

PENTAX and N-Form

IN-LINE MIXERS



For more than 75 years, Bran+Luebbe has been providing customers with high-quality metering, processing, and analyzing equipment.

As part of the global SPX Corporation, we are one of the world's most reputable manufacturers of metering and process pumps and process systems, as well as analyzing technologies. Our engineers have comprehensive process and applications knowledge across a wide range of markets. This has resulted in product innovations and developments that harness the latest technology while meeting the highest quality standards.

SPX Corporation (NYSE: SPW) is a global, multi-industry manufacturing leader with approximately \$5 billion in annual revenue, operations in more than 35 countries and over 14,000 employees. The company's highly-specialized, engineered products and technologies are concentrated in Flow Technology and energy infrastructure. Many of SPX's innovative solutions are playing a role in helping to meet rising global demand for electricity and processed foods and beverages, particularly in emerging markets. The company's products include food processing systems for the food and beverage industry, critical Flow components for oil and gas processing, power transformers for utility companies, and cooling systems for power plants. For more information, please visit www.spx.com.

PENTAX - For Intensive Mixing

We offer a wide variety of solutions to solve specific mixing problems.

The range includes either static or dynamic in-line mixers depending on the application.

The PENTAX dynamic in-line mixer offers excellent performance and can accommodate a wide capacity range, variable shear, and can be supplied with auxiliary equipment as required.



DESIGN AND CONSTRUCTION

The multi-frequency liquid mixer comprises a series of opposed rotors and stators on a common axis. The rotors are fitted with milled teeth for low viscosity applications and with round studs for use with viscous fluids.

Inside the PENTAX mixer, constantly changing areas of rapid flow and resistance subject the liquid to high frequency acceleration and deceleration.

The resulting high-energy shear forces result in effective dispersion and emulsification.

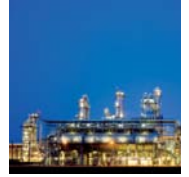
A pre-mixing chamber is located at the entrance to the mixer. When one or more components are fed in by non-synchronous piston or diaphragm pumps, this chamber accommodates the discharge volume of several pump strokes and thereby equalizes any differences in concentration before the liquids enter the main mixing area.



Applications

Chemicals and Plastics

- Dispersing hardeners, accelerators, and colorants into resins
- Continuous cross-linking of PVA solutions
- Continuous molten resin saponification
- Wax and paraffin emulsion preparation
- Dispersing propellant in foams



Food

- Continuous production of mayonnaise
- Fine dispersion of additives in cocoa and chocolate
- Soya milk drink production
- Enzymatic or chemical degumming of vegetable oil
- Homogenization of nut-nougat sandwich spread
- Preparation of beaten egg-white/sugar foam mixtures



Cosmetics and Detergents

- Continuous manufacture of creams and emulsions
- Alkaline neutralization of fatty and sulphonic acids
- Dilution of molten alkane sulphonate
- Elimination of viscosity anomalies in alkyl ether sulphate dilutions
- Continuous shampoo and dish-washing liquid and production

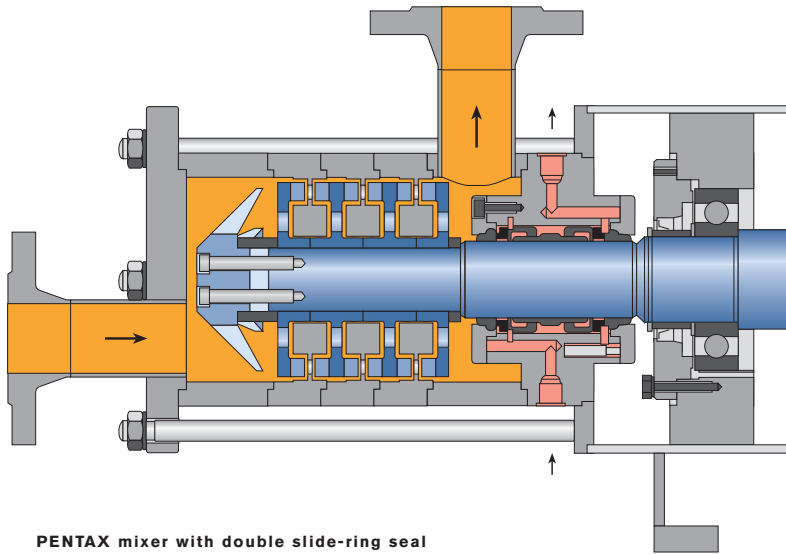


Fibers and Textiles

- Dyeing and delustering for semi- and fully synthetic spinning solutions
- Homogenization for viscous solutions
- Production of lubricant emulsions
- Continuous starch gelatinization



