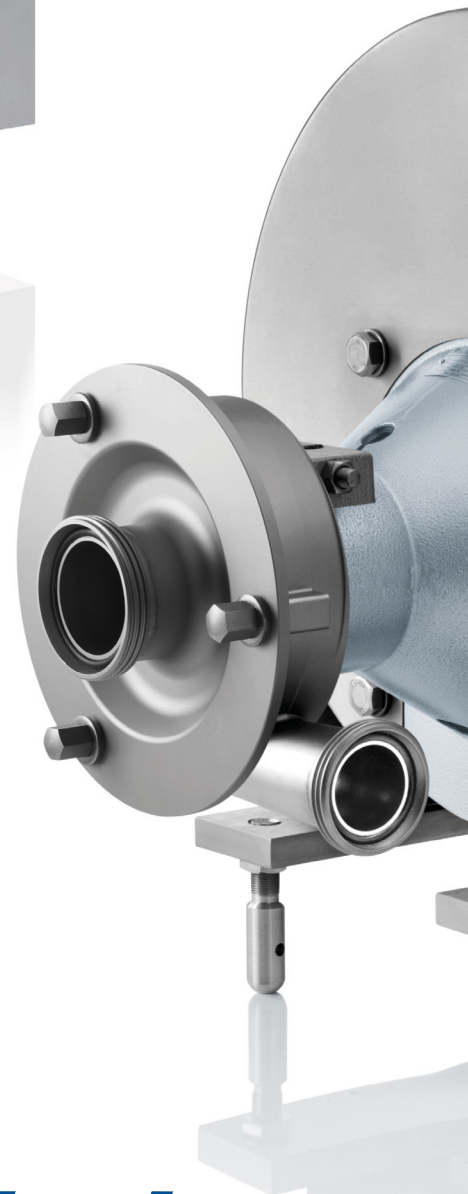
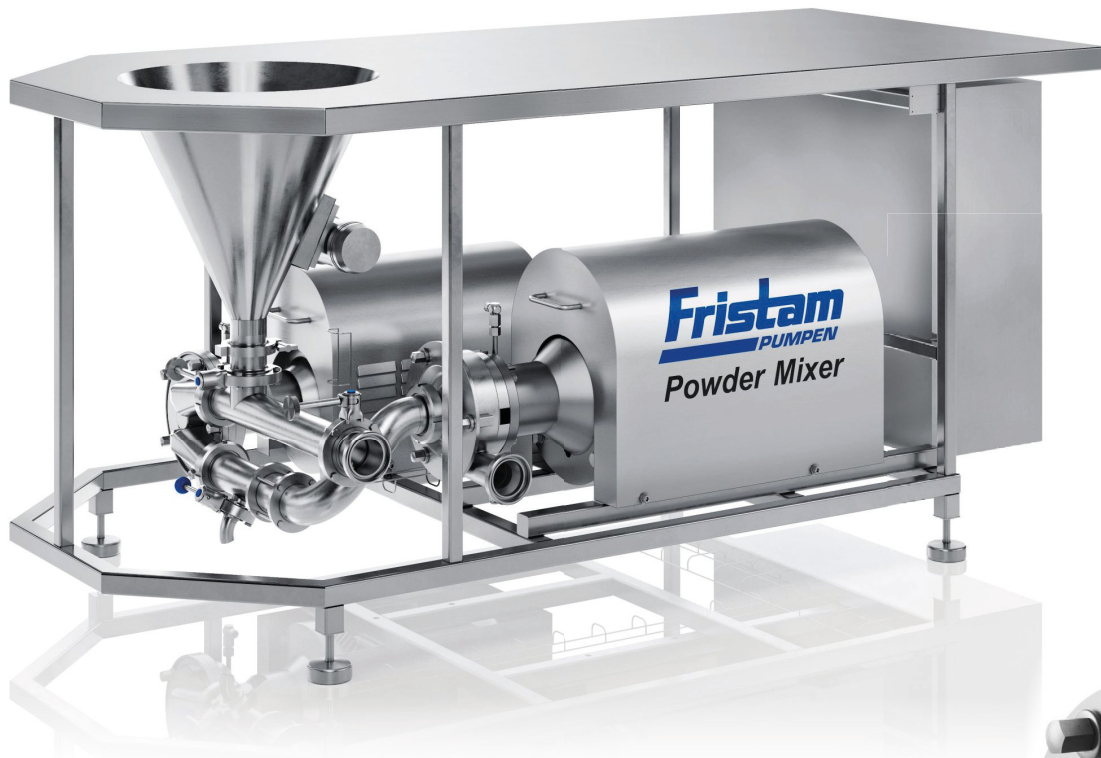


