

# STATIC MIXERS

## A Technical Introduction



### Selection Guide

For each application, the designer must first determine the number of mixing sections required to achieve a complete mix. The guidelines below are based upon the Reynolds Number of your system. Also included are tables with some general application guidelines. Next, the designer should select a diameter and/or a construction that will give the desired mixing performance without exceeding your system's maximum allowable pressure drop (see item 3 below).

**1. Calculate the Reynolds Number. Use the diameter given in the charts. If both inside and outside diameters are supplied, use the inside diameter**

$$RE = \frac{3157 \times Q \times S}{D \times MU}$$

**2. Select a model based on the Reynolds Number.**

**FMX7000 Series Mixers:**

Reynolds No.	No. of Elements
800 to 1000	14
>1000	7

Typical Application	No. of Elements
Ozone Absorption	7
pH Control	7
Gas/Gas Blending	7
Dilution of Chemicals	7
Polyelectrolyte Dilution	14

**FMX8000 Mixers:**

Reynolds No.	No. of Elements
<10	24 to 32
10 to 500	16 to 24
500 to 2000	8 to 16
>2000	4 to 8

Typical Application	No. of Elements
1-1 Epoxies	24
Urethanes/Elastomers	32
Urethane Foam	16
In-line Aeration	8
Admixing of Additives	8

### 3. Determine the Pressure Drop

Laminar Flow:  
Reynolds Number < 500

$$DP = Q \times MU \times L$$

Turbulent Flow:  
Reynolds Number > 500

$$DP = Q^2 \times S \times T$$

**Note:** If the pressure drop across the mixer exceeds its maximum rating, a modular mixer is required. For example, if a 24-element FMX8300 mixer is required and the pressure drop exceeds the 250 psi rating, we recommend coupling two 12-element mixers in series.

