



**UET Mixers**  
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**PAC Static Mixers**

**Bulletin 13-200**  
08/06/2018  
Supersedes: 03/22/2013

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# **Static Mixer IO&M Manual**

## **PAC Static Mixer**



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## General Information

The PAC mixer is composed of a set of partial mixing elements which are generally fixed inside a piece of commercial or special made pipe. Attached to the pipe may be end connections such as flanges, threads, or tri-clamps. As part of the mixer, injectors, jackets, and other fittings may be incorporated.

Some PAC models will consist of a wafer only and is designed to be sandwiched in-between two flanges.

Though constructed in accordance with strict industrial standards, it is important to adhere to a few precautions so as to avoid difficulties resulting from improper handling, installation, and operating procedures. Use the following check list as a guide to trouble free service.

### Inspection, Storage, & Shipping Claims

- After uncrating your mixer, please check for shipping damage and report any damage immediately to the responsible carrier and to the customer service department of our factory.
- Shipping package contents must be inspected for conformity with your order and for proper unit quantities. Any discrepancies must be reported to the factory service department within one week of receipt. Mixers should be stored indoors in clean, well ventilated storage areas. Care should be taken to see that excessive loads are not applied to carbon steel external surfaces prior to shipment. For extended storage in harsh environments additional coating or protection may be required.
- Mixers must be handled with appropriate care. Careless handling may result in permanent damage. Field modifications (cutting to length, addition of fittings, etc.) to static mixers should never be made without prior consultation with your local representative or the factory.

### Operating Guidelines

- When moving a mixer, always lift it - do not drag or push it. If the mixer is too large to lift manually, use a web sling or two heavy cloth straps. Chains, cables, and fork lifts in direct contact with the mixer could damage it.
- Operate the mixer within the lowest temperature/pressure limits specified for either the housing or end connections.
- Bolt flanged mixer to existing pipe at one end, and bring a new flanged pipe up to the other end of the mixer. Do not try to install the mixer between two existing flanged pipes. Follow proper flange tightening procedures; and use recommended gasketing material as required for the intended service. This can be especially critical for plastic mixers (i.e. FRP, PVC, CPVC).
- The mixer is to be operated with the injector on the downstream side of the flow.
- PAC static mixers can be located anywhere in your piping systems and may be installed vertically, horizontally, or any intermediate angle. Where the mixer is used to achieve uniformity, such as in sampling, or prior to manifolds and where disengagement of phases can occur, the mixer should be located no more than 1-2 pipe diameters from the desired result.



## General Information (continued)

Before installation, purge process lines to remove foreign materials and debris. In most new construction or modifications to process piping there is a high probability of foreign material within the system, which if not removed could damage the mixer.

### Injection and Metering

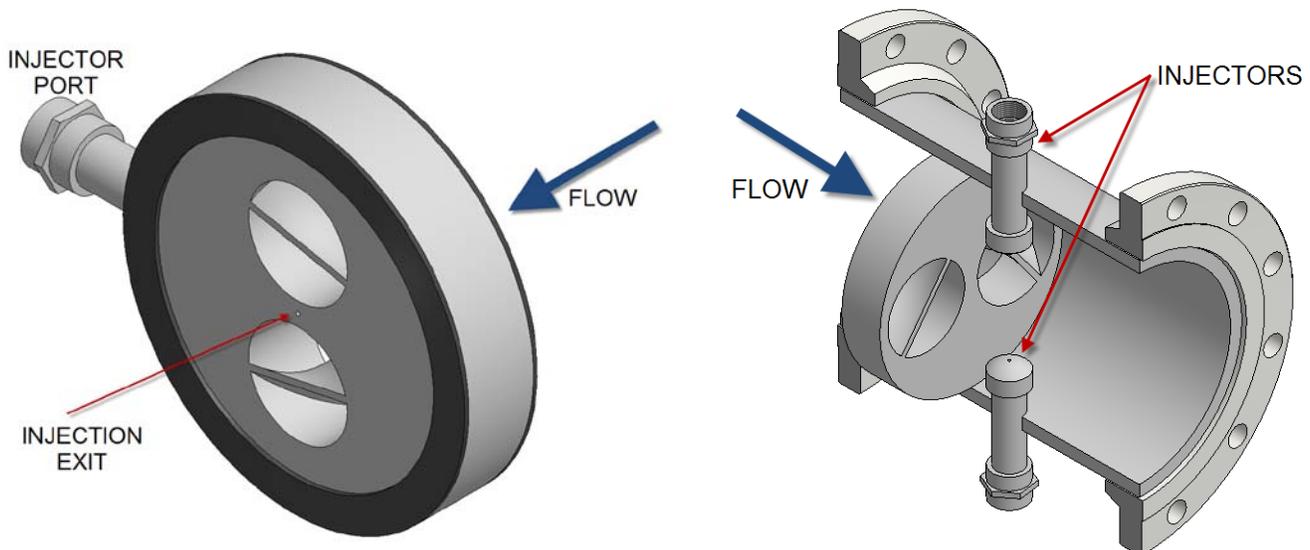
Injection of side streams before a static mixer can be very important to the operation of the mixer, especially where large viscosity, density, or volumetric differences exist. The maximum ratios advised without special engineering from the factory are:

