Powder mixer and pump in one mobile unit

Alfa Laval Hybrid Powder Mixer M15

Application

The Alfa Laval Hybrid Powder Mixer is a patented hygienic mobile unit that both disperses powders into liquids quickly and efficiently and pumps the resulting solution at outlet pressures of up to ~5 barg, all using a single motor. This versatile, easy-to-use mixer produces homogeneous products at high dry matter concentrations and high productivity.

The mixer is an excellent choice for use in a wide range of dairy, beverage and food powder mixing applications, e.g. for incorporating thickeners and stabilizers like pectin and xanthan and emulsifiers in the concentrations required in most applications. It is also capable of producing recombined milk with more than 50% dry matter.

Design

The Alfa Laval Hybrid Powder Mixer is comprised of a two stage pump with one rotor-stator stage and one pump stage. The unit is fitted with a single motor and a frequency converter. A funnel is used for introduction of powder through an injector system which can be isolated using a hygienic C-Ball valve. The construction is mounted on a stainless steel frame and the liquid inlet is equipped with a sight glass and a butterfly valve.

TECHNICAL DATA

Versions:

ROW version . . . . . (380-480 VAC)

Materials:

Product wetted steel parts: . . . W. 1.4404 (316L) and Duplex steel
Other steel parts: . . . . . W. 1.4301 (304)
Product wetted seals: . . . . . EPDM, PTFE
Other O-rings: . . . . . EPDM
Finish: . . . . . Semi-Bright
Internal surface roughness: . . Pipework acc. to DIN11850 Ra<0.8 µm (Impellers: Blasted/machined)
Shaft seal: . . . . . Single mechanical SiC/SiC, flushed version
Flush tank: . . . . . Approx. 1 ltr. incl. sight glass
Note: Flush through possible via easy connection

Motor:

ROW version (Incl. SS motor shroud): Standard foot-flanged motor with a fixed ball bearing on drive side, according to IEC metric standard, 2 poles = 3000/3600 RPM at 50/60 Hz, enclosure IP55 (with drain hole with labyrinth plug), insulation class F.

Power:

Installed power: . . . . . 18.5 kW

Frequency drive

Type: . . . . . Danfoss VLT® AutomationDrive FC 300 series
Power rating: . . . . . 18.5 kW (Normal overload 110 %/60 s)
Input voltage:
ROW version: . . . . . 380-480 VAC
Mains option: . . . . . Local mains disconnect
Insulation class: IP66
RFI filter:
ROW version: . . . . . Class A1/B
Display: . . . . . Graphical local control panel

Connections:

Liquid inlet connection:
ROW version: . . . . . DIN 11851 DN 50 male union
Liquid outlet connection:
ROW version: . . . . . DIN 11851 DN 40 male union

Control of powder addition:

Manually actuated special C-Ball valve for dry ingredient adding

Other:

Funnel strainer.
Blind cover at powder inlet for use during CIP

OPERATIONAL DATA

Technical data:

Temperature range: . . . . . -10°C to + 95°C
Recommended inlet pressure: . . . . . 0.0 - 0.2 bar
Min. back pressure recommended: . . 1 barg
Dry ingredient capacity: . . . . . Dependent on powder (e.g. 3000 kg/h capacity for skimmed milk powder).
Noise level (at 1 m): . . . . . < 90 dB(A)

Dimensions/weight:

HxWxL [mm]: . . . . . 1130 X 826 X 1340
Weight: . . . . . Approx. 280 kg
Max. table load: . . . . . 300 kg

Benefits

The Alfa Laval Hybrid Powder Mixer provides a lower total cost of ownership of a powder-mixing system by combining powder mixer and pump function in one unit, thereby reducing installation costs. The system also allows the introduction of additional pressure-drop producing equipment downstream of the powder mixer, such as valves, heat exchangers, etc. without the necessity of installing an additional pump for boosting pressure. In addition, the simple design of the system keeps maintenance costs low. Furthermore, for a mixing application in a batch tank, the powder mixer can be configured in combination with an Alfa Laval Rotary Jet Mixer in such a way that the Hybrid Powder Mixer delivers the flow and pressure needed for the Rotary Jet Mixer.

