump heads
- 6 models (low speeds)
- Max. Flow Rate 400 gpm (90 m<sup>3</sup>/hr)
- Viscosities in excess of 5,000 cps

"Our tea powder was not being properly hydrated, which resulted in customer complaint calls. We were able to eliminate the undissolved solids and reduce our batch time by more than 50%."

- Beverage producer

# In-line Blending

Fristam's FS Series Shear Blender for in-line mixing, blends products quickly and consistently. Compared to conventional methods, the Shear Blender shortens processing times significantly.

## BLEND, DON'T STIR

The FS Shear Blender uses high tip speeds and close clearances to create an effective, highly turbulent mixing zone.

Traditional batch mixing processes can result in a lot of waste. Product tends to stick to the sides and bottom of the tank and may never reach the agitator. This results in extended processing time waiting for the product to blend.

With the Fristam FS, all of the product is passed through a rotor-stator system before reaching the tank, ensuring a thorough and complete mix, in minimal time.

## BLENDING IN MINUTES

With the FS Blender, powders are wetted and dispersed on the first pass, dramatically reducing process times.

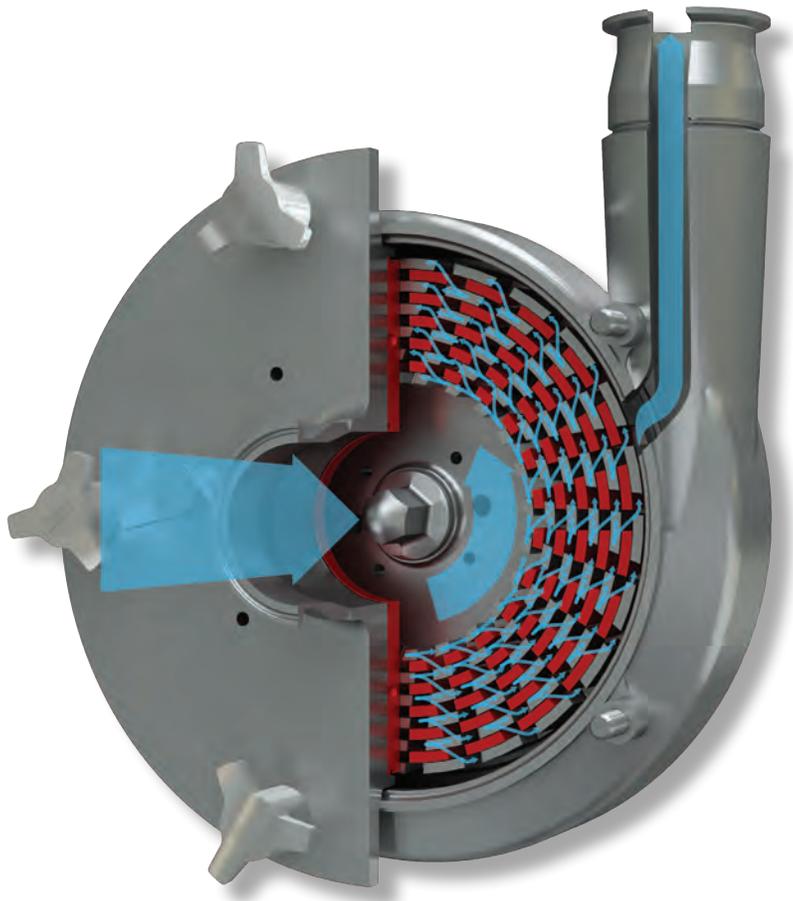
## SAVES ENERGY

Since most blending can be done in a single pass, the energy is exerted precisely and for a shorter time than with in-tank mixing.

## REPEATABLE RESULTS

With the FS, all of the product is processed through its rotor/stator at a controlled concentration, achieving a complete and consistent mix while saving ingredients. With a batch tank mixer, some product may be needlessly mixed over and over, while some product may not be mixed at all.





#### IMPROVED PRODUCT TEXTURE

Fristam's FS Shear Blender uses an intermeshed rotor/stator system to disperse particles into liquid. Its rotating teeth pass within 0.5 mm of the stationary teeth at high speeds, causing a tremendous amount of turbulence. As centrifugal force pushes the product towards the outlet, the intensity of this turbulence ensures that all product must be thoroughly blended to exit the FS.