### Symbols

**RE** = Reynolds Number  
Dimensionless

**Q** = Flow rate in Gallons/Minute

**S** = Specific Gravity—  
Dimensionless

**MU** = Viscosity in Centipoise

**D** = Diameter in Inches

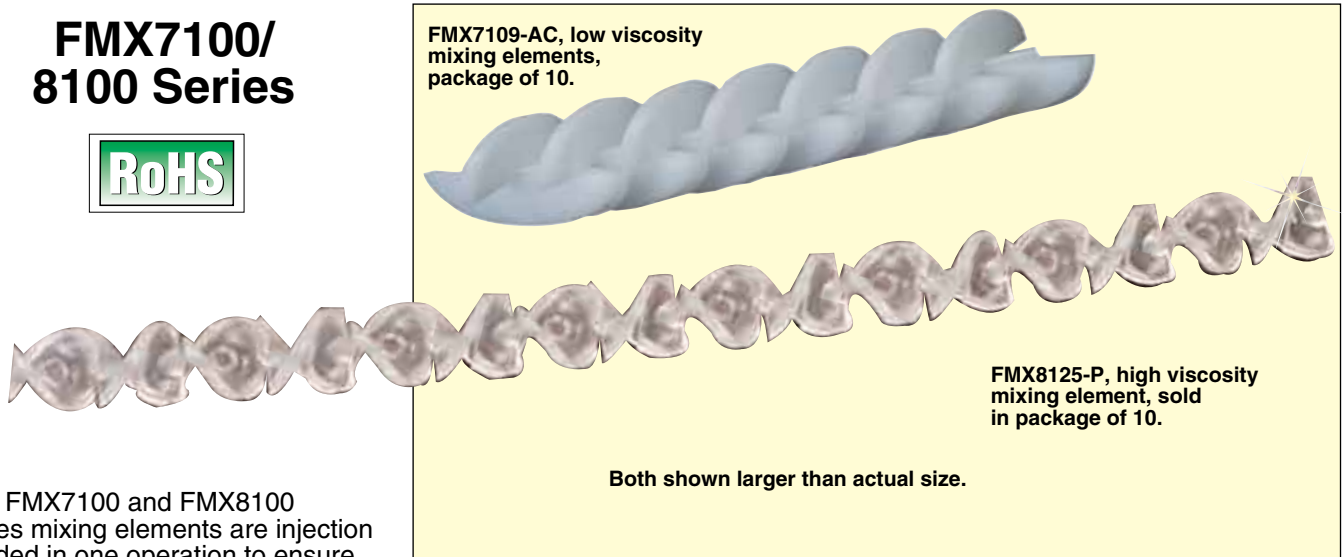
**DP** = Pressure Drop in psi

**L** = Laminar Factor—  
See Mixer Tables

**T** = Turbulent Factor—  
See Mixer Tables

# MIXING ELEMENTS

## FMX7100/ 8100 Series



The FMX7100 and FMX8100 series mixing elements are injection molded in one operation to ensure low cost with excellent quality. The FMX7100 series are specifically designed for low viscosity applications. The FMX8100 plastic spiral elements were developed for adhesive and sealant and other high viscosity mixing applications. The leading and trailing edges of the FMX8000 mixers are "knife edged" so that the unit flushes clean with less solvent—no flat leading edges to accumulate material.

Polyacetal is completely inert to most common solvents, such as MEK acetone, and methylene chloride for use in the Adhesive and Insulation industries. Its maximum service temperature is 250°F. Polyacetal is not recommended for service with bases or acids. Polypropylene has

excellent chemical resistance and a maximum service temperature to 200°F. Metal or plastic tubing may be used to house the mixing sections. However, to achieve maximum performance, the sections must fit snugly inside the tube. Accepted tolerance is no more than 2% greater than the mixer diameter.

To Order						
Model No. Package of 10	Diameter (inch)	Elements	Length (inch)	Factors		Material
				L	T	
<b>Low Viscosity Mixing Elements</b>						
FMX7103-AC	0.300	7	1.4	0.18	8.74	Polyacetal
FMX7106-P	0.687	7	4.2	0.015	0.276	Polypropylene
FMX7109-AC	0.903	7	5.3	0.0066	0.092	Polyacetal
FMX7109-P	0.906	7	5.3	0.0066	0.092	Polypropylene
FMX7120-AC	2.040	5	9.0	0.0003	0.0018	Polyacetal
FMX7120-P	2.050	5	9.0	0.0003	0.0018	Polypropylene
<b>High Viscosity Mixing Elements</b>						
FMX8112-AC	0.125	12	1.3	1.29	328.7	Polyacetal
FMX8112-P	0.125	12	1.3	1.29	328.7	Polypropylene
FMX8118-AC	0.187	16	2.5	0.5152	104.7	Polyacetal
FMX8118-P	0.187	16	2.5	0.5152	104.7	Polypropylene
FMX8124-AC	0.250	16	4.0	0.216	35.7	Polyacetal
FMX8125-P	0.251	16	4.0	0.216	35.7	Polypropylene
FMX8137-AC	0.370	12	3.9	0.048	4.27	Polyacetal
FMX8137-P	0.373	12	3.9	0.048	4.27	Polypropylene
FMX8149-AC	0.498	12	5.1	0.0192	1.23	Polyacetal
FMX8150-P	0.500	12	5.1	0.0192	1.23	Polypropylene

Ordering Examples: FMX7109-AC, polyacetal low viscosity mixing elements, package of 10.  
FMX8125-P, polypropylene high viscosity mixing elements, package of 10.

# ALL-PLASTIC STATIC MIXER ASSEMBLIES



Sizes:  
3/4 to 2"  
diameter

## FMX7200 Series

OMEGA® FMX7200 Series mixers are designed for efficient turbulent-flow mixing at low pressure drop. Ideal for admixing water/wastewater treatment chemicals, polymer dilution, and other low-viscosity applications. Mixing elements consist of a series of polypropylene baffles, and are mounted in a PVC housing with FNPT ends. CPVC and clear PVC housings available.

## FMX7200 Series



The FMX7200 Series is an effective answer to your mixing requirements. Operating in-line, with no moving parts, these mixers blend and disperse treatment chemicals into waste water streams. Compared to competitive mixers, its unique baffling design ensures complete mixing in a shorter length and lower pressure drop.

The FMX7200 Series is easily installed in new or existing process lines. They are available in pipe sizes from 3/4 to 2" diameter. Construction materials include PVC, and CPVC.

FMX7200 Series mixers are specially designed for waste water treatment, mixing additives, pH control, and polyelectrolyte dilution. These all-plastic mixers combine PVC or CPVC pipe with polypropylene internals. Certain sizes feature clipped sections, which eliminate sharp crevices where material can accumulate and plug up the mixer. Polypropylene has excellent chemical resistance to most acids and bases. The maximum service temperature of a standard FMX7200 Series mixer is 60°C (140°F) with PVC housing, 82°C (180°F) with CPVC housing.

