MIXMATE® SPECIFICATIONS

SELECTION

The MixMate® Polymer Feed System was designed to apply any polymer to a water supply for clarification purposes. We have designed the system so that it is simple to use, easy to clean, and flexible enough to adapt to a wide range of polymer choices and flow requirements. In general, the MixMate® works well with solution or emulsion polymers of all types, and is unique in its ability to serve low flow applications. **Customers who require low flows, need versatility, portability, or even just a basic system with good economy in mind, will obtain excellent results with a MixMate®.**

There are many thousands of polymers available for use in different applications. They are classified according to their type (solution, emulsion, Mannich), their charge (cationic, non-ionic, anionic), their charge density (low, medium, high), their molecular length (short, medium, long), and their molecular weight (low, medium, high). What will work best for you will depend upon the particular water or wastewater problems you have. Your chemical vendor will help determine this based on experience, trial and error, and specific jar testing. **Whatever that choice may be, there are bound to be alternative selections, so an adaptable system will be to your advantage.**

The MixMate® will work most efficiently from the middle of the selected flow range up, since the greater the flow velocity through the system, the greater the blending and activation of the polymer. Too great a pressure drop, however, can affect your final delivery and even cause the polymer to shear. **Finding the balance between the highest possible velocity and the largest allowable pressure drop will result in the best performing system.** Knowing this, there are several key points to consider in correctly selecting a MixMate® for your polymer application:

1. What is the part per million range of polymer solution you would like to apply to your water or wastewater stream for maximum effectiveness?
2. What will the minimum and maximum flow rates of that water stream be?
3. Is the polymer you're planning to use a solution or emulsion product?
4. What is the best concentration, in percent, of the neat polymer to put it into solution in the primary make-up water flow?
5. If secondary dilution water is needed to make down the polymer to its most cost effective application strength (as is often the case with emulsions), what is the best final concentration in percent?
6. What is the available pressure of the MixMate® water supply?
7. How much pressure do you need after the MixMate® to deliver the made-down polymer solution to your point of injection?

With the information above, we can determine the size and number of mixer elements to use, eductor nozzle size, and what number and size of flowmeters to employ in your system. **If you don't have all the answers to these questions, give us a call and we'll try to clarify things to select the most flexible MixMate® for your service.**

Furrow Pump • P.O. Box 1849 • 8525 S.W. St. Helens Drive • Wilsonville, OR 97070
(503) 682-4411 • Fax(503) 682-4421

SPECIFICATIONS

The size of the MixMate® best suited to your application is really determined by the range of the primary flowmeter you select, which depends upon the type and concentration of the polymer you wish to feed. And, more specifically, are you planning to work in the upper or lower half of that flow range? The flowmeters, for the most part, have a 10:1 turndown, while the nozzle/mixer combinations perform best over a somewhat narrower window. The simplified formulas and tables below, in graphical form, would show that all of the flow velocities and pressure drops are exponential. Please note that the mixer pressure drop figures are for one element, and the number shown would need to be doubled for a standard two element system.

Nozzle Flow Velocity

$$FPS = \frac{Q^2}{2.45 \times D_1^2}$$

Nozzle Pressure Drop

$$\Delta P = \frac{(FPS \times 0.13)^2}{2.31}$$

Mixer Flow Velocity

$$FPS = \frac{Q^2}{2.45 \times D_2^2}$$

Mixer Element Pressure Drop

$$\Delta P = \frac{0.0033 \times Q^2 \times K \times N}{D_2^4}$$

Symbols

FPS	Flow Velocity in Feet Per Second
Q	Flow Rate in Gallons Per Minute
D_1	Eductor Nozzle Diameter in Inches
ΔP	Pressure Drop in Pounds Per Square Inch
K	Turbulent Flow Constant
N	Number of Mixer Element Stages
D_2	Mixer Element Diameter in Inches

Nozzle Specifications

D_1	1/32", 1/16", 1/8", 1/4", 1/2", 3/4", 1"

Mixer Specifications

Nominal D_2	Actual D_2	K	N
1/4"	0.30	2.9	7
3/8"	0.43	2.9	7
3/4"	0.68	2.3	7
1"	0.90	2.3	7
2"	2.06	1.8	5

Nozzle Flow Velocity (FPS) / Pressure Drop (ΔP) At Different Flow Rates

Nozzle Size	Gallons Per Minute										
	0.025	0.10	0.25	0.50	1.0	2.0	5.0	10.0	20	50	100
1/32"	10/0.7	42/12	104/76								
1/16"	3/0.1	11/1	26/5	53/20							
1/8"			7/0.3	13/1	26/5	51/18					
1/4"					7/0.3	13/1	33/8	49/17			
1/2"							8/0.4	16/2	32/7	82/47	
3/4"								7/0.3	15/2	36/9	73/37
1"									8/0.4	20/3	41/12

