# STATIC MIXERS
## A Technical Introduction

TRODEKS®


## 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 to1000 | 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.*

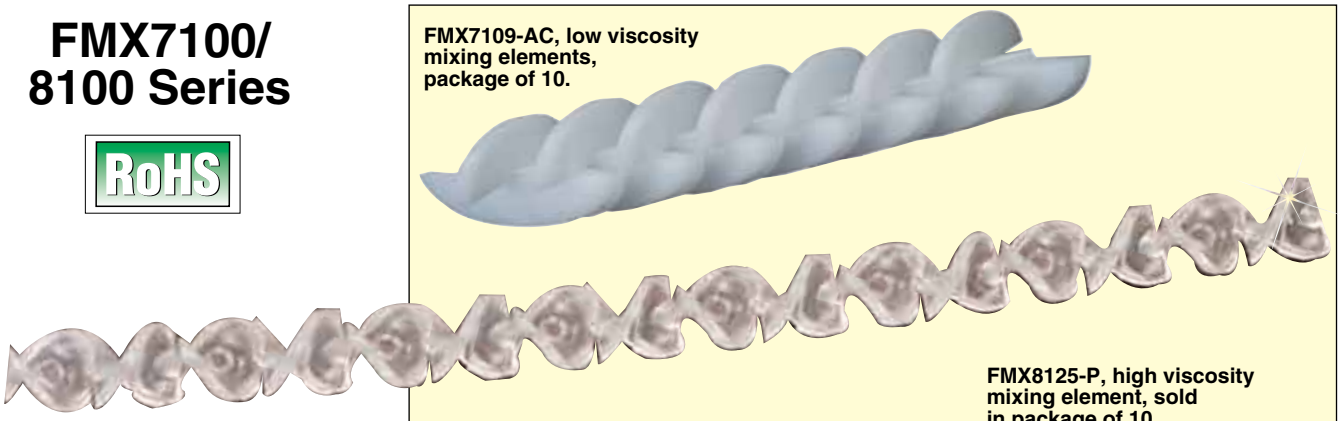
### Symbols

**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

RoHS



FMX7109-AC, low viscosity mixing elements, package of 10.

FMX8125-P, high viscosity mixing element, sold in package of 10.

Both shown larger than actual size.

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.

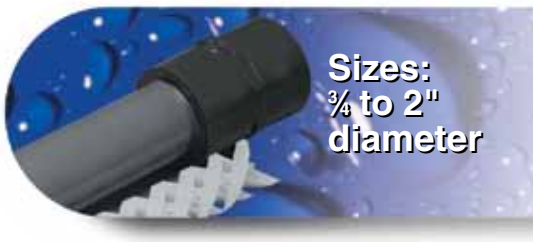
Polyacetal is completely inert to most common solvents, such as MEK acetone, and methylene chloride for use in the Adhesive and Insulation industries. Its maximum service temperature is 250°F. Polyacetal is not recommended for service with bases or acids. Polypropylene has excellent chemical resistance 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 L | Factors T | Material |
|---|---|---|---|---|---|---|
| **Low Viscosity Mixing Elements** | | | | | | |
| **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 |
| **High Viscosity Mixing Elements** | | | | | | |
| **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




**FMX7200 Series**
TRODEKS® 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

RoHS

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 ¾ 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.

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

### SPECIFICATIONS

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

### Pressure Limitations

| Pipe Size | psig @ 24°C (75°F) |
|---|---|
| ¾" | 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 | Factors T |
|---|---|---|---|---|---|---|---|
| — | **FMX7221-CP** | 0.687 | 7 clipped | ¾ | 178 (7.0) | 0.015 | 0.24 |
| **FMX7222** | — | 0.687 | 14 clipped | ¾ | 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,** ¾ FNPT, 7 clipped elements.*
***FMX7251,** 2 FNPT, 5 clipped elements.*

# ALL STAINLESS STEEL STATIC MIXERS
## With Optional PFA-Coated Elements


### FMX8400 Series

TRODEKSFMX8400 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

RoHS

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 | Factors T |
|---|---|---|---|---|---|---|
| **FMX8442S** | 0.28 | 12 | ⅛ | 5.4 | 0.1176 | 12.2 |
| **FMX8451S** | 0.37 | 6 | ¼ | 3.7 | 0.0237 | 1.9 |
| **FMX8452S** | 0.37 | 12 | ¼ | 7.0 | 0.0474 | 3.8 |
| **FMX8462S** | 0.51 | 12 | ⅜ | 9.5 | 0.0184 | 1.1 |
| **FMX8481S** | 0.64 | 6 | ½ | 5.7 | 0.0049 | 0.22 |
| **FMX8482S** | 0.64 | 12 | ½ | 11.0 | 0.0098 | 0.44 |
| **FMX8412S** | 0.80 | 12 | ¾ | 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 | 1½ | 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**

