

Fluitec Documentation No. 11.152 Rev. 1

## Turbulent mixing and gasification in the food industry

Fluitec can draw on a long history of experience when it comes to continuous mixing of a variety of pumpable fluids. There are countless mixing applications with low-viscosity media and soluble additives in the food industry. Static mixers allow such media to be homogenised in an energy efficient and controlled way with selective vortices. These static elements mix turbulently and continuously, and are increasingly employed in beverage piping and plants for this reason. Static mixers are equally suitable for beverage carbonation as well as for various other gasification and emulsifying tasks. They support both cleaning in place (CIP) and sanitation in place (SIP) and are not subject to wear.



Fig. 1 5% blue additive is dosed upstream of a Milkmix mixer ( $Re = 18000$ )

### Fluitec "Milkmix" mixer

The Fluitec "Milkmix" mixer was specially designed for use in the food industry and in applications with aqueous media. The mixing element, which produces two counteracting vortices, is mounted in two welded coupling connectors, facilitating an extremely compact design. The entire mixer can be installed in a pipe or removed from it again very easily. It can be supplied with dairy couplings to DIN 11851, SMS couplings or Tri-Clamp connections, depending on the customer's requirements. The surfaces are electropolished and the welds can be completely ground on request. Owing to the compact type of construction, the capital investment costs for this mixer – which combines high mixing efficiency with minimal pressure loss – are comparatively low.

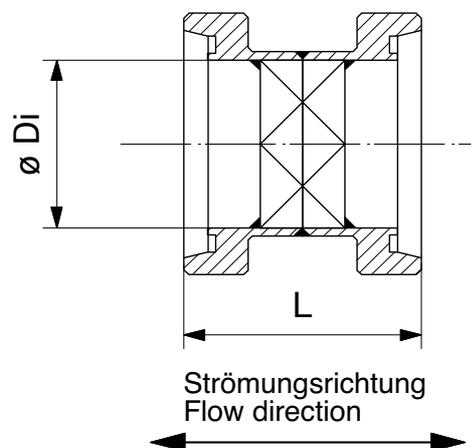


Fig. 2 Milkmix acc. to DIN 11851

### Hygienic and low on maintenance

Since all the surfaces of the Fluitec Milkmix are electropolished and the unit is manufactured with dairy couplings or Tri-Clamp connections, it represents a particularly efficient alternative for the following types of process:

- Admixing aroma compounds into milk
  - Admixing aroma compounds into fruit juices
  - Admixing masterbatches into smoothies
  - Admixing soluble additives into beverages
- Excellent cleanability (CIP) without dismantling is vital for use in the food industry. This is optimally achieved with the Milkmix because cleaning of the mixer and the downstream pipe is supported by the high local turbulence.



Fig. 3 Milkmix 1 1/2" and 2 1/2", material V4A

### Mixing efficiency and pressure drop across the mixer

The high mixing efficiency of the Milkmix mixer is based on two mutually induced flow vortices. These vortices cover the complete flow area and ensure an excellent cross-transfer ability. The degree of homogeneity is usually described by the coefficient of variation. A variation coefficient  $< 0.03$  is considered to be homogeneous. The maximum mixing efficiency occurs at a flow velocity  $> 0.3$  m/s. The additive is dosed upstream of an Aquamix coupling. The injection nozzle should be centrally positioned for low concentrations of  $< 1\%$ . For higher concentrations, it can be fitted 2 to 5 D upstream of the mixer using an ordinary tee.

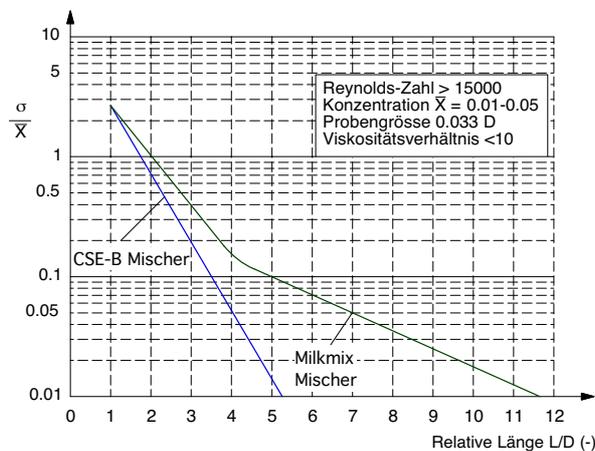


Fig. 4 Coefficient of variation as a function of the relative mixing length

The Milkmix injection nozzle can often be installed actually in the mixer. Fig. 4 shows the coefficient of variation as a function of the relative mixing length. It can be seen that the fluid mixture is optically homogeneous after a length equivalent to five times the pipe diameter. Measuring points such as temperature sensors or pH probes should be located at least ten pipe diameters away.