Fristam shear pumps FSP
Powder mixers PM, PM-V, PM-D



Fristam
PUMPEN

Fristam shear pumps FSP

Extraordinary rotational homogenisers for producing perfect blends of consistent quality. Hygienic, effective, robust and highly economical. Fristam shear pumps achieve incomparably homogenous products, reducing raw material input while considerably shortening processing times.

EXCEPTIONAL PRODUCT TEXTURE
Fristam's FSP series enable you to blend multiphase products efficiently, producing inseparable emulsions and absolutely homogenous end products. They prevent lumps and agglomerates in conveyed goods and achieve consistent, repeatable results.

Our shear pumps' design (with enforced passage) ensures complete homogenisation of every batch. Compared to conventional dissolving processes in large tanks or boilers, the use of Fristam's FSP cuts processing times significantly and provides for considerable savings of raw materials.

PERFECT VISCOSITY
The consistency and texture of sheared goods can be varied by combining an FSP with a frequency convertor. This results in better, more stable and significantly smoother end products.

SPECIFIC CONSTRUCTION
Fristam shear pumps were developed

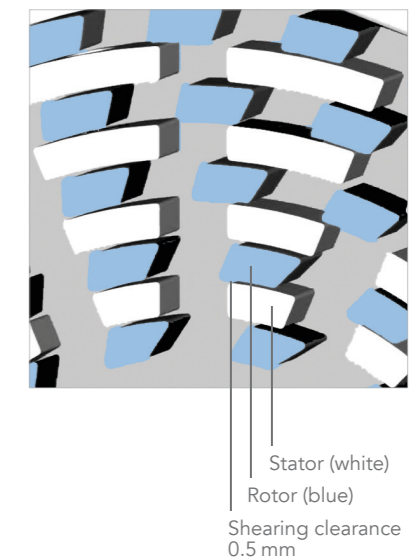
based on our proven centrifugal pumps of the FP series. In place of their impeller, a rotor-and-stator system draws inhomogeneous products through shearing clearances of just 0.5 mm at tip speeds of up to 38 m/s (see figure).

As a result of extremely high flow rates, turbulences and the high shear rates multiphase products are blended with supreme efficiency.

All standard shaft seals from the Fristam range of pumps can be used in the FSP.

CUSTOMISED PERFORMANCE
Each FSP can be fitted with a specific combination of rotor and stator. Both are specifically attuned to the transported product, ensuring that just the right amount of shearing energy is applied.

All Fristam series FSP shear pumps are suitable for various batch sizes and are fully SIP and CIP capable.



SERVICE, ADVICE AND TESTING
As applications vary in type and complexity, we offer process-oriented advice regarding customised solutions ranging from single units to large in-line installations. In addition we provide shear pumps for test runs.



TECHNICAL DETAILS OF THE FSP SERIES

- 5 basic sizes
- Rotor Ø from 124 to 250 mm
- Shear rates up to 125,000 1/s
- Revolution speed up to 5,800 rpm
- Viscosities up to 100,000 mPa s

SPECIFICS	FSP 710	FSP 3520 - 3550
Rotor diameter	124 mm	3522: 145 mm 3532: 175 mm 3542: 200 mm 3552: 250 mm
Motor output	2.2 kW - 11.0 kW	3.0 kW - 90.0 kW
Revolution speed 50 Hz / 60 Hz	1,450 - 3,500 rpm	1,450 - 3,500 rpm
Shearing clearance	0.5 mm	0.5 mm

MATERIALS

Standard:

Stainless steel, cast or forged,
CrNiMo, No. 1.4404 (316L)

Options:

Titanium
Hastelloy C
Other precision casting materials
e. g. materials with a delta-ferrite
content of down to less than 0.5%

PRODUCT WETTED SURFACES

Blasted
Ground
Polished or electropolished
Hardened and / or coated

MOTORS

Three-phase motors IP 55 / IP 56

Options:

Frequency controlled
With higher protection level
Ex protection
Special voltages and frequencies
Single-phase AC motors
Geared motors

CONNECTION TYPES

Threads according to DIN 11851,
DIN 11864, SMS, RJT, etc.
Flanges, clamps

SPECIAL DESIGNS

Various combinations of rotor / stator
Heating or cooling jackets
Drain ports
Carriers



Fristam powder mixer

The solution to almost any problem when mixing powders and liquids – for perfectly smooth consistency, even for the highest viscosities.

