Mixing and blending technology
Advantages

- Simple but versatile
- Flexibility at low CAPEX
- Large dissolution capacity due to free vortex and square shape
- Fully drainable for improved hygiene and minimum waste
- Direct drive reduces spare parts wear
- Flushed double mechanical shaft seal available in material of customer’s choice, depending on application
- Easy to maintain

Specifications

<table>
<thead>
<tr>
<th>Field of application</th>
<th>Milk, juices, desserts, pulp, purée, fruit fillings and preserves, baby food, dairy products, ketchup, sauces</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>Manual unit designed for batch mixing, inline mixing over one or more hydration tanks, or continuous mixing, with optional integration in fully automated production. Available as standard unit or with a high-shear mixing option</td>
</tr>
<tr>
<td>Standard sizes/capacity</td>
<td>Available with different mixer heads and tank sizes of: 250, 500, 1,000, 2,000 and 3,000 l (65, 130, 260, 530, 800 U.S. g)</td>
</tr>
<tr>
<td>Temperature profile/range</td>
<td>-10 - 110°C (14 - 22 PSI)</td>
</tr>
<tr>
<td>Pressure</td>
<td>0 - 0.5 bar</td>
</tr>
</tbody>
</table>

Mixing

Mixing and blending is an APV core technology. APV offers complete mixing and blending systems, including fluid agitators, batch and continuous mixers to blenders, for the processed food, beverage, dairy, healthcare, oil, chemical and water treatment industries. The Flex-Mix family includes a range of various mixers as presented below.

Mixing of liquid/liquid, liquid/powder and liquid/particulates

Stirring, mixing, and blending of products are fundamental operations in liquid processing, for example in the dairy, food, beverage and cosmetics industries. Often a fluid consists of components that are either dissolved, or contain a dispersion of particles of different sizes. A good example of a product consisting of a mixture of dispersed components is milk, which consists of fat, protein, carbohydrates, minerals, and water.

The fastest way of achieving dispersion is to use a mechanical shear force.

Flex-Mix liquiverter
**Flex-Mix instant**

Vacuum mixing for recombination and high shear emulsification

**Specifications**

<table>
<thead>
<tr>
<th>Field of application</th>
<th>Milk, juices, desserts, purée, baby food, dairy products, sauces</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>Designed for batch mixing, inline mixing over one or more hydration tanks or continuous mixing in closed systems with vacuum powder transport</td>
</tr>
<tr>
<td>Standard sizes/capacity</td>
<td>Available with different mixer heads tank sizes of: 500, 1,000, 2,000 and 3,000 l (130, 260, 530, 800 U.S. g). Powder capacity up to 20,000 kg/h (40,000 lbs/h) depending on powder type</td>
</tr>
<tr>
<td>Temperature profile/range</td>
<td>-10 - 110°C (15 - 210°F)</td>
</tr>
<tr>
<td>Pressure</td>
<td>-1.0 - 0.5 barg (0 - 22 psi)</td>
</tr>
</tbody>
</table>

**Advantages**

- Unique high shear mixing enables a high powder intake
- Air is efficiently removed during mixing prolonging running time and ensuring consistent quality
- Allows a closed, continuous production, resulting in higher throughput and reduce dust issues
- Handles a large number of formulations - flexible

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**Flex-Mix processor**

Multi-flexible mixing and processing system for formulated and complex products

**Specifications**

<table>
<thead>
<tr>
<th>Field of application</th>
<th>Particulated liquid food, fruit fillings and preserves, candy and confectionery, baby food, soups, ketchup, mayonnaise, dressings, processed cheese, cream cheese, cheese spreads, desserts, creams, lotions, gels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>Sanitary batch process with processing and cooling in a time frame similar to that of a continuous process. Special mixing agitator design for gentle processing and protection of product integrity. Optional high shear mixing unit for emulsification. Individual process step combinations</td>
</tr>
<tr>
<td>Standard sizes/capacity</td>
<td>250, 500, 1,000, 2,000 and 3,000 (65, 130, 260, 530, 800, 1,300 U.S. g)</td>
</tr>
<tr>
<td>Temperature profile/range</td>
<td>-10 - 110°C (15 - 210°F) (143°C pressure vessels only) (289°F)</td>
</tr>
<tr>
<td>Pressure</td>
<td>-1 - 0.5 barg (0 - 22 psi) (3 barg for pressure vessels only) (60 psi)</td>
</tr>
</tbody>
</table>