#### EASY MAINTENANCE

Designed with a front-loading seal, the FS allows production personnel to service the pump in place, with no special tools.

#### FULLY CIP'ABLE

The fully CIP'able design of the FS meets the most stringent sanitary standards. Its internal seal performs at virtually any pressure.

#### DIVERSE APPLICATIONS

- Blend
- Emulsify
- Disperse
- Dissolve
- Texturize
- Reduce particle size

#### FS SERIES SPECIFICATIONS

- 12 Models
- Max. Tip Speed 145 ft/s (44m/s)
- Max. Flow Rate 375 gpm (85 m<sup>3</sup>/hr)
- Max. Viscosity 30,000 cps



FS Cover and Stator



- Stator Teeth
- Rotor Teeth
- Product Flow

# Full Mixing System

Fristam's Powder Mixer blends dry and wet ingredients into a fluid stream and maintains performance even as product viscosity increases.

## INTEGRATED SYSTEM

Fristam's Powder Mixer incorporates the uniform powder induction of the FZX liquid ring pump and thorough blending of the FS Shear Blender into a single, compact system.

## CONSISTENT POWDER INDUCTION

The FZX is unparalleled as a self-priming pump, easily pulling liquids and solids together.

The table's full-port valve inducts powders fully, eliminates powder bridging and ensures maximum powder induction rate. Vacuum gauges monitor suction for repeatable results.

## BLENDS BETTER

Using an intermeshed rotor/stator system, tight gaps at high speeds and high turbulence the Powder Mixer achieves a complete and consistent mix, time after time.

## PROCESSES LARGER BATCHES

Since the Fristam Powder Mixer is an in-line system, the batch size is infinite.

## BLENDS IN MINUTES

Powders can be wetted and dispersed on the first pass through the Powder Mixer, dramatically reducing process times.





#### PORTABLE

Smaller models are portable, with locking wheels. The Powder Mixer can be moved easily to different processes as needed.

#### ERGONOMIC & SAFE

The Powder Mixer operates at floor-level, eliminating dangerous ladder climbing or accidental falling or dropping of equipment from mezzanines. Also, with its waist-height funnel top, there is no bending to pour.

#### WHY IT'S BETTER THAN BATCH MIXERS

- Devours lumps and clumps
- Blends in minutes
- Processes larger batches

#### WHY IT'S BETTER THAN FUNNEL/PUMP COMBINATIONS

- High-intensity blending
- Repeatable product consistency

#### NO RISK TRIAL

Fristam offers on-site trials with your product. For only a nominal fee, Fristam will put our powder mixer to work for you, so you can see the amazing results for yourself.

- Fully operational powder mixer
- Factory-trained technician on-site
- Expert process guidance

"It proved so successful, we kept it. The chemist and I wouldn't let it leave. We were able to achieve results that we weren't able to achieve with the old system, and in only 30 minutes mixing time."

- E. Martinez, Coats Aloe International

# Powder Mixer Applications

## DAIRY

- Flavored milk
- Eggnog
- Ice cream mix
- Light & low fat sour cream

## BEVERAGE

- Soda syrups & concentrate
- Sucrose solution
- Green tea
- Hops Induction

## FOOD

- Hummus
- Salsa & hot sauce
- Fruit puree

## COSMETIC

- Shampoo & conditioner
- Sanitizer gel

## BIO-PHARMACEUTICAL

- Media prep
- Buffer solution
- Glucose

## INDUSTRIAL

- Paintballs



Powder Mixer	Liquid Flow Rate	Max. Induction Rate lbs/min (kg/min)			
		Sugar/Salt	Starch/WPC/ Cocoa	Pectin	Carbopol/ Xanthan
01-10	7-15 (1.6-3.4)	30 (13.6)	20 (9.1)	6 (2.7)	3 (1.4)
10-52	34-50 (7.7-11.4)	100 (45)	67 (30)	20 (9)	10 (4.5)
15-53	34-90 (7.7-20.4)	175 (79)	117 (53)	35 (16)	18 (8)
20-53	55-120 (12.5-27.3)	225 (102)	151 (69)	45 (20)	23 (10)
25-54	55-150 (12.5-34.1)	300 (136)	201 (91)	60 (27)	30 (13.6)

*FZX-only Powder Mixers are available for highly soluble solids, such as sugar and salt.*

# Powder Mixer Options

The Fristam Powder Mixer can be configured to meet a wide array of processing needs specific to each industry.