### SPECIFICATIONS

**Section:** Polypropylene non-removable  
**Housing:** PVC or CPVC;  
schedule 80 up to and including  
1"; schedule 40 for 2"



FMX7221-CP (above) and FMX7251 (left) NPT threaded model, shown smaller than actual size.

### Pressure Limitations

Pipe Size	psig @ 24°C (75°F)
3/4"	690
1"	630
2"	200

To Order							
Model No. (PVC)	Model No. (CPVC)	Dia. (inch)	No. of Elements	Ends FNPT (inch)	Length mm (inch)	Factors	
						L	T
—	FMX7221-CP	0.687	7 clipped	3/4	178 (7.0)	0.015	0.24
FMX7222	—	0.687	14 clipped	3/4	267 (10.5)	0.03	0.48
FMX7232	—	0.906	14 clipped	1	320 (12.6)	0.013	0.16
FMX7251	FMX7251-CP	2.05	5	2	287 (11.3)	0.0003	0.0016

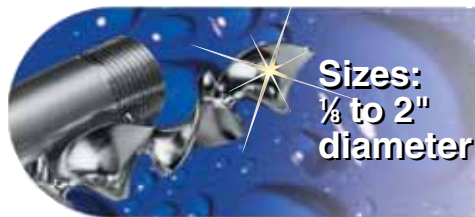
Comes complete with PVC housing and PVC 150# Van Stone SlipON flanged ends, internal mixing elements are CPVC material.

**Ordering Examples:** FMX7221-CP, 3/4 FNPT, 7 clipped elements.

FMX7251, 2 FNPT, 5 clipped elements.

# ALL STAINLESS STEEL STATIC MIXERS

## With Optional PFA-Coated Elements



Sizes:  
1/8 to 2"  
diameter

### FMX8400 Series

OMEGA FMX8400 Series mixers offer efficient mixing of low or high viscosity fluids at low pressure drop. Also ideal for two-phase (gas-liquid) mixing and blending of gases. Elements consist of a series of left and right helixes fabricated from 316 SS. 304 SS housing is corrosion-resistant, designed for high pressure and high temperature service. MNPT ends ensure easy installation.

## FMX8400 Series



FMX8400 Series pipe mixers feature 304 SS piping (schedule 40 nominal) with 316 SS elements. For routine maintenance, the elements can be pushed out and cleaned.

The leading and trailing edges of the mixers are "knife edged" to flush clean with less solvent, having no flat leading edges to accumulate material.

The FMX8400 Series consists of effective motionless mixers. When combined with metering pumps, these mixers replace expensive treatment tanks and dynamic mixers. Consider these advantages: zero maintenance, low cost, easy installation, and low energy consumption.

Typical applications include laminar or turbulent blending, liquid/gas contacting, and enhanced heat transfer. The mixing process is modular: the more difficult the application, the greater the number of elements required.



FMX8481S (NPT threaded model), shown actual size.

### 316 SS Elements

To Order						
Model No.	ID (inch)	No. of Elements	Ends MNPT	Length (inch)	Factors	
					L	T
FMX8442S	0.28	12	1/8	5.4	0.1176	12.2
FMX8451S	0.37	6	1/4	3.7	0.0237	1.9
FMX8452S	0.37	12	1/4	7.0	0.0474	3.8
FMX8462S	0.51	12	3/8	9.5	0.0184	1.1
FMX8481S	0.64	6	1/2	5.7	0.0049	0.22
FMX8482S	0.64	12	1/2	11.0	0.0098	0.44
FMX8412S	0.80	12	3/4	14.7	0.0046	0.08
FMX8413S	1.06	6	1	9.5	0.001	0.024
FMX8414S	1.06	12	1	18.5	0.002	0.048
FMX8415S	1.61	6	1 1/2	14.0	0.0002	0.004
FMX8421S	2.07	6	2	17.5	0.0001	0.0013

Ordering Example: FMX8481S, 316 SS element mixer.

