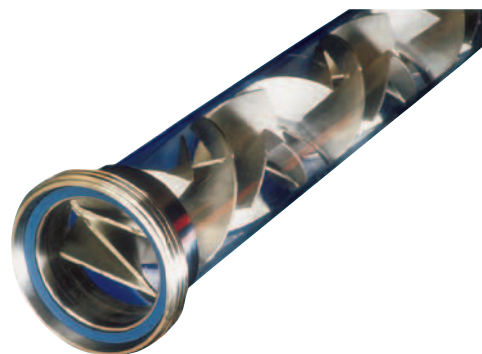


# PENTAX and N-Form

IN-LINE MIXERS



Part of SPX Corporation (NYSE: SPW), the Flow Technology segment designs, manufactures, installs and services highly engineered solutions used to process, blend, meter and transport fluids, in addition to air and gas filtration and dehydration. The segment supports the food and beverage, dairy, pharmaceutical, oil and gas, energy, and industrial markets worldwide.

Based in Charlotte, North Carolina, SPX Corporation (NYSE: SPW) is a global Fortune 500 multi-industry manufacturing leader with over \$5 billion in annual revenue, operations in more than 35 countries and over 15,000 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, power transformers for utility companies, and cooling systems for power plants. For more information, please visit [www.spx.com](http://www.spx.com).

For more than 75 years, Bran+Luebbe - now SPX Flow Technology - has been providing customers with high quality metering, processing and analysing equipment.

As part of the global SPX Corporation, we are one of the world's most reputable manufacturers of metering and process pumps, 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 which harness the latest technology whilst meeting the highest quality standards.

## 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.

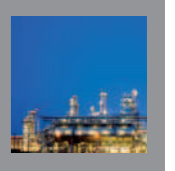
A pre-mixing chamber is located at the entrance to the mixer. When one or more components are fed in by non-synchronous piston or diaphragm pumps, this chamber accommodates the discharge volume of several pump strokes and thereby equalises any differences in concentration before the liquids enter the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



## Applications

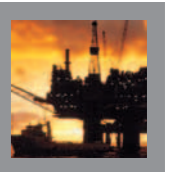
### CHEMICALS AND PLASTICS

- Dispersing hardeners, accelerators and colourants 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.



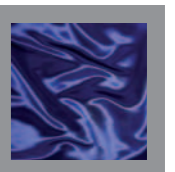
### COSMETICS AND DETERGENTS

- Continuous manufacture of creams and emulsions.
- Alkaline neutralisation 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+ production.

