



QUADRO® YTRON™ JET MIXER OWNER'S MANUAL

Customer:

Serial No.:

IMPORTANT DOCUMENTATION

**READ THE OWNER'S MANUAL
BEFORE OPERATING THIS MACHINE
OR CONNECTING TO THE
POWER SUPPLY**

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Important safety rules

Failure to follow these rules may result in serious personal injury or damage to machine.

Quadro strongly recommends that this machine NOT be modified. When using the machine, basic safety precautions should always be followed to reduce the risk of fire, electric shock and personal injury including the following.

1. **KNOW YOUR MACHINE.** Do not allow persons to operate the machine unless they have carefully read and understand these Safety Rules and all instructions in the Owner's Manual.
2. **LIFT MACHINE AS SHOWN ON INSTRUCTION SHEET AFFIXED TO CRATE.** Use a suitable lifting device. Refer to the assembly drawing for the approximate weight of the machine. Check for the center of balance before lifting the machine, as it may be top or back heavy.
3. **DO NOT USE IN A HAZARDOUS ENVIRONMENT** unless your machine is specifically rated for that area. Know the rating of the area where the machine is to be used and consult the assembly drawing for rating of electrical components.
4. **GUARD AGAINST ELECTRIC SHOCK.** All electrical connections must be made by a qualified electrician and must conform to local electrical codes and grounding practices. Before connecting the machine to a power source, be sure that the voltage supply is the same as specified on the assembly drawing. Disconnect and lock out power before opening any electrical enclosures.
5. **LOCATE THE MACHINE SO THAT THE START AND STOP BUTTONS** can be reached easily by an operator.
6. **SECURE REMOVABLE PARTS** such as rotor, stator, by-pass tube, stator tube, hopper, etc. prior to starting the machine.
7. **DISCONNECT MACHINE** and lock out power before opening, adjusting, cleaning, servicing and changing rotors, stators, gaskets or any other parts. Always use the stop button and wait for rotating parts to come to a complete stop and disconnect and lock out all power sources prior to opening the machine. If the machine is equipped with an **isolation switch**, turn the switch to OFF ("O") prior to plugging the machine in or unplugging the machine.
8. **NEVER INSERT BODY PARTS OR FOREIGN OBJECTS INTO THE RUNNING MACHINE.** Keep fingers, hands, arms, feet, tools, rods, sticks or any other foreign objects clear of moving parts when running the machine.

9. **WEAR PROPER APPAREL.** Do not wear loose clothing, gloves, neckties, rings, bracelets, or other jewellery that may get caught in the machine. Non-slip footwear is recommended. Wear protective hair covering to contain long hair.
10. **STAY ALERT** when using the machine. Watch what you are doing. Do not use the machine if you are tired or under the influence of drugs, alcohol or any medication.
11. **ALWAYS USE SAFETY GLASSES** when operating the machine. Use appropriate breathing-apparatus if or when operation is dusty.
12. **WEAR HEARING PROTECTION.** Noise generated by the machine is dependent on process conditions. Hearing protection may be required. Consult your local standards and regulations to ensure compliance.
13. **REPLACE DAMAGED OR WORN PARTS** before further use of the machine.
14. **DO NOT ABUSE ELECTRICAL CORD.** Never pull the machine by the cord or yank cord to disconnect it from the receptacle. Keep cord away from heat, oil, water and sharp edges.
15. **STOP THE MACHINE** immediately if the rotor is heard rubbing or ticking. Replace worn or damaged parts.
16. **DO NOT SPRAY HIGH PRESSURE (over 60 psig or 4 barg) LIQUIDS** directly at bearings, seals, or spindle assemblies. Allow a minimum gap of 2" (50 mm) between the tip of the spray nozzle and the machine.
17. **DO NOT SPRAY MOTOR OR OTHER ELECTRICAL COMPONENTS** with pressures greater than 15 psig or 1 barg. Allow a minimum gap of 2" (50 mm) between the tip of the spray nozzle and the motor or electrical components.
18. **DO NOT MOVE THE JET MIXER WHEN EXTENDED ON A LIFT STAND.** A tipping hazard may occur when the Jet Mixer and lift stand is in its highest position. CAUTION is required due to floor level, smoothness, and obstructions when transporting the Jet Mixer on a portable stand. Always retract to the lowest position before attempting to move the assembly.
19. **DO NOT STAND OR WORK UNDER A JET MIXER** that is mounted to a portable or fixed lift stand.

Terms used in this manual

WARNING

The word “**WARNING**” indicates that you can cause personal injury if you do not follow strictly the procedure or statement.

CAUTION

The word “**CAUTION**” indicates that you may cause equipment damage if you are not careful in performing the procedure or statement.

NOTE

The word “**NOTE**” indicates that there is some important or special information that you should know when performing an operation or procedure.

What you should know about this manual

This manual will save you valuable time *and may also prevent possible injury*. To help you find what you need to know, all information and instructions about a task, such as operation or maintenance, are located in a single section. In some cases, however, specific details on some parts of your customized Quadro[®] Ytron[™] Jet Mixer may be located in the Appendices.

This manual tells you:

- In **Section 1**, how to install and set up the Jet Mixer.
- In **Section 2**, how to operate the Jet Mixer.
- In **Section 3**, how to clean, maintain and troubleshoot the Jet Mixer.
- In **Section 4**, how to order replacement parts for the Jet Mixer.
- The **Appendices** include an assembly drawing, an electrical schematic drawing and other information about the components used on the Jet Mixer.

The information and drawings in this manual apply specifically to the Jet Mixer that is identified by the serial number on the title page of this manual.

Section 1. - Installing the Quadro[®] Ytron[™] Jet Mixer

To install the Quadro[®] Ytron[™] Jet Mixer, perform the following tasks:

1. Unpack and check that all parts are present and undamaged.
2. Get familiar with the Jet Mixer terminology.
3. Determine the optimum location to mount the Jet Mixer in the tank.
4. Assemble the Jet Mixer and mount it into the tank.
5. Connect the Jet Mixer CIP port.
6. If the Jet Mixer is equipped with mechanical seals, make the necessary connections.
7. Have a qualified electrician make the necessary electrical connections.
8. Run the Jet Mixer to verify proper operation.

Unpacking and checking

While unpacking, refer to the Assembly Drawing located in Appendix A of this manual, to ensure that all parts are present. Inspect each item as it is removed from the crate for any obvious physical damage.

WARNING: Lift machine as shown on instruction sheet affixed to crate. Use a suitable lifting device. Refer to the Assembly Drawing in Appendix A for the approximate weight of the machine. Ensure that the machine is balanced before lifting the machine.

WARNING: Do NOT tilt the machine or it may tip over. On height adjustable machines, move the machine to its lowest level prior to opening, cleaning, servicing, or moving.

Remove the packaging material or split plastic shipping spacer which is located between the Jet Mixer shaft and the stator tube.

What to do if damage is found

If you find any parts damaged, contact your nearest Quadro® Ytron™ representative. To obtain the name of the Quadro® Ytron™ representative nearest you, contact:

Quadro Engineering Corp.

(Head Office)

613 Colby Drive

Waterloo, Ontario CANADA

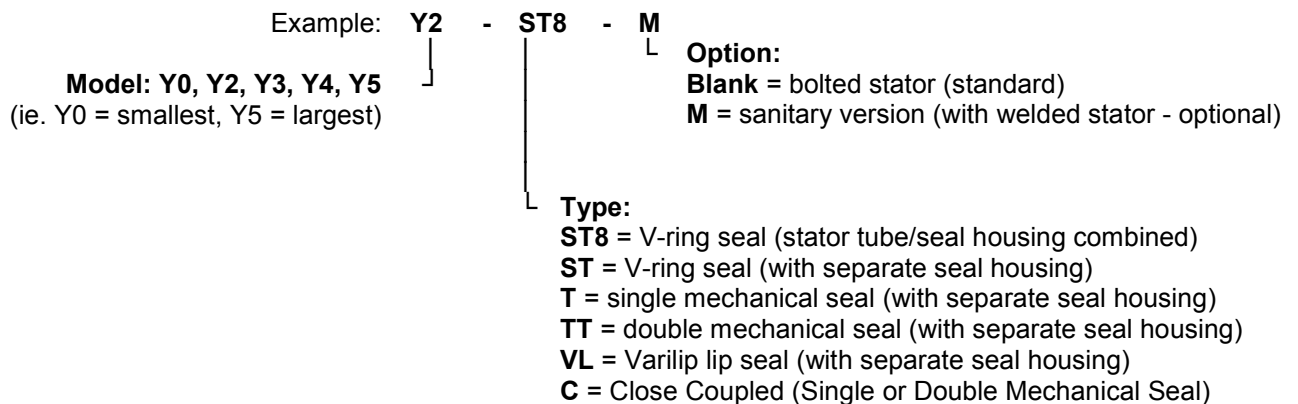
N2V 1A1

Telephone: (519) 884-9660

Fax: (519) 884-0253

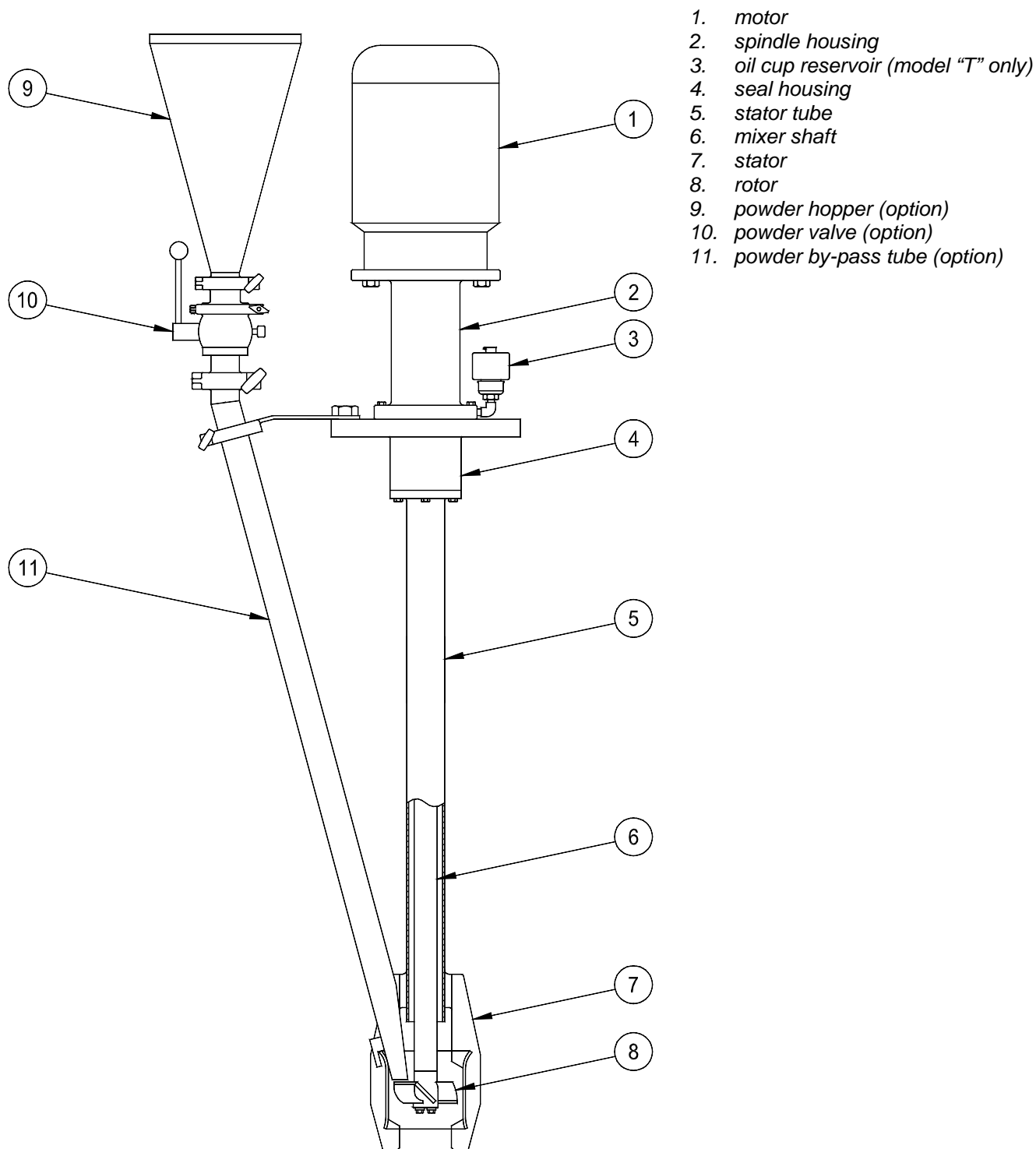
Jet Mixer model number

The Jet Mixer is available in a number of different models, types and options. Some of the instructions in this manual only apply to specific types of Jet Mixers. In order to understand this manual, it is necessary to know the type of your Jet Mixer. This is found on the Assembly Drawing located in Appendix A of this manual.



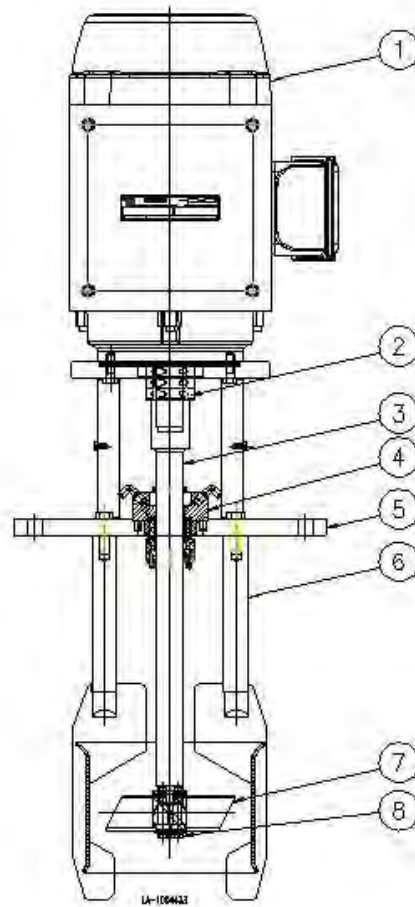
Getting familiar with the Jet Mixer terminology

Examine the following figure to gain a better understanding of the terminology used in this manual.



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Close coupled Jet Mixer (typical)



1. Motor
2. Shaft Collar
3. Shaft
4. Mechanical Seal Assembly
5. Mounting Flange
6. Tri-Rod Stator
7. Rotor
8. Rotor Bolt

Determining the optimum mounting location in the tank

There are many different methods to mount the Jet Mixer into a *tank*. For general information on locating your Jet Mixer in a *tank*, refer to the drawing entitled “Optimum Jet Mixer Mounting” in Appendix A of this manual.

For top entry applications, it is recommended that the outside of the *stator* be located as close as possible to the side of the *tank*. If possible, 2"(50mm) is recommended. It is also recommended that the Jet Mixer be mounted at the correct vertical location that is dependent on the geometry of the *tank* bottom. For more details, see the guidelines on the “Optimum Jet Mixer Mounting” drawing, or contact Quadro Engineering Corp. for technical assistance. Mounting the Jet Mixer in the recommended location will ensure optimum performance.

CAUTION:

Unless directed by Quadro, do NOT locate the Jet Mixer in the center of the *tank*. Mounting it in the center will cause the fluid in the *tank* to swirl. This leads to poor mixing and may cause vortexing which will result in excessive vibration and possible pre-mature failure of the Jet Mixer.

NOTE:

An exception to the above rule exists with very viscous fluids (i.e. above 2000 centipoise). In these cases it may be necessary to locate the Jet Mixer in the center of the *tank* and run the *rotor* in reverse. Note that this is a very special application of the Jet Mixer. Consult Quadro for guidance.

For side entry applications, it is recommended that the Jet Mixer be located on a 45° angle with the bottom of the *stator* located approximately 2" (50mm) from the bottom of the *tank*.

When selecting the location for the Jet Mixer, ensure there is sufficient space for assembly, disassembly, cleaning and maintenance. Also ensure that there is good access to the electrical controls and enough room to feed powder into the *powder hopper* (if equipped).

Assemble the Jet Mixer and mount it into the tank

The mounting for the Jet Mixer must be rigid enough to hold the mixer steady against the dynamic operating loads which are listed on the Jet Mixer assembly drawing located in Appendix A of this manual.

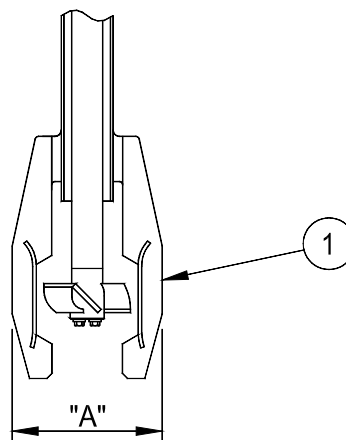
CAUTION:

If the Jet Mixer is not mounted rigidly, it may vibrate and do considerable damage to itself and the *tank*. Ensure that the *mounting flange* is rigid and that all mounting bolts are securely tightened. See the drawing "Optimum Jet Mixer Mounting" in Appendix A for minimum recommended gusset dimensions on the *tank*.

CAUTION:

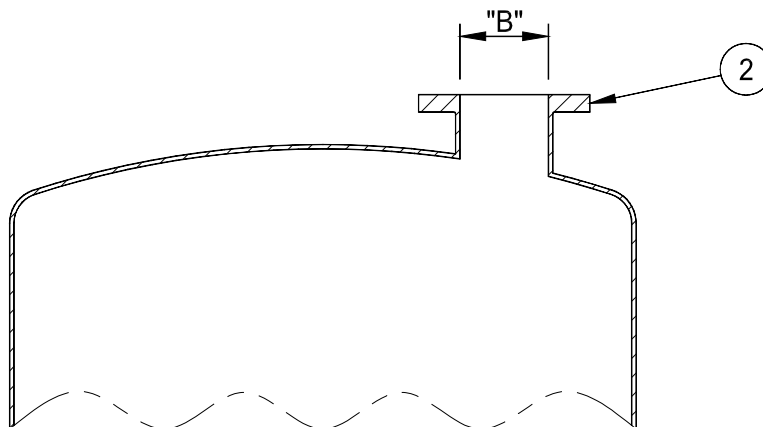
In order to prevent excessive vibration, ensure that any gaskets between the Jet Mixer and the *mounting flange* on the *tank* are a minimum of 60 durometer and no more than 3/16"(5mm) thick.

1. The first step in mounting the Jet Mixer is to determine if the *stator* will fit through the opening in the *tank*. Determine the outside diameter of the *stator* from the Jet Mixer assembly drawing.



1. *stator*
2. *mounting flange*

"A" = outside diameter of stator
 "B" = opening in tank



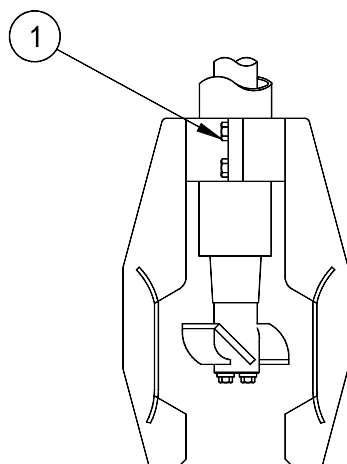
DWG_JET_02.dwg

2. If the opening in the *tank* is larger than the outside diameter of the *stator*, simply insert the Jet Mixer through the opening and rigidly secure the Jet Mixer to the *tank*.