## BEVERAGE PACKAGE

- Double seals
- Drum unload port

## DAIRY PACKAGE

- Rectangular funnel
- Funnel screen
- Funnel lid

## PHARMA PACKAGE:

- Validation package
- Product testing & certifications
- Casing drains
- Diaphragm valves
- 15 Ra finish with electropolish on product contact areas

## PERSONAL CARE PACKAGE:

- Variable frequency drive
- Funnel orifice

## HOPS DOSING PACKAGE:

- Funnel gas blanket

# In-line Blending Options

## FSI OPTION

Fristam's FSI Series Shear Pump is an impeller-style version of the Fristam FS Series Shear Blender. A pump and blender in one—for applications requiring both pumping and mixing—Fristam's FSI has an integrated impeller that provides high flow rates while still mixing your product.

## TYPICAL APPLICATIONS

- Biodiesel
- Ice cream mix
- Supplemental mixing after a batch tank

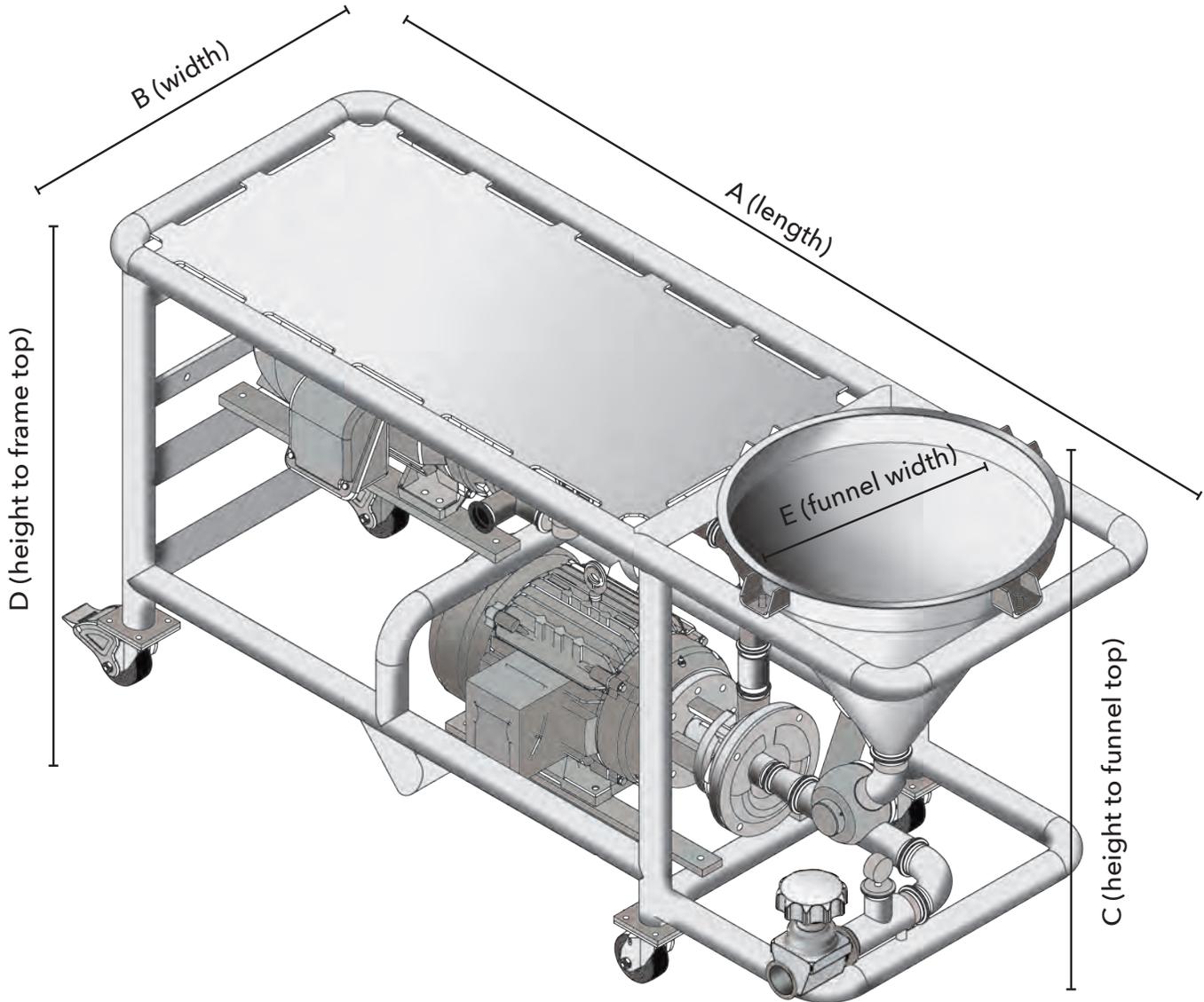
## FSI SERIES SPECIFICATIONS

- 10 Models
- Max. Tip Speed 145 ft/s (44m/s)
