

# Fristam shear pumps FSP powder mixers PM, PMV



**Fristam**  
PUMPS



Fristam shear pump series FSP

# 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 converter. 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 0.5mm at tip speeds of up to 38m/s (see figure).

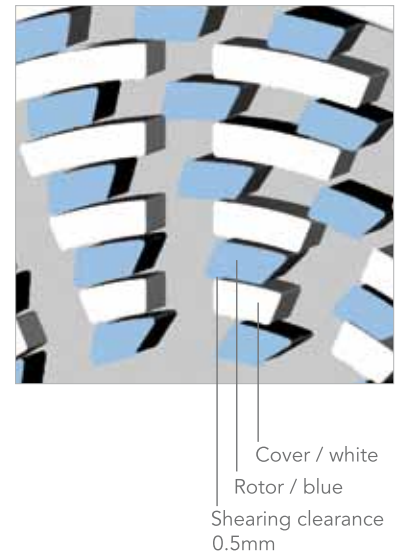
As a result of extremely high flow rates, turbulences and the high shear rates multiphase products are blended with supreme efficiency.

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/cover plate. 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 application possibilities 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 130 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                            | FSPE 710          | FSPE 3520 - 3550   |
|--------------------------------------|-------------------|--|
| Rotor diameter .....                 | 124 mm (130 mm)   | 3522: 145 mm<br>3532: 175 mm<br>3542: 200 mm<br>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

### STEEL GRADE

Standard:

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

Options:

Titanium

Hastelloy C

Other precision casting materials  
eg. materials with a delta-ferrite  
content of up to 0.5 %

### SURFACES TOUCHED BY PRODUCT

Blasted

Ground

Polished or electropolished

Hardened and / or coated

## ENGINES

Three-phase motors IP 55 / IP56

Options:

Frequency controlled

With higher protection system

Ex protection

Special voltages and frequencies

Single-phase a.c. motors

Geared motors

## CONNECTION TYPES

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

Flange

## SPECIAL DESIGNS

Various combinations of rotor and  
cover/stator

Heating or cooling jackets

Discharge nozzles

Carriers



Rotors from the Fristam shear pump series FSP



Fristam powder mixer series PM



# Fristam powder mixer PM

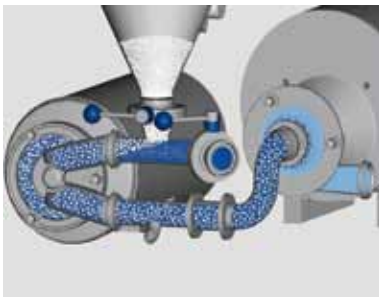
The solution to almost any problem when mixing powders and liquids – for perfectly smooth consistency. Hygienic, effective, sturdy, easy to handle and highly economical. Fristam's powder mixer is the universal solution for dissolving, emulsifying and homogenising wet and dry ingredients into fluids.

## SPECIFIC CONSTRUCTION

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

It is a 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 pre-mix is fully homogenised.



In its standard configuration a powder mixer of the PM series has a compact

design consisting of a tube frame on mounting feet, 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 (series PM) are fully CIP and SIP capable.

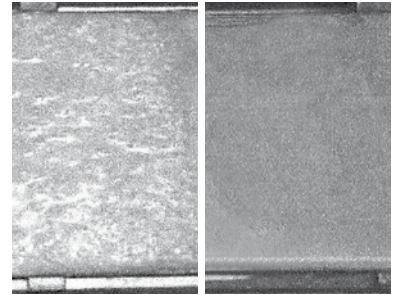
## CUSTOMISED OPERATION

By design all Fristam powder mixers are mobile and highly flexible in their operation. If equipped with specific control systems, they can also easily be integrated with fully automated systems.

We offer adapters for fully- or semi-automatic feeding via big-bags, crew-converters and other conveyer systems.

## ON-SITE TRIALS

In addition to providing extensive process guidance we offer powder mixers for test runs.