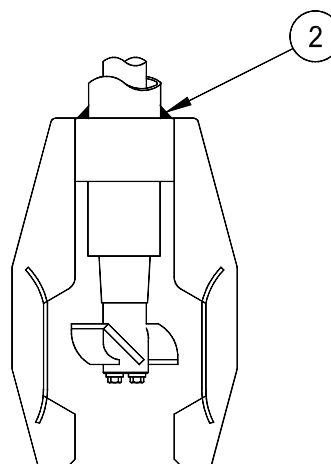
CAUTION:

If support rails are used to mount the Jet Mixer, they must be firmly secured to the *tank* and conform to the minimum sizes shown on the “Optimum Jet Mixer Mounting” drawing in Appendix A.

3. If the opening in the *tank* is smaller than the outside diameter of the *stator*, it will be necessary to partially disassemble the Jet Mixer in order to mount it in the *tank*. Proceed with the following steps.
4. Unbolt and remove the *rotor*.
5. Examine the Jet Mixer to determine if the *stator* is bolted or welded to the *stator tube*.

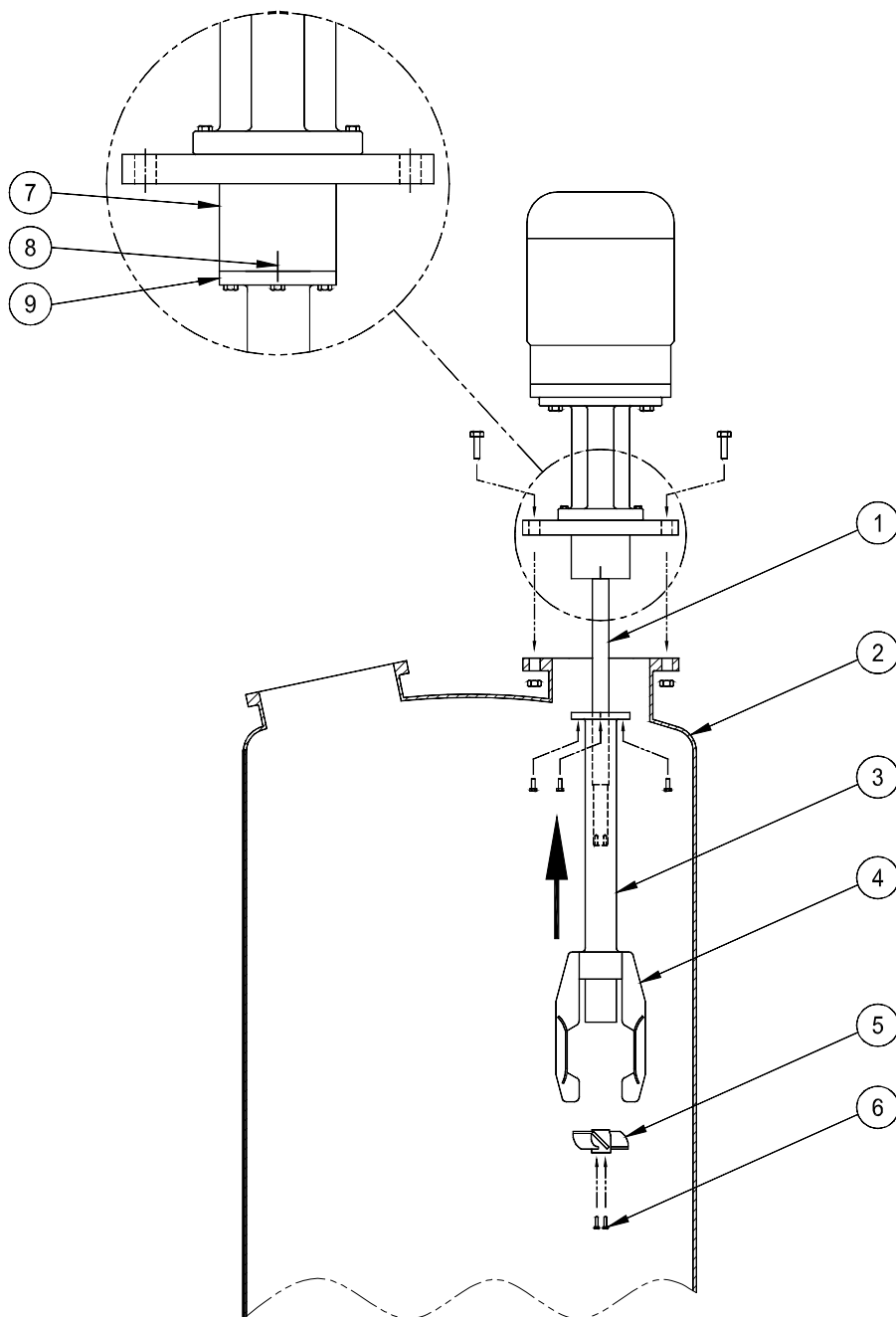


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1. *bolted stator*
2. *welded stator*

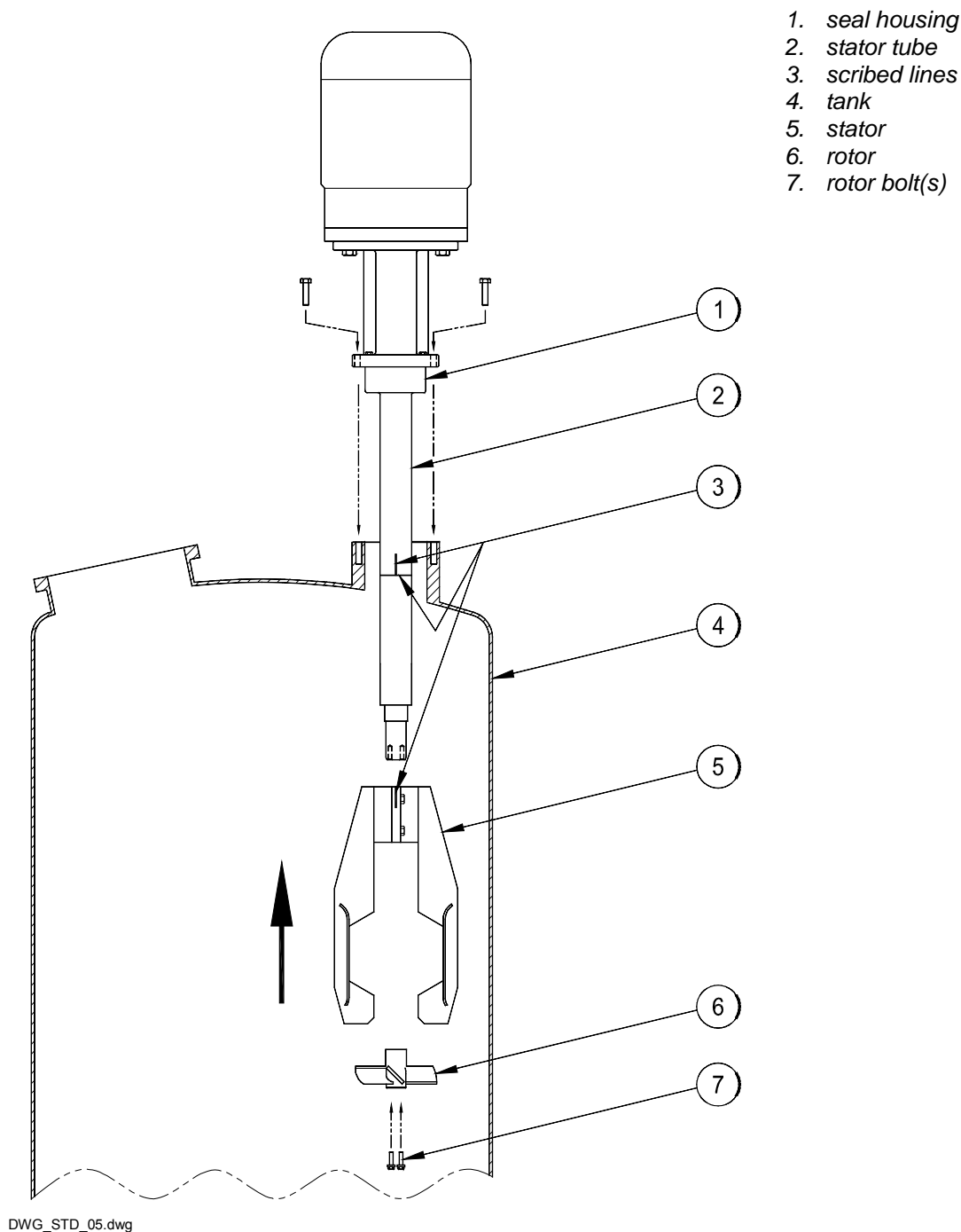
6. If the *stator* is welded to the *stator tube*, scribe a *vertical line* to indicate the correct angular position of the *stator tube upper flange* on the *seal housing*. Remove the bolts securing the *stator tube* to the *spindle housing*. Lower the *stator tube* inside the *tank* and have one person in the *tank* hold it in position while another person lowers the *mixer shaft* down into the *stator tube*. Align the *scribed lines* and securely bolt the *stator tube* to the *seal housing*. Rigidly secure the Jet mixer to the *tank* flange and install the *rotor*.



1. mixer shaft
2. tank
3. stator tube
4. stator
5. rotor
6. rotor bolt(s)
7. seal housing
8. vertical scribed line
9. stator tube upper flange

DWG_JET_04.dwg

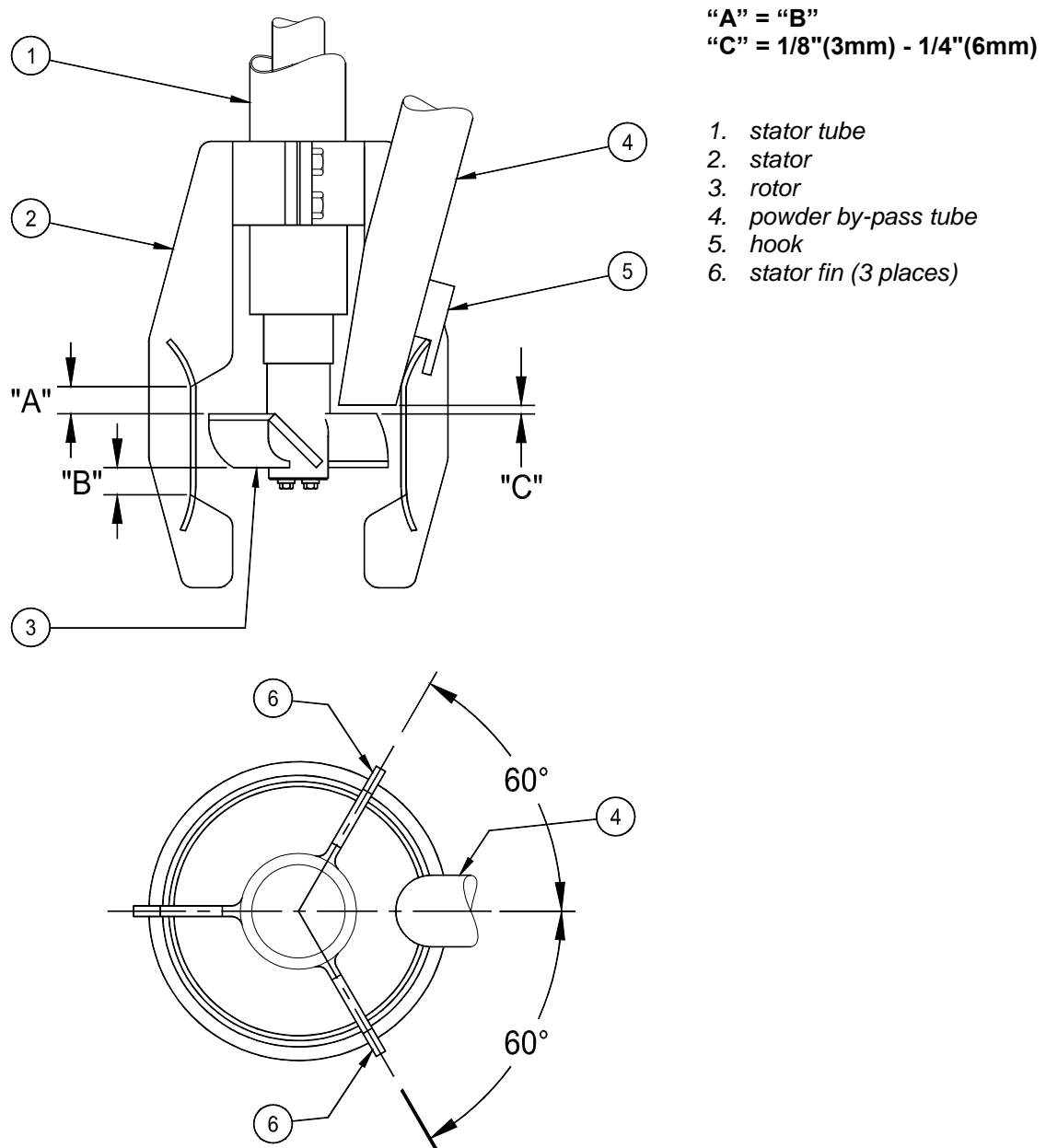
7. If the *stator* is bolted to the *stator tube*, *scribe a horizontal line* to indicate the correct height of the *stator* on the *stator tube*. *Scribe a vertical line* to indicate the correct angular position of the *stator* on the *stator tube*. Loosen the *stator bolts* and remove the *stator*. From inside the *tank*, hold the *stator* in position and carefully lower the *stator tube* down into the *stator*. Align both *scribed lines* and securely fasten the *stator* to the *stator tube*. Rigidly secure the Jet Mixer to the *tank flange* and install the *rotor*.



CAUTION:

Ensure that the height of the *stator* is positioned so that the *rotor* is centered ("A" = "B").

8. If the Jet Mixer is equipped with the optional *powder by-pass tube*, assemble it to the Jet Mixer now. The *powder by-pass tube* is equipped with a *hook* that is "clipped" on to the wall of the *stator*. Note that the *hook* is designed to support the weight of the *powder by-pass tube*. Ensure that the *hook* is bottomed out on the wall of the *stator*. If necessary, loosen the clamp securing the top of the *powder by-pass tube* and adjust the position of the clamp so that the *hook* bottoms out. Also, if necessary, adjust the angular position of the *stator* so that the *by-pass tube* is centered between two of the *stator fins*.



DWG_JET_06.dwg

CAUTION: To prevent *rotor* contact and for optimum powder suction, it is recommended that the end of the *powder by-pass tube* be positioned 1/8" (3mm) to 1/4" (6mm) from the *rotor*. If necessary, reposition the bolted *stator* to achieve this gap. If the *stator* is welded, it may be necessary to grind the *powder by-pass tube* in order to achieve the required gap.

CAUTION: DO NOT secure the top of the *powder by-pass tube* directly to the *tank*. Use the bracket provided by Quadro, and mount the bracket to the Jet Mixer as shown on the Assembly Drawing (Appendix A). Leave a minimum of 1/4" clearance between the *powder by-pass tube* and the *tank*. If it is necessary to seal the *powder by-pass tube* to the *tank*, use a flexible connection. Failure to follow this recommendation may result in excessive wear of the *stator* wall where the *hook* makes contact.

9. If the Jet Mixer is equipped with a *powder valve* and *hopper*, clamp them to the *powder by-pass tube*. Refer to the Assembly Drawing in Appendix A for details.

Connect the Jet Mixer CIP port

Examine the Jet Mixer Assembly Drawing to determine the location of the Cleaning-In-Place (CIP) port and the type of connection. The CIP port is provided to allow the user to flush out the cavity between the *stator tube* and the *mixer shaft* during equipment cleaning. Refer to Section 3 for more details on CIP cleaning.

1. Connect the cleaning fluid to the CIP port on the Jet Mixer. If the CIP port is not going to be used, ensure that the plug supplied with the machine is tightly sealed.
2. Install the CIP valve at a higher elevation than the CIP port to ensure that line is self-draining. It is also recommended to install the valve as close as possible to the Jet Mixer to reduce the volume of the CIP fluid that will drain into the *tank* once the CIP valve is closed. Teflon tape or an equivalent product should be used on all connections.

NOTE: During operation, there is a slight vacuum created at the CIP port. If the CIP connection is poor, air could travel down the *stator tube* and get mixed into the product.

Making necessary connections to Jet Mixers equipped with mechanical seals

As an option, the Jet Mixer may be ordered with either a *single* or a *double mechanical seal*.

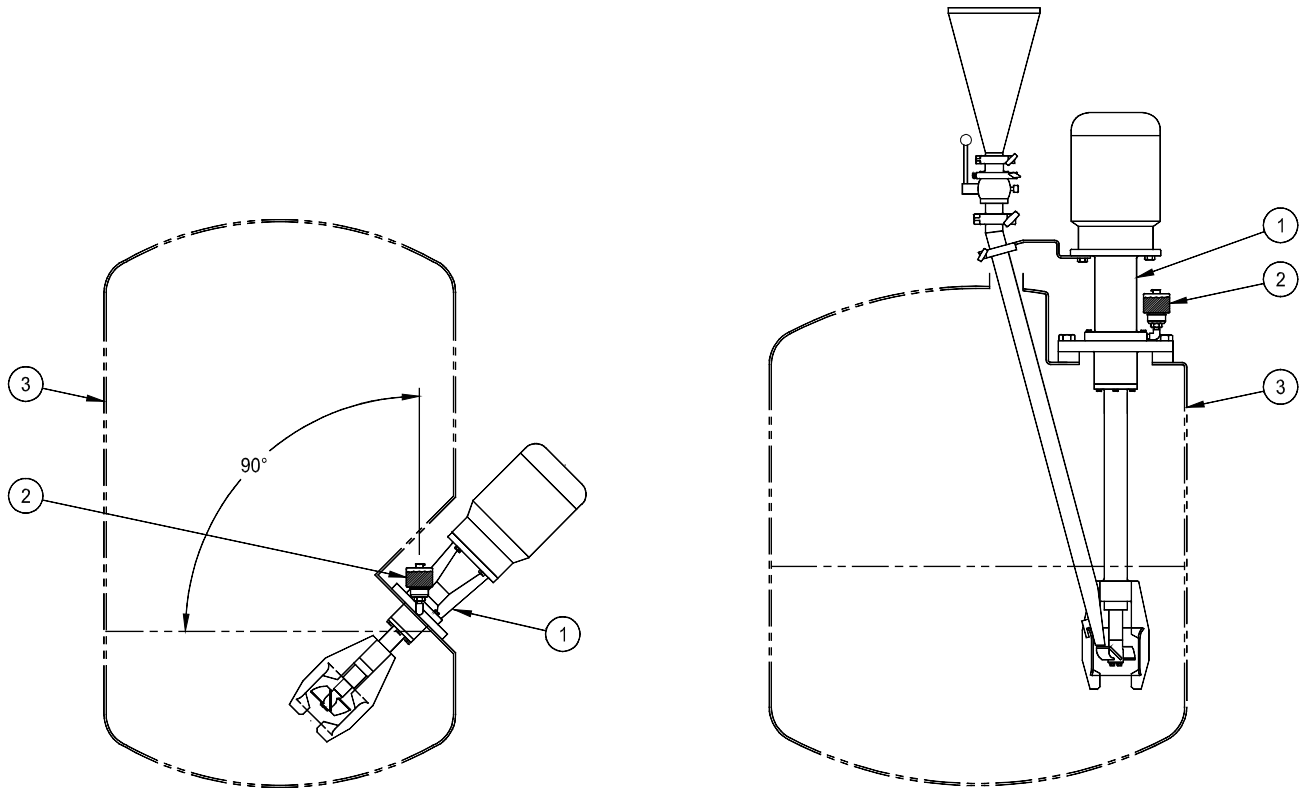
1. If the Jet Mixer is equipped with a *single mechanical seal* (ie. type “T”), it will have an *oil cup reservoir*. The *single mechanical seal* requires oil in order to run. With the Jet Mixer installed in the *tank*, orient the *oil cup reservoir* in a vertical position. Fill the *reservoir* with DAEDOL 205 USP food grade mineral oil (Quadro part no. 108020) or an equivalent light mineral oil.