Hygienic, effective, powerful, easy to handle and highly economical. Fristam's powder mixer is the universal solution for dissolving, emulsifying and homogenising wet and dry ingredients into fluids or viscous products.

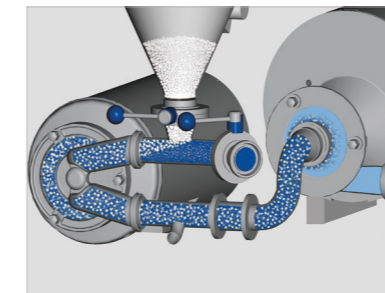


SPECIFIC CONSTRUCTION

Fristam's powder mixer was designed as a 'use anywhere' powder feeding and mixing station.

It is an ergonomic combination of Fristam's self-priming centrifugal pump series FZ with the shear pump series FSP.

The powder is drawn from a funnel directly into the fluid product stream. Passing through the shear pump, this premix is fully homogenised.



In its standard configuration a powder mixer has a compact design consisting of a tube frame on mounting feet or wheels, a funnel, table, manual disc valves and connecting pipes. The table top at an ergonomic level provides for easy manual feeding.

All Fristam powder mixers are fully CIP and SIP capable.

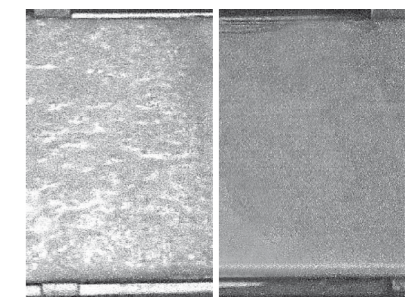
PERFECT ADAPTABILITY

Fristam powder mixers are perfectly suited for a wide range of applications – no matter if low or high viscosities.



For low viscous media an FZ self-priming centrifugal pump is used as feeding pump (powder mixer type PM), whereas for higher and highest viscosities, positive displacement pumps of the FL3 series (powder mixer type PM-V) or double-screw pumps of the FDS series (powder mixer type PM-D) are utilised.

The comprehensive Fristam pump range allows for utmost flexibility.



CUSTOMISED OPERATION

Fristam powder mixers are available as mobile and stationary units. If equipped with corresponding control systems, they can also easily be integrated into fully automated systems.

Fristam also offers adapters for fully or semiautomatic feeding via big-bags, screw conveyors and other conveyor systems.

CONSULTING AND TRIALS

Our specialists provide extensive process guidance. In addition, we offer powder mixers as rental units for onsite trials.

TECHNICAL DETAILS OF THE POWDER MIXERS

3 different types:

- PM with self-priming pump FZ
- PM-V with FL lobe pump
- PM-D with double-screw pump FDS

4 or 5 sizes per type



Fristam powder mixer type PM

Size	Centrifugal Pump		Shear Pump / Rot. Homogeniser		Dimensions approx. LxWxH [mm]	Connections DIN 11851	Weight approx. [kg]
	Type	Motor Power [kW]	Type	Motor Power [kW]			
PM 01	FZ 15	2.2 – 4.0	FSP 712	4.4 – 5.5	1,200 × 1,000 × 800	DN 40	250
PM 02	FZ 17	4.0 – 5.5	FSP 3522	4.0 – 11.0	1,700 × 1,000 × 800	DN 50	300
PM 03	FZ 20	5.5 – 11.0	FSP 3532	7.5 – 18.5	1,700 × 1,000 × 900	DN 50	350
PM 04	FZ 22	11.0 – 15.0	FSP 3542	15.0 – 30.0	2,050 × 1,000 × 1,050	DN 65	450
PM 05	FZ 25	15.0 – 18.5	FSP 3552	22.0 – 45.0	2,050 × 1,000 × 1,050	DN 80	620