- Max. Flow Rate 375 gpm (85 m<sup>3</sup>/hr)
- Max. Viscosity 30,000 cps



# Powder Mixer Dimensional Drawing

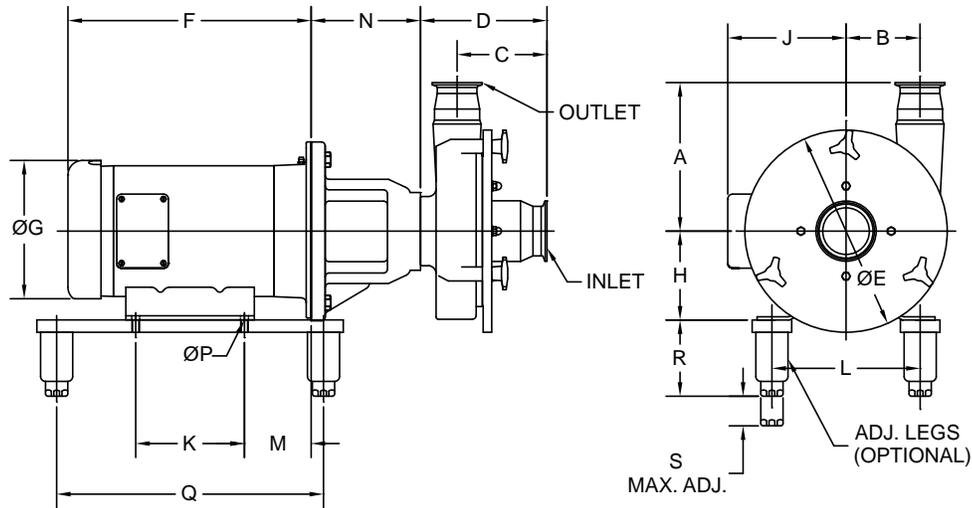
There are several standard model sizes, depending on the powder being mixed and the flow rate.



Model	FZX Model	FS Model	Inlet	Outlet	A	B	C	D	E
01-10	2010	712	1.5 (3.8)	1.5 (3.8)	56 (142)	30 (76.2)	36.5 (92.7)	34 (86.4)	12 (30.5)
10-52	2100	3522	2 (5.1)	2 (5.1)	71 (180)	30.5 (77.5)	40.5 (103)	38 (96.5)	24 (61)
15-53	2150	3532	2 (5.1)	2 (5.1)	71 (180)	30.5 (77.5)	41.5 (105)	38 (96.5)	24 (61)
20-53	2200	3532	2.5 (6.4)	2.5 (6.4)	83 (211)	30.5 (77.5)	41.5 (105)	39 (99.1)	24 (61)
25-54	2250	3542	2.5 (6.4)	2.5 (6.4)	83 (211)	30.5 (77.5)	41.5 (105)	39 (99.1)	24 (61)

All dimensions are in inches (centimeters).

# FS Shear Blender Dimensional Drawing



**NOTE:**

1. MOTOR DIMENSIONS MAY VARY DEPENDING ON MANUFACTURER REQUESTED.
2. BLENDER DIMENSIONS ARE BASED ON CLAMP FITTINGS.
3. ALL DIMENSIONS ARE IN MILLIMETERS (INCHES).