CAUTION:

Do not run a type “T” Jet Mixer dry. Fill the *oil cup reservoir* before starting the Jet Mixer or the *seal* will be damaged.

NOTE:

A slight decrease in the oil level is normal during the first 48 hours of running the Jet Mixer as air works its way out of the *seal* cavity. A sudden decrease in the oil level, however, is an indication of *seal* failure. See Section 3 for further information.



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1. spindle housing
2. oil cup reservoir
3. tank

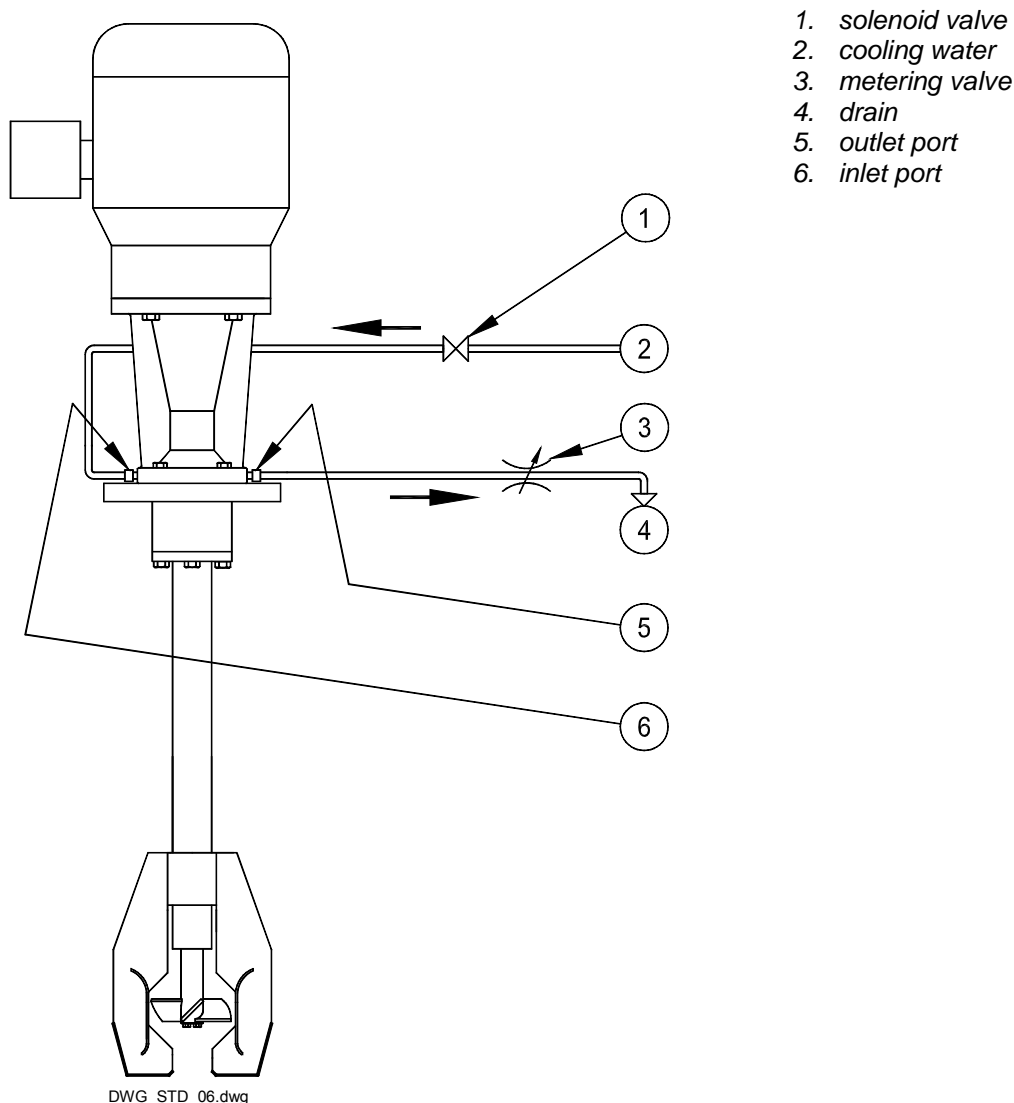
2. If the Jet Mixer is equipped with a *double mechanical seal* (ie. type “TT”), it will have two ports on the *spindle housing* marked “INLET” and “OUTLET”. The *double mechanical seal* requires liquid cooling in order to run.

CAUTION: Do not run a type “TT” Jet Mixer dry. The *double mechanical seal* will overheat in a few minutes and destroy the *seal faces*.

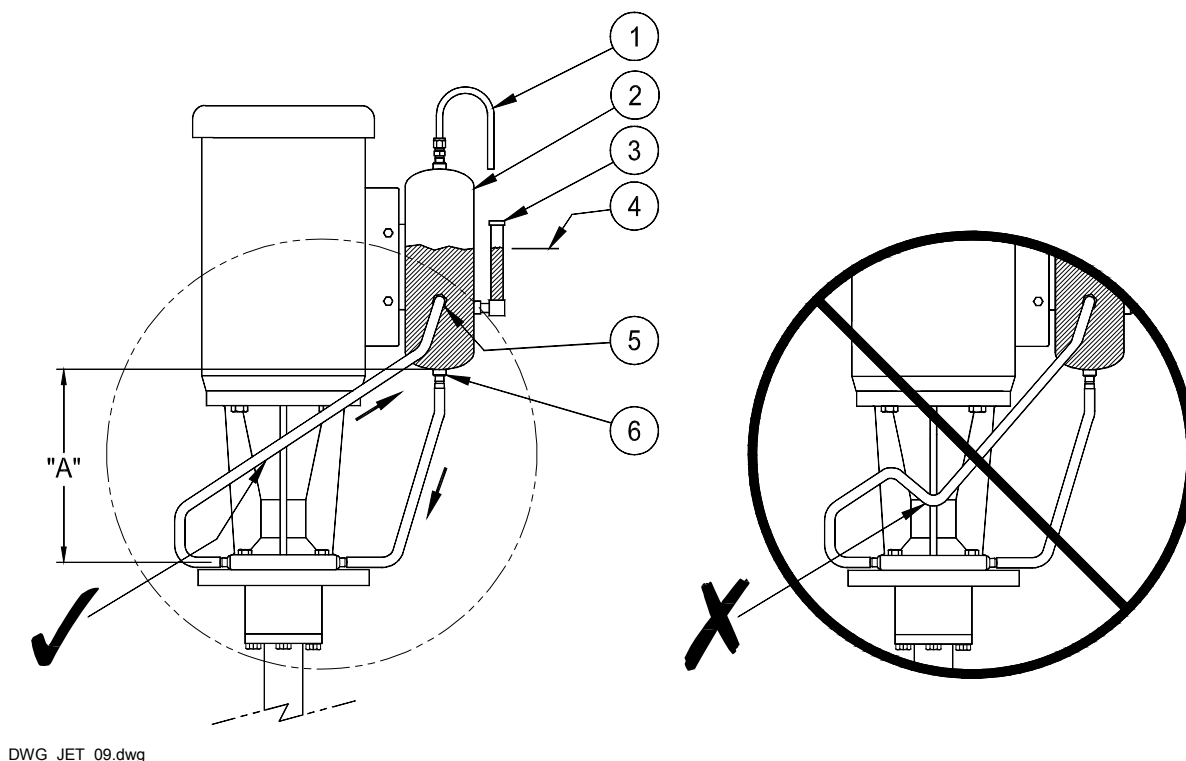
NOTE: The *double mechanical seal* may be cooled by flushing water through the *seal* to the drain or by connecting the *seal* to a re-circulating “thermo-cooling” reservoir.

3. If the *double mechanical seal* is to be cooled by flushing water through the *seal* to the drain, connect the *inlet port* to clean, cool (20 °C or less) tap water. Connect the *outlet port* to a *metering valve* and then to *drain*. Adjust the *metering valve* to obtain a flow rate of approximately ½ litre/minute through the *seal*. This can be measured by timing the water into a suitable measuring cup. To prevent leakage and minimize *seal* face wear, ensure that the *cooling water* inlet pressure is a minimum of 15 psig.(1 barg.) to a maximum of 60 psig.(4 barg.) above the pressure inside the *tank*.

CAUTION: The *cooling water* must be automatically turned on as soon as the Jet Mixer is started.



4. If the *double mechanical seal* is to be cooled using a *thermo-cooling reservoir*, mount the *cooling reservoir* in a vertical orientation with the bottom of the *reservoir* 12" (300mm) above the Jet Mixer *inlet* and *outlet ports*. Ensure that the connecting lines rise continuously upward to the *reservoir* with no "valleys" in either the supply or return lines.



1. vent
2. atmospheric pressure thermo-cooling reservoir
3. sight glass

4. oil level
5. reservoir inlet
6. reservoir outlet

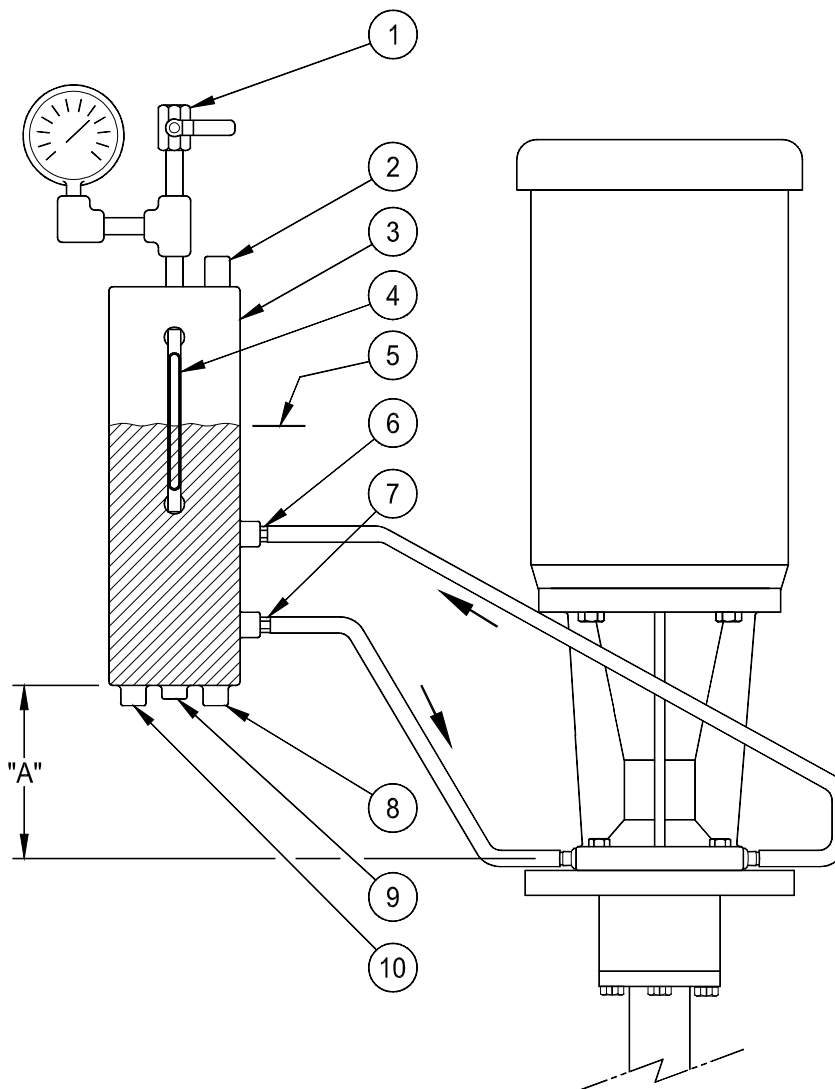
A" = 12" (300mm)

NOTE:

A "valley" in the supply or return lines between the Jet Mixer and the *reservoir* may block air bubbles in the cooling lines that could restrict the flow of coolant.

5. Connect the Jet Mixer *outlet port* to the *reservoir inlet*. Note that the *reservoir inlet* is the higher of the two ports on the *thermo-cooling reservoir*. Next, connect the *reservoir outlet* to the Jet Mixer *inlet port*. Refer to the assembly drawing (Appendix A) for location of ports and type of connections.
6. Using the *sight glass* on the *thermo-cooling reservoir* as a gauge, fill the reservoir half ($\frac{1}{2}$) full with DAEDOL 205 USP food grade mineral oil (Quadro part no. 108020, or equivalent light mineral oil) or alternatively, with distilled water.

7. If the *tank* is under pressure, a *pressure rated thermo-cooling reservoir* must be used. Using the *vent valve*, pressurize the *thermo-cooling reservoir* to 15 to 20 psig. (1 to 1.4 barg.) above the *tank* pressure.



DWG_JET_10.dwg

- | | |
|--|-------------------------|
| 1. vent valve | 6. reservoir inlet |
| 2. fill port | 7. reservoir outlet |
| 3. pressure rated thermo-cooling reservoir | 8. inlet cooling port |
| 4. sight glass | 9. drain por |
| 5. oil level | 10. outlet cooling port |

"A" = 12" (300mm)

8. If the *thermo-cooling reservoir* is equipped with an optional cooling coil (standard feature on *pressure rated thermo-cooling reservoirs*), connect the *inlet cooling port* to clean, cool (20°C or less) tap water. Connect the *outlet cooling port* to a metering valve and then to drain. Meter the flow from the *outlet cooling port* to obtain the desired cooling rate.

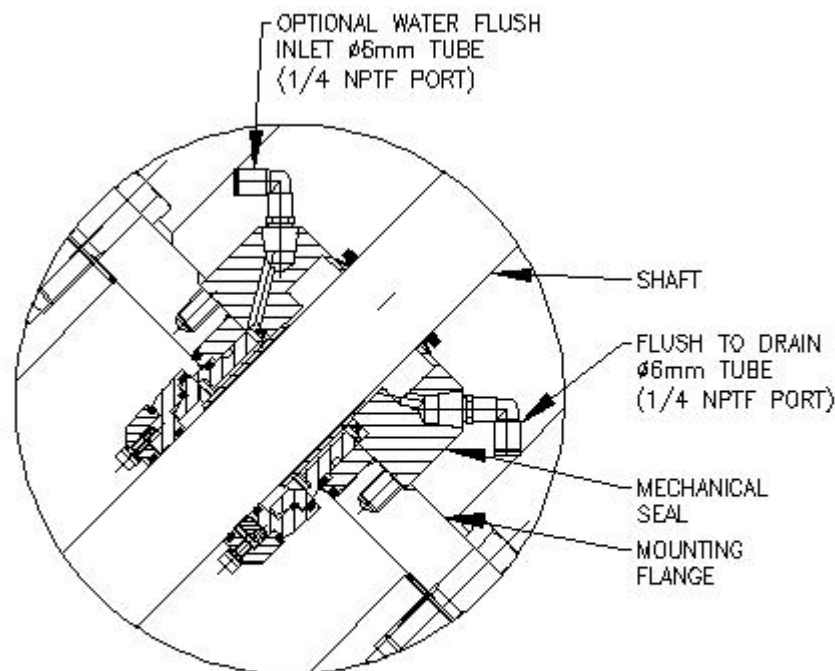
Making necessary connections with Close Coupled Jet Mixers equipped with mechanical seals

As an option, the Close Coupled Jet Mixer may be ordered with either a *single* or a *double mechanical seal*.

1. If the Jet Mixer is equipped with a *single mechanical seal* (ie. type “T”), it will have optional water flush inlet and outlet ports. The *single mechanical seal* requires liquid cooling and lubrication from either product fluid in the tank or an external flush of water or mineral oil.

CAUTION:

Do not run a type “T” Jet Mixer dry. Fill the tank to a level up to the seal or run flush liquid to the inlet and outlet ports before starting the Jet Mixer or the seal will be damaged.



SEAL AREA DETAIL

TYPICAL APPLICATION SHOWN

LA-10044330

2. If the Jet Mixer is equipped with a *double mechanical seal* (ie. type “TT”), it will have two ports on the *spindle housing* marked “INLET” and “OUTLET”. The *double mechanical seal* requires liquid cooling in order to run.

Assemble the Close Coupled Jet Mixer and mount it into the tank

The mounting for the Jet Mixer must be rigid enough to hold the mixer steady against the dynamic operating loads which are listed on the Jet Mixer assembly drawing located in Appendix A of this manual.

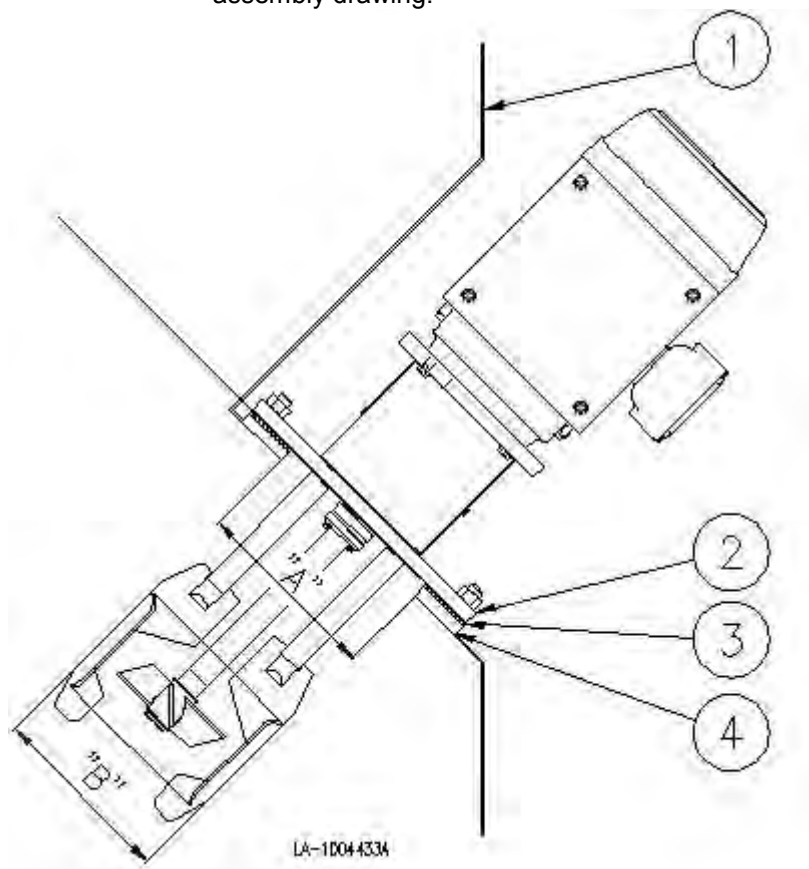
CAUTION:

If the Jet Mixer is not mounted rigidly, it may vibrate and do considerable damage to itself and the *tank*. Ensure that the *mounting flange* is rigid and that all mounting bolts are securely tightened. See the drawing "Optimum Jet Mixer Mounting" in Appendix A for minimum recommended gusset dimensions on the *tank*.

CAUTION:

In order to prevent excessive vibration, ensure that any gaskets between the Jet Mixer and the *mounting flange* on the *tank* are a minimum of 60 durometer and no more than 3/16"(5mm) thick.