**Advantages**

- Gentle agitation, internal circulation
- High shear mixing for emulsification
- Handles particulate inclusion
- Heating via jacket or direct steam injection
- Closed system with vacuum/flash options
- Quick batch preparation (flip-flop)
Power-Mixer

Aseptic in-line mixer designed for liquid/liquid and liquid/gas dispersion technology

Advantages
- Aseptic aeration
- Emulsification
- Continuous mixing
- PLC standard in all aseptic systems
- Operator-friendly, smooth and trouble-free operation
- Pre-assembled and factory-tested

Specifications

<table>
<thead>
<tr>
<th>Field of application</th>
<th>Desserts, butter spreads, pulp, puree, fruit fillings and preserves, candy and confectionery, baby food, dairy products, mayonnaise, dressings, cheese spreads, emulsions, creams, lotions, gels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>High shear, stand-alone, in-line mixer, suitable for processing liquid/liquid and liquid/gas dispersions. Optional aseptic mixing</td>
</tr>
</tbody>
</table>
| Standard sizes/capacity | PM750  250 - 1,100 kg/h  
(550 - 2,400 lbs/h)  
PM1150  600 - 2,100 kg/h  
(1,320 - 4,600 lbs/h)  
PM1550  750 - 3,100 kg/h  
(1,650 - 6,800 lbs/h)  
PM2250 2,500 - 5,100 kg/h  
(5,500 - 11,200 lbs/h) |
| Temperature profile/range | -10 - 150°C (14 - 300°F) |

Mixer - TPX

An inline static mixer

Specifications

<table>
<thead>
<tr>
<th>Field of application</th>
<th>Designed for blending of liquids with a max. viscosity of approx. 20 cP. E.g. fat/recombined skimmed milk and cream/milk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>The mixer consists of a number of helical blending elements mounted in a stainless steel tube</td>
</tr>
<tr>
<td>Capacity</td>
<td>Dependent on the medium. Available in size: DN40-80 1.5</td>
</tr>
</tbody>
</table>

Advantages
- 3A certified
- Low-cost mixing alternative - no tank is required
- Reliable mixing directly in the pipes
- Easy to maintain
- Fast and easy CIP-cleaning
Mixer TPM+

A reliable powder mixer

**Specifications**

<table>
<thead>
<tr>
<th>Field of application</th>
<th>When powder/granulates is first added to and then dissolved in a liquid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>Powder is added to the mixer via a butterfly valve. The valve controls the flow of powder and prevents air entering the mixer</td>
</tr>
<tr>
<td>Capacity</td>
<td>Dependent on the medium</td>
</tr>
<tr>
<td>Sealing material</td>
<td>EPDM, FPM</td>
</tr>
</tbody>
</table>
| Max. flow             | TPM+1: 25,000 l/h (6,500 U.S. g/h)  
                        | TPM+2: 50,000 l/h (13,000 U.S. g/h) |
| Temperature profile/ | Max. product temperature during mixing is 60°C (140°F) |
| range                 | Max. head 1.5 bar (22 psi) |

**Advantages**

- Easy to maintain - the shaft seals are changed easily
- Reliable design due to the sturdy construction
- Hygienic, CIP-friendly design
- Reduced maintenance costs, when other APV pumps are being used. The shaft seals are identical to the ones used in W+/WS

**DarMix+**

In-line mixer for mixing of butter and butter blends

**Specifications**

<table>
<thead>
<tr>
<th>Field of application</th>
<th>Butter, butter spreads, dairy blend</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>Compact and highly efficient in-line mixer. Mixing intensity (rpm) controlled by a frequency converter</td>
</tr>
<tr>
<td>Temperature</td>
<td>8 - 18°C (46.4 - 64.4°F)</td>
</tr>
</tbody>
</table>

**Advantages**

- Applicable for high- and low-viscosity products
- Ensures a homogeneous product
- No product contacting bearings
- Compact design
- Cleaning simultaneously with the pipeline
**Continuous sugar dissolver - CSD**

Optimum flexibility and great cost saving potential

**Specifications**

<table>
<thead>
<tr>
<th>Field of application</th>
<th>Beverages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>The CSD is a fully automatic sugar syrup blending system, which can readily be integrated with any APV beverage process unit. Capable of producing sugar syrup up to 72°C (162°F) Brix</td>
</tr>
</tbody>
</table>

**Capacity**

5,000 - 50,000 l/h (1,000 - 15,000 U.S. g/h)

