

Operating Instructions for Fristam Powder Mixer

The Fristam Powder Mixer is used to dissolve or suspend powdery or liquid ingredients (e.g. sugar, milk powder, cocoa powder, thickeners, oils and liquid flavourings etc.) in a receiver tank.



Function Principle

The powder mixer consists of two main components:

1. A self-priming centrifugal pump from the Fristam FZ range.
2. The Fristam shear pump from the FSPE 35 range which acts as an inline rotary homogenizer.

The self-priming centrifugal pump draws the basic fluid out of the receiver tank and transfers through a short pipe into the shear pump. When the self-priming centrifugal pump is throttled on the suction side by a butterfly valve, a strong vacuum (up to approx. 0.5 bar) is generated between the pump and the butterfly valve. The feed hopper is located at this point for product intake.

The vacuum draws in the powder or liquid directly into the fluid flow. This un-homogenised mixture is first transferred to the self-priming centrifugal pump where the initial mixing takes place. The premix is then pumped to the shear pump where any remaining lumps are completely eliminated by high turbulence action at peripheral speeds of up to 30 m/s.

CONNECTION OF THE POWDER MIXER TO A FEED TANK

The following connections are provided as standard,
Suction/discharge sides: DIN 11851 (milk thread):

PM01:	FZ 15	FSPE 712	DN40
PM02:	FZ 17	FSPE 3522	DN50
PM03:	FZ 20	FSPE 3532	DN50
PM04:	FZ 22	FSPE 3542	DN65
PM05:	FZ 25	FSPE 3552	DN80

HYDRAULIC CONNECTION

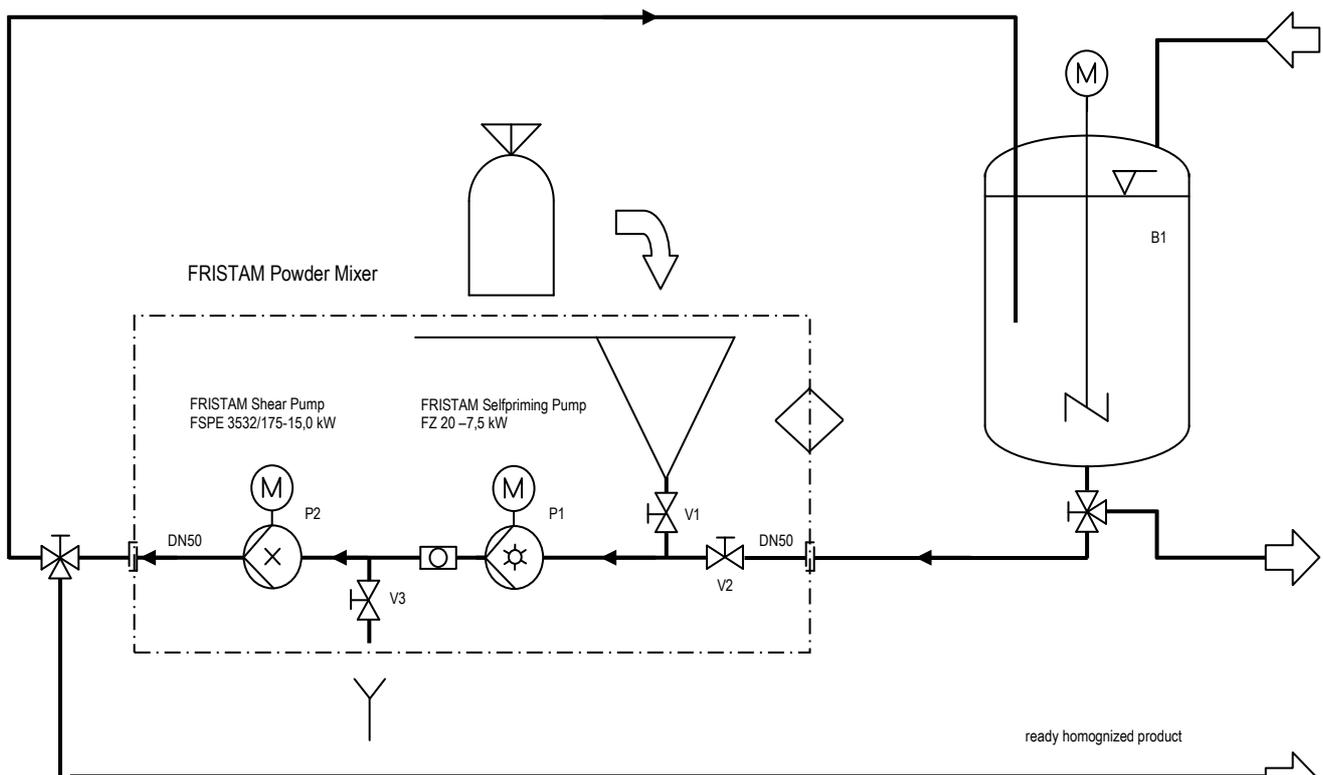
The hydraulic connection will be installed according to machine size, project specifications, customer requirements etc. (see order confirmation).