PENTAX Standard KMF



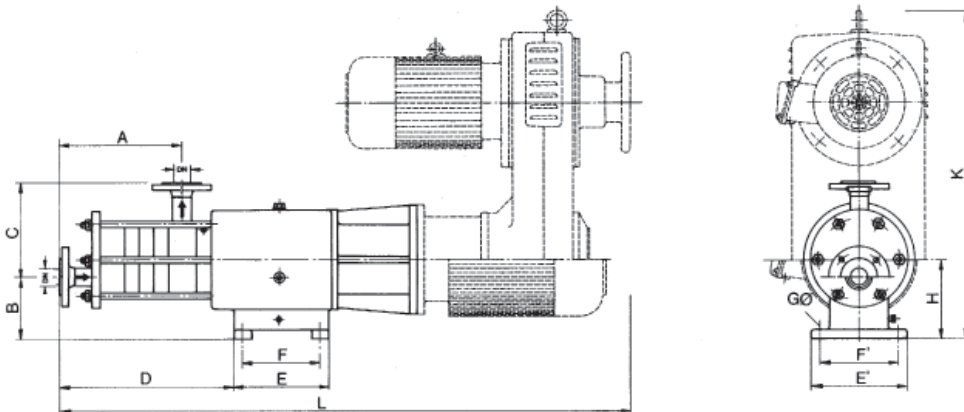
PENTAX mixer with double slide-ring seal

ADVANTAGES

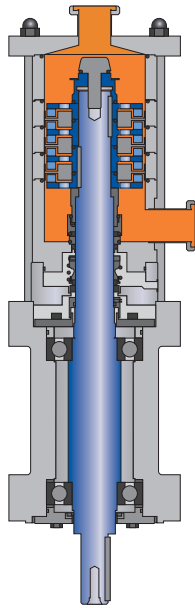
- Extremely fine droplet size and material distribution
- Low space requirement
- High shearing action and phase boundary area
- Rapid reaction rate for neutralization and other reactions
- Effective material exchange for reactions involving gases

CONNECTIONS AND DIMENSIONS

TYPE	CONNECTION DN	DIMENSIONS MM (INCHES) APPROX. DIMENSIONS									
		A	B	C	D	E X E'	F X F'	G	H	K	L
KMF 8	025	230 (9")	092 (3.6")	128 (5")	298 (11.75")	190 x 180 (7.5" x 7")	165 x 155 (6.5" x 6.25")	13 (.50")	110 (4.5")	600 (23.5")	1015 (40")
KMF 15	040	303 (12")	116 (4.56")	166 (6.5")	383 (15")	200 x 240 (8" x 9.5")	170 x 210 (6.75" x 8.25")	14 (.50")	142 (5.5")	630 (24.75")	1235 (48.5")
KMF 30	050	334 (13.25")	170 (6.75")	255 (10")	477 (18.75")	260 x 265 (10.25" x 10.5")	210 x 215 (8.25" x 8.5")	19 (.75")	215 (8.5")	900 (35.5")	1600 (63")
KMF 70	080	389 (15.25")	172 (6.75")	303 (12")	488 (19.25")	470 x 380 (18.5" x 15")	420 x 330 (16.5" x 13")	19 (.75")	245 (9.75")	-	1700 (67")
KMF 120	100	445 (17.5")	165 (6.5")	310 (12.25")	657 (26")	500 x 400 (19.75" x 15.75")	440 x 350 (17.5" x 13.75")	24 (1")	260 (10.25")	-	2100 (82.75")
KMF 250	100	470 (18.5")	210 (8.25")	385 (15")	593 (23.5")	410 x 450 (16.25" x 17.75")	350 x 400 (13.75" x 15.75")	24 (1")	315 (12.5")	-	2400 (94.5")
KMF 300	150	400 (15.75")	130 (5.1")	437 (17.25")	707 (28")	750 x 610 (29.5" x 24")	684 x 560 (27" x 22")	24 (1")	333 (13.25")	-	2500 (98.5")