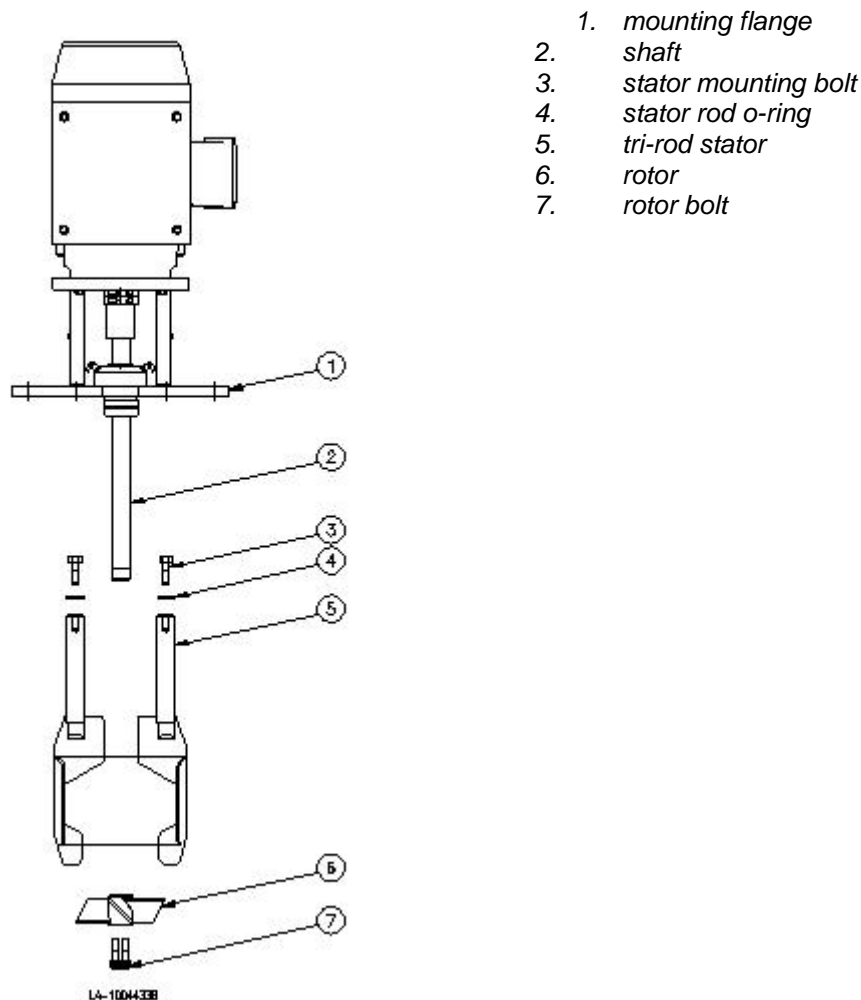
1. The first step in mounting the Jet Mixer is to determine if the *stator* will fit through the opening in the *tank*. Determine the outside diameter of the *stator* from the Jet Mixer assembly drawing.



3. *tank*
4. *mounting flange*
5. *flange gasket*
6. *tank flange*

"A" = outside diameter of stator
 "B" = opening in tank

2. If the opening in the *tank* is larger than the outside diameter of the *stator*, simply insert the Jet Mixer through the opening and rigidly secure the Jet Mixer to the *tank*.
3. If the opening in the *tank* is smaller than the outside diameter of the *stator*, it will be necessary to partially disassemble the Jet Mixer in order to mount it in the *tank*. Proceed with the following steps.
4. Unbolt and remove the *rotor*.
5. Remove the bolts securing the rotor to the shaft tri-rod stator to the mounting flange. Lower the tri-rod stator inside the tank and have one person in the tank hold it in position while another person lowers the jet mixer into the tank flange. Align the tri-rod stator and securely bolt the tri-rod stator to the tank flange. Rigidly secure the Jet mixer to the tank flange and install the rotor.



Making electrical connections

Refer to Appendix A for specifications on the motor and starter for your Jet Mixer. For wiring details, refer to the electrical schematic diagram in Appendix A.

1. The Jet-mixer must only be wired by a qualified electrician; who is familiar with local electrical codes, and grounding practices.

WARNING:

Guard against electric shock. All electrical connections must be made by a qualified electrician and must conform to local electrical codes and grounding practices. Before connecting the machine to a power source, be sure that the voltage supply is the same as specified on the Assembly Drawing in Appendix A. Disconnect and lock out power before servicing or accessing the *rotor*.

CAUTION:

Ensure the direction of rotation is correct. The *rotor* must rotate clockwise when viewed from above the *tank*.

2. Ensure that the electrical connections are water tight and suitable for the environment that the Jet Mixer is being used in.

WARNING:

Do not use in a hazardous environment unless your machine is specifically rated for that area. Know the rating of the area where the machine is to be used and consult the Assembly Drawing in Appendix A for the rating of electrical components.

Run Jet Mixer to check operation

Quadro recommends running the Jet Mixer for a minimum of 30 minutes prior to using it in a production environment. This allows the user to ensure that the mounting is rigid, that the *rotor* direction is correct and there is no excessive vibration or noise. Review Section 2 “Operating the Quadro® Ytron™ Jet Mixer” carefully before running.

CAUTION:

Do not run the Jet Mixer without reading and understanding Section 2 of this manual.

Section 2. - Operating the Quadro[®] Ytron[™] Jet Mixer

WARNING: For your safety when operating this machine:

Know your machine. Do not allow persons to operate the machine unless they have carefully read and understand these safety rules and all instructions in the Owner's Manual.

Disconnect the machine and lock out power before opening, adjusting, cleaning, servicing and changing *rotors, stators*, or any other parts. Always use the stop button and wait for the rotating parts to come to a complete stop and disconnect and lock out all power sources prior to opening the machine. If the machine is equipped with an isolation switch, turn the switch to OFF ("O") prior to plugging the machine in or unplugging the machine.

Never insert body parts or foreign objects into the running machine. Keep fingers, hands, arms, feet, tools, rods, sticks or any other foreign objects clear of moving parts when running the machine.

Stay alert when using the machine. Watch what you are doing. Do not use the machine if you are tired or under the influence of drugs, alcohol or any medication.

Wear proper apparel. Do not wear loose clothing, gloves, neckties, rings, bracelets, or other jewellery that may get caught in the machine. Non-slip footwear is recommended. Wear protective hair covering to contain long hair.

Always use safety glasses when operating the machine. Use appropriate breathing-apparatus if operation is dusty.

Wear hearing protection. Noise generated by the machine is dependent on speed, tank geometry and the product being processed. Hearing protection may be required. Consult your local standards and regulations to ensure compliance.

Operation of the Quadro® Ytron™ Jet Mixer includes:

- A pre-start check.
- Starting the Jet Mixer and running it.
- Stopping the Jet Mixer.

Pre-start check

Before starting the Jet Mixer:

1. Ensure that the machine is cleaned to meet the process requirements. Refer to “Cleaning the Quadro® Ytron™ Jet Mixer” in Section 3 of this manual.
2. Inspect the machine for damaged or worn parts. Replace any damaged or worn parts prior to operating.
3. Ensure that the *rotor bolt(s)* and Jet Mixer mounting bolts are tight. If equipped with a *powder by-pass tube* and *hopper*, ensure that these items are tightly secured to the Jet Mixer.
4. With the *tank* empty, momentarily jog the Jet Mixer and view the direction of rotation of the *rotor*. Ensure that the *rotor* turns clockwise when viewed from above the *tank*. If this is not the case, reverse the direction of the *motor*.

WARNING: Running the Jet Mixer in reverse will throw liquid upward causing it to spill out of an open *tank*. It may also force liquid up the *powder by-pass tube* and out of the *powder hopper*.

NOTE: In some special applications, the *rotor* is intentionally run in reverse. Refer to Section 1 for guidance.

5. If the Jet Mixer is to be Cleaned In Place (CIP), ensure that the valve supplying the CIP cleaning fluid is closed.
6. If the Jet Mixer is equipped with a *powder hopper*, ensure that the powder valve is closed.
7. If the Jet mixer is equipped with a *single mechanical seal* (ie. type “T”), ensure that the *oil cup reservoir* is full. If the Jet mixer is equipped with a *double mechanical seal* (ie. type “TT”), examine the *sight glass* to ensure that the *thermo-reservoir* is approximately ½ full.
8. If the Jet Mixer is being used in a pressurized *tank*, examine the pressure gage on the *thermo-reservoir* to ensure that the pressure is 15-20psig (1-1.4 barg) higher than the pressure inside the *tank*.

9. Fill the *tank* with liquid and ensure that the level is above the minimum liquid level. As a general rule of thumb, the minimum liquid level is 2" (50mm) above the highest point on the *stator*. The actual minimum level, however, varies with *rotor* speed and product. It is empirically determined by the minimum level of the liquid in the tank that is required to prevent vortexing or funnelling of the product.

CAUTION:

Do not operate the Jet Mixer below the minimum liquid level shown on the Assembly Drawing (Appendix A) especially at high speeds. This may cause excessive vibration and eventual fatigue cracking of the *stator fins* as a result of air being drawn into the *rotor*. Failure to follow this instruction will result in voiding the warranty.

Starting the Jet Mixer and running it

Start the Jet Mixer and:

1. Check that there is no excessive vibration or noise.

CAUTION:

Stop the Jet Mixer immediately if there is excessive vibration or noise. Refer to the Section 3 "Troubleshooting" for tips on how to solve this problem.

2. If the Jet Mixer is equipped with *double mechanical seals* which are being cooled by water flushing to a drain, ensure that the water is flowing as soon as the Jet Mixer is turned on.
3. If equipped with a variable speed drive, adjust the speed of the *rotor* to the desired speed. Due to the long shaft on the Jet Mixer, there are certain "critical" speeds at which the mixer shaft will vibrate severely due to its natural frequency. To prevent damage and possible injury, the Jet Mixer must not be run at these speeds. The critical speed range is calculated by Quadro and listed on the Jet Mixer assembly drawing (Appendix A). If the Jet Mixer is being used with an A.C. inverter drive, ensure that the drive is programmed to prevent the Jet Mixer from operating at these speeds.

CAUTION
THIS JET MIXER HAS A
CRITICAL SPEED RANGE
WITHIN WHICH IT CANNOT BE
OPERATED. REFER TO THE
ASSEMBLY DRAWING IN
APPENDIX A FOR THE RPM
RANGE THAT MUST BE
AVOIDED DURING
OPERATION.

4. If the Jet Mixer is equipped with a *powder by-pass tube* and *hopper*, load the *hopper* with product while the powder valve is still closed. With the Jet Mixer running, open the powder valve and observe the level of the powder in the *hopper*. After the *hopper* is empty, wait approximately 2-3 seconds until the *powder-by pass tube* is empty. Note that once this occurs, a slight increase in the noise level will be heard. As soon as this increase in noise level is heard, shut the powder valve immediately to avoid drawing air into the product.

NOTE:

With variable speed or two speed Jet Mixers, equipped with a *powder by-pass tube*, the *rotor* is normally run at the fastest allowable speed during powder incorporation. After the powder is incorporated, the rotor speed is normally reduced to that which yields a gentle “roll over” of liquid in the *tank* or to the minimum speed necessary to keep the solids suspended in the liquid.

5. Continue mixing until the desired viscosity or product characteristics are achieved. If product is removed from the *tank* while the Jet Mixer is running, ensure that the liquid in the *tank* does not go below the minimum liquid level before the Jet Mixer is stopped.

CAUTION:

If a sudden drop in the fluid level of the *oil cup reservoir* (ie. type “T”) or in the *thermo-reservoir* (ie. type “TT”) is observed, it is an indication that the *mechanical seal* has failed. Refer to the Section 3 “Troubleshooting”.

Stopping the Jet Mixer

It is recommended that the user stop the Jet Mixer prior to draining the *tank* in order to avoid violating the minimum liquid level requirement.

Section 3. - Maintaining the Quadro[®] Ytron[™] Jet Mixer

Introduction

This section describes the procedures required to maintain the Quadro[®] Ytron[™] Jet Mixer in good, safe operating condition. Maintenance includes:

1. Cleaning the Jet Mixer
2. Replacing the coupling
3. Replacing the seals and bearings
4. Preventive maintenance
5. Troubleshooting

NOTE:

Failure to follow the preventive maintenance procedures will void the warranty.

Cleaning the Jet Mixer

The Jet Mixer is designed to be cleaned in the *tank*. It is equipped with a Clean in Place (CIP) port on the *seal housing*. Refer to Section 1 of this manual for recommendations on how to connect to the CIP port.

The CIP procedure consists of at least a series of **wash, rinse, and immersion cycles**. The exact duration and number of cycles must be experimentally determined by the user in order to achieve adequate cleaning. In general, the cycles are as follows:

1. **Wash Cycle:** With the Jet Mixer running, flush a suitable cleaning solution through the CIP port at a pressure between 20 to 60 psig (1.4 to 4 barg). The corresponding flow rate at these pressures is approximately 10 to 18 USgpm (40 to 68 l/min).
2. **Rinse Cycle:** With the Jet Mixer running, rinse using the same CIP port.
3. **Immersion Cycle:** Fill the *tank* with cleaning solution to the minimum liquid level (see Section 2). Run the Jet Mixer.

CAUTION:

Do not spray high-pressure (over 60 psig or 4 barg) liquids directly at the *seals* or *spindle housing*. Allow a minimum gap of 2" (50 mm) between the tip of the spray nozzle and the machine.

- CAUTION:** Do not spray motor or other electrical components with pressures greater than 15 psig or 1 barg. Allow a minimum of 2" (50 mm) between the tip of the spray nozzle and the machine.
- CAUTION:** Do not use steam for CIP cleaning unless the Jet Mixer is equipped with *mechanical seals* (ie. type "T" or type "TT").
- NOTE:** Quadro recommends that the user experiment with the CIP parameters including the type of cleaning solution, the temperature, the time and the order of the individual cycles required to achieve proper cleaning of the Jet Mixer.

Compatibility of cleaning solutions

When selecting a cleaning solution, it is critical to ensure that it is compatible with all the components that it will contact during cleaning, especially the *seals*, *spacers*, and *o-rings*.

The standard material of construction of the Jet Mixer is either 304 or 316 stainless steel. The standard construction of the *o-rings* and *v-ring* seals is Viton. The standard material for the shaft spacer is HYDEX (FDA). Depending on what was ordered, however, your particular Jet Mixer may be equipped with different materials. Refer to the Assembly Drawing located in Appendix A, to determine the specific type of stainless steel, seal and o-ring materials used in the construction of the Jet Mixer.

Quadro recommends soap or detergent solutions to clean the Jet Mixer. Most chlorine based cleaning solutions are also compatible with the standard materials of construction of the Jet Mixer.

Quadro recommends:

- avoiding alcohol and acetone cleaning agents unless the Jet Mixer is equipped with special o-rings and seals.
- not exceeding temperatures above 90°C when using the HYDEX shaft spacer.

NOTE: If you are unsure of the materials of construction of the Jet Mixer, contact your local Quadro® Ytron™ representative.

Replacing the coupling

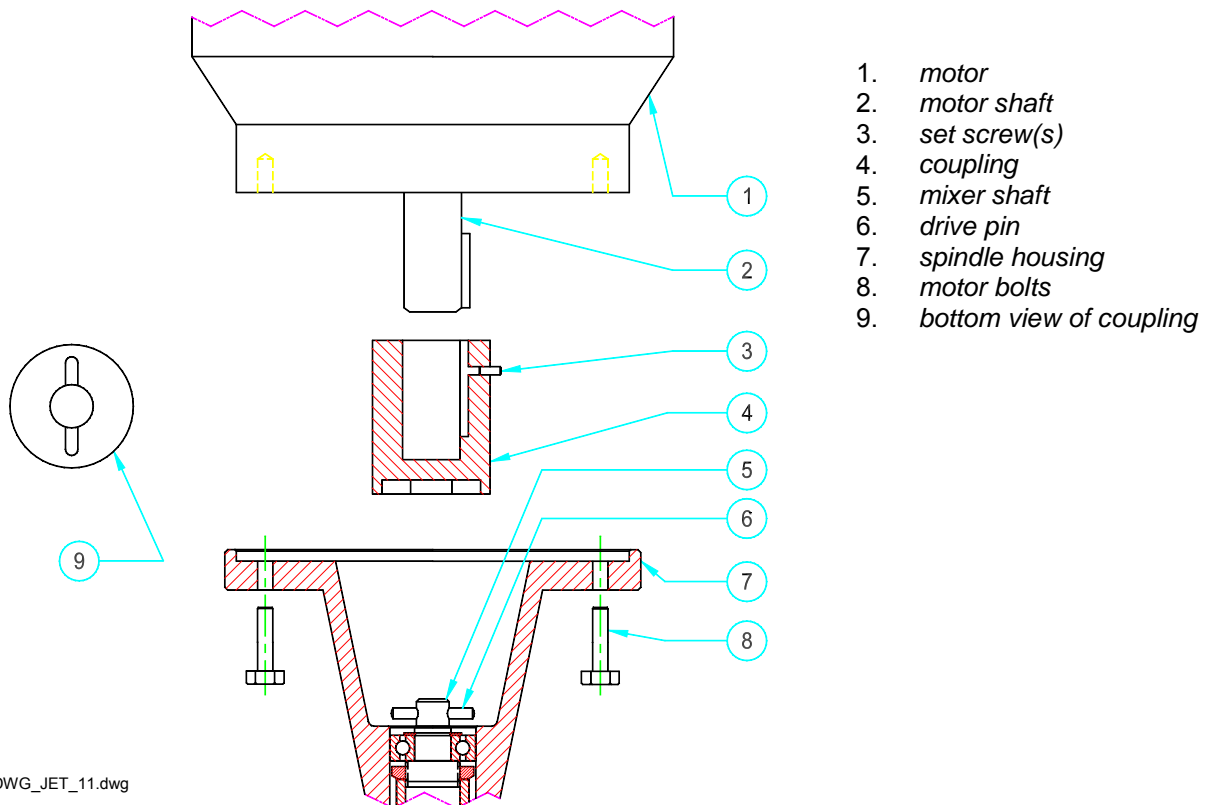
Replacing the Jet Mixer coupling is a simple procedure that can usually be done with the Jet Mixer still mounted in the tank.

WARNING:

Disconnect and lock out the power to the Jet Mixer prior to disassembly.

CAUTION:

The Jet Mixer coupling is designed to break if the *rotor* becomes stalled. In order to protect your Jet Mixer, only replace the *coupling* with factory original parts from Quadro. If the *coupling* has broken, determine the cause of the breakage and visually examine the *rotor* and *stator* for damage. Replace any worn or damaged parts.



1. Remove the *motor bolts* securing the *motor* to the *spindle housing*. Using a suitable lifting device, lift the *motor* off of the *spindle housing* and set the *motor* down in a safe location.
2. Loosen the *coupling set screw(s)* and pry the *coupling* from the *motor shaft*.
3. Ensure that the *drive-pin* is not bent, by placing the new *coupling* over the existing *drive-pin* on the *mixer shaft*. It should slide easily over the *drive pin*. If it is a tight fit, the *drive pin* may be bent.

NOTE: If the *drive pin* is bent, replace it. In order to do this, it will be necessary to remove the Jet Mixer from the *tank*. Refer to the instructions “Replacing the Bearings” found later on in this section for guidance.

4. Install a new *coupling* on the *motor shaft*. Push the *coupling* all the way onto the *motor shaft* until the shaft bottoms out in the *coupling*. Tighten the *set screw(s)*.
5. Lift the *motor* above the *spindle housing*, align the slot in the *coupling* with the *drive pin* and gently lower the *motor* onto the *spindle housing*.
6. Grasp the *rotor* and turn it back and forth. A slight amount of rotational clearance between the *drive pin* and the *coupling* should be felt. This is an indication that the *drive pin* is properly engaged in the *coupling*. If no rotational clearance is felt lift the *motor*, reposition the *coupling*, lower the *motor* and check again until a slight amount of rotational clearance is felt.
7. Securely tighten the *bolts* holding the *motor* to the *spindle housing*.