Suction side:

We recommend that a feed/break tank is used to allow the liquid to free flow into the powder mixing system to avoid excessive inlet pressures. The hydrostatic pressure should be between approx. 0.05 – 0.5 bar (0.5 – 5.0 m static height). Uncontrolled pumps should not be used to feed the suction of the powder mixer, as this will disrupt the suction capability of the system and could force liquid up into the funnel.

Discharge side:

Back pressure from the discharge side of the powder mixer back to the feed tank has to be kept as low as possible. For this reason the pipe I.D. has to be as large as possible and the length of the return pipe as short as possible. The powder mixer in its standard set-up can handle a back pressure of max. 0.5-0.6 bar for an optimal powder suction capacity. That means it might be necessary, if there are heat exchangers, fittings, strainers etc. in the pipe the usage of an additional pump has to be considered.



ELECTRICAL CONNECTION OF POWDER MIXER:

Electrical connection: 1 x 400 V, 32 A or 63 A, CEE-plug acc.to DIN 49 462/63, depending on the execution.

Interpoles are only approved for 32 A CEE-plugs.

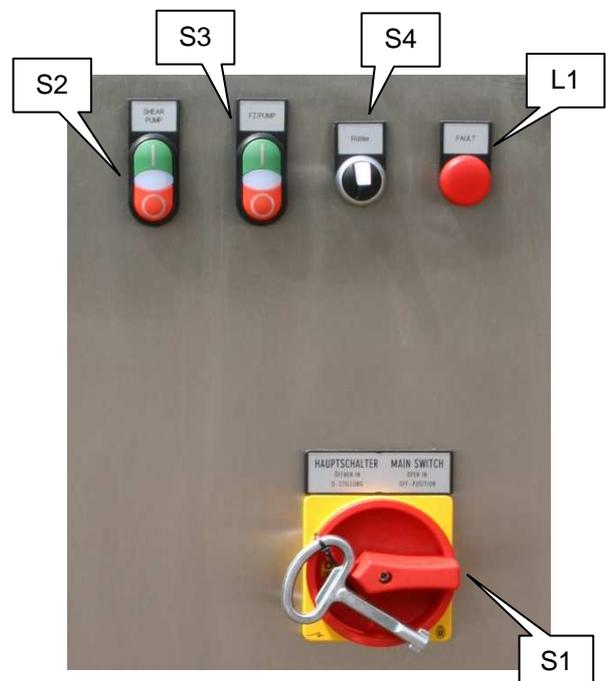
In general a plug-in connection is used – a plug socket with switch and 63A fuse is required.

The motors are poled at the connection to the control cabinet so that they will rotate correctly with a right-handed phase sequence.

The VDE (or locally recognised) regulations must always be observed.

CONTROL SWITCHES:

- S1 Main switch (ON/OFF)
- S2 Switch FZ/PUMP (ON/OFF)
Start/Stop of FZ pump. The switch will light up during Operation.
- S3 Switch Shearpump (ON/OFF)
Start/Stop of FSPE pump. The switch will light up during Operation.
- S4 Switch Vibrator (ON/OFF) Vibrator drive on the funnel. On activation the Vibrator runs in a defined, (adjustable) cycle time (i.e. 8 s on/8 s off)
- L1 Light „FAULT“
Indicates a fault condition



When the Shearpump is driven by a frequency inverter/controller, it is imperative that the suppliers' specific operation manual is adhered to.