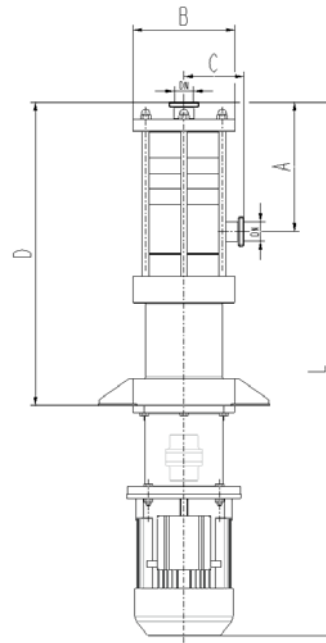
PENTAX Hygienic SMD



ADVANTAGES

- EHEDG—Certificate
- Hygienic mechanical seal
- Components gasketed with O-rings only
- Vertical execution for total emptying prior to cleaning
- No dead space
- Vertical design allows easy and fast disassembly and reassembly
- Robust design; wide variety of materials available
- Reduced wear due to moderate RPM
- Low noise level

PENTAX mixer with single slide-ring seal



CONNECTIONS AND DIMENSIONS

TYPE	CONNECTION DN	DIMENSIONS MM (INCHES) APPROX. DIMENSIONS				
		A	B	C	D	L
SMD 15	040	286 (11.25")	170 (6.5")	137 (5.5")	644 (25.5")	1235 (48.5")
SMD 30	050	343 (13.5")	267 (10.5")	157 (6.0")	803 (31.5")	1618 (63.75")
SMD 70	080	419 (16.5")	338 (13.5")	222 (8.5")	936 (36.75")	1781 (70")
SMD 120	100	470 (18.5")	380 (15")	212.5 (8.5")	1070 (42")	1781 (78")

How to choose the right dynamic in-line PENTAX mixer

TYPE	CONNECTION DN	THROUGHPUT ¹⁾ L/H	SPEED RANGE MIN ⁻¹	DRIVE POWER KW	ROTOR DIAMETER D _r MM (INCHES)
KMF 8	25	40 - 800	500/4500	02 - 4,0,0	72 (3")
KMF/SMD 15	40	150 - 3000	500/4000	02 - 9,5	94 (3.75")
KMF/SMD 30	50	400 - 6000	350/2800	04 - 18,5	149 (6")
KMF/SMD 70	80	900 - 12000	250/1450	05 - 22,0	236 (9.25")
KMF/SMD 120	100	1500 - 18000	200/950	15 - 30,0	256 (10")
KMF 250	100	2500 - 30000	150/750	15 - 30,0	317 (12.5")
KMF 300	150	4000 - 50000	100/450	22 - 45,0	515 (20.25")

The table above indicates the relationship between throughput, drive power, and rotation speed.

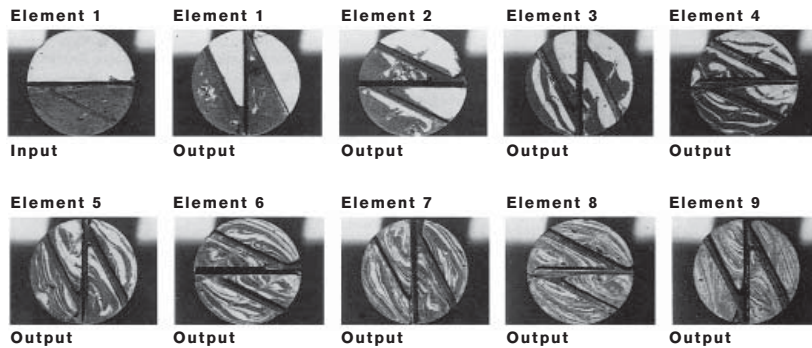
Low viscosity applications require high throughput and rotation speed with a low power rating; high-viscosity applications require the opposite.

As many products exhibit non-Newtonian flow characteristics, it is not normally possible to determine the effective viscosity within the mixer; in these cases, test runs in our pilot plant are required.