Right:  
Casein powder in skim milk is dissolved quickly and perfectly by a Fristam powder mixer.

Left:  
Conventional blend by stirrer, tri-blender or Venturi.



Fristam side channel centrifugal pump series FZ



Fristam shear pump series FSP

# Fristam powder mixer PMV

The perfect solution for mixing powders and liquids into concentrated, 'highly viscuous' pastes. Ultra hygienic, powerful performance, exceptionally high powder intake, mixes at very low product temperatures. Now you can have a consistently homogenous mix in a fraction of the time it used to take – even with high viscosity products.

## SPECIFIC CONSTRUCTION

The Fristam PMV powder mixer is designed for particularly challenging mixing tasks whilst providing maximum food safety.

It is a highly effective combination of a Fristam positive displacement pump series FL3 and an FSP shear pump.

Using the FL3 with its unique helical rotors guarantees excellent suction at particularly low product temperatures.



At the same time, the PMV powder mixer features significantly reduced noise emissions and very low power consumption.



Its design corresponds to the PM series' with a compact layout of a tubular frame on machine mountings, funnel, ergonomic table, manual butterfly valves and connecting piping. All Fristam powder mixers are fully capable of CIP and SIP.

## HIGHLY FLEXIBLE APPLICATION

PMV series powder mixers are suitable for mobile use as well as integration into fully automated systems. They can be adapted for automatic and semi-automatic input using big bags, screw conveyors and other systems.

Left:

The FL3's unique rotors have the shape of an interlocking double helix.

Right:

Impressive results when mixing especially high viscosities.

## TRIALS AND CONSULTATION

We would be happy to advise you on all process-related matters. We can also make a PMV series powder mixer available to you for trial runs.



Fristam rotary lobe pump series FL3



Fristam shear pump series FSP





## TECHNICAL DETAILS OF THE PM SERIES

- 5 different sizes
- Powder intake up to 10 t/h

|       | Self-priming centrifugal pump<br>Fristam FZ |                   | Shear pump<br>rotational homogeniser<br>Fristam FSP |                                       |                                       |
|-------|---|-------------------|---|---------------------------------------|---------------------------------------|
|       | Rev. speed<br>Frequency                     | 1450 rpm<br>50 Hz |   | Rotor / stator<br>combination<br>1011 | Rotor / stator<br>combination<br>1311 |
|       |   |                   |   | 2950 rpm<br>50 Hz                     | 2950 rpm<br>50 Hz                     |
|       | Type  | Performance<br>kW | Type  | Performance<br>kW                     | Performance<br>kW                     |
| PM 01 | FZ 15                                       | 4                 | FSPE 712  | 4                                     | -                                     |
| PM 02 | FZ 17                                       | 5.5               | FSPE 3522   | 5.5                                   | 11                                    |
| PM 03 | FZ 20                                       | 7.5               | FSPE 3532   | 7.5                                   | 15 - 18.5*                            |
| PM 04 | FZ 22                                       | 11 - 15           | FSPE 3542   | 11 - 15                               | 22 - 37*                              |
| PM 05 | FZ 25                                       | 15 - 18.5         | FSPE 3552   | 15 - 18.5                             | 45 - 75*                              |

|       | Refined sugar                                 |   | Skim milk- and<br>protein powder              |   | Thickening powder<br>(eg. pectin-Na-caseinate;<br>depending on type<br>and concentration) |   |
|-------|---|---|---|---|---|---|
|       | max.<br>powder<br>intake<br>through<br>funnel | recomm.<br>min. Ø<br>of pipe-<br>lines in<br>system | max.<br>powder<br>intake<br>through<br>funnel | recomm.<br>min. Ø<br>of pipe-<br>lines in<br>system | max.<br>powder<br>intake<br>through<br>funnel   | recomm.<br>min. Ø<br>of pipe-<br>lines in<br>system |
|       | kg/h  | mm  | kg/h  | mm  | kg/h  | mm  |
| PM 01 | 500   | 40  | 450   | 40  | 100<br>- 200  | 40  |
| PM 02 | 1,800   | 50  | 1,600   | 50  | 300<br>- 500  | 50  |
| PM 03 | 3,500   | 50 - 65   | 3,200   | 50 - 65   | 600<br>- 1,200  | 50 - 65   |
| PM 04 | 5,000   | 65 - 80   | 4,500   | 65 - 80   | 1,200<br>- 2,000  | 65 - 80   |
| PM 05 | 10,000  | 100 - 125   | 9,000   | 100 - 125   | 1,500<br>- 3,000  | 100 - 125   |