Operation of the Alfa Laval Hybrid Powder Mixer

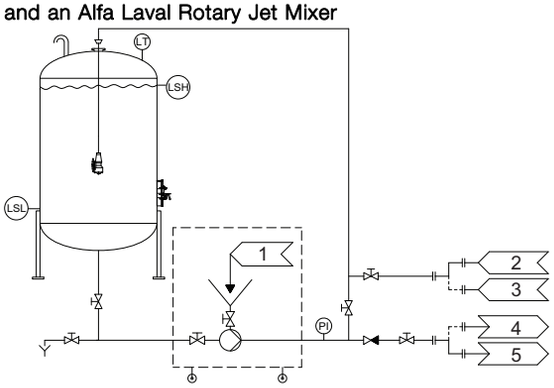
The two-stage in-line Hybrid Powder Mixer is installed in a recirculation loop connected to a batch tank. This user-friendly mobile unit has a built-in table to facilitate handling of heavy bags of powder. The table easily slides into position for convenient placement of the bags during mixing.

After adding liquid ingredients to the tank, the Alfa Laval Hybrid Powder Mixer is used to circulate the liquid over the tank. To provide high-efficiency mixing in tanks with volumes larger than 1 - 2 m³ it is recommended to install an Alfa Laval Rotary Jet Mixer in the tank by connecting it to the end of the circulation pipe.

After powder is introduced in the funnel, the C-Ball valve under the funnel is opened. The valve is the only component that the operator must control during introduction of the powder. The injector positioned under the valve creates an under pressure in the funnel outlet, drawing the powder into the rotor-stator stage of the pump and blending the powder and liquid into a homogeneous mixture. The impeller in the second stage of the pump transfers the powder-liquid mixture back to the tank while part of the powder-liquid mixture is sent through the injector creating the under pressure in the funnel outlet, which enables the suction of the powder into the liquid.

When mixing is complete, the Hybrid Powder Mixer may be used as a discharge pump or, when used with the Alfa Laval Rotary Jet Mixer, as a CIP forward pump – depending on the size of the tank and Rotary Jet Mixer - to clean the tank interior.

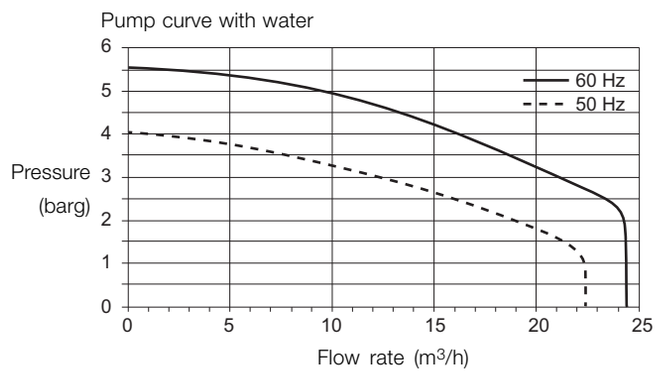
Example of setup with the Alfa Laval Hybrid Powder Mixer and an Alfa Laval Rotary Jet Mixer



NOTE: This diagram is for illustration and guidance only!

1. Powder/Crystals
2. Water/main media
3. CIP-F
4. CIP-R
5. Product

Pump Curve for the Alfa Laval Hybrid Powder Mixer



Powder mixer and pump in one unit

Alfa Laval Hybrid Powder Mixer S15

Application

The stationary Alfa Laval Hybrid Powder Mixer S15 is a patented hygienic unit that both disperses powders into liquids quickly and efficiently and pumps the resulting solution at outlet pressure of up to 5 bar, all using a single motor. This versatile, easy-to-use mixer produces homogeneous products at high dry matter concentrations and high productivity.

The mixer is an excellent choice for use in a wide range of dairy, beverage and food powder mixing applications, e.g. for incorporating thickeners and stabilizers like pectin and xanthan and emulsifiers in the concentrations required in most applications. It is also capable of producing recombined milk with more than 50% dry matter.

Design

The Alfa Laval Hybrid Powder Mixer S15 is comprised of a two stage pump with one rotor-stator stage and one pump stage. The unit is fitted with a single motor and a funnel for introduction of powder through an injector system which can be isolated using a hygienic c-ball valve.