Replacing Jet Mixer seals

To replace the *seals*, it is necessary to remove the Jet Mixer from the *tank*. The following two steps are apply to all types of Jet Mixer.

WARNING: Disconnect and lock out the power to the Jet Mixer prior to disassembly.

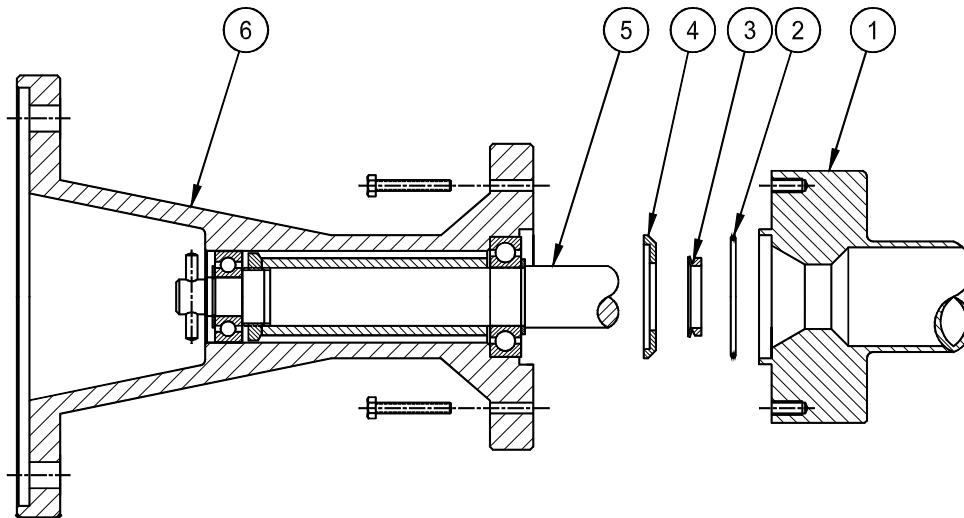
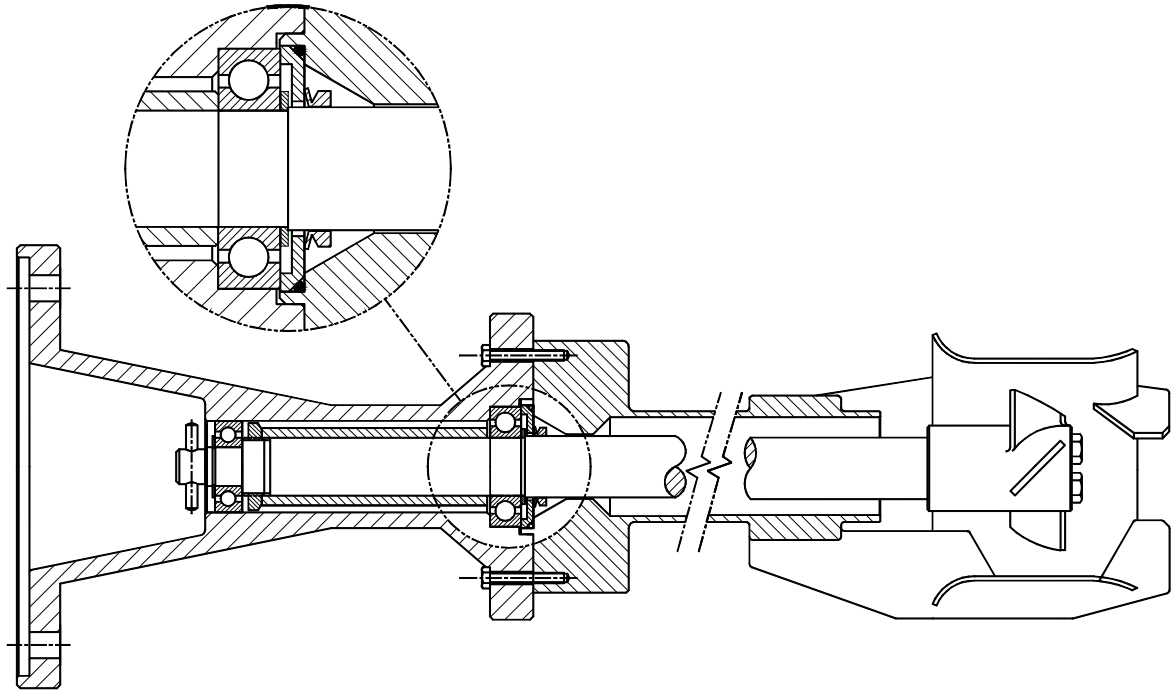
NOTE: Quadro recommends replacing the *bearings* at the same time as the *seals* are replaced.

1. If possible, remove the *motor* while the Jet Mixer is still mounted in the *tank*. This will reduce the weight of the Jet Mixer, making it easier to handle during the next step.
2. Remove the Jet Mixer from the *tank*. This is simply the reverse of the installation detailed in Section 1. Use a suitable lifting device to raise the Jet Mixer out of the tank. Lay the Jet Mixer down on a workbench and remove the *rotor*.
3. The remainder of the steps depend on the type of the Jet Mixer you have purchased. If you are unsure which type of Jet Mixer you have, refer to Section 1 of this manual. Follow the procedure that applies to your Jet Mixer (see following pages).
4. Mount the Jet Mixer back into the *tank* using the instructions in Section 1 of this manual.

Type ST , ST8 - v-ring seal

Type ST and ST8 Jet Mixers are very similar in construction. The procedure to replace the *v-ring seal* is as follows:

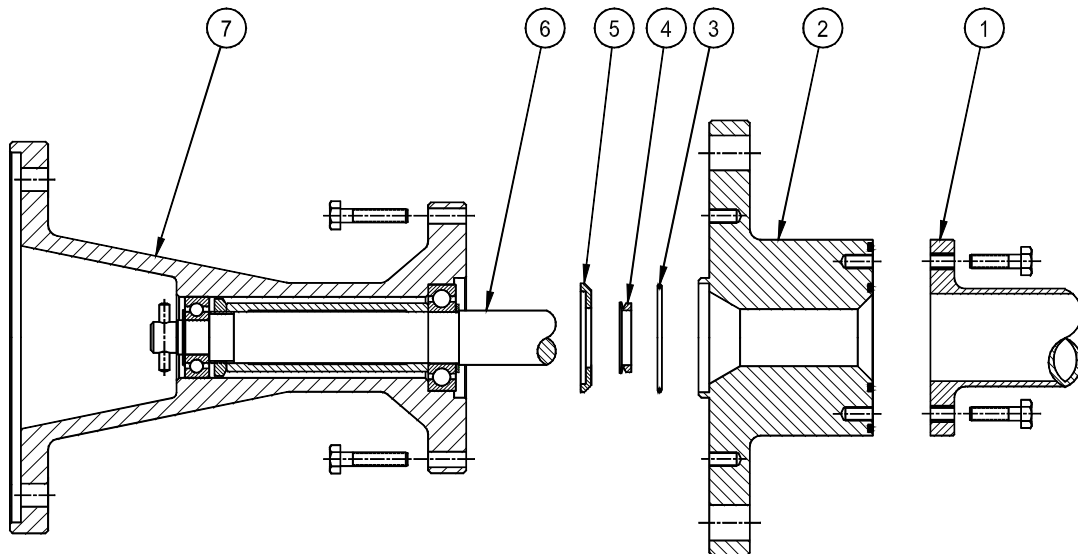
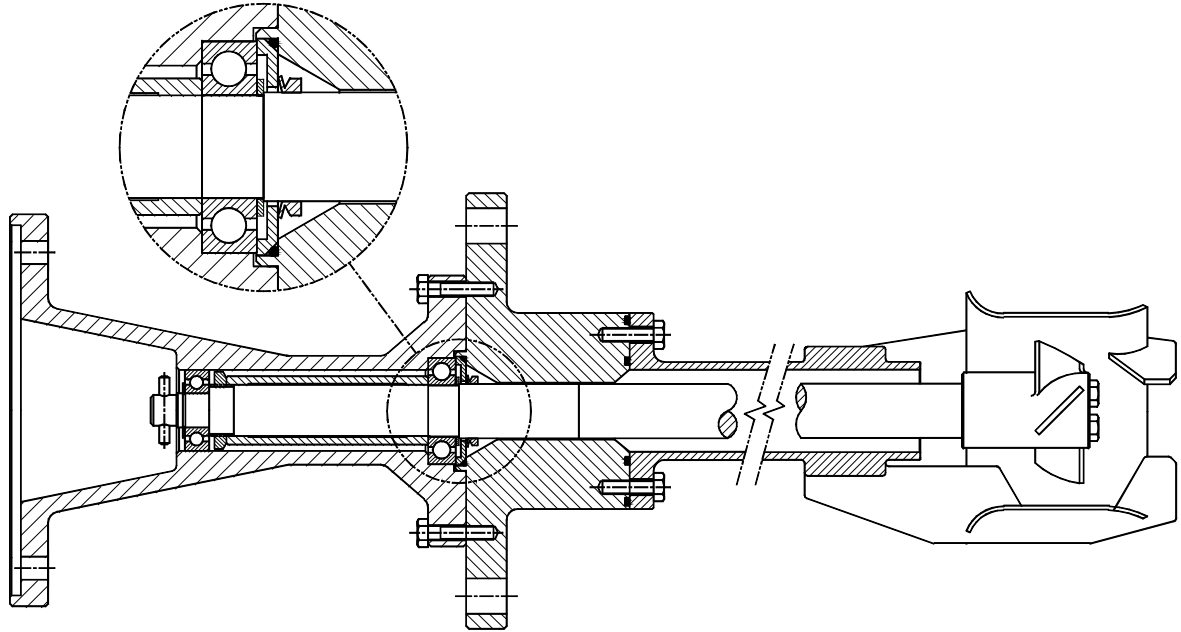
1. For type "ST8" Jet Mixers, unbolt the *stator tube/seal housing* from the *spindle housing* and carefully slide it off of the *mixer shaft*.



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- | | |
|-----------------------------|--------------------|
| 1. stator tube/seal housing | 4. seal washer |
| 2. o-ring | 5. mixer shaft |
| 3. v-ring seal | 6. spindle housing |

2. For type “ST” Jet Mixers, unbolt the *stator tube* from the *seal housing* and carefully slide it off of the *mixer shaft*. Unbolt the *seal housing* from the *spindle housing* and slide it off of the *mixer shaft*.



DWG_JET_13.dwg

1. *stator tube*
2. *seal housing*
3. *o-ring*
4. *v-ring seal*

5. *seal washer*
6. *mixer shaft*
7. *spindle housing*

CAUTION:

With the *stator tube* removed, do not lift the Jet Mixer by the end of the *mixer shaft*. This may bend the *mixer shaft*.

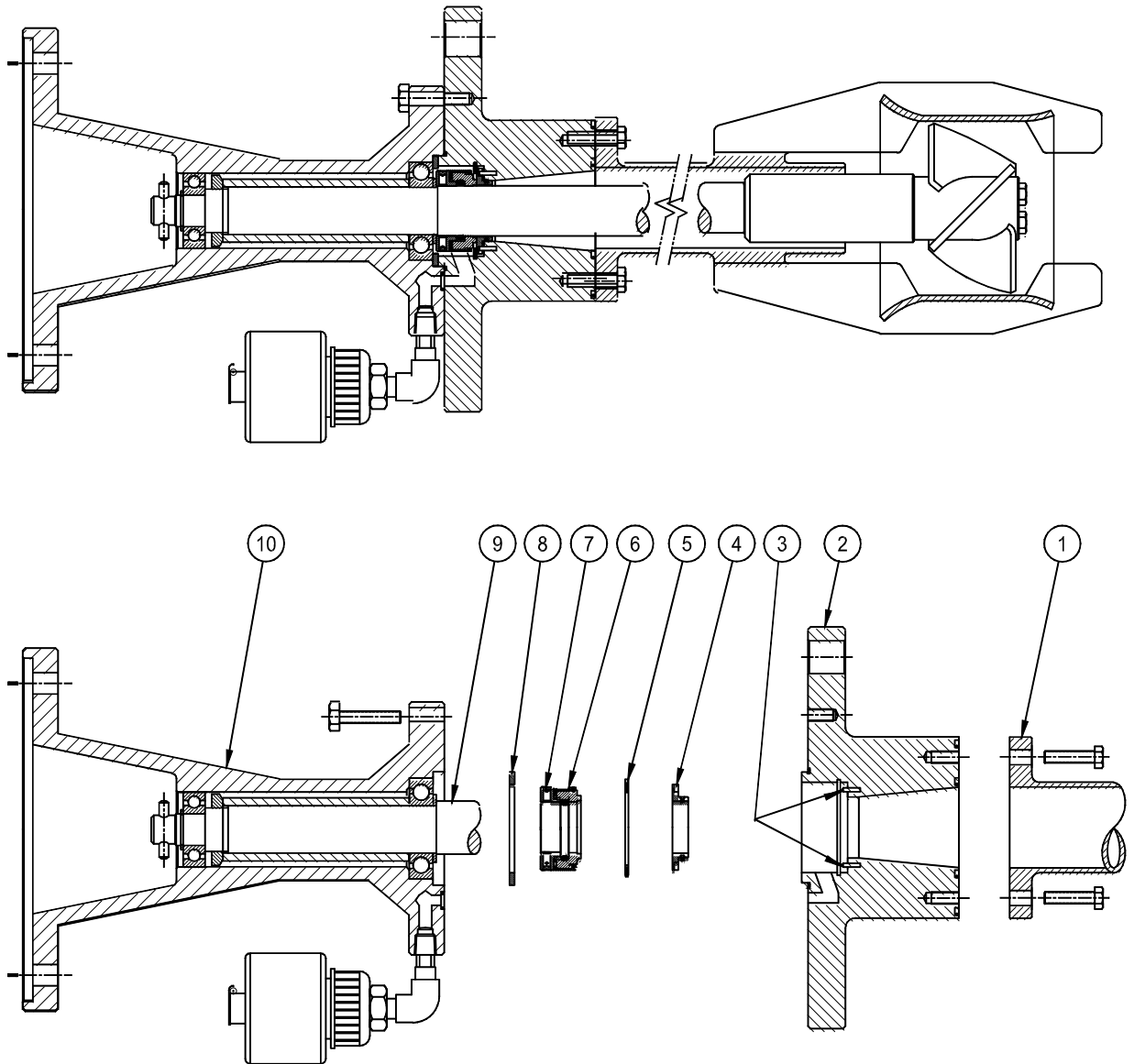
3. Thoroughly clean the *mixer shaft* and apply a light coat of DAEDOL 205 USP food grade mineral oil (Quadro part no. 108020) or equivalent to the *mixer shaft*.
4. Slide the *v-ring seal*, *o-ring* and *seal washer* off of the *mixer shaft*. Inspect the *seal washer* and replace if worn or damaged.

NOTE: It is recommended that *bearings* be replaced at this time.
Refer to “Replacing the Bearings” located in this section.

5. Slide the *seal washer* and *v-ring seal* onto the *mixer shaft*. Position the *v-ring seal* so that the lip is partially compressed (see enlarged view) against the *seal washer* to form a good seal.
6. For type “ST8” Jet Mixers, insert the *o-ring* into the bore of the *stator tube/seal housing* and carefully slide it over the *mixer shaft*. Align the *seal washer* with the bore in the *stator tube/seal housing* and bolt the *stator tube/seal housing* to the *spindle housing*.
7. For type “ST” Jet Mixers, insert the *o-ring* into the bore of the *seal housing* and slide it over the *mixer shaft*. Align the *seal washer* with the bore in the *seal housing* and bolt the *seal housing* to the *spindle housing*. Carefully slide *stator tube* over the *mixer shaft* and bolt it to the *seal housing*.

Type T - single mechanical seal

Type “T” Jet Mixers have a *single mechanical seal* for improved sealing capabilities. The *single mechanical seal* is generally used in vacuum applications or when the Jet Mixer is mounted in the side of the *tank*. The procedure to replace the *seal* is as follows:



DWG_JET_14.dwg

- | | |
|---------------------|--------------------------|
| 1. stator tube | 6. primary seal assembly |
| 2. seal housing | 7. set screw (4 places) |
| 3. spring pins | 8. spacer |
| 4. mating seal ring | 9. mixer shaft |
| 5. retaining ring | 10. spindle housing |

1. Unbolt the *stator tube* from the *seal housing* and carefully slide it off of the *mixer shaft*. Unbolt the *seal housing* from the *spindle housing* and slide it off of the *mixer shaft*.

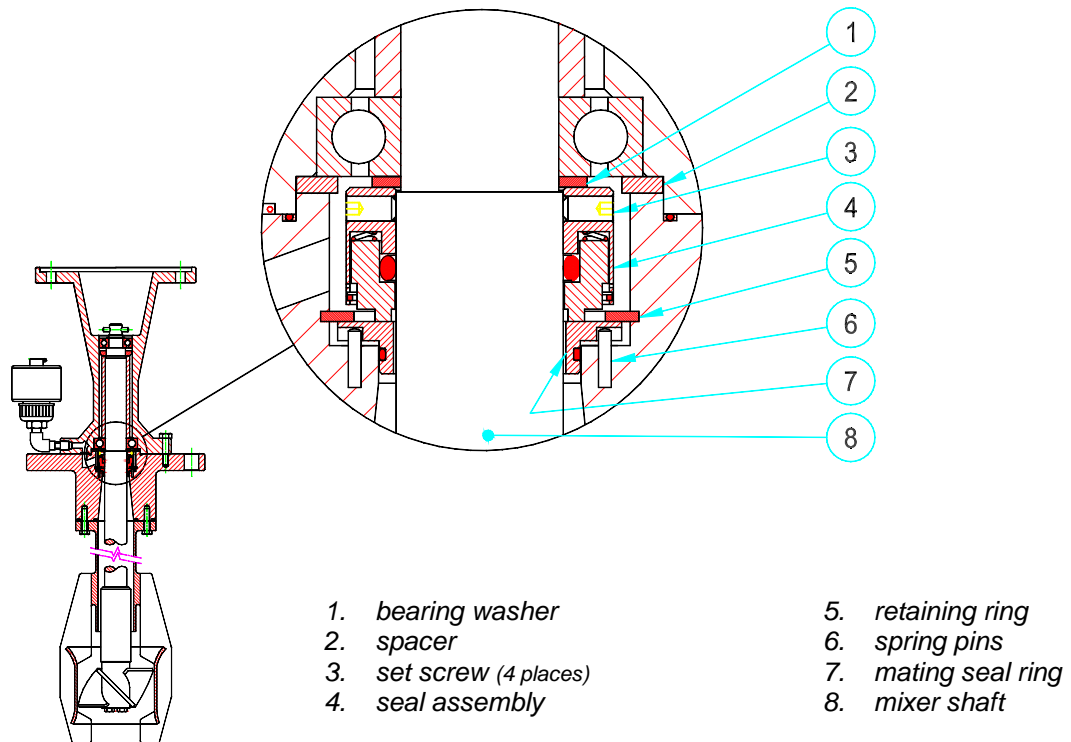
CAUTION: With the *stator tube* removed, do not lift the Jet Mixer by the end of the *mixer shaft*. This may bend the *mixer shaft*.

2. Thoroughly clean the *mixer shaft* and apply a light coat of DAEDOL 205 USP food grade mineral oil (Quadro part no. 108020) or equivalent to the *mixer shaft*.
3. Loosen the *four set screws* securing the *seal assembly* to the *mixer shaft* and slide it off of the *mixer shaft*.

NOTE: It is recommended to replace the *bearings* at this point. Refer to the “Bearing Replacement” instructions located in this section.