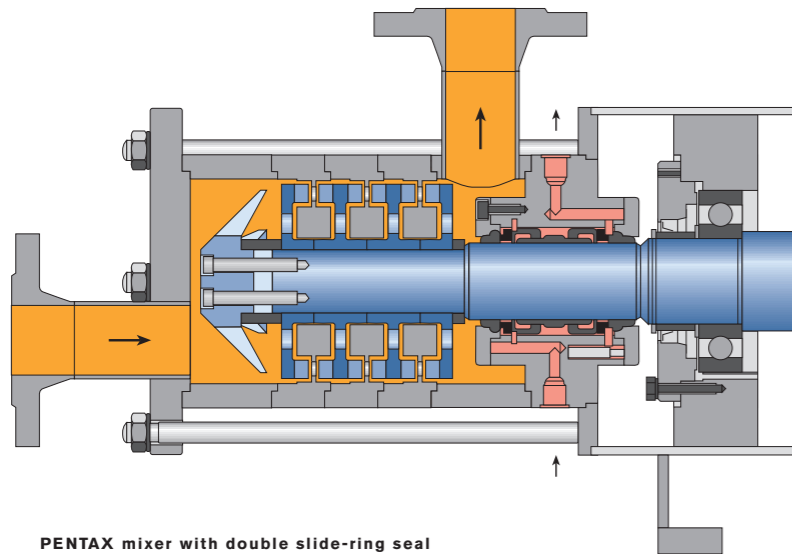


### FIBRES AND TEXTILES

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



## PENTAX Standard KMF



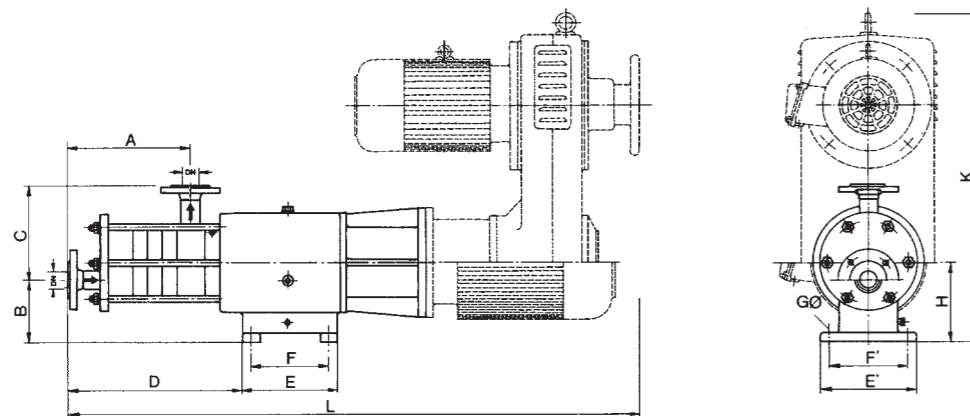
PENTAX mixer with double slide-ring seal

### ADVANTAGES

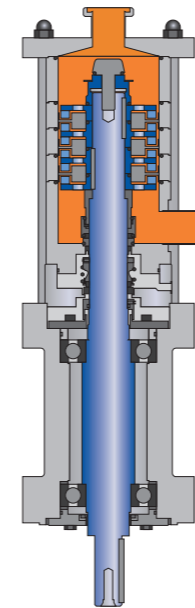
- Extremely fine droplet size and material distribution
- Low space requirement
- High shearing action and phase boundary area
- Rapid reaction rate for neutralisation and other reactions
- Effective material exchange for reactions involving gases

### CONNECTIONS AND DIMENSIONS

TYPE	CONNECTION DN	DIMENSIONS (MM) APPROX. DIMENSIONS									
		A	B	C	D	E X E'	F X F'	G	H	K	L
KMF 8	025	230	092	128	298	190 x 180	165 x 155	13	110	600	1015
KMF 15	040	303	116	166	383	200 x 240	170 x 210	14	142	630	1235
KMF 30	050	334	170	255	477	260 x 265	210 x 215	19	215	900	1600
KMF 70	080	389	172	303	488	470 x 380	420 x 330	19	245	-	1700
KMF 120	100	445	165	310	657	500 x 400	440 x 350	24	260	-	2100
KMF 250	100	470	210	385	593	410 x 450	350 x 400	24	315	-	2400
KMF 300	150	400	333	437	707	750 x 610	684 x 560	24	333	-	2500



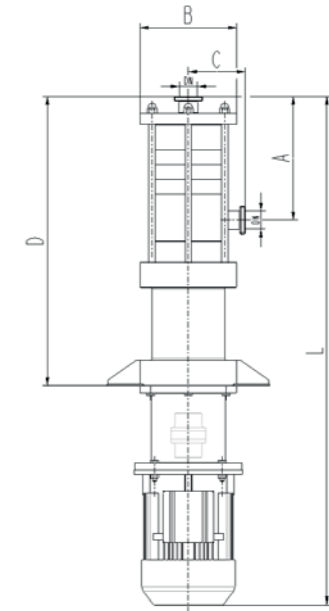
## PENTAX Hygienic SMD



### 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) APPROX. DIMENSIONS				
		A	B	C	D	L
SMD 15	040	286	170	137,0	644	1235
SMD 30	050	343	267	157,0	803	1618
SMD 70	080	419	338	222,0	936	1781
SMD 120	100	470	380	212,5	1070	1985