**Advantages**

- An accuracy of <+ 0.1°Brix in the final product (measured as a standard deviation)
- Blending control takes place via Brix analyses
- The jet mix principle is used for optimum dissolving in the dissolver tank
- A more precise and consistent product, resulting in savings in raw ingredient consumption
- Flexible and fully automatic system
- Fast settling time
- High accuracy level
- Designed for low maintenance and energy costs

**In-line blending - BlendMaster**

New dimensions in flexibility and efficiency in blending

**Specifications**

<table>
<thead>
<tr>
<th>Field of application</th>
<th>Juice beverages, diet beverage products, alcohol based beverages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>Fully automatic, two-stream or multi-stream blending system that integrates easily with any APV process systems for Brewery and Beverage applications. The standard Brix-Master can store and handle up to 30 different recipes. Suitable for diet product processing. Simple conversion of the basic two-stream BlendMaster for added versatility</td>
</tr>
</tbody>
</table>

**Capacity**

5,000 - 30,000 l/h (1,000 - 8,000 U.S. g/h)

**Advantages**

- Ensures exact conformity with the specified recipe
- High calibration stability
- High-precision blending
- Space-saving design (high capacity/m²) (sq. feet)
- Continuous monitoring and regulation of the combined product
- Automatic switch-off, if offset exceeds the limit
- Easy change of recipe for fast product change
- Turn down ratio 25% of nominal capacity
- Blending ratio 1:10 to 1:2
- Brix measurement as an option. Accuracy of <+ 0.05°Brix in the final product (measured as a standard deviation)
Carbonation and nitrogenation - CarboMaster

Cost effective, accurate and flexible gas-dosing

Specifications

<table>
<thead>
<tr>
<th>Field of application</th>
<th>Brewery and Beverage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>The heart of the CarboMaster unit is the patented gas injector, which injects liquid into the gas rather than traditional injection of gas into liquid. This achieves faster dissolution with tight binding of gas such as CO₂ and N₂ to the beverage. While a measuring instrument can be used to monitor gas addition and to control the dosing set-point, mass flow measurement for the gas provides superior accuracy, typically + 0.05 g/kg gas in the beverage.</td>
</tr>
<tr>
<td>Capacity</td>
<td>5,000 - 70,000 l/h (1,000 - 20,000 U.S. g/h)</td>
</tr>
</tbody>
</table>

Advantages
- High dosing accuracy (+/- 0.05 g gas/kg product)
- Injection independent of inlet temperature and pressure
- No gas losses
- Space-saving design
- Holding time not necessary
- Turn down to 25% of nominal capacity
- Injects and dissolves up to 10 g gas/kg product
- Constant monitoring and control of final product
- Fully CIP-cleanable

Wort cooling, yeast dosing and wort aeration - WortMaster

Economical production by minimising production time and the use of additives

Specifications

<table>
<thead>
<tr>
<th>Field of application</th>
<th>Brewery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>The WortMaster product range comprises wort cooling, yeast dosing and wort aeration units. In addition to fast and efficient wort cooling, designed for easy integration with existing lines, WortMaster units enable effective and accurate in-line dosing of yeast and oxygen using the patented APV gas injector.</td>
</tr>
<tr>
<td>Capacity</td>
<td>50 - 1,200 hl/h (1,000 - 30,000 U.S. g/h)</td>
</tr>
</tbody>
</table>

Advantages
- Constant monitoring and improved regulation of the process
- Repeatable fermentation performance
- Higher accuracy in yeast and oxygen dosing
- Reduced fermentation time
- Turn down ratio to 25% of nominal capacity
- Constant yeast/oxygen ratio, regardless of flow
- Fully CIP-cleanable
- Traceable production data
The success of a dairy operation today is dependent on optimal utilisation of high-value milk components (fat and protein).

The CompoMaster is designed for continuous standardisation of the fat content in milk and cream. The basic version CompoMaster is directly connected to a separator for in-line standardisation. On-line fat analysis enables you to optimise the production process to an extent, which is not possible in a traditional batch operation method.

Regardless of whether the application is market milk or milk for cheese, powder or condensed production, the tight process control of the advanced CompoMaster with an on-line milk component analysing instrument facilitates improved product consistency and greatly improved production profitability. An investment in this type of standardising equipment saves time, labour and investment in tank capacity.