4. Remove the *retaining ring* holding the *mating seal ring* into the *seal housing*. Pull the *mating seal ring* from the *seal housing*.

NOTE: Ensure that the *spring pins* in the *seal housing* are in good condition and that they line up with the holes in the *mating seal ring*. If damaged, replace only with the same diameter and length pins.



DWG_JET_15.dwg

5. Push the new *mating seal* ring into the *seal housing* and install the *retaining ring*.

CAUTION:

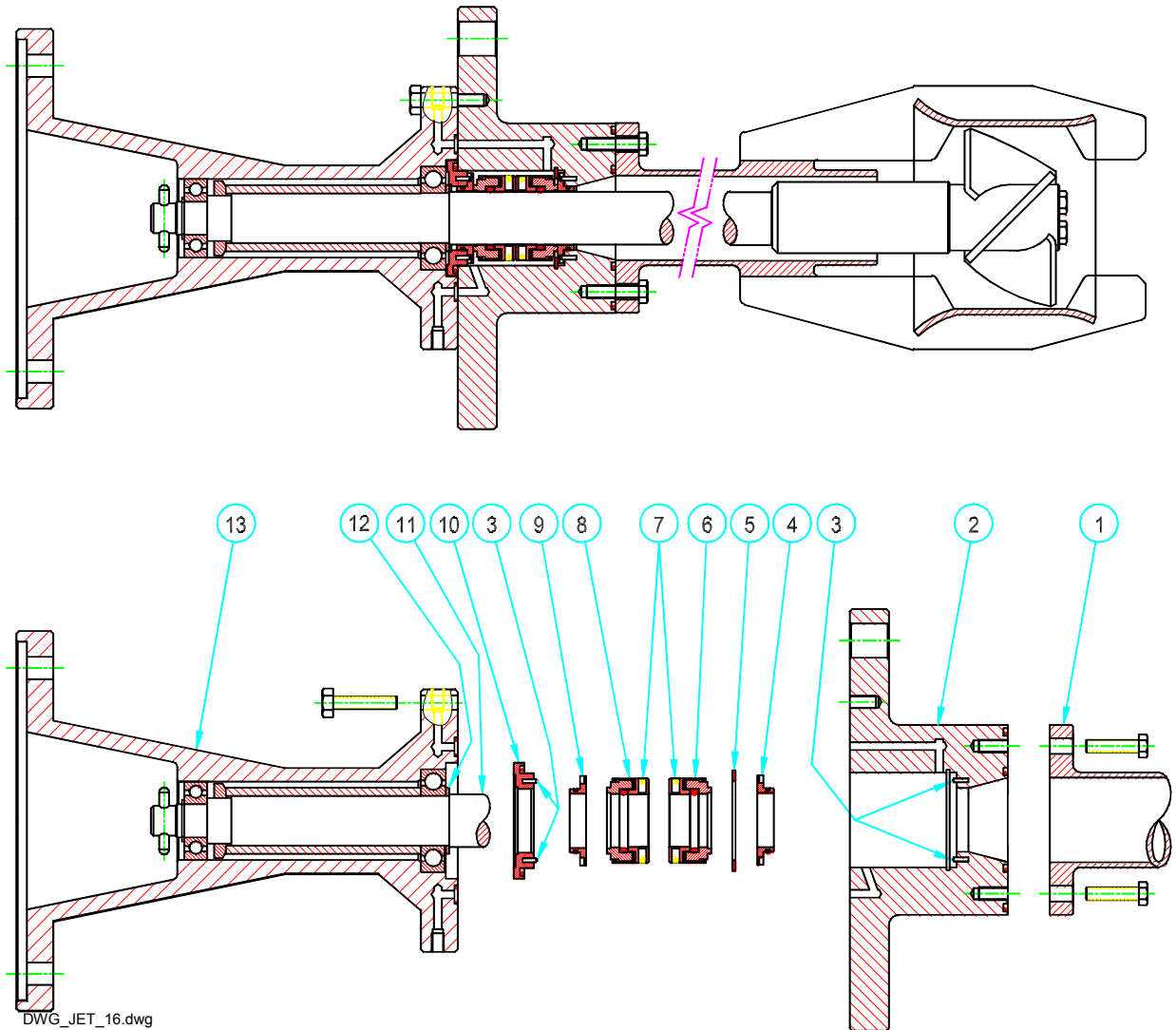
Do not touch the seal mating surfaces or set the seal face down on any surface. Even small particles of dust or lint on the seal-mating surface may cause the seal to leak. If you do touch the mating surface or get some dirt on it, gently wipe them clean using alcohol and a clean, lint free cloth. Visually examine the sealing surfaces. If no scratches are visible, flush the sealing surfaces with alcohol and allow to air dry in a clean area.

6. Peel the tape away from the new *seal assembly* and discard the three holding clips. Slide the *seal assembly* onto the *mixer shaft* until it bottoms out on the *bearing washer*. Tighten the four *set-screws* to secure the *seal assembly* to the *mixer shaft*.
7. Apply two drops of DAEDOL 205 USP food grade mineral oil (Quadro part no. 108020) or equivalent to the *mating seal ring*. Gently slide the *seal housing* over the *mixer shaft* and secure it tightly to the *spindle housing* with the four bolts.
8. Carefully slide the *stator tube* over the *mixer shaft* and secure it tightly to the *seal housing* with the four bolts.

Close Coupled Jet Mixer Design

Type TT - double mechanical seal

Type "TT" Jet Mixers have a *double mechanical seal*. *Double mechanical seals* are generally used in applications where the *tank* is pressurized or the Jet Mixer is mounted through the bottom of the *tank*. The procedure to replace the seal is as follows:



- | | |
|---------------------------|---------------------------|
| 1. stator tube | 8. upper seal assembly |
| 2. seal housing | 9. upper mating seal ring |
| 3. spring pins | 10. locating ring |
| 4. lower mating seal ring | 11. mixer shaft |
| 5. retaining ring | 12. bearing washer |
| 6. lower seal assembly | 13. spindle housing |
| 7. set screw (4 places) | |

1. Unbolt the *stator tube* from the *seal housing* and carefully slide it off of the *mixer shaft*. Unbolt the *seal housing* from the *spindle housing* and slide it off of the *mixer shaft*.

CAUTION: With the *stator tube* removed, do not lift the Jet Mixer by the end of the *mixer shaft*. This may bend the *mixer shaft*.

2. Thoroughly clean the *mixer shaft* and apply a light coat of DAEDOL 205 USP food grade mineral oil (Quadro part no. 108020) or equivalent to the *mixer shaft*.
3. Remove the *retaining ring* holding the *lower mating seal ring* into the *seal housing*. Pull the *lower mating seal ring* from the *seal housing*.

NOTE: Ensure that the *spring pins* in the *seal housing* are in good condition and that they line up with the holes in the new *lower mating seal ring*. If damaged, replace only with the same diameter and length pins.

4. Push the new *lower mating seal ring* into the *seal housing* and install the *retaining ring*.

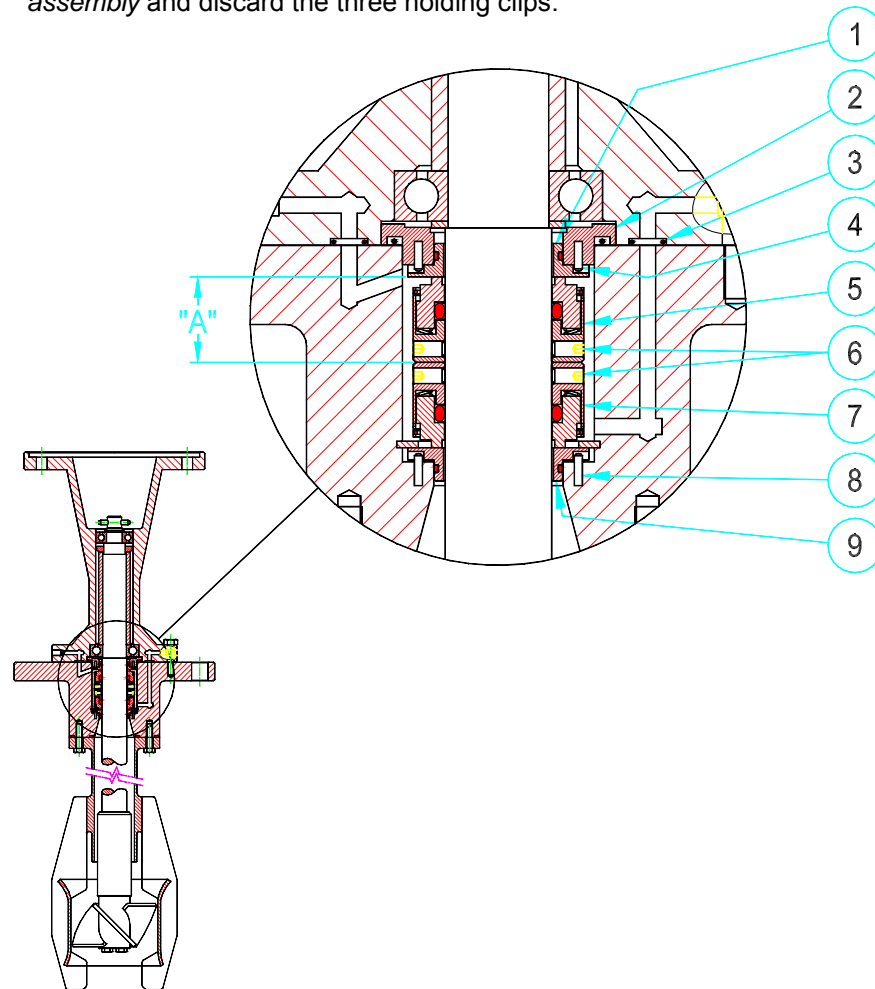
CAUTION: Do not touch the seal mating surfaces or set the seal face down on any surface. Even small particles of dust or lint on the seal-mating surface may cause the seal to leak. If you do touch the mating surface or get some dirt on it, gently wipe using alcohol and a clean, lint free cloth. Visually examine the sealing surfaces. If no scratches are visible, flush the sealing surfaces with alcohol and allow to air dry in a clean area.

5. Loosen the eight *set-screws* securing the *upper* and *lower seal assemblies* and slide both of them off of the *mixer shaft*.

NOTE: It is recommended that *bearings* be replaced at this point. Refer to “Replacing the bearings” located in this section.

6. Slide the *upper mating seal ring* and the *locating ring* off of the *mixer shaft*.
7. Insert the new *upper mating seal ring* inside the *locating ring* and slide both onto the *mixer shaft* until they bottom out on the *bearing outside race*.
8. Apply two drops of DAEDOL 205 USP food grade mineral oil (Quadro part no. 108020) or equivalent to the *mating seal surfaces*.

9. With the three holding clips still taped in place, slide a new *upper seal assembly* onto the *mixer shaft* until the seal faces contact each other. Tighten the four set-screws to secure the *upper seal assembly* to the *mixer shaft*. Peel the tape away from the *upper seal assembly* and discard the three holding clips.



DWG_JET_17.dwg

- | | |
|----------------------------------|----------------------------------|
| 1. <i>upper seal mating ring</i> | 6. <i>set screw (8 places)</i> |
| 2. <i>locating ring</i> | 7. <i>lower seal assembly</i> |
| 3. <i>o-ring (2 places)</i> | 8. <i>retaining ring</i> |
| 4. <i>spring pin (2 places)</i> | 9. <i>lower seal mating ring</i> |
| 5. <i>upper seal assembly</i> | |

NOTE:

Using a vernier caliper equipped with a depth gauge, measure dimension "A" (seal working height) shown in the above figure. Dimension "A" must be equal to $1.000 \pm .020$ " ($25.4\text{mm} \pm 0.5\text{mm}$) for Y2 & Y3 and $1.156 \pm .020$ ($29.4\text{mm} \pm .05\text{mm}$) for Y4 & Y5. If necessary, adjust the location of the *upper seal assembly* until dimension "A" is within the above tolerance.

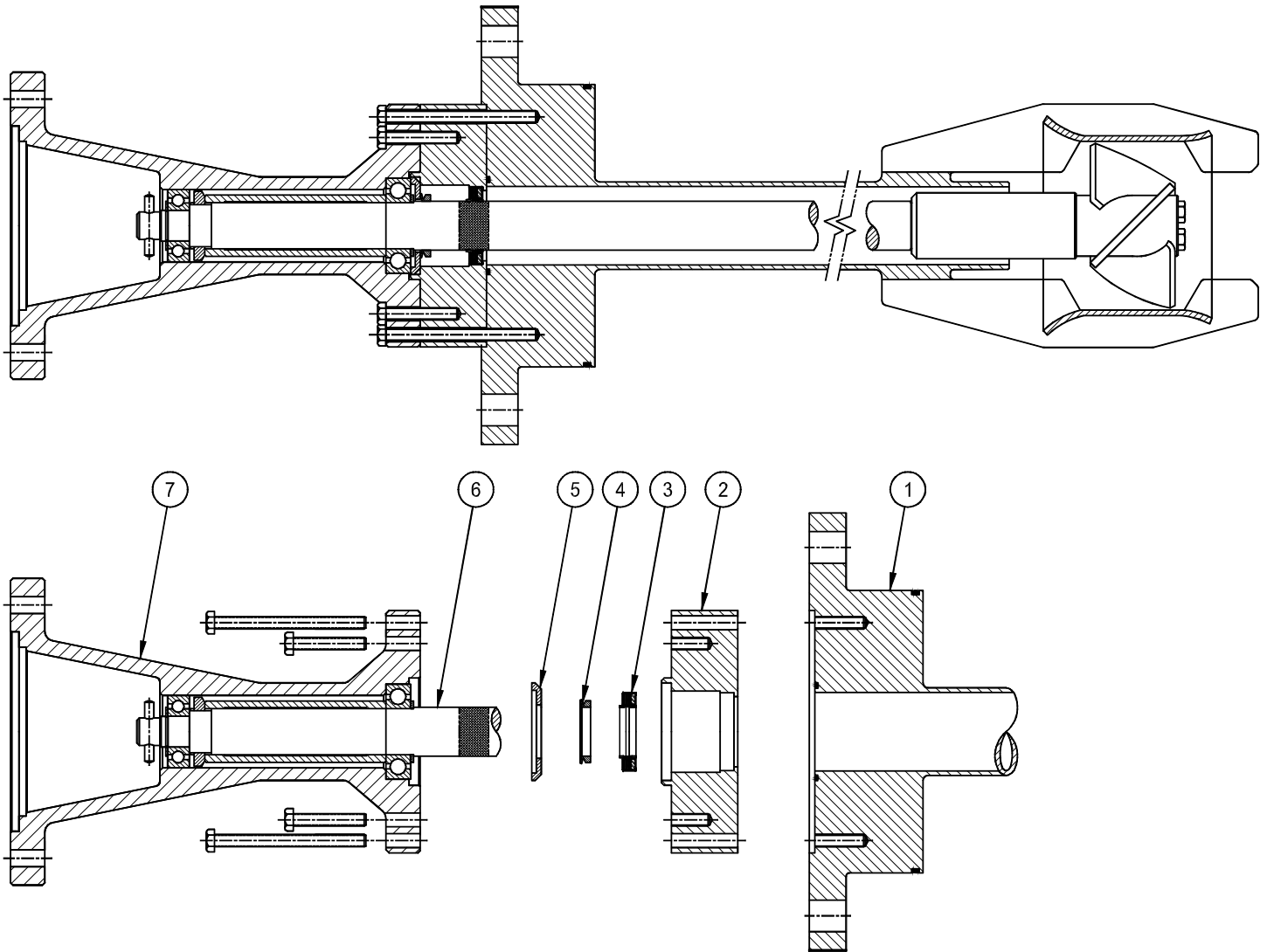
10. Refer to the previous figure the correct orientation of the *lower seal assembly*. Peel the tape away from the *lower seal assembly* and discard the three holding clips. Slide the *lower seal assembly* onto the *mixer shaft* until its casing bottoms out against the casing of the *upper seal assembly*. Tighten the *four set-screws* to secure the *lower seal assembly* to the *mixer shaft*.

NOTE: **Ensure that the two small o-rings in the spindle housing which seal the lubrication ports for the double mechanical seal are in place prior to proceeding with the next step.**

11. Apply two drops of DAEDOL 205 USP food grade mineral oil (Quadro part no. 108020) or equivalent to the seal mating surfaces. Gently slide the *seal housing* over the *mixer shaft* and secure it tightly to the *spindle housing* with the four bolts.
12. Carefully slide the *stator tube* over the *mixer shaft* and secure it tightly to the *seal housing* with the four bolts.

Type VL - Varilip seal

Type VL Jet Mixers use a *Varilip seal* in combination with a *v-ring seal*. The *Varilip seal* is generally used in applications where good sealing is required, but the user does not want to use mechanical seals due to the risk of getting cooling oil or water into their product. The procedure to replace the seal is as follows:



DWG_JET_18.dwg

1. stator tube
2. seal housing
3. varilip seal
4. v-ring

5. seal washer
6. mixer shaft
7. spindle housing

1. Unbolt the *stator tube* from the *seal housing* and carefully slide it off of the *mixer shaft*. Unbolt the *seal housing* from the *spindle housing* and slide it off of the *mixer shaft*.

CAUTION: **With the *stator tube* removed, do not lift the Jet Mixer by the end of the *mixer shaft*. This may bend the *mixer shaft*.**

2. Thoroughly clean the *mixer shaft* and apply a light coat of DAEDOL 205 USP food grade mineral oil (Quadro part no. 108020) or equivalent to the *mixer shaft*.
3. Slide the *v-ring seal*, *o-ring* and *seal washer* off of the *mixer shaft*. Inspect the *seal washer* and replace if worn or damaged.

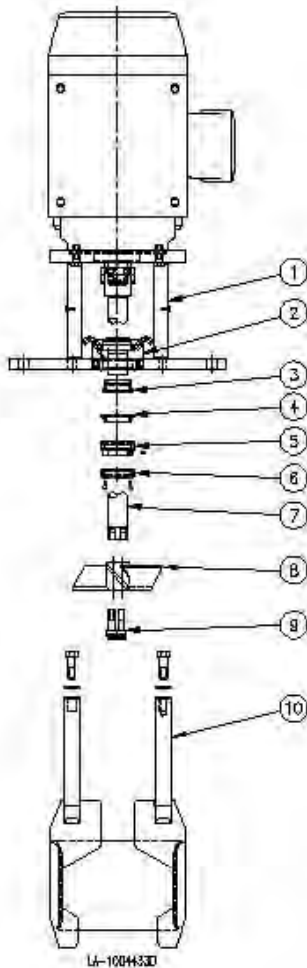
NOTE: **It is recommended to replace the *bearings* at this point. Refer to the “Bearing Replacement” instructions located in this section.**

4. Slide the *seal washer* and new *v-ring seal* onto the *mixer shaft*. Position the *v-ring seal* so that the lip is partially compressed against the *seal washer* to form a good seal.
5. Press the *Varilip seal* out of the *seal housing*. Press the new *Varilip seal* into the *seal housing*.

CAUTION: **The *Varilip seal* has one forward and one backward facing lip. Be very careful when sliding it onto the *mixer shaft* to ensure that the lips do not catch on anything.**

6. Slide the *seal housing* over the *mixer shaft*. Align the *seal washer* with the bore in the *seal housing* and bolt the *seal housing* to the *spindle housing*. Carefully slide *stator tube* over the *mixer shaft* and bolt it to the *seal housing*.