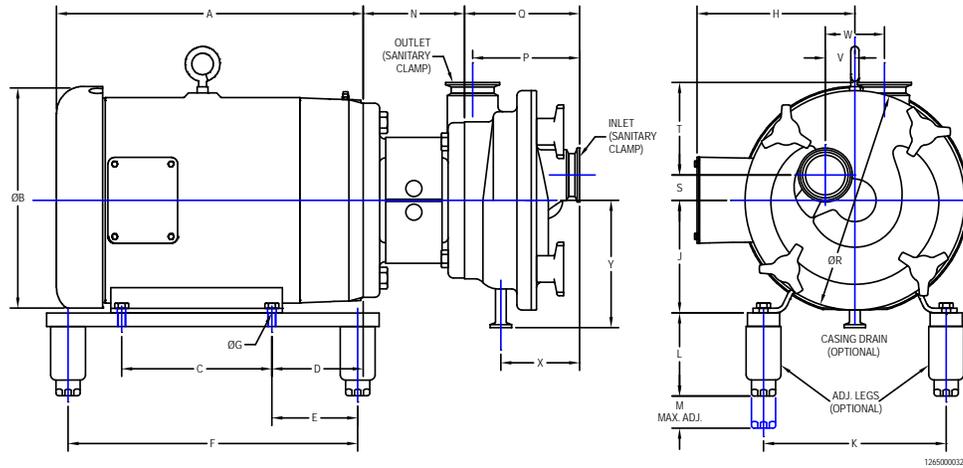
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PUMP MODEL	INLET	OUTLET	A	B	C	D	E
711 / 712	2"	1.5"	144	58	113	145	185
			5.67"	2.28"	4.45"	5.71"	7.28"
721 / 722	2"	1.5"	170	79	113	145	230
			6.69"	3.11"	4.45"	5.71"	9.06"
3521 / 3522	2.5"	2"	190	80	118	157.5	230
			7.48"	3.15"	4.65"	6.2"	9.06"
3531 / 3532	2.5"	2"	191	95	115.5	157.5	260
			7.52"	3.74"	4.55"	6.2"	10.24"
3541 / 3542	3"	2.5"	211	115	118	157.5	290
			8.31"	4.53"	4.65"	6.2"	11.42"
3551 / 3552	3"	2.5"	230	140	119	170	350
			9.06"	5.51"	4.69"	6.69"	13.78"