CompoMaster - KCC

Unit for automatic standardisation of fat content in milk and cream

**Specifications**

<table>
<thead>
<tr>
<th>Field of application</th>
<th>Milk and cream</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>The CompoMaster is designed for operation together with a milk separator. The fat content of the raw milk is determined automatically using density transmitters after which the CompoMaster fully controls the on-line standardising process</td>
</tr>
<tr>
<td>Capacity</td>
<td>7,000 l/h - 60,000 l/h (1,800 - 16,000 U.S. g/h)</td>
</tr>
<tr>
<td>Temperature</td>
<td>Milk separation at 55 - 65°C (130 - 150°F)</td>
</tr>
</tbody>
</table>

**Advantages**

- High standardisation accuracy
- Fast control response to fat set point changes
- Automatic determination of fat content
- Advanced designs for in-line standardisation of fat, protein and solids
- Delivered as a skid-mounted unit ready for installation and commissioning
- Available as stand-alone unit or as unit for full integration into complete milk processing systems
Mixer selection guide

Liquid/Powder mixing?

- YES: Powder to be incorporated in liquid
- NO: Liquid to be mixed into another liquid

Particulates?

- YES: Sauces with meat or vegetable pieces, vegetable pieces alone etc.
- NO: Particulates?

Viscosity?

- HIGH: The product cannot be pumped by a centrifugal pump (viscosity 1,000 to 100,000 cP)
- LOW: The product can be pumped by a centrifugal pump (viscosity <1,000 cP)

Powder capacity?

- HIGH: Powder handled by automatic means (high capacity > 5 t/h)
- LOW: Manual powder de-bagging directly into mixer (low capacity < 5 t/h)

Air incorporation?

- LOW: During powder incorporation air is incorporated at higher levels than by vacuum
- HIGH: Powder handled by automatic means (high capacity > 5 t/h)

Liquid dosing?

- YES: Liquids dosed directly to mixer e.g. syrup, tomato paste
- NO: Liquid to be mixed into another liquid

Liquid to be mixed into another liquid

Blending?

- YES: Blending of two low viscosity liquids is normally performed by a static mixer
- NO: High shear is needed for emulsification

Emulsification?

- NO: Emulsions normally require a higher shear than the DAR mixer is capable of
- YES: Blending of difficult liquids, e.g. with high viscosity, is normally performed by a dynamic mixer

Aeration?

- YES: Aerated products like chocolate mousse need systems where air is mechanically stabilised in the product by use of high shear forces
- NO: Blending?

High shear?

- YES: High shear is needed for emulsification
- NO: Blending?

Static?

- YES: Blending of two low viscosity liquids is normally performed by a static mixer
- NO: Blending?

De-aerated end product?

- YES: The amount of air/oxygen has an impact on final product quality
- NO: De-aerated end product?

Vacuum technology needed to de-aerate product

De-aerated end product?

- YES: The product cannot be pumped by a centrifugal pump (viscosity 1,000 to 100,000 cP)
- NO: The product can be pumped by a centrifugal pump (viscosity <1,000 cP)

Flex-Mix Processor
Prepared food, processed cheese, jams, fruit preparation, confectionery, healthcare

Flex-Mix Instant
Recombined products, baby food, cream, ice cream, healthcare, dressing, sauces

Flex-Mix Liquiverter
Flavoured milk, recombined milk, beverages, syrups, starch slurries, gravies, soups

Flex-Mix TPM+
Recombined sugar, milk, chocolate powder

Flex-Mix Static
Milk/water
Sucrose solution/milk
Parmeae/milk
Milk/cream

Flex-Mix DarMix+
Butter blend
Syrup in milk
Milk/cream

Flex-Mix PowerMixer
Whipped desserts, mousses, emulsions (e.g. low fat spreads)
The APV Innovation Centre cooperates closely with APV companies and customers around the world in order to provide a constant stream of innovative, world-class solutions that add decisive competitive value to the businesses of our customers.

Located in Central Jutland, the heart of Danish dairy farming country, the Centre is the focal point of APV’s dairy process development activities. The APV Innovation Centre extends its reach far beyond this, however, offering a raft of services for the food industry in the broadest possible sense.

These include after sales service, laboratory analyses, technical information and training of APV employees and APV customers.

The APV Innovation Centre leverages the extensive industry experience and expertise of a permanent staff of food technologists, process engineers and production engineers together with knowledge gained over many years throughout the worldwide APV Group to contribute actively to all types of development, testing and application of APV equipment, systems and processing lines. All facilities and services are designed to provide added value by minimising waste and energy requirements, or by converting commodity ingredients into new, competitive products.

Important keywords for the Centre are innovation, optimum plant dimensioning, high-quality products, and up-to-date knowledge of market requirements. The trials are custom-tailored and can be performed in the Innovation Centre or on customer site. All work on behalf of individual customers is subject to the strictest confidentiality and the highest standards of customer service.