Close Coupled-Mechanical Seal



1	mounting flange
2	Mechanical seal stationary body
3	Stationary seal face
4	Rotating seal face
5	Rotating seal holder
6	Rotating seal holder cover
7	Shaft
8	Rotor
9	Rotor bolts
10	Tri-rod stator assy

Disassembly

1. Unbolt the Tri-rod Stator Assembly (10) from the Mounting Flange (1) taking care not to lose the sealing o-rings at the top of the rods.
2. Remove the rotor bolts (9) from the shaft (7) and remove the rotor (8) from the shaft (7).
3. Unbolt the Rotating Seal Holder Cover (6) and slide off the shaft (7).
4. Loosen the set screws on the side of the Rotating Seal Holder (5) and slide off the shaft (7).
5. Remove and replace the Rotating Seal Holder (5) and Rotating Seal Face (4) (both are a complete unit).
6. At this stage, you can slide the Stationary Seal Face (3) off the shaft. You will not have to remove the Stationary Seal body (2) to do this.
7. If the Stationary Seal Body (2) is to be replaced, then the motor and shaft (7) will need to be removed from the mounting flange (1). Unhook the seal cooling fluid tubes, unbolt the Mechanical Seal Stationary Body (2) from the Mounting Flange (1).

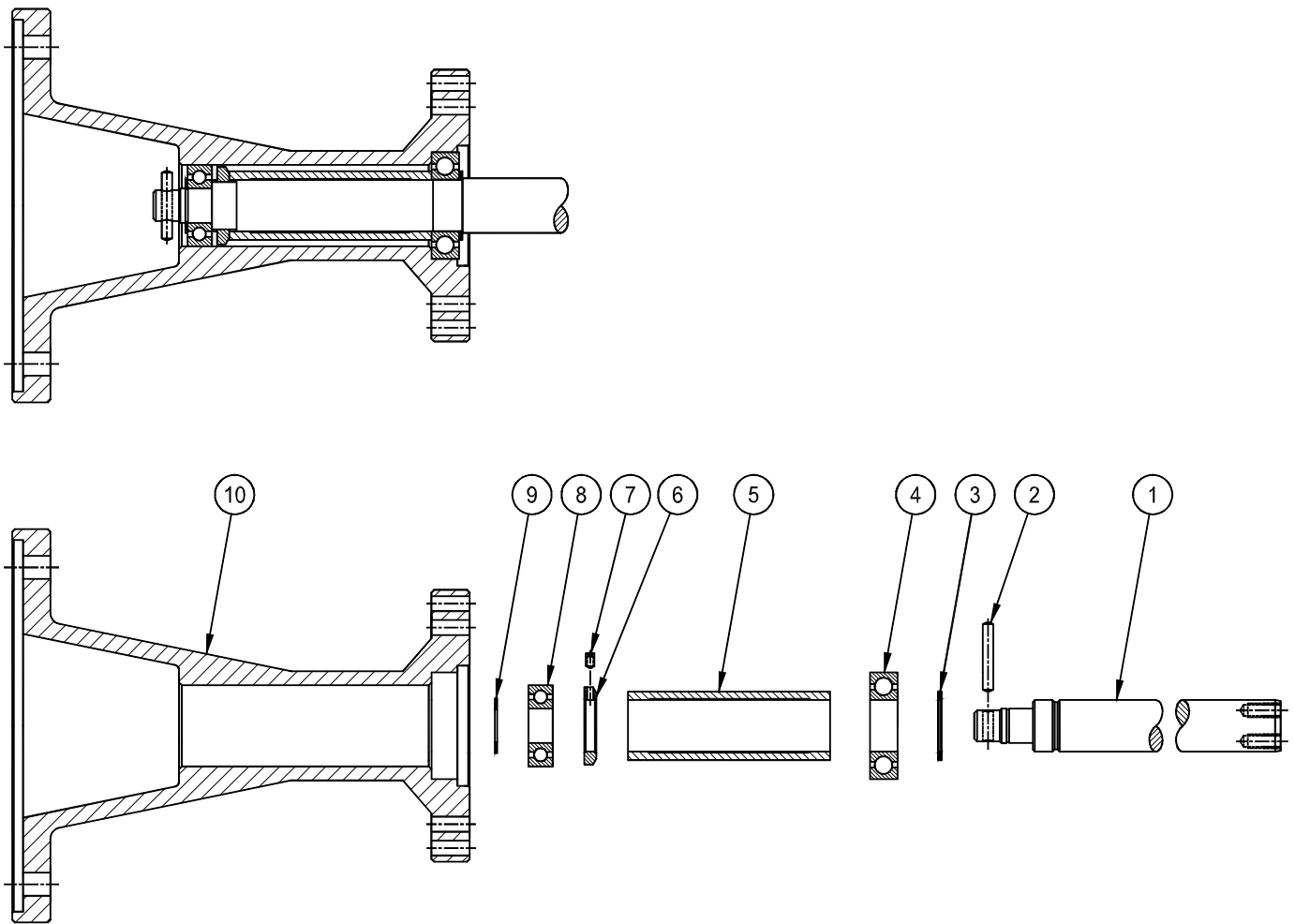
Reassembly

1. Reassembly is a simple matter of following the steps in reverse with the exception of maintaining the 1.000" spacing of the Rotating Seal Holder (5) to the Mounting Flange. See the General Assembly drawing for this detail.

Replacing the bearings

It is recommended to replace the *bearings* at the same time as the *seals* are replaced. Prior to replacing the *bearings*, one must remove the Jet Mixer from the *tank* and remove the *seal housing*. Refer to the section “Replacing the Jet Mixer Seals” for these instructions.

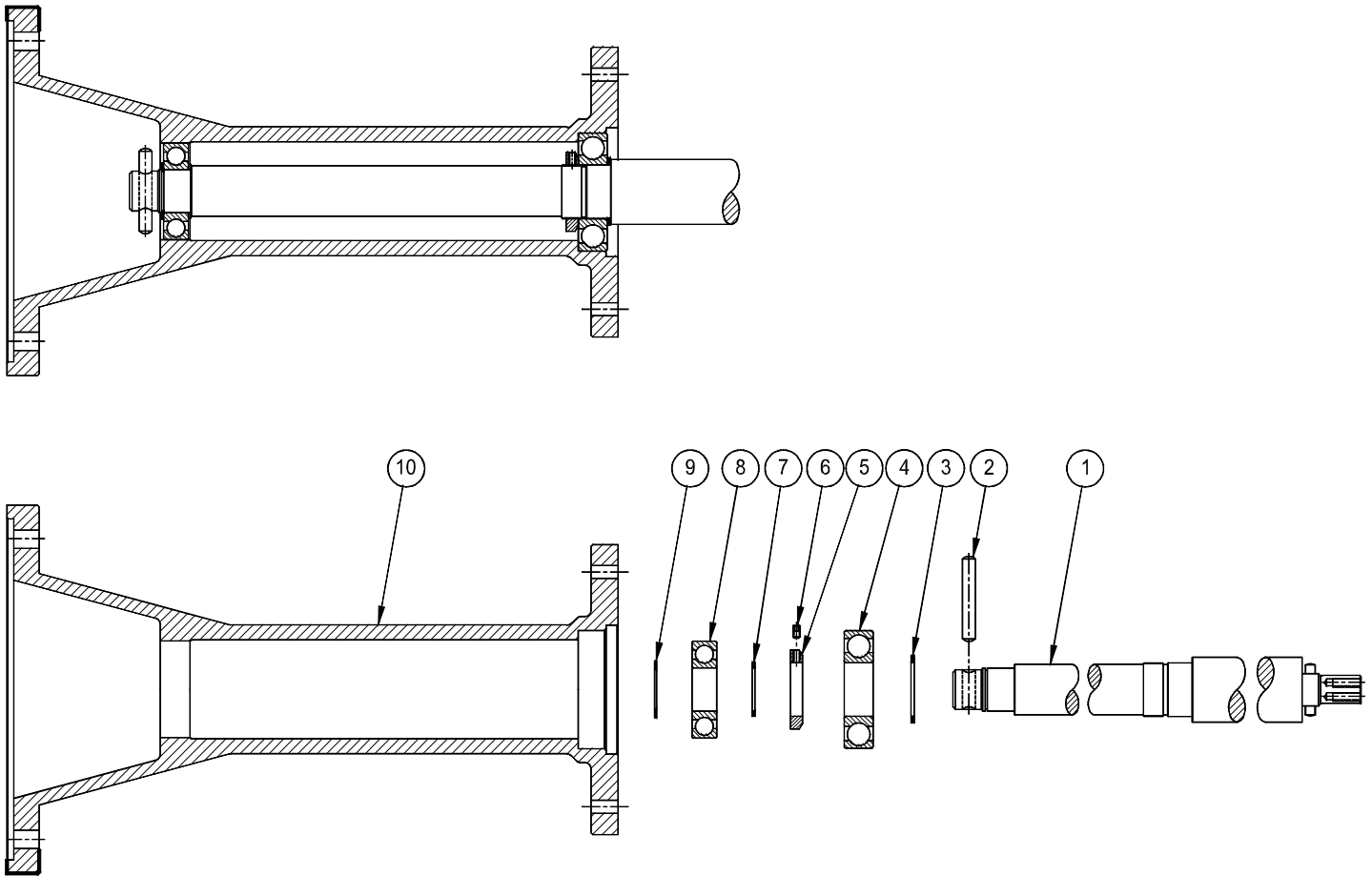
Disassembly



DWG_JET_19.dwg

MODELS Y0, Y2, Y3, Y4

- | | |
|-------------------------|---------------------|
| 1. mixer shaft | 6. lock nut |
| 2. coupling drive pin | 7. set screw |
| 3. lower bearing washer | 8. upper bearing |
| 4. lower bearing | 9. retaining ring |
| 5. bearing sleeve | 10. spindle housing |



DWG_JET_20.dwg

MODEL Y5 ONLY

- | | |
|-------------------------|-------------------------|
| 1. mixer shaft | 6. set screw |
| 2. drive pin | 7. upper bearing washer |
| 3. lower bearing washer | 8. upper bearing |
| 4. lower bearing | 9. retaining ring |
| 5. lock nut | 10. spindle housing |

- Using a soft metal bar (ie. brass or aluminium), drive the *mixer shaft* assembly, complete with bearings out of the *spindle housing*.

CAUTION:

Support the *mixer shaft* assembly during this step to prevent it from dropping.

- Punch the *drive pin* out of the *mixer shaft*.
- Remove the *retaining ring* from the *upper bearing*.
- Pull the *upper bearing* off the *mixer shaft*. Remove the *upper bearing washer* (on model Y5 only).

5. Loosen the *set-screw* in the *locknut* and remove the *locknut*. Remove the *bearing sleeve* (all models except Y5).
6. Drive the *lower bearing* off of the *mixer shaft*. Remove the *lower bearing washer*.

Assembly

1. Clean all parts prior to assembly. Inspect the *mixer shaft* and *spindle housing*. Replace the bearings and other worn or damaged parts.
2. Apply a light coat of DAEDOL 205 USP food grade mineral oil (Quadro part no. 108020) or equivalent to the *mixer shaft* and *bearing* seats.
3. Slide the *lower bearing washer* into place.
4. Slide the *lower bearing* onto the *mixer shaft*. Use a tube or pipe to press the inner race of the bearing onto the *mixer shaft*.

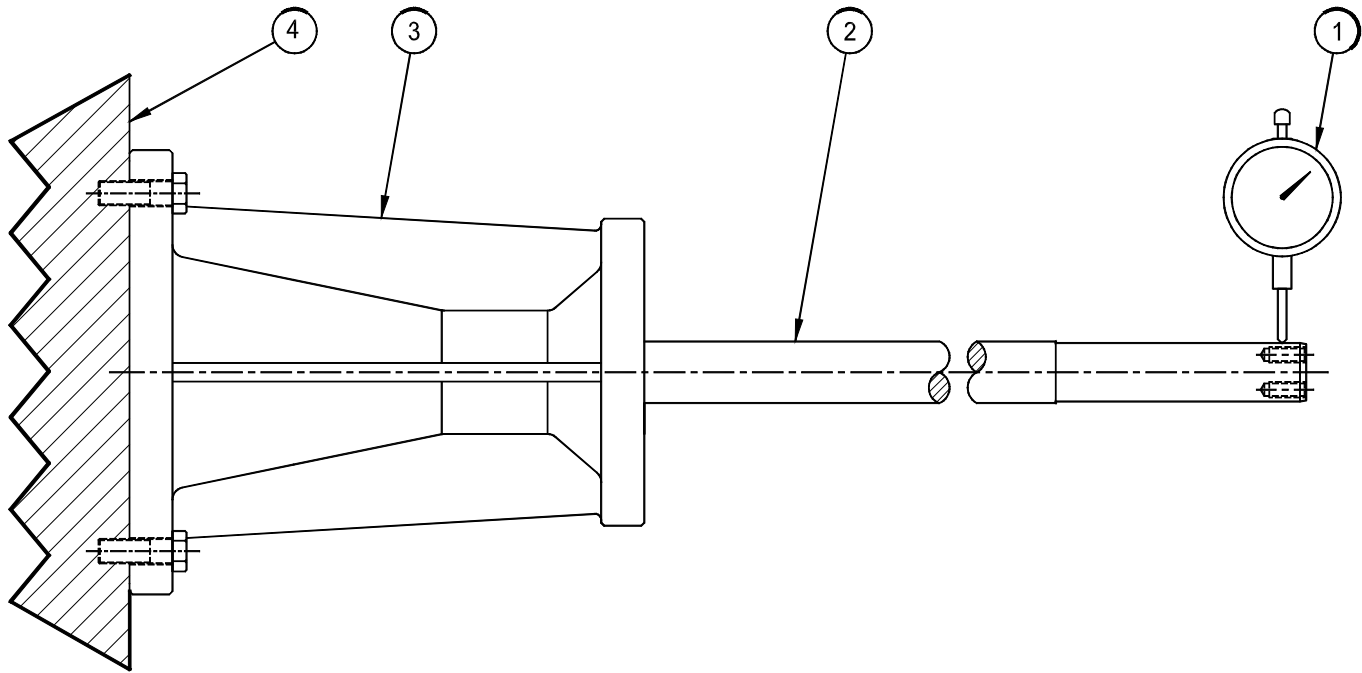
CAUTION: Do not press on the outer race of the *bearing* as this may damage the *bearing*.

5. Slide the *shaft sleeve* (all models except Y5) onto the *mixer shaft*.
6. Thread the *lock nut* onto the *mixer shaft* and tighten it. Tighten the *set screw*.
7. Slide the *upper bearing washer* onto the *mixer shaft* (on model Y5 only).
8. Slide the *upper bearing* onto the *mixer shaft*. Use a tube or pipe to press the inner race of the *bearing* onto the *mixer shaft*.

CAUTION: Do not press on the outer race of the *bearing* as this may damage the *bearing*.

9. Install the *retaining ring*.
10. Press the *drive pin* into the *mixer shaft*. Position the pin so that it is centered on the shaft.
11. Using a plastic hammer, gently drive the shaft assembly into the *spindle housing*. Turn the *mixer shaft* frequently by hand while tapping the *rotor* end of the *mixer shaft* with a plastic hammer.

12. During assembly the *mixer shaft* may become slightly bent or out of alignment. To check this, bolt the *spindle housing* to a *rigid wall or building column*. Place a *dial indicator* against the *rotor end* of the *mixer shaft* and measure the runout. If the total indicator runout exceeds .012" (0.3mm) at the *rotor end*, the shaft must be straightened. This is done by finding the high side of the *mixer shaft* and applying a downward pressure by hand, to deflect the shaft until the runout is less than .012" (0.3mm).



DWG_JET_21.dwg

1. dial indicator
2. mixer shaft

3. spindle housing
4. rigid wall or building column

Preventive maintenance of the Jet Mixer

The Jet Mixer is designed to provide many years of trouble-free service. Periodic replacement of components is not generally required, however, some items should be inspected on a regular basis to determine their condition and replace them only if necessary.

General preventive maintenance includes the following:

1. Listen for any unusual increase in noise.
2. Monitor the hours of operation and replace parts as per the “Preventative maintenance guideline” which follows.
3. Keep a recommended spare parts kit for each mixer or set of mixers. In the case where several mixers of the same shaft length are in service, keep a spare spindle assembly with shaft and bearings for easier preventive maintenance and for fast changes in case of unscheduled maintenance.
4. Return any parts that have failed prematurely to Quadro Engineering Corp. for evaluation.

Specific preventive maintenance inspection procedures are outlined in the following table. Due to the customized nature of the Jet Mixer, some items may not be applicable to your Jet Mixer.

NOTE:

Due to the wide variety of applications and the number of hours the machine is run daily, it may be necessary to fine-tune the inspection frequency. Quadro recommends adopting the following guidelines as a starting point.

Some of the following procedures require the Jet Mixer to be partially disassembled.

WARNING:

Disconnect machine and lock out power before opening, inspecting, adjusting, cleaning, servicing and changing parts.

WARNING:

Only qualified maintenance persons who have a good understanding of safe machine working practice should disassemble the Jet Mixer for inspection. Following inspection, Jet Mixer must be properly re-assembled.

Preventive maintenance guideline

Weekly		
Item	Inspection Procedure	Corrective Action
1. Oil level in oil cup reservoir or thermo-cooling reservoir (applicable to type "T or "TT" Jet Mixers)	Visually examine for a noticeable drop in level.	If noticeable drop occurs: < Replace any leaking tubes to the thermo-cooling reservoir. < Tighten all tube connections. < Replace mechanical seal(s).
2. Varilip seal (applicable to type "VL" Jet Mixers)	Shine a light in the inspection port of the seal housing and visually examine the seal for excessive wear or leakage of product past the seal.	Replace the seal if excessive wear or leakage is detected.
3. Powder valve (applicable to Jet Mixers equipped with a powder valve and powder by-pass tube)	Manually open and close the powder valve several times and feel for looseness.	If valve feels loose, replace the valve seals.

Every 200 hours of operation		
Item	Inspection Procedure	Corrective Action
1. Spindle assembly	While the Jet Mixer is running, listen for any squealing or rubbing noises originating from the spindle assembly or the mechanical seals.	If squealing or rubbing noises are heard, replace all bearings and seals. Check the condition of the spindle shaft at the location of the bearings. If the shaft is damaged, replace it.
2. Shaft Spacer	When the Jet Mixer is stopped and locked out, inspect the condition of the shaft spacer. Look for wear, cracks, or damage.	Replace if excessive wear, damage or material condition is compromised. Ensure working conditions are within the limits of HYDEX (221°F, Ph outside of 2.0 – 9.0 Range).

Every 500 hours of operation		
Item	Inspection Procedure	Corrective Action
1. Electrical cables and cable glands	Visually inspect all electrical cables for kinks or damage. Ensure that cable glands are tight.	Replace any kinked or damaged cables. Tighten loose cable glands.
2. Thermo-cooling reservoir tubing/hoses and fittings (applicable to type "TT" Jet Mixers)	Visually inspect all tubing/hoses for damage. Ensure that compression fittings are tight.	Replace any kinked or damaged tubing/hoses. Tighten loose compression fittings.
3. All Fasteners including rotor bolt(s) and stator bolts (on units with a bolted stator)	Inspect all fasteners.	Tighten all loose fasteners.
4. Rotor and stator	Inspect the rotor for evidence of rubbing against the inside walls of the stator.	Replace the rotor if damaged.
	Inspect the stator and stator welds for metal fatigue cracks.	Repair or replace the stator if damaged or if the welds are cracked.
5. Powder valve seals (applicable to Jet Mixers equipped with a powder valve and a powder by-pass tube)	Remove the powder hopper and close the powder valve. Fill the tank with water and turn on the Jet Mixer. Place a hand over the powder valve and feel for vacuum.	If vacuum is felt, replace the valve seals.
6. Gasket between powder valve and by-pass tube (applicable to Jet Mixers equipped with a powder valve and a powder by-pass tube)	Visually inspect the gasket for wear or damage.	Replace the gasket if worn or damaged.