TECHNICAL DATA

ROW version: . . . . . 380-420 D/660-690 Y @ 50 Hz

Materials:

Product wetted steel parts: . . . W. 1.4404 (316L) and Duplex steel
Other steel parts: . . . . . W. 1.4301 (304)
Product wetted seals: . . . . . EPDM, PTFE
Other O-rings: . . . . . EPDM
Finish: . . . . . Semi-Bright
Internal surface roughness: . . Pipework acc. to DIN11850 Ra<0.8 µm (Note: Impellers: Blasted/machined)
(Note: Impellers: . . . . . Blasted/machined)
Shaft seal: . . . . . Single mechanical SiC/SiC, flushed version
Flush tank: . . . . . Approx. 1 ltr. incl. sight glass
Note: Flush through possible via easy connection

Power:

Installed power: . . . . . 15 kW

Frequency drive

The HPM S15 should always be operated by use of a frequency converter.

Connections:

Liquid inlet connection: . . . . . DIN 11851 DN 50 male union
Liquid outlet connection: . . . . DIN 11851 DN 40 male union

OPERATIONAL DATA

Technical data:

Recommended operation frequency 60 Hz (specially for thickeners and stabilizers)
Temperature range: . . . . . -10°C to + 95°C
Recommended inlet pressure: . . . . . 0.0 - 0.2 bar
Min. back pressure recommended: . . 1 barg
Dry ingredient capacity: . . . . . Dependent on powder properties (for example, 3000 kg/h capacity for skimmed milk powder).
Noise level (at 1 m): . . . . . < 90 dB(A)

Dimensions/weight:

HxWxL [mm]: . . . . . 1115 X 580 X 1300
Weight: . . . . . Approx. 230 kg

Motor:

Incl. SS motor shroud: Standard foot-flanged motor with a fixed ball bearing on drive side, according to IEC metric standard, 2 poles = 3000/3600 RPM at 50/60 Hz, enclosure IP55 (with drain hole with labyrinth plug), insulation class F.

Other:

Funnel strainer.
Blind cover at powder inlet for use during CIP

Control of powder addition:

Manually actuated special C-Ball valve for dry ingredient adding

Benefits

The Alfa Laval Hybrid Powder Mixer S15 provides a lower total cost of ownership of a powder-mixing system by combining powder mixer and pump function in one unit, thereby reducing installation costs. The system also allows the introduction of additional pressure-drop producing equipment downstream of the powder mixer, such as valves, heat exchangers, etc. without the necessity of installing an additional pump for boosting pressure. In addition, the simple design of the system keeps maintenance costs low. Furthermore, for a mixing application in a batch tank, the powder mixer can be configured in combination with an Alfa Laval Rotary Jet Mixer in such a way that the Hybrid Powder Mixer delivers the flow and pressure needed for the Rotary Jet Mixer.