Fristam powder mixer type PM-V

Size	Positive Displacement Pump		Shear Pump / Rot. Homogeniser		Dimensions approx. LxWxH [mm]	Connections DIN 11851	Weight approx. [kg]
	Type	Motor Power [kW]	Type	Motor Power [kW]			
PM-V 01	FL2 75 L3	2.2 – 4.0	FSP 712	5.5 – 7.5	1,800 × 1,000 × 900	DN 40	300
PM-V 02	FL2 75 L3	4.0 – 5.5	FSP 3522	7.5 – 11.0	1,800 × 1,000 × 900	DN 50	350
PM-V 03	FL2 75 L3	5.5 – 7.5	FSP 3532	11.0 – 22.0	2,000 × 1,100 × 1,000	DN 50	400
PM-V 04	FL2 100 L3	5.5 – 7.5	FSP 3542	22.0 – 37.0	2,000 × 1,200 × 1,000	DN 80	550
PM-V 05	FL2 100 L3	7.5 – 11.0	FSP 3552	37.0 – 75.0	2,000 × 1,200 × 1,000	DN 100	720

Fristam powder mixer type PM-D

Size	Double-Screw Pump		Shear Pump / Rot. Homogeniser		Dimensions approx. LxWxH [mm]	Connections DIN 11851	Weight approx. [kg]
	Type	Motor Power [kW]	Type	Motor Power [kW]			
PM-D 01	FDS 1	1.1 – 5.5	FSP 712	2.2 – 7.5	1,500 × 900 × 900	DN 50	Depending on type and size of motor
PM-D 02	FDS1/FDS 2	3.0 – 7.5	FSP 3522	4.0 – 11.0	2,000 × 1,000 × 1,000	DN 65	
PM-D 03	FDS2/FDS 3	5.5 – 15.0	FSP 3532	11.0 – 30.0	2,200 × 1,200 × 1,150	DN 80	
PM-D 04	FDS3/FDS 4	11.0 – 37.0	FSP 3542	15.0 – 30.0	2,200 × 1,200 × 1,150	DN 100	

Fristam side channel centrifugal pump series FZ



Fristam shear pump series FSP



POWDER INTAKE CAPACITIES

- Powder intake and homogenisation in one step
- Intake capacity of up to 10 tonnes per hour

Fristam powder mixer type PM

Size	Refined sugar or salt [kg/h]	Skim milk powder or protein powder [kg/h]	Thickening agents (e.g. pectin, guar gum) [kg/h]	Recommended minimum diameter of connected piping [mm]
PM 01	500	450	100 – 200	40
PM 02	1,800	1,600	300 – 500	50
PM 03	3,500	3,200	600 – 1,200	50 – 65
PM 04	5,000	4,500	1,200 – 2,000	65 – 80
PM 05	10,000	9,000	1,500 – 3,000	100 – 125

Fristam powder mixer type PM-V

Size	Refined sugar or salt [kg/h]	Skim milk powder or protein powder [kg/h]	Thickening agents (e.g. pectin, guar gum) [kg/h]	Recommended minimum diameter of connected piping [mm]
PM-V 01	500	450	100 – 200	40
PM-V 02	1,800	1,600	300 – 500	50
PM-V 03	3,500	3,200	600 – 1,200	50 – 65
PM-V 04	5,000	4,500	1,200 – 2,000	65 – 80
PM-V 05	10,000	9,000	1,500 – 3,000	100 – 125

Fristam powder mixer type PM-D

Size	Refined sugar or salt [kg/h]	Skim milk powder or protein powder [kg/h]	Thickening agents (e.g. pectin, guar gum) [kg/h]	Recommended minimum diameter of connected piping [mm]
PM-D 01	500	450	100 – 200	40
PM-D 02	1,800	1,600	300 – 500	50
PM-D 03	3,500	3,200	600 – 1,200	50 – 65
PM-D 04	5,000	4,500	1,200 – 2,000	65 – 80

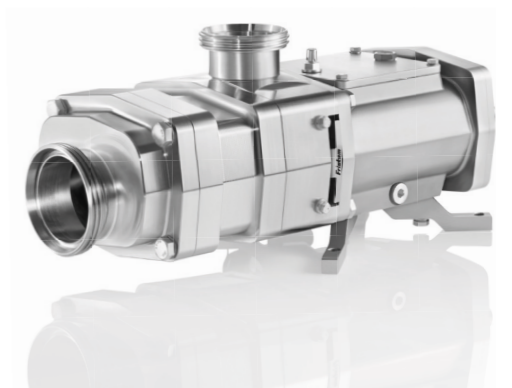
Please note:

All values for intake capacities depend on concentration (°Bx), temperature and viscosity of the finished product, as well as on the diameter and length of the pipeline.