Every 3000 hours of operation		
Item	Inspection Procedure	Corrective Action
1. Mechanical seals (applicable to type "T or "TT" Jet Mixers)	Visually examine the area between the spindle housing and the seal housing for oil or lubricant leakage. Drop the stator tube and visually examine the mixer shaft for oil or lubricant leakage.	Replace the mechanical seal(s) if oil or lubricant leakage is detected.
2. Seal lubricating fluid (applicable to type "T or "TT" Jet Mixers)	Visually examine the oil or lubricant for discolouration or darkness.	Replace lubricant if dark or discoloured.

Every 6000 hours of operation		
Item	Inspection Procedure	Corrective Action
1. Bearings	None.	Replace the bearings.
2. V-rings (applicable to type "ST" and "ST8" Jet Mixers) and O-rings	None.	Replace v-rings and O-rings.
3. Coupling and drive pin	Visually examine the coupling for damage or wear and the drive pin for bending.	Replace if damaged or worn.

Every year		
Item	Inspection Procedure	Corrective Action
1. Non-hazardous area electrical enclosures (Note - do not perform this procedure for explosion-proof or flameproof enclosures)	This procedure must be performed by a qualified electrician. Isolate and "lock out" the electrical power to the Jet Mixer. Open the electrical enclosure. Visually examine the inside of the panel for dust, moisture or discoloured wires. Check the tightness of all electrical connections. Visually examine the enclosure door seal for damage.	If dust or moisture is found inside the electrical enclosure, remove the moisture or dust and determine the point of entry. Eliminate the point of entry (ie. apply silicone to close holes, tighten the cable glands, etc.). Determine the cause of any discoloured wires and replace them. Tighten any loose connections. Replace any suspect electrical components. If the enclosure door seal is damaged, replace it.
2. Motor	This procedure must be performed by a qualified electrician. Measure the current in each phase to the motor (only applies to 3 phase motors). Try to start the motor with the motor overloads tripped.	If the current in the phases, of the motor are unbalanced, consult an authorized motor service centre. If the motor starts with the overloads tripped, replace the entire motor overload assembly.
3. Hazardous area electrical enclosures	This procedure must be performed by a qualified electrician only when all hazards (ie. dust and/ or vapours) in the environment have been removed. Isolate and "lock out" the electrical power to the Jet Mixer. Open the electrical enclosure. Visually examine the inside of the panel for dust, moisture or discoloured wires. Check the tightness of all electrical connections. Visually examine all mating surfaces on the enclosure for damage.	Remove the moisture or dust. Determine the cause of any discoloured wires and replace them. Replace any suspect electrical components. Tighten any loose connections. Remove any burrs on the enclosure mating surfaces with emery paper. Do NOT file. If damage is extensive, replace the enclosure.

Troubleshooting the Jet Mixer

Some of the following procedures require the Quadro® Ytron™ Jet Mixer to be partially disassembled.

WARNING: Disconnect the machine and lock out power before opening, adjusting, cleaning, servicing and changing parts.

WARNING: Only qualified maintenance persons who have a good understanding of safe machine working practice should remove any guards or disassemble the Quadro® Ytron™ Jet Mixer. Following inspection, all guards must be properly mounted in place and the Quadro® Ytron™ Jet Mixer must be properly re-assembled.

Problem	Possible Cause	Corrective Action
1. Jet Mixer does not start	No power to the starter.	Ensure power at the supply. Ensure plug, cord are not damaged.
	Overloads in the starter have tripped.	With tank empty, remove motor fan cover and turn fan to ensure that the mixer shaft rotates freely. Press the reset button on the motor starter. If the motor overloads trip again, consult a qualified electrician.
	Motor has overheated causing the thermistors in the motor to 'open'.	Ensure that the motor voltage matches starter voltage. Allow the motor to cool and re-start the machine. If this problem persists, consult a qualified electrician to correct the cause of the motor overheating.
(continued on next page)		

Problem	Possible Cause	Corrective Action
2. Excessive noise, rattling or vibration	Cavitation in the rotor area due to too fast a rotor speed for the liquid level in tank.	Slow down speed of rotor. Maintain a higher liquid level in the tank.
	Incorrect rotor direction.	Ensure that the rotor rotates clockwise when viewed from above. Refer to Section 1 of the manual for details.
	Rotor is loose.	Tighten the rotor bolt(s).
	Jet Mixer is being operated in the critical speed range.	Change the speed of the rotor. Refer to Section 2 of the manual for an explanation of critical speeds.
	Tank mounting is not rigid enough.	Increase the rigidity of the mounting in the tank. Refer to Section 1 of this manual for more details.
	Location of the Jet Mixer in the tank is incorrect.	Re-locate the Jet Mixer in the tank. Refer to Section 1 for optimum location.
	Mixer shaft is bent.	Straighten mixer shaft. Refer to Section 3 for details.
	Spindle bearings are damaged or worn.	Replace bearings. Refer to Section 3 for details.
	Powder by-pass tube is rigidly mounted at the top of tank causing stain on the by-pass tube and stator.	Mount the top of the powder by-pass tube to the spindle assembly with the bracket supplied by Quadro. Ensure that there is 1/4" (6mm) clearance between the stator tube and the top of the tank. If the stator tube is sealed to the top of the tank, ensure that the seal is flexible.
	The speed of the rotor is too fast.	Slow down speed of rotor.
3. Motor starts but the liquid in tank is not moving	Rotor is not installed.	Install the rotor.
	Drive coupling is damaged.	Remove the motor and inspect the drive coupling for damage. Replace if damaged. Refer to Section 3 of the manual for details.
4. Liquid is splashing out of the tank	Motor direction is incorrect.	Consult a qualified electrician to correct the motor rotation direction.
	Liquid level in tank is too low.	Increase the level of the liquid in the tank.
5. Spindle Assembly is running hot (ie. above 65°C)	Bearings are damaged or worn.	Replace seal(s) and bearings.
(continued on next page)		

Problem	Possible Cause	Corrective Action
6. Product is foaming. Excessive air entrained in product.	Seals in the powder valve are worn.	Replace seals in powder valve.
	Gasket between powder valve and by-pass tube is damaged.	Replace the gasket.
	CIP connection is not tight.	Tighten CIP connection.
	Speed of rotor is too fast for the liquid level.	Decrease the speed of the rotor.
7. Stator welds cracked	Liquid level in tank is too low causing cavitation at rotor and fatigue cracking of stator.	Increase the level of the liquid in the tank.
8. Lubricant level in the thermo-cooling reservoir or oil cup reservoir suddenly drops	Mechanical seal(s) have failed.	Replace the mechanical seal(s). Note that the most common cause of mechanical seal failure is lack of lubrication. Ensure that the new seal is adequately lubricated. Refer to Section 1 for details.
9. Liquid is shooting up the by-pass tube	Motor direction is incorrect.	Consult a qualified electrician to correct the motor rotation direction. Refer to Section 1 of the manual for correct direction of rotation.
10. The seal housing is running hot (ie. above 65°C)	The flow of lubricant in the lines to the thermo-cooling reservoir is blocked.	Ensure that the lines to the thermo-cooling reservoir are not pinched, kinked and that they rise continuously from the mechanical seal to the thermo-cooling reservoir. Refer to Section 1 of this manual for more detail.
	Liquid in tank is hot.	Increase the flow rate through the thermo-cooling reservoir or add optional cooling coil to thermo-cooling reservoir.
(continued on next page)		

Problem	Possible Cause	Corrective Action
11. Inadequate or poor mixing in the tank	Location of the Jet Mixer in the tank is incorrect.	Re-locate the Jet Mixer in the tank. Refer to Section 1 for optimum location.
	The speed of the rotor is too slow.	Increase the speed of the rotor.
12. Powder incorporation is slow or has stopped	Clearance between the rotor and tip of the powder by-pass tube is too large.	Check to ensure that the powder by-pass tube “hook” is properly positioned on the stator. Adjust the clearance between the rotor and the tip of the powder by-pass tube to be 1/8"(3mm) - 1/4"(6mm). Refer to Section 1 for details.
	Rotor is running in reverse.	Ensure that the rotor is rotating clockwise when viewed from above the tank. If not, reverse the direction of the motor.
	Product is too viscous.	If product is too viscous, it will cause poor powder incorporation. Consult with Quadro for application assistance.
	Powder by-pass tube is plugged.	Clean the powder by-pass tube.
	The speed of the rotor is too slow.	Increase the speed of the rotor.

Section 4. - Ordering parts

How to locate part numbers

Part numbers for the Jet Mixer may be found on the:

- **Assembly Drawing** (located in Appendix A). The Assembly Drawing lists the part numbers for all of the major components used.
- **Actual Part**. Part numbers are etched onto each of the major components.

If the part number cannot be located from any of the above, contact your Quadro® Ytron™ representative with a description (and if possible, a sketch) of the part and the serial number of your machine. The format of the serial number is generally as follows:

NN-XXXXR

- | | |
|-------------|---|
| NN | The first two numbers identify the model (ie. Y0, Y2, Y3, Y4, Y5) |
| XXXX | The last four numbers are a consecutive running number (ie. 0123, 0124, etc.) |
| R | A letter “R” indicates that the equipment is or was a rental machine. |

NOTE:	The serial number is located in the title block of the Assembly Drawing (located in Appendix A), on the metal nameplate affixed to the machine, and on the cover page of this owner’s manual.
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How to order parts

When ordering replacement parts and other components, please provide the following information:

- Machine serial number (for example Y2-0123).
- Part number (for example Y2-83-10123).
- Description of part.
- Quantity of each part required.
- If made of stainless steel, the type (for example, 304 or 316).
- If gasket or o-ring, the type of elastomeric material (for example, silicone, Viton etc.).
- If mechanical seal, the type of facing material (for example, silicon carbide or carbon).

Parts may be ordered from the following:

IN CANADA:

Quadro Engineering Corp.

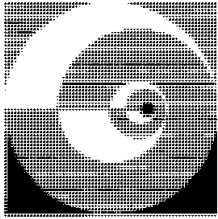
613 Colby Drive
Waterloo, Ontario CANADA
N2V 1A1
Telephone: (519) 884-9660
Fax: (519) 884-0253

OTHER:

Contact **Quadro Engineering Corp.** to obtain the name of the Quadro[®] Ytron^{IM} representative nearest you.

Appendix A - Electrical data/ assembly drawing

This section contains the Assembly drawing, Bulletin QTB-Y-Y-001, and specific information regarding the electrical components installed on the Quadro[®] Ytron[™].



Congratulations on purchasing a QUADRO® YTRON™ Jet Mixer. This Jet Mixer is specifically engineered for your process. We take pride in supplying you with the utmost in quality and performance. In order to achieve optimum performance and assure a long trouble-free life, it is important that the Jet Mixer is mounted properly.

The Jet Mixer has an axial flow component that, in conjunction with fluid dynamics, requires the following:

- Positioning of the rotor / stator relative to the sides and bottom of the tank as per Quadro Engineering Corp. approval drawings (supplied)
- The by-pass tube must be fastened in such a way that it is an integral part of the Jet Mixer. It must be free to move in unison with the mixer. Therefore, it cannot be “fixed” to the top of the tank.
- If a mounting flange on your vessel or tank is used, this flange must be “true” (flat) and should be checked after weldment and corrected if necessary.
- The mixer forces are “dynamic” in nature, and it is necessary to take this into account when calculating the thickness of the tank head or mounting bridge. The operating loads are supplied on the approval /assembly drawing.

Typical mounting configurations, for conceptual purposes only, are shown on the attached drawing SK-YTRN-10041. Please be sure to contact the Engineering Department at Quadro Engineering Corp. if you have any doubts about the mounting of the mixer.

The first and second critical speeds of the Jet Mixer shaft are accounted for in the design and the stated critical speeds to be locked out are calculated. In some situations, the natural vibrating frequency of the tank / mounting flange may be close to the excitation frequency of the rotating shaft and/or fluid forces. Therefore, if required, it is the end user’s responsibility to modify the tank and/or install a variable speed drive with the critical speeds locked out. This cannot be determined and calculated in advance by Quadro Engineering Corp.

Quadro Engineering Corp. **will not** be responsible for any tank, piping, electrical or location modifications if the **original approval drawing** tank or vessel mounting requires changes. It is important to have your tank manufacturer design a mounting for an axial flow dynamic load mixer. This will ensure efficient, trouble-free operation.

CLOSED TOP/ASME DISH

NOTES:

1) GUSSET DIMENSION:

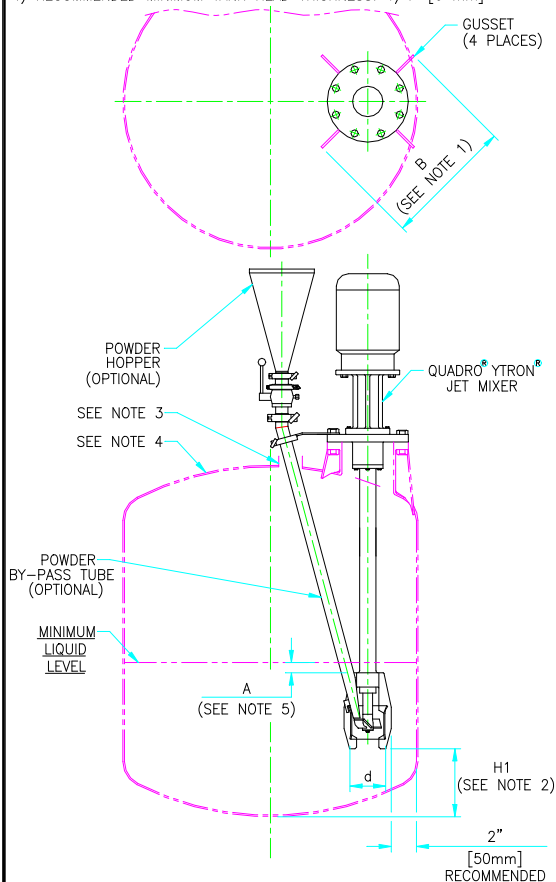
MODEL	B (GUSSET DIM.)
Y2	16" [406mm]
Y3	24" [610mm]
Y4	36" [914mm]
Y5	48" [1219mm]

2) TANK BOTTOM	H1 (MINIMUM)
FLAT	2d*
ASME DISHED	d*

* WHERE d=STATOR INSIDE DIAMETER

3) DO NOT SECURE POWDER BY-PASS TUBE TO TANK! LEAVE CLEARANCE BETWEEN POWDER BY-PASS TUBE AND TANK. SECURE TUBE WITH BRACKET PROVIDED.

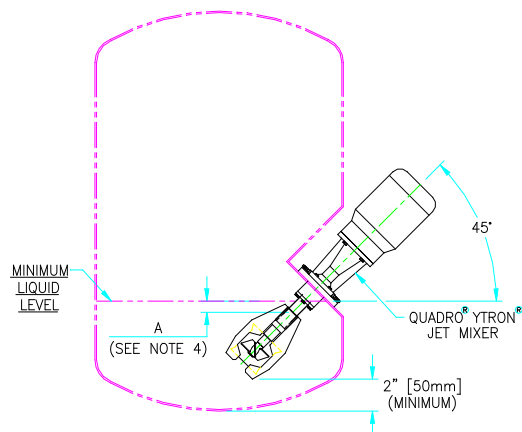
4) RECOMMENDED MINIMUM TANK HEAD THICKNESS: 1/4" [6 mm]



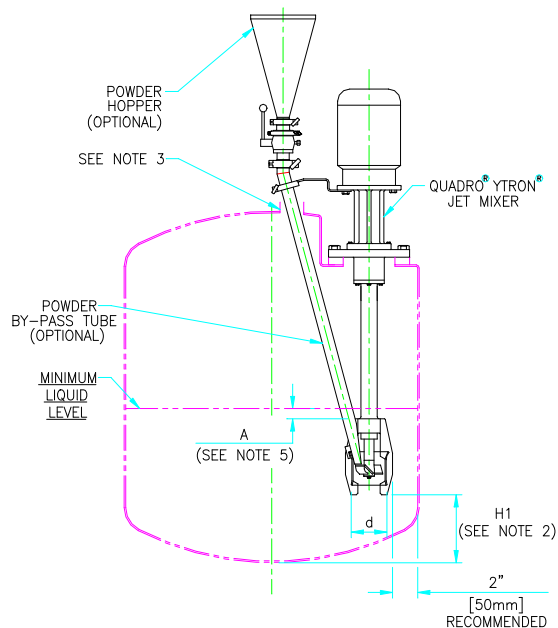
SIDE ALCOVE

NOTES (CONT'D):

5) RECOMMENDED MINIMUM LIQUID LEVEL A=2" [50mm] OR THAT WHICH PREVENTS VORTEXING AND ENTRAINMENT OF AIR INTO THE ROTOR AREA. ENTRAINMENT OF AIR WILL CAUSE VIBRATION WHICH MAY DAMAGE THE JET MIXER.



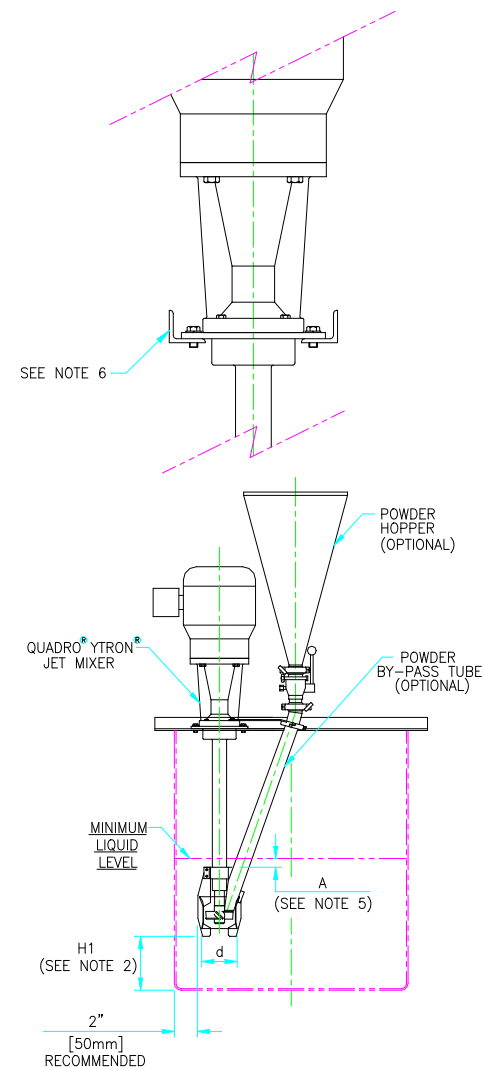
TOP ALCOVE



OPEN/FLAT TOP

NOTES (CONT'D):

6) MODEL	TANK DIAMETER	MINIMUM ANGLE IRON OR EQUIVALENT
Y2	48" [1219mm]	2" x 2" x 1/4"
Y3	60" [1524mm]	3" x 3" x 1/4"
Y4	84" [2134mm]	6" x 6" x 1/4"
Y5	108" [2743mm]	6" x 6" x 1/2"



QUADRO ENGINEERING INC
613 COLBY DRIVE, WATERLOO, ONTARIO, CANADA

TITLE:

OPTIMUM JET MIXER MOUNTING

DATE:

13 NOV 00

DRAWN BY:

TBK

SKETCH NO:

MD-SK-YTRN-10041

REV. A - 11 JUN 01 - BJW

Appendix B – Supplementary data

**This section contains specific information regarding
the specific components installed on the Quadro® Ytron™.**