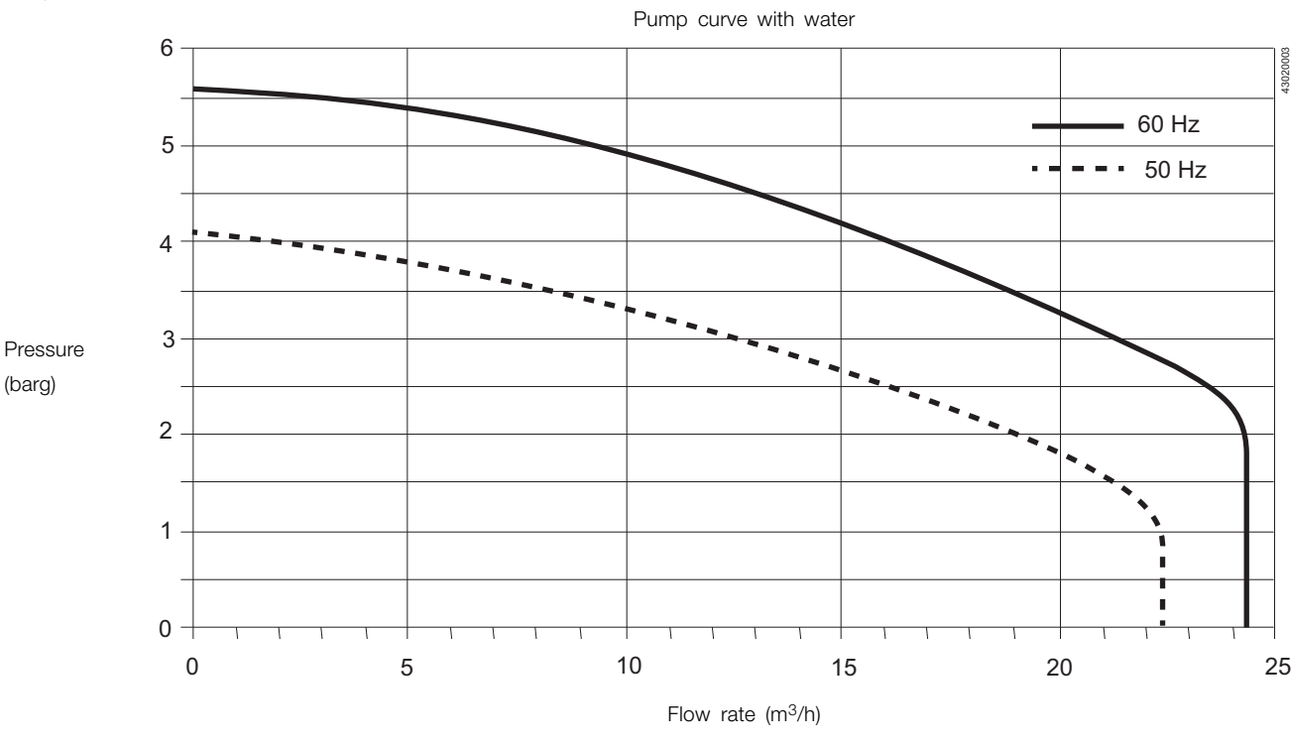
Operation of the Alfa Laval Hybrid Powder Mixer S15

The two-stage inline Hybrid Powder Mixer is installed in a recirculation loop connected to a batch tank. After adding liquid ingredients to the tank, the Alfa Laval Hybrid Powder Mixer S15 is used to circulate the liquid over the tank. To provide high-efficiency mixing in tanks with volumes larger than 1 - 2 m^3 it is recommended to install an Alfa Laval Rotary Jet Mixer in the tank by connecting it to the end of the circulation pipe.

Before powder is added in to the funnel, we have to make sure that no air is in the circulation pipe and a minimum pressure of 1 bar is build up after the HPM. After powder is introduced in the funnel, the C-Ball valve under the funnel is opened. The valve is the only component that the operator must control during introduction of the powder. The injector positioned under the valve creates an under pressure in the funnel outlet, drawing the powder into the rotor-stator stage of the pump and blending the powder and liquid into a homogeneous mixture. The impeller in the second stage of the pump transfers the powder-liquid mixture back to the tank while part of the powder-liquid mixture is sent through the injector creating the under pressure in the funnel outlet, which enables the suction of the powder into the liquid.

When mixing is complete, the Hybrid Powder Mixer may be used as a discharge pump or, when used with the Alfa Laval Rotary Jet Mixer, as a CIP forward pump – depending on the size of the tank and Rotary Jet Mixer - to clean the tank interior.

