Kenics® Static Mixers

Kenics Static Mixer Installation, Operation and Maintenance Manual

Model:

ULTRATAB (UTS, UTA, & UTR) MIXERS

Unit Serial Number:

Equipment Number:

Manual Number:

870

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THANK YOU FOR PURCHASING A KENICS STATIC MIXER. THIS MANUAL SHOULD BE READ IN CONJUNCTION WITH THE GENERAL ARRANGEMENT DRAWING SUPPLIED WITH YOUR MIXER.

SAFETY:

- The surfaces of the mixer may reach dangerous temperatures when carrying hot or very cold fluids!
- Do not operate the mixer outside the pressure/temperature ratings given on the mixer nameplate. Ensure that the pipe-work system is fitted with suitable safety devices that are rated to protect the mixer and the pipe-work system.
- Do not modify the mixer in any way without consulting Chemineer. If the mixer is modified, then the rating on the nameplate may no longer be valid.
- Do not operate if any form of damage is evident.
- Pipework shall be installed such that the risk of overstressing from inadmissible free movement or excessive forces being produced, e.g. on flanges, connections, bellows or hoses, is adequately controlled by means such as support, constraint, anchoring, alignment and pre-tension.
- Take precautions when handling. Use suitable lifting equipment where necessary. This mixer may contain loose, removable internals that may be heavy and/or sharp.
- When installing the mixer use gaskets and fasteners that are suitable for the type of flange used.
- Observe site safety instructions relating to the system in which the mixer is installed.
- Ensure the materials of construction are suitable for the process conditions. Where a chemical reaction can occur in the mixer ensure that the specified design conditions have taken this into account.
- No corrosion allowance or allowance for externally applied loads or for fatigue conditions has been incorporated into the design unless stated.
- Fluids under pressure can be very dangerous. Take suitable precautions.
- Before working on the mixer, ensure the system is depressurized, cleaned and cool.
- It is recommended that a hydrostatic test of the system be carried out before putting it into service.
- Take appropriate precautions when handling hazardous fluids.

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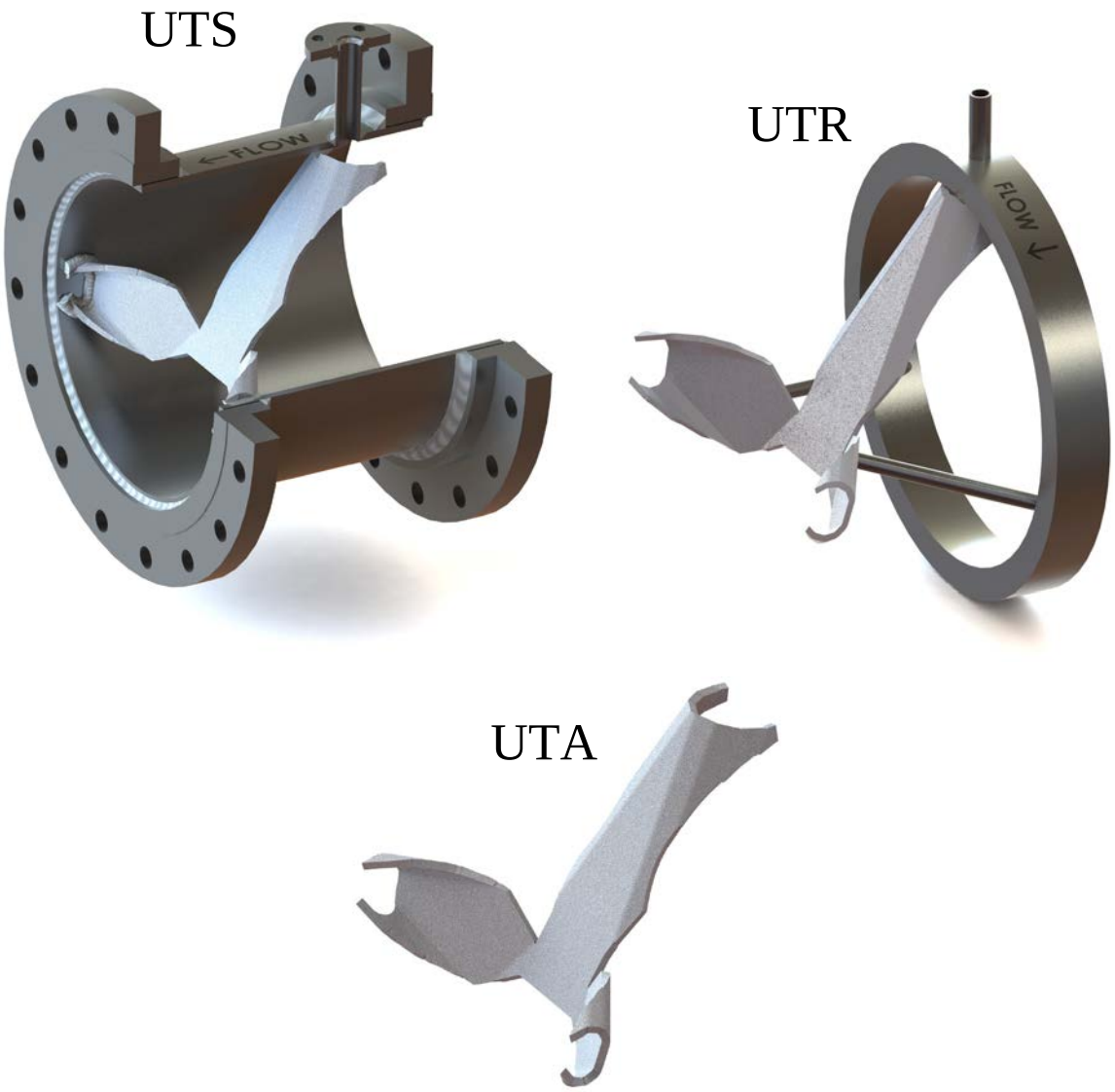