## How to choose the right dynamic in-line PENTAX Mixer

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

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

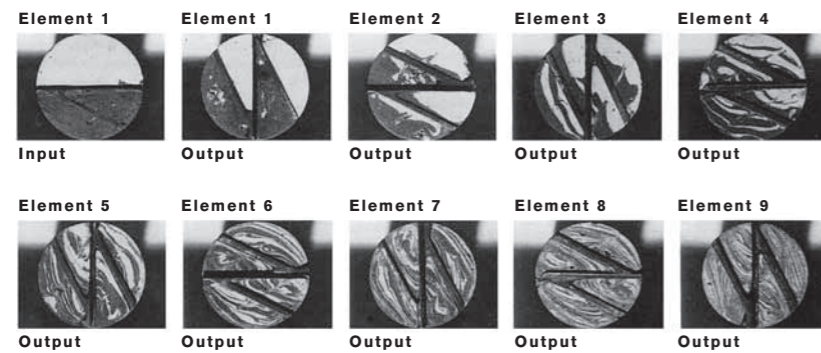
Low viscosity applications require high throughput and rotation speed with a low power rating; high viscosity applications require the opposite.

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 colours attain increasing degrees of mixing as they pass through each mixer element.

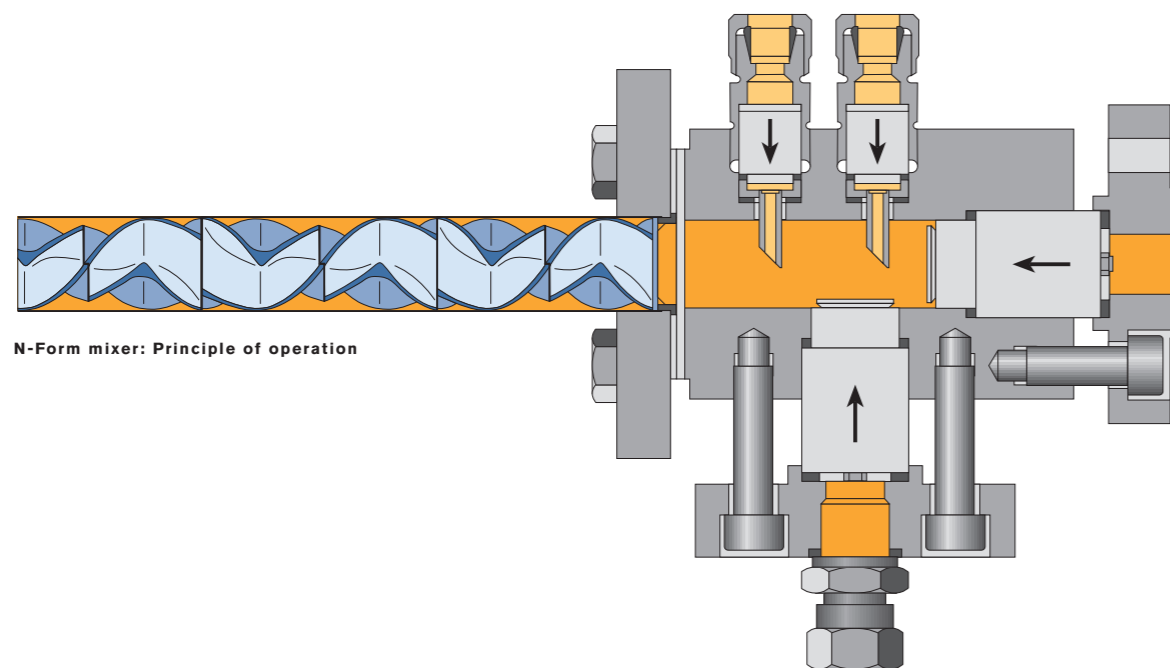
## ADVANTAGES

- Excellent radial mixing
- The N-form of the mixing elements produces four separate flows which 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  $\geq 10$ , 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