<b>Volumetric Ratio</b>	<b>1000:1</b>
<b>Viscosity Ratio</b>	1000:1
<b>Density Ratio (Liquids)</b>	2:1
<b>Density Ratio (Gases)</b>	5:1

The PAC static mixer is a radial mixer having characteristics approaching a plug flow device, therefore a minimum amount of back-mixing is achieved. In order to maintain this characteristic, excessive surging or pulsating of the feed components should be minimized to avoid non-uniformity of the final product. This can be especially important with certain applications including addition of a caustic or acid for pH control or blending of wide viscosity streams. It is therefore important that the upstream equipment including type of pump and injection method be considered when designing mixer systems.

If reciprocating piston or diaphragm pumps are used to meter in chemical side streams, an accumulator should be installed before flow discharge to the mixer in order to maintain a steady discharge flow and to dampen the pulsating effect.

When used, injection ports for chemical side stream addition should be located immediately downstream of the mixer. In addition, the injector could enter through the wafers center usually through a small port hole facing downstream. The preferred injection methods are pictured below. When strong acids are added through an injector provided by UET, a Teflon or Kynar insert may be included which needs to be installed in the nozzle prior to plumbing the line to the nozzle.





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## General Information (continued)

### Maintenance

PAC static mixers require no routine maintenance other than sealing joint care typical to the rest of the piping system. Replace gaskets each time the mixer is removed.

### Spare Parts

Because the PAC static mixer inherently does not have any moving parts, a parts list is not applicable. Where mixers are used for extremely heavy duty applications and where down time must be minimized, we highly recommend that a complete spare static mixer be purchased for inventory or storage.

### FRP Bolt Torque Recommendations

When installing a flanged FRP mixer, do not use the flange bolts to bull the mating flange connection to the mixer. Where misalignment gaps exist between mating flanges and the mixer, repositioning of the mating connection is recommended before assembly and installation.

Soft, resilient, full face, flat gaskets (1/8 or 3/16" thick) with a Shore A durometer rating of 40 to 50 should be used.

Some sizes of FRP mixers are furnished with flat face socket flanges which have an "O" ring groove to be used with either an "O" ring or a flat gasket.

Recommended mounting hardware is a hex head bolt, hex-nut, and two flat washers per bolt hole. Lubricate the bolt thread, the underside or the head, and both faces of each washer. Assemble all hardware finger tight. When installing flanged Fiberglass mixers, use the following recommended bolt torques to avoid flange distortion or fracture. Bolts should be tightened in a normal cross hatch sequence, and in increments of 25 percent of the recommended bolt torque. Load all bolts at each increment before proceeding to the next bolt.

NOTE: Some wafer style mixers are made without flanges and will have an adhered gasket to each side of the wafer. The wafer should be sandwiched between an existing flanged connection pipe and another abutting pipe flange. Center the wafer in the connection while hand tightening all bolts. Follow same cross hatch tightening procedure as stated above.



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### General Information (continued)

<b>Pipe I.D. Inches</b>	<b>Recommended Bolt Torque in Foot Pounds at Pressure Ratings</b>			
	<b>25 PSI</b>	<b>50 PSI</b>	<b>100 PSI</b>	<b>150 PSI</b>
<b>1</b>	5	5	8	8
<b>1.50</b>	5	5	10	10
<b>2</b>	5	5	10	10
<b>2.50</b>	5	5	10	10
<b>3</b>	5	10	10	10
<b>4</b>	5	10	10	10
<b>6</b>	5	10	10	15
<b>8</b>	10	10	17	25
<b>10</b>	10	10	20	30
<b>12</b>	10	15	30	40
<b>14</b>	10	20	40	60
<b>16</b>	10	20	40	60
<b>18</b>	15	30	60	90
<b>20</b>	15	30	60	90
<b>24</b>	25	45	95	140
<b>30</b>	30	55	105	----
<b>36</b>	40	85	155	----
<b>42</b>	50	95	190	----