Mixer Element Flow Velocity (FPS) / Pressure Drop (ΔP) At Different Flow Rates

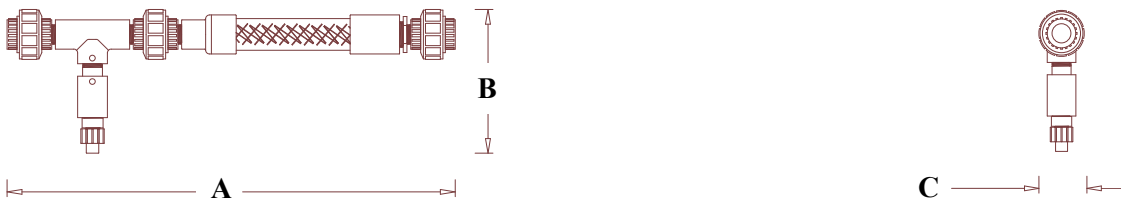
Mixer Size	Gallons Per Minute										
	0.025	0.10	0.25	0.50	1.0	2.0	5.0	10.0	20	50	100
1/4"	0.1/0.1	0.4/0.1	1/0.5	2/2	4/7	9/30					
3/8"			0.5/0.1	1/0.5	2/2	4/8	11/48				
3/4"				0.2/0.1	0.9/0.5	2/1	4/13	7/29			
1"					0.5/0.1	1/0.3	2/2	5/8	10/32		
2"							0.5/0.1	1/0.2	2/0.7	5/4	10/16

MIXMATE® SPECIFICATIONS

Although the specific nature of the polymer you use will make the final decision, experience tells us that the MixMate® will generally work best with a nozzle flow velocity between ten and forty feet per second, and a mixer flow velocity between one and ten feet per second. The MixMate® converts the force of the pressure in your water supply into flow velocity, which in turn does the work required to supply the energy needed to activate and blend the polymer solution. The table below shows the most commonly used combinations of flowmeter range, nozzle and mixer element size, the number of elements employed, and the FPT connections.

Flowmeter Range	Nozzle Size	Element Size	Element Number	FPT Size
0.025 to 0.25 GPM	1/16"	1/4"	2	1/2"
0.1 to 1.0 GPM	1/8"	1/4"	2	1/2"
0.2 to 2.0 GPM	1/8"	3/8"	2	1/2"
0.5 to 5.0 GPM	1/4"	3/4"	2	1/2"
1.0 to 10 GPM	1/4"	1"	2	3/4"
20 to 100 GPM	3/4"	2"	2	1 1/2"

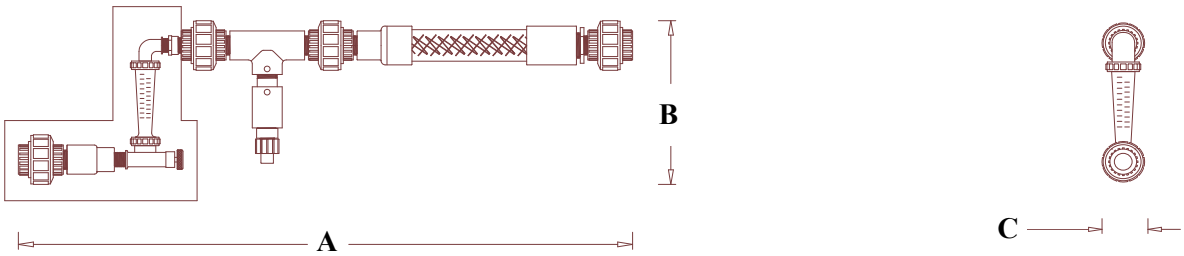
MIXMATE® BASIC SYSTEM



System Dimensions

Element Size	A_1 One Element	A_2 Two Elements	B	C
1/4"	16 1/4"	17 1/2"	7"	2"
3/8"	17 1/4"	19 1/4"	7"	2"
3/4"	17 1/2"	21"	7"	2"
1"	17 3/4"	22"	7 1/2"	2 1/2"
2"	27 1/2"	35"	9"	3 1/2"