FIGURE 1. UTS, UTR, & UTA MIXERS

1.0 GENERAL

Your Kenics Mixer is a rugged piece of process mixing equipment manufactured to demanding design and quality standards. This manual has been provided to assist you in the storage, handling, installation and operation of your mixer and should be reviewed carefully before removing the mixer from the package. Adherence to precautions will assure a highly satisfactory installation and years of trouble free service.

The few difficulties encountered with Kenics Mixers often result from improper handling, installation and operating procedures. The following quick check list

should assist you in avoiding any difficulties:

- ☐ Flanged mixers should not be bolted into systems where mis-alignment or gaps exist between the mixer and mating flanges. Follow standard flange bolt tightening instructions common to the pipe-work system that the mixer is fitting into and use the appropriate torque for the materials of the bolts. One possible source for bolting and torqueing guidelines is ASME PCC-1 "*Guidelines for Pressure Bolted Flange Assembly*". Customized mixers may require further considerations.

   CAUTION: DO NOT OVER TIGHTEN FLANGE BOLTS. USE RECOMMENDED BOLT TORQUE PROCEDURES TO AVOID FLANGE DISTORTION OR JOINT FRACTURE.

- ☐ Never use chains, cables or fork lifts in direct contact with the mixer. If the mixer is too large or heavy to be moved manually, use a web sling or two heavy cloth straps spaced at least ½ the mixer length apart. Lifting lugs, if provided, should be used. Never drag or push the mixer; always lift it. For the Ring Retained mixer designed to be sandwiched in between (2) flanges pay careful attention to ensure that the lifting straps do not contact the tab itself.
- ☐ Mixers should be operated within process and pressure/temperature limits specified. Consult your local representative or the factory prior to changing operating conditions.
- ☐ Injection of side streams prior to the mixer can be very important to the operation of the mixer where large viscosity or volumetric differences exist. Refer to the Operation Section of this manual or consult your local representative for specific recommendations.

For dimensional and construction information, refer to the equipment drawing supplied for this mixer.

2.0 INSPECTION AND/OR SHIPPING DAMAGE

Your Kenics Mixer was carefully packaged, crated or protected for shipment. The shipping container or package should be visibly inspected upon receiving. Any damage should be reported immediately and a claim filed with the responsible carrier. Your local Chemineer-Kenics representative or the factory Customer Service Department can assist you with any claims.

Shipping package contents should be inspected for conformity with the order and for proper unit quantities. Any discrepancies should be reported to the factory Customer Service Department within one week of receipt.

3.0 STORAGE AND HANDLING

All Kenics Mixers should be stored indoors in clean, well ventilated storage areas. Care should be taken to see that excessive loads are not applied to the mixer during storage. Sealing surfaces, including threads and flanges, should be protected. The original shipping container is adequate protection for most storage conditions. A rust preventative paint is applied to external carbon steel surfaces prior to shipment. For extended storage in harsh environments, additional coatings or protection may be required.