Fristam rotary lobe pump series FL3



Double-screw pump series FDS



Only the best mixers for the best products: ideal solutions for all applications

Around the globe, Fristam shear pumps and powder mixers are used by leading companies in 'food and beverage', pharmaceutical and chemical industries. The exceptional quality of construction and manufacturing makes our rotational homogenisers ideal for blending and dispersing in any industrial process.

PRODUCT GROUPS

Alcoholic beverages: liqueurs, wine, champagne, distiller's wash, spirits, alcoholic solutions

Biotechnology: cell suspensions, nutritive solutions, enzymes

Brewing: mash, yeast, beer, hot and cold wort, waste beer

Chemicals: inks, dyes, detergents, cleaning agents, photographic emulsions, waste water

Dairy products: butter, yoghurt, cream, skimmed milk, milk concentrate, set milk, whey, whey concentrate, raw milk, cream cheese

Foods: sauces, soups, flavourings, broth, vinegar, fruit and vegetable juices and purees, mayonnaise, oils and fats, whole egg, brine, dough

Non-alcoholic beverages: syrup, concentrates, fruit juices, mineral water, sodas and mixed drinks containing CO₂, concentrates with fruit pulp

Paper and cellulose: glues, starch, resin and kaolin solutions

Pharmaceuticals: infusion solutions, lotions, plant extracts, perfumes, suspensions, tooth paste, ethanol, enzymes, culture mediums, toxic and alcoholic solutions, special pastes

Sugar and confectionery: chocolate, liquid sugar, molasses as well as starch solutions

Examples of Fristam shear pumps and powder mixers in action

The Fristam series FSP and PM enable you to produce homogenised finished products of superior quality in a single production step. In addition, both shear pump and powder mixer are great for the final treatment of goods from other production processes, bringing their consistency to perfection.

DAIRY INDUSTRY

Dissolving and homogenising stabilisers such as gelatine, pectin, carrageen, xanthan gum, guar flour, carob gum etc. in fermented milk products

Dissolving sugar, milk-, whey-, yoghurt-, cream- or protein powder

Recombining milk with skim-milk powder, water, butterfat or vegetable oil

Producing shakes with whey, soymilk or milk, ice cream, etc.

Dissolving concentrated milk protein, oil or fat in milk, in order to raise protein or fat levels in the production of cheese

FOOD INDUSTRY

Dissolving yeast extract for health products

Dissolving protein powder, thickeners and stabilisers

Dissolving starch, salt, sugar, etc. (in the production of additives, eg. for

tomato ketchup and sauces)

Dissolving Aspartame and other sugar substitutes

Producing toffee cream from sugar, glucose, carrageen and fat

Dissolving aromas and citric acid

Dissolving spray-dried protein powder in the production of baked goods

Dissolving wheat and rye flour or shred in the production of sourdough, breakfast cereals or baking mixes

Dissolving pectin, carboxymethyl cellulose (CMC), Carbopol, arabic gum and other thickeners such as carob gum, guar flour, and xanthan gum

BEVERAGE INDUSTRY

Dissolving sugar, minerals, pectin, xanthan, aromas, citric acid, bentonite etc.

Dissolving dry yeast in the production of beer

Dissolving sugar in alcohol

CHEMICAL INDUSTRY

Dissolving powders in liquids such as Polytetrafluoroethylene (PTFE), and additives in lubricants

Dissolving minerals such as calcium carbonate, carboxymethyl cellulose (CMC), bentonite, layered silicate when producing drilling emulsions

Dissolving micro-capsule powders and fillers such as zeolite and aluminium hydroxide in the production of polyurethane sheets

PHARMACEUTICAL AND BEAUTY CARE INDUSTRIES

Dissolving saline eg. for isotonic solutions suitable for injection

Dissolving phosphate and iodine powder in the production of disinfectant ointments

Dissolving emulsifiers and additives in the production of creams and lotions





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