Pump Curve for the Alfa Laval Hybrid Powder Mixer S15



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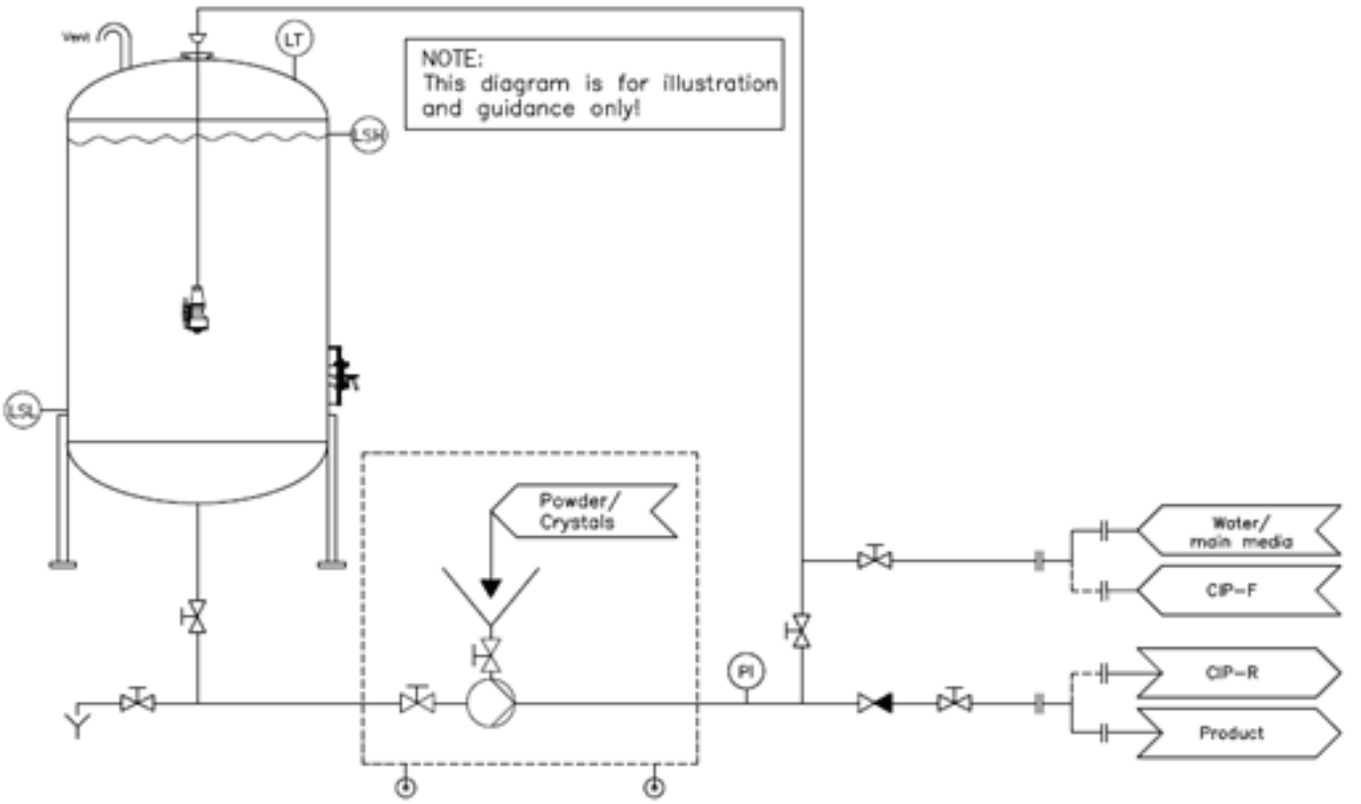
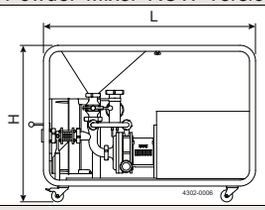
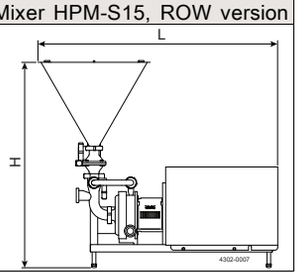
Example of setup with the Alfa Laval Hybrid Powder Mixer S15 and an Alfa Laval Rotary Jet Mixer



Product code: 5521

Item no	PPL EUR	Description	Dimensions (mm) L	W	H	
						Hybrid Powder Mixer ROW version
TE35A000	**55004**	Hybrid Powder Mixer ROW version, Installed power: 18.5 kW, Voltage: 380-480 VAC @ 50 Hz, Inlet: DIN 11851 DN 50 male union, Outlet: DIN 11851 DN 40 male union	1340	826	1130	
						Alfa Laval Hybrid Powder Mixer HPM-S15, ROW version
9614302701	**27222**	Alfa Laval Hybrid Powder Mixer HPM-S15, ROW version Installed powder 15 kW Voltage: 380-420/660-690 VAC Inlet DIN 11851 DN 50 male union, Outlet: DIN 11851 DN 40 male union	1300	580	1115