MOTOR HP	MOTOR RPM	MOTOR FRAME	F	G	H	J	K	L	M	N	P	Q	R	S
			1750 RPM	3500 RPM										
1 HP	1.5 HP	143TC	284	175	89	133	101.6	140	127	120	8.7	356	98	38
			11.18"	6.89"	3.5"	5.25"	4"	5.5"	5"	4.72"	0.34"	14"	3.86"	1.5"
1.5 HP	2 HP	145TC	284	175	89	133	127	140	127	120	8.7	356	98	38
			11.18"	6.89"	3.5"	5.25"	5"	5.5"	5"	4.72"	0.34"	14"	3.86"	1.5"
2 HP	3 HP	182TC	284	175	89	133	127	140	127	120	8.7	356	98	38
			11.18"	6.89"	3.5"	5.25"	5"	5.5"	5"	4.72"	0.34"	14"	3.86"	1.5"
3 HP	5 HP	184TC	340	221	114	149	114	191	108	169	10.3	356	98	38
			13.39"	8.7"	4.5"	5.87"	4.5"	7.5"	4.25"	6.65"	0.41"	14"	3.86"	1.5"
5 HP	7.5 HP	184TC	354	221	114	149	114	191	108	169	10.3	356	98	38
			13.94"	8.7"	4.5"	5.87"	4.5"	7.5"	4.25"	6.65"	0.41"	14"	3.86"	1.5"
7.5 HP	10 HP	213TC	423	221	114	149	140	191	108	169	10.3	356	98	38
			16.65"	8.7"	4.5"	5.87"	5.5"	7.5"	4.25"	6.65"	0.41"	14"	3.86"	1.5"
10 HP	15 HP	215TC	403	260	133	187	140	216	108	169	10.3	356	98	38
			15.87"	10.25"	5.25"	7.38"	5.5"	8.5"	4.25"	6.65"	0.41"	14"	3.86"	1.5"
15 HP	20 HP	254TC	416	260	133	187	178	216	108	169	10.3	356	98	38
			16.38"	10.25"	5.25"	7.38"	7"	8.5"	4.25"	6.65"	0.41"	14"	3.86"	1.5"
20 HP	25 HP	256TC	515	260	133	187	178	216	108	169	10.3	356	98	38
			20.28"	10.25"	5.25"	7.38"	7"	8.5"	4.25"	6.65"	0.41"	14"	3.86"	1.5"
25 HP	30 HP	284TSC	499	327	159	244	210	254	102	169	13.5	406	98	38
			19.65"	12.87"	6.25"	9.63"	8.25"	10"	4"	6.65"	0.53"	16"	3.86"	1.5"
30 HP	40 HP	286TSC	499	327	159	244	254	254	102	169	13.5	406	98	38
			19.65"	12.87"	6.25"	9.63"	10"	10"	4"	6.65"	0.53"	16"	3.86"	1.5"
40 HP	50 HP	324TSC	499	327	159	244	254	254	102	169	13.5	406	98	38
			19.65"	12.87"	6.25"	9.63"	10"	10"	4"	6.65"	0.53"	16"	3.86"	1.5"
50 HP	60 HP	326TC	588	371	178	333	241	279	121	179	13.5	445	118	45
			23.15"	14.63"	7"	13.13"	9.5"	11"	4.75"	7.05"	0.53"	17.5"	4.63"	1.75"
60 HP	75 HP	364TSC	588	371	178	333	241	279	121	179	13.5	445	118	45
			23.15"	14.63"	7"	13.13"	9.5"	11"	4.75"	7.05"	0.53"	17.5"	4.63"	1.75"
75 HP		365TSC	588	371	178	333	279	279	121	179	13.5	445	118	45
			23.15"	14.63"	7"	13.13"	11"	11"	4.75"	7.05"	0.53"	17.5"	4.63"	1.75"
		366TSC	636	419	203	359	267	318	121	179	16.7	470	118	45
			25.04"	16.5"	8"	14.13"	10.5"	12.5"	4.75"	7.05"	0.66"	18.5"	4.63"	1.75"
		367TSC	636	419	203	359	305	318	121	179	16.7	470	118	45
			25.04"	16.5"	8"	14.13"	12"	12.5"	4.75"	7.05"	0.66"	18.5"	4.63"	1.75"
		368TSC	685	470	229	383	286	356	89	209	16.7	508	127	45
			26.97"	18.5"	9.02"	15.08"	11.26"	14.02"	3.5"	8.23"	0.66"	20"	5"	1.75"
		369TSC	685	470	229	383	286	356	89	209	16.7	508	127	45
			26.97"	18.5"	9.02"	15.08"	12.24"	14.02"	3.5"	8.23"	0.66"	20"	5"	1.75"
		370TSC	685	470	229	383	311	356	89	209	16.7	508	127	45
			26.97"	18.5"	9.02"	15.08"	12.24"	14.02"	3.5"	8.23"	0.66"	20"	5"	1.75"
		371TSC	685	470	229	383	311	356	89	209	16.7	508	127	45
			26.97"	18.5"	9.02"	15.08"	12.24"	14.02"	3.5"	8.23"	0.66"	20"	5"	1.75"

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# FZX Series Pump Dimensional Drawing