### FMX8400 Pressure Limitations

Pipe Size (in)	psig @ 24°C (300°F)
1/8	8750
1/4	8500
3/8	7250
1/2	7250
3/4	6000
1	4500
1 1/2	3000
2	2500

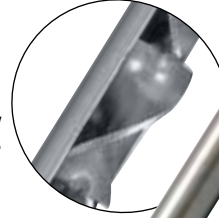
# STAINLESS TUBE AND SPIRAL SANITARY MIXERS

## FMX9600 Series



The FMX9600 Series spiral mixers are designed for high-pressure applications such as two component adhesives and sealants. The mixers consist of a series of left and right hand spiral elements which have been "edge-sealed" into a tube. The spiral tube mixer is available in four diameters and with 21 to 32 elements. The elements have been microbrazed along their complete length and cannot be removed from the tube. Consider the advantages of this all-stainless steel assembly: the moderate price offers significant savings over competitive mixers, the contour of the elements ensures that the mixer flushes clean with less solvent, and the tube mixers are manufactured with heavy walled tubing, which resists warpage during furnace cleaning and increases the life of the mixer.

Inset to show detail.



FMX9604, shown actual size.

FMX9611, shown actual size.

### SPECIFICATIONS

**Elements:** 316 stainless steel, non-removable

**Housing:** 304 stainless steel with plain ends

To Order							
Element			Housing				
Model No.	Diameter mm (inch)	Mixing Elements	Length cm (inch)	Outside Dia. mm (inch)	Pressure Limitation		L Factor to Calc. Pressure Drop
					psi@300°F	bar@150°C	
FMX9603	2.87 (0.113)	27	19.05 (7.50)	4.75 (0.187)	6900	476	3.180
FMX9604	4.75 (0.187)	21	17.78 (7.00)	6.35 (0.250)	4200	290	0.540
FMX9605	4.75 (0.187)	27	23.50 (9.25)	6.35 (0.250)	4200	290	0.700
FMX9608	7.42 (0.292)	27	35.56 (14.00)	9.53 (0.375)	3600	248	0.110
FMX9611	10.62 (0.418)	32	62.87 (24.75)	12.70 (0.500)	2800	193	0.077

Supplied with plain ends, the elements are edge sealed to the housing to handle the mixing of high pressure or highly viscous materials. Elements are 316 SS and the housing is 304 SS.

**Ordering Examples:** FMX9604, spiral mixer, 4.75 mm (0.187").

FMX9611, spiral mixer, 10.62 mm (0.418") diameter.

# POLYACETAL STATIC MIXER ASSEMBLIES

## FMX8200 Series



The Series FMX8200 disposable spiral mixers are ideal for adhesives or other high viscosity applications. The leading and trailing edges of the mixers are “knifed edged” to flush clean with less solvent—no flat leading edges to accumulate material.

### SPECIFICATIONS

**Max Pressure Drop:** 250 psi

**Element:** Polyacetal

**Housing:** Nylon plain ends

### Pressure limitation

OD	PSIG @ 75°F
0.187	580
0.250	430
0.375	600
0.500	460
0.625	350



FMX8263, sold in package of 10

FMX8234, sold in package of 10

FMX8213, sold in package of 10

All models shown smaller than actual size.

To Order							
Model No. Polyacetal Package of 10	Diameter (inch)	Elements	Length (inch)	O.D.	Factors		Material
					L	T	
FMX8213	0.125	24	2.8	0.187	2.58	657.4	Polyacetal
FMX8214	0.125	30	3.5	0.187	3.23	821.7	
FMX8223	0.187	24	4.1	0.250	0.7728	157.1	Polyacetal
FMX8224	0.187	32	5.4	0.250	0.9660	209.4	
FMX8233	0.250	24	6.5	0.375	0.3240	53.6	Polyacetal
FMX8234	0.250	32	8.5	0.375	0.4320	71.4	
FMX8251	0.370	12	7.5	0.500	0.0480	4.27	Polyacetal
FMX8253	0.370	24	11.5	0.500	0.0960	8.54	
FMX8254	0.370	30	13.5	0.500	0.1200	10.7	
FMX8262	0.498	18	11.1	0.625	0.0288	1.85	Polyacetal
FMX8263	0.498	24	13.5	0.625	0.0384	2.46	

**Ordering Examples:** FMX8213, plain ends, 24 elements, package of 10.

FMX8234, plain ends, 32 elements, package of 10.