PREPARATION FOR OPERATION

Remove packing material and protective film (e.g. from the rollers). Inspect the mixer after it has been unpacked. Remove any foreign material that may be lodged inside the funnel and piping.

Connect the powder mixer to the power supply.

ATTENTION:

Never allow the pumps on the powder mixer to run dry

Check the direction of rotation of both pumps:

Shut butterfly valve V2; shut drain valve V3. Open valve V1 below the hopper. Fill the hopper with water until the piping is filled and the mechanical seals are completely wetted.

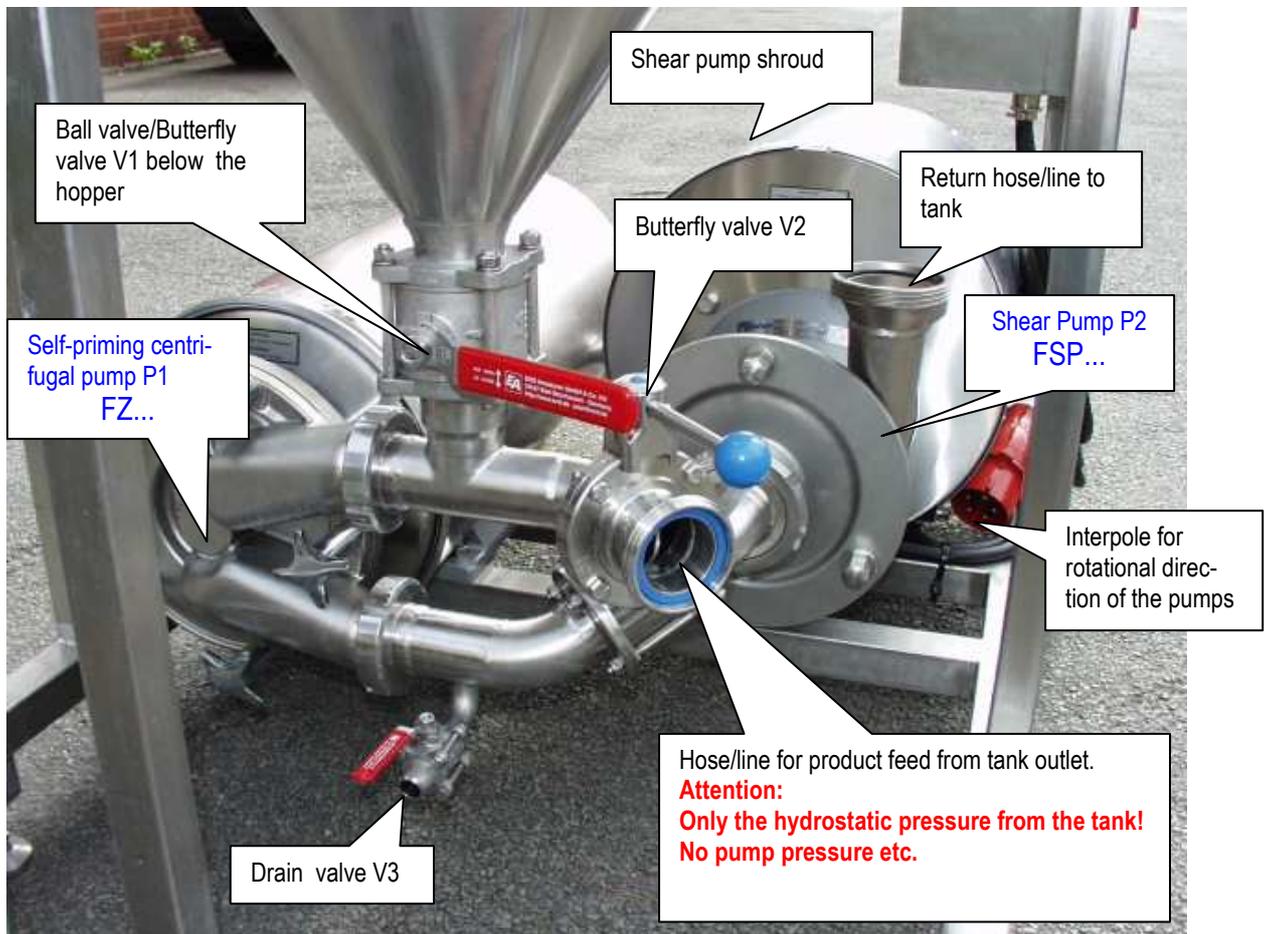
ATTENTION:

Briefly switch the shear pump on and off to check the direction of rotation.