4.0 FIELD MODIFICATION TO KENICS MIXERS

No field modifications (cutting the length, addition of fittings, etc.) to Kenics Mixers should be made without prior consultation with your local representative or the factory.

5.0 OPERATION

There are a few special operating instructions required with Kenics Mixers. This mixer was designed for use in a specific flow regime: turbulent flows where the system Reynolds Number is greater than 10,000. You mixer was designed based on specific processing requirements and the most efficient operation will occur under these conditions. The mixer will, however, accommodate wide flow variations in *most* processes. Consult your local representative for specific recommendations or limitations.

The nameplate on your mixer and the equipment order drawing include product pressure and temperature rating information. These ratings should not be exceeded. For service conditions other than the specified ratings, consult your local representative.

6.0 MAINTENANCE

It is essential that periodic inspections occur to check for mechanical damage, corrosion, and erosion. Usually the mixer has similar or better strength and corrosion resistance than the line to which it is fitted. Note local concentrations of chemicals can cause increased corrosion rates in these areas. Where appropriate, carry out regular wall thickness and general condition inspection. Do not operate the line if the corrosion allowance is exceeded.

Kenics mixers require no routine maintenance other than sealing joint care typical to the rest of your piping system. To remove a flanged mixer, both ends of the mixer must be disconnected.

7.0 INSTALLATION

The Ultratab Spool mixer is designed such that the long central portion of the mixing element is to be aligned vertically. See Appendix A for a diagram that details the rules of thumb for installation.

Kenics mixers can be located anywhere in your piping system as long as the prospective location accounts for the upstream and downstream effects on the mixer. The Kenics UT mixer is a *vortex-shedding* mixer. The actual “mixing” does not take place within the flange-to-flange laying length that is purchased. The mixer actually creates an ordered flow pattern with vortices that will perform the mixing. This mechanism requires a minimum of three diameters of straight downstream piping following the outlet flange of the mixer. Predicted mixing will not occur without this downstream length. Consult your local representative for questions regarding piping layout.

Upstream of the mixer, one should ensure that there is an empty section of pipe with a length of approximately one to two pipe diameters prior to the mixing element. This location rule of thumb will prevent the mixing action from being affected by the adverse flow profiles created by elbows, restrictions, and obstacles in the line.

Before installation, purge process lines to remove foreign material 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 tab.

Our metal Ultratab mixers are designed for installation in commonly used piping systems and are available for welded, threaded and a variety of flanged installations. Refer to your equipment drawing for the specific end connection and hardware required by your mixer.

7.1 UTS INSTALLATION

7.1.1 FLANGED MIXERS

Mixers can be provided with raised face slip-on, raised face weld neck or lap joint flanges in all standard pressure ratings or drillings. Refer to your equipment order drawing for the type of rating of flange supplied.

Unless specified otherwise on the equipment order drawing, flange facing is either a serrated-concentric or a serrated-spiral with a surface finish between 125 and 500 micro-inches.

A wide variety of gasket materials can be used depending upon plant standards, materials being handled, or gasket supplier recommendations. Local gasket distributors should be contacted for specific recommendations.

Flanged mixers should fit snuggly into your piping system without gaps or misalignment at either end. It is poor practice to over-tighten flange bolts in order to compensate for misalignment or gaps in the piping system. Flange distortion or housing to flange joint fracture may result.

Sound engineering practice and plant standards should be followed in flange bolt tightening, especially in high pressure service or those employing special gasketing.

7.1.2 THREADED END MIXERS

Kenics mixers with threaded ends are provided with die cut NPT threads, which are cut to high quality standards. Little difficulty should be encountered in achieving sound; leak free joints if good pipe fitting practice is followed and mating threads are of equal quality. A high quality thread sealing compound will help assure leak free joints.

7.1.3 WELD-PREPPED OR PLAIN END MIXERS

Weld prepped mixers are supplied with standard 37.5° weld prepped ends for field installation of flanges or direct installation in the piping system.

Welders that are qualified for the class of service and materials specified should perform all field welding.

Plain end mixers are supplied for field beveling and welding, threading or other desired customer uses.

7.1.4 INJECTION PORT

If your unit has integral injection ports, take care to align the flanged port connection between flange bolt holes as required by feed piping. The mixer has been designed based on using this port. Consult your local representative before operating with a different injection method.

Standard AWWA flange gaskets, as used elsewhere in this system, should be used at this piping joint.

Injection velocity should be equal to the main flow velocity and the injector should finish flush to the wall and be positioned as close as possible to the large concave area touching the wall.