Fristam side channel centrifugal pump series FZ

Fristam shearpump series FSP

## TECHNICAL DETAILS OF THE PMV SERIES

- 3 different sizes
- Powder intake up to 10 t/h

|        | Self-priming rotary lobe pump<br>Fristam FL3 |                       | Shear pump rotational homogeniser<br>Fristam FSP |   |   |
|--------|--|-----------------------|--|---|---|
|        |  |                       |  | Rotor / stator combination<br>1311 / 2121 | Rotor / stator combination<br>1311 / 2121 |
|        | Rev. speed<br>Frequency                      | 1450 rpm<br>5 - 50 Hz |  | 1450 rpm<br>50 Hz                         | 2950 rpm<br>50 Hz                         |
|        | Type   | Performance<br>kW     | Type   | Performance<br>kW                         | Performance<br>kW                         |
| PMV 03 | FL3 75                                       | 4 - 5,5               | FSPE 3532  | 7,5                                       | 15 - 18,5*                                |
| PMV 04 | FL3 100                                      | 5,5 - 7,5             | FSPE 3542  | 11 - 15                                   | 22 - 37*                                  |
| PMV 05 | FL3 100                                      | 7,5 - 11              | FSPE 3552  | 15 - 18,5                                 | 45 - 75*                                  |

|        | Refined sugar                     |  | Skim milk- and protein powder     |  | Thickening powder<br>(eg. pectin-Na-caseinate;<br>depending on type and concentration) |  |
|--------|-----------------------------------|--|-----------------------------------|--|--|--|
|        | max. powder intake through funnel | recomm. min. Ø of pipe-lines in system | max. powder intake through funnel | recomm. min. Ø of pipe-lines in system | max. powder intake through funnel  | recomm. min. Ø of pipe-lines in system |
|        | kg/h                              | mm                                     | kg/h                              | mm                                     | kg/h   | mm                                     |
| PMV 03 | - 3.500                           | 50 - 65                                | 3.200                             | 50 - 65                                | 600 - 1.200  | 50 - 65                                |
| PMV 04 | - 5.000                           | 65 - 80                                | 4.500                             | 65 - 80                                | 1.200 - 2.000  | 65 - 80                                |
| PMV 05 | - 10.000                          | 100 - 125                              | 9.000                             | 100 - 125                              | 1.500 - 3.000  | 100 - 125                              |

\*) Depending on concentration (°Bx), temperature and viscosity of the finished product, as well as diameter and length of the pipeline



Fristam rotary lobe pump series FL3



Fristam shear pump series FSP

# 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 CO<sub>2</sub>, 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, eg. polyvinyl pyrrolidone (PVP), Betaisodona, povidon

Dissolving emulsifiers and additives in the production of creams and lotions







Fristam Pumps UK Limited Partnership  
Unit 11 APEX Business Park  
Diplocks Way, Hailsham  
East Sussex BN27 3JU  
United Kingdom

Tel +44 (0)1323 849 849  
Fax +44 (0)1323 849 438  
E-Mail [sales@fristam.co.uk](mailto:sales@fristam.co.uk)

Fristam Pumpen KG (GmbH & Co.)  
Postfach 80 08 80  
21008 Hamburg Germany

Tel +49 (0)40 725 560  
Fax +49 (0)40 725 56 166  
E-Mail [info@fristam.de](mailto:info@fristam.de)

For international contact  
information, please  
visit [www.fristam.de](http://www.fristam.de).