PENTAX mixers can be supplied with fixed gearing via a directly coupled motor, or with variable speed drives.

N-Form Static Mixer with Excellent Cross Mixing Effect

The N-form mixer is a static mixer using forced flow separation and geometrically offset stream recombination to give a progressive mixing effect.



The photos show how two high-viscosity pastes with different colors attain increasing degrees of mixing as they pass through each mixer element.

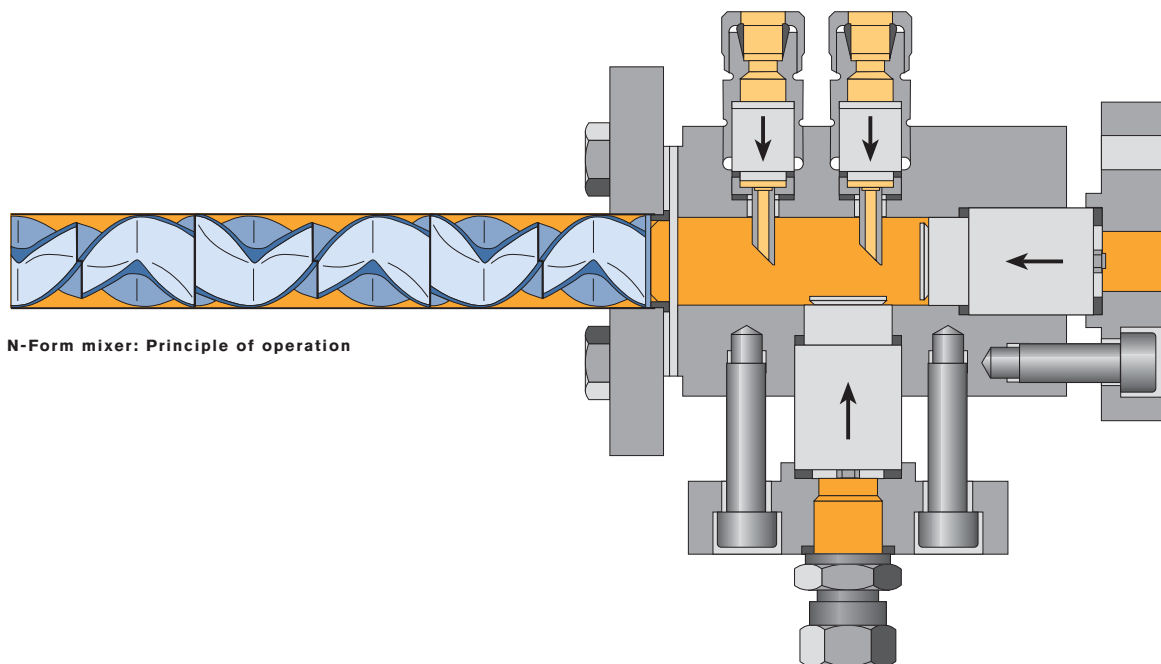
ADVANTAGES

- Excellent radial mixing
- The N-form of the mixing elements produces four separate flows that are mixed simultaneously

COMBINING THE LIQUIDS

For optimum mixing, it is important that the liquids to be mixed are combined using the correct type of fitting.

A simple T-inlet is only acceptable where the flow rates of both liquids are almost the same. Where the ratio is ≥ 10 , such as resin/hardener in resin mixtures, an injection tube must be used to add the low-volume component, immediately before the N-form mixer, in mid-stream and in the direction of the flow.



N-Form mixer: Principle of operation

Applications

Required mixer size

Low-viscosity liquids can be completely mixed with only a few N-elements, thanks to the simultaneous effects of flow separation and turbulence; longer mixers are ideal for medium- to high-viscosity fluids with laminar flow characteristics.