MOTOR HP	MOTOR FRAME	DIMENSIONS IN MILLIMETERS (INCHES)												
		A	ØB	C	D	E	F	ØG	H	J	K	L	M	N
1750 RPM		354 (13.92")	Ø178 (Ø7.01")	101.6 (4.00")	73 (2.87")	102 (4.00")	343 (13.50")	Ø10.5 (Ø.41")	145 (5.71")	88.1 (3.47")	139.7 (5.50")	98.5 (3.88")	38 (1.50")	120 (4.72")
2 HP	143TC	354 (13.92")	Ø178 (Ø7.01")	101.6 (4.00")	73 (2.87")	102 (4.00")	343 (13.50")	Ø10.5 (Ø.41")	145 (5.71")	88.1 (3.47")	139.7 (5.50")	98.5 (3.88")	38 (1.50")	120 (4.72")
3 HP	182TC	354 (13.92")	Ø183 (Ø7.19")	114 (4.50")	73 (2.87")	102 (4.00")	343 (13.50")	Ø10.5 (Ø.41")	149 (5.87")	114 (4.50")	191 (7.50")	98.5 (3.88")	38 (1.50")	120 (4.72")
5 HP	184TC	361 (14.20")	Ø226 (Ø8.92")	140 (5.50")	73 (2.87")	102 (4.00")	343 (13.50")	Ø10.5 (Ø.41")	149 (5.87")	114 (4.50")	191 (7.50")	98.5 (3.88")	38 (1.50")	120 (4.72")
7.5 HP	213TC	383 (15.10")	Ø263 (Ø10.34")	140 (5.50")	89 (3.50")	102 (4.00")	343 (13.50")	Ø10.5 (Ø.41")	187 (7.37")	133 (5.25")	216 (8.50")	98.5 (3.88")	38 (1.50")	120 (4.72")
10 HP	215TC	398 (15.65")	Ø263 (Ø10.34")	178 (7.00")	89 (3.50")	102 (4.00")	343 (13.50")	Ø10.5 (Ø.41")	187 (7.37")	133 (5.25")	216 (8.50")	98.5 (3.88")	38 (1.50")	120 (4.72")
15 HP	254TC	496 (19.56")	Ø270 (Ø10.62")	210 (8.25")	108 (4.25")	67 (2.63")	343 (13.50")	Ø13.5 (Ø.53")	244 (9.62")	159 (6.25")	254 (10.00")	98.5 (3.88")	38 (1.50")	120 (4.72")
20 HP	256TC	487 (19.16")	Ø336 (Ø13.25")	254 (10.00")	108 (4.25")	95 (3.75")	394 (15.50")	Ø13.5 (Ø.53")	244 (9.62")	159 (6.25")	254 (10.00")	98.5 (3.88")	38 (1.50")	120 (4.72")
40 HP	324TC	636 (25.03")	Ø413 (Ø16.25")	260 (10.25")	133 (5.25")	121 (4.75")	470 (18.50")	Ø16.7 (Ø.66")	359 (14.12")	203 (8.00")	318 (12.50")	117 (4.62")	44.5 (1.75")	171 (6.73")
50 HP	326TC	636 (25.03")	Ø413 (Ø16.25")	305 (12.00")	133 (5.25")	121 (4.75")	470 (18.50")	Ø16.7 (Ø.66")	359 (14.12")	203 (8.00")	318 (12.50")	117 (4.62")	44.5 (1.75")	171 (6.73")
60 HP	364TC	685 (26.96")	Ø467 (Ø18.38")	286 (11.25")	149 (5.87")	89 (3.50")	508 (20.00")	Ø16.7 (Ø.66")	383 (15.06")	229 (9.00")	356 (14.00")	127 (5.00")	44.5 (1.75")	171 (6.73")
75 HP	365TC	685 (26.96")	Ø467 (Ø18.38")	311 (12.25")	149 (5.87")	89 (3.50")	508 (20.00")	Ø16.7 (Ø.66")	383 (15.06")	229 (9.00")	356 (14.00")	127 (5.00")	44.5 (1.75")	171 (6.73")