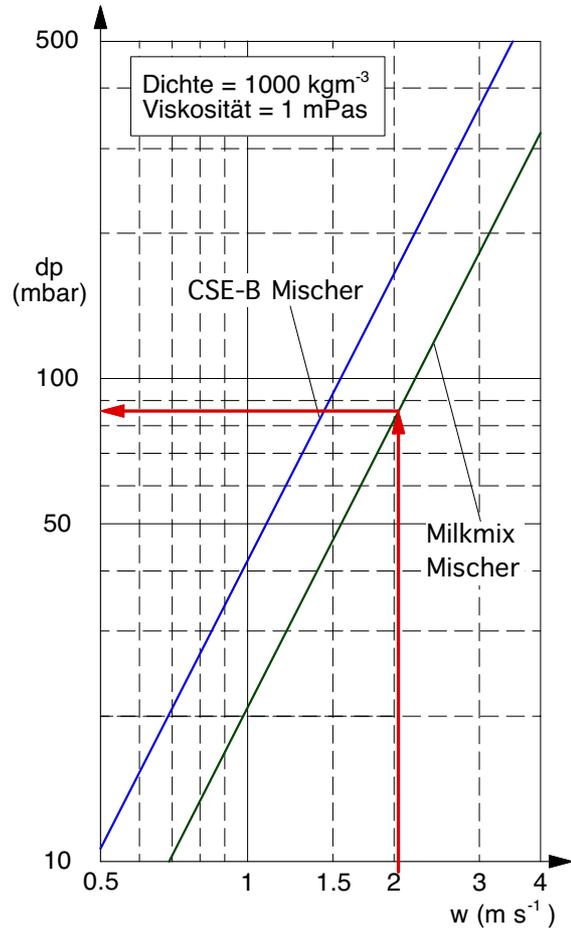


Fig. 5 Pressure drop across a Milkmix mixer (measured with water)

The pressure loss can be determined with the help of the following example:

Additives are mixed into a beverage volume flow of 40 m<sup>3</sup>/h in a pipe with a diameter DN80. The flow velocity in the empty pipe is 2.16 m/s. The diagram shows the pressure loss, which in this case is approximately 85 mbar.

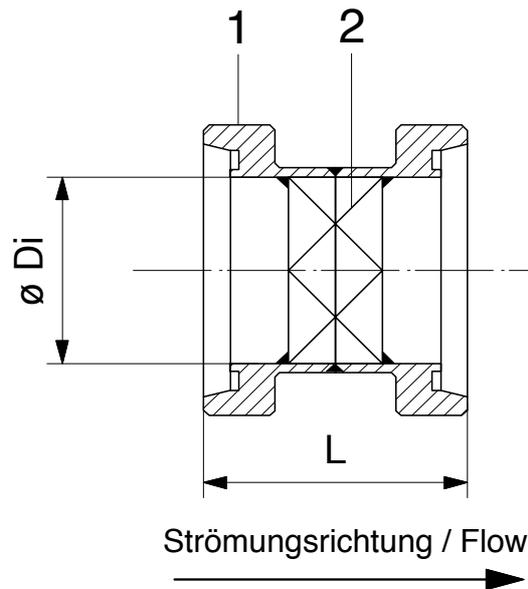
### Mass transfer with static mixers

Fluitec mixers have been used to process mineral water and beverages with great success for many years. Static aerators for enriching low-viscosity media with CO<sub>2</sub> are a Fluitec speciality. Intensive research and countless industrial applications have laid the groundwork for today's precise calculations of the gas enrichment in fluids. Unfortunately, only approximate calculations are possible for complex mixtures of natural substances because the combined influence of buffering capacity, electrolytes and surface active substances cannot be quantified.

Technisches Datenblatt Nr. 13.140 Rev. 1

## Fluitec Mischer "milkmix", CSE-X/4 und CSE-X/8 mit Gewindestutzen nach DIN11851 (2 x male part 2 S lang)

## Fluitec Mixer "milkmix", CSE-X/4 and CSE-X/8 with fittings DIN 11851 (2 x male part 2 S long)



### Standardgehäuse / Standard Housing

Gehäuse / Housing	Di	L	s
(-)	(mm)	(mm)	(mm)
<b>Gehäuse DN25</b>	26	57	2.5
<b>Gehäuse DN32</b>	32	63	2.5
<b>Gehäuse DN40</b>	38	65	2.5
<b>Gehäuse DN50</b>	50	69	2.5
<b>Gehäuse DN65</b>	66	79	3.0
<b>Gehäuse DN80</b>	81	89	3.5
<b>Gehäuse DN100</b>	100	107	3.0
<b>Gehäuse DN125</b>	125	91	3.5
<b>Gehäuse DN150</b>	150	99	3.5

Kleinere Nennweiten auf Anfrage (CSE-W)  
 Smaller diameters on request (CSE-W)

### Zusammenstellung / Parts

1. Gewindestutzen / Fittings DIN 11851
2. Fluitec Mischelemente / mixing elements

### Material

1.4404  
 1.4571 od. 1.4581 od. 1.4404

Alle Teile elektropoliert / all surfaces electropolished