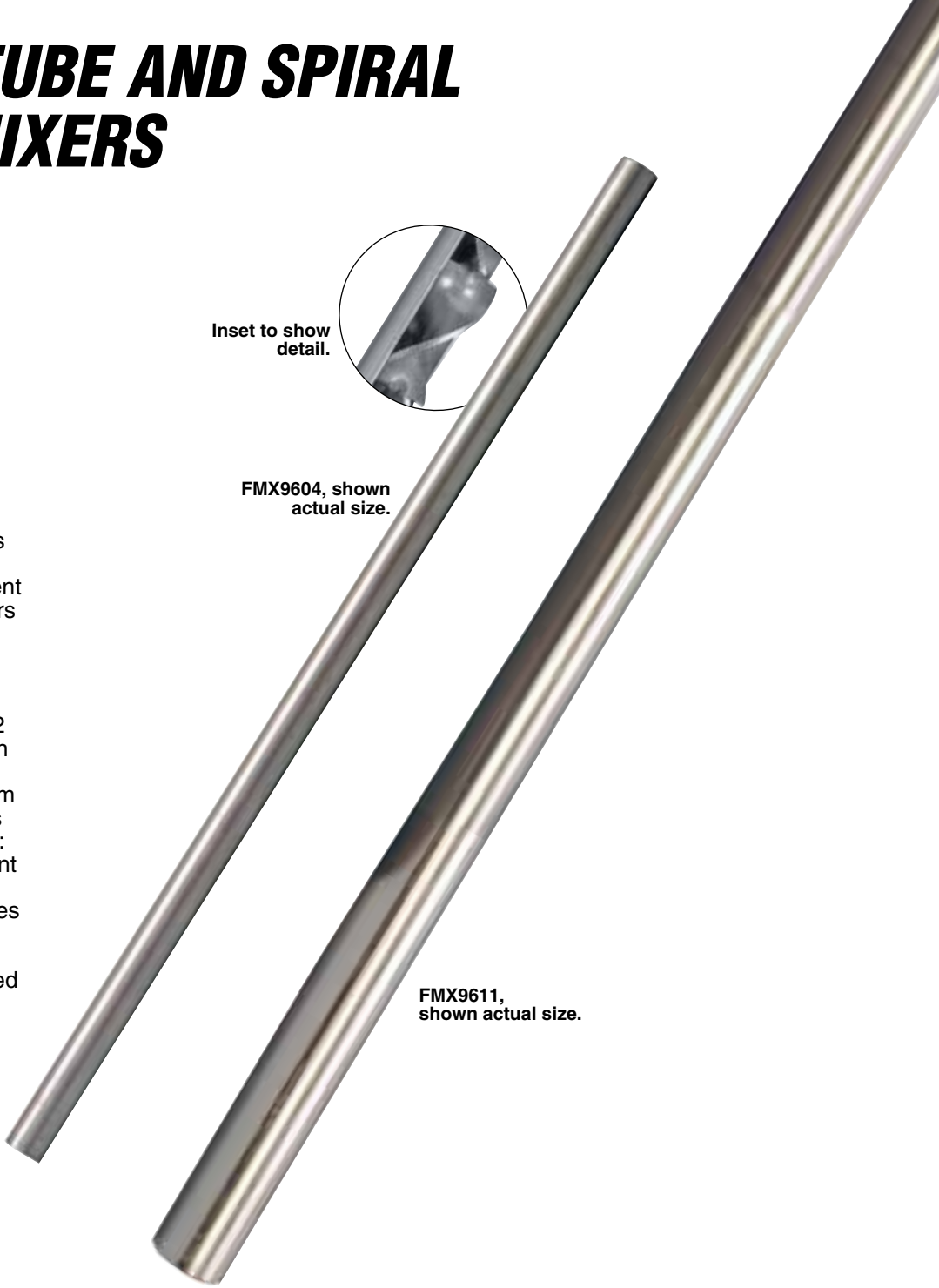
| Pipe Size (in) | psig @ 24°C (300°F) |
|---|---|
| ⅛ | 8750 |
| ¼ | 8500 |
| ⅜ | 7250 |
| ½ | 7250 |
| ¾ | 6000 |
| 1 | 4500 |
| 1½ | 3000 |
| 2 | 2500 |

L

# STAINLESS TUBE AND SPIRAL SANITARY MIXERS

## FMX9600 Series

RoHS




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 nicrobrazed 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.

### 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 psi@300°F | Pressure Limitation bar@150°C | L Factor to Calc. Pressure Drop |
| **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

1 YEAR WARRANTY

The Series FMX8200 disposable spiral mixers are idea 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.


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.

### SPECIFICATIONS

**Max Pressure Drop:** 250 psi
**Element:** Polyacetal
**Housing:** Nylon plain ends

**Pressure limitaion**

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

### To Order

| Model No. Polyacetal Package of 10 | Diameter (inch) | Elements | Length (inch) | O.D. | Factors L | Factors T | Material |
|---|---|---|---|---|---|---|---|
| **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 | |
| **FMX8263** | 0.498 | 24 | 13.5 | 0.625 | 0.0384 | 2.46 | Polyacetal |

***Ordering Examples: FMX8213,*** *plain ends, 24 elements, package of 10.*
***FMX8234,*** *plain ends, 32 elements, package of 10.*