## 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

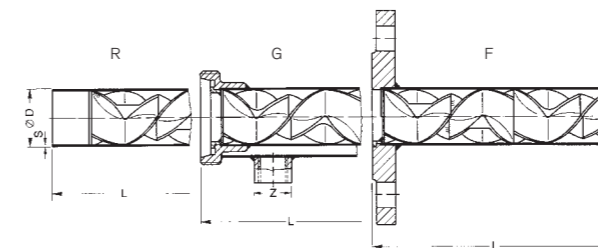
11 – 16 elements

### 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

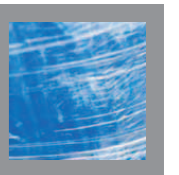
## N-FORM MIXERS (STANDARD SPECIFICATION)

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	148	150	18X1	R3/8"	158	7,85
	11	240	248	250			290	14,4
	16	340	348	350			422	20,9
	21	440	448	450			554	27,5
25	6	220	234	240	28X1	R3/8"	15,2	1,25
	11	385	399	405			27,8	2,30
	16	550	564	570			40,5	3,34
	21	715	729	735			53,1	4,39
40	6	310	324	340	40X1	R1/2"	2,14	0,28
	11	550	564	580			3,93	0,52
	16	790	804	820			5,71	0,76
	21	1030	1044	1060			7,50	0,99
65	6	520	536	550	70X2	R1/2"	0,18	0,04
	11	925	941	955			0,34	0,07
	16	1330	1346	1360			0,49	0,11
	21	1735	1751	1765			0,64	0,14

## Applications

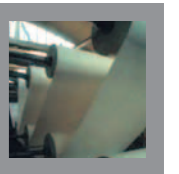
### PLASTICS

- Mixing hardeners, accelerators and colourants into resins.
- Mixing propellant and colour stock into polyol.
- Dispersing TiO<sub>2</sub> suspensions and acetic acid in caprolactam.
- Mixing waterglass, catalysts and water.



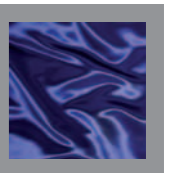
### PAPER AND TEXTILES

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



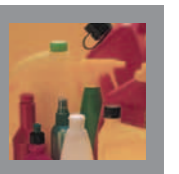
### FOOD AND DRINKS

- Addition of fat to low-fat soft cheese and quark.
- Colouring 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, perfume 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



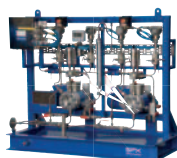
**Metering pumps**  
for all process areas  
where liquids are  
metered and mixed.  
NOVADOS



**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

## Global locations

### EMEA

#### SPX FLOW TECHNOLOGY

Werkstraße 4  
D-22844 Norderstedt  
Phone: +49 (0) 40 - 522 02 -0  
Fax: +49 (0) 40 - 522 02 -444  
E-Mail: branluebbe@spx.com

#### SPX FLOW TECHNOLOGY

Ironstone Way  
Brixworth, Northants, NN6 9UD  
Phone: +44 (0) 1604 880751  
Fax: +44 (0) 1604 880145  
E-Mail: ft.brixworth.sales@spx.com

### AMERICAS

#### SPX FLOW TECHNOLOGY

611 Sugar Creek Road  
Delavan, WI 53115 USA  
Phone: +1 (800) 252-5200 or  
+1 (262) 728-1900  
Fax: +1 (262) 728-4904  
E-Mail: branluebbe.americas@spx.com

### APAC

#### SPX FLOW TECHNOLOGY

25 International Business Park  
#03-03/12, German Centre,  
Singapore 609916  
Phone: +65 6568 1568  
Fax: +65 6265 9133  
E-Mail: asia.pacific@spx.com

#### SPX FLOW TECHNOLOGY NORDERSTEDT GMBH

Werkstraße 4  
D-22844 Norderstedt  
Phone: +49 (0) 40 - 522 02 -0  
Fax: +49 (0) 40 - 522 02 -444  
E-Mail: branluebbe@spx.com

SPX reserves the right to incorporate our latest design and material changes without notice or obligations.

Design features, materials of construction and dimensional data, as described in this bulletin, are provided for your information only and should not be relied upon unless confirmed in writing. Please contact your local sales representative for product availability in your region. For more information visit [www.spx.com](http://www.spx.com).

"The green ">" is a trademark of SPX Corporation, Inc."