The direction of rotation is checked by looking at the impeller through the discharge connection of the shear pump while the motor is slowing down, or at the motor fan after having removed the shroud.

Viewed from the top of the pump housing, the pumps should run anti-clockwise. If the motors are running the wrong way, change the interpole in the plug (up to 32A).

Connect the powder mixer as shown in the flow chart:



The powder mixer is connected to a tank via the connections described in the picture above. The tank should be **on** the same level as the powder mixer.

CLEANING

Cleaning the pumps via a cleaning tank

1. Put the cleaning agents into connected cleaning tank.
2. Shut drain valve V3. Completely open butterfly valve V2 and the valve at the tank outlet.

ATTENTION:

Pump P1 (FZ) requires a small amount of liquid in the supply line to obtain suction

3. This liquid can also be filled into the hopper.
4. Otherwise wait until the cleaning agent has reached the pump.
5. Check that valve V1 is shut.
6. Switch on both pumps. During the cleaning process the shear pump can be switched off for a time and then on again.
7. The drain valve V3 and the powder dosing valve V1 can be opened carefully for a moment.

Cleaning the pumps via a CIP system.

1. The powder mixer can also be connected to and cleaned via an existing CIP system.
2. If required, the drain valve V3 can be used to quickly de-aerate the system. The drain valve is fitted with a slide valve to prevent accidental switch-over. Before operating the drain valve, shift the slide valve to the side.

ATTENTION:

During CIP cleaning, the control valve V2 must be fully opened and the powder dosing valve V1 and drain valve remain shut.

Emptying

After cleaning, shut the valve at the tank outlet and empty the hose line through the open inlet valve V2 and drain valve V3. Open the powder dosing valve V1.

The filling table and hopper must be cleaned manually according to factory practice. The hopper should be dried thoroughly after cleaning.

After cleaning, connect the mixer to the working tank as described above.

OPERATION

1. Shut drain valve V3.
2. Shut valve V1 below the hopper.

ATTENTION:

Do NOT put any powder into the hopper at this stage.

3. Open the valve at the tank outlet.
4. Fully open control valve V2. The medium should flow from the tank to pump P1. Add a little fluid as required via the hopper to prime the pump.
5. Switch on the pump P1 and circulate the fed liquid (e.g. water, cream, milk etc.). Switch on the shear pump P2.
6. Shut the control valve V2 until pump P2 (shear pump) runs a little more quietly. This means closing the valve by approx. 60% (please try out!). This allows a sufficient partial vacuum to build up below the hopper.
7. Completely open the powder-dosing valve V1 below the hopper and check the suction in the hopper outlet with the back of your hand. The suction must be strong. If the suction is not sufficient, close the control valve V2 further.
8. Completely shut the powder-dosing valve V1 below the hopper.
9. Fill powder into the hopper.
10. Carefully open the powder-dosing valve V1 below the hopper.

ATTENTION:

When working with products that swell, e.g. pectin or carrageen, take great care that the pumps do not get blocked.

11. When the product is running in well, open the valve a little further.
12. Should the suction capacity lessen with the increasing viscosity of product flow, this can be counteracted to a certain extent by opening valve V2 further.
13. As soon as the powder has all been drawn out of the hopper into the product, close the valve V1 below the hopper to prevent air from being sucked into the product.

In the case of shear-sensitive products switch off the shear pump P2 immediately.

If a product is not shear-sensitive, it can remain in circulation for further homogenisation.

ATTENTION:

Always clean the powder mixer after use.

If the pumps are not cleaned, product residues can clog up the mechanical seals and cause damage at the next start-up.

The installation can also become microbiologically contaminated.

Detailed operating instructions are supplied with each pump. Please follow these instructions carefully.

The circuit diagram is in the control cabinet.