Aqueous liquids

6 elements

Viscous liquids

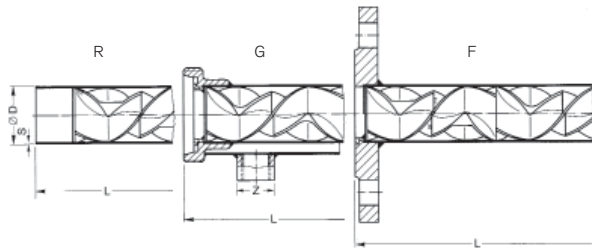
11 – 16 elements

Liquids with viscosity differences up to about 1:1000

16 – 21 elements

Liquids with higher viscosity differences

21 or more elements



Standard material: 1.4571 for N-form mixers, 1.4581 for N-elements of high-grade cast stainless steel

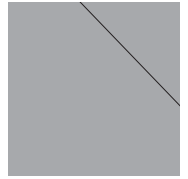
N-FORM MIXERS (STANDARD SPECIFICATION)

CONNECTION DN	NO OF ELEMENTS	F FLANGE PN 16	LENGTH L (MM) CONNECTION G THREAD DIN 11851	R WELDING-ENDS	MIXING TUBE D X S (MM)	HEATING/COOLING CONNECTION Z (MM)	PRESSURE LOSS COEFFICIENT	
							KN	KN'
15	6	140 (5.5")	148 (6")	150 (6")	18X1	R3/8"	158	7,85
	11	240 (9.5")	248 (9.75")	250 (9.75")			290	14,4
	16	340 (13.5")	348 (13.75")	350 (13.75")			422	20,9
	21	440 (17.5")	448 (17.5")	450 (17.75")			554	27,5
25	6	220 (8.5")	234 (9.25")	240 (9.5")	28X1	R3/8"	15,2	1,25
	11	385 (15.25")	399 (15.75")	405 (16")			27,8	2,30
	16	550 (21.5")	564 (22.25")	570 (22.5")			40,5	3,34
	21	715 (28.25")	729 (28.75")	735 (29")			53,1	4,39
40	6	310 (12.25")	324 (12.75")	340 (13.25")	40X1	R1/2"	2,14	0,28
	11	550 (21.5")	564 (22.25")	580 (22.75")			3,93	0,52
	16	790 (31.25")	804 (31.75")	820 (32.25")			5,71	0,76
	21	1030 (40.5")	1044 (41.25")	1060 (41.75")			7,50	0,99
65	6	520 (20.5")	536 (21.25")	550 (21.5")	70X2	R1/2"	0,18	0,04
	11	925 (36.5")	941 (37")	955 (37.5")			0,34	0,07
	16	1330 (52.5")	1346 (60")	1360 (53.5")			0,49	0,11
	21	1735 (68")	1751 (70")	1765 (69.5")			0,64	0,14

MM (Inches)

Plastics

- Mixing hardeners, accelerators, and colorants into resins
- Mixing propellant and color stock into polyol
- Dispersing TiO₂ suspensions and acetic acid in caprolactam
- Mixing waterglass, catalysts, and water



Paper and Textiles

- Continuous color shading and dilution
- Diluting retention media
- Mixing glue
- Continuous shading of printer's ink



Food and Drinks

- Addition of fat to low-fat soft cheese and quark
- Coloring glucose-sugar mixtures
- Dispersing water in crude vegetable oil
- Mixing hop extract and sugar solution into beer
- Mixing sugar syrup, fruit concentrates, and water



Cosmetics and Detergents

- Mixing surfactants, preservatives, perfumes, and salt solutions with water
- Neutralizing sulphonic and fatty acids with sodium hydroxide solution





THE PRODUCT RANGE: MORE EXAMPLES OF BRAN+LUEBBE PRODUCTS WITH HIGH-QUALITY STANDARD, INNOVATION, AND KNOW-HOW.



Metering pumps
for universal application
in the low to medium
requirement range
ProCam
ProCam Hygienic



Metering pumps
for all process areas
where liquids are
metered and mixed
NOVADOS



Process pumps
for large flow rates and
high operating pressures
NOVAPLEX
NOVAPLEX Integral
NOVAPLEX Vector
MEGANIZER
High Pressure Homogenizer



Process systems
as a complete solution for
increased productivity and
quality
AutoBlend
Metering and Mixing Systems



Oil & Gas systems
to aid oil & gas recovery
onshore and offshore
Solar Panel Packages
Chemical Injection Systems
Flow Control Device Panels



On-line analyzers
for use in water
and effluent treatment
PowerMon
PowerMon S
PowerMon Compact

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