MIXMATE® WITH ONE FLOWMETER

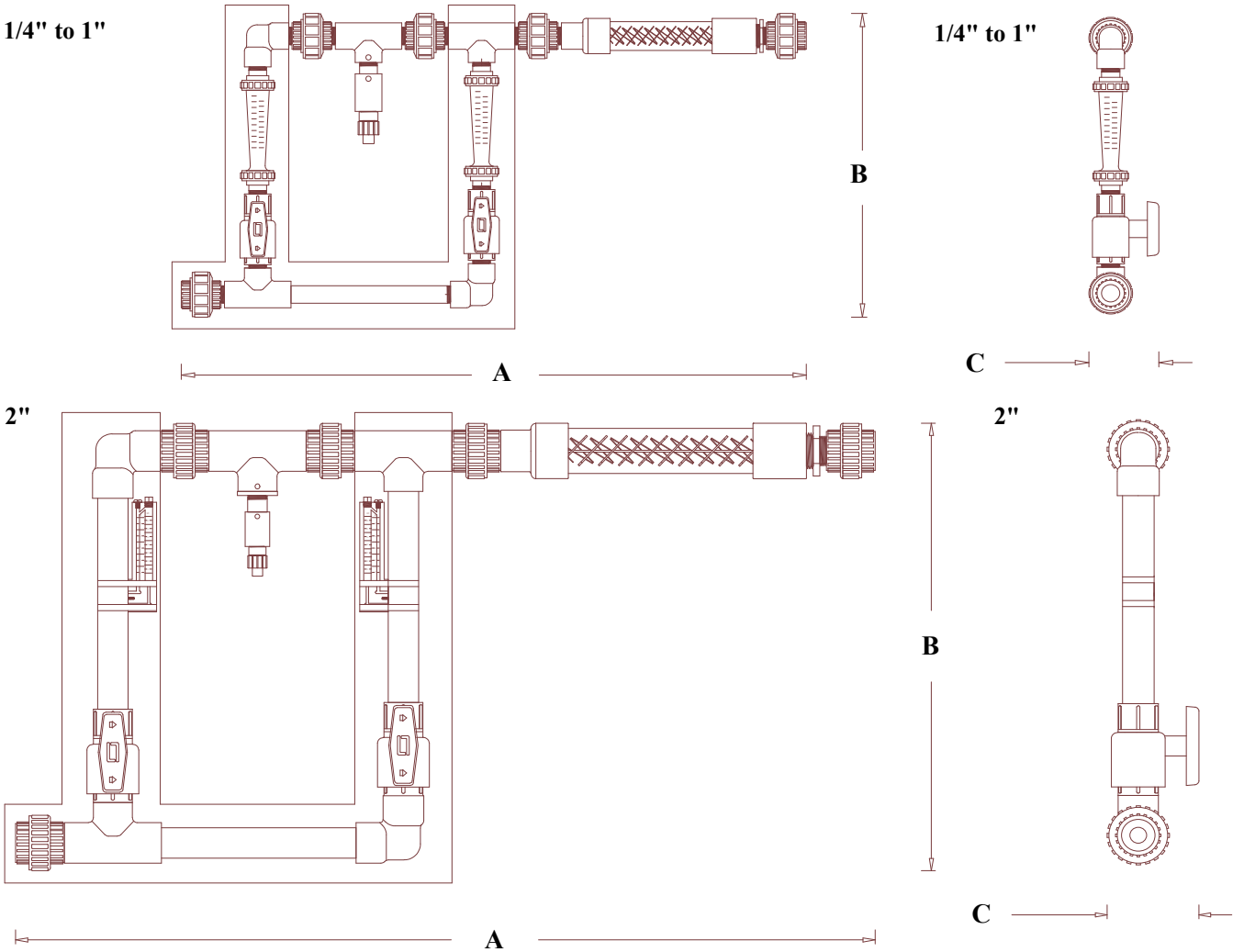


System Dimensions

Element Size	A_1 One Element	A_2 Two Elements	B	C
1/4"	21 1/2"	22 3/4"	7 1/2"	2"
3/8"	22 1/2"	24 1/2"	7 1/2"	2"
3/4"	23"	26 1/2"	7 1/2"	2"
1"	26 1/2"	30 3/4"	8 1/2"	2 1/2"
2"	35 1/4"	42 3/4"	27"	5 1/2"

SPECIFICATIONS

MIXMATE® WITH TWO FLOWMETERS



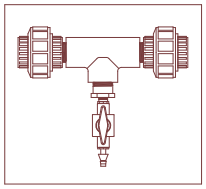
System Dimensions

Element Size	A_1 One Element	A_2 Two Elements	B	C
1/4"	26 1/4"	27 1/2"	13 1/4"	3 1/4"
3/8"	27 1/4"	29 1/4"	13 1/4"	3 1/4"
3/4"	27 1/2"	31"	13 1/2"	3 1/4"
1"	29"	33"	16 1/4"	4"
2"	43 1/2"	51 1/2"	27"	5 1/2"

OPTIONS

MixMate® Options are shown in the Model Numbering Guide and the Price List. Most customers find the Sample Valve Assembly to be a convenient way to test their made down polymer. Also, it is possible to use pressure measurements to calculate actual flow velocities through the nozzle and mixer assemblies, to determine system efficiency and whether or not any field changes need to be made to improve performance. The formula needed to calculate flow velocity is given below.

Sample Valve Assembly



Nozzle/Mixer Flow Velocity

$$FPS = \frac{\sqrt{2.31 \times \Delta P}}{0.13}$$

Pressure Gauge Assembly