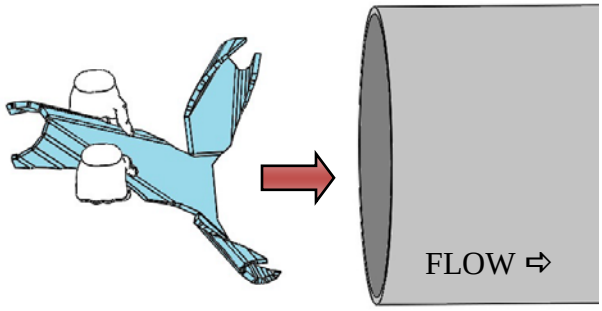

FIGURE 2. UTA Installation

Ensure that the UTA element is symmetrical about the vertical plane and that the long central portion of the element is upstream of the flow in the pipe. Let the arms of the Ultratab element rest inside the pipe and bring the long central portion up to contact the ID of the pipe.

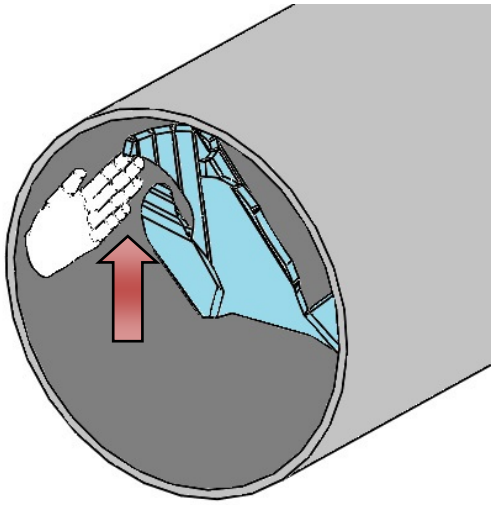

FIGURE 3. UTA Installation Positioning

Reposition as necessary to achieve desired depth in the pipe (allowing enough space for welding).

If to be used with an injector, ensure the top of the long central portion of the Ultratab element wraps around the injector.

Prior to welding, the element should be centered in the pipe diameter using removable shims. Welding procedures

7.2 UTR INSTALLATION

The UTR wafer mixer is designed to be sandwiched between two flanges. Gaskets should be used on both sides of the wafer. Refer to your equipment drawing for further installation details.

7.3 UTA INSTALLATION

UTA elements are supplied for field welding into the customer's housing. Downstream of the mixer, one should ensure that there is an empty length of pipe equal to at least three pipe diameters.

The UTA elements are manufactured with precise tolerances on the element diameters and are designed for a slip fit into appropriate size standard pipe which is within applicable ASTM specifications. For non-standard pipe or custom housings, elements are supplied to fit the minimum inside diameters as specified by the customer, without need for field trimming. Insert the UTA element into the pipe housing as shown in the figure.

should be in accordance with good welding practice for the material supplied. Welds should be applied all around the (3) branches where the Ultratab element contacts the wall of the pipe.

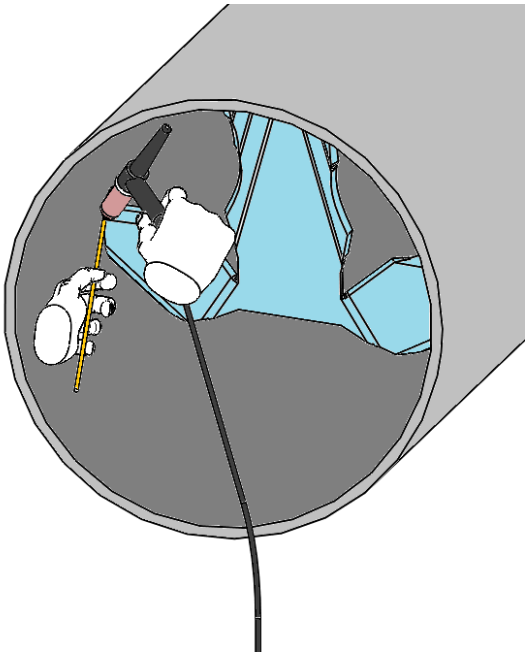

FIGURE 4. TIG Welding the UTA

The weld size should be approximately equal to the lesser of the wall thickness of the pipe or the thickness of the Ultratab element. Refer to your equipment drawing for further installation details.

APPENDIX A
GENERAL INSTALLATION RULES OF THUMB