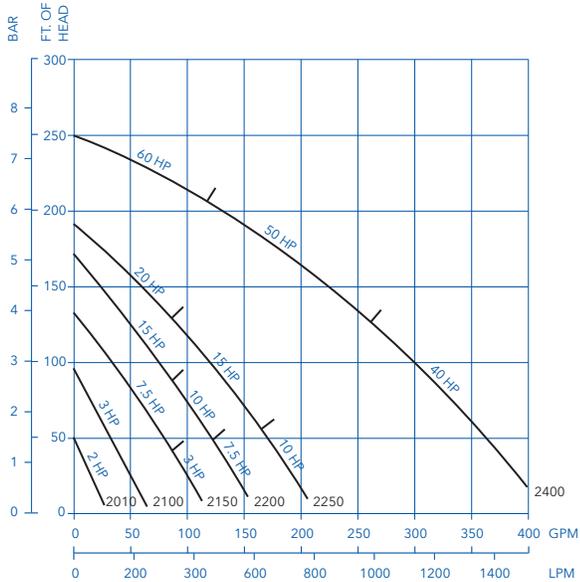
PUMP MODEL	INLET & OUTLET	DIMENSIONS IN MILLIMETERS (INCHES)								
		P	Q	ØR	S	T	V	W	X	Y
2010	1.5"	49.5 (1.95")	114.7 (4.52")	167.2 (6.58")	6.9 (.27")	105.8 (4.17")	25.6 (1.01")	69.6 (2.74")	—	—
2100/2150	2"	133.5 (5.26")	141 (5.56")	226 (8.90")	21 (.83")	110 (4.33")	30 (1.18")	62.5 (2.46")	94 (3.70")	131.5 (5.18")
2200	2"	126.9 (5.00")	136.5 (5.37")	260 (10.24")	30 (1.18")	110 (4.33")	35 (1.38")	70 (2.75")	93 (3.66")	151 (5.94")
2250	2.5"	137.5 (5.41")	141 (5.56")	275 (10.83")	25 (.98")	117 (4.61")	37.2 (1.46")	75.5 (2.97")	100 (3.94")	153 (6.02")
2400	3"	158.2 (6.23")	164.2 (6.46")	340 (13.39")	29 (1.14")	151 (5.93")	49 (1.93")	96.6 (3.80")	110 (4.33")	186.5 (7.34")

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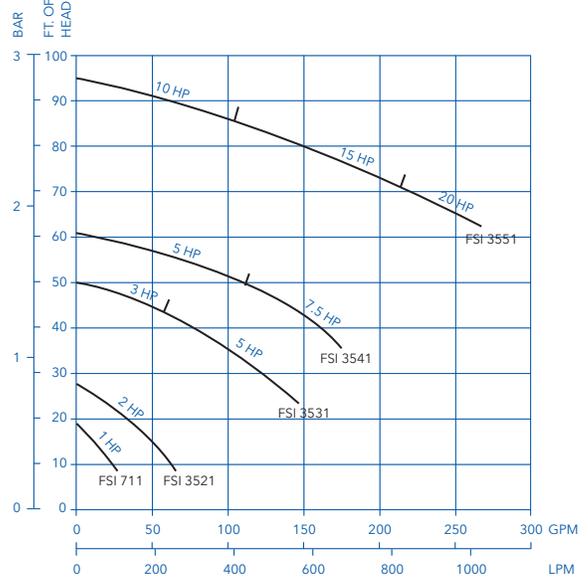
# Composite Performance Curves



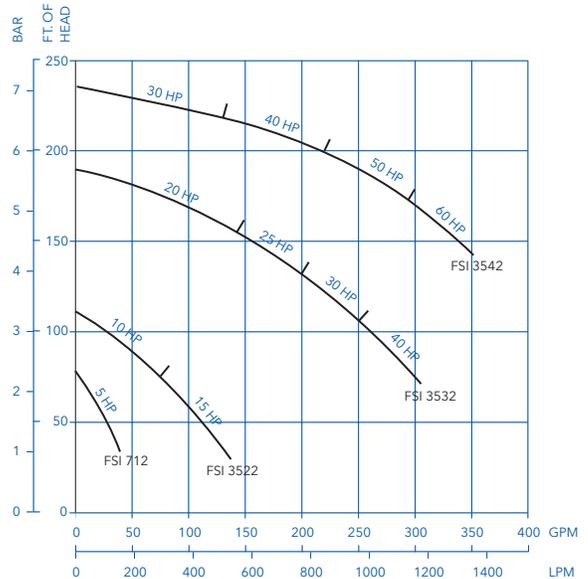
FRISTAM LIQUID RING PUMPS  
FZX 1750 RPM



FRISTAM SHEAR PUMPS  
FSI 1750 RPM



FSI 3500 RPM





**Designed, Manufactured &  
Assembled in Middleton, WI**





CENTRIFUGAL



POSITIVE DISPLACEMENT



MIXING & BLENDING